Electricity reform: social and environmental challenges

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Edited by
Njeri Wamukonya

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Towards socially and environmentally accountable reform

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Njeri Wamukonya
UNEP Risø Centre, Roskilde

Foreword

By **Klaus Töpfer**
Executive Director
United Nations Environment Programme

Since the 1970s, the electricity sectors in many countries have been undergoing major transformations, with the pace of power reform generally increasing in the 1990s. The drivers of reform in developed countries have tended to differ from those of developing countries. Enhanced competition and consumer choice have dominated the reform rationale in the former, with improved financial and operational performance and increased investment capital for improving electricity service levels the main driving forces in developing countries. Growing experience with the impacts of power sector reform has, however, given rise to concerns about the ability to address environmental and social agendas through reform efforts in addition to economic and managerial ones.

The links between environment, development and electricity have been widely discussed, but strategies to implement initiatives that effectively take these linkages into account remain under-explored, and initiatives to promote environmental goals in the electricity sector are relatively isolated. Of course, the need for electricity, especially in facilitating growth in the developing countries, cannot be undermined. Evidence shows that electrification in the developed world is associated with the level of development (as measured by GDP). Predictions show that electricity consumption in the developing countries will continue to rise, with potentially serious environmental implications and an increasing urgency to consider the social dimensions of electricity supply. In achieving sustainable development objectives, it is imperative to integrate environmental and social aspects into power sector reform efforts. Such policies demand new and relevant ideas, and this volume represents an important step in this regard, in its documentation of reform experiences and exploration of possible strategies for addressing the environmental and social agenda.

Electricity reform cannot be successful without concerted effort by all the stakeholders, including government, donors, international financing agencies, and non-governmental organisations. There is a need to develop a common understanding about the constraints facing each of the stakeholders and ways to manage these in a manner that facilitates power reforms that meet social and environmental goals. Operationalising this broader agenda will require a collaborative approach among stakeholders.

The initial effort behind the publication of this volume was a collaborative initiative between the International Energy Agency and the United Nations Environment Programme. These agencies organised a so-called 'brainstorming session' on power sector reform in May 2002 in Paris, directed at improving understanding about the social and environmental implications of reform. Some of the chapters in this book have been developed from the papers presented at that meeting.

Notes on the contributors

LAWRENCE AGBEMABIESE holds a PhD from the Center for Energy and Environmental Policy at the University of Delaware, USA. He is currently employed as programme officer at the United Nations Environment Programme's Division of Technology, Industry and Economics. His activities cover energy and development policy, technology transfer and capacity building to promote small and medium energy enterprises in developing countries. He works with NGOs, developing country governments and small business operators to identify and implement innovative and sustainable models of energy service delivery targeting rural and peri-urban communities. He is also actively engaged in research activities, currently focusing on participatory approaches for integration of equity and sustainability principles into the operation of energy markets. This work is being done in collaboration with colleagues at the Center for Energy and Environmental Policy and the UNEP Collaborating Center on Energy and Environment.

DANIEL BOUILLE is Vice-President and Senior Researcher at the Institute for Energy Economics at the Bariloche Foundation in Argentina. He is also a member of the expert roster of the Global Environment Fund. He received his postgraduate degree in Energy Economics from the University of Cologne, Germany, and is an expert on energy planning, sustainable energy policies, greenhouse mitigation, and a range of other issues related to environment and development. He has published extensively on these topics, and was lead author of one of the chapters of the Third Assessment Report of the Intergovernmental Panel on Climate Change working group on stabilising greenhouse gases. He is also professor at the University of Buenos Aires, the Argentine Catholic University, the Latin American Masters Course on Economics and Energy Planning developed by Bariloche Foundation, the Centre for Energy Regulation at Buenos Aires University, and the Masters in Energy Developed by OLADE and Calgary University. He acts as advisor to the Environmental Direction at the Argentine Foreign Affairs Ministry.

TED BRADSHAW is an Associate Professor in the Human and Community Development Department at University of California, Davis, USA, where he teaches community and economic development. He received his PhD in sociology from University of California, Berkeley

(1972). Prior to joining the faculty at Davis, he was a research sociologist at the Institute of Urban and Regional Development at Berkeley. He is co-author of *Planning Local Economic Development* (Sage), and *Rural Communities in Advanced Industrial Society* (Praeger), and is the editor of the *Journal of the Community Development Society*, which publishes articles on the theory and practice of community development. He is the author of over 70 articles and reports on economic development and community development, including studies on municipal power, alternative energy technologies, and energy policy. He has studied the California electricity system through the energy crises of the 1970s and is currently collaborating with Woodrow Clark on a book on the lessons to be learned from the recent attempt at electricity deregulation in California and the options for the future.

JOHN BYRNE is Professor of Energy and Environmental Policy and Director of the Center for Energy and Environmental Policy, University of Delaware, USA. He is co-founder and co-Executive Director of the Joint Institute for a Sustainable Energy and Environmental Future, an innovative research and policy advocacy organisation headquartered in Seoul, South Korea with the mission of promoting peaceful and sustainable policy options in Asia. He is editor of the Transaction Books series on *Energy and Environmental Policy*, a contributing author to Working Group III of the United Nations-sponsored Intergovernmental Panel on Climate Change, and serves on the National Council for Science and the Environment (USA). His work has included collaborations with the World Bank, the United Nations Development Programme, the W Alton Jones Foundation, the US Department of Energy, the National Renewable Energy Laboratory, and the US Environmental Protection Agency, among others. He has published 12 books and over 100 articles on energy and environmental policy.

WOODROW W CLARK II is a 'qualitative economist' and was appointed Senior Policy Advisor for Energy Reliability in 2000, to use his extensive international and national experience in energy and environmental business, research and policy to find and implement renewable and advanced technologies to meet the Californian energy crisis. His responsibilities focused on renewable energy generation, advanced and emerging technologies, and financing of projects and programmes. He is Chairperson, Renewable Energy Generation Forum Series; Co-Chair, Stationary Fuel Cell Collaborative; Co-Chair, Intergovernmental Agency Finance Working Group; Co-Chair, Climate Change Working Group; and Co-Chair, Intermittent Renewable Resources Working Group. In

mid-2002 he was appointed Senior Policy Advisor to the Director, Governor's Office of Planning and Research for work also in environmental justice and the commercialisation of emerging technologies. Clark has three Master degrees in separate fields, and a PhD from the University of California, Berkeley. He has been the Manager of Strategic Planning for the Energy Directorate at the University of California's Lawrence Livermore National Laboratory, and has taught at the Universities of San Francisco and Aalborg. He has over 40 publications, and two books due for publication in 2003.

NAVROZ K DUBASH is a Senior Associate in the Institutions and Governance Program at the World Resources Institute (WRI). He is an Indian national with research and work experience at international policy levels as well as the local level in India. He currently co-manages a project on the social and environmental implications of changing patterns of international financial flows. Most recently, he has edited a volume on the political economy of electricity reform entitled *Power Politics: Equity and Environment in Electricity Reform*. His other work examines the environmental implications of structural adjustment lending, the Clean Development Mechanism, the impact of global investment rules on national social and environmental policies, and mechanisms for global democratic governance. Prior to joining WRI, he worked with the Environmental Defense Fund, and was international coordinator of the Climate Action Network. In addition, he has studied local institutions for management of groundwater. He holds PhD and masters degrees in energy and resources from the University of California, Berkeley, and a bachelor degree in public and international affairs from Princeton University.

ALIOUNE FALL is the Chairman of the Regulatory Commission of the Electricity Sector in Senegal. From 1995 to 2000 he served as Director of Energy, playing a key role in preparing general energy policy, and in formulating and implementing the energy sector reform – the Energy Sector Adjustment Programme – including the privatisation of the the national electricity company of Senegal, Senelec, and the liberalisation of the oil sector. Prior to that served in different positions in Senelec, as Director of the General Economic Studies Department, as Director of the Distribution Department, and as Director of General Studies, Construction and Training Department. He has published numerous papers, articles and reports and given numerous conferences speeches and lectures in the field of energy economics and regulation. Fall holds doctoral degrees from the Universities of Dijon and Lille, France.

ERIC MARTINOT currently manages the renewable energy programme of the Global Environment Facility in Washington DC. His work includes programme evaluations and research on emerging experience and lessons with markets, financing, and policies. Author of over 50 publications on renewable energy and energy efficiency in developing and transition countries, he received his PhD in energy and resources from the University of California at Berkeley in 1995. He has served as a consultant for the World Bank and United Nations, as a senior scientist for the Stockholm Environment Institute – Boston, as a convening lead author for the Intergovernmental Panel on Climate Change, and as an adjunct professor on energy and environment at the University of Maryland and Tufts University.

YU-MI MUN holds a Masters degree from the Center for Energy and Environmental Policy (CEEP), University of Delaware, USA, and a degree in sociology from the Seoul National University, South Korea. She is now a research associate at CEEP, where she is also completing a dissertation that examines the controversy over the California electricity crisis from the perspective of frame conflict analysis. Her work at CEEP has focused on sustainable energy development and the comparative analysis of electricity restructuring initiatives. She has also collaborated with the Transnational Institute based in Amsterdam, Netherlands, on its Energy Project. In South Korea, she worked as an energy campaign coordinator for the Korea Federation for Environmental Movements, which she now serves as a policy advisor.

SUDHIR CHELLA RAJAN is a senior scientist at Tellus Institute, Boston, working on environment and resource strategies. His main areas of research involve analysis of technological and policy options for alternative transport and energy futures, electricity reforms and environmental governance. He was previously Director (Operations and Asia) at the International Energy Initiative, an energy and development NGO based in Bangalore and, prior to that, a member of engineering staff at the California Air Resources Board. He is the author of *The Enigma of Automobility: Democratic Politics and Pollution Control* and has written numerous academic and popular articles on environment, politics and development. He has a doctorate in environmental science and engineering from the University of California, Los Angeles and a degree in aeronautical engineering from the Indian Institute of Technology, Bombay.

NJERI WAMUKONYA has a PhD from the Department of Environmental Science, Policy and Management, University of California, Berkeley, USA. She is currently a researcher at the UNEP Collaborating Centre on Energy and Environment, Risø, Denmark. Her work focuses on climate change, particularly the Clean Development Mechanism, and energy policy. She has a keen interest in power sector reform in developing countries, particularly issues relating to the integration of social and environmental agendas into reform. Prior to her current employment, and after working as a freelance consultant in Namibia and completing her PhD, she was a project manager at the Energy and Development Research Centre, University of Cape Town, South Africa, where she worked on renewable energy policy, analysis of energy use patterns and socio-economic impacts of electrification. She worked on monitoring and evaluation of public-private initiatives in rural electrification and managed a capacity building project for the Clean Development Mechanism in Africa.

NORBERT WOHLGEMUTH is Associate Professor in the Department of Economics at the University of Klagenfurt, Austria. Before joining the University he worked in the International Energy Agency as a member of a group preparing the Agency's World Energy Outlook publication, editions 1993 to 1996. From 1998 to 2000 he was with the UNEP Collaborating Centre on Energy and Environment where he worked on the promotion of energy-efficient technologies and low environmental impact energy resources, and the analysis of impacts of institutional energy sector restructuring. Current research areas include institutional changes in the electricity industry, renewable energy financing, the Kyoto mechanisms, and the economics of networks. Professor Wohlgemuth holds a doctorate in economics and a masters degree in applied computer science, both from the University of Vienna.

Acronyms used

This list does not include acronyms used only for a few paragraphs or pages of the book.

ADB	Asia Development Bank
CEC	California Energy Commission
CPA	California Consumer Power and Conservation Financing Authority
DOE	[United States] Department of Energy
DSM	demand-side management
EDF	Electricité de France
ESB	environmental and social benefits
EU	European Union
FERC	Federal Energy Regulatory Commission
GEF	Global Environment Facility
GW	Gigawatt
GWh	Giga watt-hours
IBRD	International Bank for Reconstruction and Development
IEA	International Energy Agency
IEA	International Energy Agency
IFC	International Finance Corporation
IMF	International Monetary Fund
IPP	independent power producer
IRP	integrated resource planning
MIF	Multilateral Investment Fund
MW	megawatt
MWh	megawatt-hours
NGO	non-governmental organisation
OECD	Organisation for Economic Cooperation and Development
OLADE	Organización Latinoaamericana de Energía
PPA	power purchase agreement
R&D	research and development
SEB	state electricity board [India]
T&D	transmission and distribution
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development

THE PROBLEM

1

Introduction

NJERI WAMUKONYA

Countries across the globe have been changing the structure of their electricity utility industries since the 1970s and the process continues to grow apace. Reform has in many cases been justified in the developing countries by the unsatisfactory performance of regulated, state-led power regimes, while in the developed countries increasing competition and consumer choice are major drivers. The overall direction entails commercialisation, privatisation, deregulation (or reregulation) and competition as key elements of the reform initiatives, often nested within broader economic restructuring.

The market-oriented framework has been dominant and is often justified on the basis that it is most efficient. In the power sector, especially in developing countries this has entailed reducing the number of employees and power losses as measures to cut down costs and make the sector attractive to the private sector. On the other hand, tariffs have gone up and are justified on the basis of cost-reflectiveness. These measures have had negative social consequences.

It is becoming increasingly evident, however, that the market too often neglects social and environmental concerns and so compromises sustainable development. In fact, governments and utilities face a range

of policy choices both in the initial reform phases and subsequently. Such choices include the type of regulation to be administered and how to address concerns relating to provision of electricity to the unserved. Most developing countries lack the power to determine their preferred policies, however, since they are dependent on donors and international financing bodies for finance, which is often conditional on adopting prescribed reforms.

Although it may be clearly more challenging to shift the ongoing reform process towards a socially and environmentally responsible path, opportunities to do so certainly exist. Experience in California serves as a model for correcting a flawed reform process. In 2000 California suffered severe power shortages which were associated with the liberalisation of the power sector. In a measure to remedy the situation, the state has taken over control of the power system. In April 2002, Ecuador announced cancellation of the sale of seven electricity distribution companies after strong resistance from local municipalities and a negative ruling by the Constitutional Tribunal, leading to withdrawal of international bidding companies. Senegal has stopped the privatisation process, and management of electricity returned to the government-owned utility after the failure to attract credible strategic partners.

Concerns voiced from various parts of the world regarding impacts of power reform call for redress. Cases that have been hailed as successes, and used to demonstrate the superiority of reform compared to previous government-owned monopolistic structures, are experiencing problems – Chile, Brazil and Argentina are glaring examples. Models marketed as ideal and 'exported' as the basis for many reform packages are coming under heavy criticisms as they are proving unreliable for meeting intended goals in the home countries; England is one such case.

It is against this background that this book project was conceived. The book documents processes, and social and environmental implications, of power reform across the globe. The contributions are partly developed from selected papers presented at a brainstorming forum organised by the International Energy Agency and the United Nations Environment Programme in Paris in May 2002, that was aimed at establishing a comprehensive understanding of how power sector reform affects environment and society. The social issues considered relate to employment, access to electricity, quality of service delivery, and general welfare. Environmental indicators relate to generation source and energy management.

The differences across regions cannot be ignored. Yet from the various contributions some notable crosscutting issues may be discerned. The level of economic advancement is not a sufficient condition for de-

signing and implementing environmentally and socially sound reform programmes. However, economic maturity and stability does undoubtedly provide a necessary cushion against reform failures. Mechanisms to address social and environmental concerns tend to be isolated from the general reform process and are generally implemented 'aside' from the process, so their impacts on the intended goals remain minimal. A regulatory framework is critical for a successful reform, where 'successful' implies 'socially and environmentally sound'. This should not, though, be taken to imply the establishment of new institutions, especially since regulatory activities are not necessarily an innovation. Rarely is the design of the reform allowed to mature and so integrate all stakeholders concerns before implementation commences. Rather, the design process is the prerogative of a few. Emerging evidence indicates that the market should be informed by social needs if sustainable development is to be achieved. Overall the role of government policy should not be undermined. A socio-political economy should be the overarching framework within which reform is designed and implemented.

What follows in this introduction are abstracts of the chapters of this book, which well illustrates the complexity of the issues. Each chapter relates a story of reform within a given socio-economic and political context, influenced by relationships across various stakeholders. Together, the contributions make a good case for paying urgent attention to the way reform is being implemented. Practical strategies on how to shift reform to a more responsible process are provided.

Power sector reform in developing countries: Mismatched agendas — Based on a 'hypothesis' of reform promises, the chapter explores the impact of reform across developing countries, and looks at the ability of reform to meet developmental challenges. A discussion on the drivers of reform is presented as a basis for the analysis. The outcomes are hence discussed in a manner that reflects reform rationales. Implications are contextualised by relating the challenges facing developing countries with reform. Using specific illustrations, the validity of the conventional performance indicators is questioned, on the basis that they do not necessarily capture the underlying social and environmental dynamics that are critical for development. The chapter notes alternative paths for reform as an acknowledgement of the possibility of revisiting and revising reform processes.

Rethinking reform in the electricity sector: Power liberalisation or energy transformation? — Drawing on experiences in the US, UK and several Asian countries, the chapter offers an analysis informed by the theoretical distinction between commodity and commons. The cur-

rent approach treats electricity as a commodity, so any malfunctioning of the system can be rectified by the 'genius of the marketplace'. Analysing the different contradictions, it is here demonstrated that the market has, however, not worked; instead, the commoditisation of electricity has resulted in chaos, and neglect of social and environmental values in favour of financial gain. The chapter advocates policy intervention and explicit recognition and appreciation of the role of policy in making 'markets work'. This would occur with a 'commons approach' framework which replaces market liberalisation – an economic space – with public discourse – a socio-political space. The applicability of this approach is illustrated by its similarity with the widely-known integrated resource planning.

Power sector reform and sustainable development in the European Union — The environmental implications of reform in Europe are examined in view of the 1999 EU Directive within a region where limiting climate change and increasing use of clean energy are considered key under the sustainable development agenda. Since the launching of the Directive, the level of market opening has increased, the degree of unbundling has risen, and there is greater clarity and transparency in regulation. The main focus of the Directive is to achieve consumer choice of operator and so, by implication, make consumers responsible for the environment. The chapter notes insufficient transmission interconnections as a major hindrance. While the Directive requires competition in generation, the reality in the market is consolidation into large companies, undermining possibilities for influencing trends. Most member states opt for a system that lets the market determine the level of capacity and choice of generator. This implies reduced opportunities for policy intervention on social and environmental grounds. While the Directive explicitly aims at increasing renewable energy share and promoting energy efficiency, there are not always direct links between these efforts and general reform. Fiscal incentives have so far been the most effective. The seemingly contradictory objectives – reliance on market power on one hand and use of sustainable energy technologies on the other hand – are, however, noted.

Power sector reform in Latin America: A retrospective analysis — Latin America took the lead among developing countries in implementing reforms, although some countries there started reforming as late as 2001. This chapter provides a summary of the reform drivers and the main characteristics in the different countries. The region has attracted major foreign companies into the power sector but many challenges remain and sustainable development is at stake. Among the challenges are

the increase in access to electricity, sporadic crises resulting in consumers going without power for extended periods, lack of coordination across different institutions, and the vagueness in awarding responsibilities to the stakeholders. The macro-economic crises that have hit many of the Latin American countries have not only had an effect on the power sector but have also exposed the extent to which the reformed system can be vulnerable – and hence the level of insecurity associated with power reform.

African power sector reforms: some emerging lessons — The chapter notes the justifications for reform in Africa and identifies some key indicators for evaluating it. These include private sector participation, competition, regulation, performance indicators and jobs. Drawing on specific country experiences it illustrates reform performance with respect to these indicators. The issues highlighted for each of the countries may not be the only ones that should be considered, but collectively they serve to demonstrate the variety of concerns that need addressing and the challenges facing the continent, particularly sub-Saharan Africa. The emerging lessons from the reform process in Africa are thus presented on the basis of expectations with respect to targeted outcomes.

The California experience: from deregulation debacle to flexible power — A sensational case that has drawn international attention, California's reform process is surprisingly young and should serve as a lesson to many of the developing countries that are at different reform stages. The chapter distils the lessons and recommends a flexible system that maximises diversification with more renewable energy sources, balance, interconnection, linkage to community and economy and public good values. A civics market instead of the free market system is advocated. Such a market would entail limited regulation and public participation that gives consumers 'real' choice. It is noteworthy that legal, political forums and investigations concluded that, although California enacted a flawed system, the crisis was caused by greedy private companies gaming the system through rules they helped write. Californian policies have shifted towards energy independence and thus decreasing reliance on out-of-state supplies. A consumer power and financing authority has been established to provide fiscal incentive for generation from clean energy, and various green building programmes targeting state facilities have been set up. Evidently policy intervention is necessary for a reliable, socially and environmentally sensitive reform.

Electricity reforms in India: Political economy and implications for social and environmental outcomes — India's experience shows that power reform is not just about efficiency in the electricity system but

rather an arena with various stakeholders with different and conflicting agendas. The role of powerful international players, including private companies, financing institutions and consultants, in shaping reform is demonstrated here. The interconnectedness between electricity and agriculture, a key economic sector, highlights the danger of neglecting the operative conditions (and hence context) in designing power reform. Little attention has been given to social and environmental agendas. As in many other countries, regulators and the electricity bill become operational after the process has started and so have had little influence on the trend. Having started down the road to reform, the prospect of a more socially and environmentally accountable reform rest on engaging more stakeholders in a broader public debate about the goals of reform and the future of a restructured sector.

Power sector reform in Senegal — Senegal's unique experience in reforming its power sector is presented. Two failed privatisation processes demonstrate the unattractiveness of small markets to the private sector. The case illustrates the inadequate attention paid to the fundamental conditions necessary for privatisation and realities in many small un-industrialised economies with a large share of the population still unconnected. After regaining control of the system, Senelec, the utility, has made laudable efforts – including borrowing from the West African banking system – to increase generation capacity. Overall, Senegal's experience clearly shows that privatisation is not necessarily the solution to the power sector's problems.

Power sector restructuring and environment: Trends, policies, and GEF experience — This chapter provides a synthesis of the core issues relating to power reform. Using specific activities for illustration, the reform patterns and their effects on the environment are discussed. The trends within the various frameworks – including competitive power markets, independent power producers, self-generation by end-users, privatisation, and unbundling – are not necessarily beneficial to the environment, and addressing environmental concerns demands directed efforts. Various institutional, legal and fiscal policies for incorporating clean energy into reform process are noted. These policies are partially informed by the concrete recommendations from a previous forum, of actions that could support integrating clean energy into power reform. Strategies to promote grid renewable energy are further elaborated using experiences and lessons from Global Environment Facility activities.

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Power sector reform in developing countries: Mismatched agendas[1]

NJERI WAMUKONYA

1. Introduction

Power sector reform is being pursued in many developing countries on the premise that a reformed system would be more efficient and effective in addressing power demand and meeting the sustainable development agenda. Such an agenda entails balancing economic, social and environmental development. Voices of dissent and discontentedness, muted in the past, are awakening – fuelled by mishaps emanating from power reforms. Recent experiences in California and Brazil have been particularly influential in elevating concern about how reforms should be undertaken, and about their impacts. This chapter endeavours to understand the implications of power sector reform on social and environmental aspects in developing countries. In analysing the reform process, the social and environmental impacts are judged against the promised reform outcomes and the needs of affected countries. The 'hypotheses' in this case are the 'reform promises or expectations'. The analysis pays particular attention to the context and local circumstances within which reform is being undertaken.

There is emerging evidence that reform has been designed to mainly address economic and, in particular, financial concerns, with insufficient consideration for social and environmental issues. Consequently, most of the evaluation undertaken has focused on financial issues. The select

[1] This is a revised version of the paper published in *Energy Policy 31 (2003): 1271-1289*

work that has evaluated beyond financial factors shows cause for concern. The 'market', which was expected to automatically deliver on the social and environmental concerns, has not performed as expected. Electricity has the ability to improve social status through facilitating provision of basic needs such as health, education, food and water. Yet many developing countries have significantly low levels of electrification, and successful reform needs to ensure universal access to electricity. The electricity industry is also a source of employment, and given that one of the major challenges facing developing countries is the ever-rising level of unemployment, reform can only be beneficial if it creates rather than eliminates jobs. The global environmental problems cannot be overstated. The Intergovernmental Panel on Climate Change has documented imminent climatic change and advocated changes in energy production and consumption patterns as a measure to curb global warming. However, to embark on a sustainable development path, developing countries will have to increase total energy consumption. Clearly this trend has environmental implications. It is thus imperative that reform in the power sector support environmental goals.

In the course of their implementation, however, power sector reforms have had some notorious repercussions, which have elevated electricity to an issue of concern at international level and driven developing countries to question the wisdom of undertaking reform. The necessity and desirability of reform is often taken for granted. As Norlander (2001) comments, 'reform has taken the appearance of inevitability, an overwhelming force that could not be resisted'. Even in the face of evidence of undesired effects of reform the process lingers on, providing a disjuncture which social scientists refer to as 'cognitive dissonance'.

The late 1970s saw the start of power sector reform in a handful of countries, but by the 1990s rampant reform activity had extended to many more. More than thirty countries have initiated reform in the power sector over the last 15 years (Besant-Jones & Tenenbaum 2001). The process involves a combination of restructuring, regulation, commercialisation, and privatisation. According to the World Bank (1994), power sector reform seeks to improve financial performance, supply-side efficiency and demand-side efficiency. Despite the obvious differences across reforming countries, the processes have generally been similar everywhere and are close to attaining 'conventional wisdom' status, as Wilson (1998) implies in her note on Russian reform, whose 'story ... would be relatively *routine*'. The uniformity of reform is further captured in Palast's (2001) lament that 'although Thatcher's private power market scheme was a poor idea that proved worse in practice, the International Monetary Fund (IMF) and World Bank adopted it as a requirement of

every single structural assistance programme worldwide'. (Proponents of the British reform insist, of course, that it has been largely beneficial.)

Reform has not been the prerogative of the power sector, which has been caught up as part of the externally driven macro-economic structural adjustment programmes which called for elimination of state-led development paradigms in favour of open and free competitive market economies.[2] These ideas took root in the latter 1990s, as a general consensus in development thinking and cooperation developed, following a relatively simple logic: (i) poverty reduction is the main objective of development; (ii) central to development is economic growth; (iii) economic growth is best achieved through the private sector; (iv) government has a role to play in making the private sector flourish and ensuring that growth contributes to poverty reduction (Schulpen & Gibbon 2002). To facilitate the transition, donors and multilateral agencies provide not only reform-targeted loans but blueprints for the process as well.[3] These agencies have been architects of the reforms (Lefevre & Todoc 2000), with many countries obliged to take on technical assistance as part of the loan package. Technical studies aimed at convincing policy-makers on the need and type of reform are often undertaken and funded by the financing institutions, in most cases using external experts.

Power sector reform is challenging the decades-old power structure in which governments monopolised electricity generation, transmission and distribution. A shift in ownership and control of energy assets and services from public to private sector has been a key focus of reform. In the 1990-99 period, 76 developing countries introduced private participation in energy, including electrification, natural gas transmission and distribution. 733 projects were awarded, representing total investment of almost $187 billion. Of these projects, 36 are in Africa. Latin America and East Asia lead in the growth and share of private investment in energy. The bulk of the investment in the power sector has been in divestures and greenfield projects (44.8% and 51.3% respectively); the balance has been on operations and management contracts (Izaguirre 2000).

This chapter is structured so as to reflect the analytical framework adopted. The following section presents the various factors driving reform as a background which highlights the legitimacy of the need for

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[2] Between 1980 and 1990 the World Bank increased the number of its structural adjustment programme loans from seven to 187, in 60 developing countries (UNIDO 2000).

[3] For example, the power reform initiatives in Kenya were derived from an IDA-funded project document (Karekezi & Mutiso 2000).

reform. Outcomes are then discussed, based on reform promises which include private sector participation, job creation and increased competition. Developing countries face special challenges relating to electricity, and the ability of a reformed sector to meet these challenges is questioned in the subsequent section, through examples drawn from realities experienced by reforming countries. Alternative proposals on how to reform are then presented before drawing some conclusions. The chapter is not exhaustive and it does not address the issues as comprehensively as warranted by the gravity of the matter; it highlights, however, concerns about power sector reform that deserve urgent attention, and so aims to help trigger open debate and a shift in approach towards a socially and economically accountable power system.

2. The drivers of reform

Reform has been driven by a variety of factors whose level of importance differs across countries. In the East Asian cases, as well as in a few Latin American countries such as Guatemala and Colombia, initial reforms were largely a response to the government's inability to meet a surging electricity demand, prompting them to allow independent power producers (IPPs) to operate (Andersen et al 2001; Lefevre & Todoc 2000; Hoskote 1995). Problems with IPPs, partly caused by an inadequate regulatory framework as well as the macro-economic crisis which has made access to capital finance difficult, are, however, forcing East Asian countries to undertake further reform along the conventional lines of unbundling and regulation. Huge financial deficits in the power sector emanating from defaults on international loans were important drivers of reform in Latin America (Andersen et al 2001). Lack of capital to boost domestic power supply was a key reason for China and Asia Pacific countries embarking on reform (Li & Dorian 1995; Cope 2000). For most developing countries, however, reform – and particularly the reform recipe – has been imposed by the multilateral financing institutions which have been the traditional sources of investment finance for the sector. In Ghana, for example, prior to reform the national utility relied almost exclusively on guaranteed loans from 20 foreign governments and donor agencies to finance generation and transmission projects (Edjekumhene et al 2001; Turkson & Wohlgemuth 2001). Since 1993, reform has been a World Bank condition for lending to the power sector (World Bank 1993). Mismanagement, poor operational performance, and distorted tariff structures resulting in poor economic efficiency and low returns on investment have been given by the financiers as reasons for reform (Gutierrez 1996; Zekeyo 2001; Rudnick 1996; World Bank

2001a). Political inclination has also been instrumental in initiating and propelling reform; for example, the Chilean President's strong belief in the power of the market provided the political pressure that resulted in Chile's lead in reform (Kwoka 1997).

Prior to 1993, World Bank funding for the power sector aimed at addressing the key broad objectives identified in the Bank's operational manual statement 3.72 issued in 1978. These objectives included provision of power service on a least-cost basis and improving access to electricity by disadvantaged groups. According to the Bank (1996; 1999; 2000), by the end of the 1980s it was evident that projects were not delivering – especially with respect to financial and environmental sustainability. Hence, in 1993 there was a shift in policy, identifying five guiding principles as conditionalities for accessing loans from the Bank: transparent regulation, importation of services, commercialisation and corporatisation, commitment lending, and investment guarantees (World Bank 1993; 2000; Edjekumhene et al 2001; Mohiuddin & Haque 1999; USAID 1999; DOE 1997). The Asia Development Bank (ADB) has similar policies (IRN 2001) and its loans are provided on the principle of 'reform-linked assistance' (ADB 2001). After the 1997 Asian economic crisis, IMF, World Bank and the ADB demanded comprehensive power sector restructuring before releasing the US$46 billion loan bail-out the country desperately needed (Mohoyama & Widago 1999). Table 1 shows examples of countries where conditionality for lending from the IMF was evident from the Letters of Intent from borrowing countries.

Conditionalities by financiers have emerged at periods when demand for electricity was rising, and in many cases large shares of the population are unelectrified. At the same time the power sector is not only suffering high financial deficits but also lacks the necessary financial capacity for power development, due to a variety of factors including non-payment. In many cases, non-payment by customers, particularly government, have been mainly responsible for the poor financial state of the utility. As of January 2002, the Kenyan government, for example, owed Kenya Power and Lighting Company KShs2.5 billion (approximately $310 million). ZESCO, the Zambian utility has such a high debt stock that it is providing incentives in form of a bag of mealie meal (valued at K26000 = $6.5) for every K100 000 payment (about $25) (*The Post* 2002). This meant that the sector had to access finance externally, and the high degree of dependency on the external loans for power sector development has left most countries with no alternative but to comply with conditions, especially since multilateral banks and bilateral donors are colluding against loan beneficiaries. In Bangladesh, suspension of external funding to the power sector in 1991 forced the govern-

ment to adopt the Power Sector Reform plan prepared in 1994 in consultation with ADB and the World Bank (ADB 2001). The near-bankruptcy of the public electricity utility in Côte d'Ivoire in 1988-89 left the government with no option but to accept reform in the form of a management contract to a private company in 1990 (Plane 1999). In Egypt a memorandum of understanding was signed in 1994 between the Electricity Authority, the Ministry of International Cooperation and the US Agency for International Development (USAID), stating that the Authority would receive a financial incentive provided it achieved a number of legal, financial and operatives objectives outlined in the policy reform matrix (Swidan 1998).

Table1: Countries where IMF conditionalities in electricity reform are in Letters of Intent
Source: Adapted from Bayliss (2001)

Country	*Letter date*	*Key reform area*
Albania	12/01/01	Management contract with ENEL to improve performance of electricity utility.
Benin	26/12/00	Privatisation strategy for water and electricity utility to be decided by January 2001. Privatisation to be completed before end of third quarter 2001.
Bolivia	20/12/99	The government intends to complete its privatisation programme by the end of 2000 and to offer for sale in 2000 the distribution company of Tarija, the generation and distribution company of Potosi and the generation company of Trinidad.
Brazil	3/11/00	Several state energy companies have been privatised.
Bulgaria	18/8/00	Electricity utility separated into generation, transmission, and distribution components. Privatisation is envisaged for the next few years.
Burkina Faso	17/4/00	Waiver requested for the completion of the privatisation of the electricity company (Sonabel).
Cameroon	6/12/00	The successful bidders for the electricity company (Sonel) will be selected by February 2001.
Cape Verde	26/4/99	Privatisation receipts expected in the second half of the year, as a result of various public enterprises including the electricity company.
Central African Republic	15/12/00	The government plans to speed up the implementation of structural reforms with technical and financial assistance from the World Bank. Energy is one of the sectors where there are ongoing operations to privatise or restructure companies.

Country	*Letter date*	*Key reform area*
Chad	6/7/00	Negotiations on the privatisation of the management of the water and electricity company (STEE), began in the third quarter of 1999.
Colombia	22/8/00	Significant advances have been made but the sale of the main electricity distribution company, ISA, would be postponed to 2001.
Republic of Congo	3/11/00	A management contract will be signed in June 2001 for the Société Nationale d'Electricité.
Dominican Republic	22/10/98	A privatisation law was passed in 1997, paving the way for the sale or liquidation of public enterprises, including, inter alia, the Dominican Electricity Company,
Ecuador	10/8/00	The regulatory framework for electricity is to be reformed in order to facilitate privatisation and/or joint ventures.
Estonia	24/11/00	A principal agreement on the partial privatisation of the electricity complex was reached in August 2000.
Ethiopia	29/1/01	The restructuring of the telecommunications and electricity utilities will be finished, regulatory frameworks put in place, and decisive progress made with private participation in these activities in 2001/02.
Georgia	12/7/99	In the sphere of energy sector restructuring, the successful privatisation of Teals will be followed by other sales of electricity generation and distribution companies in 1999/2000.
Ghana	25/6/00	A sales advisor for the Electricity Company of Ghana will be appointed by end-September 2000.
Guinea	6/12/00	An action plan for restructuring the energy sector should be prepared by the end of the year, under which the liquidation of the electricity company (ENELGUI) will be launched.
Guinea-Bissau	13/11/00	The government will (i) open financial bids for a long-term leasing contract (*contrat d'affermage*) of the power and water utility (EAGB) by November 15, 2000; and (ii) create an independent regulatory agency by end-January 2001.
Honduras	13/4/00	To speed up privatisation of electricity distribution, the Framework Law on the Electricity Sector will be approved in October 2000.
Jordan	4/7/00	The former generation and distribution functions have been separated to form the Central Electricity Generation Company and the Electricity Distribution Company, which operate independently and are targeted for privatisation
Kazakh-stan	22/11/99	Aim to complete privatisation of all electricity producers and all regional electricity distribution companies by December 31, 2001.

Country	*Letter date*	*Key reform area*
Lesotho	12/2/01	In early 2001 a private company will take over the management of the Lesotho Electricity Corporation. The management company will restructure the LEC and prepare the enterprise for privatisation in mid-2002.
Mali	11/8/00	The final call for bids to privatise at least 60% of Electricité du Mali's capital was launched in August 2000.
Mauritania	25/5/00	The sale of 49% of Sonelec's electricity component to a strategic partner was deferred to March 2001 when the entire responsibility for managing the company will be assumed by the strategic partner.
Nicaragua	13/12/00	The electricity distribution companies have been sold.
Niger	21/11/00	The terms and conditions for the privatisation of Nigelec (electricity) were finalised, consisting in a concession arrangement for the production, import, and distribution of electricity.
Peru		During 2000, remaining government shares in two previously privatised electricity firms were sold.
Senegal	4/6/99	Government shares in six large enterprises including the electricity company (Senelec) were scheduled for sale in 1999.
Uganda	21/8/00	In November 1999, the government approved legislation to remove the state monopoly, establish an independent regulator and unbundle the Uganda Electricity Board into separate distribution, transmission, and generation companies. Each of these companies will be privatised.
Zambia	30/6/00	Elimination of government majority ownership and control of tility.

Consumers have been enticed with the promise of more choice, lower prices and better services. The typical economist argument that competition has advantages over regulated monopolies is used to convince consumers of the need for change towards privatisation and concomitant competition. Dissatisfaction of consumers with government-owned electricity utilities due to rampant corruption has also worked in favour of change. The advent of new technologies has also motivated reform, as these have enabled new entrants and hence justified deregulation in favour of competition. The decreasing costs per megawatt using small-scale technologies to generate electricity, as well as development of high voltage transmission lines enabling long distance electricity transportation, are the main technological developments attributed to the rationalisation (Pineau & Hamalainen 1999). This provides technological

opportunities for electrifying the majority of the unelectrified in the remote areas. However, institutional and financial barriers will have to be addressed for this goal to be achieved.

It is evident that factors promoting reform have been relatively strong and largely justifiable. The question, then, is whether reform has solved the problems which prompted its adoption. This issue is explored in the following section.

3. Outcomes of reform

Overall, the outcome of reform has been mixed, and the expected achievements have not always materialised. Advocates of reform promise overall improvements in the sector, including better management, decreases in technical and other losses, better availability of electricity, job creation and economic growth.

Private sector participation has been a key reform prescription by the World Bank, justified by the findings of a 1995 World Bank study which concluded that the greater the involvement of the private sector the better the enterprise performance (World Bank 1995; Bacon 1995; Bouille et al 2001). Littlechild (1999) notes that the discipline of private ownership was needed to eliminate losses and restore good management in the government-owned facilities. In the Ukrainian case, for example, the IMF noted that it would release the frozen $2.6 billion loan only if Ukraine privatised the electricity companies (*Wall Street Journal* 2001). The ADB has also made privatisation of the power sector a pre-condition for approving loans, in line with its recent energy policy for 'availing of all possible opportunities to "crowd in" private sector participation' (ADB 2000). To further facilitate private sector entry, the multilateral banks created a private sector financing portfolio which include power utilities. In the Philippines, ADB refused to approve the US$300 million loan for power sector restructuring unless there was demonstrated private sector participation (IRN 2001). Governments have also provided various incentives, including tax holidays and guarantees of fuel supply, in order to attract the private sector (Adamantiades et al 1995). Consequently the electricity sub-sector has experienced the highest private sector activity within the energy sector. IPPs have boomed. More than 600 private-owned electricity projects, representing investment of US$160 billion, in 70 countries were implemented in the 1990-99 period (Izaguirre 2000). As is evident from Table 2, the majority of electricity projects with private participation have been in Latin America and the Caribbean and East Asia and the Pacific. Most of these projects have been in electricity generation, which accounted for about 70% of all the 1990-99 projects. As

might be expected, the lowest activity was in transmission, which has largely remained under public sector control. (Table A2 in the appendix provides a list of the international investors into the electricity market.)

Table 2: Private electricity projects in developing countries, 1990-97
Source: Izaguirre (1998)

	Projects	*Total investment (1997 US$)*
East Asia and the Pacific	165	49 741
Europe and Central Asia	112	10 436
Latin America and the Caribbean	169	45 311
Middle East and North Africa	10	6 721
South Asia	57	16 799
Sub-Saharan Africa	21	2 040
Total	534	131 048

While there may be no legal barriers to local private sector participation, it is becoming increasingly evident that foreign investors dominate, mainly because the former lack access to the necessary capital. This may have some security implications in the future. Foreign domination through foreign investments in the power sector is one of the main reasons why the Institution of Industrial Engineers in Bangladesh opposes reform, citing lack of financial strength and capacity among indigenous companies (IEB 2000). The top ten private investors in energy projects in developing countries are presented in Table 3. This data, however, masks the fact that there are many other foreign companies or consortia playing significant roles in the smaller developing countries.

Reform has facilitated the growth of mega-companies, as electricity companies extend their investments from home country to emerging reformists (Davis 1997). Multi-national companies have entered the electricity market. In Africa and South America, French, Spanish, American and Canadian companies are major players. In Côte d'Ivoire, French companies own 51% shares of the company that manages generation, distribution and transmission (DOE 2001b). A foreign consortium owns a similar proportion of shares in Cape Verde (World Bank 2001b). The South African private company Eskom Enterprises is active in many African countries; it owns 51% of shares in the Lusemfwa hydropower company in Zambia; has a 15-year management and operation contract of the Manantali hydro station in Mali; will manage, operate and maintain Hwange power station in Zimbabwe; and in Malawi the company got a

one-year contract in 2001 to improve performance of the public-owned utility. Enersis, a Chilean company, supplies electricity to 52%, 22%, 19%, 24% and 5% of the Chilean, Colombian, Argentine, Peruvian and Brazilian populations respectively (Rudnick & Zolezzi 2001).

Table 3: Private investors in energy projects with private participation in 1990-1999
Source: Modified from Izaguirre (2000)

Private investor	*Investment (billions 1998 US$)*	*No. of projects*	*Investor's home country*
AES corporation	12.7	35	USA
Enron Corp	12.5	23	USA
Electricité de France	11.5	22	France
Endesa (Spain)	9.1	11	Spain
Southern Energy Inc	7.6	10	USA
CMS Energy Corp.	6.7	17	USA
Cia Naviera Perez Co	6.2	8	Argentina
Endesa (Chile)	5.7	15	Chile
Tractebel	5.6	17	European-Belgium based
Enersis	5.3	7	Chile
Total	68.2	156	

A rationale advanced for increasing private sector participation is to release public finance for alternative development projects. However, the private sector has largely sourced the bulk of the finance externally but used the government as guarantor. By 1995, for example, IFC had been a financier of over one third of all IPPs in developing countries (Hoskote 1995), many of which involved government backing. This implies that the private sector has not been as financially independent as had been anticipated and may have placed the public sector at relatively high risks. In some cases, as in Senegal, where the private sector did not perform as expected, government was forced to buy back the shares at higher prices than it had originally sold them (World Bank 2001b), at the expense of the tax-payers. In addition, the majority of the private sector-owned generation facilities use fossil fuels which have to be imported and paid for in foreign currency, which exposes the country to erratic foreign exchange problems. In Indonesia one of the main causes of financial problems of the national utility is high purchasing costs of power from IPPs

which are paid in US dollars while the electricity tariff is in rupiah (Motoyama & Widago 1999). A study of the ten countries with most IPP activity finds that private sector participation has exposed countries to foreign risks which are higher than during the pre-reform period (Labour & Busby 1998). But as Palast (2001) notes, in the power reform the profits are privatised and losses socialised. Overall, governments have assumed fairly substantial risks through sovereign guarantees, long-term power purchase agreements (PPAs), fuel supply, inflation and foreign exchange risks (Lefevre & Todoc 2000). In Kenya the Kipevu II power generation project is underwritten by a 20-year PPA whereby the state-owned utility has contracted to pay '140% of what is required' into an escrow account to ensure that the investors (including the World Bank's International Finance Corporation (IFC)) will be paid (Project Finance 2000). In the Dominican Republic, after IPPs hiked tarrifs to unaffordable levels, government was forced to absorb 42% of the increase, leaving customers with 9% to pay. This subsidy cost the government around five million dollars every month. By July 2000, the state-owned electricity corporation CDE had accumulated a debt of more than $135m with private generation companies (*Business News Americas*, 2000). Privatisation has shielded the government from addressing public concerns raised by public sector unions, as these have become increasingly powerless. There are speculations that Israel is contemplating privatisation as a measure to weaken labour unions and reduce costs (Tishler et al 2002).

Reform was generally expected to fill government coffers with revenue generated from the sales of public utilities. To make the utilities attractive to the private sector, governments have had to spend on commercialisation. It is believed that the revenues generated from the sales have often fallen short of the value of the assets, especially when the 'lacing-up' expenditure is taken into account. Advocates of reform note that the private sector relieves government from future expenditures into the power sector and equate this to revenue in present terms. For example, the Executive Vice-President of the IFC, Peter Woicke, when signing the agreements for an IFC-sponsored power generation plant at Kipevu in Kenya, said that the private sector financing of the plant would 'enable the Government of Kenya to conserve limited public resources for other priorities, such as education and healthcare' (Africa News Service 2000). However, there is increasing evidence that the private sector only focuses on profitable customers and that to achieve the universal access goal, government will have to continue investing into the sector. In addition, governments in the poorer developing countries, particularly in Africa, are forced to provide incentives such as tax breaks and value added tax security to attract the private sector, despite having imple-

mented privatisation. In Uganda, AES asked the Ugandan government to guarantee prompt reimbursement of its value added taxes during negotiations for the Bujugali power plant.

Private investment has also been expected to result in job creation, higher incomes and economic growth (Bouille et al 2001). In reality, reform has been accompanied with retrenchments as a measure to cut costs and increase financial efficiency. In Brazil, for example, barely a year after Electricité de France and Houston Industries of Texas took ownership of the government-owned Rio Light, they cut the company's workforce by 40%. The number of utility customers per employee is used as a measure of performance efficiency, a necessary stipulation for countries seeking conventional multilateral financing. The internationally accepted standard is about 160 customers per employee (Kwoka 1997), but many developing countries have tended to have lower ratios and are thus considered overstaffed. Karekezi and Kimani (2001) note that by 1998 seven of the twelve reported sub-Saharan African countries had ratios ranging from 40 to 110 customers per employee, way below the international standard. In the advent of reform the customer/employee ratios are changing, as reformers have been tasked with downsizing, particularly as a condition for attracting private sector players. In Côte d'Ivoire, the operations/management contract reform under the private sector resulted in a reduction of employees per customer from 9.5 to 6.9 within a few years – that is, one employee serving 0.14 customers (Bacon & Gutierrez 1996). In Chile the number of customers per distribution worker more than doubled over ten years (Rudnick 1996), while Argentina experienced a 23% improvement between 1992 and 1998 (Andersen et al 2001). Clearly the reduction of staff might be beneficial to the entrepreneurs, but is detrimental to the employees and perhaps to the country's macro-economy as well. Notably, while on one hand the sector is laying off staff, on the other hand the new management has enjoyed significant and socially controversial large salaries (World Bank 1995). This aspect has hardly been publicised and goes unchecked, since most developing countries lack strong and active consumer watchdogs.

The usability and relevance of the number of consumers served as a performance indicator deserves some comment. Efficiency is an input output measure where, in the case of power sector, the output of an employee is measured by the number of consumers served. This would be reasonable if the employee had influence on customers as in the case of developed countries where marketing strategies affect consumer choice of service provider and consumption levels. In many developing countries the potential consumer has no access to electricity. The international average performance indicators normally used as a reference assumes

an electricity coverage that has not been attained in many developing countries. As such, there are hardly any additional customers that an employee can persuade to seek services from their utility. In addition the employee lacks the marketing facilities, such as a telephone infrastructure, necessary to reach the potential customer. The special circumstances facing developing countries call for certain allowances and makes certain indicators redundant. Due to the limited employment opportunities in developing countries, the utilities cannot expect to sack employees without taking into consideration the national economic implications. The ratio of employed to unemployed remains high, and as a result the employed are forced to support the unemployed. As such, getting rid of an employee in order to improve utility performance indicators has major ramifications for the welfare of many people. Privatisation can only be beneficial if it accommodates economic and social stability (Stiglitz 2002b) rather than just balancing financial spreadsheets. Another indicator used is electricity sales per employee, measured in Watt-hours (Bacon 1995b). Consumption levels are low in developing countries compared to developed countries for a variety of reasons, including lack of appliances and money to pay for additional power. On average, per capita consumption in developing country households is ten times less than in developed countries. Hence, using an international consumption average per employee to rate performance provides a skewed figure that does not reflect the fundamental differences and places developing countries at a disadvantage.

Technical losses have decreased among many reformers, due to improvements in management and maintenance. In Argentina the private concessionaires almost eliminated technical losses and reduced overall losses from 27% to 10% over a ten-year period (Bouille et al 2001). Rudnick (1996) reports halving of distribution losses in Chile in seven years. Power losses in Côte d'Ivoire dropped from 19.8% to 17.4% from 1990 to 1998 (Bacon & Gutierrez 1996). Curtailing of theft and illegal connections by using technical devices that prevent such tampering has contributed significantly to the loss reduction.

A pervading problem in the power sector has been lack of reliability in supply. Reform was expected to change this. In general, connected consumers have experienced more reliable supply with reform. In Côte d'Ivoire, the power outages decreased from 50 hours to 19 hours per month in four years, but at higher consumer prices (Girod & Percebois 1996). Similarly, in Argentina the distribution company reduced the power outages from 39 hours per year in 1992 to six hours per year in 1995 (DOE 1997). It can be noted, though, that Israel managed to reduce average outage hours from 15 in 1990 to 3.5 in 1999 without re-

form (Tishler et al 2002). Positive experience in this regard is, anyway, not universal. In the Dominican Republic, privatisation in 1999 was presented as a way of putting an end to the blackouts that had crippled the nation for the many years. However, towards the end of 2001, blackouts were on a much higher scale than under state ownership. In Kenya and Senegal, power rationing was a persistent problem in 2001, partly because of drought but also because of reform-associated factors. Despite having started reforms in 1992, Brazil faced critical power supply problems in 2001 due to various factors including prolonged macroeconomic crisis, poor rainfall and unsynchronised reform measures which froze some aspects of the sector while leaving others fluid. Additional generation capacity was the responsibility of the government, but under an agreement signed in 1999 with the IMF the state-owned utilities were prohibited from making new investments as these would endanger the public budgetary surplus prescribed by the IMF. Hence they could not invest in generation (TNI 2002). Ghana has decided to diversify by adding a 600 MW thermal power plant to operate on natural gas from Nigeria, as a measure to lower the power crisis risks such as those experienced in 1983 and 1997 when the Volta Lake literally dried up (Wereko-Brobby 2002) The inability to meet demand and provide reliable power is forcing consumers to acquire their own generation facilities. In Senegal, 'genset peddlers' have emerged, selling diesel- or petrol-operated generators to consumers; power outages in Dakar are characterised by the noise of the generator engines. A recent study in Kenya shows that electricity supply no longer ranks as high as in the past among the list of concerns for multinational private sector operations mainly because 60% of these have invested in full stand-by generators (*The Nation* 2002).

The promised lower increases in consumer tariffs have not always materialised. Tariffs have generally risen, partly in response to the removal of subsidies and in an attempt to attract the profit-seeking private investors. In Uganda, a month after the Uganda Electricity Board was unbundled into the Uganda Electricity Generation, Uganda Distribution, and Uganda Transmission companies, electricity bills rose by as much as 158% (*East African Standard* 2001) – consumer outrage forced the Ugandan President to intervene and seek tariff reductions. In Argentina and India, not only have prices been increasing but the quality of service has not improved – in Argentina this despite the strict electricity quality requirements and associated penalties for non-compliance (Rudnick & Zolezzi 2001). The Court of Appeal in Kenya has given consumers permission to challenge a 40% rise in power rates and tariffs approved by the Electricity Regulatory Board on request from KPLC (*East African*

Standard 2002b). Under the proposed reform for Israel, electricity prices will have to substantially increase as subsidies are withdrawn and a control on tariffs removed (Tishler et al 2002). Chile, an old reformer, has not achieved the level of tariff decreases consumers had expected; instead, the companies are reaping huge profits (Andersen et al 2001; Estache et al 2000). Notwithstanding, macro-economic crisis that have ripped through many countries have generally resulted in reversal of any price reduction gains. This was the general experience in East Asia. Power shortages emanating from drought and poor planning in Brazil have also resulted in tariff increases. The consequences of these increases have been detrimental, particularly due to the high price elasticity of electricity. Consumers have had to reduce electricity consumption and shift to other energy carriers.

Some analysts fear that, in the mid-to-long-run, electricity tariffs will increase due to the high marginal cost of production emanating from the expected technological mix. With new technological developments, such as combined gas cycle, the cost of investment for small power plants has decreased considerably (Pineau & Hamalainen 1999). Compared to the 1970s the cost of installation per MW has decreased, making small-scale technologies more competitive (Hunt & Shuttleworth 1996). The new players are therefore investing in small-scale fossil fuel- and gas-powered generation units which have higher marginal costs of production than the conventional large hydro units which were the commonly used technologies (DOE 1999), and so drive consumer tariffs upwards. In addition, in countries where the overall demand is not large enough to encourage competition, the monopoly situation is likely to prevail and tariffs will remain uncontested as long as they are not effectively regulated.

Increasing the number of stakeholders and creating competition was one of the expected outcomes of reform. While this may have occurred in some cases, the relevance and sustainability of a truly competitive, multiple-actor environment in many of the reforming countries is questionable. In countries such as Bangladesh, 'preferential competition' is occurring, as new IPPs are exempted from tax on imported generators up to 10 MW capacities, an incentive that is not extended to current utility owners (ADB 2001; Mohiuddin & Haque 1999). Re-integration of the unbundled sectors is being observed among some reformers. In India, privatisation of distribution services resulted in industry ownership being split between just two companies, one of which controls three of the four distribution zones – which is tantamount to a horizontal re-integration. The second company also owns substantial generation facilities, leading to some level of vertical re-integration (Dubash et al 2001). In Chile, En-

ersis, the holding company for Chilectra, the largest distribution company, bought 26% of the shares of Endesa (the largest generator), creating some vertical re-integration (SDS 2000a). Reform has brought some major world energy players into Latin America, resulting in a reduction in the number of actors and agents in the markets, and it is expected that in the near future only five or six large actors will remain, having swallowed the rest (Rudnick & Zolezzi 2001).

Realising that competition may not occur if left to market forces, some reformers use regulatory measures. The Argentine and Bolivian governments have tried to control mergers by barring any generating company from holding more than, respectively, 10% or 35% of the market (Rudnick 1996). In Bolivia, however, this only applies to companies operating under Sistema Interconnectado National, the national grid, while the rest are allowed to be vertically integrated (DOE 2001c).

Reform is creating a situation which is threatening to the energy security of various countries, particularly the low-income ones, through transferring the power to control access to energy to foreign private sector in environments with weak regulatory agencies. In some cases the foreign investors in the power companies have more financial power than the governments of the countries they invest in, posing a risk of abuse of market position. In Cameroon for example, AES Corporation, the company that bought 56% of the national utility's shares in 2001 and has exclusive management responsibilities of generation, transmission and distribution assets for 20 years, had in 1999 a revenue of $3.3 billion while Cameroon's GNP was $8.5 billion (Pineau 2002). In addition, foreign private companies are often linked to their home governments and can be used to advance home-government political interests in countries they invest in. It is interesting to note that in the mid-1990s the US embassy in Mozambique and US officials in Washington were blackmailing the Mozambican government, threatening to cut off aid, unless a deal was signed granting Enron rights to Mozambican natural gas (Agencia de Informacao de Mocambique 2002).

The tendency to re-integrate raises the threat of reverting to a monopolistic industry controlled by foreign companies instead of the national government, as was the case in pre-reform period. Surely such a condition cannot be good – especially since it was against such monopoly that reform was advanced in the first place. As MacEwan (2002) notes, privatisation is not always appropriate and it is especially problematic when it replaces an inefficient government monopoly, as the private company then yields huge profits for its owners. It leads to questioning the rationale for pushing competition as a conditionality and raises the fundamental issue of the financial viability of various subsets of

the power sector which result from unbundling. While creation of mega-powers may pose the danger of social-political instability, there is nevertheless a need to re-examine the competition push and, to a large extent, unbundling requirements, particularly with respect to countries with small market sizes. Bacon (1995b) notes that countries with systems of 1000 MW should not be restructured to introduce competition at all, and the gains from restructuring are rather small. But despite a consultants' report proposing maintenance of an integrated monopoly in Kenya instead of unbundling (on the basis that the latter had several important disadvantages),[4] the restructuring has been undertaken upon World Bank recommendations (World Bank 1997). Obviously the power sector is not unique; what is happening in the sector is a reflection of a global wave of change towards privatisation and globalisation. The pivotal importance of the electricity sector as a driver of the economy makes its case particularly sensitive, however. It is in this spirit that the following section discusses the role of reform in meeting the challenges facing the power sector.

4. Challenges in the power sectors in reforming countries

Reformers have been caught at various stages of development of the power sector. Many of the reforming countries are characterised by high levels of poverty, low electrification levels, high unemployment and heavy debt burdens. This section endeavours to understand how these challenges are affected by power reform.

4.1 Increasing electricity access to the majority

While electrification is not a sufficient condition for economic development, it is socially desirable, and in the developed countries it has been strongly correlated with wealth (Ferguson et al 2000). As most of the developing countries aspire to similar levels of wealth, access to electricity is seen as a key indicator of progress. The responsibility to electrify has largely been viewed as that of the public sector, and has been mainly undertaken by government, a situation that is targeted for change under reform.

Most pioneer reformers had the advantage of mature systems with electricity accessibility levels well over 70% (Turkson & Wohlgemuth 2001). This is not the case with a significant share of current reformers. Electrification rates in some reforming countries are still low (see Table A1 in appendix). Regional estimates vary greatly, indicating a lack of

[4] Similar recommendations have been given to Israel (Tishler et al 2002).

reliable data and varying definitions of access.[5] Davidson and Turkson (2001) estimate that in most African countries on average only 20% of the population had access to electricity in 1999, while the World Bank (1996) noted the proportion as being 44.9% in 1995; regardless, the proportions connected are low. Despite this important variation across reformers, the designs of the reform processes have neglected the country-specific access levels and thus provision for improving access where relevant.

Increasing access to peri-urban and rural areas, where the majority of the unserved are, is the goal of most governments. Reform should meet this objective – ESMAP (2001b) notes that in the case of Peru one of the common beliefs was that private sector would do everything under market conditions, including rural electrification. However, evidence from some reforming countries indicates otherwise. In Bolivia, five years into the reform process, only 19% of the rural households had been electrified compared to 14% at the commencement of reform (ESMAP 2000). In Argentina, the number of consumers is growing at a faster pace than the rate of growth of service and it appears that reform has not generated the conditions necessary for expansion of service (Bouille et al 2001). Reports have also shown that the number of poor beneficiaries has sometimes decreased, as a result of the private sector not tolerating unbilled and informal connections (Estache et al 2000). In Georgia, the privatised electricity distributor, Telasi, now owned by the American AES, was disconnecting users at the rate of 1 000 a month when it took over the operation in 1999. In the majority of countries, to electrify the unserved requires an increase in capacity and establishment of distribution systems.

While improving maintenance can increase supply capacity (World Bank 1993), the additional capacity will not meet projected demand in most countries, and additional investments in generation will be needed. In Tanzania demand is expected to grow by 9% per annum in 2001-3, 6% during 2004-6 and 5.7% in 2007-15, requiring US$500 million investments in generation, transmission and distribution (World Bank 2001a). Zimbabwe's demand is forecast to grow at 3% per annum for the next ten years, requiring capital expenditures of approximately $1.5-2 billion (World Bank 2000e). Forecasts for Ghana indicate that demand should double in ten years, requiring 2000 MW peak capacity (Opam & Turkson 2000) and investments worth $1.5 billion (Edjekumhene et al

[5] Access has been defined as being connected, having electricity in the household; in other cases having the grid extending to a village has been used as indicator that the village population has access.

2001). Implementation of the Kenyan government's five-year electricity sector programme requires about $1.1 billion (Gichuru 1998). Forecasts for India indicate investment needs amounting to $150 billion by 2005 (USAID 1998).

Alarmingly, reform does not seem to bring about as much additional investments into new generating plants as was expected. In India, reform did not come near to meeting the increase in demand of 40 000 MW from 1992-97, achieving a mere 17 000 MW (Dubash et al 2001). This may be attributed to various factors, including unsynchronised regulation between generation and distribution. Though the government has been encouraging construction of mega-projects with a capacity of more than 1000 MW, most of the approved projects have not been constructed, mainly due to withdrawal of loans triggered by concerns for large-scale projects (DOE 2001). Generation commitments made by the various stakeholders have not always been honoured. In 2000 the government of Senegal was forced to buy back the 34% shares of Senelec it had sold to the French-Canadian Consortium Hydo-Quebec International Elyo in March 1999, since the company could not honour its commitment to increase generation capacity (World Bank 2000d, 2001b). In Côte d'Ivoire, after reserving the responsibility of installing new generation plants, the government was unable to do so. Consequently, the private sector has come to its rescue and is constructing a 420 MW thermal power plant with loans from IFC and the Commonwealth Development Corporation (DOE 2001b). The shortcomings in increasing generation capacity are more prevalent in the poorer developing countries. The faster growing Asian economies have not suffered as much, but instead had a boom of IPPs (until after the macro-economic crisis). High tangible electricity demand is obviously a necessary pre-requisite for increased activity in electricity generation under reform.

The majority of the unserved population resides in dispersed rural and peri-urban settlements; their load demand and incomes are low, and connection costs are unaffordable. As such, electrifying them is not financially attractive to the private sector. This is a lesson that developed countries learned decades ago, and subsequently resorted to using subsidies. For example, fearing that private power providers would be unwilling to incorporate rural America into their future plans throughout much of the 1910s and 1920s due to low returns on investment, President Roosevelt set up a subsidy scheme for the affected areas (Leone 2001). Provision of subsidies is, however, counter to the World Bank's 1993 reform policy; according to the Bank, subsidies and inadequate tariff levels lead to prices that give incorrect signals to users, resulting in overuse (World Bank 1993). Some have argued that removing subsidies

would increase rural electrification by making decentralised renewable energy technologies more competitive (Burtraw et al 2000). This implies that the cost of the electricity generation from such technologies would be accessible to the rural communities. However, experience indicates that even where these technologies are subsidised, the cost per unit remains relatively high (Wamukonya 2002). Nevertheless, it is becoming increasingly clear that rural and peri-urban populations in reforming countries will not be electrified by the private sector unless incentives are provided. Responding to the concerns about Endesa's policy to cut investments in Latin America despite growing electricity demand, the Chief Executive Director noted that Endesa's 'mission in a deregulated market is not to fulfil the demand for electricity, but the expectations of shareholders' (*Financial Times* 2002). A World Bank publication acknowledges that, without a rural electrification programme or another programme aimed at encouraging extensive coverage of the poor, they will remain without electricity (World Bank 2001). Notably, the scope for cross-subsidies is quite limited under reform, though the extent depends on the type of reform.

Legal structures have also limited access to electricity for low-income urban households and entrepreneurs. In South Africa and Kenya, for example, the utility will not supply consumers without legal tenure, a predicament suffered by a significant and increasing share of urban households and small-scale enterprises (DFID 1999). Access has been further curtailed through the aggressive measures adopted by the electricity industry to eliminate power theft and losses. In some cases, these measures are implemented with funding from multilateral donors. While intended to improve the financial status of the utilities, these measures have also resulted in significant, socially unacceptable increases in company profit margins (Bouille et al 2001). Hence, whereas there may be good moral arguments against theft, the distribution of benefits from avoided theft remains an issue of concern. Studies have recorded illegal connections and non-payment accounting for as much as 30% of a utility's 'customers' (ESMAP 2001). Since the basis of such theft is not always malicious, it is important that measures to address improved access to such potential consumers be adopted.

In some Latin American countries, access to electricity continued to increase under reform, largely due to two key factors: services were extended to the urban areas which were generally financially attractive, and programmes were established to address the unattractive rural sector. In Peru, for example, coverage rose from 48% in 1992 to 70% in 1998 (Andersen et al 2001). In 1992 only about 53% of the Chilean rural population had access to electricity, although Chile started reforming

in 1974; so Chile launched a ten-year rural electrification programme in 1994 with the goal of electrifying 100% of the electrifiable dwellings and achieving 75% coverage by 2000. A special fund was set up which provided a competitive one-time direct subsidy to the private distributors to cover part of their investment costs, while the operating costs were met through tariffs. The subsidy amount is no more than the negative net present value of the project. The state's investment has been the highest portion, accounting for 70% in 1992 but decreasing to 61% in 1999 (Jadresic 2000). As part of the reform in Nicaragua the commission for national energy will plan and implement a rural electrification programme which aims to increase rural electrification levels to 65-70% by 2015, from 11% in 1998. Although the programme will use subsidies it is unclear where these will come from (GEF 2000).

Reformers are increasingly realising that targeted strategies are required to meet the challenge of universal electrification. In its work in Bolivia, ESMAP (2000) categorically concludes that 'it seems evident that the necessary expansion of the grid to connect the poor will not take place as a consequence of privatisation and restructuring'. Governments are tweaking the reform structure and hatching alternative strategies to be implemented in parallel with reform. These include setting up electrification funds replenished through electricity levies. This option has, however, not always been successful: in some cases levies have not materialised, while in others the fund has been used inefficiently and hence contributed little to improving access levels (Karekezi & Kimani 2001). Ghana is providing concessionary loans for rural electrification (Opam & Turkson 2000). The country has also established a self-help electrification project through which communities can bring forward their electrification date by meeting a share of the investment costs. The initial phases, 1992-1995, comprised 300 projects. This programme has, however, relied mainly on external funding and its sustainability remains unclear (Edjekumhene et al 2001). In Guatemala, the government ratified a General Electricity Law in 1996 which provides for extending service to rural areas using state subsidies (SDS 2000). Under this scheme the Guatemalan government awards $650 to the private company for each residential connection made (Levington & Zilli 2002). The Nicaraguan government has set a policy committing itself to electrify rural areas that are not attractive to the private sector using the special funds collected through concession and licence fees (SDS 2000b). Uganda endeavours to establish a rural electrification fund which will be used to subsidise electrification (MEMD 2000). Motivated by the American experience, in August 4 1969 the Philippines created the National Electrification Administration and declared as a national policy the country's total electrifi-

cation, using the area concept through the organisation and development of cooperatives tasked with providing adequate, reliable and low-cost electricity. The project was made possible by a loan from the USA of $3.5 million (NEA 2001). In Argentina in 1994, on realisation that the peri-urban areas of Buenos Aires are financially unattractive to the private company, the federal and municipal governments agreed to contribute the value added tax that is levied on the electricity bills of the consumers. A concession approach is used whereby the concessionaire is subsidised with money sourced through a World Bank loan, GEF grant and the special electricity fund (Tomkins 2001). Côte d'Ivoire (which is undertaking a management contract reform) established a special electricity development fund replenished through a surtax on tariff to electrify the peri-urban areas (ESMAP 2001). In Panama a social fund has been established with government and donor funding to provide lump-sum subsidies for 20-year periods to private companies to electrify rural areas. Many of the approaches to rural electrification are relatively young, and their effectiveness and sustainability yet to be adequately tested.

4.2 Curbing unemployment

When private companies boast increased productivity and a greater number of customers per employee, the total of unemployed people rises. In Argentina, individual electricity companies reduced total employment by as much as 40% three years after privatisation (DOE 1997). This trend seems to be common across reformers. The scaling down of staff is, however, not limited to the industry but extends to the government agencies and regulators who, to the disadvantage of the consumer, cannot subsequently perform their duties efficiently (World Bank 1995; Bouille et al 2001). In some cases retrenchment packages have been offered. In Burundi, for example, over a three-year period personnel was reduced from 1500 to 1000 – with the 500 being placed in private firms which were starting to carry out work previously done in-house, such as producing wooden poles and connecting new customers (Bacon & Gutierrez 1995). This, though, is not the norm; in most cases retrenched workers do not receive adequate compensation and financial problems facing the country are often used as an excuse (Widagdo 2001). The Kenya Power and Lighting Company, for example, needed to pay KShs2 billion ($250 million) to 1700 laid-off workers in the first six months of 2002, but the process was protracted due to the company's financial problems.

Clearly commercialisation and privatisation has a cost to employees. Notably, though, the impact on employment has been used both by the

advocates of reform as well as those opposed to it. Those in favour of privatisation argue that it results in higher efficiencies through shedding of unproductive workers. Critics note the high social costs associated with unemployment which are not taken into account due to recommendations which do not focus on overall economic efficiency. Theoretically it is envisaged that privatisation would create jobs. While this might occur in the longer term, it is not evident today. Without concerted policies and efforts on job creation and low interest rates to encourage investment, which are well timed and sequenced alongside privatisation (Stiglitz 2002b), sustainable development remains threatened.

4.3 Setting affordable tariffs

Reform demands increased participation of the private sector, which requires making the sector profitable. So tariffs in reforming countries have been rising, the justification being that they were below cost of service provision. In addition, lifeline consumption targets have been lowered. This is happening in an environment where economic growth in most countries has deteriorated and the proportion of the poor has risen. Ability to pay for electricity does not seem to play a significant role in determining post-reform tariffs, even when there is evidence of consumer exploitation. As Coyle (2002) notes, prices are not necessarily based on cost of production or service but on what the seller can get.

In Zimbabwe, the lifeline consumption level dropped from 300 kWh to 50 kWh per month in 2000 (World Bank 2000e) despite the country's economic crisis. In Ghana in 1998, the tariff increased by about 300% and the lifeline consumption level fell from 100 kWh to 50 kWh, while the lifeline tariff increased from 1200 to 4000 cedis. The regulator in Ghana was under external pressure to hike tariffs further but refused to budge, since utilities had not increased efficiency, reduced system losses or improved the quality of service (Edjekumhene et al 2001). In Uganda, the lifeline tariff is offered for the first 30 kWh and within a month of unbundling rose from Ushs 20 to Ushs 50, an increase of 150% (East African Standard 2001). However, social and consequent political pressure forced a sharp general tariff reduction in October 2002. In its first year of operation under reform the Compagne Ivoirienne d'Electricité, a private company in Côte d'Ivoire, made profits amounting to US$2.5 million mainly from tariff hikes. In Dominican Republic, generators increased charges by 51% on privatisation. Consumers have suffered and in June 2000, wholesale businesses in the north of the country began to withhold payment of electricity bills in protest against daily blackouts lasting more than 20 hours and 'abusive rates' charged by power companies.

The World Bank (2001) notes that, without some form of subsidy, the poor majority will not be able to access electricity or pay for their consumption. In Bolivia, ESMAP (2000) concludes that if the subsidies had been removed at the time reform was implemented the end-user prices would have fallen for high-income households by 40% but increased by an average of 60% for the poor households. Such findings underscore the need for public sector involvement in reform: to ensure the poor are not marginalised any further than they already are.

4.4 The reform pace in view of capabilities

In advocating reform the World Bank (1993) noted that this should be a gradual process, the pace being dependent upon the sector's capability to manage reform. But despite the vacuum in understanding impacts of reform, the pace at which it is happening is not in conformity with this fact. The need to slow the pace has been echoed by other stakeholders, mainly out of concern that it is extremely politically difficult to change reform structure or general rules after the process is underway (Bacon 1995; Bouille et al 2001). Nevertheless, this cautionary advice is not reflected in practice. Even the project plans the World Bank prepares for reforming countries are contrary to its original policy. In Mauritania, for example, the reform process was planned to be completed within four years (World Bank 2000d). In Zimbabwe, establishing a regulatory agency, corporatisation and unbundling of ZESA, and privatising generation were planned to occur within a three-year period (World Bank 2000e). In Lesotho, the process is planned for five years. In contrast, the developed country reformers have adopted a slow pace which they are able to implement since they have control over the process. For example, though the reform process started in 1990 in the UK, the complete opening up of competition in the generation sector through divesture of the coal power plants by PowerGen did not happen until 1998 (Office of Electricity Regulation 1998). The pace was similarly slow in Australia (ADPIE 1998). The Spanish government passed the Electric Power Act in January 1998, laying the foundation for reform that is planned to occur over ten years (Urzaiz 1998). Chile's privatisation process was planned to start in 1980 and end in 1990 (Rudnick 1995).

Unfortunately, the push for a fast-tracked reform process is occurring in countries that are in most need of time to consolidate the impacts and plan accordingly. In acknowledgement of such a need, the Ukrainian President ordered suspension of privatisation of electricity companies in May 2001 in order to 'take pause and carry out a thorough analysis of the privatisations that have already been carried out' (*Wall Street Jour-*

nal 2001). Ideally, the regulatory body should guide the reform process. But in most countries the regulator is being established at the same time as restructuring and privatisation. In Haryana state, India, the regulatory commission was established on 17 August 1998 after the unbundling of the state electricity utility had already started, and three days after the state utility ceased to exist (Dubash 2001). In Uganda the regulator had not yet started operating by the time the Uganda Electricity Board was unbundled. As such, the regulator was not able to respond to the consumer outcry after the huge electricity tariff increases following the unbundling (*East African Standard* 2001). In Mozambique the National Electricity Council or CNELEC, the electricity regulator, was not operational at the end of 2001 though the Electricity Act 21/97 liberalising the power sector started being implemented in 1997. This trend where the unbundling occurs before regulatory framework is established was also common in Latin America (Andersen et al 2001). It is somewhat puzzling that it remains so prevalent.

Reform has also been jeopardised by low staff capacity. In a general move to downsize governments in most developing countries in accordance with macro-economic policy directives, staff in the energy bodies have been reduced. At the same time, reform has resulted in changing the role of government but the staff expertise has not necessarily changed. Emerging regulatory bodies are largely staffed with personnel that were previously employed in the energy agencies. As a result some of these agencies cannot perform their duties efficiently, which is to the disadvantage of the consumer (World Bank 1995; Bouille et al 2001).

Most reformers have been unable to implement reform on their own and have had to depend on loans from bilateral and multilateral financiers, sometimes at the expense of more important development needs. The World Bank has been a front-runner in loan provision (see Table 3). In 1996 the Inter-American Development Bank lent Guyana $45 million to support a comprehensive reform of the electricity sector, including the privatisation of the Guyana Electricity Corporation, the state-owned power company (Drosdoff 1996a). In the same year the Multilateral Investment Fund (MIF) approved a loan of $1.169 million to assist Haiti in reorganising the electricity sector to make it more efficient and effective (Drosdoff 1996b). By implication, supporting reforms with loans has meant increased problems in the countries' balance of payments and increased financial dependency for many who were already deeply in debt.

Table 3: Loans for electricity reform to select countries
Sources: World Bank project database (www4.worldbank.org/sprojects/); Asia Development Bank project database (www.adb.org/Projects/profiles.asp); Multilateral Investment Fund database (www.iadb.org/mif/website/projectsort.asp)

	Total cost	*Loan (million $)*	*Loan source*	*Approval date*
India (Rajasthan power sector restructuring project)	_	180	IBRD	2001
India (Uttar Pradesh power restructuring project)	_	150	IBRD	2000
India (Andra Pradesh power sector restructuring project)	_	210	IBRD	1999
India (Haryana power sector restructuring project)	60	60	IBRD	1998
India (Orrisa power sector restructuring project)	997	350	IBRD	1996
Russia (Electricity sector reform project)	70.3	40	IBRD	1997
Lebanon (Power sector restructuring)	486	100	IBRD	1996
Bolivia (Power sector reform technical assistance project)	5.1	5.1	IBRD	1995
Indonesia (Power sector restructuring project)	780	380	ADB	1999
Philippines (Power sector restructuring project)	300	300	ADB	1998
Srilanka (Power sector restructuring project)	1	1	ADB	1998
Dominican Republic (Energy sector reform)	1.7	1.22	MIF	1997
Honduras (Regulatory agency for energy and telecommunications)	1.38	1.13	MIF	1996
Nicaragua (Support for the restructuring of ENEL and the introduction of the private sector	3.476	2.606	MIF	1998
Paraguay (Private sector participation in energy)	1.2	1.085	MIF	1995

4.5 Planning for calamities

Countries with large hydroelectric capacities have mainly invested in this resource, while many others rely on imported hydro-generated electric-

ity. However, recent experiences indicate the need to diversify generation source and to have a comprehensive centralised planning strategy. Recurrent droughts have resulted in high load-shedding at high economic costs, as experienced by Kenya and Uganda in 2000 (World Bank 2001b). Between 1994 and 2000 Tanzania suffered three major electricity shortages due to drought and sub-optimal operations of the hydro/thermal system (World Bank 2000). As of June 2001, Brazilians were ordered to slash electricity consumption by 20% or face power cut-offs for three days for first offenders, six days for repeat violators, partly due to low hydro supply resulting from drought (Margolis 2001). Between 1997 and 1999, the National Electricity Corporation of Cameroon constantly practised load-shedding in many parts of the country due to low water levels in the dams (Zekeyo 2001). Drought in 1999 forced Chile to impose compulsory power rationing and later establish a bye-law which obliges companies to supply under all hydrological conditions (Moya 2001).

The threat of macro-economic collapse and its implications on power sector reforms cannot be ignored. Indonesia's experience after the 1997 economic crisis demonstrates the need for taking such events into consideration when getting into long-term power purchase agreements and other financial arrangements with IPPs. After the crisis Indonesia could not honour its obligations to contribute financially to the construction of generation plants operated as IPPs since the government had no funds. In addition, electricity demand had decreased significantly, making additional generating plants unnecessary. As such, the government was forced to enter into expensive agreements with the private partners, stopping new constructions and delaying those that had started but were still incomplete. The government also renegotiated for lower tariff and a switch from the US dollar to rupiah. The recent (end of 2001) Argentinean financial fiasco is yet another experience that is rocking the power sector. These occurrences highlight the need for long-term planning, an activity that is being abandoned with entry of the private sector and government's 'exit'.

4.6 Meeting the environment agenda

According to the multilateral environment agreement, the UNFCCC, countries will reduce GHG emissions to curb the global warming threat. Energy production and consumption patterns are attributed with the largest share of GHG emissions. Threats of global warming have hence directed attention to the energy mix in our systems. A shift to a non-carbon-intensive system is advocated. There are major financial costs

associated with such a transition, however, and the principle of common but differentiated responsibilities is evoked when addressing the mitigation strategies. This acknowledges that developed countries are responsible for the largest share of historical emissions and should thus bear the major responsibility of reducing emissions. On the other hand, developing countries have to increase their energy consumption if they are to grow. This thinking has significant implications on the power sector.

To comply with a lower carbon scenario the sector should invest in low-emission generating facilities while increasing energy conservation and efficiency at distribution and end-use levels. At the same time the sector should encourage a switch to low-emitting fuels. Reform has, however, largely removed the control of the sector from government to private sector. Planning is limited to reactionary short-term policies and strategies often to address power crises.

Hydropower, particularly small-scale, is generally considered environmentally friendly, but recent unpredicted droughts have triggered concerns about its reliability. Other renewable energy technologies also score higher than fossil fuels on environmental friendliness. Under reform the decision on generation technology is mainly entirely made by the investor and is largely dictated by access to funds, ease of facility development and profits thereof. There is no longer any public oversight to direct type of capacity built. The private sector players prefer to use conventional fossil fuel technologies since they are cheaper (Widagdo 2001). Morocco, for example, completed development of the largest IPP in Africa in February 2001, 1356 MW, which will be operating on coal (IEO 2001). Most of the IPPs that are planned and being implemented in Kenya use fossil fuels. About 60% of the new IPP capacity in Thailand will be from coal (Ryder 1999). There are expectations that funding available under the UNFCCC and related financing mechanisms will encourage increased use of renewable energy technologies for electricity generation, but it is difficult to establish the extent to which this will occur. Unbundling of generation and distribution has meant lack of incentives to invest in demand-side management and overall energy efficiency.

5. Alternative paths for reform

Various sensational events, including the widely documented California crisis and the Enron debacle, are compelling power sector reform critics to re-surface and offer alternatives. Two proposals, an energy commons approach and a civic markets approach, are discussed here.

Byrne and Mun (2001), after a comprehensive analysis of the California case and other areas, note that reform has intensified commodification of electricity and hence geared the system towards short-term profits, leaving long-term public interests such as conservation and renewable energy development further neglected. They propose a shift towards a reform system that underscores the fact that energy is a commons rather than the commodity it is currently viewed as. As such the public sector cannot be divorced from the operations of electricity sector. This argument is justified by the historical electricity system ownership and management structure: the public is entitled to a stake in electricity business since electricity networks were initially built with taxpayers' funds. The second forward-looking justification is the natural availability of renewable energy resources which makes them potential energy commons. Embedded in the energy commons approach is the assurance of access to electricity within the 'energy income' – i.e. the income available to consumers for energy expenditure.

The energy commons approach is also advocated by Agbemabiese (2002) as the analytical approach that should have prevailed in the decision to construct the Akosombo dam in Ghana, since it would have enabled inclusion of the equity and efficiency concerns. He argues that this would have resulted in a different outcome – the dam might never have been built. He laments the role of energy commodification in discrimination against African rural electrification in favour of profitable urban electrification, and hence the betrayal of the universal access goal. In addition he notes that a reform process that emphasises comodification, and consequently by default results in biases towards fossil fuel-based technologies, is likely to violate the environmental agenda.

After an analysis of the California reform experience, Bradshaw and Clark II (2002) conclude that the free market system does not deliver on many fronts, including efficient service provision, competition or consumer choice, as electricity markets are vulnerable to monopoly. After the crisis resulting from reform process, the state was forced to take over many of the functions that were previously in the private domain, such as ensuring supply and running the transmission system. The authors propose a flexible power system under a civics market approach which entails a more limited reduction of regulatory control, and emphasises giving consumers real choices rather than a 'free' market. They note that the civics market approach would reduce prices and lead the market while maintaining a watchdog who protects the public interest. The abuses of monopolies are controlled under the premise that the public interest should be represented in making key market-forming decisions. Instead of open competition, the civic market model increases choices

through regulated licensing combined with public participation as it is needed. This market also enables inclusion of technologies that the public may deem preferable.

In both approaches governance rests with the political system, rather than exclusively with markets. A corrupt political system will yield poor commons policy just as a corrupt market system will give similarly less than satisfactory outcomes. Thus, a commons approach requires enduring efforts to govern properly. In this vein, Byrne and Mun (2001) and Agbemabiese (2002) underscore the importance of a companion strategy entailing empowerment of civil society to meet the challenges of equity and sustainability as societies and the energy commons evolve.

6. Conclusions

While the power sector in many developing countries has been financially and administratively ailing, justifying calls for reform, the processes adopted have given inadequate attention to the crucial diversity across reformers and their peculiarities, and hence jeopardised sustainable development. Rising electricity demand and unmet electricity needs have necessitated increased investments in generation at a time when donor and traditional financing agencies policies have shifted from pro-public sector to pro-private sector. Lack of financial autonomy has left countries with little choice other than to adopt conditionalities advanced by the external agencies in order to get support for electrification and other macro-economic issues. The reform recipes are rarely matched with country-specific conditions. It is becoming increasingly clear that reform will hardly contribute to addressing developmental and environmental challenges. The ramifications of the reforms extend beyond the power sector. Hence developing countries cannot afford to reform the electricity sector in isolation, but need to take into account its impacts across the economy.

The short-term implications indicate a need to slow down the pace of reform while at the same time undertaking comprehensive analysis of its impacts and modifying the process accordingly. The California electricity crisis and the more alarming Enron collapse bring to the fore the following questions: Can developing countries survive such tragedies? Is there a way out? The 'Enrons' of today are increasingly gaining control of the power sector in developing countries.

Poverty alleviation and increasing electricity access remain key challenges for developing countries. It is evident that the reform models being implemented will not facilitate poverty alleviation and will instead further marginalise the poor as many employees get laid-off, tariff in-

creases and disconnections mount up, and the unconnected are ignored. Theoretically, conferring electrification responsibilities on the private sector proves to be an optimal choice as public resources become available for other development projects. Government's abdication of duties in the electricity sector in favour of the private sector was on the basis that public funding would become more available for more important social development needs. This has hardly happened and the expected savings have hardly made dents in the foreign debt suffered by respective countries. In reality, not only has the private sector continued to depend on government financial support albeit indirectly but it has also rarely met the electricity demands, a fundamental rationale for reform. In an effort to make utilities financially attractive to the private sector, downsizing has been rampant, with the target being international average values of employee per customer served. As Stiglitz (2002) notes as a lesson from Argentina, policies resulting in unemployment spell doom for a country's economic and social stability. Financial institutions advocating power sector reform ignore macroeconomic stability, social and economic efficiency, focusing instead on sectoral financial impacts. It is an inescapable fact that an employee in a developing country supports more than a couple of persons and thus loss of a single job means hunger for many. The social instability associated with unemployment is evident across the developing world.

If developmental and environmental goals are to be met under reform, can it be done without concerted government involvement? To increase access, strategies to accommodate rural and low-income urban electrification are imperative. As is evident from 'seasoned' reformers, this electrification cannot be left to the 'market'. Who should be responsible for designing and implementing such strategies?

Reform has had some positive achievements, particularly in reducing technical and 'other' losses (the latter mainly related to theft). Reform has made utilities financially stronger than during the pre-reform period mainly through staff cuts. Performance indicators depict improvement. However it is important to ask; are these 'universal' indicators relevant for the developing countries context?

Problems associated with reform cannot be blamed entirely on external actors. Stakeholders within reforming countries have vested interests making them susceptible to supporting certain processes. But are there no mechanisms such as those that ensure autonomous regulation that could make reform process more accountable? What form of government intervention could result in socially and environmentally favourable reform?

Investigating implications for different reform options and choosing accordingly provides opportunities for adopting responsible reform. However, government's bargaining positions relative to other stakeholders, and in particular the financing institutions, may be weak. Would a consultative approach in formulation of the reform plans which includes civil society and decision makers beyond the power sector offer a better alternative?

The power sector may be suffering inefficiencies, but is privatisation the solution? What are the alternatives approaches that could ensure an efficient sector while meeting development and environment objectives?

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Appendix

Table A1: Installed capacity and electricity coverage in selected countries

Country	*Installed capacity (MW)*	*Population coverage*
Argentina		91%
Bangladesh		16
Brazil		92%
Burkina Faso	Hydro: 20%; diesel 50 MW	7-8%
Cameroon	863 (hydro: 83%; diesel: 17%)	25% (rural: 6%)
Chile		95%
Colombia		85%
Costa Rica		93%
Côte d'Ivoire	1200 (hydro: 75%; thermal:25%)	
Ecuador		80% (urban: 96%; rural: 54%)
El Salvador		65% (urban: 92%; rural: 38%)
Ethiopia	377 (hydro: 97%; diesel: 3%)	10%
Ghana	912 (hydro: 95%; thermal: 5%)	25%
Guatemala		67% (rural: 52%)
Guinea		5% (urban: 35%; rural 1%)
Honduras		45% (rural: 19%)
India		80%
Kenya	782 (hydro: 76%; thermal: 18%; geo-thermal: 6%)	
Lesotho	Hydro:85%; thermal:15%	
Malawi	168 (hydro: 95%; thermal: 5%)	
Mexico		95%
Pakistan		50%%
Panama		70%
Peru		65%
Senegal	900	Rural: 4.1%
Swaziland		Rural: 5%
Tanzania	Thermal: 112MW	
Uganda	270 (hydro:96%; diesel: 4%)	5% (rural:2%)

Country	*Installed capacity (MW)*	*Population coverage*
Venezuela		90%
Zambia	1750 (hydro: 98%; coal: 2%)	
Zimbabwe		35% (rural: 7%)

Table A2: International private power investors in developing countries
Source: Lamech & Sayeed (2003)

ABB Equity ventures	Delma Power	HEI Power
American Electric Power Company	Duke Energy	Hydro Quebec
AES Corporation	Dynergy	Ibedrola
Alliant Energy International	E.ON Energie	Independent Power
Alsons Consolidated Resources	Edison Mission Energy	Intergen
Amata Power	El Paso Energy	International Power
Banpu Public Co-Ltd	Electricité de France International	Keppel FELS Power
BG group	Electricite de Portugal	Korea Electric Power Co
BP Global Power	Elyo	Marubeni Power
CHI Energy	Endesa	Mirant
Chilectra	EIF Group	Mitsui & Co
Cinergy Global Resources	Entergy Power Group	NRG Energy
CLP Power International	Eskom Enterprises	Panda Energy
CMS Energy Corporation	FondElec	PPL Global
Cogentrix Energy	Fortum	PSEG Global
Commonwealth Development Corp	GE Capital Global Energy	Reliant Energy
Covanta Energy	GMS Power	Rolls-Royce Power Venture
Saur International	Sempra Energy	Sithe Energies
Scudder Latin America Fund	Siemens Power Ventures	Statkraft International
Tomen Power	Tractebel	Steag AG
TranAlta	TXU Corp	Union Energy
Union Fenosa	Wartsila NSD	

3

Rethinking reform in the electricity sector: Power liberalisation or energy transformation?

JOHN BYRNE

YU-MI MUN

1. Introduction

After electricity was first introduced in the 1880s in the United States and Europe, its use expanded dramatically throughout the world, transforming almost every aspect of daily life. It is now essential to the operation of most modern technological systems, and, for this reason, has attained the status of a 'metatechnology' (Schon cited in Zimmerman 1992). The inner logic of this metatechnology has shaped contemporary development patterns – grid expansion and urbanisation are nearly synonymous; national and local politics – pro-growth and pro-electrification coalitions significantly overlap; social values, culture and identity – to be modern is to be electrified; and community life – our connection to one another, in industrial countries especially, is often electrical (telephone, television, e-mail). It is not surprising, therefore, that electricity supply is often viewed as an essential public good in contemporary society.

The electricity systems developed over the last century mainly rely on large-scale power plants and extensive networks of transmission and distribution that deliver electricity at affordable prices (at least, in most industrial countries). However, these systems have also created a host of environmental, social, and economic problems. For example, increasing

electricity consumption in industrial countries has caused major air pollution problems. In fact, power plants are estimated to account for almost two-thirds of sulphur dioxide emissions in Europe and North America (Brennan et al 2002; Fox-Penner 1997); and pollution from them has been linked to urban smog, forest loss and freshwater contamination in industrial and developing countries (see Reddy et al 1997). For developing countries, adding large-scale power plants is very costly. Still, elites usually succeed in demanding investment priority for their construction, which can lead to a widening of social inequity as sizeable portions of developing country populations (especially in rural areas) are often left unserved.[1]

Starting from the early 1990s, a set of institutional reforms – including unbundling, privatisation of ownership, and the introduction of competition into the generation sector – began to be promoted as a global solution to the problems of the electricity industry (IEA 2001; Littlechild 2001; Patterson 1999; Joskow 1999; Bacon 1995). The concurrent movements of unbundling, private ownership and competition (or at least demonopolisation), which hereinafter we will call *power liberalisation*, aim to rationalise the sector's development by treating electricity as a commodity in need of optimal allocation. Advocates maintain that governing the electricity industry according to market dynamics, rather than socio-political considerations, promises to result in its more efficient operation (Bacon & Besant-Jones 2001; IEA 2001; World Bank 1999; International Chamber of Commerce 1998; Joskow 1998; World Bank 1993). Some further promise important social and environmental benefits if the sector is liberalised (Lovei & Gentry 2002; Powell & Starks 2000; Joskow 1998; see also Smeloff & Asmus (1997), especially chapter 4).

The experience with power liberalisation around the world, however, has frequently included price hikes, unreliable service, employment loss, and reduced access, particularly for the poor (TNI 2002; Coyle 2000; Higley 2000; Hall 1999). This chapter offers an analysis of the initiative based on what are argued to be commonly embraced tenets and commonly witnessed results. The analysis is informed by a theoretical distinction between *commodity* and *commons* as platforms for energy policy development (see Byrne and Mun (2001) for an earlier discussion of this distinction). Below, we argue that power liberalisation follows a com-

[1] The high cost of grid extension to distant rural communities and the relative lack of investment in small-scale power resources that can serve the rural areas in a cost-effective way (see Zhou & Byrne 2002; Byrne et al 1998) can lead to service inequities.

modification agenda that is socially, politically, economically and environmentally problematic. As an alternative, we propose an *energy policy commons* approach that can lead to transformation of the sector in a manner that is responsive to the aims of democratic, equitable and sustainable development.

2. Anatomy of power liberalisation: Historical context, ideology, and agenda

2.1 Historical context

For nearly a century, electricity around the world was typically produced by vertically integrated utilities, which operated facilities for all three stages of electricity service: generation, transmission, and distribution. In many cases, utilities were state-owned monopolies. When private ownership was present, the companies nonetheless operated as monopolies in designated franchise areas regulated by governments that set rates and oversaw investments (Patterson 1999).

The involvement of the public sector in the electricity industry is partly explained by the sector's technical and economic evolution. As utilities pursued economies of scale both in supply and in demand, electricity systems became highly centralised, large-scale technological networks (see Hughes 1984; Messing et al 1979). Creating such a network is a highly capital-intensive project with long payback periods (but significant society-wide benefits), and, as a result, has required public sector oversight of electricity supply in many countries. Even where private firms were active from the outset in the electricity business (e.g., the USA, Germany, and Japan), governments have played an important role in building electric networks – sometimes as a supporter of, and at other times as a competitor to, private power (Patterson 1999).

While electricity systems built by public and/or private monopolies made large-scale production and consumption of electricity possible in many parts of the world, their operation also created serious problems. For example, mega-projects such as large-scale hydro dams, nuclear reactors and coal-fired power plants have become sources of serious ecological degradation and have crowded out public spending on other social projects, especially in developing countries (Durosomo 1994). In many developing countries, a phenomenon known as 'electricity poverty' emerged in which urban elites enjoyed service at the expense of large majorities of the un- or under-served rural poor. These problems were exacerbated by the undemocratic mode of governance often characterising electricity decision-making. Too often, important decisions

regarding electricity supply were made by a closed circle of technical experts, government bureaucrats, and large corporate clients. Such a governance structure, coupled with the monopoly status of utilities, resulted in electricity industries developing into powerful organisations with their own political and economic agendas. In the absence of effective public supervision, moreover, electric utilities in many countries became a source of corruption, cronyism and pork-barrel politics rather than guardians of the public interest (Patterson 1999).

A series of proposals during the late twentieth century sought to address such issues, as well as capital shortages suffered by developing country public sectors. Power liberalisation has differed by country, but common elements of an agenda for sectoral change can be identified (IEA 2001; Littlechild 2001; Rosen et al 2000):

- Vertically integrated utilities are broken up, either by sale of generating plants, or by placing generation assets in separate unregulated generating companies that remain utility subsidiaries.
- Markets are created into which the generating companies can sell, and from which others can buy.
- Capital investment in the sector is increasingly decided by market actors and forces.

Reforms in the institutional framework of the electricity industry that are associated with power liberalisation are justified by advocates on several grounds. It is argued by many that the merits of monopoly in electricity generation have disappeared because economies of scale associated with centralised power plants have been exhausted (see Joskow 1998; Flavin & Lessen 1994; Kahn 1991). Continued monopoly supply under these circumstances would only hinder the introduction of new technologies (Hirsh & Serchuk 2000). Others point to the fact that governments in many countries are experiencing financial strain in mobilising capital for investments in electricity infrastructure (see World Bank 1999 and 1993).

Where state ownership is not prevalent, state interventions in electricity price-setting and capacity planning are blamed for 'distorting' markets, thus creating artificially low prices (in developing countries) or high prices (industrial countries). In both cases, sub-optimal conditions for electricity supply and demand are possibly created (IEA 1999a; 1999b). Additionally, some suggest that pressures are escalating from increasingly globalised capital sectors for the electricity industry to be more open to new investments, competition, and capital mobility (see Flowers 1998; Graham 2000; Tellam 2000).

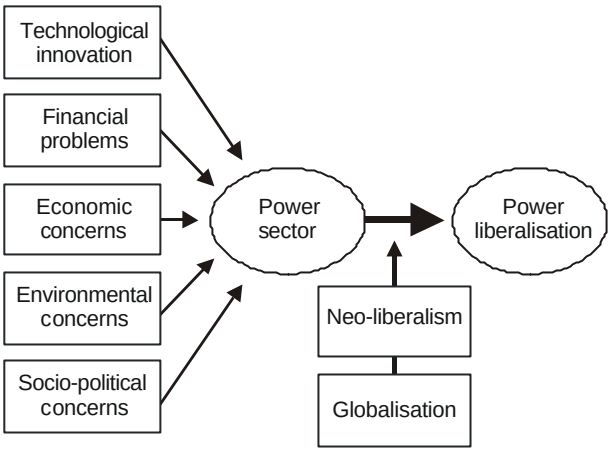

Figure 1: Power liberalisation

2.2 Efficiency ideology

An almost universal justification for electricity privatisation and/or the introduction of competition has been the claim that reform will yield an economically more efficient sector than regulated monopoly arrangements. The International Energy Agency (IEA), for example, argues that electricity market competition offers significant potential benefits through improved economic performance, lower prices, and an expansion of choices available to consumers (IEA 1999a; 1999b). Following the same line of argument, other multilateral institutions such as the World Bank, the International Monetary Fund, and the Asian Development Bank also are calling for power sector reform as a key condition for loans and other forms of financial support (see Dubash 2002; and Tellam 2000). In this regard, power liberalisation is increasingly expressed in the form of an ideology, that is, a belief (with cited empirical support) in the ability for specific institutional changes to create societal improvement, in this case, via advances in efficiency. Key beliefs underlying this ideology include:

- the view that the private sector is more efficient than the public sector in matters involving resource allocation (Lovei & Gentry 2002);
- the assumption that greater competition and less regulation will increase economic efficiency (Bacon & Besant-Jones 2000);
- the conviction that market-oriented policies will enable the electricity system to be subject to democratic pressures through the choices that consumers make (Smeloff & Asmus 1997); and

- the presumption that liberalisation will enhance environmental quality by driving out old technologies (Lovins et al 2002; Joskow 1998; Flavin & Lessen 1994) and/or by facilitating 'green' consumerism (Wiser 1998).

2.3 The agenda of power liberalisation

Power liberalisation aims to free electricity from the constraints of public control by permitting it to be auctioned largely as a commodity. As Offner (2000) points out, the policy emphasises private markets and ability to pay, and regards public support and cross-subsidies as sources of social and economic distortion. In other words, power liberalisation is centered on an agenda of commodification 'in which progress is determined by increased social capacity to produce and purchase goods and services' (Byrne & Rich 1992: 271). As explained below, commodification of electricity supply advances trends toward centralisation and marketisation in not only the techno-economic but also socio-political contexts that give structure to the sector.

2.3.1 Increasing centralisation

In discussing the origin of electricity restructuring, many note that recent technology innovation in electricity generation has made obsolete the logic of scale economies, which had earlier justified monopoly status for suppliers (Fox-Penner 1997; Hunt & Shuttleworth 1996). Improvements in smaller-scale, natural gas-fired, combustion technology have arguably diminished the economic edge that large plants once had. As a result, advocates believe that a key hurdle to supply-side competition, namely, high initial capital costs to enter the market, is no longer present (see Fox-Penner (1997) and Brennan et al (1996) for details). In fact, power plants built by independent power producers in the USA, which typically account for over 50% of new capacity additions, averaged just 25 MW by 1992. Similarly, the average size of utility-built plants declined from more than 600 MW in the mid 1980s to an average of about 100 MW by 1992 (Flavin & Lenssen 1994: 17). This trend is seen as a decisive factor in explaining the rapid increase in restructuring efforts during the 1990s.

While it is true that smaller-scale gas turbines have played a role in challenging the 'natural' monopoly economics in generation, this does not necessarily mean that power liberalisation will lead to decentralised electricity systems, in which small-scale, community-based technologies flourish, and management of the electricity systems becomes localised. To the contrary, centralisation is being further reinforced especially in the form of utility mergers and acquisitions, and in the operation of transmission and distribution (T&D) networks.

For example, since wholesale competition was established in 1992, the number of private utilities in the USA has shrunk dramatically because of increasing merger and acquisition activity. As a result, while the ten largest utilities in the USA, ranked according to generation capacity, owned 36% of all investor-owned-utility generation capacity in 1992, the share had increased to 51% by 2000. Evidence of consolidation among the sector's top 20 companies is even more compelling. In 1992, the 20 largest companies owned 58% of total investor-owned-utility generation capacity; their share had increased to approximately 72% by 2000 (USA EIA 2000). British experience likewise suggests that centralisation of the electricity business is likely, notwithstanding advances in small-scale generation technology. While the UK originally had 12 retail supply companies operating in its competitive movement, six large generation companies now dominate. The 12 distribution companies created under the country's restructuring plan are also beginning to merge. As of 2002, eight firms own most of the distribution business (Thomas 2002: 3).

For developing countries, a relatively modest number of overseas companies have competed to enter their electricity markets. For example, Cameroon received just foreign six bids when its market opened and Mauritania and Senegal each attracted only four foreign bidders in their liberalisation processes. Final participants were even smaller in number (one or two) (see Wamukonya, 2003a). According to a recent World Bank survey, moreover, most private investors are losing interest in developing country power markets (Lamech & Saeed 2002: 2). This is hardly convincing evidence that liberalisation and technology change are promoting competition in the electricity sectors of developing countries.

Power liberalisation initiatives put great emphasis on the role of transmission networks as 'common carriers' and try to ensure 'open access' to the transmission network by competitors. Transmission operators also typically manage the bidding markets for the supply of electricity when competition in generation is introduced. While the language may resemble that of a 'commons' argument, the actual implications are quite different: the transmission system is operated as a 'common' carrier of electrons generated by large electricity companies, and 'open' access to the transmission system is guaranteed mostly to those companies and large-scale electricity consumers. Rather than being used as a means to reflect economic, social and environmental priorities of diverse communities connected to the electric grid, T&D networks are operated mostly as highly sophisticated technocratic institutions that enable the transfer of large volumes of electrons (and private gains) among a small number of sizable companies. Compared to the Internet, for example, there are only a modest number of participants, with substantial market power.

Centralisation of the generation business and transmission and distribution networks has to do with the commodification of electricity spurred by liberalisation. A key action of reform in this respect is the lifting of restrictions on electricity trade. A 'free' market for electricity calls for competition in so-called bulk power supply (i.e., the delivery of large volumes of electricity to large, interconnected grids). Winning a bid in this market (at regional, national and international geographies) ensures a company that it can operate its plants at high capacity factors, thereby driving down unit costs. Merger and acquisition activities reflect this logic. Thus, even if smaller-scale generation is now affordable, the generation business is likely to increase in scale. Similarly, an 'open' market depends on freer movement of electrons, which in turn requires increased interconnections between existing systems over wider geographies. Indeed, the extension and interconnection of transmission lines to facilitate the free movement of electric commodities is commonly presented as a key requirement for a more efficient electricity sector. The phenomenon is also readily observed in Europe, where the prospect of a multinational grid is being vigorously pushed.

Another important element of the further centralisation of the electricity system is the concentration in ownership of electricity systems on a regional and global scale. As discussed by Thomas (2002), Flowers (1998) and Patterson (1999), for example, mergers and acquisitions across national borders are a distinct feature of power liberalisation. In fact, opening the electricity industry to global capital is one of the key imperatives of power liberalisation, since its proponents believe that competition among electricity suppliers and carriers will generate the most efficient and optimal outcomes. Thus, liberalisation is likely to expand the geographical reach of the already large electricity suppliers, which will be justified under the guiding logic of commodification as the necessary result of the market's drive for efficiency.

2.3.2 Marketisation agenda

Faith in the marketplace constitutes another keystone of the policy framework underlying power liberalisation. Based on neo-liberal ideology that associates markets with freedom and governments with repression (see Somers (2001) for a discussion of the origins of this ideology), free market advocates elevate trade as the centrepiece of civil society, and assign secondary status to non-market values and interests. In fact, some proponents regard markets and consumerism as preferable alternatives to political activism and the aggressive exercise of citizenship because, arguably, society's members can participate in markets directly and individually, whereas citizens participate in the polity only indirectly

and collectively (Crouch et al 2001). Such a tendency to 'marketise' or 'privatise' citizenship (Somers 2001) is noticeable in the debate over power liberalisation. In line with the 'Citizens' charter' formulated by the British government to celebrate individual choice (Freedland 2001: 100), providing individual consumers with 'the right to choose' electricity suppliers is often described as equivalent to securing civil rights and 'democratising' the electricity system (MOCIE 2001). The advocates of this view argue that citizens, who hitherto had little influence in decision-making on electricity policy, can now realise their preferences and values in the electricity market using their power to choose and change electricity suppliers (see Smeloff & Asmus 1997).

Based on the belief that market mechanisms are more efficient than social regulation or planning, proponents of electricity restructuring also argue that important public policy goals such as the promotion of renewable energy can be realised by expanding consumer choice. For example, 'green pricing,' which allows electricity companies to sell renewable energy at a higher price than other power (see Rabago et al (1998) and Wiser (1998) for details), has been proposed as a key mechanism to make the electricity sector sustainable. Proponents of green pricing base their optimism on survey results showing that consumers are willing to pay more for electricity produced in an environmentally friendly manner. According to a US study, however, only 1-2% of consumers have actually switched to a green power provider even in the states with the most successful green pricing programmes (Swezey & Bird 2000). Nonetheless, liberalisation's proponents often promise a less polluting future if electricity is governed by markets rather than governments.

3. Contradictions in power liberalisation

3.1 Economic contradictions

Experience with liberalisation so far has revealed that creating a genuinely competitive electricity market is an extremely difficult task. After initially unbundling electricity monopolies into several firms, for example, many countries have seen those companies vertically and horizontally reintegrate. In many cases, therefore, the result of power liberalisation has been the creation of electricity oligarchies, which tend to be dominated by large multinational corporations (Thomas 2002).

The experience with California's Power Exchange, moreover, suggests that policy-making based on a belief in 'the genius of marketplace' (CPUC 1996) can lead to surprising results. For example, day-ahead,

hour-ahead, real-time electricity markets in California succeeded in boosting, rather than lowering, prices. The economic value and profits of some generators such as Reliant Energy, Duke Energy, and the AES Corporation improved dramatically (see Table 1), but without any tangible increases in efficiency of generation. Indeed, these companies largely profited from the purchase of power plants that utilities in the state were required to sell under restructuring in order to increase competition. The costs to California of power liberalisation included high wholesale prices (reaching a monthly average of 37 cents per kWh in December 2000[2] – more than 11 times higher than the pervious year – see EIA (2001)), exceptional service disruption rates (CPUC 2001), the emergence of profitable 'dirty power' plants (especially beyond California's borders) and the necessity of a government bailout of the industry (which totalled $12.0 billion in bond sales – see the Foundation for Taxpayer and Consumer Rights (2002) for details).

Table 1: 'Winners' in the California electricity crisis: merchant plant owners
Source: Public Citizen (2001)

	Price paid for CA plant ($m)	*2000 est. gross CA plant profit (A)*	*Rate of return on CA plant ($m)*	*Company 2000 profit (B) ($m)*	*% of co's 2000 profit from CA plant sales (A/B)*
Southern	801	212	26%	1 313	16%
AES	781	235	30%	657	36%
Duke Energy	501	344	69%	1 776	19%
Reliant Energy	280	261	93%	819	32%
Dynergy	59	59	100%	452	13%
TOTAL	2 422	1 111	46%	5 017	22%

In analysing the causes of the California electricity crisis, many point out that market participants were able to 'game' the system to maximise short-term profits (CPUC 2002). This is attributed to California's policy requiring all wholesale transactions to occur via 'spot markets' and its restrictions on the use of long-term contracts to hedge risks that would accompany market speculation. Capitalising on such a market design in California and the distinctive characteristic of the electricity system,

[2] On December 12 2000, the daily average power exchange price in California exceeded 60c per kWh. On the following day, the average wholesale price in the day-ahead market jumped to $1.20 per kWh (Smith 2000a; 2000b).

namely, that demand and supply must be precisely and continuously matched in real time (due to the inability to store electricity), some generators withheld supply from the day-ahead market, and instead bid capacity into other markets in order to collect high premiums for real-time energy and ancillary services (FERC 2001). In essence, power generators in California created an artificial scarcity and drove up prices by adjusting their bidding strategies – without collusion (World Bank 2001). The 'genius of the marketplace' (CPUC 1996), to which California entrusted the management of its electricity system, ultimately provided new opportunities for profit creation in the electricity sector and little else.

Under such circumstances, the claim that markets produce efficient allocations of resources is problematic. Why would one presume that rapid increases in profit collected by energy traders who withheld, rather than expanded, capacity is efficient? Why would the need for billions in bond sales to bail out the industry and the occurrence of rotating blackouts be regarded as efficient? In reply, some market proponents have argued that rate caps on residential consumer bills doomed the California policy to failure (e.g., Berg et al 2001). But is it reasonable to argue that results would have been efficient if the utility sector could have passed on 400% increases in wholesale prices to residential users? Why would the transfer of billions of dollars in profits to energy traders by residences count as an efficient allocation of resources? Others explain the California crisis as the consequence of a flawed market design (e.g., World Bank 2001). However, this begs the question. If markets require policy design to succeed, why wouldn't it be appropriate to recognise policy – and importantly, the chosen aims of policy – as the key factor, rather than markets. Obviously, acceptance of this point would deny markets the presumption of inherent benefits. Instead, economic benefits would accrue in relation to the design of market policy, thereby requiring explicit goal-setting as to those who should gain how much, and how the gains should be accumulated, invested, and shared.

Rather than relying on 'genius' strategies, it would perhaps be more apt to argue that our policy challenge involves the creation of a decision-making process that can produce a collectively valued restructuring strategy. Seen in this light, markets could be tools for meeting public aims, but it would be inappropriate to use market economics to preempt public policy choice.

3.2 Environmental contradictions

The impact of power liberalisation is not confined to the economic realm. By subsuming societal goals under the promise of economic effi-

ciency, power liberalisation tends to leave existing environmental problems unaddressed and creates new challenges in meeting sustainability goals. Power liberalisation promotes an electricity system that is geared toward short-term profits, compared to its monopoly predecessor. While this can mean that innovation is encouraged, it may also mean that a long-term public interest in sustainable alternatives, such as conservation and renewable energy, can be neglected. Treating electricity as a commodity drives economic actors to focus on selling more kWhs – rather than providing more services with fewer kWhs. For example, utility spending on demand-side management programmes in the USA fell 45% between 1993 and 1998, and fell 57% from projected levels (Union of Concerned Scientists 2000). This is the period during which electricity restructuring was initiated in the USA. Further, much of the revenue from policy tools created by states during restructuring to capture public benefits (those tools include system benefit charges, set asides for conservation and renewables, and renewable portfolio standards) has mainly substituted for funds from utility-sponsored programmes, rather than expanding the level of a social commitment to sustainable energy options.[3]

In the case of renewable energy investment, a dramatic reversal from a steady upward trend in development has been the clear result of USA restructuring. According to a recent report (Union of Concerned Scientists 2000), renewable energy generation in the USA fell from 66 billion kWh in 1993 to 49 billion kWh in 1998, as utilities bought out contracts and shut down or reduced output from renewable energy plants. While renewable energy investments are increasing in Europe, growth in these options is the result of clear government policies to promote renewables in an effort to reduce greenhouse gases (Commission of the European Communities 2000).

In countries that choose to begin power liberalisation by inviting the participation of independent power producers (IPPs) – a common approach in developing countries as observed by APERC (2000) and Hunt and Shuttleworth (1996), the situation can be worse. Many countries have learnt that IPPs require power purchase agreements with take-or-pay clauses. Such clauses provide little incentive to improve demand-side efficiency, since a country must pay a fixed fee regardless of whether full use is made of the electricity supply pledged by an IPP (Wagle 1997). In short, the commodification of electricity tends to further

[3] In any case, these tools find their rationale in environmental, not efficiency, terms and, therefore, any achievements associated with them cannot properly be attributed to liberalisation.

divorce the value of electricity from the actual uses to which it is put, thereby impeding an integrated approach to meeting energy needs at least cost to both the economy and the environment.

Experience to date indicates that electricity commodification tends to speed up, rather than slow down, the 'race to the bottom' in terms of environmental profiles of electricity generation (Higley 2000 and RAGE, no date). Since prices in electricity markets do not include environmental costs, older, highly polluting power plants can have competitive advantages compared to other modes of power generation, especially when markets become enlarged through increasing interconnection of grids. In the absence of stronger environmental regulations, therefore, liberalised electricity markets appear likely to add to environmental harm in the search for a cheaply priced electricity commodity. In fact, carbon dioxide emissions in the USA electricity sector jumped 20% to 2.6 billion tons in 2000 from 2.1 billion tons in 1995, exceeding the worst-case forecast of the Federal Energy Regulatory Commission (FERC) for environmental impacts of power liberalisation in the USA (FERC 1996). The unexpectedly high increase is attributed to a cutback in energy conservation measures by utilities (Carlton and Smith 2002).

3.3 Political contradictions

While power liberalisation initiatives aim to substitute self-regulating markets for political governance, the new markets have turned out to be far from self-regulating. Regulatory measures needed for adequate supervision of market activities have proved to be more complex than those required under regulated monopoly regimes. For example, system coordination – making different components of the system balanced in real time in terms of voltage and frequency – has become much more challenging in a liberalised market environment and more sophisticated in terms of central controls than many had expected (see Brennan et al (2002) for details).

The process of establishing regulatory agencies or other kinds of controlling bodies needed for liberalised electricity markets has tended to date to reinforce the authority of centralised and largely autonomous organisations. These include power exchanges, independent system operators, and regional transmission organisations, all of which diminish the range of local decision-making and governance. In the USA, for example, federal government agencies have assumed much more critical roles in a liberalised electricity market. Whereas state and local governments were primarily responsible for the supervision of electric utilities during the era of regulated monopoly regimes, FERC has recently as-

sumed a large portion of the regulatory obligation. Moreover, partly because of the complexity involved in adequate management of liberalised electricity systems, technical knowledge tends to be further empowered at the cost of citizen-based political deliberations. Thus, local USA jurisdictions had the authority to decide the balance between demand-side management and utility generation until liberalisation. Now that balance is lost in the whir of independent system operators and power exchange machinations about transmission congestion pricing, 'must-run' versus 'bidded' supply, and detection of market gaming strategies.

Without explicit efforts to reinsert democratic principles in the process of power liberalisation, electricity markets are likely to be controlled by and serve the interests of already powerful economic and technical entities. Nonetheless, advocates of power liberalisation often delegitimise political interventions in electricity markets, arguing that societies should 'let the market work' (Berg et al 2001). By doing so, they effectively diminish the space for public decision and action and leave the market 'open' to the needs of special interests (particularly those with large financial stakes). As a result, political and regulatory bodies face increasing challenges in establishing the legitimacy of interventions into market operations to protect the public interest.

The preference under power liberalisation for individual consumer choice to political intervention is fundamental to the claim that electricity decision-making is more democratic with restructuring. However, consumer choice of electricity suppliers or products is only one of the many choices that societies have traditionally exercised with regard to electricity. In fact, many values important to a society's electricity future are decided outside the context of consumer choice of electricity providers. Universal service, environmental sustainability, social equity, and democratic governance of infrastructure investment are examples of commitments that societies have often embraced concerning the operation of their power sectors. By promoting neo-liberal ideology, which places individual above socio-political choice, power liberalisation sizably diminishes the space for collective, deliberative decision-making. Even in cases where consumer choice matters, marketisation of citizenship ultimately tips the balance toward more powerful economic interests, since one dollar is one vote in markets.

3.4 Social contradictions

Some researchers have raised concerns that power liberalisation would further entrench the unequal power relationship in the electricity sector, aggravating inequity between producers and consumers, and between

affluent and poorer consumers (Coyle 2000). For instance, Ratepayers for Affordable Green Energy, a USA consumer group, notes that even if efficiency improvements lowering the cost of electricity generation were to occur with liberalisation, the benefit would not necessarily be distributed equitably. Because large energy consumers may be able to negotiate low prices with competitive providers, residential and small business consumers could experience price discrimination (due to their comparatively lower price elasticity) and pay higher unit prices (RAGE nd). Based on the experience in Brazil, Silva (2000) also reports that because of the uneven contest for low-cost electricity generation, the price of electricity has risen by nearly 320% for those using less than 30 kWh per month, whereas those consuming more than 1 100 kWh per month experienced a 16% decrease in prices.

In a similar context, Guy et al (1997) discuss the practices of 'cherry-picking' and 'social dumping', witnessed after liberalisation in the UK. They argue that privatisation and liberalisation reward companies who accurately gauge market potential and profitability, and this has led British companies to carefully target socio-economic groups and locations through various techniques such as geo-demographic analysis and consumer-profiling (Guy et al 1997). The consequence of such cherry picking is the dumping of unprofitable consumers (Graham & Marvin 1994). With the gradual removal of cross-subsidies and an erosion of the commitment to universal service, utilities have sought to cut the cost of serving so-called 'cold spots' by either 'levering poor domestic customers off their networks or by installing prepayment cards' (Guy et al 1997). Since electricity provides an essential service for social and economic development, disconnection of unprofitable communities will eventually divide society into 'haves,' 'have nots,' and those who 'have little'. As information and communication are digitised and transferred by means of electrical networks, the social divisiveness of power liberalisation will ultimately mean not simply an inequality in service, but in the capacity to participate economically and politically. In sum, what may be rationalised on microeconomic grounds of allocative efficiency could undermine justice at the macro or societal level.

4. Redefining the path for power sector reform

Growing trends of economic globalisation and political neo-liberalism have spread ideals of economic and technical efficiency throughout the policy arena, including those addressing energy (Winner 1982). Power liberalisation is a recent reflection of this phenomenon. In many cases, the question before governments has not been 'whether' but 'how' to

liberalise the electricity sector. Yet, the contradictions in power liberalisation, at the theoretical level and in empirical experience, warrant a more critical assessment of the reform imperative. While eventual outcomes of power liberalisation depend upon the type of social regulation that guides a particular reform process, it seems clear that as long as policy-makers adhere to the belief that the market will deliver the optimal outcome for sustainability and democracy, policies that could explicitly seek to ensure those goals are unlikely to be developed or implemented.

Although private initiatives and competitive pressures may have a role in addressing fundamental problems of the current electricity industry, delinking reform efforts from the neo-liberal belief in market optimality is needed if alternatives are to be constructively discussed. Markets can serve societal interests only when clear public preferences are reflected in their operating structures (see Reddy, forthcoming, for a discussion of this issue). In this respect, the proper relationship between markets and society is one in which the former is informed by the needs and aims of the latter, not the reverse (as neo-liberalism and globalisation advocate).

4.1 Commodity policy or policy commons

Experience with power liberalisation suggests that its promises of efficiency, environmental improvement, greater equity and more democracy are overdrawn. Several explanations can be offered for the worldwide embrace of what has turned out to be a poorly performing policy strategy (see, e.g., Wasserman 2001; World Bank 2001). A key factor surely is the effectiveness of the ideology of market efficiency, which directs policy attention to the benefits of unsubsidised prices and competition. In formulating a public benefits agenda as an outgrowth of market processes, this ideology conceives social need in commodity terms, that is, as a good or service whose value is determined by individuals being able to afford more or less of it. In the case of electricity, an efficiency-based strategy expects to increase service and lower short- and/or long-term costs, thereby enabling more people to consumer more electricity. It is the empowerment of individual choice, coupled with the promise of expanding consumption, that is the hallmark of commodity policy in electricity.

In this respect, a *commodity policy* relies for its claim of being a distinctive source of public benefits on two premises – cornucopianism and individualism. Specifically, a commodity policy's public benefits are the result of the production of 'more,' on the logic that 'more is better' (cornucopianism); and/or the result of a greater exercise of individual choice,

on the logic that individual choice is the only true expression of freedom or, at least, its principal expression (individualism).

The experience with power liberalisation described above has underscored the existence of vital public values that are neither cornucopian nor individualistic. These include the value of reducing energy use in the interest of sustainability – a direct contradiction of cornocopianism; the value of social equity that can only be realised by a collective commitment to, for example, universal service even when it is 'inefficient' – a direct contradiction of 'individualism; and the value of democratic deliberation and participation, which can interfere with individual choice but may build long-term confidence in the efficacy of the process. Because these values inescapably conflict with the norms of commodity policy, it is not reasonable to expect them to be effectively considered under existing liberalisation strategy. Furthermore, adding 'policies' to address them in some manner, while maintaining the basic architecture of power liberalisation, can only promise to heighten awareness of the conflict between commodity and non-commodity values in electricity reform.

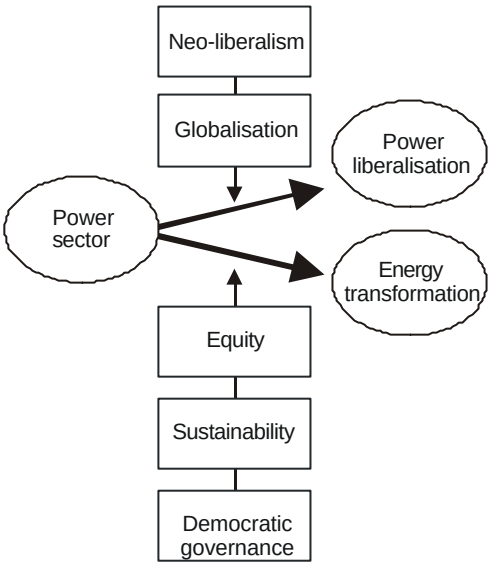

Figure 2: Electricity liberalisation or energy transformation

What might be an alternative base informed by the specific experience of power liberalisation? A policy commons approach (Figure 2) replaces liberalisation's marketplace – an economic space – with public discourse – a socio-political space. It does this in recognition of the fact

that non-commodity values are not intended to be efficient – instead, they most often are intended to correct failures of democracy, equity and sustainability. These values are lost when the decision space is economised. Invigorating the socio-political character of the decision space is therefore essential if a public benefits agenda is to be pursued.

The pre-liberalisation era of electricity supply hardly offers guidance in this matter. Relying on a mixture of technocracy and monopoly, the era preempted public discourse and responded to social and political criticism only in moments of crisis. A vigorous public discourse would require that technology choice, investment commitments, social impacts, and ecological implications would all be routinely considered in an 'open access' regime of ongoing evaluation. As discussed below, a policy commons would be distinguished by a process of evaluation unavailable in either the marketplace or technocracy.

As well, the content of decisions should differ, since a policy commons would authorise policy actions that are responsive to a range of values incapable of being valorised within the realm of commodity production and consumption. These values stand apart from the cornucopian and individualist norms of power liberalisation. Broadly, their content is to be found in the emerging ideas of an electricity system governable by communities and responsive to criteria of equity and sustainability. While specific policy content will be shaped by the particulars of each societal context, the evolving discourse on sustainable energy strategy (Reddy et al 1997; Byrne & Rich 1992; Goldemberg et al 1988) is likely to contribute ideas about the attributes of a new energy-environment-society relationship. In this respect, a policy commons approach will be less likely to yield reform of the power liberalisation model than a transformation of the electricity policy agenda. Moving beyond the 'genius of the market' appears to be unavoidable. What then might be elements of process and content that could help to transform the policy agenda? We first examine the question of process.

4.2 Democratisation of electricity

A fundamental problem of power liberalisation and its commodity policy is that it tries to build consensus around a model of reform rather than to build a model of reform based on social consensus (Prayas 2000). A policy commons approach to electricity reform emphasises a democratic governance process, in which diverse elements of society can participate in decision-making on capital investments, price setting, technology development and environmental and social goals relating to electricity provision. When participation of all stakeholders – not only from the government and business sectors but also from civil society – is institu-

tionally encouraged and supported, and diverse concerns of different stakeholders are discussed in an open and transparent manner, the needs and aims of society regarding electricity service can be better clarified, and the possibility of reaching social consensus can be advanced.

In fact, such an approach has been tried in actual electricity decision-making in some countries. For instance, what has come to be known as an integrated resource planning (IRP) approach, while having been adopted in different countries in different forms, embodies the idea of democratic governance of the electricity sector quite well. Rather than leaving decisions about electricity service exclusively in the hands of utility companies, IRP aims to create a mechanism by which power development plans can be scrutinised by the public. The process enables civil society to propose alternatives that can be analysed to see if there are less costly and socially more preferred means of meeting needs than simply building large-scale power plants (see, e.g., Reddy et al (1991) for a least-cost planning approach applied to India). By requiring utilities to examine demand-side as well as supply side options and small-scale as well as large-scale alternatives, IRP seeks to reduce system-wide costs (often including environmental costs) of energy service provision while ensuring that society's wider interests are represented in the allocation of capital (Regulatory Assistant Project 2001; Kreith 1993).

IRP was implemented in the USA to enhance the public capacity to intervene in the regulatory process (Kahn 1991). Relevant information about utility planning was made available to concerned parties, and regulatory proceedings were held in an open and transparent manner using an administrative process to decide policy action. In order to counterbalance the resources and expertise available to utilities and business sectors, moreover, financial and analytical support was made available to public interest groups (e.g. consumer groups and environmental NGOs – see CEEP (1999)). Additionally, 'public advocates' were created to ensure an institutional voice for ordinary citizens and small businesses who, otherwise, would not have been represented in the planning process. Using such mechanisms, non-conventional actors in electricity planning were able to articulate their concerns and visions, often based on independent research and alternative energy plans. In short, IRP was an effort not only to hold utilities accountable to the public but also to create and enrich the policy commons, by sustaining a public space for new ideas and innovations.[4]

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[4] Although IRP has mostly been adopted in a regulated monopoly system, it can be readily employed in the context of market competition. For example, using an integrated resource plan generated by its staff as a benchmark, an

Establishing a democratic governance process such as IRP is as important in developing countries as in industrialised ones. This is well illustrated in the contrasting stories of two states in India: Andhra Pradesh and Karnataka. While the electricity sectors of both states suffered from technical inefficiencies and financial crisis in the 1990s, their approaches to the reform process were quite different. The state government of Andra Pradesh implemented a so-called 'World Bank model,' including unbundling and privatisation of its electricity board without extensive public consultations. As a result, when steep tariff hikes were imposed on the residential and agricultural sectors in 2001, mass protests erupted (Raghu 2002). In the state of Karnataka, where access to information and the right to representation were institutionalised through enactment of the Right to Information Act and the Transparency in Government Procurement Act, however, the situation was quite different. When two tariff increases were proposed by the newly created Karnataka Electricity Regulatory Commission, over 9000 objections were received from the public. Those objections were examined seriously through extensive dialogues between the Regulatory Commission, its consumer advocate office, and the Electricity Consumers Network, an independent citizens organisation. The dialogue resulted in a compromise including a lower level of tariff increases, low-income consumer protection measures, and programmes for efficiency improvements in the electricity sector. Instead of protests, citizen groups organised to promote conservation and renewables in order to make electricity affordable and its provision environmentally less damaging. Since most citizens in the state depend on the rural economy for their livelihoods, this approach proved to be economically, socially, and environmentally superior to the commodity approach of Andra Pradesh (Muralidharan 2002).

Democratising electricity decision-making – including decisions regarding industry structure and the investment of capital – is critical in creating an energy policy commons. While it is difficult to form a consensus on any issue in a complex world where conflicting interests exist, the politics of open dialogue based on the principles of transparency, accountability and participation can better align the aims of power sector reform with a broader agenda of public benefits (Prayas 2001).

ISO can initiate a competitive bidding process to see if bidders can offer demand- or supply-side projects that lower the cost of electricity service and increase public benefits. Such projects can then be incorporated in an operational plan for electricity service (Regulatory Assistance Project 2002).

4.3 An equitable and sustainable power sector

The creation of an electricity policy commons would represent a paradigm shift from the commodity-focused strategy of existing reform. While commodity policy narrowly focuses on economic efficiency, a policy commons approach calls for explicit commitments to identified societal goals. Among others, equity, which recognises a universal right to service, and sustainability, which commits society to ecological balance in the provision of electricity service, are key to the successful transformation of the content of the electricity system. Communities seeking to scale their electricity sectors to achieve universal access, for example, would need to grapple with the centralisation and marketisation tendencies of commodity-oriented reform. In cases where a sizable part of the population relies on rural institutions for development, conventional grids designed for urban users are seldom affordable or technically rational. Electricity networks designed to produce bulk power in order to serve small, dispersed loads among rural communities hardly make sense and this explains why such 'urban' systems underserve rural needs. Thus, in Uganda, only 2% of rural users receive grid electric service; in Cameroon, 6%; and in Zimbabwe 7% (Wamukonya 2003b). Commodification of the sector can only amplify the dilemma.

However, the 'distributed utility' concept (Weinberg et al 1993) offers a new framework for delivering needed energy services to communities in a way that potentially minimises environmental impacts as well as economic cost. Fundamental to the concept is the idea that small-scale and modular generation, demand-side management projects, and efficiency improvement programmes can be distributed throughout – or instead of – the transmission and distribution system (Feinstein 1993: 3). This strategy can be applicable to both rural and urban communities. In rural communities, it offers an alterative to high-cost extensions of the bulk power grid system. In urban communities, the distributed utility can furnish least-cost solutions to transmission and distribution upgrades and to siting problems associated with large-scale central power plants (see Lovins et al 2002; Sant & Dixit 2000; Flavin & Lessen 1994). In particular, renewable energy, which is widely available in all parts of the world (while fossil and nuclear energy are not) and is flexible in its application and size (from several hundred Watts to several MWs), potentially provides an important opportunity in realising the distributed utility concept (see TERI 2003; Zhou & Byrne 2002; Byrne et al 1998; Letendre et al 1996).[5]

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[5] Although some renewable energy technologies (such as wind, small-hydro, and geothermal) are competitive in bulk power markets (see, e.g., Flavin &

The distributed utility concept embodies efforts to utilise 'energy income' that can be regenerated, instead of consuming depletable 'energy capital' such as fossil fuels and nuclear energy (Lovins, 1977: 39). The architecture offers opportunities for universal service that do not require rural communities to 'urbanise' their energy consumption (i.e., utilise high levels of electricity in order to serve the logic of scale economies). At the same time, this architecture can provide an ecologically balanced and socially equitable solution to urban energy needs, especially when it is combined with community or municipal management and/or ownership.

The principal failing of the distributed utility in the present context is that it undermines commodity economics. While commodity costs depend on the volume of supply, the economics of conservation and end-use efficiency is built on reduced supply, focusing instead on quality of service. Similarly, microturbines and appropriately scaled power plants (often less than 50 MW) may have higher unit costs, but their advantages in being more easily sited near loads than large power plants – thereby saving transmission and distribution losses, and their much lower capital and environmental risks, can offset higher generation costs. Every step taken to reduce dependence on energy capital (e.g., through efficiency improvements and conservation, and the use of appropriately-scaled power plants), and to create a space for a distributed network based on local energy resources, could be counted as progress toward the goal of turning the current energy system into an energy commons. Such a

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Dun 1997), others (e.g., photovoltaics and certain biomass applications) are not. Yet, this can be a false dichotomy in rural settings since renewables would not normally be competing with conventional grid power – the prohibitively high cost of grid extension typically means that rural households distant from the grid are unserved. Instead, renewables compete with small, high-maintenance generator sets that require fuels which must be fetched from distant town markets. When lifecycle costs are compared, small wind, photovoltaic and biomass systems can be a much less expensive means of rural electricity supply (Byrne et al 1998). There is an additional factor to consider with regard to the rural potential of renewables for electrification. Renewable technologies often have rural roots and offer the opportunity for development of energy infrastructure that is endogenous to rural economies (in contrast to the 'input' of electricity from conventional power plants and transmission-distribution systems that are possible only where urban manufacturing platforms are present). In the case of urban markets, renewables may be lower in cost than conventional grid power options when social costs are considered and when grid congestion is present (see, e.g., Letendre et al 1996; Hohmeyer 1992).

transformation could make electricity available to more people, could distribute the benefits and costs of electricity generation more equitably, and could lower the ecological footprint of the power sector.

5. Beyond power liberalisation

Experience with power liberalisation over the past decade offers an important lesson for social strategy: a metatechnology must operate within and be subject to institutions of collective evaluation – a policy commons – if it is to serve society. When disconnected from such an institutional context, metatechnologies are prone to produce the equivalent of a public benefits 'blackout.' The painfully earned awareness of the potential for public benefits 'blackouts' from the crises of liberalisation witnessed in California, Brazil, India and elsewhere should caution those interested in electricity reform against neglect of the special obligations of a metatechnology.

Built on a commodity orientation toward policy and intending mainly to promote cornucopian and individualist values, the current agenda for electricity restructuring is destined to ill- or under-serve the aims of equity, sustainability and democratic participation that have been prominent elements of public evaluation of this metatechnology for decades. Liberalisation's nearly exclusive reliance on decision-making in market settings preempts meaningful public discourse on the appropriate trajectory for the sector. When considered in conjunction with this reform effort's parallel promotion of globalisation, the observed contradictions in the power liberalisation agenda with important values of society destined the initiative to fail from the standpoint of public benefits.

At the same time, a hopeful sign can be identified from global experience with power liberalisation. Consider, for example, that in the wake of a very costly fiasco, California was able to extricate itself from high prices and power shortages in just eighteen months. What policy actions reversed the crisis? A combination of democratic planning and the adoption of distributed resource tools. California closed its power exchange and returned to an IRP style of decision-making. Via this forum, it found public benefit investments in energy conservation that shed 6 359 MW of load (CEC 2002a) and added 300 MW of new renewable energy capacity in 2001 (CEC 2002b). The strategy lowered costs to consumers, restored balance to the supply-demand relation, improved environmental performance and substantially better served the aim of social equity. Most important, the embarrassment and anger that power liberalisation spawned has been replaced by a heartened and reinvigorated civil society unafraid to govern this metatechnology according to

public values. As California learned, a real and substantial choice lies before society: power liberalisation or energy transformation. It is a lesson well worth the thoughtful consideration of all societies seeking to reform their electricity sectors.

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REGIONAL PERSPECTIVES

4

Power sector reform and sustainable development in the European Union

NORBERT WOHLGEMUTH

1. Introduction

In February 1999, the European Union (EU) required that member states integrate into national law the EU Directive on Rules for the Internal Market in Electricity (European Commission 1997a). The Directive requires the gradual opening of national electricity markets to competition, enabling consumers to purchase their electricity from a variety of sources, including foreign utilities. Economic efficiency was the key driving force behind the European Parliament's decision to pass the Directive in 1996.

The Directive has so far induced more competition in the European electricity industry. This move towards liberalisation of energy markets is part of a greater global process. Some Union member states, such as the United Kingdom, had already set out on their own liberalisation course during the 1980s in pursuing a general policy of liberalisation and privatisation of regulated industries such as telecommunications, financial

services, and water, as well as of the energy market (Green and Newbery 1997).

In the light of the Amsterdam Treaty[1] of 1997 the EU has changed its energy policy to include sustainability as one of its three core principles, which are:

- security of supply – which aims to minimise risks and impacts of possible supply disruption on the EU economy and society;
- competitive energy systems – to ensure low-cost energy for producers and consumers to contribute to industrial competitiveness and wider social policy objectives; and
- environmental protection – which is integrated in both energy production and energy use.

The protection of the environment has, then, become a key criterion by which to judge the long-term success of the Union's energy policy. For the past few years much of the political and industrial focus has been on the emerging European energy market, with the introduction of the EU's electricity and natural gas market Directives.

A key priority in the EU's sustainable development policy is limiting climate change and increasing the use of clean energy. In order to meet its commitments under the Kyoto Protocol, the Commission proposes several actions, including the phasing out of subsidies to fossil fuel production and consumption by 2010; a new framework for energy taxation; tradeable permits for carbon dioxide; and actions to improve energy efficiency.

Subscribing to the ethic of sustainable development provides two main motivations for promoting sustainable energy technologies as a worthwhile goal in itself. Firstly, because a vast majority of current energy demand is provided by depletable resources, society should restrain their use until a transition to a system based on renewable sources can be made. Secondly, since energy use is an important contributor to the emissions of gases with global warming potential, mainly carbon dioxide, sustainable development requires an increasing use of more environmentally benign technologies. In the energy sector, these technologies include more efficient technologies on the supply (e.g., electricity generation) and demand (e.g., electricity consumption) side, less carbon-intensive (i.e., natural gas) and carbon free resources (e.g., renewable energy sources).

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[1] Information on the Amsterdam Treaty is available at http://europa.eu.int/abc/obj/amst/en/. The text of the Treaty can be downloaded from the European Parliament's web site at www.europarl.eu.int/topics/treaty/pdf/amst-en.pdf.

In the Communication on Energy Policy (European Commission 1995), industrial competitiveness is explicitly identified as one of the main objectives of the evolving common European energy policy. By introducing competition into energy markets, so the Commission believes, one can strengthen the competitiveness of energy-intensive industries. As a means to realise such competitiveness through the energy sector, the Communication recognises the need for completion of the internal energy market as a basic prerequisite. Price differentials within the EU have contributed to promoting the idea of restructuring the electricity industry.[2] This driving force comes primarily from industrial consumers which are concerned about their economic competitiveness. Figure 1 shows the wide range of electricity prices for small and large consumers in the EU.

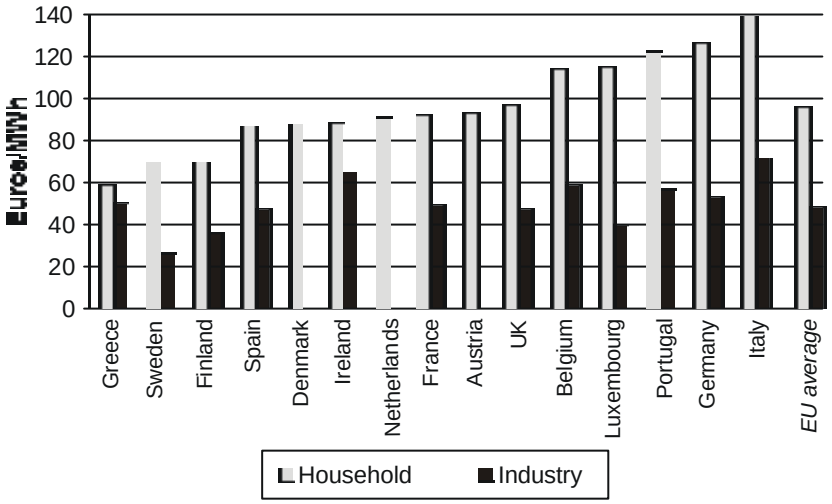

Figure 1: Comparison of EU net electricity prices for households and industry
Source: European Commission (2002b)

This development may lead to economically more efficient electricity markets but also to a backlash for environmental issues, because of potentially contradictory goals between the Electricity Directive (European

[2] For most of the industry's history, consumers welcomed the protection that regulation afforded them and felt that this means of oversight assured fair prices for electricity. Now, however, consumers themselves are pushing for competition (to both lower prices and increase the variety of suppliers such as green power producers) and regulatory reform.

Commission 1997a) and sustainable development objectives.[3] The environment is threatened by the Directive for the following reasons in particular:

- In the short run, a reduction in electricity prices and increased price volatility (Robinson and Baniak 2002) reduce the financial incentive to invest in more efficient energy technologies.
- Some clean energy technologies are at a pivotal time in their development. Although they are proven technologies, they require market stabilisation to become widespread mainstream generators. An economic environment characterised by a high degree of uncertainty may negatively affect the technology's development in the long run. Currently, just nine OECD countries[4] perform more than 95% of the world's public sector energy R&D and, consequently, nearly all of the world's long-term energy R&D (IEA 1997). It is also important to note that between 1985 and 1995, these nine energy R&D-intensive OECD countries each reduced their budgets for energy R&D on average by more than 20% in real terms.
- A reduction in energy efficiency and a decreased input from renewable energies will lead to an increase in carbon dioxide emissions. This will make it unlikely that the EU will conform to its Kyoto targets.

On the other hand, market reform can also benefit the environment by encouraging the promotion of environment-friendly energies, while reducing the role of government. For instance, end-user choice gives electricity consumers the ability to choose energy-efficient services and 'green electricity'.[5] In the past, policy-makers made these choices; now

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[3] Apart from the environmental consequences of power sector reform, the liberalisation has also resulted in massive job losses in the electricity industry: The 1998 Employment in Europe Report shows that the electricity and gas sectors have been among the sectors worst hit by a reduction in employment over the last decade. More significant reductions in employment were only experienced in mining, agriculture and textiles. Based on European and national statistics it can be estimated that over 250 000 jobs have been lost in the electricity and gas sectors between 1990 and 1998 and there are fears among the trade union movement that a further reduction of jobs by 25% can be expected over the next five years as a result of mergers, concentrations and restructuring in the industry.

[4] Canada, France, Germany, Italy, Japan, Netherlands, Switzerland, United Kingdom and United States.

[5] For example, by the year 2006, more than 500 million people in the OECD will be entitled to choose their electricity supplier. This accounts for nearly 50% of the population of OECD countries (IEA 2001).

the consumer has some power in electricity consumption decisions. This has added to the repertoire of mechanisms currently being deployed to support renewable energy sources. In most EU countries, green electricity has only recently gained attention, and there is little data on the effectiveness of schemes to promote green electricity. However, it is clear that throughout the EU programmes have been established and there is commercial optimism that a share of the market will seek renewable energy.

Central issues in the context of power sector reform and sustainable development include the design of appropriate incentive mechanisms aimed at simultaneously promoting public policy objectives while being compatible with market forces, rapid technological developments, and the effects of technological advances on sustainable development. A key question, therefore, is whether the incentives provided are compatible with sustainable development objectives. Governments can provide incentives for technological development and diffusion, via regulatory instruments, economic instruments, voluntary agreements and information campaigns (OECD 2001). Governments are more or less heavily involved in these issues and their engagement is likely to substantially affect the outcome, even in liberalised markets. The implication of sustainable development under the restructured electricity sector is still an open question. This paper gives an overview of the key provisions of the EU's Electricity Directive and its implementation in the member states, and assesses sustainable development implications of this reform process.

2. The implementation of the Electricity Directive

The European Commission presented in 1992 two proposals for Directives concerning common rules for the internal market in electricity and for the internal market in natural gas, based on Article 100A of the European Community Treaty. These proposals aimed to create a framework for liberalising these markets and progressively opening up the electricity and natural gas sectors to more competition. They formed the beginning of the second phase of the Commission's efforts to complete the internal energy market and as such complemented the Directives already adopted by the Council as part of a first phase in 1990 and 1991 concerning the transit rights for electricity and natural gas and the transparency of electricity and gas prices charged to industrial consumers. The 1992 proposals provided for greater competition in the supply of energy to customers, for access by third parties to electricity networks and gas pipelines, and for competition in electricity generation.

The European Community Treaty defines the internal market as 'an area without internal frontiers in which the free movement of goods, persons, services and capital is ensured in accordance with the provisions of the Treaty'. The European Commission based its ideas for the establishment of the internal energy market on four general principles: first, the recognition of the need for a gradual approach to enable industry to adjust to the new competitive environment; secondly, a measure of subsidiarity to enable member states to opt for the system best suited to their particular circumstances;[6] thirdly, the avoidance of excessive regulation; and, fourthly, a legislative approach entailing a democratic political dialogue with all the institutions of the European Union.

On 19 December 1996 the Electricity Market Directive was adopted. This was a further stage of the Commission's measures to liberalise the electricity market following the Directives which harmonised pricing and transit regulations. The Market Directive proved much more difficult to reach agreement on and took over four years from the original drafting to adoption. After adoption, the Directive entered into force on 19 February 1997 and should have been implemented by all EU member states by 19 February 1999. The Directive's objective is to open up each national electricity industry to provide competition within each national market, and ultimately to create one European electricity market – as opposed to numerous national ones. In order to achieve this objective, changes are needed in key areas, including market opening, access to the network, transparency of accounts, public service obligations, independent transmission and distribution system operation, competitive electricity generation, and reciprocity.

There has been a general increase in the overall level of market opening, an improvement in the degree of unbundling of network operators, and greater clarity and transparency in regulation. Most member states, notably Austria, Germany and the Netherlands, have seen an increase in consumer activity among eligible customers, and price reductions have been recorded in Italy, Spain and the UK for large consumers. Meanwhile, prices for small businesses have fallen significantly in Austria. Some outstanding issues have not been resolved and key problems re-

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[6] The subsidiarity principle is intended to ensure that decisions are taken as closely as possible to the citizen and that constant checks are made as to whether action at Community level is justified in the light of the possibilities available at national, regional or local level. Specifically, it is the principle whereby the Union does not take action (except in the areas which fall within its exclusive competence) unless it is more effective than action taken at national, regional or local level.

main, however, particularly concerns about the degree of unbundling, the continuing position of market dominance in some countries and the lack of infrastructure to allow cross-border exchanges (European Commission 2002b).

Extent of market liberalisation

EU-wide, all customers consuming more than 40 GWh per annum are liberalised – free, that is, to choose their power supplier. Each member state is obliged to liberalise customers on a national basis corresponding to the community average percentage. The average Community share of electricity market opening, as effective in 1998, is 25.37%. This initial (minimum) degree of opening of the national markets is calculated on the basis of the Community share of electricity consumed by final users consuming more than 40 GWh per year (first step of liberalisation). The degree of opening is progressively increased over a period of six years. This increase will be calculated by reducing the Community consumption threshold of 40 GWh to a level of 20 GWh annual electricity consumption three years after the date of implementation of the Electricity Directive (28% market opening) and to a level of 9 GWh annual electricity consumption six years after the date of implementation of the Electricity Directive (33% market opening).

Although the Directive is only mandatory for very large users, it has set a precedent for freer movement of electricity on a European level and has encouraged more radical market reforms on a national level. Many countries are adopting a faster timetable for competition within their electricity markets. Table 1 shows the extent of this variation, with Austria, Finland, Germany, Sweden and the UK opting for a fully open market, while others are only implementing the minimum requirements of the Directive. This diverging speed of market liberalisation reflects the different national energy policies that are still possible, since the Directive only provides a general framework which has to be transposed into national laws.[7]

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[7] The French government has not followed the rules and requirements of the Directive. The European Commission in November 1999 wrote to the French Government over the lack of progress. Although the situation in France raises concerns over lack of respect for agreements and the distortion of the markets, France's failure to implement the Directive has resulted in a number of individual countries making complaints. The Spanish government has threatened to block French companies from its power market as long as France refuses to open up to foreign competition. The Netherlands has indicated they may halt electricity imports from France, for some consumers.

Table 1: Eligible customers and market opening in EU countries
Source: Haas et al (2001)

Country	*Eligible customers*	*Market opening*
Austria	All	100%
Belgium	>100 GWh	35% (100% in 2010)
Denmark	>10 GWh + distributors	90% (100% in 2002)
Finland	All	100%
France	>20 GWh (16 GWh)	30% (34% in 2003)
Germany	All + distributors	100%
Greece	>100 GWh + others	>26%
Ireland	> 4 GWh	28% (32% in 2003)
Italy	>9 GWh	40%
Luxembourg	>100 GWh	45%
Netherlands	2 MW/20 GWh + distrib. for eligible customers	33% (100% in 2007)
Portugal	>9 GWh + distrib. for 8% of volume	34%
Spain	> 1 GWh	42% (100% in 2007)
Sweden	All	100%
UK	All	100%

At the Lisbon EU Summit in March 2000, the Commission proposed that the speed of market opening for both the electricity and gas markets be increased to allow full opening by 2004, as the actual level of market opening already exceeded that required by the Directive (European Commission 2000a; 2001b). Objectives are:

- the creation of an effective internal market instead of 15 individual markets (this is to be achieved by a full market opening by 2003/2005 and a non-discriminatory access to the transmission and distribution grid);
- adoption of rules on cross-border tariff-setting and congestion management for electricity (rules based on simplicity, non-discrimination and cost-reflection);
- development of a European infrastructure plan for electricity and gas (in order to remove network bottlenecks); and
- negotiation of reciprocal electricity market opening agreements with the EU's neighbours (including environmental and safety standards).

Insufficient transmission capacities constitute a hindrance to a single European electricity market. It is agreed that a minimum level intercon-

nection of about 20% of peak demand in any area with the rest of the EU could help eliminate segmented markets and create a real competitive internal market while also improving short-term supply security.

Generation

The Directive essentially requires that construction and operation of all new production facilities need to be completely open to competition. There are two alternative approaches, reflecting divergent approaches in ensuring the security of electricity supplies: a system of planned production, or the market mechanism. In the former, the tendering process, the future electricity requirements are calculated by a central body, and the project is then put out to open tender. In the latter case, the authorisation process, the member state permits the market mechanism to decide the level of capacity necessary to meet demand: anyone may build and operate an electricity plant.

The majority of member states have opted for the authorisation process, including Austria, Belgium Finland, Greece, Ireland, Italy, Luxembourg, Netherlands, Spain, Sweden, and the UK. The tendering process has been adopted by Portugal. Some countries have opted for a mixture of the two processes. Denmark assumes an authorisation process, except for the construction of some combined heat and power plants and some renewable energy projects (offshore wind). France has adopted an authorisation process, except where production capacities do not meet the objectives of the multi-annual investment programme, when a tendering process is used.

A study by the Öko-Institut (2000) shows different trends. On the one hand, the market concentration in the United Kingdom decreased significantly in recent years and led to electricity generation markets that can be called unconcentrated, similar to the Scandinavian power production market. On the other hand, market concentration is occurring in all other regions in the European Union. In markets which are characterised by former centralised state monopolies the concentration indicators remain very high. Furthermore, especially on the German market, which is historically characterised by a diversity of power generation, recent and upcoming mergers push the concentration indicators to levels which are more and more critical. Figure 2 shows the market shares of the largest generator and the three largest generators in the national markets. This shows the paradoxical situation that, on the one hand, government policy makers are deregulating and liberalising with the view of promoting more competition in the marketplace. On the other hand, the market is in many cases dictating the consolidation and agglomeration of productive assets into bigger companies. While market shares or concentra-

tion ratios may not be appropriate proxies for market power in the case of electricity markets (Borenstein et al 1999), the degree of market power remains an important influence on performance. A conclusion from this development is that it is necessary to implement stricter competition rules in the electricity markets to counterbalance these trends.

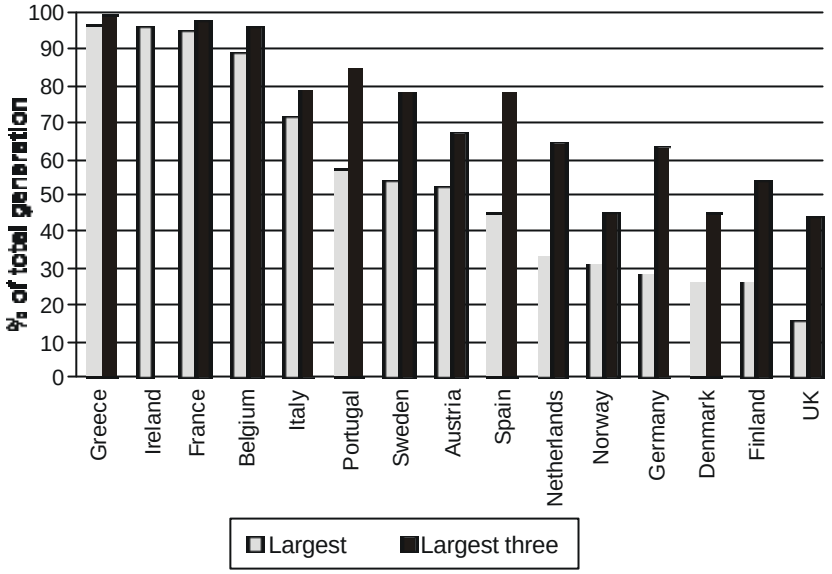

Figure 2: Market concentration in power generation
Source: European Commission (2002a)

Network access choices

The Electricity Directive allows member states to adopt laws which enable producers of electricity to build their own networks and guarantee them fair access to those established by incumbents. There are two basic choices: third party access (TPA) or single buyer systems (SB). Where a member state opts for TPA, eligible customers purchase from electricity producers in other member states, or from domestic independent producers, and request the domestic transmission system operator to transport the electricity to its consumption site. Under the SB, the monopoly position of a single electricity supplier vis-à-vis each eligible customer is maintained. Eligible customers may purchase electricity from suppliers in other member states, but that electricity must be supplied via the SB.

Originally the European Commission wanted to have compulsory TPA. Under TPA producers and consumers may negotiate with each other for contracts, but may not negotiate transmission or distribution

costs, which are fixed. However, this was not popular amongst industry and some government representatives and it was revised to allow negotiated third party access (nTPA), which allows producers and consumers to negotiate directly with each other and then to negotiate access to the distribution network with its operator. In the event of lack of capacity, the system operator is able to refuse access and is not obliged to construct new capacity. Germany is the only country with such a system. As shown in Table 2, many countries have liberalised access to transmission and distribution (T&D) networks. In most cases, access liberalisation has taken the form of regulated third party access (rTPA); that is, a legal obligation to provide network access under non-discriminatory conditions.

Table 2: Grid access and network regulation in EU member countries and Norway
Source: Haas et al (2001)

Country	*Grid access*	*Regulatory approach*
Austria	rTPA	Cost-based
Belgium	rTPA	Cost-based
Denmark	rTPA	Cost-based
Finland	rTPA	No direct regulation
France	rTPA	Cost-based
Germany	nTPA	Cost-based
Greece	rTPA	Cost-based
Ireland	rTPA	Cost-based
Italy	rTPA .. eligible customers SB (rTPA)..captive customers	Price cap
Luxembourg	rTPA	Cost-based
Netherlands	rTPA	Cost-based / maximum tariff
Norway	rTPA	government bond rate plus 1%
Portugal	rTPA .. eligible customers SB (rTPA)...captive customers	Cost-based
Spain	rTPA	Standard costs
Sweden	rTPA	No direct regulation
UK	rTPA	Price cap

Unbundling

The Electricity Directive requires a vertical disintegration ('unbundling') of the industry into production, T&D and final consumer services. The

intention is to remove both market power (and its associated rents) and cross-subsidies. Different approaches have been taken to ensure the separation of the individual parts of the industry, either by formal (legal) separation or by ensuring separate management and accounts. Under the latter, utilities are still allowed to own transmission, distribution and generation facilities but must maintain separate books and records for the individual parts. Table 3 shows the unbundling approaches and ownership of the network in the EU and Norway. Given the increasing concentration in power generation, a strict unbundling of generation, transmission and distribution is a key issue. Ownership unbundling should be seen as the medium-term target, while legal unbundling should be established immediately.

Table 3: Type of unbundling and ownership of the grid in EU countries and Norway
Source: Haas et al (2001)

Country	*Unbundling*	*Ownership*
Austria	Legal and management	3 owners / 3 operators
Belgium	Legal [1]	1 owner / 1 operator
Denmark	Legal	1 owner / 1 operator per island
Finland	Ownership	1 owner / 1 operator
France	Management	1 owner / 1 operator
Germany	Management	Many owners / many operators
Greece	n.a.	1 owner / 1 operator
Ireland	Legal	1 owner / 1 operator
Italy	Legal	Many owners / 1 operator
Luxembourg	Management	
Netherlands	Legal [2]	Many owners / 1 operator
Norway	Ownership	Many owners / 1 operator
Portugal	Legal	Many owners / 1 operator
Spain	Ownership	1 owner / 1 operator
Sweden	Ownership	1 owner / 1 operator
UK	Ownership (England, Wales); management (Scotland, N. Ireland)	1 owner / 1 operator

Notes

1. Although the transmission system operator has not been nominated yet.
2. The Dutch state intends to buy the majority share in the Dutch transmission system operator.

3. Public service obligations: The case of energy efficiency and renewable energy

Article 3 of the Directive states: 'Having full regard to the relevant provisions of the Treaty, in particular Article 90, Member States may impose on undertakings operating in the electricity sector, in the general economic interest, public service obligations which may relate to security of supply, regularity, quality and price of supplies and to environmental protection.' Consequently, member states can decide not to comply with the articles of the Directive if they can show that their public service will be compromised. Article 3 is a clause that has been used to justify a wide range of activities that might otherwise contravene the Directive.

Despite its loose definition, it is clear that many countries have on paper proposed to use the opportunity created by the public service obligations to support renewable energy sources, energy efficiency measures and combined heat and power plants. For Austria, for example, the Electricity Act lays down six explicit public service obligations:

- non-discrimination and equal treatment of customers and system users;
- an obligation to connect and supply final customers under specified tariffs and general conditions;
- the requirement to honour legally imposed obligations on electricity undertakings in the public interest;
- priority dispatch for power generation from renewables, waste and combined heat and power plants;
- purchase of electricity only from generators that respect the environmental standards of the EU; and
- reduction of energy imports from third parties subject to not contradicting international obligations.

The Electricity Directive is based on the same understanding of competition as is applied in the Directives for the telecom market and other grid-based fuels, such as natural gas (European Commission 1998). The theoretical basis for this understanding is the model of contestable markets. In order to apply this model, market 'entry is absolutely free, *and exit is absolutely costless*' (Baumol 1982).[8] Baumol et al (1982) argue that, even if economies of scale and scope are present, they are neither necessary nor sufficient for a natural monopoly to exist. Making the crucial dynamic distinction between fixed costs and sunk costs, they observe that only sunk costs give an existing firm the cost advantage

[8] Therefore, a perfectly competitive market is necessarily perfectly contestable, but not *vice versa*.

necessary to insulate it from competition. Contestable markets have an inherent incentive to produce cost-effectively, depending on the current technological knowledge and on the actual or expected future primary fuel prices.

The British 'dash for gas', which was also caused by environmental restrictions such as the EU Directive on sulphur emissions, serves as an illustrative case study: one can doubt whether the current low market prices for natural gas also cover the external costs of this fuel, which range from depletion of an exhaustible resource to the negative consequences of their potential global warming effect. The short life-cycle of gas-fired plants makes them relatively more attractive to investors compared with alternative investment opportunities with a longer pay-back period. One consequence is also that if electricity is produced at least-cost in terms of kilowatt-hours, investment opportunities on the consumer side of the meter – that is, investment in end-use energy efficiency – appear less attractive. One experience is also that cogeneration may become uncompetitive as a result of lower electricity prices.

It is an explicit goal of the Electricity Directive to improve energy efficiency on the supply (generation) side[9] and to increase the use of renewable energy[10] because these options have generally been accepted to be of key importance in the attainment of sustainable development objectives.

Box 1: The UK experience with promoting energy efficiency

Prior to re-organisation, the extent to which energy efficiency had been offered in the United Kingdom was minimal. Existing programmes were funded by the government, not by the utilities. As a result, at the time of privatisation there was little pressure to consider how to continue providing energy efficiency. A handful of energy efficiency advocates urged that energy efficiency be built into the new structure, on both energy resource and environmental protection grounds. OFFER, the then regulatory agency, however, believed that since market forces would meet demands as they arose, no special provisions for energy efficiency were needed. If customers communicated a desire for efficiency measures, markets would develop to serve them.

9 'Whereas establishment of the internal market in electricity is particularly important in order to increase efficiency in the production, transmission and distribution of this product, while reinforcing security of supply and the competitiveness of the European economy and respecting environmental protection.'

10 'Whereas, for reasons of environmental protection, priority may be given to the production of electricity from renewable sources.'

By 1992, it was apparent that the marketplace was not yielding either demand for, or investments in energy efficiency. In the absence of an explicit government directive, the regional electricity companies did not offer customers end-use energy efficiency options. This led to the establishment of the Energy Savings Trust,[11] set up by the UK Government after the 1992 Rio Earth Summit and one of the UK's leading organisations addressing the damaging effects of climate change. Its goal is to achieve the sustainable and efficient use of energy, to cut the carbon dioxide emissions. The Trust is a non-profit organisation funded by government and the private sector.

Since renewable energy can contribute to all aspects of sustainable development, one of the challenges for energy policy is to ensure that renewable energy technologies have a fair opportunity to compete with other resources required for the provision of electricity services. Supporters of renewable energy fear that this option may be an inadvertent casualty in the transition towards more competitive industry structures, primarily due to market failure. Renewable energy provides many attributes in support of the public interest and in enhanced economic efficiency. Many motivations for the public support of renewable energy can be found, typically including aspects relevant to a more sustainable development, such as the following:

- *Climate change*. Renewable energy use does not produce additional carbon dioxide and other greenhouse emissions that contribute to global warming.
- *Reduced air pollution*. Renewable energy technologies produce virtually none of the emissions associated with urban air pollution and acid deposition, without the need for costly additional controls.
- *Renewable energy technology development and technology transfer to developing countries*. Financial support of renewable energy technologies in developed countries also helps to transfer these technologies to developing countries, possibly allowing them to leapfrog to a more sustainable energy system.
- *Diversity/security of supply*. The penetration of various renewable energy technologies increases the diversity of supply technologies, therefore making the energy supply system less vulnerable to price manipulation or unexpected disruptions of supply.[12] Such diversity could also help to reduce price volatility (IEA 2002b; UNECE 2001).

[11] The Trust's web site is available at www.est.org.uk/.

[12] 'Community resources in conventional primary energy cannot, at their current stage of development, form the basis for European energy self-sufficiency. Only technology-intensive renewable resources can help mitigate the present trend towards increasing energy dependence.' (European Commission 2000b)

- *Distributed generation.* Some renewable technologies can be sited in or near buildings where electricity is used. This practice, known as distributed generation, can avoid costly expenditures on T&D equipment. Distributed generation can also improve power quality and system reliability (IEA 2002).

Ongoing changes in the organisation of the electricity industry affect renewable electricity generation particularly directly. Concern that the new structure of the power industry may prove hostile to renewable energy technologies is also often mentioned as a justification for market intervention to promote environmentally friendly technologies: introduction of competition does not automatically favour such technologies as energy prices are expected to decrease, short-sighted investment decisions are preferred because of uncertain market environment, etc. In a context where utilities do not have long-term guarantees regarding the evolution of the market, economic characteristics with up-front capital investment and low running costs do not favour renewables. Investors therefore may prefer to invest in sources with shorter payback periods, thus lowering their long-term risk exposure, even if those sources are more expensive on a long-term life-cycle basis.

In 1997 the Commission submitted the White Paper on renewable energy sources (European Commission 1997b), which stressed the fundamental role they play in security of supply and protection of the environment. The White Paper suggested an indicative objective of doubling the share of renewable energy resources in the energy balance of the European Union to 12% in 2010. Increasing use of electricity generated from renewable energy sources will make a major contribution to attaining this objective and meeting the commitments entered into by the European Union in Kyoto on reducing greenhouse gases. To meet the target of 12% it was considered necessary for the electricity sector to make a contribution by raising the share of renewable energy sources in total electricity consumption to 22%.

In a non-liberalised market where electricity is sold to captive customers, the absence of common rules does not create any distortions of the electricity trade between member states, as trade is limited and strictly regulated. In a liberalised electricity market, however, or even in a partially liberalised market, some harmonised rules on the treatment of renewables are required in order to assure a certain contribution to the electricity generation mix. Figure 3 shows the wide range of the contribution of renewable energy to the power generation mix in EU countries as well as indicative national targets for increasing this share. In Norway virtually 100% of all electricity is based on hydro power.

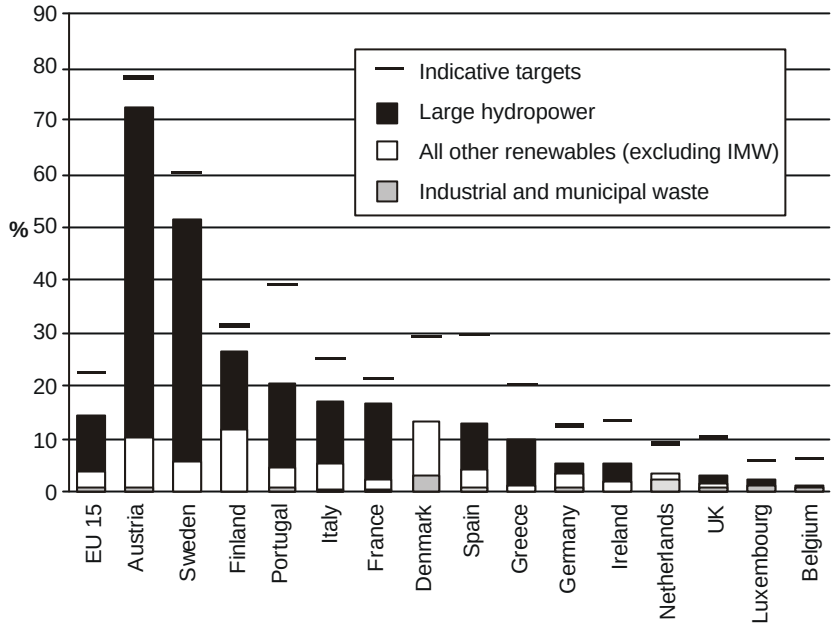

Figure3: Share of electricity consumption met by renewable sources of energy, 1999
Source: European Environment Agency (2002)

Measures to promote renewable energy have been taken in all member countries. Table 4 gives an overview of the most widely used promotion strategies. The general experience has been that price-based mechanisms proved to be more effective than quantity-based mechanisms in promoting renewable energy and in investing in renewable energy R&D activities. However, it is not clear if these efforts are sufficient to achieve the ambitious market penetration targets of the White Paper (Fuchs & Arentsen 2002; Krewitt & Nitsch 2003).

4. Prospects for sustainable development in the power sector

In the electricity industry, driving forces for change include the desire for deregulation and privatisation, new power generation and transport technologies, global, regional and local environmental considerations, electricity price differentials among countries and regions, the expected global electricity demand growth, and power supply reliability concerns. None of these individual forces driving the changes is new, but together

Table 4: Strategies to promote renewable energy in the European Union
Source: Froggatt (2000)

	Investment subsidy	*Feed-in tariff*	*Tender*	*Fiscal or tax*	*Voluntary schemes*	*Green certificates*
Austria	o	+	o			
Belgium		o		o		+
Denmark		o		o		+
Finland	+			o	+	
France	+	o	o			
Germany	+	+			o	
Greece	+	+		o		
Ireland	+		+	o		
Italy		o		o		
Luxembourg		o				
Netherlands	+			o	o	+
Portugal		o				
Spain		o		o		
Sweden	+	o			o	
UK			+		o	

+ = main instrument
o = additional instrument

they exercise significant pressure for change. For example, the increasing need for more reliable power supply in high-tech industries and the availability of new gessneration technologies are mutually enhancing forces. What makes the analysis complicated is that some of these drivers pull in different directions: stricter environmental standards, for example, may favour sustainable energy technologies, but increasing reliance on market forces fundamentally changes the rules under which these new technologies can be promoted. The overall effect of these driving forces is multi-dimensional, often interdependent, transitions in electricity industries.

The co-operative and collegial environment of the past in which the obligation to serve was of paramount importance is being replaced by a competitive atmosphere of contracts and markets. The news about liberalisation is not invariably positive. Along with intense competition, free markets also bring uncertainty and unpredictability that often result in

high price volatility. Competitive markets may not always incorporate adequately the environmental impacts of electricity resource development and consumption decisions. Supplemental actions are needed to ensure that sustainable development objectives are effectively incorporated in complex proposals for regulatory reform. Poorly designed and implemented regulatory reform measures can seriously harm consumers and the quality of the environment. Specifically, possible outcomes of restructuring can include higher electricity prices for all consumer groups; a degraded environmental quality through increased use of more polluting fuels and technologies; elimination of energy efficiency programmes; little or no development of sustainable energy technologies; a socially inefficient technological lock-in; discrimination against rural and/or poor customers; and companies taking advantage of consumers through aggressively unfair marketing and business practices.

Orientation towards competition makes short-term profit maximisation the overriding company concern. Combined with higher discount rates as a result of increasing uncertainty, companies become reluctant to invest in renewable energy and energy efficient technologies. This clearly reflects the shift from strategic to operational objectives.

The environmental impacts of the changes in the industrial organisation of the European electricity supply industry pull in different directions. Effects of introduction of competition on energy efficiency include the following:

- End-user price reductions are likely to drive increased consumption.
- End-use energy efficiency incentives are weakened if competition lowers prices and increases uncertainty, and by the ability to switch to lower cost supplier.
- End-use energy efficiency incentives could be strengthened by tariff reform, such as peak load pricing, and improved by stronger attention to cost recovery and subsidy removal.

As for renewable energy it can be summarised that market-based mechanisms to promote it should encourage the development of new renewable resources and the advancement of new and emerging renewable technologies that show reasonable potential to become cost-competitive. Promotion mechanisms, therefore, should maximise fund effectiveness by including distribution mechanisms and eligibility criteria that minimise administrative costs, allow the market to naturally weed out projects that are unlikely to be competitive and reward those that are already competitive, and encourage renewable suppliers to improve operations and make the industry more competitive. Competitively neutral instruments implemented in the EU, such as renewables portfolio stan-

dards and certificates trading schemes, have the potential to meet these requirements. However, recent developments indicate that the mechanisms implemented to promote renewable energy may not be sufficient to achieve the ambitious goal of doubling the renewable energy share in the Union's energy mix.

The degree to which a handful of players has come to dominate the current power system indicates the degree of market dominance that can be expected, and the concentrations of financial and political influence that will result if this trend continues unchecked. In the light of inadequate regulations, control and enforcement mechanisms at EU level, it can be expected that the shareholder demand for dividends in a competitive market will dominate any potential margin for environmental and social responsibility, unless that responsibility is legally imposed. Breaking old monopolies and avoiding new concentration trends in the generation sector must be a central issue for competition policy in the energy sector.

The high levels of market concentration in the generation sector must be compensated for by fair, transparent and coherent rules for third party access. Strict unbundling of generation, transmission and distribution is a key issue. Legal unbundling needs to be established immediately while ownership unbundling should be seen as the medium-term target.

Policy-makers need to recognise that regulating to encourage competition, supply security and desired public policy objectives in the new industry structure will be inherently more difficult than in the more heavily government-controlled electricity supply industry. The famous 'invisible hand' of the market is not necessarily a 'green' one, and the price of improved economic efficiency on the supply side could be a deteriorated technical efficiency on the demand side. The final verdict on the environmental effects of increased competition is still out, as impacts can go both ways. If implemented compatibly with the market-oriented industrial organisation, electricity industry liberalisation could, however, contrary to the fears of sceptics, pave the way for 'sustainable electricity' in the European Union.

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5

Power sector reform in Latin America: A retrospective analysis

DANIEL BOUILLE

NJERI WAMUKONYA

1. Introduction

The process of institutional and regulatory reform of the energy industry[1] within developed, transitional and developing countries has set and is setting a more complex environment for the design, development and implementation of a sustainable energy policy. In Latin America and the Caribbean, energy sector reform was closely related to global economic reform. The expressed main objective was to liberate governments from a cumbersome fiscal burden while at the same time attaining economic efficiency goals. This was shrouded by constraints on equity and environmental considerations, and attracting investment to the sector, taking into account government's 'lack of capacity' to deliver the investment needed for expansion of the sector. 'Consequently, reforms aimed more at liberalisation and privatisation than competition *per se*' (Von der Fehr & Millán 2001).

Deregulation, re-regulation and a stronger market role have had positive results for the economic dimension of sustainability. The intro-

[1] The reference to energy industry is related to energy supply. 'Energy system' is used to include energy supply and consumption (final or intermediate). Energy industry and energy system interact with the socioeconomic and environmental system in the search for sustainability.

duction of competition or new regulation increased, in some cases, the productive and structural efficiency of the industry and, in others, led to reduced prices for final consumers (mainly large ones). Nonetheless, to date the decentralised market-based decision process has proven insufficient to adequately address the public benefit, as well as issues related to the economic dimension. Sustainable energy development is still an unresolved issue in many developing and developed countries and globally. The search for a new institutional, policy and regulatory framework allowing for an adequate balance among the different sustainability dimensions is an issue of concern, given that reforms implemented during the last two decades failed to solve many of the problems. In a dynamic context, the political dimension – including system governance – has represented and still represents a key issue to be addressed.

Recent forums,[2] plus some dissatisfaction with the results of the reform, suggest the need for re-examination and discussion of the sustainability of the power sector reform implemented during the nineties. Although defenders of the reforms insist that they are still young and that results should not be judged by the 'naive expectations of the reformers', there are widespread doubts about their sustainability. Firstly, new investors have entered the market, but they have been few and mostly foreign. Competition is generally limited and hampered by concentration of players in both generation and distribution markets. Most private investments, green field investments or privatisation have been profitable to investors, in particular old generation power purchase agreements (PPAs), and in certain areas of distribution. Secondly, all consumers have benefited from lower prices, but large consumers have been the big winners. There is in general no expansion of the service to new areas, although there have been some improvements in the quality of service to existing consumers. Security of supply seems to have been satisfactory, with the significant recent Chilean exception. Thirdly, state-owned enterprises have a mixed experience: some were left with the burden of social obligations and some continue to exist as vehicles for transferring rents to particular interest groups (including politicians); some, rather than being scaled down, have in fact extended their participation to a degree that may undermine the whole reform process. Fourthly, governments have in general benefited from privatisation and fiscal burden relief. And, finally, society at large may have benefited from the release of public funds. Nonetheless, sustainability of reform has been questioned in

[2] For example, those highlighted at the workshop on Sustainability of Power Sector Reform in Latin America and the Caribbean, Interamerican Development Bank, Washington DC, May 2002.

some countries because of 'problems experienced with the functioning of their reformed electricity markets' (Von der Fehr & Millán 2001).

There is some consensus that the basic objectives of electricity provision are to provide electricity in a sustainable manner – economically, financially, socially, politically, and environmentally. This implies availability of resources, universal access to the service, consumer satisfaction with quality, and meeting equity and environmental constraints.

Several examples of real or potential crises of the sustainability of the sector are available, and include the following:

- El Salvador's experiences with high volatility in wholesale prices;
- Chilean blackouts during late 1998 and early 1999;
- failures in competition in the Peruvian and Bolivian markets;
- the Colombian Pool's numerous difficulties originating in the failure to control market power and in transplanting system design, developed for a thermal system, to one dominated by hydro;
- the high cost of PPAs signed prior to reform in Guatemala have become a huge financial burden on the sector forcing the government to use its remaining assets to buffer the impact on tariffs;
- the blackout in the Argentine distribution system, leaving 160 000 clients without electricity for nearly two weeks in 1999.

Generally, an overall lack of coherence of the reform package with the technological, institutional and human resources endowments of the country presents serious threats to its sustainability in the long term. Furthermore, conditions for the design, formulation, development and implementation of energy policies have become even more complex within globalisation strategies. Liberalisation and the stronger role of the markets bring the need to use indirect instruments to influence the behaviour of energy system players. Decentralised decision-making for resource allocation leads to new challenges in achieving compatibility between microeconomic objectives and global and sub-sector energy policy goals.

Where, then, should we search for the causes of the limitations of the reform process in order to provide an adequate answer to the sustainability dilemma and, especially, to its social and environmental dimensions? The search for answers requires, first, a brief reference to the context and historical sequence of the reform process itself.

2. The birth of the reform ideas: Context, processes and consequences

A well-known paper by McKerron and de Oliveira (1992) develops a clear picture of the context situation and the prevailing ideas with reference to energy systems (especially electricity) during the 1970s and

1980s in relation to the process of reform implemented in some OECD countries. This period was characterised by breakthroughs associated with constant technological improvement and falling prices. On the other hand, the large investments made to expand and interconnect the electric systems of the industrialised nations were coming to an end, while demand registered growth rates much lower than those that had been characteristic of the sector after World War II. Especially in Europe, the goals of reconstruction and expansion of the supply system had been met or were nearing completion. Demand for large investments and rising production seemed to be exhausted. Thermal efficiency seemed to have reached its peak, while the development of air-derivative turbines and the growing availability of natural gas opened doors to new technologies that combined high efficiency with low investment costs and high productivity at low levels of production. The escalation of fossil fuel prices associated with the so-called oil-price crisis affected the evolution of demand by discouraging electricity consumption. The accidents registered in two nuclear stations negatively affected perceptions of nuclear generation. At the same time the environmental dimension was growing in significance, even before the discovery of 'new' environmental problems like climate change. In sum, supply and demand elements combined to produce a new scenario for electricity in the developed economies – one which implied low demand growth rates, the disappearance of scale economies, the appearance of new generation technologies, and the availability of new sources.

These factors created a favourable environment for the private sector to start playing a greater role in power supply in industrialised countries. Coincidentally this was a time when international capital was searching for new investment opportunities because of the low growth levels of the industrialised economies; the electricity sector was seen as a promising area for investment.

The process initiated in some industrialised countries led to conceptions that were credited with universal validity amongst multilateral finance agencies and international organisations – the approach of 'one size fits all', was, and in some forums still is, the dominant idea in power sector reforms. These multilateral and international organisations were strong promoters of reform, setting the conditions and presenting them as the panacea to also solve the problems affecting the developing world. Diagnosis of the power sector by these institutions identified the following problems: centralisation and the excessive size of the electricity utilities and, especially, the monopolistic position and state ownership, and consequent political interference. The proposed solution – privatisation, unbundling, deregulation – was offered to developed, developing

countries or transition economies, without considering its feasibility in specific situations.

Although it is possible to agree with the diagnosis, the situation of the power sector within the developing world was, and still is, far from uniform. Many of these countries had evidenced characteristics similar to those of the industrialised world, while others had low electrification rates and low productivity and inefficient equipment and infrastructure. Additionally, policies and actions followed by developing countries in response to the oil price crisis were very different. In most cases, the rising costs were not transferred to prices and the electricity companies had to bear a constant de-capitalisation and de-financing. A few years later, the challenge faced by these companies was to recover their financial stability and to guarantee future supply and the expansion of the system.

The situation in many developing countries at the time when the process of reform was initiated was characterised by small and/or immature power systems, low access to electricity, lack of local capital markets, and high levels of macroeconomic instability, especially in some Latin American countries. There were important differences from the developed world. First, the electricity systems differed substantially as to their maturity, complexity, structure, size, access and coverage. Secondly, the industrialised world had highly developed capital markets with abundant locally-quoted resources. This condition was absent or incipient in the developing economies, where capital markets are even today an objective of macroeconomic policies. Thirdly, the reform and restructuring process within the industrialised nations was locally determined, led and implemented, while the developing countries were influenced and in many cases conditioned by multilateral financing institutions – in some cases, design, direction and implementation aspects were in the hands of foreign experts recommended by these institutions.

Despite profound differences between the situation of the electricity systems of the industrialised world and those of the developing world, both offered a common element to private capital: the opportunity to become part of an attractive market, with long-term permanence and low uncertainty and risk. Through divesting of state companies or through co-operating to expand the system, this attractive market was opened up to private capital.

Local capital was mainly used in the privatisation of electricity utilities while in the developing economies practically all the resources channelled into the sector via capital transfers or new investments resulted from foreign direct investment. In other words, the reform had – in the case of the developing economies – a strong effect on the transnationalisation and internationalisation of the basic resources and sectors of the

economy (including the energy sector). It would appear that availability of 'floating' capital from the developed world coincided with the opening up of the electricity sector. [3]

Clearly, it is difficult to expect a single model of almost even characteristics to be capable of adapting to such different situations and yielding adequate results in both the developed and developing blocs of nations. In fact, the difficulties, limitations and problems in the implementation of the reform and its further development can be explained by the inadequate diagnoses and proposals that neglected local realities within the framework of a new paradigm – the key role assigned to the market, as the only institution capable of achieving allocation and production efficiency and the best mechanism for resource allocation, the free flow of capital and goods and the opening up of the economies. A further element of special significance to the energy industry is the fact that the reform processes were simultaneously registered within the framework of structural adjustment policies and programmes which strongly restricted the capacity of governments to control, regulate and monitor the privatised electricity systems.

It is also important to note that – at least in the case of the developing economies – the guiding element in the origin and implementation of the actions followed purely financial and economic objectives. Public benefits (environmental and social) were considered to be an almost inevitable consequence of better market operation. It was expected that economic prices and the dispersion caused by a more efficient system would be sufficient mechanisms to guarantee environmental protection and equity in income distribution.

3. The reform in Latin America: key elements

The reform processes within the Latin American energy industry were developed within the framework of significant economic change and were conditioned by crisis situations at macroeconomic level. The situation of macroeconomic imbalance, a large external debt and fiscal instability represented a common denominator in many Latin American economies and conditioned the policies and measures implemented

[3] 'The abundant availability of capital on international financial markets at the start of the nineties, and the severe financial difficulties being experienced by the public sector of the region's countries since the early eighties to address the need for investments in the energy sector were also factors that led to the liberalization that led to the liberalization of the sector's industries.' (OLADE-CEPAL-GTZ 2000)

within the energy field. Privatisation actions were put forward as the best alternative to solve the debt problem, while market liberalisation measures were deemed the best mechanism to attract large foreign investment and guarantee future growth.

In accordance with this economic policy orientation, the swift privatisation of state companies represented a key element to obtain financial resources to consolidate the viability of the reform plan and alleviate the conflicts between the domestic economic groups and the foreign creditors. Notably, doctrine statements were explicitly brought forward as rationale for such transformation. Additionally, forecasts developed at regional level indicated that the volume of investments required to meet the rise in the region's electricity demand would be wholly beyond the reach of the state companies and impossible to finance through the multilateral banks. Figures presented by multilateral agencies demonstrated the need for a role for private capital in order to assure the future supply of electricity.

As mentioned before, multilateral agencies played an essential part both in inspiring and implementing reforms. The World Bank's proselytising, as well as its publication of analyses favouring a role for the private sector and emphasising the inefficiency of the state, supported domestic arguments, considerations and justifications for the transformation of the sector.

Box 1. World Bank perspectives on electricity reform in Latin America during the early 1990s

The following quotes from a key World Bank document in support of privatisation.

'Efficiency improvements, the transformation of state electricity companies into business entities, the establishment of independent regulation authorities, and the total or partial transfer of construction, operation and maintenance activities to the private sector would reduce fiscal pressure on public resources and relieve the state of the responsibility for micromanaging electricity companies.'

'Its (reform) purpose is for state companies to meet exploitation costs and debt obligations and, above all, to reasonably contribute to meeting expansion needs.'

'Challenges to Latin America are the same as those posed to the rest of the developing world:

- establishment of a legal and institutional framework guarantees stability while providing sufficient flexibility to adapt to changing conditions;

- introduction of the market forces wherever possible in a sector that until recently was considered a natural monopoly;
- mobilisation of resources, especially those from the private sector; and
- protection of the population and the environment affected by electricity projects.

In view of today's changing environment, the traditional model of the electric sector does not always provide adequate incentives to reduce production costs over time or to operate in an efficient and reliable way.'

Source: World Bank and OLADE (1991)

Beside privatisation, the World Bank supported a gamut of initiatives by countries in the region to expand the role of the private sector. The mechanism used to do this included regulatory reform, as well as varying options for private sector participation in different sectors, among them the power sector. The Bank also expanded its capacity to 'amplify the political dialogue' and supply technical assistance to governments with regard to the policies and strategies of privatisation (World Bank 1991).

World Bank financing of the process is the clearest proof of its influence and support. It supplied the sector with funds to finance voluntary severance or retirement programmes, as well as for the corporatisation, reorganisation and 'clean-up' of public companies in preparation for their privatisation. Also, the World Bank's credit policies were tied to conditions of policy reform. One policy document stated that 'Bank loans for the electricity sector shall focus on nations that are clearly committed to the improvement of the sector in accordance with the principles mentioned earlier', the 'principles' being efficiency, rates, cost adjustment, privatisation, independent regulation, lack of government interference, etc (World Bank 1993a). The document goes on to say that '[e]xplicit progress of the country towards the establishment of a legal framework and of regulatory processes *which the Bank deems satisfactory* will be a requirement for all loans to the power sector' (emphasis added).

Recommendations set out in a World Bank document on Argentina (World Bank 1993b) were based on a mission that took place between November 1991 and October 1992, and included the following:

In order to make the sale of public companies more attractive, the government's restructuring program must include:

- Absorption of excess labor.
- Absorption of all the companies' debts as well as any other obligations.

- Reduction of the labor force is estimated at 95,200 people and represents a decrease of around 37% in relation to employment levels in June 1991.
- Privatisation should be used to pay off public debt.
- Prices and tariffs must be set at international prices and marginal costs and indention should be adjusted to the price index in the USA.

Notwithstanding the fact that every Latin American and Caribbean nation has implemented reforms to a certain extent, the deepest changes – including a key role given to the private sector – were in Chile, Argentina, Peru, Bolivia, Colombia, Guatemala, Panama, El Salvador, Nicaragua and Jamaica, in that order. The process was initiated in Chile in 1970s, and Jamaica privatised its integrated electricity company in 2001.

It is important to point out that, although the reforms have shown common patterns and characteristics across the region, institutional, legal and regulatory aspects have followed specific outlines in each country. It is hence possible to identify specific characteristics among the different models relating to vertical and horizontal integration, public-sector characteristic given to the different segments, monopolistic or competitive situations in different markets within the electricity chain, regulation and operation of the wholesale market, regulation of international interconnections, co-ordination modes and property rights (Olade-CEPAL-GTZ 2000).

Figure 1 provides a schematic outline of the orientations prevailing among the reforms implemented in the electric power systems of the region. From the diagram it is evident that the general tendency is to give priority to the introduction of market mechanisms or the maintenance of integrated public enterprises, with openness to private-sector players and new regulatory approaches highlighted. There are very few situations where there have been no substantial changes either in the co-ordination scheme or the ownership of assets (Olade-CEPAL-GTZ 2000). In general terms, the trend is to abandon the ‘centralised command and control scheme’ and to go in the direction of an ‘open market’.

We identify situations of pronounced difference both in the cession of property rights over the production units and in the co-ordination system defined. Some nations moved from sole state ownership to joint or private ownership, some abandoned central control to position themselves at different steps, such as the regulated integrated way, the single purchase model, or the open market. Vertical and horizontal integration

possibilities also allow for substantial variation, as does the qualification of public or non-public service character given to the electricity chain segments.

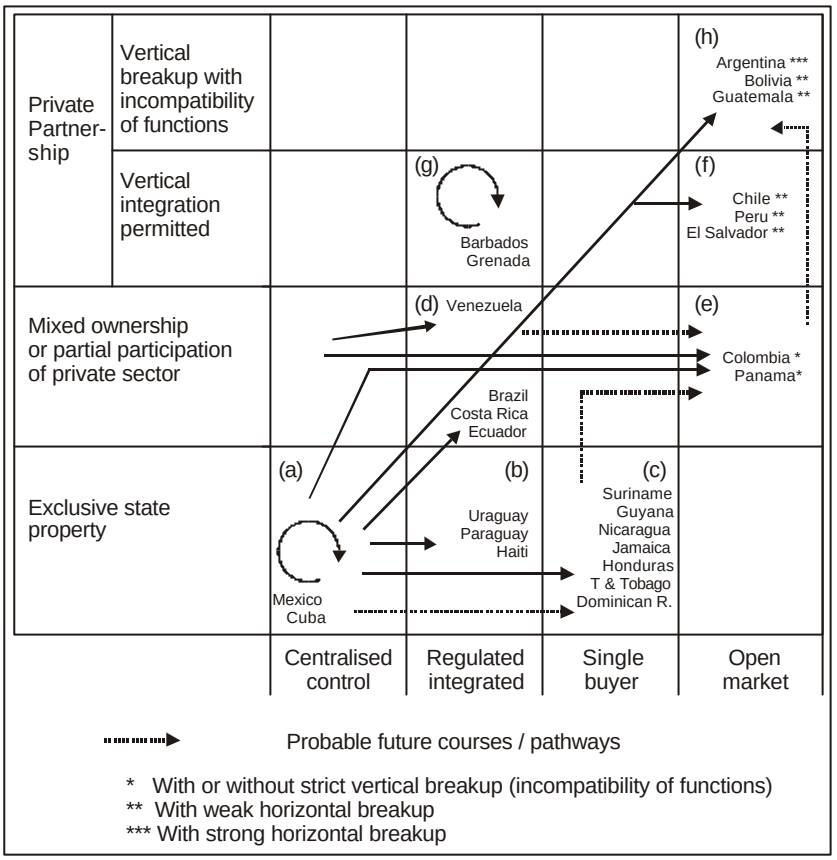

Figure 1: Evolution of reform processes in electric power systems in Latin America and the Caribbean

There has not always been clarity in the interpretation of several notions or ideas associated with the reform process, although some seem obvious or even pointless, while certain terms, measures or actions were often presented as synonyms, at least within the Latin American reality. The most remarkable among these notions related to the conviction that privatisation implied competition and efficiency. It was also expected that higher efficiency would immediately translate into falling prices. Other myths limited the scope of the restructuring to privatisation, where the mere renunciation of production activity on the part of the state was

already a sufficient advance in itself – something wholly positive and without demanding any concern as to potentially negative effects. Competition and deregulation were frequently used synonymously, in a superficial reading of the operation of the markets and the characteristics of many of them, which required – even in conditions of competition – 'game rules' to guarantee, precisely, effective competition among the players.

It was and still is common to see a degree of confusion between objectives and instruments. Policy documents repeatedly assert that goals are related to achieving a higher market role, the introduction of competition, the privatisation of the systems. 'Reform' has in a sense been vaguely used, and explained as if the modification of the system were by definition necessary and good, with no diagnosis to clearly determine the problems, the objectives that provided an answer to these problems, the most adequate strategies, the actions and measures that best adapted to the strategies that would allow meeting the objectives and the feasibility of the scenarios brought forward. The roles of property rights, private investors and free market operation should be related to the social and economic organisation that a society deems the best to reach its ultimate goal: sustainable human development.

Apart from these general considerations, the events or failures associated with the reforms have depended on many aspects, the most manifest being the following: the degree of maturity of the systems,[4] the depth of the crisis in which the system and the economy as a whole were immersed; the co-ordination, formulation, execution, control and rationality of the decision process; the size and structure of the supply system; the co-ordination systems adopted; the development of an accurate diagnosis; the definition and implementation of a legal and regulatory framework that adequately comprehended the key technical and economic elements of the system and clearly defined the intervention points; the speed of the process itself; etc.

The cases that revealed greater difficulty in achieving the expected results of the reform were those in which the systems were least mature, as in El Salvador. The institutional proposals did not consider the economies of range and scale associated with the size of the systems and the feasibility of their vertical or horizontal disintegration, as in the cases of Guatemala and Bolivia. Changes were made too hastily, and inadequate co-ordination proposals were given for the structure of the system

[4] By degree of maturity, we understand the level of development reached by the electric system with reference both to population supplied and to level of technological development, efficiency, economic-financial situation, etc.

and associated markets, with insufficient analysis of the complexity of the system – here Argentina would serve as an example. Briefly, simplistic proposals, based on an understanding that a uniform response would be adequate for every system whatever the local circumstances, gave way to actions and processes that in many cases were far from reaching the results promised by the reform promoters. It is clear that the unsustainability of some proposals for vertical and horizontal deintegration have result in additional costs, inefficiency and high tariffs. Table 1 shows the degree of reform in relation to the size of the market.

4. Pending issues or new challenges

If many achievements have been accomplished, important issues arising from the lack of coherence of the reform package with the technological, institutional and human resources endowments of the country present serious threats to its sustainability in the long term. The criterion for success should be the assessed likelihood of attaining sustainability. Notwithstanding the time elapsed in some countries, the reform process has proved unable to give a significant portion of the population access to modern sources of energy. The expansion of the systems and the connections of new household consumers did not progress at the expected speed, while large sections of the population – in both rural and urban areas – remain without access to electricity. In El Salvador, for example, the rate of growth in new household connections decreased 38% since reform was implemented (bringing total connections down from 6.6% to 4.1%) (Bouille et al 2001). Concentration of the markets in private hands and absence of competition, together with the absence of anti-monopoly laws in many Latin American and Caribbean countries, is seen by many experts as a threat to the sustainability of the process of reform (Von der Fehr & Millán 2001; Benavidez 2002; Fundación Solar 2002).

A second issue is the guarantee and quality of supply. One argument often put forward prior to the reform within most countries regarded the incapacity of the state to meet the needs of investment to guarantee future supply and the expansion of the system. It was assumed that supply would be guaranteed through the security provided by the involvement of private investors. Reality has proved different: guarantee of supply remains an issue of concern to the energy authorities. In many cases, the mechanisms proposed to rule on the tariff setting and distribution of the costs of electricity investments experienced serious problems that pointed to an inefficient and insufficient allocation of resources. There were, for example, problems in many countries (Bolivia, Peru, Argentina) with the

Table 1: Reforms in electricity systems and size of the markets
Source: OLADE-CEPAL-GTZ (2000)

Installed generation capacity (MW)	*Centralised control*		*Regulated integrated system*	
	Integral part of the state	*Certain degree of business autonomy*	*Single integrated structure*	*Various business units*
0-500		Haiti	Barbados Grenada	
501-1000				
1001-2000	Cuba	Uraguay		Costa Rica
2001-5000		Paraguay		Ecuador[1]
5001-10000				
10001-20000				
>20000				Venezuela[1] Brazil[1]

Installed generation capacity (MW)	*Single buyer*		*Open market*	
	Integrated distribution	*Distribution breakup*	*Vertical integration permitted*	*Obligatory vertical breakup*
0-500	Suriname Guyana Nicaragua			
501-1000	Jamaica Honduras	Panama[2]	El Salvador	Bolivia
1001-2000	T & Tobago			
2001-5000	Dominican R.			
5001-10000			Chile	
10001-20000			Colombia	Argentina
>20000	Mexico			

Notes

1. According to the approach appearing in the regulatory norms, these countries should be included in the open market scheme. The placing in the table reflects the situation of transition.
2. The introduction of market mechanisms is forecast for 2001. In this transition, the power transmission utility will be the single buyer (not for profit) of the energy to be transferred afterwards to distributors.

expansion of the transmission system. It appears advisable to think of mechanisms that allow identifying the investment needs from a global perspective, through a multi-objective approach, considering environmental aspects, regional development, the use of natural energy re-

sources, etc, and not just minimising costs. Although investment in the sector continues to be significant, the economic repercussions of attempts at political manipulation of regulated rates could compromise the quality of the supply of electricity in the country in the not too distant future (Fundación Solar 2002).

Notwithstanding the regulatory ordinances that established the incompatibility of the functions within the different energy chains, there are situations where players are members of consortiums that operate in different links of the chain; while this is not a formal violation of the regulations, it does lead to a certain degree of vertical reintegration of industrial activities. This type of integration in some cases reaches the consumption sphere, for certain large consumers are also part of consortiums holding the concession for the distribution of natural gas or electricity. Given the strong interaction of natural gas and electricity in certain countries, such as Argentina, there are also situations within the field of transformation centres in which certain agents related to transporting and/or producing natural gas have been incorporated into the electricity generation business, thus gaining competitive advantages over specialist agents.

The situation of the institutions in charge of the control and monitoring of the system is an issue of special sensitivity and significance. The existence or establishment of a regulating body is not sufficient guarantee of the full achievement of its functions, nor in particular of the safeguarding of the interests of consumers. Guatemala and El Salvador bear witness to this. In both countries inadequate regulation of the access to transmission system has resulted in volatile behaviour of prices.

Financial autonomy, availability of the necessary resources, trained technical staff covering all specialities and functions required by the task, and access to technical, economic and legal information, are all necessary conditions for a regulatory body to adequately carry out its functions (Millán & Ayala 2002). The failure to adequately meet some of these conditions have prevented the electricity systems of several Latin America and Caribbean countries from achieving the forecast results of the reform process. As Von der Fehr & Millán (2001) suggest, '[t]he critical role of institutions has sometimes been seriously underestimated'. The consultants who participated in the design of the recent reforms in Latin America may not always have had the necessary expertise in institutional issues. The fact that regulation is a foreign concept in French law, influential in Latin America legal principles, may also explain the lack of regulatory culture in many of the relevant countries.

Another problem is that separating the roles of the state from those of the other players has not been easy. In particular, unclearly defined borders remain between policy-making and regulation. This is evident,

for example, in Colombia, in the ongoing struggle about the liberalisation of the natural gas market, and in El Salvador, where the responsibility for energy policy has not been clearly defined or vested in any particular institution. In the second case, for example, the policy authority in the power sector, the Dirección de Energía Electrica, was established in January 2000, three years after the reform. There is no clear institutional coordination between the hydrocarbon sector and the power sector authorities or with the new and renewable energies sector which is under the responsibility of the Environment Ministry.

Public benefits were generally not deemed priorities at the time of the reform. It was maintained that the transformation process itself and its consequences on prices, together with the better market operation, would be sufficient to guarantee higher efficiency, reduce or eliminate the effects on the environment, and lead to benefits for the poorest sectors. Given that public benefits were not accorded a significant place on the reform agenda, and social and environmental dimensions were not explicitly excluded, it is somewhat difficult to evaluate their contribution to the sustainability of the reform processes. With the exception of Colombia, which maintains subsidies and a social tariff, the other countries if the region have, in general, eliminated any kind of subsidies through their regulatory frameworks, with the result that low-income groups have been adversely affected by higher tariffs (Argentina, El Salvador).

A recent analysis gives additional arguments on the need to revise the process of reform (de Paula 2002 – authors' translation):

- Barriers to the introduction of 'real and effective' competition. An example is Peru, which shows an important concentration in generation and distribution markets.
- Practically, there was little success in promoting private investment in the expansion of the transmission systems.
- Efficiency gains in generation through competition were not always adequately transferred to the captive final users, who are significantly disadvantaged in comparison with the 'free' users. Market power in generation provoked price volatility and reduced competition in pricing
- It is evident there is a reduction in private investor interest in recent years. Some factors behind this reduction could be related to political uncertainty, violence, corruption, social conflicts, recession, politic pressures, etc.
- There are no clear signs of investment in thermal generation, particularly in countries with important hydro participation.

The advantages of international electricity exchange were frequently highlighted in the 1980s by pro-reformists. These included the possibilities of complementarities in resource and demand and reduction in the need to maintain high energy reserves. Several countries in the region have operated such inter-country grids for decades with benefits for both parties (Legisa 2001). The new context has imposed different conditions on such energy exchange. In those nations in which cross-border connections were implemented as a result of private initiative, a significant rise in transactions has been registered as in the Chile-Argentina and Guatemala-El Salvador links. The possibility of moving towards a regional market requires, however, the development of specific regulatory frameworks for international markets and grids, and the implementation of legal frameworks so that the benefits yielded by the grid system are satisfactorily shared and act as an incentive towards greater integration.

In sum, sustainability is the key issue, while system governance is a highly sensitive aspect. Electricity systems must be understood within the context of their role in a total energy system, and therefore its articulation with sustainable economic development. The reform has set new conditions and challenges in the search for sustainability. What is important is not so much the evaluation of the reform or its contributing to meeting public needs, but to recognise that the reform introduces a new institutional and regulatory situation and, thus, stands as a conditioning factor in meeting sustainability objectives. It is necessary to evaluate – for each particular situation – the extent to which the specific characteristics assumed by the reform represent an opportunity or an obstacle to sustainability.

In the quest for a sustainable energy policy, the following objectives should have priority within the context of Latin America and the Caribbean:

- guarantee of supply;
- rules and actions promoting regional markets and integration;
- promotion of energy efficiency;
- clarification and consideration of public benefits including universal access;
- development of systemic, institutional and individual capacity as a need common to the region.

Energy must recover its role as an instrument for sustainable development. Second-generation reforms offer an excellent opportunity to provide answers to current challenges and contribute to such development.

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6

Some emerging lessons in the reform of the African power sector

NJERI WAMUKONYA

1. Introduction[1]

The power sectors of countries across the continent are to be found at various levels of reform – primarily motivated by commitment lending by international financing institutions. Since 1993, reform has been a World Bank condition for lending to the power sector (World Bank 1993).[2] In a more recent energy policy position paper, the World Bank (2000a) explicitly notes that:

> The Bank will be increasingly selective in its activities. Resources will be focused on only those countries which demonstrate credible commitment to reforms. Specific criteria will be actions taken to: disengage government from day-to-day operation of the energy sector; liberalize access, attract private investment and move the sector towards private ownership.

[1] This paper is a revised version of the paper published in *Energy for Sustainable Development Journal* VII(1): 7-15.

[2] Discussions here on the World Bank do not differentiate between the Bank's core and member institutions (including the Multilateral Investment Guarantee Agency, the International Finance Corporation, International Development Association, and the International Bank for Reconstruction and Development. Reference to the World Bank also indicates related institutions, including the International Monetary Fund.

Mismanagement, poor operational performance, and distorted tariff structures resulting in poor economic efficiency and low returns on investment have been given by the financiers as reasons for reform. It has not been adequately acknowledged, however, that while there may have been inefficiencies in the power sector, its malfunctioning cannot be entirely blamed on mismanagement, as other global macro-economic factors have played a major role. In many cases, non-payment by customers – particularly government – has been mainly responsible for utilities' poor financial states. In January 2002, for example, the Kenyan government owed Kenya Power and Lighting Company KShs2.5 billion (approximately $310 million). ZESCO, the Zambian utility, has such a high debt stock that it is providing incentives in form of a bag of mealie meal (valued at K26 000 = $6.5) for every K100 000 payment (about $25) (*Post* 2002). The 'mismanagement' conclusion tends to be applied, however, across all countries – irrespective of the performance of the state-owned utilities.

Not only are most African countries largely unelectrified, but demand is also growing, necessitating additional generation capacity. Projections indicate a need for substantial investments. In Tanzania demand is expected to grow by 9% per annum in 2001-3, 6% per annum during 2004-6, and 5.7% per annum in 2007-15, requiring $500 million investment in generation, transmission and distribution (World Bank 2001a). Zimbabwe's demand is forecast to grow at 3% per annum for the next ten years, requiring capital expenditures of approximately $1.5-2 billion (World Bank 2000b). Forecasts for Ghana indicate that demand should double in ten years, requiring $1.5 billion of investment (Edjekumhene et al 2001). Implementation of the Kenyan government five-year electricity sector programme requires about $1.1 billion (Gichuru 1998). Yet most governments are already heavily indebted to potential financiers and thus vulnerable to any conditions they set.

The World Bank has generally provided prescriptions on how to reform, characterised by a requirement to privatise. Once a country has agreed to implement the recommended reform, the Bank advances loans to effect it. Part of the loan extended to reforming countries is earmarked for commercialisation or effectively restructuring power utilities to make them attractive to the private sector. In Egypt a Memorandum of Understanding was signed in 1994 between the Electricity Authority, the Ministry of International Cooperation and USAID, stating that the Authority would receive a financial incentive provided it achieved a number of legal, financial and operatives objectives outlined in the policy reform matrix (Swidan 1998).

The privatisation approach is justified on the basis of findings of a 1995 World Bank study which concluded that state ownership is inherently inefficient and the greater the involvement of the private sector the better the enterprise performance (World Bank 1995; Bacon 1995). The Bank has such apparent confidence in privatisation, and hence restructuring, that it does not always accept alternative recommendations made by its own consultants. Despite a consultants' report proposing maintenance of an integrated monopoly in Kenya instead of unbundling (on the basis that the latter had several important disadvantages), the restructuring has been undertaken upon World Bank recommendations which stipulate unbundling (World Bank 1997). The Bank is also involved in the privatisation process, often launching the privatisation bids, as evident from Cameroon (Pineau 2002) and Senegal (*African Intelligence* 2002), indicating the level of Bank influence on the reform process.

As the reform process unfolds there is some evidence that the experiences are not always positive and the expectations are not met. This article discusses some emerging lessons, using examples from select countries. The main issues addressed include the ability of privatisation to attract the private sector, and inconsistencies between the justifications given for reform and the reality on such matters as competition, increased access and job creation.

Reform has progressed to various levels in the different countries. It would not be impossible to re-orient the process to take into account factors that need addressing to ensure a people-centred sustainable development approach. For this to happen all key stakeholders – including the international financing institutions, private sector companies and governments – would have to cooperatively re-negotiate on equal and fair terms. This would entail establishing, at the initial stages, forums for discussion where all could openly present their needs and problems, with the joint aim of designing a cooperative strategy on how to address sustainable development objectives.

2. Lessons of the reform process

2.1 Private sector participation

Privatisation is proving not to be the solution to attracting the private sector into most of the African power sector. The private sector is attracted by assured profitable returns on investments. This entails large demand, a prerequisite unmet by most countries, since electrification levels are low and per capita consumption among the connected limited

by poverty and low industrial activity. After two years of aggressive privatisation ordeals Senegal has failed to get the private sector to take over Senelec, for example (see Box 1). Consequently Senegal has incurred financial losses through power shortages, since the process meant that no generation capacity was added despite increased demand. In desperation, consumers have purchased diesel- or petrol-operated generators – so that power outages in Dakar are characterised by the noise of these generators engines paraded along the pavements. Côte d'Ivoire had a different experience. The management contract, won by a consortium of Electricité de France and SAUR, a French water distribution company, took only a few months of negotiation with the government (Plane 1999), mainly because the consortium was sure of making profits, partly due to the relatively high consumption levels. (Côte d'Ivoire had a generation capacity of 1100 MW in 1999 while by 2000 Senegal had an installed capacity of 422 MW and a peak power demand of 241 MW).

Offers made by the private and other companies for utility shares have not always reflected the real value of the assets. In Mauritania, for example, government was forced to plead with the World Bank to relax privatisation conditionality to save the Societé Mauritanienne de l'Electricité et de l'Eau (Somelec) from being acquired by the Office National d'Electricité (ONE) at an extremely low price (see Box 2). Revisions by the companies towards even lower prices than originally proposed do occur. AES for example revised the proposed price of $80-90 million down to $70 million for a 56% share of Sonel, the Cameroonian utility (AES 2001). So charged is the privatisation agenda that the World Bank loses no time at all in bringing countries into it. So Rwanda was expected to privatise Electrogaz, the national water and power company in early 2003, barely a year after the end of its political crisis (AEI 2002c). Prior to the political turmoil, privatisation should have been completed by October 2000 after Cabinet approval on 24th May 2000 – in literally less than half a year (Electrogaz 2001).

Box 1: Senegal: Attempts to privatise the power sector

As a result of increasing pressure from the World Bank, in 1998 Senegal was forced to embark on a fast-tracked reform of the power sector – a reform mainly characterised by privatising the electricity utility Senelec. In acknowledgement, the World Bank approved a $100 million credit for a programme to improve Senegal's energy sector through a comprehensive set of reforms explicitly aimed at opening up the power sector to private investment. Parliament enacted two Acts (98-29 and 98-06) which authorised the creation of a regulatory body and the transformation of Senelec into a stock company, thus enabling its privatisation. The Commission for Regulation of the Electricity

Sector was established in 1999 to oversee transition and regulate the sector. Through a tender process, in 1999 a consortium of Hydro-Quebec of Canada and Elyo, a subsidiary of the French company Suez Lyonnaise des Euas, acquired 34% of Senelec's shares, with 10% going to employees and 15% to the local private sector, while the state retained the balance as the majority shareholder. The consortium was, however, granted full management powers. Twenty months later the government was forced to re-possess the shares from the consortium as it had proved incapable of increasing generation capacity as per the contractual agreement. Senegal was not, however, released by the World Bank from the privatisation condition. In 2001, after a second tender process, two companies were short-listed: Vivendi Environnement (of France) and AES Corporation (of the USA), both of which were experiencing financial difficulties. AES offered $77 million and Vivendi $40.9 million for the stakes. After ten months of negotiation, it was evident that the companies could not raise the investments. The fall in value of AES stock – worth just $4 in July 2002 compared to $20 in January 2002– prevented the group from raising the money needed to acquire a 51% stake in the Senegalese utility.

Meanwhile power shortages were rampant; consumers sufferered as much as eight continuous hours of outages per day in October 2001, for example. Finally, out of frustration, in August 2002 the government called off the privatisation of Senelec. The utility's first subsequent activity was to set in process the acquisition of two 15 MW generators at a unit cost of $8 million to help address the generation shortfall. The deal is financed through a loan of $8.6 million from the West African Development Bank and $6.4 million from Banque de la Communauté Economique des Etats d'Afrique de l'Ouest, with the balance met by Senelec itself. The generators were expected to be operating by the beginning of 2003.

Sources: World Bank (1998); AEI (2002a; 2002d)

Box 2: Mauritania: Bid to privatise fails

In 2001 the World Bank financed the bidding process for 51% of Somelec shares. The Bank had made Somelec's privatisation a condition of granting Mauritania a reduction in its debt under the 'highly indebted poor countries initiative'. EDF, Hydro-Quebec, Vivendi Environnement and Morocco's ONE pre-qualified for the bid, but in early 2002 all except ONE withdrew from the process. In the absence of competition, ONE put in a very low bid in the hope that the government would feel compelled to accept it. However Mauritania decided to negotiate with the World Bank on its conditionalities on privatising Somelec on the basis that the country would be incurring a heavy loss if it accepted ONE's offer. Eventually the Bank agreed, deeming that Mauritania had done everything in its power to sell Somelec and could not be blamed for the failure of the privatisation process.

Source: AEI (2002b)

2.2 Foreign and local participants

Terms of operation of the utilities have often favoured foreign investors, with power purchase agreements spanning extended periods and at very favourable tariff rates. In Kenya, the security package for the forthcoming independent power producer at Kipevu II consists of an escrow account holding one month's payments (around 140% of what is required) and a letter of credit for a further three months. The 140% coverage ratio is augmented by a letter of understanding from the Kenyan government insulating the sponsors from force majeure risk (Bayliss & Hall 2000). This unequal treatment between foreign and local players is further demonstrated by the transactions over the Songo-Songo gas-to-electricity project in Tanzania, where AES was awarded favourable rates that had not been extended to the local utility, and in the favourable US currency denomination (see Box 3). Throughout Africa foreign companies are increasingly dominating the electricity sector. In Côte d'Ivoire, French companies own 51% shares of the company that manages generation, distribution and transmission and a foreign consortium owns a similar proportion of shares in Cape Verde (World Bank 2001b). The South African private company Eskom Enterprises is active in many African countries: it owns 51% of shares in the Lusemfwa hydropower company in Zambia; has a 15-year management and operation contract for the Manantali hydro station in Mali; will manage, operate and maintain Hwange power station in Zimbabwe; and in Malawi the company got a one-year contract in 2001 to improve performance of the public-owned utility.

Most of these foreign companies have financial positions stronger than those of the host governments. They are often indirectly linked to their home governments and can be used to advance the political interests of those governments in countries they invest in.[3] The bargaining positions of host countries are potentially compromised by all this. The credibility, financial and otherwise, of the foreign companies dominating the African power market is, however, questionable – the financial ailments suffered by AES and Vivendi are clear examples of this, while the Enron debacle has shaken the electricity market. Problems with these companies have been widely reported, mainly because of their size, but many more smaller foreign companies are as un-creditworthy. Reports

[3] It is interesting to note that in the mid-1990s the US embassy, and high ranking US officials in Washington, were blackmailing the Mozambican government, threatening to cut off aid, unless a deal was signed granting Enron rights to Mozambican natural gas (Agencia de Informacao de Mocambique 2002).

show that most of the 15 largest corporate beneficiaries of the World Bank energy and power projects from 1992 to 2002 are being investigated for alleged accounting irregularities, energy market manipulation, fraud, bribery and/or human right abuses (Green 2002). Thus the extent to which the electricity power system is in the hands of foreign companies (see Table 2) raises important energy security questions.

Box 3: Uncompetitive terms for local investors: The Songo-Songo project, Tanzania

The Songo Songo gas-to-electricity project involves development of gas fields and construction of a gas pipeline for a gas-operated 111 MW plant and supply of gas to Wazo Hill cement factory. The total project cost is $325 million, financed by the government of Tanzania, World Bank, European Investment Bank and SIDA. Tanesco, the state-owned utility, has 1% equity share. The project is owned by a consortium led by AES Corporation which has $50 million equity. Under the current power purchase agreement, Tanesco will buy all the electricity generated at $0.12 per kWh and sell it to consumers at $0.075 per kWh. The terms available to AES are much better than those extended to Tanesco.

Table 2: Select multinational companies involved in the electricity sector

Company	*Home country*	*Countries company is involved in*
ABB	Sweden	Lesotho, Côte d'Ivoire, Morroco
AES	USA	Uganda, Cameroon, Tanzania
Cinergy	USA	Kenya, Côte d'Ivoire
EdF	France	Guinea, Côte d'Ivoire, Mali, Morocco, Egypt
Endesa	Spain	Morocco
Eskom	South Africa	Uganda, Gambia, Zanzibar, Malawi, Mali, Zimbabwe, Libya
Hydro-Quebec International	Canada	Togo
Marubeni	Japan	Ghana, Tunisia
SAUR	France	Côte d'Ivoire, Guinea
Vivendi	France	Djibouti, Tunisia

2.3 Competition

One of the rationales for privatisation was to facilitate competition and thus eliminate monopolies. Increasing competition is normally lauded as a measure leading to lower consumer prices. But this has hardly hap-

pened – in fact the opposite situation has emerged where foreign private monopolies have replaced the government-owned monopoly structure. This is best demonstrated by the case of Cameroon, where AES has full management control for 20 years (see Box 4). In some cases financing institutions have facilitated acquisition of national utilities by other foreign 'national monopoly utilities'. EDF, a French monopoly in France, is, for example, a player in many African countries, including Côte d'Ivoire. In Mauritania, the World Bank had no qualms about letting the Moroccan state-owned monopoly company ONE bid for Somelec, the Mauritanian utility.

Box 4: Successful privatisation? The case of Cameroon

In July 2000 the IFC launched an international call for bids for acquisition of 51% of Sonel, Cameroon's electricity utility responsible for generation, distribution and transmission. In 2001 AES was awarded 56% of Sonel's shares at $70 million. AES was the only company out of five pre-selected firms to submit a financial offer to the government of Cameroon, which had stated that it had anticipated a purchase price of $80-$90 million. AES later revised this price. Despite the fact that one of the rationales offered by financiers for privatisation was to develop competition (in fact a regulatory agency on competition to insure an adequate level of competition was created in 2000), AES was awarded exclusive management responsibilities for generation, transmission and distribution assets for 20 years. This effectively entails transfer of monopoly and hence energy security from a government to a foreign-owned company. To compound this matter, AES had in 1999 a revenue of $3.3 billion while Cameroon's GNP was $8.5 billion. In addition AES has access to high-level technical experts through its energy businesses in 24 countries world wide.

Under the terms of the contract, AES will be required to increase the number of electricity subscribers in Cameroon to at least one million. There are currently just 400 000 subscribers. In March 2002, AES-Sirocco, the parent company of AES-Sonel, was reported to be on the verge of bankruptcy, and AES-Sonel has been accused of diverting funds to its parent. Frequent power outages have occurred since AES took over, and may force Cameroon's government to scale back growth projections.

Sources: Cameroon DOE (2002); Pineau (2002)

2.4 Regulation

The establishment of a regulator has been advocated to facilitate transition towards private control and regulate the industry. Many of the regulatory agencies are, however, being established after or concurrently with restructuring and so cannot offer guidance but must instead conform to set structures. To perform effectively, a regulator has to be autonomous,

but many of the regulatory agencies have to report to the respective Ministers of Energy, and most lack independent sources of funding. Kenya well demonstrates this problem (see Box 5). The regulators' decisions, particularly on tariffs, have not always been adhered to – a further indicator of the constraints on their power. After Uganda Electricity Board raised tariffs by as much as 158% (*East African Standard* 2001), consumer outrage forced the Ugandan President to intervene and seek tariff reductions. The Court of Appeal in Kenya has given consumers permission to challenge a 40% rise in power rates and tariffs approved by the Electricity Regulatory Board on request from KPLC (*East African Standard* 2002).

Box 5: An autonomous regulator? The case of Kenya

The Electricity Regulatory Board (ERB) was established through the Electricity Power Act of 1997 to regulate the industry. A second statute, however, the State Corporation Act, covers ERB, effectively placing it under the Ministry of Energy and providing for its dissolution. ERB has been defined as a state corporation and its autonomy is therefore suspect. For example, although the ERB is supposed to provide licences for construction of electrical works, the Ministry has continued to do so. In addition, the ERB can only advise the Minister of Energy on matters relating to granting, suspension and revocation of licences. It is the Minister rather than ERB with authority to fine a licensee in breach of conduct. In 2001 the entire Board was replaced under the State Corporation Act provisions. A levy imposed by the Minister for Energy on electricity sales is the only source of ERB budget. While so far this funding has been sufficient, there is no provision for ERB to seek external funding should there be a shortfall.

Sources: Nyoike (2002); Nyoike & Okech (2002)

Regulators are also finding themselves politically compromised and hence not in a position to assert their authority. This seems to be the case in Namibia (see Box 6) where, despite convictions by the regulator that the bidding company had insufficient technical competency and unreliable financial status, the regulator awarded a licence to it in preference to an operational competitor.

Box 6: Competing political interests: Namibia's regulatory difficulties

In 1996 Northern Electricity, a private company was awarded a tender by the Namibian government to distribute electricity to the northern areas. In recognition of the poor financial characteristics of rural electrification, the contracts between the company and Ministry of Local Government and Housing obli-

obliged the company to pay only a very small fee to costs of infrastructure. However when the company started generating profits this contractual agreement did not change, resulting in resentment by affected local authorities. At the same time, the governing structure changed towards decentralisation empowering local authorities. This had the effect of politicising electricity provision. As part of restructuring, a regulator was established in 2000. Tensions across the electricity stakeholders resulted in new tender calls for serving the north. The regulator issued a licence to a new firm, Nored (a joint venture between NamPower, the dominant utility, and several local and regional governments), and did not renew Northern Electricity's licence. This was in spite of a statement by the regulator that it did not feel Nored had sufficient technical expertise and financial resources to manage the contract it was granted.

Sources: The Namibian (2001); Econ & EMCON (2002)

2.5 Performance, performance indicators and jobs

Reform has been successful in improving the quality of service to those connected. In Côte d'Ivoire, power outages decreased from 50 hours to 19 hours per month in four years – albeit at a high prices to the consumer (Girod & Percebois 1996). Reform has failed, however, in extending power to the unserved, most of whom are financially unattractive to the private sector while, as a result of unbundling, the possibility for cross-subsidisation has been eliminated. Disconnections have actually risen in number as companies strive to raise profits by eliminating poor customers and 'illegally' connected customers.

In most of urban sub-Saharan Africa, informal settlements have become the norm as poverty increases and urbanisation increases. These settlements are characterised by temporary housing structures, poor sanitation and lack of other basic services including water and electricity. Much of the housing is characterised as 'illegal' and hence not likely to be connected under a reformed power sector. As a result residents resort to drastic and potentially dangerous measures to access electricity and energy services. The case of a Tswane resident in South Africa demonstrates this (see Box 7).

Box 7: 'Illegal' supply of power to 'illegal' residents in Mamelodi, South Africa

A woman owning a Reconstruction and Development Programme house in Mamelodi East, Pretoria is on the run from police for illegally connecting 15 of her neighbours residing in an informal settlement. This woman had laid underground electricity cables from her house to these settlements and had been supplying them electricity for two years at a flat rate of R150 (US$19)

per month per connection. In addition she provided, at a fee, refrigeration services to some 'spaza' (retail) shop-owners.

Source: Khupiso (2003)

Using the number of consumers served as a performance indicator deserves some comment. Efficiency is an input-output measure where, in the case of power sector, the output of an employee is measured by the number of consumers served. This would be reasonable if the employee had an influence on customers as is the case in developed countries, where marketing strategies affect consumer choice of service provider and consumption levels. In many African countries the potential consumer has no access to electricity. The international average performance indicators normally used as a reference assumes an electricity coverage that has scarcely been attained in Africa. There are hardly any additional customers whom an employee can persuade to seek services from the utility; furthermore the employee lacks the marketing facilities, such as a telephone infrastructure, necessary to reach potential customers. The circumstances of developing countries calls for certain allowances and makes certain indicators redundant.

Another indicator used is electricity sales per employee, measured in Watt-hours (Bacon 1995). On average, per capita consumption in African households is ten times less than in developed countries, for a variety of reasons including lack of appliances and money to pay for current. Using an international consumption average per employee to rate performance provides a figure that does not reflect the specificitites of the African situation.

Due to the limited employment opportunities in Africa, the utilities cannot expect to dismiss employees without taking into consideration the national economic implications. The ratio of employed to unemployed remains low, meaning that the employed are forced to support the unemployed, so that getting rid of an employee in order to improve utility performance indicators has ramifications for the welfare of many. Privatisation can only be beneficial if it accommodates economic and social stability (Stiglitz 2002) rather than just the balancing of financial spreadsheets. Advocates of privatisation have advanced the argument that it creates jobs. In reality, not only are workers laid-off as restructuring occurs but many are poorly compensated. Retrenchment is justified on the basis of efficiency calculated as a ratio of customers to employees. The internationally accepted standard is about 160 customers per employee (Kwako 1997), but many developing countries have tended to have lower ratios and are thus considered overstaffed. Karekezi and Kimani (2001) note that by 1998 seven of the twelve reported sub-Saharan Afri-

can countries had ratios ranging from 40 to 110 customers per employee, way below the international standard. To soften the blow of job loss, companies offer workers 'voluntary' retrenchment packages which take a long time to implement and tend to be relatively inadequate. The Kenya Power and Lighting Company, for example, needed to pay KShs2 billion ($250 million) to 1700 workers it laid off in the first six months of 2002, but it is expected that the payment process will be protracted due to the company's financial problems. In Burundi, however, for example, over a three-year period personnel was reduced from 1500 to 1000 – with the 500 being placed in private firms which were starting to carry out work previously done in-house, such as producing wooden poles and connecting new customers (Bacon & Gutierrez 1996). The need to retrench is axiomatic for the private sector, as is often demonstrated by the speed with which retrenchments are embarked on after winning the bid. Shortly after acquiring the coal-powered power station in Johannesburg, Kelvin, a subsidiary of AES, retrenched about 480 workers (See Box 8).

Box 8: Retrenchments by private sector: South Africa

Kelvin, a coal-powered electricity station, provides 25% of Johannesburg's electricity needs. The US-based AES corporation currently owns 50% of the power plant with an option to purchase the other 50%. After winning the bid in July 2001 AES lost no time in confirming the fears of South African public sector workers on the impact of privatisation. It started massive job cuts in December 2001. The voluntary retrenchments represent almost three-quarters of the current workforce at Kelvin. Kelvin promised a generous package including three years' salary, a $1000 bonus and some re-location expenses and training. However, there is no available documentation on whether AES has delivered on its promises.

Source: McInnes (2002)

2.6 Environment

While environmental concerns have gained attention globally, within the power sector reform frameworks they seem to be largely dormant. Dependence on thermal power generation has been historically significant, accounting for about 76% of total generation in Africa, and this trend does not appear to be changing with reform. Investments are largely dictated by access to funds, ease of facility development, and profitability, and there is no longer any public oversight to direct the type of capacity built. The private sector prefers to use conventional fossil fuel technologies since these are cheaper (Widagdo 2001). Morocco, for example,

completed development of the largest IPP in Africa in February 2001, 1356 MW, which will be operating on coal (IEO 2001). Most of the IPPs that are planned and being implemented in Kenya use fossil fuels, and the two generation facilities that Senegal plans to build by mid 2003 are fossil-fuel-based. About ten countries have high shares of hydro-generated electricity, but hydro-power is facing increasing pressure, with some international NGOs attempting to block hydro-power plants on the basis that they are environmentally destructive. The most recent experience is Bujagali in Uganda where NGO protests have forced government to respond and highlight the need to increase access for Uganda to develop (see Box 9).

Box 9: Power or environment: Uganda

Uganda has an electrification level of less than 5%; in rural areas less than 1% of the population have access. On the other hand it has commitments to export power to Kenya from its capacity of 260MW. With a GNP of about $320 per annum, Uganda is one of the poorest countries in the world, but businesses lose about 90 working days per year due to power outages and load-shedding, at an estimated cost of 2% of economic growth. Electricity demand is growing at 7-8% per annum. To help to alleviate poverty, access to electricity and total consumption has to grow. Hence the government's proposal to develop the 250 MW Bujagali hydropower facility on the Victoria Nile River. The site was first proposed by Acres International, a Canadian engineering firm, as suitable and in 1994 the government of Uganda and AES signed a memorandum of agreement to develop the dam. AES Nile Power, a consortium company formed by AES International and Madhvani International of Uganda, is the project developer.

The estimated project cost is $500 million and the government of Uganda has sought a loan from the World Bank, International Finance Coorporation and African Development Bank and private sources. The project is expected to employ 1500 persons during the four-year construction period and 29 persons afterwards for operating the facility. AES Nile Power will have a 30-year power purchase agreement with Uganda Electricity Board. The terms of the agreement have been a contentious issue. Apparently, it guarantees AES payments of $100 million per annum for the first 10 years of project operation, with the payments decreasing somewhat for the subsequent 20 years. The Ugandan government is committed to ending subsidies to the power sector, therefore all costs are to be passed onto the consumer. Under these terms the consumer also bears the currency exchange rate risks. (while details of the PPA are still confidential and the figures presented here are not confirmed, a report by IRN (2002) indicates that Bujagali would result in an increase of tariffs to an unaffordable 14UScents/kWh.)

Despite a favourable environmental impact assessment, international NGOs have launched an aggressive campaign to block the development of the dam

on the grounds that it would damage the environment. Local NGOs consulted for the impact assessment, through a forum in March 2000, were in favour of construction, although some of them have also opposed the dam, claiming that 'typical of greed and misguided decisions of African leadership, the decision to build a dam at Bujagali in Jinja is going to destroy this first class magnificent treasure of Uganda and Africa as a whole'.

Sources: Musumba (2002); ESG International (2001); Booshard (2002)

2.7 Rural electrification

With reforms, rural electrification has been marginalised. It is commonly acknowledged that rural electrification is not financially attractive and hence can only be undertaken by the public sector or with public sector assistance. The USA offers a good learning experience. Fearing that private power providers would be unwilling to incorporate rural America into their future plans throughout much of the 1910s and 1920s due to low returns on investment, President Roosevelt set up a subsidy scheme for the affected areas (Leon 2001). Provision of subsidies is, however, counter to the World Bank's 1993 reform policy; according to the Bank, subsidies and inadequate tariff levels lead to prices that give incorrect signals to users, resulting in overuse (World Bank 1993). Some have argued that removing subsidies would increase rural electrification by making decentralised renewable energy technologies more competitive (Burtraw et al 2000). Consequently African governments have been advised to eliminate subsidies in the power sector. The result has been neglect of rural areas by the private sector. The rationale by the private sector could not have been articulated better than in the Endesa Chief Executive's comments: 'Endesa's mission in a deregulated market is not to fulfil the demand for electricity, but the expectations of shareholders' (*Financial Times* 2002). Though rarely used, alternative strategies to extension of service by the main utility or private sector to rural areas do exist. Provision of electricity service by community cooperatives is one such approach. This is being applied in Tanzania where it is evident that government and utility support is needed for the sustainability of the project (see Box 10).

Box 10: Rural electricity cooperative in Tanzania

In June 1993 the community of Urambo, a village located 80 km west of Tabora, established the Urambo Electric Consumers Cooperative Society (UECCO) to generate, transmit and distribute electricity to the community after the Urambo District Commissioner decided to cease providing this service due to lack of funds. The cooperative acquired three 85KW diesel generators, only one of which was in operation but also in poor condition. With

financial and technical assistance from both SIDA and Tanesco, two of the generators were rehabilitated and a new 108 kW generator was purchased. The new generator was only installed in 1998, however, due to delays by the Treasury office on formalities regarding exemption of import duties. Overall the main costs incurred by the cooperative are operation and maintenance, as all capital costs have been paid for. This cost-sharing approach has clearly facilitated the financial sustainability of the cooperative.

UECCO is run by voluntary community members. Operation and maintenance of power plants is done by two trained personnel paid by the cooperative and trained by Tanesco. The cooperative generates funds from membership fees, selling electricity and connection fees. Though its costs are lower than similar Tanesco establishments (mainly due to lower wages), its revenue covers only 75% of its total cost. The cooperative has adjusted tariffs to reflect cost of supply but as a result the consumption per consumer has decreased by more than 50% of 1994 levels. Monthly household consumption dropped from about 100 kWh in 1994 to 45 kWh in 1997 mainly due to introduction of a metered tariff. Though the number of connected consumers increased from 67 in 1994 to 101 in 1997 the increased consumption was insufficient to meet costs. Potential industrial consumers do not join the cooperative, since power is only available in the evenings and the loads are not always sufficient to meet their needs. The cooperative has been successful in collection of bills – demonstrating 100% payment. By providing technical and financial support Tanesco has been instrumental in the success of the cooperative.

Sources: Salter (1997); Gullberg et al (1999)

Population size, settlement patterns and their economic power offer real challenges to attracting the private sector into rural areas. Some countries, such as Gabon, have bundled water and electricity services and sold the previously government-owned utility, Societé d'Energie et d'Eau du Gabon (SEEG) to Vivendi Environnement. However while a private company has improved service in well-established areas, it has made little progress in rural areas (see Box 11).

Box 11: Is bundling services sufficient in facilitating access? The case of Gabon

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In 1997 SEEG was privatised to Vivendi Environnement (which acquired 51% of the shares) and signed a 20-year concession contract with the Government of Gabon for operating water and electricity services throughout the country. The company generates most of the revenue from Libreville and Port-Gentil and uses this to subsidise the other areas. Electricity coverage targets were some of the aspects covered in contractual agreements – for example, serving 15 unserved isolated centres by 2000 (a target which has not been met).

Combining water and electricity has enabled cost reduction through sharing of resources. The company has paid shareholders higher dividends every year rising from 6.5% in 1998 to 20% in 2000. However all the areas that were previously unserved remain unserved due to the high costs involved in extending services.

Source: Tremolet (2002)

A few countries, such as Senegal and Cameroon, have established rural electrification agencies. However, these seem to depend largely on donor funding and consequently have not made significant progress in extending service to rural communities. African governments have prioritised attracting foreign investors rather than ensuring meeting social needs. In the struggle to fulfil this objective, the governments are not ensuring fair tax revenues from private sector-led projects. Rather they are providing tax breaks among other incentives to attract the private sector. This approach is rationalised on the philosophy that once investments boost the economy the benefits accruing to the country are so great that it is worth tax exemptions. There is, however, emerging evidence that generally the cost of incentives provided by governments tends to be greater than the benefits.

2.8 Regional trade

While sub-regional trading mechanisms are being implemented, such as the Southern African Power Pool and West African Power Pool, and some cross-border trade does occur, it is evident that there is room for more cooperation and trade. Many factors hinder extensive trading across the region, however, a notable example of which has been the inconvertibility of the currencies. The Zimbabwe case (see Box 12) illustrates this predicament.

Box 12: The limits of regional trade: Zimbabwe's experience

Zimbabwe is threatened with power supply cuts by South Africa's power utility, Eskom, and Mozambique's Cahora Bassa unless the government settles part of its account – which ZESA, the Zimbabwean power utility, has been unable to do since the government has failed to allocate the scarce foreign currency for this. ZESA owes Eskom, Cahora Bassa and the Democratic Republic of Congo's SNEL electricity system more than $147m altogether. Imports by ZESA account for about 50% of the country's power needs. ZESA requires US$17m a month to import electricity. Last year's monthly US$ allocations from the reserve bank of Zimbabwe averaged US$2.12m, which was below expectation. There have been no allocations this year. ZESA has been appealing to its clients to pay their bills in US dollars instead of the conventional Zimbabwean dollar (Muleya 2003).

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SOME CASE STUDIES

7

The California experience: From deregulation debacle to flexible power

TED K BRADSHAW

WOODROW CLARK II

1. Introduction

California has earned a deserved reputation for both catastrophe and innovation, and the recent world-wide attention given to its recent electricity crisis has components of both. In 1998, California was the first major US state to implement sweeping deregulation and, while it followed a number of countries in Europe and several other states, California's restructuring experiment remains a paradigmatic example of a deregulation debacle because of the size of the market, the speed with which problems emerged, and overall economic costs. During 2000-2001, what initially appeared to be a successful process of opening electricity markets to competition, turned sour, with at least 38 stage-3 emergencies causing rolling blackouts through Spring 2001 (DOE 2001). Despite warnings that there would be persistent blackouts during the rapidly approaching summer, a crisis was avoided through interventions

that put the state in a central role as energy purchaser, transmitter, and provider of conservation incentives.

While the story of who caused the crisis and what mitigated it is interesting (see Clark & Bradshaw forthcoming), the purpose of this chapter is more reflective and forward-looking. We will draw from a brief summary of what happened in California to distil some of the lessons that can be learned from the mistakes made, and then consider what the future will hold. While the restructuring experiment cost California tens of billions of dollars in energy payments and many times that much lost to the economy, the crisis also provides the opportunity to refocus attention on the potential for a different and better future energy system that might enable the state to reach what the Governor calls 'energy independence'. The future, we argue, will be enhanced by the promotion of a flexible power system. In a complex society and economy, where energy uses and sources both increase rapidly and where the environmental consequences of energy production are under increasing scrutiny, the energy system must be more than sustainable – it must be flexible to respond to the opportunities of sustainability and the challenge of complexity. We argue that a flexible power system is the next step in the transformation of power systems, which are now in a transitional phase that is displacing the vertically integrated utility system that served a specific locality. A flexible system is one that maximises diversification with more renewable resources, balance, interconnection, linkage to the community and economy, and public good values. The flexible power future is an emerging option, building on experimentation and policy being developed today. While the outline of the future flexible system is not yet clear or determined, steps being taken today assure that such a system will help California and other states or nations achieve independence from both bandits in the market and greedy regulated utilities.

2. California update

Without repeating the whole story, it is worth noting that the State of California went into energy deregulation in a bi-partisan manner that had the participation of all the regulatory bodies, private firms, and political groups largely satisfied that the proposed changes would successfully reduce costs and assure reliable power supplies. The proposed deregulation would create public agencies to manage the perceived essential monopoly services of transmission and assuring adequate power to balance the system, while private firms would compete on the basis of price both in generation to supply power and in retail distribution where

competition for customers would keep prices down. Whereas regional 'private monopolies' used to have control of a vertically integrated system, the California plan was to break up the monopoly and introduce competition where possible. This created a number of 'public controlled monopolies' for the parts of the system where competitiveness was not efficient (Lior 2001; Woo 2001). The optimistic prediction that change would be smooth and prices would fall was hardly questioned.

In 1997, fully four years before the energy market in California was to be deregulated, the Public Utilities Commission (PUC) ruled to move ahead in a unanimous decision to 'throw open the state's $20 billion electricity market to competition will make California the first state to join a worldwide movement to deregulate utilities' (Marshall 1997: 1). In the euphoria of the times, energy companies and politicians joined in applauding the move.

Part of the unquestioning enthusiasm was clearly an early interpretation of the benefits of deregulation along the laissez-faire model established in the United Kingdom. Interested California regulators returned from a visit to England reporting that deregulation produced broad benefits, without looking at critical differences between the two systems. They took an approach that was summed up thus: 'Competition should bring down prices and foster a host of new services – along with new headaches for consumers who will have to choose among dozens of potential new suppliers' (Marshal 1997: 1). It was assumed that the cost savings would ultimately please consumers. And in a fortuitous manner, a representative of Enron said: 'We think the commission took a bold step. This hasn't been done anywhere else in the country' (Marshall 1997: 11). As the then Governor Pete Wilson put it (Wilson 1996), in signing the AB 1890 bill to deregulate the California energy market: 'This landmark legislation is a major step in our efforts to guarantee lower rates, provide customer choice and offer reliable service, so no one is literally left in the dark.'

At this point, supply was not a concern. In the early 1990s California's electrical system seemed to be balanced, following the successful introduction at least 10 000 MW of independently produced power through the PURPA process under long-term standard offer contracts (Summerton & Bradshaw 1991). In fact, during this period an auction system was set up to obtain additional power, but it was barely used. Concern over electrical supply at the Energy Commission diminished so much that forecasts and analyses stopped. Moreover, utilities were getting used to relying on power they did not generate themselves, and most of the fears of system control problems resulting from dispersed operation did not materialise (lots of small producers not under direct

control of the utilities did not create management problems). On the horizon, however, were the immediate seeds of crisis. The events during the early 1990s clearly placed the California system in a transitional phase between the unified and vertically integrated utilities of the past and a dispersed production multi-distributor system. The transition caused considerable stress, and it called for some kind of restructuring, though there was little precedence on which a new system could be based.

To describe the old power system that was to be deregulated, several points need to be made as a point of reference (see Williams 1997; Brigham 1998; Smeloff & Asmus 1997). First, California's 32 million residents were served by three very large investor-owned utilities that served about 75% of the state – Pacific Gas and Electric (PGE), the largest, served the northern part of the state, Southern California Edison served most of the huge Los Angeles basin, and San Diego Gas and Electric (now Sempra) served the San Diego region. Two large municipally-owned utilities served the city of Los Angeles and Sacramento, along with about 30 additional municipal utilities that served smaller cities scattered throughout the state. The three investor-owned utilities were regulated by the California PUC, which sets rates and assures quality service. Deregulation proposals were designed to break apart the vertical integration and introduce competition within the region served by the private utilities.

At least seven system tensions were operating at this time to create the context for deregulation according to 'market' economists and policy makers.

1. Self generation and non-utility supplier pressure from large consumers

The lucrative contracts for independent producers who had cogeneration opportunities created an explosion in the knowledge and awareness of self-generation or cogeneration (combined heat and power) opportunities (see California Energy Commission 2000). For example, The Chevron refinery in Richmond used about 5% of the total PGE capacity, and it planned to systematically add cogeneration capacity with a well publicised plan of electricity self-sufficiency. Moreover, the falling cost and rising efficiency of small gas turbine generators became so attractive that most large users of electricity at this time considered significant amounts of self-generation to be in their economic interest. The utilities panicked that their most lucrative market would vanish, and with PUC blessing instituted huge connection and backup power fees that by themselves largely removed the financial incentives for self-generation. However, the

large users did not accept these fees and immediately saw that the rates they were paying the utilities were much more than their non-utility options. Moreover, the large users saw that wholesale prices out-of-state were lower than they were paying, and they tried to find a way to get the power transmitted (wheeled) to them, but because of the utility monopoly on transmission these efforts were temporarily blocked.

During the recovery from the 1970s energy crisis California regulators used price signals to ensure conservation, instituting an inverse sliding scale of prices. Homeowners were given a low price base, and if they used above this the rate increased. Large users and businesses were perceived to have considerable conservation potential and their prices were relatively higher. In contrast, bulk discounts were given to the largest users in other parts of the country. These higher prices also created an incentive for large users to be interested in decoupling themselves from the high-priced utility grid.

In a regulated system the large users have significant political power, and in this case their interests were backed up by threats to disconnect from the grid. The utilities, however, now awash in dispersed power and an inverted rate schedule, needed the large users to help pay their costs. They entered into a series of negotiations with the large users, and the regulators held hearings to try to resolve the potentially damaging crisis. Users pointed out the vastly lower electricity prices that their competition was paying out-of-state, and the potential to secure lower prices. As a result, utilities lowered rates for large users on the premise that if they stayed on the grid it would help pay for investments already made. Some customers developed cogeneration plants as well, but the threat of massive migration of large customers from the grid was effectively mitigated by sharply lower rates. More than anything else, the threat of self-generation and the political power of the large users created a price pressure that the utilities had to respond to.

2. Out-of-state surplus

While California in the late 1970s carefully scaled back its construction of new generation plants based on forecasting methodologies initiated by the California Energy Commission (CEC), other states continued to build excess capacity. By the mid 1980s, California had a reasonable balance of supply and demand, while throughout the rest of the nation and West there was an enormous glut of electricity, and this had to be sold at bargain rates. California was a good market. Seeing the price pressure, California utilities quickly expanded their long distance transmission lines to bring this power into the state, and in a series of projects expanded links to Oregon/Washington and the Southwest. The out-of-state power was

coming in at 1-2 cents per kWh where in-state generation was costing 2-3 cents and independent qualifying facilities had contracts from 5-20 cents, depending on peak load. Diablo Canyon nuclear power cost at least 15 cents, though that did not fully cover the utility costs. In short, out-of-state power was a means by which the utilities could reduce their costs to meet the price pressure from the large users.

The surplus also contributed to the fact that during the early 1990s California had a large reserve margin due to contracts and high prices with qualifying facilities which translated into retail electricity rates that were up to 50% above nearby competing states (Faruqi et al 2001: 24). This became an economic development problem, especially as the state tried to pull itself out of the persistent recession that plagued it during the early 1990s.

3. Fuel costs fall

The PURPA contracts were calculated on the basis of steadily rising oil and natural gas prices in keeping with post-oil embargo experience. However, fuel prices fell instead, making the calculations in the standard offers seriously high. While utilities and all producers needed to make estimates of fuel prices under different scenarios, and the utilities participated in the calculation of fuel prices for the standard offers, the result was locked in for qualifying facilities that resulted in disproportionate costs. Moreover, there were no links to fuel prices for producers using wind and other renewable technologies. Thus, when fuel prices fell for gas-fired utility plants, consumers benefited. But contracts with many independent producers were not adjusted, resulting in higher prices for the independent producers relative to the lower costs for other producers.

4. Nuclear plant issues: Diablo Canyon

The Diablo Canyon nuclear plant was proposed by PGE as an attempt to produce low-cost power. What started as a $300 million plant to generate 2000 MW turned into a $5.6 billion project. Upon completion, it became apparent that even under the most optimistic price forecasts this plant would not be able to compete with other options, but PGE was assured financial returns under return on investment regulation. After a series of regulatory hearings, PGE was allowed to recover most of their costs and blend high-priced power into their rate base for many years. While the issue of blame has not been fully resolved even yet, the cost implications for the utility system remained, and finding a way to merge high-priced Diablo Canyon power into a system already perceived to be too expensive drove many policy decisions leading to deregulation.

It is fair to say that the enormous investment of capital in Diablo Canyon predisposed the California system to rely even more on low-price out-of-state power to dilute prices, and finding a way to pay off debt from Diablo Canyon became a priority in the transition to deregulation. It also was the last major power plant constructed by the large California utilities, and its problems signalled to the utilities that the generation part of their operations would likely cease in the future and that their operations would be limited to transmission and distribution (see Morris 2001).

5. Dispersed system solutions abandoned

An immediate result of expanded power-lines that could access very cheap power from outside the state was that the marginal price for power now was lower than the average cost, while during the period when PURPA contracts were negotiated the opposite was the case – the marginal price for new production was higher than the average (Summerton & Bradshaw 1991; Tatum & Bradshaw 1986). As a result, conservation, which had been a key piece of the California energy strategy, no longer was as cost-effective for the utilities, which now needed sales volume to reduce costs. Not only did utilities pay more than 1-2 cents for conservation, if they increased demand they could dilute high-price power from the independent producers and Diablo Canyon with the cheaper out-of-state power.

Thus, the benefits of dispersed and renewable power from independent producers, which had become a hallmark of the California energy system (Bradshaw 1985; Summerton & Bradshaw 1991), quickly vanished under the pressure of deeply discounted out-of-state power. Instead of an increasingly robust system instate, the utilities became dependent on short-term opportunistic prices created by the out-of-state glut, and conservation started to make no sense.

6. Deregulation 'market' debacle: a process gone wrong

The botched deregulation of California's electricity system that went into effect in 1998 is, as already remarked, too large and long a story for this paper, but the key is to recognise that the preceding conditions led to many pressures on the California system that deregulation was thought able to resolve. While many contemporary critics argue that there was no reason to consider deregulation because the system was not broken, in fact there were so many pressures on the regulated electricity system that some kind of change was inevitable, deregulation being just one option. Based on local experiences at the time, deregulation was proposed and, on projections about what was likely to happen, it seemed like a solution

that would resolve a cascade of problems including the tensions of high prices, inability to recapture the costs of Diablo Canyon, pressures from large users, and need to better capture low out-of-state prices. The deregulation strategy generated widespread support and AB1890 passed with unprecedented support from the industry and politicians who all believed that prices would fall rapidly.

Deregulation was first proposed by the PUC in 1994 and approved by the legislature in August 1996. The plan had the following characteristics:

- Consumers were free to choose their electricity supply company.
- Utilities would freeze their 1996 prices at 10% below previous levels for four years, through 2002. The rate reduction was paid for by the sale of bonds that would be repaid.
- Utilities would be reimbursed for 'stranded assets' of plants that would not be competitive, such as Diablo Canyon and high-cost PURPA contracts, through higher retail prices. Once stranded assets had been recovered, the price freeze would end.
- Incentives would entice utilities to sell half or more of their generation capacity to assure competition among suppliers. By May 1999 utilities had sold 17 683 MW capacity, or about 40% of total generation of 55 000 MW (Woo 2001: 752).
- Power purchases would not be from long-term contracts but would be limited to the spot market (hour- and day-ahead markets). The structure of the market raised prices for virtually all electricity to the high Market Clearing Price.
- Renewable energy and demand-side management (conservation) were to be subsidised until 2002, at which time all technologies were to compete on the open market.
- The state would set up an independent system operator to manage the high-voltage transmission grid, and the California Power Exchange to operate the wholesale market.

Now that deregulation has been in place for over three years, however, the consensus is that it is seriously flawed and that deregulation is the immediate cause of the problems facing the state (Faruqui et al 2001; Munroe & Baroody 2001). During the first two years when supply was ample, utilities made money buying power on the low-price spot market, and they sold their power plants for more than expected to companies interested in operating them, often headquartered outside the state. They set up independent companies to own some of their assets, and shifted assets away from their power distribution companies.

Wholesale prices stayed low during these first years of deregulation, but consumers did not see price competition through this transitional period because the wholesale market was consolidated statewide, and all retail suppliers had to purchase power through the same pool and at the same price (see Fisher & Duane 2001). Some supply companies signed up customers based on 'green production,' but these customers had to pay a premium. Most customers remained happy with the mandated 10% rate reduction.

By the end of 1999 some of the flaws in the California deregulation scheme began to be visible. San Diego was the first utility to recover costs of stranded assets, and their price cap was removed, but instead of offering lower prices, they started having trouble buying low-price power and passed the increases to customers. Eventually wholesale prices would increase everywhere, causing problems unable to be fixed within the state's regulatory scheme. Deregulation in other states has not had the serious problems that developed in California, but the consensus is that these other states are having problems and that they are taking strong steps to assure that they do not repeat what has happened on the West Coast.

7. End of out-of-state surplus by 2000

Deregulation worked successfully for the first two years simply because the utilities were able to buy great amounts of out-of-state power at very low rates that kept other rates low. Because of this there was no incentive for any companies to build additional generating capacity. The surplus ended by 2000, however, and with the utilities owning very little instate capacity, they could not respond. The immediate end of surplus was a record dry year in the Pacific Northwest. With snowpack water content as low as 35% of normal, the state lost up to 3000 MW of power during the winter, equal to output from three nuclear plants. High gas prices also drove up prices and restricted supply from some plants in the Southwest.

Rapid economic growth in California and other Western states combined to increase demand. While the increased demand was gradual, and construction of new supply was stagnant, the late 1990s saw a general tightening of supply throughout the West. Interestingly, the first blackout actually occurred in Nevada (Las Vegas) rather than in California. Moreover, this end of surplus was not undetected. Many analysts worried that the low prices associated with excess supply would create shortages, and the data were widely available to support these concerns. In the deregulated environment, however, no entity had responsibility for assuring adequate supply because the market was supposed to take

care of it. Moreover, in deregulation with its reliance on short-term spot markets for supply, there were no viable systems for assuring that reserve margins were maintained because they are not adequately valued in a system that only pays for power delivered. Further, the end of the surplus enabled new players such as Enron to enter the market as brokers in what is turning out to be both an unregulated and a scandalous strategy that manipulated shortages into crisis. The full story of the role that Enron and other large energy traders played in California is just now being told, and the role that they played in manipulating the market increasingly seems to be based on rules they helped create in shaping not only the actual structure of the deregulation legislation in California, but also the Federal role and response.

3. The crisis

Starting in the summer of 2000, deregulation became a problem rather than a solution. Hot weather, drought in the Pacific Northwest, and population and economic growth in states that previously supplied California with surplus power reduced supply to narrow margins. With shortages and escalating prices, generators and brokers discovered that they could drive up prices by withholding some supply, and in documented but still being litigated moves, took power plants out of service for unscheduled maintenance or other reasons, exacerbating the shortages. Prices which had been 1-3 cents a KWh rose to 15 cents, and then climbed to 30 cents or more during January to March 2001, peaking at 75 cents during the top emergency hours.

While prices toward the end of 2000 had been high, by early 2001 they had increased even more, which proved catastrophic and set in motion a system breakdown. Utilities had agreed to the cap on prices at the retail level, which on the one hand protected consumers from a pass-though of escalating prices paid to generators, and on the other reduced the utility's ability to recover funds to purchase power. As the utilities defaulted on paying electricity producers, some independent suppliers withheld sales until they were paid, and others only continued selling because of court orders.

The Governor ordered the state's Department of Water Resources to purchase electricity on behalf of the utilities, using the state's credit, to avoid total crisis. However, even with outrageous prices, these supply efforts did not match demand, and the utilities were ordered to institute rolling blackouts in order to shed enough load to avoid system failure. By late spring one cycle of blackouts had affected virtually every cus-

tomer area, and forecasts were for frequent recurring blackouts all summer.

On April 6, 2001 the state's (and one of the nation's) largest private utility, PGE, declared Chapter 11 bankruptcy. Southern California Edison was negotiating with the state to buy some assets, postponing similar insolvency. The state, in order to maintain power supplies, had in a series of steps purchased $7.6 billion of power with state funds that were to be repaid to the state by a bond offering that customers would then repay. As of now, the major utilities are still insolvent, the state is still buying power, and the bond to repay the state treasury has been postponed due to the weakening economy and disagreements over how repayment will be allocated.

The Federal government and its regulatory arm, the Federal Energy Regulatory Commission (FERC), refused to assist. Vice-President Dick Cheney commented in April 2001:

> Frankly, California is looked on by many folks as a classic example of the kinds of problems that arise when you do use price caps. Your problem is that your demand for electricity is up and your supplies have actually declined.... Ultimately, of course, the peak power period this summer will exceed any capacity the state has and you'll end up in those rolling brownouts. There's no magic wand that Washington can wave. (Quoted by Shelton 2002)

Shelton (2002) and others report that '[o]ne particularly galling scheme was to buy electricity produced by California plants during blackout threats and sell it for huge profits in Oregon'. The financial pain for the state became enormously profitable for private companies. For example, Shelton calls Enron and other companies, 'power pirates' and notes that they made from 400-600% profits. Not enough for Enron, however. The price for electricity went from the average of $30 per MW to over $1000 in some cases, but averaging about $300 per MW, until the Governor imposed (against FERC wishes and threats) consumer price caps. The results was that these energy suppliers and marketers (or 'gougers' as some now call them) 'sucked $40 billion in excess profits out of California over a two-year period' (Clark and Demirag 2003). They broke Edison and PGE and forced the state into the power-buying business (Shelton 2002).

Transmission bottlenecks also emerged. The need to shift power from one part of the state to another and to tap out-of-state sources strained a number of sections of the grid, and in several cases power available in one part of the state could not get to people who were having blackouts.

During February 2001 the Power Exchange ended its role as wholesale purchasing agent, and changes took place in the market for wholesale power. In response to the crisis a number of efforts were made in order to avoid a total crisis during the approaching summer with its peak demand.

- The Governor and his staff negotiated long-term contracts with many producers for significant amounts of power at around 6-7 cents per KWh, well below crisis-induced spot market prices of 15 to 75 cents. These contracts extend for up to ten years at an estimated $43 billion total cost.
- Legal and press scrutiny of producer and marketing companies increased, with concern over alleged unnecessary plant outages for repair or other reasons. Consequently, plants came back on line and fewer outages were experienced.
- Construction was completed on several major new power plants as well as peaking plants.
- Approval was speeded for new plants, and construction was started on a variety of gas-fired plants expected to provide adequate capacity over the next few years.
- The price cap was removed and consumer rates went up with surcharges, with large users having the highest increases.
- Consumers who conserved more than 20% compared to the same month in the previous year received 20% rebates on their electricity bills, and these price signals served to increase conservation. Estimates are that conservation reduced demand between 10 and 15%, with more during peak periods.

The claim has been made that California had not built enough new power plants since the early 1990s to meet demand. The state only added 672 MW in the last five years, compared to Texas which added 5 700 MW in that period. While this indicates some lack of responsibility, it is important to keep in mind that the average retail price of power during the last five years was lower than utilities could build plants for, given the surplus power available. In other words, there was little need to build new capacity, and the fact that some plants were under construction indicates that planners recognised that supply may be getting tight. No one correctly estimated the extent to which weather, drought, mechanical problems, and the booming economy and population growth throughout the entire West would make the system so vulnerable so quickly, but this was not a simple problem of not building enough power plants. The point is simply that there had been so much surplus capacity that plant construction was delayed too long because of poor estimates.

The good news coming out of the crisis, if any, is that during the summer of 2001 supply was generally adequate and forecasts of hundreds of hours of blackouts were wrong. Mild summer weather can be credited for helping avoid a summer crisis, but evidence is accumulating that the system is regaining stability and that many emergency responses have succeeded in stemming the crisis. For example, prices on the wholesale market have fallen to near what they had previously been, and power seems generally available at lower prices. However, the long-term contracts negotiated with producers during the peak of the crisis now are higher than average spot market prices, leading to criticism of these long-term contracts. The contracts, which are still not fully available to the public, are supposedly being renegotiated by the Governor's staff, though it is not clear whether this is either possible or feasible. While the legal issues raised by the crisis period of 2000-2001 will take years to resolve, it is becoming clear that California's electricity system has come back from the brink and is now entering a new rebuilding phase.

Today, legal and political forums and investigations are showing what many had long suspected: California enacted a flawed system but the crisis was caused by greedy private companies gaming the system through rules they helped write. Garbesi and Ramo (2002) in a careful review of the crisis write that the 'lack of competition in California's electricity market was less the fault of poor implementation of deregulation, than a flaw in the concept itself'. Perhaps it is best said by Gary South, Governor Davis' chief political strategist: 'This is going to be the most egregious example in history of greedy and unethical corporate interests – with the complicity of the U.S. government – going into a state and raping it economically' (quoted by Shelton 2002).

4. Steps toward a flexible power system

From the chaos that California got itself into, a number of good polices and programmes have emerged. We cannot see the future clearly, but we can see that a potential is shaping up for a new type of state power system that solves the problems of the traditional rigid vertically integrated grid-centric system while taking advantage of technological breakthroughs that promise to make the old system obsolete. At the same time, the institutional and regulatory system is exploring options that will facilitate the transition from the current system toward a future that is flexible in both power sources (including renewables) and that is far more responsive to the public good, rather than corporate greed.

The result of the crisis in California is that the private regulated utilities have been 'downsized' and made less significant than they were be-

fore deregulation, aside from their financial problems leaving them in or near bankruptcy. In addition, while the traditional utilities retain their position as 'distributors' of power to the local consumer (the last mile or few feet), there has been an irreversible breakup of the previously vertically integrated functions. Equally significant, the state has had to take over many of the functions that were previously in the private domain, such as assuring supply and running the transmission system. If the goal of deregulation was to reduce state involvement over prices and supply of power, the opposite happened. The future will not be 're-regulation' but certainly state and local government oversight of the energy sector.

The amazing thing about the deregulation crisis in California is that many of the economists who once preached the doctrine of the value of competition to drive down prices and to achieve an efficient power system are starting to change their mind. Professor Peter Navarro (2002), one of the champions of deregulation, recently published an opinion piece in which he said that 'electricity markets are vulnerable to monopoly,' and that the 'nation's energy markets cannot function properly without strong regulatory oversight'. He went on to say that he could imagine no possible way to allow free competition that would avoid the abuses of monopoly power in a deregulated power system. Continuing exposure of evidence by the end of 2002 shows that Enron and other energy companies have been suspect of monopolistic business practices that once were thought most unlikely (Clark & Demirag 2003).

California seems to have no interest in either returning to the previous regulated model or of moving in the same direction of deregulation that already failed once. Today the mood in California is still one of trying to learn what went wrong and how to protect against making similar mistakes again. Looking ahead, the state is taking incremental steps to try to fix problems as solutions become obvious. The following review shows the steps California is taking toward a new regulatory model for flexible power systems.

5. Privatisation or civic markets?

The transition from the traditional vertically integrated utility and the emerging flexible power system is a struggle between two different perspectives on how to increase the public good: on the one hand 'privatisation' and the other hand 'civic markets'.[1] Deregulation was proposed

[1] This point was made by Clark and Lund (2001) with regard to the Danish restructuring, using the concept of privatisation and democratisation. See also Clark and Jensen (2001).

under the premise of privatisation, which is the neo-classical economist view that competitive markets reduce prices and allow maximum choice, while providing optimum conditions for technological innovation. The belief has been a cornerstone of the Thatcher reforms as well as the philosophy behind relaxing regulations in many other industries from banking to airlines. In all these cases proponents look at the declining prices and innovation, but also have to acknowledge gaps in service and occasional scandals, such as the collapse of the American Savings and Loan institutions. The failure of the California deregulation can be added to the list of failures.

In contrast, civic markets is a more limited reduction of regulatory control, where the emphasis is on giving consumers real choices rather than a 'free' market. The goal of creating civic markets seems to be consistent with helping reduce prices and lead the market, while maintaining a watchdog who protects the public interest. Civic markets provide choices that are real and flexible, that do not have to be tied to a neoclassical free market where monopoly interests can quickly form to undermine competition. Consumer can purchase alternative solutions to their personal and public needs, recognising that there are many ways to provide services. In a civic market, the abuses of monopolies are controlled under the premise that the public interest should be represented in making key market forming decisions. Instead of open competition, the civic market model increases choices through regulated licensing combined with public participation as it is needed.

Of course, no market system is purely one or the other, and especially during the current transition phase where there are few choices, any programme aiming at improving market conditions will adopt a mixture of competition and nurtured option creation. We feel, however, that the future will be much more like the controlled choices of a civic market than the brutish competition of the unfettered market. Indeed, one can argue that in the cases where deregulation of the power system has succeeded, it succeeded because choices were introduced slowly and carefully, assuring the public good, and revising the rules as disparities were discovered. The parallel to the Internet can be made. The Internet was invented by researchers and academics, through initial public investment. The main public role was to set standards and assure open access. No provider was able to monopolise any part of the system, its standards and structure were transparent, and it was flexible enough to grow over time while accommodating previous users. Moreover, users were seamlessly networked together with huge local autonomy. This allowed public interest priority over all aspects of the web. In power too, the competition will be enhanced by more public involvement rather than less.

On the way to a flexible power system, the model of restructuring is to increase civic markets instead of open free market competition. California may be thought a poor place to look for lessons on successful regulation, and indeed these directions are still in formation. The most undeniable lesson from the bungled deregulation is that choices in retail power provision or generation were more limited during the deregulation period than before, and options are perhaps even more limited today. However, current debate is moving to take another approach to increasing viable options for California power consumers.

6. Promote renewable technological choices

California was the leader in promoting and installing alternative and renewable technologies in the early 1980s following the first energy crisis. Under PURPA, contracts were signed for over 15 000 MW of small-scale, qualifying facility power generated largely by independent power producers. This equivalent of 15 nuclear power plants was designed and brought to contract within a period of just two years, overwhelming the utilities and causing an oversupply problem. Under the pending deregulation, however, virtually all new construction came to a halt in the early 1990s. The major reason for this was that there was adequate power and, with the changing regulatory scheme, no utility wanted to lock in any new production capacity, especially contracts which would be relatively expensive.

In the current regulatory climate, utilities and other generators have virtually no ability or interest in contracting for any new power, especially non-traditional or renewable power. To fill this gap the state is taking a multi-pronged public interest approach to increasing the production of renewable power. The immediate strategy for more power needs, however, to be incorporated into a long-term fuel source diversification strategy so as to limit future dependency on any one type of fuel. As Figure 1 indicates, the state by the spring of 2001 already derived 52% of its fuel supply from natural gas. All but one of the new power peakers and plants approved and funded are natural gas-fired facilities. By mid-summer of 2001, 9000 MW of proposed new power plants were natural gas-fired. However, also my mid-summer, over 4000 MW of renewable energy facilities were under active negotiations to round out the California power portfolio.

The Governor has declared the primary goal for the state to be ‘energy independence’, which means decreasing reliance on out-of-state generators and out-of-state natural gas for power production. While full independence is only a very long-term goal, many steps are being taken

towards it. As the state is in the position of purchasing substantial portions of all the power distributed in the state since the collapse of the regulated utilities, this gives it considerable leverage.

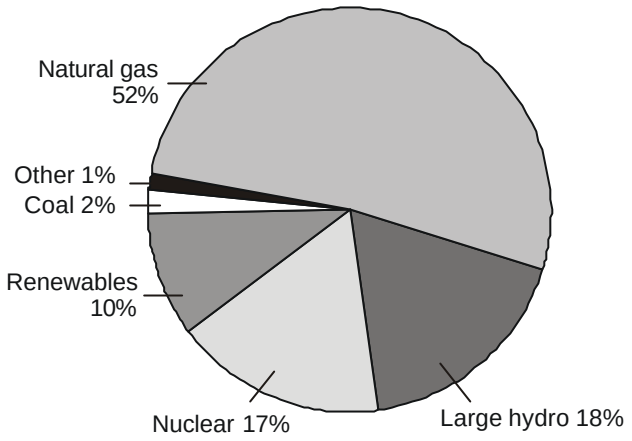

Figure 1: Share of current in-state power generation fuel mix
Source: Rand Institute (2001)

More importantly, several technologies are already nearly competitive with no further incentives. Wind power is the most attractive technology today and, while intermittent, it tends to be available most summer afternoons when most needed, and new wind machines are being installed to replace smaller less efficient ones. Costs below 5 cents per KWh are common, and the lowest price examples are 3.5 cents. Photovoltaic power is also getting a public boost. The California Net Metering Law (PRC 2827) allows utility customers who are self-generators to connect to the grid and to draw power from the grid when needed to supplement self-generation, and then to run the meter backwards when the generator needs less than is produced. When the self-generator takes more from the grid than it put back they pay the difference. But when they generate more they do not get paid, but they donate it to the grid. A recent enhancement to the law balances these accounts over an annual period rather than monthly, which means that more self-generators are in closer balance at the end of the year. The maximum system size has also been increased from 10 KW to 1 MW, making the California net metering law one of the most attractive in the country (Garbesi & Ramo 2002: 22) Current rebates of about half the purchase costs are boosting photovoltaic applications – assuming a 25 year life, photovoltaic power

now costs about 8.5 cents after rebate, which displaces average consumer power costs of about 12 cents per kWh. The state role in nurturing the expansion of these technologies is considerable. None of the proponents of wind or other technologies can solve all the problems alone – usually it takes several firms to supply viable products, long-term contracts to assure financing, and intense brokering and problem solving to resolve contract and transmission linkage difficulties.

The future is enabled by technological changes which have added flexibility to the California power system, while many technological potentials promise to make the system more capable and robust than ever imagined. California has a large and growing renewable energy capacity, amounting to at least 5500 MW of capacity (EPRI 2001: 1-3). Geothermal and wind are largest of these, with substantially more wind being proposed. Most of the wind capacity was installed as part of the PURPA contracts with utilities, while geothermal projects somewhat preceded PURPA. By all accounts, wind is the lowest-cost new source of renewable power and it is competitive with fossil fuels. As it should, California is developing a deep distrust of independent power brokers such as Enron, whose bankruptcy and subsequent evidence of price manipulation have enraged the public. The future will certainly be built on more flexible systems and these might well be along the local energy models of distributed generation (Clark 2003).

7. Expand financing for clean power: The California Power Authority

The commitment to renewable and efficient power is serious, and supported by the creation of the California Consumer Power and Conservation Financing Authority (CPA), a $5 billion financing capacity in the state. The funds are expected to be leveraged up two or more times, giving the state up to twice as much additional private funding. The funds will be used for a) clean energy financing, supporting renewable power and energy efficiency; b) strategic reserves for protection against future crises; and c) greening of public buildings. This initiative builds on the finding of a Gallup poll that asked respondents if they favoured different energy alternatives. The surprising finding was that more renewable sources scored the highest of all the options with 91% favouring it. Mandated appliance efficiencies scored second with 85% in favour, and new plants 81%. In contrast, nuclear only had a 42% acceptance.

In order to expand the state's grid based renewable capacity, two major barriers were noted by the CPA Clean Growth report (2002: 17): the lack of a wholesale market either with long-term contracts or short-

term bidding opportunities. The second is the high cost of capital for financing renewable projects compared to conventional power plants. The CPA is addressing the financing problem by making available some bond funding at lower rates to qualifying projects. In addition, the CPA is working to assure a market for the power if it were to be installed and start producing. Three actions to assure a market are to a) use the power for state facilities; b) require utilities to include a certain percentage renewables in their load mix; and c) have utilities offer 'green power' alternatives to their customers. The latter is possibly significant, since, under the early part of the failed deregulation programme in the state, up to 2% of customers were willing to pay a premium to get power from companies with 'green sources' (Heiman 2002).

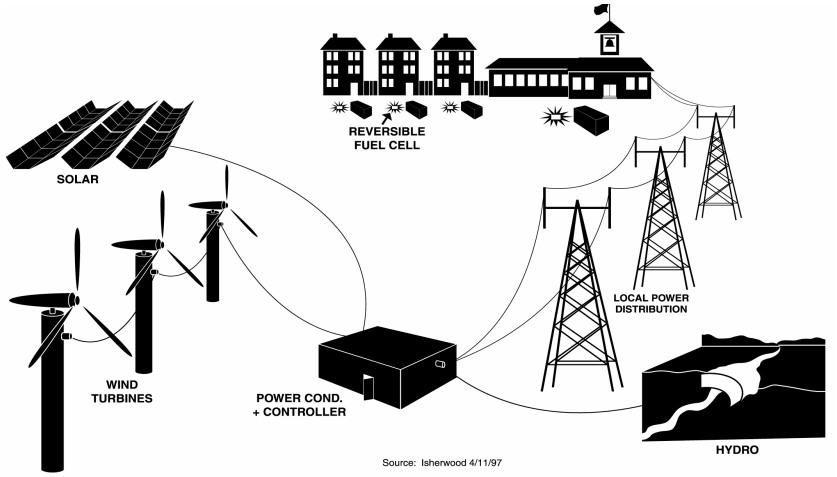

Figure 2: Using renewables to sustain distributed power and heating needs

Source: Governors' Commission on Buildings in the 21st Century (2001)

The type of commitment to support green solutions to the power crisis are illustrated by several additional efforts by the CPA. They have a programme called 'Greening the peak', which aims to find renewable solutions to peak needs. Both an advanced load-shedding programme made possible by automatic meters and the use of renewable sources to supply peak power have been proposed. For example, some biogas operations with limited production are economical if they operate only on peak. Figure 2 shows a schematic description of how different renewable sources can be used together to provide reliable energy from a number of intermittent sources. The CPA will also finance and promote conser-

vation and demand-side financing. In total, the CPA with a $5 billion bonding capacity will be able to stimulate investment of over $17 billion and achieve a total contribution of 8000 MW to the state.

8. Lead by example: state buildings

The goal of energy independence is being pursued by aggressive programmes that require energy investment in state buildings. This programme is aimed at creating a market for renewable technologies. The state invests over $2.5 billion annually in state facilities, and they are major energy consumers. In total, state buildings cost over $600 million in energy, water, and waste disposal. While not all this can be eliminated, the investment potential to save and to lead by example is substantial. A number of specific projects are important (Sustainable Building Task Force 2001):

- A sustainable building design programme which will encourage state design teams to increase energy and materials efficiencies.
- A new state office building, the Capital East End project is being designed using state-of-the-art technologies, with an expected savings of $400 000 annually.
- The Leadership in Energy and Environmental Design programme developed by the US Green Building Council rates buildings, and the state has a supplement to that rating.
- The Fuel Cell Collaborative is working on fuel cell technologies which can be used both in cars and then hooked to buildings to provide distributed power in a community.
- The Greening the Capital project seeks to define sustainable energy, water, and waste projects that can be championed by state agencies.
- The University, State University, and community colleges have over 200 campuses which are major power users, and each is targeted to adopt energy-efficient technologies. The university systems comprise nearly half of all state buildings, and they will become leaders in energy efficiency.

These various programmes for green building have been linked into a state infrastructure investment plan that sees state spending as a resource for sustainability and economic development. They have a dual objective. First, they need to set standards that demonstrate that energy efficiency is viable and cost-effective. Second, they will create a market for photovoltaic cells, better lighting, and efficient heating and cooling equipment. The greater market will entice manufacturers to drop prices and will encourage private sector buildings to adopt similar standards.

9. Aggregation

Under deregulation, consumers had the choice to either receive power from the existing utility as a 'bundled' service that included power, transmission, and distribution costs, or the consumer could opt for direct access from an electricity service provider. If they chose direct access, they would be charged the cost of power from their provider, and the transmission and distribution fees from their current utility. The fixed price of wholesale power under the California deregulation offered consumers little opportunity to find a lower price, and thus very few consumers opted to change electricity service provider. However, some of the largest consumers were able to negotiate contracts with other providers that saved them some money. In total only about 13.5% of customers, purchasing 28% of the power, took the initiative to accept direct access (Brennen et al 2002: 41). Direct access generally was used by large purchasers to secure a more favourable bulk power contract than they were getting from the utility. Since their retail rates were not frozen, when prices escalated during 2000-2001 many of these customers temporarily returned to their old utility; when prices stabilised somewhat in the fall of 2001 most returned to direct access contracts. However, the state had spent public funds of over $8 billion for power for the financially strapped utilities, and projected the need to spend another $10 billion by the end of 2001. These funds were to be repaid by customers of the utilities for whom the power was purchased. Consequently, the state was worried that too many customers would leave their utility for direct access, hoping to avoid the repayment costs. To correct this possibility, the state eliminated all new direct access on September 20, 2001.

Today, direct access is still frozen, though legislation has been proposed that would allow communities to aggregate their local citizens into a direct access municipal utility to obtain advantageous power prices. The original legislation allowed community aggregation, but only to the extent that customers signed up for the service. The new proposed legislation allowed communities to enrol everyone, giving anyone the option to opt out if they wished. The municipal utility interests were very optimistic that this would lead to many new municipal utilities in the state. However, the legislation still would require that the new municipal utility pass on an 'exit fee' to cover their share of costs born by the rest of the state. At the present time this option remains undecided.

It is not clear yet how or when customers will have limited access to alternative suppliers, or how the state will get out of the power purchasing role. It is ironic that the premise of deregulation was to have more open and competitive markets, but the result has been the opposite –

much greater state roles in the provision of power. On the other hand, the consistent emphasis by the Governor and the state has been to first stabilise the system which was in chaos, and then to find ways to increase flexibility.

10. Conclusion

What do the worldwide changes in the energy sector all add up to? The goal of deregulation or privatisation was to create competition, whereas the goal of flexible power is to create a civic market in which private companies operate with the government as their partner. These new entities might be formed under 'joint public-private agreements' (as in California), or third party vendors (companies that create new clean energy for an industry or region), or be distributed in terms of location and function. In any case, these entities are a direct consequence of regulatory and policy intervention on behalf of the government for the public interest.

The new regulatory and policy role in California is not, however, a restoration of the old regulatory scheme. It is a proactive set of policies on behalf of the civic culture in which the power system serves the goal of sustainability and environmental responsibility. California in this way is forging a new model of restructuring based on choices that support sustainable development. Civic markets structure a role in the manner indicated below.

Power supply: The state is moving boldly to assure that consumers have more clean and renewable options in terms of power generation. The emphasis on 20% renewable power sources by 2010 assures that the monopoly of natural gas-fired central power plants will be weakened, and eventually reduced further. California clearly recognises that without strong public leadership, financing, and regulation, a single focus gas-powered power supply system will result, emphasising short-term financial objectives while leaving the state vulnerable to long-term crises. The state role is clearly to support a more diversified fuel supply system.

Self-generation: California is encouraging, through regulation and incentives, greater use of dispersed production that allows customers to supply greater proportions of their own power either through clean on-site energy such as photovoltaic installations at their property or through co-generation (heat-power) systems. Since self-supply requires some backup and grid connections, these contractual barriers are being broken down so that generators can contribute to the grid when they have excess power and draw from it when they do not. This is especially important with intermittent power sources such as wind and solar.

Conservation and load management: The state is also expanding the public incentive programmes in conservation through a variety of programmes including the California Power Authority and fees charged to consumers. For the most part these programmes provide incentives to increase important conservation activities that lower overall demand, especially at peak times. In addition, it is likely that consumers will have more choices of rate schedules based on time-of-day pricing. The extent to which time-of-day will include 'real time' costs based on the actual blend of contractual and spot market costs is not clear, though the largest purchasers are already operating with similar contracts.

Retail level: The state is continuing to see the value in offering a greater range of choices among retail providers, but it is not clear how fast this will expand. On the one hand, large industrial customers are already able to select from alternatives to the local utility, and this may expand. On the other hand, there is no immediate plan to open the system to presumed widespread retail competition. The state appears to be working with the nearly bankrupt utilities to assure that they recover and for the most part it is likely that they will continue as major retail providers. What will probably happen is that the previous utilities will retain their role as a regulated monopoly or near monopoly for the distribution of power to the local customer, but they will not have a monopoly over supply of power. New suppliers will probably be added incrementally under the principles of aggregation where members of communities and industry associations or other bargaining groups will secure supplies to be transmitted and distributed by existing regulated utilities to final demand.

An important caveat on retail choices, however, is that all consumers, with the possible exception of municipal utilities (and their pre-deregulation customer base) that were not part of the original deregulation, will have to share in the costs of the crisis purchases of power and the uncompetitive costs of the long-term contracts that were negotiated by the state. The total costs of these statewide expenses will be a non-bypassable assessment on future energy sales. How these costs will be computed and allocated is being discussed now (spring 2002), and any estimate of the costs will depend on the outcome of the current legal uncertainty over the contracts, given the increasing evidence that Enron and other firms manipulated the market.

Clearly the expansion of power providers must resolve several problems created by the energy crisis, and it is not yet clear how this will happen. First, the state now holds long-term contracts for about a third of the power that will enter the grid. While these contracts are high (and

given the Enron 'smoking guns' appear to be contrived as well by other energy trading firms), the contracts are being re-negotiated and reduced. Currently the state purchases power into a common pool from which distribution utilities draw. The Independent System Operator needs to control supply to balance the system demand so that the transmission lines do not get overloaded. How choice will be increased while the state controls so much power that will need to be shared by all consumers is still not resolved. Any option selected by state policy makers will require approval by FERC with which California has had a strong ideological difference on the market-place. Similarly, the current system still has not figured out how to ensure that the capacity is built and maintained ready to meet the top of the peak demand.[2] Peak demand means that capacity has to be available to serve demand for only a few hours on that hottest summer afternoon. This is very expensive indeed, and no clear plan exists for meeting the demand under current models.

In sum, the evolution of the California deregulation debacle has moved in the direction of flexible power, which is about expanding the civic market, rather than deregulation, which is about laissez-faire 'free market' competition. The California experience has shown that deregulated competition leads to instability and fewer choices, whereas the current response is to carefully use regulation in the public interest to increase choices.

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[2] Some peak demand is shaved by conservation or load-shedding, while other demand is met by hydro plants and old or less efficient plants which are reserved just for peak periods. Utilities also meet peak demand through long-distance transfers from other states where night has already fallen, or where weather differences result in less demand. However, it remains uneconomic to build or maintain peaking plants for the very highest loads.

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8

Electricity reforms in India: Political economy and implications for social and environmental outcomes

NAVROZ K DUBASH

SUDHIR C RAJAN

1. Introduction[1]

For much of the history of post-independence India, the electricity sector has been an entrenched symbol of the nation's state-led economic development approach. Publicly owned, and operated and managed by state employees, the sector was conceived of and run as an instrument of development policy. Beginning in 1991, however, these basic assumptions began to be challenged. Sector reform efforts have been as much about contesting this mindset as about undertaking changes in ownership, investment, and management practices. For a profile of the electricity sector in India see Box 1.

In this paper, we suggest that electricity sector reform in India has become polarised. Efforts to shrink the role of the state and replace it with greater private sector participation allowed little or no place for state stewardship of a public benefits agenda. On the other hand, efforts to continue operating the sector as an instrument of development policy

[1] This is an updated version of a paper previously published by the authors as India: Electricity reform under political constraints, in Dubash (2002).

failed to recognise the dire state of the sector. This study of the political economy of decision-making seeks to go beyond this dichotomy to understand how public benefits can be promoted in a post-reform sector.

There have been four overlapping but distinct periods of electricity sector policy approaches: (1) pre-1991; (2) the 1991 independent power producer (IPP) policy and its aftermath; (3) the World Bank-led restructuring policy, which began to be implemented around 1993 in Orissa; and (4) the period shortly after 1998, when the restructuring model was scaled up through national legislation and state-level reforms. These periods are here described thematically rather than sequentially. Nonetheless, distinguishing between them is useful in order to recognise how and when different types of institutional arrangements were 'locked in' with considerable impact on the electricity sector.

Box 1: Profile of the electricity sector in India

Population (2001)[1] 1.0 billion

Population with access to electricity (2000):[2]
Total: 46%
Rural: 33%
Urban: 82%

Installed electricity generation capacity (1999)[3]
Total: 103 gigawatts (3.2% of total world capacity)
Thermal: 76% *Hydro:* 21% *Nuclear:* 2% *Geothermal and other*: 1%

Emissions from electricity as a share of national emissions:
CO_2 emissions (1998):[4] 47%
NO_x emissions (1998):[4] 25%

Notes:
1. WRI 2000.
2. IEA 2002.
3. www.eia.doe.gov/pub/international/ieapdf/t06_04.pdf 2/6/02.
4. Computed by WRI using data compiled by the IEA (2001).

2. Background: A legacy of state control

During the 1990s, electricity sector reforms were part of a seismic shift in India from a closed toward a more open economy. From Indian independence in 1947 until the mid-1980s, the state played a strong role in planning and implementing strategies for economic development. Internal and external pressures to rethink this approach emerged in the 1980s, as the country went through a moderate recession. These views were endorsed primarily by strong statements from development agen-

cies that their borrowers would henceforward have to increasingly look to international capital markets for their financing needs.[2]

The immediate impetus for action was a serious balance of payments crisis in 1991. The response was to liberalise investment in key sectors of the economy, including electricity, to reduce licensing restrictions on industry, lift government controls on the financial sector, and partially free currency transactions. Both the intent and the actual policies marked a significant departure from the previous 40 years of government policy.

The electricity sector before 1991

Operating under the Electricity Act of 1910, private companies or local authorities supplied more than 80% of the total generation capacity in the country prior to independence in 1947 (World Bank 1993b). In 1948, the Electricity Supply Act brought all new generation, transmission, and distribution facilities within the state's purview. Each state subsequently established its own vertically integrated state electricity board (SEB).[3] Significantly, SEBs were financed through state government loans and were run as extensions to state energy ministries.[4] As a result, SEBs were 'indebted in perpetuity', and were forced to continue in a relationship of financial dependence and administrative thrall to energy ministries.[5] Nonetheless, SEBs were the backbone of the electricity infrastructure, and by 1991 controlled 70% of electricity generation and almost all distribution (World Bank 1991).

Under the Indian constitution, the electricity sector is a 'concurrent' subject, allowing both the central and state governments some authority in the sector. SEBs are under the control of state governments, which also controlled the critical tariff-setting function. The central government was responsible for electricity policy, long-term planning, technical analysis, and project approvals through the Power Ministry, Planning Commission, and Central Electricity Authority (see Figure 1).

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[2] There were clear warnings from the donor community that only about one fifth of required finance for developing countries' projected electricity needs would be available from multilateral sources (Churchill & Saunders 1989).

[3] A small number of private companies continued operation, particularly in large cities, largely buying electricity from SEBs.

[4] SEBs are expected to operate on a commercial basis and earn at least a 3% return on their net fixed assets.

[5] Interview with a former member of the Planning Commission, July 18, 2000. All interviews for this paper were conducted on a not-for-attribution basis, but the institutional affiliation of the interviewees have been identified.

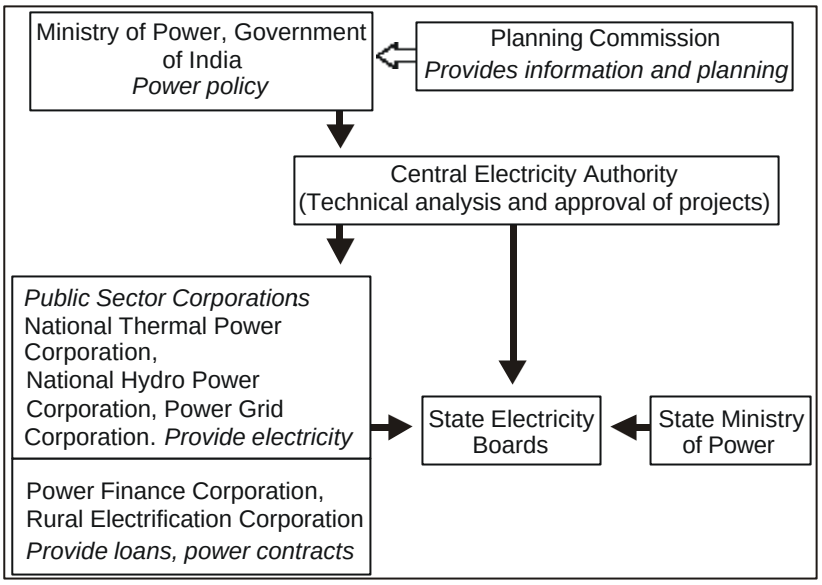

Figure 1: The Indian electricity sector before 1991

In addition, in response to declining SEB performance and to establish a 'model of modern operational practices that the SEBs could emulate', the central government established two central power generation corporations – the National Thermal Power Corporation (now the world's sixth-largest thermal power company, it is widely considered an efficient and well-respected public corporation)[6] and the National Hydroelectric Power Corporation (World Bank 1999a).[7]

By 1991, the first four decades of public-sector-led electricity development had chalked up some notable accomplishments. Between 1948 and 1991, generation capacity increased by a factor of 50 with an annual growth rate of 9.2% – considerably greater than the economic growth rate (World Bank 1991). Moreover, official reports claimed that electrification rates were 80%.[8]

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[6] This record has been tarnished recently by the reports of human rights abuses at a power plant at Singrauli in Madhya Pradesh (World Bank 1997a).

[7] The World Bank was supportive of this move, and directed more than half of its total allocation of $7 billion in sector funding between 1970 and 1991 to NTPC (World Bank 1999a).

[8] This figure, drawn from various Central Electricity Authority surveys, must be treated with some caution. That distribution lines had reached most hamlets

The seeds of crisis

Despite these accomplishments, there were reasons for concern about the future of the sector. Well before 1991, the sector had been locked into arrangements with electricity users, and into management practices with negative long-term implications. These arrangements constrained future reform efforts.

Perhaps the most damaging practice was the political decision in many states to provide highly subsidised or free electricity to farmers. Provision of electricity to run irrigation pumps was an important ingredient in the Green Revolution technology package aimed at increasing the productivity of Indian agriculture. However, from 1977 onward, electricity increasingly became an instrument of populist politics. By offering electricity at flat rates – based on pump capacity rather than metered consumption – or even completely free, several state governments cultivated farmers as a vote bloc.[9] Subsidised electricity imposed high costs and compounded the technological, institutional, and political problems in the sector.

These practices had several negative effects. First, by the mid-1990s, the World Bank estimated that SEBs paid an annual subsidy of about $4.6 billion (1.5% of GDP) to agricultural and residential users (World Bank 1999a). Second, since flat rate or free electricity rendered the meter redundant, existing meters were no longer monitored and were often broken or removed. This 'de-metering' has increased the financial and organisational challenge to the re-introduction of a consumption-based tariff. Third, agricultural tariff policy has had negative spillover effects on overall management practices of the SEBs. Since the electricity load for agriculture is not well measured, technical losses as well as theft throughout the sector are conveniently allocated to agricultural consumption (Reddy & Sumithra 1997). Finally, although agricultural electricity subsidies have been introduced in the name of social benefits, poor farmers typically do not benefit from this subsidy, and indeed may be hurt by it.[10] However, wealthier farmers have successfully organised themselves to lobby for continuation of this policy.

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did not mean that all households were necessarily able to access and use electricity.

[9] Interview with former Andhra Pradesh state government official. July 20, 2000.

[10] Sant and Dixit (1996) suggest that the benefits flow largely to landed farmers who can afford mechanised irrigation, and who use irrigation to grow high-value cash crops. Landless populations do not benefit from this policy (Verma 1999), unless it is indirectly through greater employment opportunities. Moreover, cheap electricity encourages profligate use of groundwater,

Other negative effects followed. Although many states had a declared social policy to provide agricultural subsidies, they did not always pay the SEBs directly to compensate for the loss of revenue. Indeed, agricultural de-metering meant that the actual level of compensation required was often a mystery. Instead, SEBs developed an elaborate and self-defeating system of cross-subsidies from industrial consumers to make up for the growing revenue losses from agriculture and theft. Over time, industrial consumers found it more cost-effective to set up their own captive power plants to supplement, or replace, SEB electricity. In 1960, industrial consumption accounted for 67% of SEB sales; by 1991, its share had dwindled to 40%. Over the same period, agriculture consumption leaped from 10 to 25% (TERI 1993). Losses from theft also seemed to be a serious problem. SEBs seemed reluctant to acknowledge the extent of such losses, perhaps because it was so difficult to distinguish theft from technical losses and unmetered consumption. Recent evidence suggests that, while the focus has been on agricultural losses, industries using high-tension lines may be responsible for much of the theft and loss (Purkayastha 2001; Mahalingam 2002).

Hence, the SEBs found themselves in the unenviable position of facing growing loss-making segments of their business, and a shrinking profit-making segment. Considerable staff development and morale problems followed, with wages stagnant and sales per employee among the lowest in the world (Gutiérrez 1993). The quality of the electricity provided inevitably suffered, with low frequency, brownouts and blackouts, and billing problems increasingly common. Poor service quality hastened the exit of industrial users from the grid, and diminished the willingness of consumers to accept higher tariffs, both of which accelerated the spiral of deterioration.

Attempted reform of the SEBs

Through the 1980s and early 1990s, various efforts at SEB reform led by the central government, the World Bank, and independent researchers all suffered from either insufficient or weak implementation.[11] In 1991, the central government attempted to solve the problem of electricity supply to farmers. A committee recommended the establishment of a common minimum agricultural tariff, and a subsequent Chief Ministers' conference proposed that agricultural tariffs meet the modest target of

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and large farmers are better able to mobilise capital to chase the water table than are small farmers (Dubash 2001).

[11] For example, see Government of India (1980) and Planning Commission of India (1994).

50% of the average cost of supply.[12] However, in the face of mobilised farmer vote banks, state governments took little action.

The World Bank provided loans to SEBs for financial restructuring, tariff adjustment, improved metering and collection, and other measures to increase distribution efficiency and revenue flow (World Bank 1999a). In addition, World Bank support for the National Thermal Power Corporation was intended, at least in part, to promote good management practices within SEBs. By 1993, however, the World Bank had decided that SEBs had sunk into both a political and an institutional quagmire and that institutional reform under the current ownership structure was a lost cause.

In 1991, an independent team of scholars published the Defendus (*de*velopment-focused, *end-u*se-oriented, service-directed) model, a unique integrated resource planning approach that emphasised access, equity, and efficiency improvements (Reddy et al 1991).[13] Using this model, an analysis for the state of Karnataka showed that the requirements of electricity and installed capacity would only be about 40% of what would be required in 2000, according to a conventional projection commissioned for the state. But administrators only seemed to have a perfunctory, academic interest in this approach, and in integrated resource planning in general.[14] It was never seriously examined, despite several appeals to develop long-term electricity policy for the country.

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[12] Reported in Government of India (1999).

[13] Defendus modelled its framework on energy services by examining supply expansion as well as efficiency improvements, and allowed for environmental costs to be internalised. A Committee for the Long-Range Planning of Power Projects set up by the government of Karnataka projected that the state would require a six-fold increase in electricity supplies by the year 2000 – from the 1986 consumption of 7.5 terawatt-hours to 47.5 terawatt-hours, and from the 1986 installed capacity of 2 500 MW to 9 400 MW. With end-use efficiency improvements, the Defendus scenario proposed 17.9 terawatt-hours of electricity and an installed capacity of 4 000 MW by 2000, together amounting to roughly one third of the cost of the original scenario.

[14] Within the US context, IRP has a rather specific meaning applicable to traditional (vertically integrated) utilities, which are required to submit plans to regulators for integrating demand side as well as generation options in their tariff submissions. We use the term here more broadly to refer to any attempt to identify, analyze, and acquire cost-effective resources, which would lower the long-term cost of energy services. In this definition, long-term resource planning (taking into account supply-side and demand-side efficiencies) would be conceivable even in an unbundled situation as long as a regulator could develop and implement incentives structures to promote more cost-efficient resource use.

By the beginning of the 1990s, there was broad consensus that the electricity sector was in dire straits and that the status quo was unsustainable, particularly in financial terms. If there was a moment to seriously consider re-regulation of the sector to reassert the independence of SEBs from their political masters, devise mechanisms of accountability, and cut through the Gordian knot of politically influential consumers pampered by subsidies, this was it. But the moment passed without any considered reflection about policy reform. With the growing consensus favouring a shift in macroeconomic policy, spurred by the balance of payments crisis, India was set to press the accelerator and motor into the next century. The electricity sector was at the forefront of the new liberalising India.

3. A many-layered reform process

The reforms themselves unfolded in four stages. In 1991, the central government invited private investment in generation. When this approach failed to address the root problems in the sector, a World Bank-supported reform effort in the state of Orissa, organised around unbundling and privatisation in the sector, heralded a new stage in the reform process. This model was then followed by several other states. Finally, the central government reentered the debate by proposing a sweeping legislative reform package. (See Box 2.)

Box 2: Chronology of electricity sector reforms in India

1991	Electricity Laws (Amendment) Act allows private sector participation in generation, with foreign investors allowed 100% ownership.
1992-97	Eight projects given 'fast-track' approval status and sovereign guarantees by the central government.
1995	Orissa Electricity Reform Act established the Orissa Electricity Regulatory Commission and provided for unbundling of Orissa State Electricity Board.
1996	World Bank support for Orissa Power Sector Restructuring Project approved.
1996	Chief Ministers' Conference formulated a common minimum action plan for electricity.
1997	World Bank Haryana Power Sector Restructuring Project approved, and Haryana state government passes the Haryana Electricity Reform Act.
1998	Electricity Regulatory Commissions Ordinance Notification provides for establishment of a Central Electricity Regulatory Commission and state-level electricity regulatory commissions.

1999-2001	Andhra Pradesh, Karnataka, and Uttar Pradesh proceed with preparation of Electricity Reform Acts. The World Bank prepares and approves projects supporting reform in each of these states.
2001	Energy Conservation Bill passed by Parliament.
2000-2002	Draft central government Electricity Bill prepared and introduced in Parliament.

Attracting private investment: The independent power producer debacle

In late 1991, the Ministry of Power swept away four decades of public monopoly in an act of great political significance. The new independent power producer (IPP) policy was greeted with enthusiasm. However, little actual investment materialised, and a decade later, the IPP policy is broadly viewed as a flawed and half-hearted approach to reforms.

The Electricity Laws (Amendment) Act of 1991 allowed private entities to establish, operate, and maintain electricity generation plants as IPPs and to enter into long-term power purchase agreements with SEBs. Industry groups and urban middle-class consumer groups welcomed the diminution of a public sector role and the entry of the private sector (Desai 1999). Believing that private investors would be reluctant to come to India without generous incentives, the government acted to offer investors incentives. IPPs were offered a guaranteed 16% return on equity, with bonuses for improved capacity utilisation, a five-year tax holiday, and low equity requirements equivalent to 20% of project costs (Ahluwalia & Bhatiani 2000). To further hasten implementation, central government subsequently declared eight of the most promising projects 'fast track' projects with expedited clearance procedures, and provided government counter-guarantees and escrow accounts against nonpayment of dues by SEBs. These incentives had the desired effect. By mid 1995, project developers and financiers had put forward 189 project offers totaling over $100 billion, which would increase capacity by 75 gigawatts.

Despite the initial 'euphoric' reaction, as one senior bureaucrat put it, there were also early grumbles of discontent from various quarters, which steadily grew louder as the IPP policy failed to deliver (Pillai & Krishnamurthy 1997). While supporting the policy, IPPs grew increasingly critical of bureaucratic delays and hurdles in implementation, and ever more concerned about recovery of dues from SEBs. In reaction, an Independent Power Producers Association of India (IPPAI) was established in 1995 to serve as a 'neutral proactive forum'.[15] IPPAI did create

[15] See ippai.org.

an important space for articulation of concerns about the reform process, although there was also a prevailing 'negative opinion' within government ranks of IPPAI's perceived emphasis on winning special favours for IPPs.[16]

The central government was by no means unified on the IPP policy. The Ministry of Power was perceived as the primary promoter of the policy, with support from the Ministry of Finance. One widely held view was that although the IPP policy was 'flawed', it had 'been the most promising option at that time'.[17] However, within each ministry there were stronger dissenting voices, with some at the Ministry of Finance who argued that concessions to IPPs might lead to net foreign exchange outflows rather than inflows. Moreover, the Ministry of Power's suspension of technical and environmental clearance for smaller projects aroused the ire of agencies responsible for those clearances.

Multilateral donors played a curious dual role in the IPP policy. While welcoming private electricity initiatives in principle (World Bank 1991), the World Bank delivered a strong critique of the highest profile IPP, the Enron project, in a confidential memo to the Government of India. (See Box 3.) The memo stated that the project was 'not economically viable, and thus could not be financed by the Bank', but urged the government to 'explore ways to sustain the interest of the project sponsors' (Vergin 1993). That the World Bank expressed its concerns about the project is laudable; that it did so only in a muted fashion is problematic. Since the World Bank was actively supporting SEB reform at this time, it could well have been more public with its views. While there is no direct evidence on this point, Bank staff may have faced pressures to reconcile an IPP policy they viewed as flawed with the Bank's enthusiastic support for India's liberalisation efforts. As a result, an important moment for critical reflection on the IPP policy was lost.[18]

The long-term impacts of the IPP policy were several and diverse, and are well illustrated by the high-profile case of the Enron project.

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[16] Interview with government bureaucrat, July 20, 2000.

[17] Interview with power sector official, July 13, 2000.

[18] It is important to bear in mind, however, that sections of civil society were very active during this time in formulating their own responses to IPP policy. In various newspaper and magazine articles and other public forums, journalists, former bureaucrats, academics, and environmentalists criticised specific projects as well as the overall framework. One group of critics formed a 'National Working Group on Power', and organised workshops and campaigns against IPP policy. Public interest litigation was filed on behalf of citizens against the government as well as specific IPPs on grounds of corruption, environmental damage, and constitutional violation.

First, key institutions responsible for long-term planning and technical and economic clearance were weakened. Officials at well-functioning public agencies such as the National Thermal Power Corporation felt that the IPP policy created an uneven playing field in favour of foreign investors. Second, the focus on capacity expansion excluded consideration of a more rational least-cost planning approach to electricity development. Finally, in its conception and implementation, the IPP policy offered opportunities for graft and malfeasance. Projects were not typically selected through competitive bids, and power purchase agreements were kept secret even though they contained 'take-or-pay' contracts involving public financial obligations for decades to come.[19] While no accusations have been conclusively proved, some high-profile projects have been caught in a swirl of accusations concerning human rights abuses, flawed environmental clearances, and corruption.[20]

Moreover, the IPP policy had a polarising effect at multiple levels. Early support by urban middle-class consumer groups and industry associations, who saw in the policy the promise of efficient power delivery, translated into anger toward public interest advocates who were seen as unnecessarily obstructionist (Desai 1999). Within government ranks, those who saw the policy as the best option at the time were pitted against those who viewed the policy as flawed from the start. Thus, technically, economically, and politically, the policy created a hangover effect for future attempts at reform.

Box 3: The Enron affair

In October 1992, the Congress-led government of Maharashtra announced to the world that it had signed a memorandum of understanding with Dabhol Power Company (DPC), the Indian subsidiary of the US-based Enron Corporation, for a liquefied natural gas plant of 2 000 to 2 400 MW capacity, and to purchase electricity for 20 years. In what would later become a source of controversy, the deal was completed with alacrity and secrecy, despite the con-

[19] The World Bank held a workshop on competitive bidding at Hyderabad in 1994, (personal communication, World Bank staff, February 2002). Nonetheless, by then many of the largest power purchase agreements were negotiated in secret and without competitive bidding (Reddy & D'Sa 1995).

[20] For example, in the case of the Mangalore Power Corporation, where Cogentrix Corporation was the developer, public interest litigation was filed by a consumer activist in the Karnataka High Court alleging offshore payments by Cogentrix's partners through a subsidiary in the British Virgin Islands. The company has since withdrawn from the Karnataka project, citing delays in gaining government approvals and in resolving the litigation (Fernandes & Saldanha 2000).

siderable size and financial obligations of the project, amounting to an expenditure of roughly $1.3 billion per year.

Despite strong reservations expressed by some state and central government bureaucrats, and by the World Bank, the project was cleared. Just as lending arrangements were being concluded, the newly elected state government, whose election platform in 1995 had stressed national self-reliance, cancelled the contract and proposed to invite competitive bids. The international response was primarily negative, with concerns about the viability of India's reform programme and its commitment to contractual obligations.

Yet, there were good grounds for concern about the project. Journalists and analysts found indications of complicity among officials to bend laws to accommodate Enron's demands and obtain the necessary clearances. Others predicted that the financial terms of the deal were highly unfavourable to the Maharashtra state electricity board, and that public funds were being jeopardised through the use of counter-guarantees. In addition, following charges of violence against opponents of the project, a Human Rights Watch investigation found that the state government had engaged in systematic suppression of freedom of expression and assembly, and that the Dabhol Power Company and Enron Corporation were complicit in these violations.

Despite this growing rumble of protest, within two months of the project being cancelled, a new power purchase agreement was signed on the recommendation of a government committee with few changes to the original project. All clearances were subsequently awarded and counter-guarantees approved. Despite a pending public interest lawsuit challenging the final clearances that were given to the project and alleging fraud, the first phase of the project has been commissioned.

By 2001, the project had started to generate severe financial problems for Maharashtra. The SEB, which had been profitable in 1998-1999, plunged into losses exceeding $300 million (excluding subsidies received from the state government) in 1999-2000. In order to honour its contract, the state had to buy power from the Dabhol plant at a cost twice that of the average production cost of electricity in the state.

Following a series of defaults on payment by the SEB, Dabhol invoked its financial guarantee from the state. When the Maharashtra government expressed its unwillingness to pay, the state's credit rating was downgraded. DPC subsequently invoked the counter-guarantee, by which time the SEB and the state government cleared their dues. Indeed, Enron officials mobilised senior US government officials to raise the subject with the Indian government. DPC has since initiated arbitration proceedings in London, but the SEB has countered that the proper forum for settling all disputes with the company is the state regulatory agency, a dispute that has since moved to the Supreme Court. Most recently, with Enron Corporation itself in deep financial trouble, the troubled plant is up for sale to competing bidders.

Sources: Enron Action Group (2002); Godbole Committee Report (2001); Human Rights Watch (1999); Mehta (1999); Reddy & D'Sa (1995); Reuters News (2001); Sant et al (1995); Weisman (2002); Wagle, 1997.

An experiment with SEB reform: The World Bank-led Orissa model

On a parallel track to the IPP process, the World Bank played a considerable role in arguing for fundamental reforms of SEBs, and in persuading a few states – led by Orissa – to initiate reforms. Having unsuccessfully tried in the 1980s to reform SEBs within the existing structure, World Bank efforts in the 1990s were directed at unbundling and privatising SEBs. Hence, these reforms were considerably more far-reaching than the IPP policy.

Within India, there was broad agreement that the root causes of the problem were the technical, financial, and management problems of SEBs, but there was no agreement on the solution and on how to address the political thicket that SEB reform entailed. The World Bank stepped into this morass, armed with its new 1993 policy for lending to the electricity sector (World Bank 1993a). At a workshop for Indian policymakers, the Bank highlighted the experience of ongoing reform experiments in the United States, United Kingdom, Argentina, and Chile. It offered to provide lending to support 'the boldest … most deserving state-level power sector reforms', but it would not finance or provide guarantees for electricity projects in states that did not undertake restructuring (World Bank 1993b). Of the few states that expressed interest in the World Bank's offer, Orissa in eastern India was the first to proceed with a reform programme. By the early 1990s, Orissa's electricity sector was in shambles. Transmission and distribution losses were estimated at 43%, only 17% of bills were collected, and the ratio of customers to staff was an astonishingly low 29:1 (Thillai Rajan 2000: 660). However, the Bank selected Orissa mainly for political reasons. The Chief Minister of the state demonstrated strong political support for carrying through reforms.[21] Orissa also had a small electricity load in the agriculture sector and a weak farmer lobby (Thillai Rajan 2000).[22] With low levels of political mobilisation and a minor national profile, Orissa was 'an experimental rat' for reforms.[23]

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[21] The initial reason for support was the World Bank hint that funding for a favoured hydroelectric project would be more forthcoming if the state undertook broad reforms. While this tactic was instrumental in initially getting the Chief Minister's attention, several interviews with senior state officials (July 20, 2000) indicate that he very quickly developed a deep personal belief in the need for fundamental reforms in the sector. Thillai Rajan (2000) confirms this account.

[22] Agriculture accounted for 6% of load in Orissa versus around 40% in many other states (Thillai Rajan, 2000).

[23] Interview with power sector official, July 14, 2000.

While local political support was undoubtedly necessary, the World Bank was the driving force for reform and the most consistent motivator of change.[24] For example, the Bank urged increases in tariffs to lay the groundwork for reforms.[25] World Bank staff candidly described their role as overcoming 'natural resistance to change' within the state.[26] Reform consultants, NGOs, government officials, and the media eventually referred to electricity sector reforms in Orissa as the 'World Bank model'. These opinions were often not cast in a negative light, but as an appreciation of the Bank's proactive role in building momentum for change, and of the effort and commitment of particular staff members.[27]

The World Bank's Orissa Power Sector Restructuring Project required $997.2 million, and was partially funded by the UK's Overseas Development Agency. Almost three fourths (74%) of the financing went to rehabilitation of distribution and transmission. A second component (23%) was allocated to demand-side management, with the remainder going to support the reform process (World Bank 1996).

International consultants brought in by the World Bank and other donors played a considerable role in shaping reforms.[28] While consultants were hired for their technical knowledge, they frequently also had to assess the sociopolitical and institutional context for reforms. For example, consultants decided on a single-buyer system for Orissa, based on an assessment that the underlying technical, institutional, and commercial capabilities in the state were insufficient to support wholesale competition. In considering approaches to unbundling public utilities, they had to consider the need to minimise layoffs to avoid union opposition. Some national actors questioned the appropriateness and ability of international consultants playing these roles. One public official said that consultants 'sought to fit Orissa into their patterns,' while another argued that their approach was like 'applying principles of aviation to a jeep'.[29] Some national consultants with considerable experience in the sector resented being placed in junior positions, although they were well-placed to educate international consultants on local conditions.[30] Since national and international consultants compete for contracts, these comments

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[24] Interview with Orissa state official, July 20, 2000, and interview with former national power sector official, July 18, 2000.
[25] Interview with former national power sector official, July 18, 2000.
[26] Interview with World Bank staff, July 13, 2000.
[27] Interview with public power sector officials, July 18, July 20, July 25, 2000.
[28] Interview with reform consultant, September 13, 2000.
[29] Interview with Orissa public sector officials, July 25, July 26, 2000.
[30] Interview with consultant, July 15, 2000, and with academic, July 26, 2000.

should not be uncritically accepted at face value. However, international consultants' own views suggest that there are downsides to reliance on expatriates. As one consultant put it, 'subtleties … got past us'.[31]

National actors – whether official or unofficial – did not substantially modify the consultants' proposals. The reform process was managed by a set of working committees, guided by a steering committee that reported to the Orissa Secretary of Power. The intent was to bring together government officials, SEB officials, and donor agencies. However, the reform committees, with limited experience with private ownership and competitive electricity markets, made few modifications to the consultants' proposals.

Consultations and a media campaign were intended to reach out to the broader public.[32] Critics of the consultation process charge that the goal was to 'achieve consensus on a model rather than to evolve a model through a consensual process'.[33] Interviews support this view. Participants saw the role of consultations as explaining changes and 'reducing tension'.[34] NGOs reported that their concerns – including the impact on access for electricity to the poor – did not result in any changes to the approach.[35] Indeed, the process appeared designed to usher reforms through rapidly, based on a political judgment that a long process would allow vested interests time to mobilise opposition to reforms.

The content of reforms

Reforms in Orissa, following the Bank's approach being implemented in much of the world, consisted of:

- unbundling generation, transmission, and distribution;
- allowing for private participation in generation and transmission utilities;
- privatising existing thermal generation and distribution utilities;
- establishing an autonomous regulatory agency; and
- reforming tariffs at the bulk electricity, transmission, and retail levels.[36]

The lynchpin of the reform process was the passing of the Orissa Electricity Reform Act in 1995, which provided for the establishment of an independent regulatory commission and the divestment of equity in generation and distribution to the private sector.

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31 Interview with international reform consultant, September 13, 2000.
32 World Bank (1996), and interview with Orissa public official, July 25, 2000.
33 Interview with NGO staff, July 22, 2000.
34 Interview with academic, July 26, 2000.
35 Interview with academic, July 26, 2000.
36 See World Bank (1996).

Public officials and Indian consultants suggest that the reforms were single-mindedly focused on financial issues and on privatising the sector. According to one official, international donors were obsessed with removing subsidies and increasing tariffs.[37] Another characterised the donor approach as 'privatisation must be done; let's do it somehow'.[38] A donor agency representative confirmed this perspective when he described the Orissa reforms as 'basically a bankruptcy workout'.[39] International consultants emphasised that they received instructions to promote rapid privatisation, and to 'create a process that was irreversible'.[40] Donor agencies saw financial issues at the heart of the restructuring and enhanced private participation in the sector as the best solution. It was anticipated that private finance would develop new generation capacity and enhance availability of existing capacity. Private participation in distribution was expected to improve service quality and increase financial performance. Donor agencies were not alone in this view. Some senior national and state officials held the same position. Others reluctantly agreed, only because they felt that all other options, notably continued public ownership, had been exhausted.[41]

Yet, attracting investors for privatisation in Orissa proved to be a difficult task. To make the distribution sector more attractive, 75% of the shared financial liabilities were transferred to the publicly held transmission sector.[42] To make generation more attractive, generation companies were allowed to increase the price they charged to the public transmission company, but the transmission company was not allowed to pass on higher prices to distribution companies. As a result, the only public component, the transmission company, built up enormous liabilities that undermined its long-term viability. Ultimately, privatisation was carried out, but there was limited interest and few bids.[43]

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37 Interview with consultant, July 18, 2000.

38 Interview with Orissa power sector official, July 15, 2000.

39 Interview with donor agency staff, December 7, 2000.

40 Interview with international consultants, September 13, 2000. Indeed, the Bank adopted the 'reform mantra "Failure is not an option" ... to emphasise the importance of relentless pursuit of reform implementation at times of difficulties' World Bank (1996, Annex 5.3: 5).

41 Interview with Orissa public official, July 20, 2000, and July 25, 2000, and interview with former national power sector official, July 27, 2000.

42 For details see Mahalingam (2000).

43 One company, Bombay Suburban Electricity Supply purchased three of the four distribution zones, and sought to purchase the fourth, but was turned down in order to introduce some competition (Mahalingam 2000: 96).

The results have not been positive. Since privatisation, the new owners have brought neither new funds nor discernible management skills to the newly established companies.[44] Revenues from privatisation were not ploughed back into the sector, but absorbed into the government budget for other purposes.[45] The public has faced substantial tariff increases but seen few benefits in service, which has led to growing political discontent with the reform process and a call to bring back the publicly owned system. The private operator of one distribution zone, which also operates one generation unit, believes that the government has neither ceded management control nor paid its own bills.[46] As a result, this company has taken steps to withdraw from the sector in Orissa. For their part, the Orissa regulatory agency notes that distribution companies have failed to reduce distribution losses from around 42-45% to 35%, the level set by the regulators as allowable (Sinha 2002).

As a result of these conflicts, the government of Orissa established a high-level committee to reconsider the reforms. The committee found that the new distribution companies had 'neither brought superior management skills nor did they arrange financial support', that transmission and distribution losses continued unabated, and that billing and collection problems worsened after privatisation (Kanungo 2002). The Committee added that 'rural electrification seems to have unintentionally become the worst casualty of the reform process'. Even while these problems were being uncovered, the fact that Orissa had embarked on and been through several stages of a reform process, including privatisation, provided a powerful demonstration effect within India. At least a few other states were lining up to follow Orissa's lead.

Scaling-up the model

By 1998, Orissa had managed to demonstrate that it could privatise its distribution business, and the more problematic aspects of the Orissa experiment had not yet materialised. Growing disenchantment with the IPP policy left states with few alternatives other than reform of SEBs to address an electricity sector crisis that showed no signs of abating. Moreover, as economic liberalisation grew more palatable, opposition to privatisation faded. Even states with avowedly communist governments competed to invite private investors (Echeverri-Gent 2000). Finally, the

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[44] Interview with former Orissa power sector official, July 25, 2000.

[45] According to one report, only 3% of the privatisation revenues from the sale of the Orissa Power Generation Corporation were re-invested in the sector (Indiapoweronline.com 2001a).

[46] Personal communication with international reform consultant to Orissa, September 18, 2001.

World Bank continued to stand ready to support states that wished to embark on a reform programme. As a result, since 1995, several large and politically significant states have concluded (or are in an advanced stage of negotiating) loan agreements with the World Bank to reform their electric power sectors, including Haryana, Andhra Pradesh, Uttar Pradesh, Karnataka and Rajasthan.

These states have followed the basic parameters of the Orissa model, in many cases guided by the same consultants, but there have also been some significant differences. First, in subsequent efforts, electricity reforms have been part of the broader framework – articulated in the World Bank's Country Assistance Strategy for India – of state-level financial restructuring. This approach is relatively new for the World Bank, since it involves providing a broad macroeconomic restructuring loan at the state level rather than to a national government. Second, most of the new World Bank loans are structured as 'adaptable programme loans' that release small amounts of funds over many years, with each tranche dependent on the fulfilment of conditions. Compared to a single large loan, this approach enables the World Bank to provide a down-payment on future support, to signal seriousness of intent to investors, and to provide the World Bank flexibility in adapting to future conditions (World Bank 1997b).[47] Finally, in response to difficulties faced by private distributors in Orissa, subsequent efforts have sought to mitigate risks that tariffs will not be raised, payments will not be collected, or thefts will not be reduced.[48]

The World Bank has not been the only donor agency active in the sector in India. The UK's Department for International Development (DFID), Canadian International Development Agency, US Agency for International Development (USAID), and Japanese aid agencies have also provided funding for elements of the reform. Of these, DFID has provided considerable funds for technical assistance with the reform programme (World Bank 1999b). Much of DFID's contribution has been in

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[47] For example, the AP adaptable programme loan was structured around five sets of conditions: (1) pass a reform bill and reform tariff setting; (2) notify the bill, establish a regulatory commission, and unbundle the SEB; (3) partially privatise distribution; (4) further privatise distribution and list shares of the generation company on the stock market; and (5) privatise distribution completely and list shares of the transmission company (World Bank 1999c).

[48] For example, in the state of Karnataka, one proposed mechanism is the introduction of a 'distribution margin' that guarantees income to the distribution company during a transition phase. This approach has been criticised as unduly insulating the private investor from risks that are within their ability to manage, and potentially limiting the authority of the regulator (Menon 2002).

the form of a grant rather than a loan. According to one World Bank observer, DFID's grant support for basic technical work was critical to implementation of reforms.[49]

It is important to note that not all states have decided to follow Orissa. A few, including Gujarat, Madhya Pradesh, and Tamil Nadu, have decided to focus on commercialisation of their SEBs rather than going down the road toward privatisation. In some cases, they are receiving support from the Asian Development Bank. While it is too early to compare experiences across states, in the future these varied approaches will provide valuable material for a comparative assessment.

The central government follows the lead of the states

With many states following the Orissa approach, the central government took steps to provide a legislative framework for state-level reforms. In 1998, the Ministry of Power championed an Electricity Regulatory Commission Act, creating a central regulatory agency and providing an umbrella framework for each state to establish its own agency.[50] This act marked the first formal sign of recognition by the central government of the significance of Orissa's reform efforts, and was a late effort to provide a template for state-level reforms.

In 2000, the Ministry of Power initiated the drafting of a comprehensive Electricity Bill to replace all existing legislation in the sector. This bill is the most dramatic initiative taken to date by the central government to exercise some leadership over the direction of the sector. In contrast to the state reforms, preparation of this bill has been a domestic effort, initiated and led by the Ministry of Power. The World Bank has limited itself to comments on drafts. The bill provides states legislative authority to unbundle their SEBs, establish independent regulatory commissions, facilitate open access to transmission (wholesale competition), develop a spot market for electricity, and meter all electricity supply (Suri 2000). Although the Ministry of Power now does support privatisation, the bill does not explicitly require privatisation, but gives the states some flexibility on how to organise ownership of an unbundled sector.

Plans to pass the legislation, originally intended for 2000, have been stalled on various accounts, including the sudden demise of then-Minister of Power Kumaramangalam. Since it was introduced in Parliament, in August 2001, it was sent to a standing committee by the floor,

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[49] Interview with World Bank staff, July 6, 2000.

[50] Under the Act, each state had the choice of establishing a commission on the basis of the central government Act or through state level legislation, as Orissa had done.

partly because the debate has been shaken by the tumultuous experience with post-reform competitive electricity markets in California and the meltdown of the Enron Corporation. In particular, ambitious market frameworks such as spot markets for electricity have now been placed on the back burner (*Economic Times* 2001).

The central government has sought to promote fiscal responsibility. For example, a central government-convened expert group recommended in mid-2001 that SEBs take responsibility for past dues, and that incentives were needed to support this effort.[51] They also argued that failure to service future obligations should meet with heavy censure.

Central government direction has also led a broad trend away from acceptance of electricity provision as a purely commercial enterprise, and more willingness to reinsert social and economic development goals within a broad framework of fiscal accountability.[52] For example, a ministerial committee has promoted a concerted dialogue on rural electrification in the context of the electricity bill. This committee is likely to embrace a system of decentralised licences managed by state electricity regulatory commissions for rural electricity provision, and introduction of a system of subsidy auctions – inspired by experiences in Argentina and Chile – for those willing to undertake rural electrification.

In addition, evidence of a more proactive approach to environmental considerations as they relate to the fiscal and other goals of reform has begun to surface. For example, the Ministry of Non-Conventional Energy Sources has proposed that a preferential tariff be introduced for wind energy projects, and that the Electricity Bill mandate that a minimum of 10% of electricity generation be obtained from renewable sources (*Bulletin on Energy Efficiency* 2002a). Few developing countries have pursued such an approach, although China is among this small group. In addition, an Energy Conservation Bill was passed by Parliament in August 2001. It calls for the establishment of institutional and legal structures to implement energy efficiency, relying on both regulatory enforcement and market inducements (*Bulletin on Energy Efficiency* 2002b).

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[51] Specifically, the committee proposed that SEBs be allowed to issue bonds in favor of creditors, the incentive being a waiver of 50% of the interest on past dues of SEBs. While this broad approach has been welcomed, whether it adequately recognises the challenge to states to meet future obligations has been questioned (Ahluwalia 2001).

[52] Interview with Power Ministry official, March 8, 2000.

With regard to the broader reform agenda, the debate appears to have shifted from the far-reaching goals of instituting complex spot markets to using the Electricity Bill to meet more pressing demands. These include the long-standing objectives of metering all consumers, increasing tariffs and removing cross subsidies, and reducing transmission and distribution losses. Since implementation of this agenda will require considerable funds, the course of actual reforms will be dictated by the availability of financing. In this context, the World Bank's policy of making funding conditional on private participation in the sector takes on renewed significance. Only states that signal willingness to privatise will have access to external funds.

In sum, central government efforts to steer reforms do provide an opportunity to step back from the Orissa model driven by narrow financial considerations and think through the broader objectives of reform. However, it is not clear how these efforts will mesh with World Bank-funded state reforms, which so far have been focused on financial restructuring.

4. The role of public benefits in the reform process

It is far too early to conclude whether social and environmental conditions on the ground have improved as a result of the reforms. But a close look at the process provides insights into whether and how public benefits were factored into the decision-making process by the major actors involved.

Social issues through a fiscal lens

To the extent that social issues have been raised in the reform context, they tend to be viewed primarily through the lens of better fiscal management. The World Bank, in particular, suggests that reforms in the electricity sector would free state funding for 'higher priority use in the social sectors' (World Bank 1999b: 27). Thus, the framing of the electricity sector largely excludes explicit consideration of its social dimensions, a break with the previous rationale for state involvement in the sector. Where social considerations are explicitly addressed, the reform loans do not build in measures to ensure they are achieved. For example, the World Bank emphasises the importance of defending concessional rates for low-income groups in the face of price increases (World Bank 1999b). Yet, it is not clear how the continuation of lifeline rates, which will continue to place burdens on the state exchequer, can be reconciled with a desire to free funds for allocation to other priority social sectors. The magnitude of the financing shortfall is well illustrated by Ahluwalia

(2000), who computes that about 50% of all households (81 million) are unable to afford commercial rates for electricity.[53] Hence, even though the current burden on the state budget comes largely from a debt service obligation, even if these were to be minimised, social spending in the sector could easily consume much of the savings. If these households are to be provided with electricity at affordable rates, there should be no illusions about the continued need for public funds even in a privatised and restructured sector.

On the important question of increasing access to electricity services, World Bank loan documents note that the commercial orientation introduced by the reforms will lead to more modest targets. At the same time, they argue that the enhanced efficiency of the resultant institutions will lead to more effective implementation on the ground, more than compensating for the lower targets (World Bank 1996; 1999b). Yet, since the private sector is unlikely to invest in connecting low-income and typically loss-making customers, it is unlikely that even modest targets will be met without a financial incentive. Hence, a strong case can be made that reforms – whether the sector is under public or private ownership – should be accompanied by intentional efforts to provide incentives for increasing access. Of the various actors in the reform arena, only the central government has shown any interest in exploring the potential for such schemes. As yet, however, no concrete measures have been taken to address the problem of limited access to electricity.

Finally, there is one hopeful outcome from the privatisation experience in Orissa. Privatisation has allowed decentralisation of distribution responsibilities with an attendant improvement in performance. For example, the local Xavier Institute of Management (in collaboration with the Bombay Suburban Electricity Company) has established village collectives to manage and organise bill collection tasks in a few pilot rural areas. The initial experience suggests that rural residents respond very positively to control over electricity management at the village level. For example, newly formed village committees achieved a 100% increase in bill collections over a six-month period.[54] Certainly, this approach needs

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[53] Most of these 81 million households currently do not have access to electricity. If the considerable challenge of providing them access to electricity is met, and these households were asked to meet half the average cost of supply, the remaining subsidy burden on the treasury would be about $1.4 billion. This is approximately the amount now spent on electricity subsidies, an amount which clearly does not reach the poorest and most needy. However, as this calculation suggests, the issue is not whether subsidies will be needed, but how they should be best targeted to reach the poorest.

[54] Interview with Xavier Institute of Management, July 26, 2000.

to be subject to greater scrutiny to ensure that decentralisation does not transfer power into the hands of local elites. Nonetheless, this limited experience does suggest that, aside from the debated benefits of privatisation, there are potential collateral benefits arising from the greater scope for decentralised forms of organisation in the sector following a loosening of state control.

A restricted view of environmental costs and benefits

The World Bank is the most explicit of the various actors on the need to address environmental concerns. However, discussion of the environmental implications of reform is driven by the World Bank's internal 'safeguard' policies, which are designed to ensure that negative effects of investment projects are guarded against and mitigated. Within this framework, environmental impacts refer rather narrowly to the direct environmental impact of loan funds spent on physical infrastructure, such as resettlement due to power plant construction, land acquisition for transmission lines, and the like. This narrow interpretation fails to account for environmental impacts of the broader regulatory reform put in place through the reform process Consequently, the Bank's interpretation of its environmental guidelines hew to a rather narrow do-no-harm approach, rather than looking for environmental gains through reforms.

The World Bank did conduct a substantial study on environmental issues in the electricity sector (World Bank 1998).[55] The study notes that the sector is on the verge of massive changes, but it explicitly does not address the environmental impacts of the institutional and managerial dimensions of reform – such as unbundling or tariff liberalisation – or the implications of changes in ownership from public to private. Instead, the focus is on the environmental impacts of implied changes in technology and in the price of electricity. Other than encouraging attention to demand-side management (DSM), there is little evidence of the impact of the study on the design of state-level reform packages and associated World Bank loans.

Sources within the World Bank place responsibility for the limited scope of the study with the Ministry of Power. When the study was in progress in the mid 1990s, the Ministry was not convinced of the value of institutional reform. With this mindset, they were concerned that such a study could lead the Bank to impose environmental conditions on reforms, and that the study would contribute to a consensus favouring one particular route forward for state-level reforms, pre-empting a broader

[55] The study develops a methodology that is applied for two states, Andhra Pradesh and Bihar.

debate.[56] This limited the scope of the study. While the environmental issues study does provide useful information on the relative costs and benefits of specific technological measures, the inattention to institutional changes was an opportunity lost.[57]

At the state level, the only concrete attempts to implement an environmental component to the reforms involved promoting DSM. In Orissa, the World Bank, which allotted 13% of the reform loan to DSM efforts, led this effort. This enthusiasm was driven in part by the demonstrably large potential for DSM in India. It was also a political reaction to fierce criticism of the Bank for its lending programme in India, particularly for the controversial Narmada valley dam projects. However, there was widespread scepticism about DSM among other donor agencies, international reform consultants, and state officials, who cynically viewed it as a measure to satisfy internal Bank politics and procedures – 'a box to be checked'.[58]

For two reasons, the results in Orissa were not encouraging. First, the technical scope for DSM in Orissa was limited. Orissa had surplus electricity at the time of reforms, and there was no incentive for the utility to reduce consumption by paying customers. In addition, Orissa had a small agricultural sector. In other states, the agricultural sector is a prime candidate for DSM, since it is a loss-making sector for the utility. Second, DSM staff complained that they received little political support from the World Bank, and this view of DSM as an 'embellishment' percolated through to consultants and public officials. As a result, despite the allocation of substantial funds, even the opportunities that were available were not taken.[59]

DSM has remained on the agenda for other states, where it is a more timely idea. Moreover, support for the idea has deepened and broadened within the World Bank and within India. Implemented correctly, DSM could ameliorate supply shortfalls and build a political constituency for reforms – particularly in rural areas – by bringing demonstrable benefits early in the reform process. However, the lesson of the Orissa experience is that realising both technical and political benefits requires more

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[56] Interview with World Bank staff, July 6, 2000.

[57] Indeed, sources within the government do suggest that World Bank studies – such as an early study on long-term issues in the sector, or an ongoing study on farmer uses of electricity – are influential and useful in internal debates (interview with government official, July 14, 2000).

[58] Interview with international consultant, September 13, 2000, and interview with donor agency staff, July 17, 2000.

[59] Interview with reform consultant, September 16, 2000.

political support and attention to DSM as an integral part of reform efforts.

Finally, as discussed earlier, the national government has attempted to promote renewable energy technologies and energy efficiencies through various legislative instruments. These efforts represent an encouraging attention to environmental concerns, but have not yet led to any concrete gains.

Innovations in governance: The emergences of an independent regulatory culture?

Since past problems in the electricity sector are directly associated with the effective capture of electricity sector institutions by vested interests, regulatory commissions are a lynchpin in a new model aimed at independent operation. The first regulatory commission set up for the electricity sector, the Orissa Electricity Regulatory Commission, has set impressive standards for transparency in India. So far, its performance with respect to access to information and consultation has been strong. Notably, it has set up a comprehensive web site to disseminate information. On several issues, the Commission has held open hearings, where labour and consumer groups have spoken.[60]

With regard to independent operation, the central issue for state regulatory agencies has been their control over tariffs (Balakrishna 2000; Indiapoweronline.com 2000b). In some states, notably Orissa and Maharashtra, regulators have been reluctant to allow tariff increases without evidence of reduced losses. Regulatory decisions on tariffs have not gone unchallenged. In Orissa, the World Bank explicitly urged the Regulatory Commission to approve tariff increases to 'provide comfort' to investors just before privatisation, a request that they rejected.[61] In Madhya Pradesh, the regulatory agency refused to allow tariff hikes, a decision that was challenged by the state government. In Andhra Pradesh, in contrast, tariff increases were strongly opposed by the public and by opposition parties (Indiapoweronline.com 2000a).

State regulatory commissions exhibit a remarkable diversity of operation, particularly in the vigour with which they have defended their independence. Some state electricity regulatory commissions are termed 'mere extensions of government,' at least in their regulatory culture, because they do not hold open hearings and tend not to pay attention to

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[60] Interview with representative of consumers group, July 25, 2000.

[61] Interview with public official July 20, 2000 and with consultant, September 13, 2000.

stakeholder comment or complaints.[62] In other cases, there is an active interest in seeking technical assistance and informal consultation from analysts and consumer groups, resulting in bold initiatives that even seem to annoy donors and state governments because they may be 'too independent'.[63] Curiously, most regulators have come from bureaucracies with no great tradition of independence or public participation and consultation. State regulatory commissions have included as members former civil servants, judges, and former central or state electricity agency members with technical expertise. Yet, in some cases, as with the Orissa regulator, they have enthusiastically assumed the role of principled public oversight.

At the same time, critics have pointed out that the provisions requiring transparency and public consultation that guide regulatory functioning are by no means sabotage-proof (Dixit et al 1998). The pressures for political accommodation remain as strong as before, as both regulators and government officials unofficially acknowledge. As one official put it: 'There is not only one God in the Indian pantheon. Any regulator who does not talk to the government is living in a fool's paradise.'[64] In this context, principles of good governance are diluted by granting the regulators discretionary powers, which allow them to circumvent application of these principles in a variety of ways.

Most significant is the zeal with which members of the public, including consumer advocates, environmentalists, the media, and even casual observers, have greeted the new institutions. There is keen interest among members of the public to 'democratise' the commissions at an early stage. In one instance, a consumer advocacy group has even provided regulators with analysis of utility performance.[65] At the same time, few civil society groups are equipped to deal with the complex technical character of the sector, which can limit the degree of engagement with regulators.

While public participation is a necessary component, it cannot substitute entirely for public policy direction. Indeed, governments must give regulatory agencies appropriate guidelines on how to make the difficult political tradeoffs between economic, social, and environmental implica-

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62 Interviews on July 27, 2000 with consumer advocate and consultant.

63 Donor interviews, July 15-17, 2000.

64 Interview with former public official, July 20, 2000.

65 In interviews, Prayas, a nongovernmental organisation in Pune that has focused on sustainable energy issues, was referred to by officials and regulators as a credible NGO actor in the sector. Interview with government official, July 14, 2000 and interview with regulatory official, July 20, 2000.

tions of their decisions. Unfortunately, state governments perceive the reform process as an opportunity to rid themselves entirely of what has become a burdensome sector, leaving an absence of responsibility for longer-term and broader issues raised by electricity sector development. Drawing from the experience of the first regulatory agency in Orissa, regulators are setting a precedent of ignoring these tradeoffs by limiting themselves to economic decisions, and in particular to a tariff-setting role, to the exclusion of the broader landscape of electricity development in the state (Sankar & Ramachandra 2000). Part of the problem lies in the enabling legal framework, which does not empower regulators to address economic regulation and its economic and social effects in an integrated fashion. Despite this limitation, electricity regulators do occasionally embed environmental concerns in regulatory decisions.[66]

Moreover, the training that regulatory commissions receive on regulatory practice does not focus on the linkages between economic regulation and environmental outcomes. This training is often dispensed by international consultants with narrowly defined terms of reference, whose ranks are staffed by regulatory economists with neither the expertise nor the inclination to explore broader issues of public benefits in the sector. Since the past ills of the sector were perceived as the result of mixing social development with the business of providing electricity, the message typically delivered to the regulator is that 'it is not your role to solve social problems'.[67] Yet, at the moment, there is no other body in a position to do so. Early attention to these issues is necessary because it will be hard to graft attention to public benefits onto the mandate and expertise of regulatory commissions at a later date. The initial period not only develops skills, but also sets priorities and shapes institutional cultures. The lack of attention to a long-term vision could ultimately limit the full potential of regulatory commissions as a progressive force in the sector.

5. Conclusion

Electricity sector policy in India has been locked into adverse arrangements at least twice in its history. The first was when agricultural consumption was de-metered and extensive subsidies were offered. The second was when SEBs signed IPP contracts with major fiscal implica-

[66] For example, regulators provide incentives for improved efficiencies in generation, transmission, and distribution through 'no regrets' policies. Personal communication, Sanjeev Ahluwalia, February 2002.

[67] Interview with international consultant, September 13, 2000.

tions. A third set of circumstances, with the potential for equally powerful forms of institutional rigidities, are in the making with the reproduction of the Orissa model on a national scale. This may yield favourable institutions, like democratic and transparent regulation, but may also result in unfavourable ones, such as locking out integrated resource planning or scaling back programmes to expand services to rural areas.

The World Bank has played a central role in moving the sector to the threshold of a new organisational form. The Bank forcefully argued that the sector had reached the end of its current road, and backed up this assertion by conditioning funds on bold reforms. The Bank's success has rested only in limited part on the brute force of conditionality, and rather more on skill in building what appear to be genuine constituencies for reform among bureaucrats and politicians. Nonetheless, it is problematic that the Bank's dexterity led to the adoption, without broad public debate, of what appears to be a single dominant approach to transformation of a critical sector. That a few other states have adopted a different route based on reform, but no change in public ownership, will provide an interesting basis for comparison in a few years. By the time reform was served up to the nation in the form of the Electricity Bill, many of the key decisions had been made. A broader debate about the ultimate goals of policy change and the best means to achieve these goals could not only broaden the range of ideas, but also mobilise new actors to play a role in the regulatory process and build a constituency for reform. While the World Bank and its supporters have argued that opening a debate would condemn the sector to paralysis, the back-door approach, particularly in the early days of reform, limited participation in the debate to a few technical and financial experts. More recently, there are welcome signs that state-level reforms are subject to an open and more broad-based debate.

This review of the reform process suggests that there was little explicit attention paid to either the social or environmental dimensions of a public benefits agenda. While social issues received lip service, few measures were put in place to ensure that these objectives would be realised. With the exception of a genuine effort at DSM at the state level by the World Bank, discussion of innovative financing schemes for ensuring rural access by the central government, and some discussion of incentives for renewable energy, there has been little explicit attention to environmental outcomes. While reforms may yet indirectly lead to both social and environmental gains through the construction of a better functioning sector, there has been little attempt by any of the reformers to ensure this outcome. It is by no means clear that a long-term social and environmental vision can be subsequently woven into the fabric of re-

forms. Nor is it fully clear that social and environmental benefits are always coterminous with the techno-managerial vision of the sector based on privatisation and a measure of competition. Indeed, the history of agricultural subsidies and the IPP debacle should teach us how expedient choices in the present constrain our collective future.

Looking forward, considerable hope rests on the new autonomous governance structure of the regulatory commissions. Still, even that expectation is only tenuously sustained by the experience in some states, and less so in others. With regard to actively shaping a visionary future, independent regulation so far does offer many opportunities to promote public benefits. While enabling legislation provides some room for interpretation, regulators seem inclined to define their job narrowly, an inclination that is reinforced by the international consultants who train them. A conservative and narrow regulatory culture could be a particularly significant force for institutional lock-in that will shape the future development of the sector.

It is late, but perhaps not too late to have an informed public debate about the future of the sector. Such a debate should actively consider increased access to electricity, social pricing, and the promotion of sustainable energy futures as concerns to be integrated into reforms. Debates could favour a decision to pursue short-term financial motivations first, as those who have led reforms thus far suggest. But it is also possible that broad dialogue will both enhance scrutiny over and the effectiveness of existing reforms, and suggest ways to achieve both short-term financial health and longer-term social goals. Either way, without explicit attempts to bring diverse groups into the debate, in a democratic polity the political sustainability of policy reform will always hang in the balance.

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9

Power sector reform in Senegal

ALIOUNE FALL

NJERI WAMUKONYA

1. Introduction

The 1990s ushered in a period of accelerated reforms in the energy sectors of many countries. Whereas in the industrialised countries the motivation for institutional reform was to improve efficiency, inspired by competition, in the developing countries such reforms were necessitated by the funding needs of energy sector expansion. Hence, in Latin America budgetary constraints weighed heavily towards reforms, whereas in Asia institutional reforms (designed to give the private sector a bigger role) were imposed by the necessity of overhauling and developing existing infrastructures, within the context of a robust economic growth. In sub-Saharan Africa the most common reasons appear to be constraints related to investments and malfunctioning of the management systems of government-owned power companies.

Senegal, like many other African countries, has been caught up in the wave of reform of the power sector, a process largely characterised by privatisation. The Senegalese case is, however, notable for the fact that Senegal engaged in a second marriage process after the remarkable divorce from the private sector strategic partners Hydro-Quebec International and Elyo, who had purchased 34% of the Société Nationale d'Electricité du Sénégal (Senelec), the utility, in 1999. More importantly, this second marriage was paralysed for a long period and eventually never materialised. In the second privatisation process, in 2001, Vivendi Environnement, a French company, was initially awarded the tender,

implying that it would be the government's strategic partner; soon afterwards, however, Vivendi withdrew and was replaced by the American AES Corporation. After nine months, agreements between government and AES had not been finalised and Senelec remained under government management. Meanwhile the country was suffering severe electricity shortages, with blackouts lasting for as long as eight hours for some customers in the dry month of October 2001.

In 2000 Senegal had an installed capacity of 422 MW and a peak power demand of 241 MW. But the electricity demand is projected to grow at about 3% per annum, demanding an urgent increase in generation capacity. Imports from the Manantali dam, which since August 2002 has been generating 18 MW, eased the situation but did not solve the shortfall problems.

Finally, out of frustration, in August 2002 the government called off the privatisation of Senelec. The first activity the utility undertook after this decision was to acquire two 15 MW generators at a unit cost of $8 million to help address generation shortfall. To finance this deal Senelec is getting a loan of $8.6 million from the West African Development Bank and $6.4 million from Banque de la Communauté Economique des Etats d'Afrique de l'Ouest, the balance being met by the utility. The generators were planned to be operating by end of the first quarter of 2003 (AEI 2002). In addition Senelec set up a task force comprising Senegalese civil servants and World Bank experts to advise on reform strategy. This task force has urged the government to consider independent power producers for increasing generation capacity rather than selling off stakes in Senelec. It is expected that the recommended new 60 MW power station costing US$80 million will be an independent power producer (AEI 2003).

The principal objectives of government with respect to the power sub-sector are to ensure a stable electricity supply under the best possible terms of security and cost, and to accelerate the pace of electrification, particularly in rural areas. The aim is to achieve 15% rural and 60% urban electrification by 2005, up from 8.3% and 56.4% respectively in 2001, when the overall electrification level was about 32%.

2. Senegal's reform strategy

Senegal's power sector reform falls within the framework of macroeconomic reforms aimed at creating the right conditions for rapid and sustainable economic growth and reduction of poverty. Although the reform idea was initially dispensed by development partners as early as 1991, Senegal only started restructuring the power sector in earnest in

1998 in response to World Bank conditionalities. The government then was socialist and opposed to a reform that it envisioned as damaging to labour. However, to demonstrate cooperation with donors, after 1991 the government started a consultative process on reform and even commissioned some related independent studies. It was not until 1998 that the power reform was legitimised by Acts 98-29 and 98-06 which authorised creation of a regulatory body and the change of Senelec into a stock company, thus enabling its privatisation. The reform was justified on the basis that it would eradicate inefficiency, reduce supply costs, and enhance funding for developing the power sector. To achieve this it was deemed necessary to redefine the role of the state, liberalise the sector, encourage wider participation of the private sector, and create the right conditions for healthy competition.

The reform strategy involved adopting measures including a modification of the legal and regulatory framework, so as to encourage a high level of competition and participation of the private sector in investment ventures and in the management of the power sector, and the privatisation and restructuring of Senelec. To enable competition, Senelec was to be unbundled into separate entities for generation, transmission and distribution. Any new increase in generation capacity had to be made on a competitive basis and a licence or permit was required for generation or sales. Legal concession covering transmission and distribution was also needed. Generation for own consumption, however, needed only a declaration of intent.

3. Background and structure of the power industry

Prior to independence, the power sector was operated by the private sector. As in most African countries, Senegal embarked on a nationalisation process of its industries and most of the economy soon after acquiring independence. In 1983 Senelec was established as a vertically integrated state-owned utility responsible for generation, transmission and distribution of electricity. Generating electricity for own-use was allowed but limited to a maximum capacity of 90 MW. The small size of the power sector justified the monopolistic power structure.

By the beginning of the 1990s the economy started showing signs of crumbling. The structural adjustment programmes started in the previous decade had obviously not met growth expectations. In 1993 the macroeconomic indicators showed a marked deterioration, and the devaluation of the CFA franc in 1994 brought the economy to a halt, forcing an emergency restructuring. The key prescription was increasing efficiency through downsizing and privatisation.

By 1996 less than 25% of the population had access to grid electricity, with the urban areas enjoying a significantly higher connection level, 50%, compared to 5% in rural areas. Connection rates of 2% per annum were below the population growth rate of 2.7%. The electricity demand growth rate was estimated at 3.5% per year but generation capacity remained stagnant at about 300 MW and was being over-utilised – often at the expense of much-needed maintenance. The generation facilities are nearing the end of their operational lifetime and service quality was poor and punctuated by extended power outages. Senelec had also been suffering high non-technical losses due to poor billing, faulty meters and fraud. Although the need to increase capacity and improve service was clear, government lacked financial resources to address these problems. At the same time the power shortages were resulting in heavy economic losses. In 1997 it was estimated that over $138 million was needed just to raise the rural electrification levels by 10% within five years and another $276 million to rehabilitate the power plants. Some assistance was provided by bilateral donors to revamp the power stations but this was insufficient to address the problems.

It is within this context that in 1996 the government was forced to seriously consider reforming the energy sector. The Policy Bill on Energy Sector Development was signed in January 1997; according to it Senelec would be privatised such that the strategic partner, workers and the local private sector would hold the majority of capital shares.

4. Regulation of the power sector

Prior to 1998, Senelec was regulated by the Ministry of Energy. In 1998 the Commission for Regulation of the Electricity Sector was established to oversee transition and regulate the sector. Among the specific objectives of the Commission were to:

- enhance the rational development of the electricity supply;
- preserve the economic and financial equilibrium of the power sector and the economic conditions necessary for its viability;
- safeguard the interest of consumers and protect their rights with respect to cost, supply and quality of electricity;
- enhance competition and private sector participation in generation, transmission, distribution and sale of electricity; and
- safeguard the conditions favouring the financial viability of companies operating in the power sector.

The Commission is composed of three members, appointed by the President of the Republic. Its responsibilities are to

- investigate applications for licences and concessions;
- monitor compliance with the terms of licences and concessions – particularly those dealing with an obligation to maintain certain services;
- ensure respect for healthy competition in the sector; and
- determine the structure and composition of tariffs.

The minister in charge of energy consults the Commission on all legislative draft texts relating to the sector.

The Commission derives its financial resources from the annual fees paid by companies under licences or concessions and from application processing fees. It has the power to impose fines or sanctions on defaulting companies in the sector.

Only tariffs applied on activities enjoying monopoly features are subject to regulation. Tariff regulation is based on a price ceiling or price caps, not on cost of service. The tariffs policies are specified in the conditions of service annexed to the licences or concessions. These regulations remain in force for a fixed period, specified in the conditions of service.

5. Privatisation of Senelec

There have been two attempts to privatisatise Senelec. When policy guidance to reform was established in 1997, the International Development Agency approved a $100 million loan to implement the power reform. Government put out a tender in 1998 inviting strategic partners to buy capital stock in Senelec, requiring a minimum purchase of 33%. In 1999 a consortium of Hydro-Quebec of Canada and Elyo of France acquired 34% of the shares for $66 million, while the employees got 10%, and the local private sector 15%. The state retained the balance and was thus the largest shareholder, although the consortium was granted full management control.

Soon afterwards a rift emerged between the consortium partners, arising from disagreements on the allocation of shares. This resulted in derailment of implementation of contractual agreements, particularly the development of additional generation capacity. Fourteen months into the contractual period the government, having noted the lack of progress by the strategic partners in implementing the agreements, particularly increasing generation capacity, requested reaffirmation of their intention to abide by the agreement. No concrete strategy was forthcoming from the consortium, and government was forced to cancel the contract and buy back the shares, thus 're-nationalising' Senelec. The government reaffirmed its option for privatisation of the power sector, however, paving the way for a second privatisation attempt.

Drawing on the lessons of the first privatisation process, which saw the marginalisation of local competences, the government put a limit on the total number of expatriates working in Senelec: five for the first year, and three two years later with the aim of eliminating their role altogether. Potential strategic partners were also informed that no job losses would be accepted during the first five-year period unless a retrenchment programme satisfactory to the government accompanied job cuts. (The reason for this condition was that before the closing of the first privatisation 450 people left the company under a suspect compensation package.) Government also decided to give the strategic partner a controlling share, 51%, believing that this would make the partner more responsible and willing to invest.

Nearly a year after the second privatisation process began there was no agreement with either of the two short-listed bidders Vivendi Environnement (France) and AES Corporation (USA) both of which, it was soon clear, were experiencing financial difficulties. The government has finally aborted the privatisation process and resorted to the original arrangement whereby it owns and manages Senelec. The unattractiveness of Senelec to the private sector questions the validity of embarking on the privatisation process.

This reversal calls for a re-evaluation of the institutional framework. Since the Regulatory Commission had been established on the expectation that Senelec would be privatised, its role needs revisiting to ensure that it functions efficiently in the absence of privatisation. The Senegalese Agency for Rural Electrification (ASER) was also a by-product of the privatisation framework; how it will relate to Senelec demands attention.

6. Rural electrification under reform

The creation of the ASER in 1998, under the supervision of the Ministry of Mines and Energy and financed from state and donor funds, was one of the major innovations introduced into the institutional framework as part of sectoral reform. Its principal mission is to improve rural people's access to electricity, providing technical and financial assistance in support of initiatives relating to rural electrification.

It should be stressed that, since 1995, the state has made considerable effort to cover rural electrification programmes executed by Senelec, under agreements signed with the Ministry of Mines and Energy, concerning delegated public works. Nearly 20 billion CFA francs (about $29 million) from the national budget have gone towards extending the rate of electricity coverage in the rural areas. However, those programmes have mainly benefited only the more densely populated areas, which

(with rare exceptions), were electrified by extending the existing network. ASER aims to increase rural electrification from 7% in 1998 to 15% in 2005 and 30% in 2015.

ASER has divided the rural areas into 18 concessions and invited interested parties to tender to provide electricity. An electrification plan has been prepared for the initial three concession areas. ASER will provide credit to electrification companies accounting for 35-45% of the total cost, a subsidy of 30-35% will also be available and the balance should be financed by the company.

7. Conclusions

The rapid failure of the first privatisation process and the stalling and protracted termination of the re-trial leads to questioning the type of analysis undertaken in recommending privatisation as a model for Senegal's power sector. It is claimed that availability of private capital is dependent on creating a sound legal framework, good governance, development of local capital markets and an efficient banking sector with well functioning markets displaying creditworthiness, independent regulation and competition. Senegal has a good record on these issues and is even, by World Bank standards, a successful reformer. Why then did it experience such problems in privatising the power sector?

The electricity sector goals of increasing access to the unserved majority and improving the quality of service to the connected remain unmet more than four years after the whole privatisation process began. Evidently there must have been a judgmental error in the recommendation to undertake this process. The decision by the government to reclaim ownership and control of Senelec has in a fairly short period resulted in significant achievements in addressing the generation problems. Barely a month after calling off the privatisation process, Senelec began the process of acquiring two new generators. While the future of Senelec is not fully sealed, the connected Senegalese consumer can, at least, in the shorter term, be assured of power. There is also indication that the electricity system will be improved.

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TOWARDS SOCIALLY AND ENVIRONMENTALLY ACCOUNTABLE REFORM

10

Power sector restructuring and the environment: Trends, policies, and GEF experience

ERIC MARTINOT

1. Introduction

Power sector restructuring is underway or beginning in many regions and countries around the world, both developed and developing.[1] Restructuring is resulting in independent power production and competition in generation, decentralisation, privatisation, unbundling of generation and transmission, and even competition in distribution. Along with these changes are a broad variety of new institutional and contractual forms within the power sector. As restructuring takes place, environmental considerations are often overlooked, either because policy-makers and their

[1] Other terms reasonably equivalent to 'restructuring' are 'liberalisation' and 'reform,' although some might argue that there are differences. This paper uses the term 'restructuring' throughout.

advisors perceive their priorities to be elsewhere, or because they assume that restructuring will automatically lead to environmental improvement (Gilbert et al 1996; Kozloff 1998; USAID 1998e; ESMAP 1999; Bacon & Besant-Jones 2001).

This chapter reviews six key trends underway in power sector restructuring and their implications for the environment. It then looks at specific power sector policies for renewable energy and energy efficiency that can accompany restructuring and recent Global Environment Facility (GEF) experience with supporting grid-based renewable energy. Finally, it provides some recommendations from a June 2000 workshop on power sector reform and environment sponsored by the GEF Scientific and Technical Advisory Panel.

2. The power sector

Total world electric power capacity stood at 3400 000 MW in 2000, with about 1500 000 MW (45%) of this in developing countries (see Table 1). This capacity represents a cumulative investment of perhaps $3-4 trillion and annual fuel costs of perhaps $150-250 billion. Globally, fossil fuels account for about two-thirds of generating capacity, with the remaining third being large hydro (20%), nuclear (10%), and renewable energy (3%). Electricity consumption in developing countries continues to grow rapidly with economic growth, raising concerns about how these countries will expand power generation in coming decades. According to some estimates, developing countries will need to more than double their current generation capacity by 2020 (IEA 1998; 2000; Martinot et al 2002).

Traditionally, power utilities have been state-owned monopolies or privately-owned monopolies, either regulated by government agencies or 'self-regulated' without much oversight. Their traditional mission has been an engineering one: expanding supply, improving technical efficiency, and ensuring or improving reliability and access. In developing countries, many utilities have been and remain in poor financial condition and have limited borrowing ability to make investments and expand service. In developed countries, utilities had (until more recently) been considered among the safest investments available, since their profits were guaranteed by government regulation, and they thus had no trouble attracting capital for expansion.

During the 1990s, waves of 'restructuring' have washed over utilities worldwide, with profound effect on technologies, costs, prices, institutions, and regulatory frameworks. Restructuring has changed the traditional mission and mandates of utilities in complex ways, and has had

major impacts on environmental, social, and political conditions. At the same time, new regulatory approaches are being found for reducing environmental impacts from the restructured power sector. The next section discusses some of the ways in which the environmental impacts of energy have been affected.

Table 1: Renewable grid-based electricity generation capacity installed as of 2000 (megawatts)
Source: Martinot et al (2002)

Technology	*All countries*	*Developing countries*
Small hydropower	43 000	25 000
Biomass power	32 000	17 000
Wind power	18 000	1 700
Geothermal power	8 500	3 900
Solar thermal power	350	0
Solar photovoltaic power (grid)	250	0
Total renewable power capacity	102 000	48 000
Large hydropower	680 000	260 000
Total world electric power capacity	3 400 000	1 500 000

3. Patterns of power sector restructuring and influence on environment

Globally, there are six key trends at work in the context of power sector restructuring that are most relevant to environmental considerations. They are:

1. competitive wholesale power markets and removal of price regulation on generation;
2. self-generation by end-users;
3. smaller-scale generation facilities and technologies;
4. privatisation and/or commercialisation of utilities;
5. unbundling of generation, transmission and distribution; and
6. competitive retail power markets.

These trends are described below, along with the potential effects they may have on technology and fuel choices, levels of energy consumption, emissions, and consequent environmental impacts. It should be noted, however, that power sector restructuring is still in its infancy. Although

almost every country in the world is involved in some phase of electricity sector restructuring, no country considers its restructuring activities complete; all are in some transitionary phase. As a result, actual data is scarce and trends are derived from preliminary information.

3.1 Competitive wholesale power markets and removal of price regulation on generation

Power generation is usually one of the first aspects of utility systems to be deregulated. The trend is towards situations in which utilities no longer have monopolies to produce power. 'Power markets' have emerged with many buyers and sellers.[2] Distribution utilities and large industrial customers are gaining more choices in obtaining wholesale power. Where deregulation is occurring, power contracts are being concluded by players in an essentially free market for wholesale electricity (of course, producers may need to pay transmission and distribution fees to get their power to end-users). When wholesale electricity becomes a market commodity, price becomes paramount: 'in a competitive market, price appears to be much more important than other factors in determining the choice of electricity supplier' said USAID (1998a).

Such a market (and other power-sector changes discussed later) may often begin with independent power producer (IPP) frameworks, says Weinberg (2000: 7). He hypothesises that 'perhaps IPPs are a relatively easy first step because the national government is not required to cede control of assets or jeopardize workers…. But, once established, IPPs set a benchmark, and thereby drive change'. Indeed, one of the very first major markets for renewable energy in the 1980s was in California, where a new national regulatory framework enacted in 1978 (PURPA) allowed independent power producers for the first time. 'The commercial response [to PURPA] resulted in most of the renewable generation that exists today', assert Rader and Short (1998).

In developing countries, IPP frameworks are emerging. In a recent ESMAP survey of 115 developing countries, 43 had IPPs (ESMAP 1999). In some countries, such as India and Sri Lanka, IPP frameworks have played key roles in accelerating markets for renewable energy (particularly wind power and small hydro). As happened in California and is happening in many developing countries, IPP frameworks may initially develop under a 'single buyer' model, in which a competitive wholesale

[2] Historically, regulated utilities bought and sold from one another across territories in regional power markets, but each utility typically had a monopoly over generation in a particular territory.

market does not yet exist and IPP power must be sold to monopoly utility companies at regulated prices.

The potential effects of competitive wholesale markets and IPPs appear to be substantial.[3] They can include:

(a) *Older and dirtier*. Low-cost producers like older fossil-fuel power plants that have already amortised their capital costs and may be placed in a strengthened position in a competitive market and may be able to sell more power than was the case in a regulated market. These plants are often the dirtiest and may be exempt from more recent pollution-control laws because of their age. During periods of demand decline, the higher-cost, newer, cleaner plants may go unused while older, dirtier plants continue to run full bore.

(b) *Greater consumption*. Competition may lower prices and raise demand. As prices fall, consumption increases, increasing the overall environmental impacts of the power sector. Greater technical efficiency is not required; price reductions may occur as previously monopoly producers make organisations leaner or must simply accept lower profit margins or returns. Evidence for this effect occurred with restructuring in Norway in the early 1990s, where price decreases of 18-26% to industrial customers led to large increases in energy consumption (Nadel 1996).

(c) *More efficient production*. Managerial incentives to improve the technical performance of existing power plants may increase as competitive price pressures occur.

(d) '*Dash for gas.*' Natural gas generation may be favoured by competitive forces. For example, when the UK power sector was opened to competition, the market share of gas-fired generation went from 1% to 13% from 1990 to 1994, and is continuing to become a dominant

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[3] Dubash and Rajan (2001) discuss the social and environmental impacts of IPP frameworks on the Indian power sector during the 1990s. They find that many utilities were locked into long-term unfavourable power contracts with IPPs that impaired their fiscal viability, forced higher tariffs, and resulted in surplus generation capacity while crowding out potential demand-side energy efficiency improvements. This situation is by no means limited to India but has occurred in other countries and regions. On the other extreme, a 'merchant plant' market regime, in which plants do not have long-term purchase contracts but sell power on a spot market, means that capital-intensive producers, particularly renewable energy producers, face uncertain profitability and thus find it more difficult (or impossible) to obtain power project financing. The case of Sri Lankan small hydro producers discussed later in the chapter points to the problem of power purchase contracts based on short-run variation in fuel costs.

fuel source in the UK (Woolf & Biewald 1996). This phenomenon has occurred in most countries where wholesale generation is opened to competition.

(e) *Mixed prospects for renewable energy sources.* With a few exceptions, traditional utility monopolies have avoided renewable energy sources. As wholesale power markets appear, renewables are no longer 'hostage' to entrenched utility mentalities and technology biases. For example, most wind power capacity worldwide has been installed by IPPs. In general, IPP frameworks appear to be a prerequisite for renewable energy development (Weinberg 2000). On the other hand, competitive power markets may lower wholesale prices, which may stifle renewable energy development. As combined-cycle gas turbines, for instance, begin to dominate new generation, renewable energy will find it even more difficult competing.

(f) *Demise of clean-energy mandates?* Elimination of mandates for power purchases from certain types of producers may also leave renewable energy behind. For example, in California, utilities will no longer be required to purchase power from IPPs (mostly cogeneration and renewable energy producers). The state's restructuring law assesses a 'competition transition charge' to electricity sales through 2002, some of which will be spent by the government on renewable energy, but only in limited amounts and only until 2002 (Hirsh & Serchuk 1999).

(g) *Demise of nuclear?* Deregulated markets spell uncertain prospects for nuclear power. Nuclear power plants in the USA are being retired early, as competitive markets take hold because of their high operating costs. Moody's Investors Service reported that ten or more nuclear plants might be closed for economic reasons if generation is completely deregulated (Woolf & Biewald 1996, also citing Moody's Investor Service, 'Moody's assesses nuclear power risks in a more competitive market,' November 1996).

(h) *Economic valuation of generation reliability.* In spot and bulk markets, the reliability and dispatchability of generation sources are likely to be assigned explicit or implicit economic values that may penalise intermittent (or 'non-firm') power generators like renewable energy sources.

3.2 Self-generation by end-users

Independent power producers need not be simply generation companies – they may be the end-users themselves. With the advent of IPP frameworks, utility buy-back schemes (including 'net metering' in some coun-

tries), and cogeneration technology options for commercial and industrial customers, more and more end-users, from large industrial customers to small residential users, are generating their own electricity – and either selling surplus power back to the grid or using self-generation to partly offset purchased power. This trend has a number of potential effects on the environment:

(a) *Higher efficiency from cogeneration*. Cogeneration makes overall power and heat supply more efficient (up to twice as efficient), given a large enough 'system boundary' that incorporates all energy inputs to an end-user – particularly electricity and heat. Most evidence seems to indicate greater shares of cogeneration in the process of restructuring, but in Europe the cogeneration market has seen a considerable slowdown, attributed by some to legal uncertainties surrounding the implementation of 1996 European Union electricity and gas directives (Cogen Europe 2000).

(b) *More natural gas*. At least in some countries, self-generation is more likely to employ natural gas and gas turbines (and perhaps natural-gas-supplied fuel cells in the future). Provided a gas supply exists, gas seems to be the fuel of choice for small self-producers because of short construction lead times, low fuel and maintenance costs, and modular technology. New 'microturbines' are lowing the capacity threshold at which natural-gas-fuelled self-generation becomes viable.

(c) *Lower transmission and distribution losses per unit of load*. As generation becomes closer and closer to loads, the amount of transmission and distribution losses will not increase as rapidly as load growth.

(d) *Lower emissions*. As mentioned above, new smaller-scale generation technologies are generally cleaner and/or more efficient than large-scale technologies, because they tend to incorporate cogeneration, use natural gas, or use renewable energy sources.

(e) *Entry of renewable energy, especially solar PV, with 'net metering'*. As households and businesses take more interest in distributed solar PV, either by taking advantage of government subsidy programmes or deciding to pay the extra costs themselves, 'net metering' that allows 'stored' kilowatt-hours over the utility connection and power sales at retail-tariff levels, is becoming more widespread. For example, 30 states in the USA now have net metering laws, and California allows users with up to 1MW loads to use net metering.

3.3 Smaller-scale generation facilities and technologies

The economic advantages that traditional regulated monopoly utilities enjoyed from large power plants and increasing economies of scale (during an era when 'big' power plants were getting bigger, cheaper and more efficient every year) are being eroded by new technologies that are cost-competitive and even more efficient at increasingly smaller scales. In fact, newer technologies actually reduce investment risks and thus costs at smaller scales by providing modular and rapid 'just in time' capacity increments. Combined-cycle gas turbines are the best example. Wind power and other renewables are also in this category. A variety of other 'micropower' sources are becoming commercially available, and one can even anticipate future advanced technologies such as stationary fuel cells (Dunn & Flavin 2000). An additional advantage of smaller-scale technologies is that they can be distributed and placed closer to end-users, reducing needed transmission and distribution investments (as has happened with wind turbines in some European countries like Denmark). The effects of this trend are similar to those for 'self-generation by end-users' above, as the two usually go hand-in-hand.

3.4 Privatisation and/or commercialisation of utilities

In many countries, utilities, historically government-owned and operated, are becoming private for-profit entities that must act like commercial corporations. Even if utilities remain state-owned, they are becoming 'commercialised' – losing state subsidies and becoming subject to the same tax laws and accounting rules as private firms. In both cases, staffing may be reduced and management must make independent decisions on the basis of profitability. Interestingly, the existence of an IPP framework appears to precede privatisation; more than half of countries with IPPs have passed privatisation laws, but only one-third of countries without IPPs have done so (Weinberg 2000).

The effects of privatisation and these trends on the environment are difficult to judge: 'the environmental effects of privatisation can be positive or negative, depending on such factors as the strength of the regulatory body, and the political and environmental policy situation in a country' concludes USAID (1998a: 7). Some potential effects are as follows:

(a) *No demand-side management?* Privatisation and deregulation of utilities has been eliminating incentives or regulatory mechanisms for utilities to do demand-side management (DSM). With privatisation and deregulation, utilities may no longer be obligated to meet all future customer demand – an obligation which had DSM make sense.

In the USA, utility spending on energy efficiency programmes dropped from $2.7 billion in 1994 to $1.6 billion in 1997 as companies anticipated increased deregulation (Hirsh & Serchuk 1999). After adopting a utility restructuring law, 'Maryland will become the first state with a previous commitment to energy efficiency to abandon that commitment in a competitive market' say Hirsh and Serchuk (1999: 32). In Norway, deregulated utilities slashed their energy-efficiency programme staff after deregulation (Nadel 1996). In developing countries, established programmes may be similarly jeopardised. For example, the GEF and the Thai government have expended large resources to develop a highly capable DSM office in the Thai national electricity utility over the past several years. Now that the utility is being privatised, no one is sure what to do with this office or how to fund it, and there are fears it could be disbanded.

On the other hand, if a privatised utility remains obliged to serve certain customers but doing so is a net cost (i.e., when the marginal costs of generation exceed revenue potential from certain customer classes), then profit-maximising private utilities may find new incentives to invest in end-use energy efficiency to reduce their net financial losses from serving those customers (USAID 1998a).s

(b) *More financing available for renewables?* According to Kozloff (1998), privatisation might promote renewables by providing a new financing mechanism – raising capital on private debt and equity markets – that can be used to finance capital-intensive renewable energy projects. However, the transition from public to private may shorten time horizons, increase borrowing costs, and increase requirements for high rates of return. All of these factors would limit investments in more capital-intensive projects, in favour of lower-capital-cost, higher-operating-cost forms of energy (fossil fuels and natural gas in particular).

(c) *More or less R&D?* Deregulated utilities, faced with competition and short-term financial goals are spending less and less on long-term R&D. Declining expenditures on R&D translates into slower development and adoption of the next generation of cleaner technologies. Hirsch and Serchuk (1999: 34) point to 'the uncertain future facing public-interest R&D in a restructured electricity market'. On the other hand, private power developers, aggressively targeting new utility markets, may be expanding their investment in R&D as a way of enhancing future competitiveness.

(d) *More efficient production, transmission, distribution*. As with competitive wholesale power markets, managerial incentives to improve

the technical performance of existing power plants may increase as competitive pressures occur.

3. 5 Unbundling of generation, transmission and distribution

Whereas one monopoly utility traditionally performed generation, transmission and distribution functions in a vertically integrated manner, each of these functions is being parcelled out to different commercial entities, some retaining a regulated monopoly status (particularly distribution utilities) and others starting to face competition (particularly generators). This trend has a number of potential effects on the environment:

(a) *Greater consumer incentives to self-generate*. If retail tariffs accurately reflect generation, transmission and distribution costs, customers may face the full costs of centralised generation and delivery, and as such may have more incentive to self-generate.

(b) *Lower incentives to avoid transmission and distribution costs with distributed generation by utilities themselves*. If the utility that is in a position to invest in distribution-based generation (the distribution utility) cannot also benefit from the avoided costs of upstream infrastructure (generation and transmission), then mismatched institutional costs and benefits may hinder distributed generation (which is more likely to be renewable-energy-based than centralised generation).

(c) *New regulatory incentives for distribution companies to promote energy efficiency*. Experiences from several developed countries are emerging over regulatory mechanisms to get unbundled distribution companies to invest in or promote end-use energy efficiency. For example, in the UK, the Office of Electricity Regulation has established 'Standards of performance' requiring each distribution company to achieve certain energy savings levels among its customer base (King et al 1996).

(d) *Transmission pricing penalties for intermittent renewable energy sources*. Unbundling requires new methods and structures for transmission pricing. If renewables have to pay transmission charges on a capacity basis – even when the capacity is not being used – then the result may be an abnormally high transmission cost per kWh that will make renewables uncompetitive (Harris & Navarro 2000).

(e) *Transmission incentives for demand reduction and ancillary services*. Unbundled transmission services may highlight the value of demand reductions during peak periods and distributed generation near con-

strained transmission lines. This in turn could create a new opportunity for renewable energy and energy efficiency.

3.6 Competitive retail power markets and 'green power' sales

Competition at the retail level means that individual consumers are free to select whichever power generator they would like to buy their power from (intermediated through separate distribution and transmission entities). Competitive retail power markets are among the newest phenomena in developed country power sector restructuring. One of the effects of competitive retail power markets is so-called 'green power' sales. In such markets, end-users can purchase power from a 'green' supplier, usually at a premium. Proponents of green power markets point to the competitive marketing advantage of green power firms and surveys that show consumer willingness to pay a premium for such power. Recent developments show that green power wholesalers are beginning to make renewables investments specifically for new green power contracts (Edge 1998). However, Rader and Short (1998) believe a 'green revolution' in the electric industry is unlikely. They argue that green power providers must conduct substantial marketing campaigns, not just to distinguish their product, but to explain to consumers that a choice in power supplier exists at all. They also note the problem of investor financing risk and time frame: customer demand for green power is expected primarily in the short-term-oriented residential sector, while the long-term power-sales contracts that reduce financing risk are available mostly from the industrial sector.

Nevertheless, green power markets have begun to flourish in recent years. The Netherlands is perhaps the best-known example, where, as a result of restructuring at the start of 2001, an estimated 40% of residential consumers are now interested in green power. Green power demand is so high that utilities have to import green power from abroad and by early 2002 an estimated 150 000 households (2.5% of the Netherlands' six million households) were green power customers. That trend has been assisted greatly by the exemption of green power from an increasing tax on fossil-fuel generated electricity, which has made green power almost competitive with conventional power. In the USA, green power markets are emerging in several states, also in response to state incentives and aggressive marketing campaigns by green power suppliers. In California, by 2000 there were 170 000 residential customers and 50 000 nonresidential customers of green power, spurred by a 1 cent/kWh subsidy to green power providers, paid for by California's 'system benefits charge' levied on all electricity sales (Bolinger et al 2001).

But the difficulty of establishing a green power market is underscored by more recent developments in California. 'California's initial experience points to the difficulty of setting up an active power market.... Enron Energy Services, which was expected to be one of the leading purveyors of green power, stopped taking on new residential customers, saying that the high cost of educating and signing up new customers far outweighed the potential profits', say Hirsh and Serchuk (1999: 35). And during the power crisis in 2000-2001, with wildly increasing wholesale power rates, green power marketing essentially ceased and many customers went back to their old suppliers (Bolinger et al 2001).

4. Policies for incorporating clean energy with restructuring

There are a number of specific policies for incorporating clean energy within power sector restructuring that can be observed in practice or policy in many countries. Still, experience and lessons from such policies is just emerging, and many effects remain poorly documented.

Enact stable frameworks for independent power producers. Private sector involvement and investment in the power sector are greatly facilitated by establishing a transparent and stable framework and rules governing competition (both on price and access to customers). Establishing these conditions can assist in promoting renewable energy market development and scale-up. For grid-connected renewables in many countries, utility regulatory frameworks that allow fair competition for electricity generation by IPPs, including power purchase agreements and a transparent and stable tariff-setting regime, are an essential first step towards creating private markets for renewable energy. In addition, rules and institutions for bidding and transacting power purchases are also essential elements of a power market.

Eliminate subsidies. If conventional generation remains subsidised, these subsidies should be eliminated to create a 'level playing field.' Explicit or implicit subsidies for traditional forms of generation are prevalent in many countries. Implicit subsidies may exist, for example, if tariffs do not incorporate full capital replacement costs of ageing fossil units or if environment standards are not being enforced. Though it is often difficult to eliminate existing subsidies, that is the preferred option.

Provide open access to transmission. An open-access transmission system must allow power wheeling between buyer and seller that provides open access to customers. Transmission services should not discriminate against, or give unfair advantage to, specific ownership or certain types

of generation. For example, in India open wheeling policies have been credited with helping catalyse the wind industry there; industrial firms may even produce their wind power in regions with good wind resources and transfer the power over the transmission system for use in their own facilities – or for sale to a third party (Gupta 2000). Similarly, in Brazil, reduction of transmission wheeling fees has been credited as a major influence promoting a booming small hydro industry there.

Enforce comparable environmental standards on all generators. Existing facilities, even if old, should face the same environmental standards as new plants, even if this means they must be retired because of prohibitive retrofit costs. Many coal plants in the USA, for example, have been 'grandfathered' in environmental laws and are not required to meet current regulations. These plants are often the low-cost producers and also the dirtiest. As mentioned above, in a competitive environment, such low-cost producers unfairly benefit from their exempt status.

Attend to environmental policy at the same time as restructuring. Emissions standards, monitoring requirements, and other aspects of environmental policy can be integrated to strengthen power sector changes. For example, enforced emissions monitoring and disclosure can be one element of promoting 'green power' markets. The time of major power sector changes is often the time when there is maximum political leverage to incorporate related environmental policies. Advocates should anticipate this opportunity and be prepared with thoughtful, feasible policy recommendations.

Enact renewable energy portfolio standards (RPS). An RPS requires that a minimum percentage of power sold in a given region or service territory is met by renewable energy sources. Usually proposed along with RPS are power trading schemes whereby retail providers may trade their 'renewable energy' generation obligations with one another as long as all meet their respective standards, using 'green certificates.' At least nine states in the USA have now enacted an RPS, including New Jersey, Maine, Nevada, Massachusetts, Connecticut, Arizona, New Mexico, Texas and Wisconsin (Wiser, Porter & Clemmer 2000; Bolinger et al 2001). RPS-type programmes have also been adopted in Denmark, Italy, and the Netherlands, and are being proposed in other countries such as Japan, India, and Portugal. In the Netherlands, utilities are adopting RPS voluntarily, without a government mandate, although the Netherlands does have a national target of 17% of all electricity produced from renewable energy by 2020 (Schaeffer 2001). As a whole, European policy calls for 12% of energy supply from renewables by 2010. China and India also have national goals: in China, renewables should account for

5% of annual new generation being added to the system by 2010, and in India this percentage is 10% by 2012.

Enact mandatory purchases of renewable-energy-based power at a fixed price. The early PURPA implementation in California in the 1980s set avoided-cost pricing for mandatory utility purchases of power from IPPs (under 'standard offer' rules). The electricity feed-in laws in Germany, and similar policies in other European countries in the 1990s, similarly required purchases of renewable energy power at a fixed price. For example, in Germany, producers could sell to the utility at 90% of the retail market price. Feed-in laws led to a rapid increase in installed capacity and development of commercial renewable energy markets in Germany and Spain in particular. Partly because retail prices have been falling with competition, making renewable-energy producers and financiers more wary, the new German Renewable Energy Law changes pricing to that based on production costs rather than retail prices. One of the criticisms of historical feed-in approaches is that they have not encouraged cost reductions or innovation; this new German law includes provisions for regular adjustments to prices in response to technological and market developments (Shepherd 1998; Wagner 2000; Sawin 2001).

Enact competitively-bid renewable-energy-resource obligations. The United Kingdom has had positive experiences with competitive bidding for renewable-energy-resource obligations under its NFFO policy, which has led to price reductions over time. For example, wind power contract prices declined from 10 p/kWh in 1990 under NFFO-1, to 4.5 p/kWh in 1997 under NFFO-4. One of the lessons some draw from the UK is that competitively determined subsidies could lead to rapidly declining prices for renewable energy. However, critics of the NFFO say that domestic manufacturers became more and more squeezed over time and eventually became unprofitable in order to remain in the market. In addition, awarded resource obligations have not always translated into projects on the ground. In any case, this arrangement is now over, as the government has recently rescinded binding targets (Shepherd 1998; Trends in renewable energies, April 2000).

Levy 'system benefits charges' (per-kWh) to provide funds for public renewable energy and energy efficiency programmes. In the USA, some funds for renewables and energy efficiency are coming from what is often referred to as a system benefits charge (SBC). 'State clean energy funds supported by system benefits charges appear to be one of the more positive developments to emerge from electricity restructuring' wrote Bolinger et al (2001). Fourteen states in the US will collect $3.5 billion through 2011 in system benefits charges. In California, a 3% fee

added to consumers' electricity bills supported $540 million worth of renewable energy programmes and $872 million worth of energy efficiency programmes during the early years of restructuring (1998-2001). SBC support in the US for renewables has gone largely to windpower so far, along with subsides for distributed solar PV. Similar 'pollution taxes' exist in Europe for fossil-fuel-based generation. In general, the funds serve a variety of purposes, such as paying for the difference between the cost of renewables and traditional generating facilities, reducing the cost of loans for renewable facilities, providing energy efficiency services, funding public education on energy-related issues, and supporting research and development.

Enact policies to accelerate retirement of older, less efficient plants. Such policies are taking hold in China, for example, where national policies have banned further construction of smaller coal power plants (less than 50 MW) and mandate the retirement of small power plants. But there are many difficulties in implementing such policies, particularly if utilities face severe demand pressure and cannot retire units without decreasing reliability, or simply do not want to because of the favourable economics of the older plants.

Create independent energy efficiency centres. Public support, perhaps through system user fees or surcharges, can support energy efficiency centres jointly owned by utilities and third parties. (If distribution utilities operate such centres, they are not seen as credible or independent.) These centres can offer independent advice to businesses and residential customers for energy efficiency improvements, business services such as audits, and even ESCO-like performance contracting. Norway and its Energy Act provide an example of a country that has taken this approach, although 'concerns over anti-competitive behavior have been a stumbling block to fully implementing the energy efficiency programmes envisioned under the Act' (King et al 1996: 19).

Encourage distributed energy. Kozloff (1998: 2) concludes that 'renewables are likely to play a larger role in power systems dominated by the distributed model than by the central station paradigm. However, successful deployment of distributed renewable in an unbundled system requires that at least one player can capture system benefits'. Some of the ways that distributed energy can be supported are:

- new financing mechanisms;
- common interconnection standards;
- standard power purchase agreements and tariffs that reduce transaction costs;
- 'net metering' schemes for residential consumers;

- reduced procedures for grid connections and/or metering;
- incorporation of cost savings in distribution system upgrades into energy tariffs;
- attention to local zoning and code requirements that may inhibit distributed generation (i.e., building code and aesthetic issues of rooftop solar panels); and
- capacity credits in tariff structures.

Factor distribution and transmission system avoided costs into power purchase tariffs. Doing so can substantially alter the economics of distributed renewable energy generation, for example grid-based solar photovolatic power. Solar photovolatic power is perhaps the most significant. This principle was behind the development of the Philippines Cepalco grid-connected PV plant supported by the GEF; conjunctive use with variable hydroelectricity on the distribution system can avoid costly transmission system upgrades or other investments to level out power curves. Although only about 20% of global PV production was used on-grid in 1998 (mostly for government-sponsored rooftop markets), utility policy and distribution planning frameworks for such conjunctive uses offer the promise of accelerating on-grid PV applications. Such policies are more often at local or regional levels, rather than national levels.

Regulate distribution utilities to encourage distributed generation. Regulation can encourage distribution utilities to consider the lowest system cost when making decisions about types of service. 'Regulation of retail electricity suppliers should create economic incentives that promote full consideration of renewable energy technologies for bulk power, distributed generation and demand-side applications. Power sector reforms should ensure that distributed options can compete to provide electricity services' (Kozloff 1998: 2).

Provide incentives to new distribution utilities to perform DSM services. If anti-competitive concerns can be overcome (these have been raised in Norway and the UK, for example), then distribution companies can be regulated to be obliged to provide energy efficiency services that are subsidised through a levy on electricity sales or consumers (King et al 1996). 'Performance-based regulation can also create incentives for retail service providers to invest in demand-side management by decoupling profits from sales', echoes Kozloff (1998: 19). However, as utilities move toward commercial interests and away from social interests, and as it becomes more difficult to protect against anti-competitive behaviour in the retail market, the prospects for DSM programmes by utilities in a deregulated environment appear mixed.

5. Experience and lessons from GEF support of grid renewable energy

This section reviews the emerging experience and lessons from GEF-supported efforts to promote grid-connected renewable energy in developing countries.[4] From 1991 to 2000, the GEF approved 17 such projects implemented through the World Bank, United Nations Development Programme, and Asia Development Bank. Nine of these projects promote wind power (in Cape Verde, China, Costa Rica, India, Kazakhstan and Sri Lanka), five promote small hydropower (in India and Sri Lanka), six promote biomass and bagasse power generation (in China, Cuba, Hungary, Mauritius, Slovenia and Thailand), one promotes power from biomethanation (in India), and one promotes geothermal power (in the Philippines). Total GEF contribution to these projects is $180 million, and total project costs exceed $1.2 billion as the GEF has facilitated substantial co-financing.

Most of these projects are just getting started or are in early stages of implementation (8 of the 17 were more recently approved by the GEF Council, during 1998-2000, and some of them were still awaiting formal approval by implementing agencies or governments). Thus, experience from the portfolio is still quite limited. This section focuses on the emerging experience and lessons from two projects which have been completed (in Mauritius and India) and a third with substantial implementation experience (in Sri Lanka). Emerging experience from China and Costa Rica is also covered.

In general, GEF projects take five main approaches to promoting grid-connected renewable energy: (a) demonstrate technologies and their commercial and economic potential; (b) build capacities of project developers, plant operators, and regulatory agencies; (c) develop regulatory and legal frameworks that encourage independent power producers and establish transparent, non-negotiable tariff structures; (d) create financing mechanisms for project developers; and (e) develop national plans and programmes informed by the institutional and business models piloted in projects.

5.1 Wind and small hydro power in India

In India, GEF support for wind power occurred in parallel with the explosive market growth that emerged in the mid-1990s fuelled by favourable investment tax policies and a supportive regulatory framework. Besides investment tax credits, transparent power purchase tariffs,

[4] This section is taken from Martinot (2001).

transmission wheeling, third-party sales, guarantees for local utility power-purchase contracts and power 'banking' all contributed to the development of the market. By 2000, almost 1200 MW of wind capacity had been installed in India, virtually all of that by the private sector. In addition, dozens of domestic wind turbine manufacturers had emerged, many of them joint ventures with foreign partners. Exports of turbines began and high-technology turbine designs with variable-speed operation were being produced. During the 1990s, the GEF and World Bank directly financed 41 MW of wind turbine installations and 45 MW of mini-hydro capacity in India through the Renewable Energy Development project.[5]

More importantly, the India project also strengthened the capabilities of the India Renewable Energy Development Agency (IREDA) to promote and finance private-sector investments. As a result, more than 360 MW of wind projects and 65 MW of mini-hydro projects have been financed through IREDA. Another 65 MW of mini-hydro capacity is scheduled for financing and completion through 2001. The project also helped to raise awareness among investors and banking institutions of the viability of wind power technology and helped to lobby for lower import tariffs for wind systems. During the 1990s, many financial institutions decided to offer financing for wind farms, which was a key project goal.[6]

One lesson from India is that more understanding is needed about the relative effectiveness of production-based incentives relative to capacity-based incentives. In the 1990s, one-year 100% investment tax depreciation provided large economic gains for installation of wind farm capacity, regardless of the electricity generation from that capacity. This incentive is shifting, as capacity-based tax incentives have decreased due to the reduction in marginal corporate tax rates from 55% in 1992/93 to 35% in 2000, at the same time that power tariffs, production-based incentives, have continued to rise. In addition, IREDA offers incentives for wind farms it has financed to achieve higher capacity factors – in the form of interest-rate reductions.[7]

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[5] Additional hydro capacity was under development in 1999 and 2000, and a second World Bank renewable energy project for India, which would finance additional mini-hydro, was approved in 2000.

[6] More information can be obtained from the document 'Case study: India renewable resources development project' by the GEF.

[7] Interest rate reductions are 0.5% for plants exceeding 18% capacity factor (1.6 GWh/MW/yr), 0.6% for exceeding 23% capacity factor (2.0 GWh/MW/yr), and 0.75% for exceeding 27% capacity factor (2.4 GWh/MW/yr).

Another possible lesson from India may parallel that gained in California in the 1980s: it takes a substantial amount of time and a large, growing wind industry to work out technical and operational difficulties and gain enough experience to enable superior wind farm performance. The recent decline in wind farm development in Tamil Nadu, for example, has been attributed to a variety of factors. In addition to financial and policy factors, the decline has been attributed to inadequate capacity of substations, weak distribution connections, poor maintenance, inadequate facilities for repair, rotor blade failures due to manufacuring defects and lighting, control system failures due to disregard for grounding regulations and lightning protection, and inadequate wind speed data resulting in differences between actual and expected energy production (Berger 1997; Jagadeesh 2000b).

5.2 Bagasse power in Mauritius

In Mauritius, a World Bank/GEF sugar bio-energy project indirectly catalysed dramatic changes in electricity generation in Mauritius. From 1994 to 1996, the project dispersed $6 million for efficiency investments in sugar mills to provide surplus bagasse for power generation. The project also provided technical assistance and technology demonstrations to promote private/public sector cooperation in power plant ventures and evaluate ways to decrease the transport costs for bagasse and to optimise the use of sugar cane for power generation. A planned demonstration bagasse plant under the project was never constructed. Electricity generation from bagasse increased from 70 GWh/yr in 1992 to 118 GWh/yr by 1996. Several sugar mills have completed or embarked upon bagasse power plant investments on their own, independent of the GEF project, including the original mill that had been targeted for the bagasse power plant under the project. The European Investment Bank has agreed to finance a bagasse/coal-fired power plant. A project completion report states that 'extensive dialogue between the public and private sector on design work, the least-cost power development plan, and power purchasing agreements have directly or indirectly led to the development of other power plants.'

One of the lessons from the Mauritius project is how creating an investment climate for renewable energy power projects, and creating public-private partnerships, can lead to supportive regulatory frameworks. In this case, the project led to the establishment of a framework for IPP development and an administrative focal point for private/public sector partnership in IPP development. A project evaluation states that 'the project's major accomplishment was progress in helping to establish an insti-

tutional and regulatory framework for private power generation in Mauritius and the provision of technical studies and trials to support technologies for improved bagasse production and improved environmental monitoring.' Another lesson may be that technical demonstration (in this case the planned demonstration bagasse plant that was never constructed) has less of an influence on promoting markets for a technology than other types of project interventions.

5.3 Small hydropower in Sri Lanka

In Sri Lanka, the World Bank/GEF Energy Services Delivery project begun in 1997 points to the difficult and time-consuming nature of evolving business and regulatory models suitable to a given country and the flexibility needed to support approaches that show promise. Prior to the project, all mini-hydro development was done by the national electric utility. The project has opened up the market to third-party mini-hydro developers. The project has financed more than 21 MW of small hydro by IPPs and has been developing regulatory frameworks for IPPs, including standardised 'non-negotiable' power-purchase tariffs and contracts. This project provided enough incentive for the national utility to adopt IPP frameworks and agree to such tariffs and contracts, which together with demonstration effects of prior mini-hydro installations and new incentives for developers (such as import duty waivers and income tax concessions) spurred the market.

One of the lessons from the Sri Lanka project, however, is that variable power-purchase tariffs can hinder market development. In this case, tariffs were tied to *short-run* avoided utility costs based on the international price of oil. In 1997 and 1998 tariffs were set at the equivalent of 5 cents/kWh and mini-hydro development flourished. However, because of the downturn in oil prices in 1998-99, prices were only the equivalent of 3.5 cents/kWh in 1999. As a result, all development essentially stopped in 1999. And this fluctuation has seriously hurt the longer-term interest of private mini-hydro developers in Sri Lanka. 'The low tariffs and unresolved dispute [on tariff calculation methods] have caused a deep slump in mini-hydro development' said a project status report in 2000.

Another lesson from Sri Lanka is that attention must be paid to proper structure of power-purchase tariffs so that renewable energy receives credit for the value it creates, in terms of both energy and capacity. The original power-purchase arrangements negotiated with the national utility (a 'single buyer' market given the utility's monopoly status in transmission and distribution) called for only energy-based tariffs, with

no credit given for capacity. Negotiations were on-going between a mini-hydro industry association and the national electric utility to incorporate capacity credits into what was an energy-only tariff; but for now the mini-hydro industry has to make do with energy-only tariffs. Finally, bureaucratic bottlenecks in getting PPAs approved and in getting physical connections to the grid have been cited as other factors hindering market development (Bandarenke 2000).

5.4 Wind power in China

The emerging experience from the World Bank/GEF Renewable Energy Development project in China highlights the pressing need to address regulatory frameworks and find ways to reduce risks to project developers. The project was designed to finance four newly formed windfarm companies for construction of 190 MW of wind farms in Inner Mongolia, Hebei, Fujian, and Shanghai provinces. These companies were to be jointly owned by the State Power Corporation and subsidiary electric power utilities (at regional, provincial or municipal levels) and would sell power to utilities under power-purchase agreements developed through the project. The costs of wind-generated electricity from these wind companies would be higher than those of conventional electricity generation, but utilities in three provinces (Hebei, Fujian and Shanghai) were initially willing to purchase this wind power from the project developers (and in fact are required by government policy to do so, at production-cost-based tariffs). At least at small scales, the added costs of wind power were marginal relative to total utility revenue for these three large utilities.

However, a planned 100 MW wind farm in Inner Mongolia as part of that project was cancelled in 2000 because the smaller utility there was unable to sign power purchase agreements with neighbouring provinces for sales of the wind power, which could not be absorbed within the Inner Mongolian grid itself. Originally, the North China regional power company had said it would purchase wind power from Inner Mongolia. But when the North China power company was split into three provincial utilities and given an explicit mandate to operate on strictly commercial terms, Inner Mongolia has been unable to persuade any of these three provincial utilities to sign power purchase agreements with it for higher-cost wind power. And being unable to use this power itself – given the small size of the Inner Mongolia grid (but abundant wind resources) – it proved unable to undertake this investment.

The general lesson suggested by this experience is that some means must be found to supply the cost difference between wind power pro-

duction costs and utility average system tariffs (or avoided cost) in the case of wind power – until such time that wind power becomes fully competitive with conventional forms of generation (i.e., as externalities as incorporated, fuel prices rise, and/or wind power technology costs decline – all expected within the medium term). This issue will be a recurring problem with wind power in developing countries in the short term. So far, wherever wind power investments have been made, in developed or developing countries, this cost difference has been covered through specialised policies – for example, through the feed-in law in Germany or green certificates in the Netherlands, or from higher payments by self-selected retail consumers who choose to purchase 'green power' in the USA. In India, investment tax credits for wind power meant that the cost difference was covered through general government revenues. Given this issue, one of the main challenges for the GEF will be fourfold: (1) to assist client governments to commit to creating a mechanism to cover the cost difference; (2) to identify an appropriate and effective policy mechanism; (3) to create the necessary regulatory conditions and institutions; and (4) to identify the conditions under which this mechanism should no longer be employed.

5.5 General lessons from the GEF portfolio

Experience from the India, Mauritius and Sri Lanka projects suggests that two key forms of support go hand-in-hand in helping develop a market for grid-connected renewable energy: creating a favourable investment climate for private power projects, and establishing a regulatory framework for independent power production. Further, experience from these three projects suggests that that the GEF is quite capable of providing these two key forms of support. It should be recognised, nonetheless, that the Sri Lanka project points out that at least half of this formula – allowing IPPs and power-purchase agreements into a previously monopoly system – can face many challenges.

The experience from the China project, in which the 100 MW Inner Mongolia wind power component was cancelled due to lack of a supportive regulatory and power-purchase structure, suggests that regulatory frameworks must address the question of how the additional cost of wind power (relative to conventional sources) can be covered – and especially the questions of who will pay this additional cost and what policy/institutional mechanisms allow the additional cost to be collected and channelled to wind power development. Variations of this issue can be seen in India, where the government adopted very favourable investment tax credits that were successful in promoting a large wind industry

in a short time (although how it can be sustained remains to be seen), and in the Sri Lanka project, where definitions of 'avoided cost' and levels of power purchase tariffs lie at the heart of market viability.

Project experience suggests that national-level policies for technology market development and industry incentives may partly depend first on technical demonstrations and greater policy-maker awareness. But project experience also suggests that market development takes a long time and that a large and growing domestic industry is required to work out regulatory, contractual, technical, and operational challenges of grid-connected renewable energy. This means that GEF projects must focus explicitly on the medium term as well as the short term and ensure that sustainable regulatory mechanisms, policies, financing, and adequate skills and manpower are in place before project completion.

6. Recommendations from a workshop on power sector reform

A June 2000 workshop on power sector reform and the environment sponsored by the GEF's Scientific and Technical Advisory Panel considered many options and opportunities for the GEF to assist governments in incorporating clean energy more strongly within the process of electric power sector reform. The Panel concluded that 'there is a need for the GEF to be more present in the reform process' (GEF STAP 2000). More specifically, the workshop showed that key roles for the GEF are as follows:

- Assist with developing frameworks for independent power producers, formulation of standard (or model) power-purchase agreements (including transparent buy-back and transmission pricing), feed-in tariff schemes, and simplified procedures for access to the grid (i.e., legal and transactional support). Such frameworks should strive to incorporate proper pricing of diurnal and seasonal effects and capture the value of no-fuel-price risk renewables.
- Fund risk-mitigation instruments, like equity funds to cover pre-investment costs or counter-guarantee funds to cover specific risks (i.e., resource risks associated with early stages of geothermal or mini-hydro development). Appropriate risks must be identified.
- Support the emergence of third-party project developers and provide them with the tools and information they need, such as renewable energy resource assessments, evaluations of potential sites, contingent loans for feasibility studies (i.e., only repayable if the project is financed), and information on local financing and partners.

- Create a 'track record' of experience on regulatory and policy approaches to supporting grid-connected renewable energy, and assist policy-makers in understanding and adapting potentially relevant and appropriate approaches.
- Provide capacity building for power sector regulators. Such capacity building would help the regulators understand technologies and applications, build confidence in them, and show ways in which they can explicitly support these technologies with regulatory frameworks. Basic skills may need to be strengthened among regulators (and the utilities they regulate), like lifecycle costing concepts so that renewable energy technologies are not penalised in investment decisions due to their high initial capital costs. Or regulators may need to understand the renewable-specific features of capacity credits, fuel-price-risk reduction, transmission wheeling, and other aspects of a 'level playing field'.
- Build awareness, confidence, and familiarity with renewable energy and energy efficiency technologies among financial institutions and other investors. This is clearly demonstrated in the case of India, where support for wind power by the GEF included greatly raising the willingness of Indian financiers and investors to finance wind power.
- Help negotiate 'harmonised' policy approaches and help promote 'convergence' of donor programmes to the goals of power sector reform supportive of cleaner energy technologies.
- Help countries develop the capabilities and understanding to regulate a more distributed power sector, where institutional and regulatory models for rural electricity supply may not necessary follow the experience in developed countries, and thus entirely new models or informed adaptations of existing models must be applied.

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11

Stakeholder roles in promoting equity and environmental protection

LAWRENCE AGBEMABIESE

JOHN BYRNE

DANIEL BOUILLE

1. Equity and environment: endangered themes in power sector reforms

Power sector reforms initiated in several countries over the last two decades brought drastic changes in the distribution of stakeholder roles. As amply demonstrated in the case studies discussed in this volume, however, the reforms also diminished prospects for advancing goals of environmental protection and social equity (hereafter referred to as environmental and social benefits, or ESBs). There is an emerging consensus from the reform experience: power sector reforms may be better aligned with ESBs if non-governmental organisations (NGOs) are empowered through government intervention, as well as international agency and donor action, to play more decisive roles in regulating the operation of energy markets. It is also imperative that governments and international development agencies are capacitated to negotiate for and implement reforms that have ESBs.

Stakeholder performance in the pre-reform era

Prior to the reforms, electricity was typically produced by vertically integrated utilities, often operating facilities for the generation, transmission, and distribution stages of electricity service. During this period, there was intense government interest in the energy sector, driven largely by the perception of electricity as an essential public good. For the most part, utilities were state-owned monopolies. Where private companies existed, they operated primarily as monopolies regulated by governments. In the main, government intervention was often marked by the setting of detailed, quantitative targets for electricity production, financial incentives including subsidies, and government guarantees for mega projects, price controls, government-to-government deals for the purchase of electricity, and the like. In the US, for example, a government-sponsored subsidy scheme catalysed the electrification of large parts of rural America during the 1910s and 1920s. During the 1950s and 1960s, governments in developing countries, anxious to industrialise and 'catch up' with the Northern role-models, actively promoted the implementation of large-scale electrification projects. In all cases, the highly interventionist role of government reflected not only the pro-growth and pro-electrification coalitions and politics of the times, but also the general climate of more active government involvement in the economy and society as a whole.

Towards the end of the last century, it became increasingly evident that electricity systems were creating a host of environmental, social, and economic problems. Growth of electricity consumption in the industrial countries had become the single most important source of air pollution, accounting for almost two-thirds of sulphur dioxide emissions in Europe and North America. Pollution from large-scale power plants has been linked to urban smog, forest loss and freshwater contamination in industrial and developing countries. In the developing countries, the government-led allocation of scarce resources for the building and maintenance of large-scale power plants has not always addressed social inequities. Sizable portions of developing country populations (especially in rural areas) are often left unserved by the power system. The national economic benefits expected from electrification – such as rapid industrialisation, economic growth and higher incomes for all – have not materialised. In these and several other ways, the pre-reform power sector was failing not only to meet growing electricity demand, but was also, with few exceptions, largely out of alignment with longer-term prospects for addressing ESBs.

More often than not, government agencies, donors and other key stakeholders proved to be either incapable of formulating and imple-

menting viable solutions to the growing problems of the sector or unwilling to do so. In particular, governments, especially in the South, seem to be unable to exercise their political roles as advocates and guarantors of the public interest. As pointed out in earlier chapters, important decisions regarding electricity supply were often made by closed circles of domestic and foreign experts, government bureaucrats, and large corporate clients. The centralised and closed governance structure of the pre-reform power sector, coupled with the monopoly status of utilities, resulted in electricity industries evolving into powerful organisations advancing political and economic agendas while systematically marginalising ESBs.

The institutional reforms that were initiated during the 1980s were promoted by advocates as the best hope of solving the problems confronting the power sector, which had come to be viewed by most observers as an over-regulated electricity industry suffering from chronic economic inefficiency. The reform package (known simply as 'electricity liberalisation') comprised a set of measures designed to unbundle the vertically integrated utilities, privatise ownership, and introduce competition into the generation and distribution sector. With the implementation of such measures, government involvement in energy markets was significantly diminished, reflecting a profound shift in thinking about government's role. Privately owned independent power providers became major actors in liberalised electricity markets. Multilateral financing institutions such as the World Bank took on key roles as sources of investment finance of reform, able to exercise considerable influence over cash-strapped governments – often through financing conditionalities. The enthusiastic overthrow of government as central player in the power sector reflected the considerable trust placed by reformers in the ability of free market mechanisms to solve first the economic, then the social and environmental dilemmas facing the power sector. It was taken for granted that private investors and other actors will generally perform better than government in the business of producing and selling electricity.

The basic logic that was utilised to justify power sector reforms may be summarised as follows: Unbundling, privatisation, and market deregulation would unleash competition amongst private actors. This would increase economic efficiency, which would in turn translate into falling prices. Meanwhile, the free operation of these mechanisms would subject service providers to democratic pressures through the choices exercised by individual consumers. And then there would be greater consumption of quality services by a growing number of satisfied customers. This would solve – albeit indirectly – the social equity dilemma.

As for the environmental problem, the 'green forces' of the market would minimise, if not eliminate, problems such as pollution, by forcing out old technologies and/or by rewarding consumers who practise 'green' consumerism. In these and many other ways, public benefits in the environmental and social realms would eventually come about, if only the government would get out of the way for the market to do its work in deregulated freedom.

Should the free market be trusted?

Should the liberalised market be trusted to deliver social and environmental benefits? The track record of reformed power sectors suggests strongly that the answer to this question must be 'no.' While electricity liberalisation has led in some cases to improved technical performance in generation and transmission as well as economically more efficient markets (see, for example, Wamukonya, Chapter 2;[1] Bouille and Wamukonya, Chapter 5), these beneficial results[2] have been outweighed by negative environmental, social and, indeed, economic impacts. In the main, the liberalised market has proven to be more likely to punish rather than reward the pursuit of publicly beneficial goals such as universal access, energy conservation and environmental protection. Electricity liberalisation releases the market from the constraints of public control so as to allow the efficient auctioning of electricity. By treating electricity largely as a commodity whose value is determined by individuals being able to afford more or less of it, the market effectively marginalises benefits whose value cannot be fully captured in commodity terms. The commodification of electricity and the associated marginalisation of public interests underpin a number of environmental, social, political and

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[1] References in this form are to chapters in this volume.

[2] Wamukonya (Chapter 2) provides a global summary of the mainly engineering and financial benefits that followed some power sector reforms, including: the reduction of technical losses from 27% to 10% over a ten-year period in Argentina; the halving of distribution losses in Chile in seven years; and the curtailing of power losses in Côte d'Ivoire from 19.8% to 17.4% over the eight-year period from 1990 to 1998. In Europe an increasing number of consumers can choose their provider and green electricity options exist. Competition in electricity markets has also contributed to a lowering of tariffs in some European countries. These benefits and improvements in services have however been largely limited to consumers who are already served by utilities (Wohlgemuth, Chapter 4). In much of the developing world, there has been no significant advance in extending services to currently unserved groups, especially in rural areas (Wamukonya, Chapter 2).

economic contradictions of electricity liberalisation, to which we now turn.

Environmental dilemma

Electricity providers in deregulated markets cannot be trusted to deliver benefits in the environmental realm. A major reason is that service providers in free markets, unlike their publicly or privately owned monopoly predecessors, tend to focus on short-term profits. Long-term public interest in energy conservation, environmentally sound energy technologies and other options that are consistent with sustainable development goals are consequently neglected. Because they treat electricity as a commodity, private electricity providers are driven to maximise the kilowatt hours sold – rather than to provide more services with fewer kilowatt-hours. As experience of reforms in California and several countries showed, power sector reforms have often been accompanied by significant reductions – even reversals – in renewable energy investment. This unfavourable trend is largely attributable to the fact that the transition from public to private ownership tends to shorten time horizons, increase borrowing costs, and increase requirements for high rates of return. In effect, power sector reform creates new constraints to investments in capital-intensive renewable energy projects, while favouring investments in fossil fuels and natural gas (Martinot, Chapter 10; Bouille & Wamukonya, Chapter 5; Wohlgemuth, Chapter 4).

Inequity and public concerns

Electricity reform can therefore be expected to make little, if any, direct contribution to achieving the public interest goal of improving access and promoting social equity. For the most part, inequity in access to, and consumption of, electricity services has worsened as private power providers cherry-pick the most profitable customers, while dumping 'loss-making' ones. The evidence emerging from developing countries is that rural electrification, and its related public benefits goals, cannot be realised within the framework of reformed power sectors. What matters to private electricity providers in free markets 'is not to fulfill the demand for electricity, but the expectations of shareholders'.[3] As amply demonstrated in several preceding chapters, power liberalisation has proven to be more likely to further entrench unequal power relationships in the electricity sector, aggravating inequity between producers and consumers and between affluent and poorer consumers. These inequities are also

[3] This statement is attributed to the Chief Executive Director of Endesa (Wamukonya, Chapter 2).

evident between government and the private sector players as well as between government and financing institutions.

Economic instability and poverty

Free market actors and forces have shown little interest in promoting public benefits through job creation, higher incomes and economic growth. Instead, what the market mechanism promises to deliver, in the name of economic efficiency, is a reduction in the number of employees per customer served or kilowatt-hours delivered. It is 'an inescapable fact that an employee in a developing country supports more than a couple of persons and thus loss of a single job means hunger for many. The social instability associated with unemployment is evident across the developing world' (Wamukonya, Chapter 2). The largely incalculable costs to the public of political and social upheaval are not considered in the standard cost-benefit analyses that inform decisions made by free-market actors.

Politics of exclusion in energy governance

Like their pre-reform antecedents, liberalised markets can, paradoxically, restrict important sections of society – including public interest groups – from effectively participating in the identification, elaboration and pursuit of a public benefits agenda in energy governance (Dubash & Rajan, Chapter 8). The deregulated market mechanism, like a machine in the real world, requires that certain technical components are maintained routinely to keep the mechanism running smoothly. These include power exchanges, independent system operators, and regional transmission organisations – all of which diminish the range of local decision-making and governance. Partly because of the complexity involved in adequate management of liberalised electricity systems, technical knowledge tends to be further empowered at the expense of citizen-based political deliberations. And by placing individual consumer choice – expressed only through purchasing power – above socio-political consensus, power liberalisation markedly diminishes the space for collective, deliberative decision-making. 'Even in cases where consumer choice matters, marketisation of citizenship ultimately tips the balance toward more powerful economic interests, since one dollar is one vote in markets' (Byrne & Mun, Chapter 3).

Notwithstanding, reform has been beneficial on some fronts. In Europe an increasing number of consumers can choose their provider and green electricity options exist. Competition, albeit a managed form of competition, in Europe is resulting in lowering of tariffs. Where consumers were already served, the quality of service has often improved.

(Wohlgemuth, Chapter 4). Perhaps an issue that should not be undermined: reform has brought back rural electrification issues and access in general as well as poverty onto the agenda.

2 Emerging perspectives on stakeholder roles in power sector reform

What might be an alternative approach to reforms that would expand rather than diminish incentives and opportunities for stakeholders in the power sector to promote ESBs? Merely re-installing government technocrats and public or private monopoly providers as dominant actors in electricity decisions would not be a sound basis for promoting ESBs, given the pervasive contradictions that characterised the pre-liberalisation era. This should not, of course, be construed as justification for the indiscriminate dismissal of government as an active agent for the promotion of ESBs, as evident from the central role played by government in initiating remedies for California's market-induced electricity crises (Bradshaw & Clark, Chapter 7). Also, monopoly providers have on occasion been the chief actors in advancing social and economic benefits, as evident from the experience of Senegal (Fall & Wamukonya, Chapter 9). As well, the accumulated experience of power sector reforms would suggest that liberalised, commodity-oriented markets are inherently incapable of promoting an ESB agenda. On the contrary, prospects for promotion of ESBs in electricity reform appear to be enhanced in an expanded, more inclusive decision space of democratic public discourse that has come to be called a 'policy commons' (Byrne & Mun, Chapter 3).

The case studies lend support to this emerging consensus, which has been articulated in terms of a 'policy commons approach' in this volume (Byrne & Mun, Chapter 3), and elsewhere. Crucially, stakeholders following a policy commons approach would not presume, as liberalisation advocates argue, that markets have an *inherent* orientation toward ESBs. They would regard policy rather than markets to be the key factor in advancing the ESB agenda. As opposed to either free market approaches or the rigid 'command and control' regulatory regimes of the pre-reform era, the policy commons approach entails what has been called a 'progressive politics' of electricity reform (Dubash, 2002), in which sustainability values such as equity and environmental protection are better integrated into policy formulation and implementation cycles. In particular, advocates argue that environmental protection and equity goals can be advanced to the extent that stakeholders are collectively committed to (and effectively engaged in):

- expanding the scope of power sector reforms to encompass environmental and equity concerns;
- strengthening pro-sustainability political coalitions while countering the political power of parochial interests;
- ensuring open dialogue, accountability, and participation in all debates over power sector reforms; and
- structuring electricity financing strategies around sustainability goals (Dubash, 2002), instead of trading-off sustainability goals in return for capital.

From this standpoint, the policy commons approach calls for consultation and cooperation amongst energy companies, national and international financial institutions, donors, consumers, different levels of government and environmental groups. The content of power sector decisions that are based on the progressive politics of the policy commons would also differ fundamentally from those associated with either the liberalised markets or the 'command-control' approaches. Instead of a narrow focus on economic efficiency, the decisions about electricity service would reflect more explicit commitments to societal goals such as equity (expressing a universal right to service), and sustainability (expressing a societal commitment to ecological balance in the provision of electricity service) (Byrne & Mun, Chapter 3).

The country and regional experiences described in preceding chapters provide practical demonstrations of the emerging processes and stakeholder roles associated with ESB-oriented power sector reform. We revisit aspects of the experiences in California and the Indian state of Karnataka as particularly revealing cases of how government, working in consultation with NGOs and the private sector, can design and implement reforms that are environmentally sound and socially equitable.

Stakeholder roles in promoting ESB: The Karnataka reform experience

During the 1990s, Karnataka responded to technical inefficiencies and financial crisis in its power sector by implementing a reform process that embodied the idea of democratic governance, operationalised through an integrated resources planning methodology (Byrne & Mun, Chapter 3). Instead of trying to build social consensus around a pre-packaged 'World Bank model' the Karnataka state government first initiated extensive public consultations and consensus in order to develop its own model of reform. A crucial step taken towards the building of social consensus was the enactment of a Right to Information Act and the Transparency in Government Procurement Act – effectively guaranteeing

access to information and the right to representation (Byrne & Mun, Chapter 3). Within this framework of open dialogue, key decisions, such as tariff increases, were subjected to extensive multi-stakeholder dialogues involving the Karnataka state Regulatory Commission, its consumer advocate office, and the Electricity Consumers Network, an independent citizens' organisation. By operating within the larger range of options identified through integrated resource planning, the stakeholders in the dialogue reached a compromise that included a collectively agreed level of tariff increases, low-income consumer protection measures, and programmes for efficiency improvements in the electricity sector. Well-informed citizen groups mobilised resources to promote conservation and renewables in order to make electricity affordable and its provision environmentally less damaging. This aspect of the Indian experience is especially relevant to developing countries. Since most citizens still depend on the rural economy for their livelihoods, their participation through representative civil society groups can produce decisions that are economically, socially, and environmentally superior to the mainstream electricity liberalisation approaches (Dubash & Rajan, Chapter 8).

Recovering from power sector reform crisis: Roles of stakeholders in the California energy commons

California has largely recovered from the dramatic failure of its power sector reforms by following a new approach that emphasised policy-based partnerships and consultations, rather than the 'genius' of free market mechanisms and actors. A key ingredient of the recovery process was the implementation of integrated resource planning processes that effectively enhanced public capacity to intervene in the regulatory process. Relevant information about utility planning was made available to concerned parties, and regulatory proceedings were held in an open and transparent manner using an administrative process to decide policy action. In order to counterbalance the resources and expertise available to utilities and business sectors, moreover, financial and analytical support was made available to public interest groups. The creation of 'public advocates' on energy issues ensured an institutional voice for ordinary citizens and small businesses who, otherwise, would not have been represented in the planning process (Byrne & Mun, Chapter 3). Using such mechanisms, non-conventional actors in electricity planning were able to articulate their concerns and visions, often based on independent research and alternative energy plans. Specific outcomes of the stakeholder consultation processes that helped California avoid the worst effects of the crisis included the following:

- Government-producer consultations led to negotiated long-term contracts with producers, enabling the government to purchase bulk power at prices that were significantly below crisis-induced spot market prices.
- Implementation of new regulations allowed greater legal and press scrutiny of producer and marketing companies. This helped to curb the practice whereby private companies created artificial shortages through unnecessary plant outages for repair or other reasons. The effect of these measures led to significant numbers of plants coming back on-line, with consequent fewer outages.
- The price cap was removed and consumer rates went up with surcharges, with large users having the highest increases.
- New price incentives were designed, whereby consumers who conserved more than a negotiated amount of power compared to the same month in the previous year received significant rebates on their electricity bills. In this way, the market mechanisms were designed to generate price signals that served to increase conservation (Bradshaw & Clark, Chapter 7).

As the Indian and Californian experiences suggest, the proper relationship between markets and society should be one in which the needs and aims of the latter inform and shape the operation of the former, instead of the reverse. Ensuring the integration of ESBs into the reform agenda will necessitate significant changes in the distribution of roles and powers in what has been called the 'next generation' of reforms (Bouille & Wamukonya, Chapter 5).

3 Stakeholder roles in promoting equity and environmental protection

While particulars will clearly differ according to specific needs and contexts, it is possible to discern generic stakeholder roles that seem consistent with the pursuit of environmental and social benefits within the framework of a policy commons.

Non-governmental organisations

In recent years, NGOs have played pivotal roles in resisting authoritarian regimes, democratising society from below while pressing authoritarian governments for change. While NGOs have gained much of the publicity in this regard, it is relevant to recognise that potential advocates of ESBs can include a wide range of less visible but possibly potent actors, ranging from neighbourhood committees and consumer defence organisa-

tions to special interest groups and philanthropic enterprises of various sorts. The policy commons approach recognises all such groups as stakeholders capable of effectively articulating environmental and social concerns and aspirations of politically mobilised social actors. The relative importance of any one group depends on the context.

The case studies in this volume have focused attention on some specific roles that NGOs can play in promoting the ESB agenda in power sector reform. For example, apart from simply providing effective 'oversight and 'monitoring' functions over the long term (OLADE-ECLAC-GTZ, 2000: 77), NGOs can help focus attention and formulate a viable vision of the structure of a reformed electricity sector that addresses environmental protection issues, and ensures equity in access and affordability. In India and California, for example, NGOs and other 'non-conventional actors' were able to undertake independent research, feeding the results into the formulation of alternatives to energy plans put forward by government (Byrne & Mun, Chapter 3). NGOs also played crucial roles in building political support for ESB-oriented reforms through extensive public outreach campaigns embedded within local political and social aspirations. These campaigns relied on convincing demonstrations of the technical and financial viability of integrating an ESB agenda into power sector reform (Dubash, 2002). Lessons from the reform experiences suggest, however, that the strength of NGOs and other civil society groups depends ultimately on, first, their ability to maintain independence from government, big business, and international finance and donor agencies; and, secondly, on their competence in building and communicating convincing arguments to relevant target sudiences in support of an environmental and social benefits agenda in power sector reform.

Government

The history of the energy sector in general, as well as that of power sector reform experience, confirms that without the active participation of government it is highly unlikely that market forces will promote ESBs in power sector reform. The extension of electricity to rural communities in the USA by private providers would hardly have occurred at the time it did without massive use of subsidies and other incentives (Wamukonya, Chapter 2). In keeping with historical practice, several developing country governments are trying to integrate a variety of economic and financial instruments to encourage the private sector to reach low-income, mainly rural communities (Wamukonya, Chapter 2) that would otherwise have been 'dumped' as unprofitable markets (Byrne & Mun, Chap-

ter 3). The launching of Chile's ten-year rural electrification programme in 1994 was a government-led effort seeking to electrify 100% of the electrifiable dwellings and to achieve at least 75% coverage by 2000 (Wamukonya, Chapter 2). Many developing governments have also played important risk-mitigating roles in attracting foreign direct investments into the electricity sector.

However, the mere availability of various instruments and measures to pursue specific policy goals, does not necessarily guarantee the promotion of an ESB agenda through government action. A critical role for government is to create effective packages of instruments and measures that are directed at the following:

- Empowering NGOs (especially those pursuing a sustainability agenda), consumer interest groups, and the like, with funding and analytical support to counterbalance the resources and expertise available to utilities and business sectors. This has been shown to be an effective way of ensuring an institutional voice for ordinary citizens and small businesses who, otherwise, would not have been represented in key mechanisms of the policy commons such as integrated resource planning (Byrne & Mun, Chapter 3).
- Enforcing stricter competition rules in the electricity markets to counterbalance tendencies to free market concentration, hence assuring a greater range of real choices among retail providers (Wohlgemuth, Chapter 4).
- Creating and maintaining ESB obligations on the operation of electricity market actors. The presence of such obligations partly accounts for the relatively greater penetration of renewables in the European Union than in other industrialised countries where reforms have taken place (Martinot, Chapter 10).
- Catalysing technological development and diffusion, leading to a more diversified fuel supply systems (energy security). Governments are more or less heavily involved in these issues and their engagement is likely to substantially affect the outcome.
- Expanding public incentive programmes in conservation through a variety of instruments including fees charged to consumers. For the most part these programmes provide incentives to increase important conservation activities.

A vast array of instruments or measures is available to government in promoting an ESB agenda, ranging from direct administration, management and ownership, to economic and fiscal instruments, trade instruments, energy sector regulation, energy research and development, voluntary agreements and information campaigns (Wohlgemuth, Chap-

ter 4; Bradshaw & Clark, Chapter 7; Martinot, Chapter 10). Articulating these into a coherent system adapted to country contexts depends to a large extent on the success with which government is able to engage a dialogue with other stakeholders such as NGOs and the private sector. Promotion of ESB needs a vigorous public discourse in which technology choices, investment commitments, social impacts, and ecological implications are routinely considered in an 'open access' regime of ongoing evaluation (Byrne & Mun, Chapter 3).

Private sector

If properly nurtured and developed through dialogue involving all stakeholders, the private sector can be an important vehicle for promoting an ESB agenda in power sector reform. Private sector operators can, for example, negotiate with government and NGOs to create innovative financing mechanisms and economic incentives that promote full consideration of renewable energy technologies for bulk power and distributed generation (Martinot, Chapter 10). Furthermore, private investors can contribute to the promotion of energy efficiency and conservation, which, by reducing the need for additional generation, can help advance the environmental protection agenda. In Britain, for instance, the private sector co-funded the Energy Savings Trust, an NGO whose goal is to achieve the sustainable and efficient use of energy to help cut down carbon dioxide emissions (Wohlgemuth, Chapter 4). Private investors have also been active in promoting economically sound renewable energy investments with considerable potential for increasing access within a distributed generation architecture. In India, nearly all of the approximately 1200 MW wind capacity installed by 2000 was by the private sector, motivated by favourable investment tax policies and a supportive regulatory framework that included transparent power purchase tariffs, transmission wheeling, third-party sales, guarantees for local utility power-purchase contracts and power 'banking' (Martinot, Chapter 10).

It should be pointed out, however, that engaging the private sector in a consensus-building process to advance environmental and social benefits must necessarily address genuine private sector concerns about investment risks. It is well known that private financing in electricity projects is often subject to the existence of a mature, long-term capital market as well as guarantees and rewards offered for perceived risks. Private investors have traditionally avoided investing in rural electrification, where, in addition to the relative immaturity of capital markets, risks such as lower than expected demand for services, below-cost and inflexible tariff regimes, and the like are regarded as being unacceptably

high (Wamukonya, Chapter 2; Dubash, 2002). How these risks are mitigated is arguably one of the keys to securing a greater private sector commitment and participation in advancing the ESB agenda in electricity reform.

To the extent that it helps build a broader vision of reform that is grounded in a strong socio-political consensus, the policy commons approach can significantly lower the perceived risks that hamper greater private sector role in promoting an ESB agenda in electricity sector. For example, a constructive dialogue involving private sector, consumer groups or NGOs and government has been shown to result in risk-mitigating agreements that not only enable private service providers to recover costs, but also promote end-use efficiency and energy conservation, keeping the total cost of electricity consumption within socially acceptable bounds (Byrne & Mun, Chapter 3). Far from being antagonistic to the private sector, the policy commons approach creates multiple opportunities for the private sector to operate on a genuinely sustainable footing – by positioning itself and demonstrating its commitment to advancing the ESB agenda in power sector reform.

International development and donor community

As several chapters here have made clear, donors in most cases played key roles in nudging countries to implement politically difficult reform decisions. The World Bank – often operating according to an 'expert-client' model in its interactions with national stakeholders – has frequently required governments to commit to institutional reform as a condition of loans for the power sector. Experience has shown, however, that this model of interaction cannot assure ESBs, largely because it compels governments (implicitly or explicitly) to pursue the unsustainable path of trying to build social consensus around pre-packaged – often inappropriate – models of reform, rather than to base reforms on social consensus. Moreover, because such externally prescribed reforms have been associated with economic hardship and political instability, developing country governments and NGOs have come to distrust the motivations and overall agenda of donors – hardly the basis for constructive collaboration to promote an ESB agenda. In this regard, a major challenge that threatens the future role of the World Bank and other international organisations in promoting an ESB-oriented agenda is what has been called their 'credibility dilemma' (Dubash, 2002).

There is an urgent need for donors to re-invent their image by adopting a less directive approach in their interactions with governments and NGOs. The case studies in this book provide several examples of the

sorts of roles that donors can play in this regard. The GEF has assisted policy-makers and NGOs – through direct funding or capacity building – to undertake analyses/studies that improve understanding, and inform the design/adaptation of relevant and appropriate approaches to promoting ESBs. Donor assistance can also be directed at assisting governments in key areas such as: development of regulatory frameworks to govern the behaviour of independent power producers, formulation of power-purchase agreements (including transparent buy-back and transmission pricing), designing of feed-in tariff schemes, and simplified procedures for access to the grid (i.e., legal and transactional support), etc. In Mauritius, for example, a World Bank/GEF bagasse project included the establishment of a regulatory framework for independent power producer development and an administrative focal point for private/public sector partnership in that development (Martinot, Chapter 10).

Ultimately, donor effectiveness in promoting an ESB agenda in power sector reform will depend to a large extent on their ability to operationalise an internal shift in ideology from one focused primarily on economic efficiency towards a more balanced paradigm that includes equity and sustainability. Insights from the case studies here, as well as the wider debate on power sector reform, suggest that donors can regain their credibility as advocates of the public interest in electricity and energy sector transformation by working in partnership with government, NGOs and the private sector in: strengthening domestic and international political coalitions supportive of the ESB agenda; facilitating open dialogue, accountability, and participation in all debates over power sector reforms; encouraging stakeholders to structure power sector reform around sustainable development goals; and promoting financing mechanisms that are consistent with sustainable development goals.

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