Of Rocks and Hard Places: A Critical Overview of Recent Global Experience with Electricity Restructuring

Navroz K. Dubash and Daljit Singh[1]

Abstract: Indian debates over electricity have been strongly influenced by international experiences. This paper provides a critical overview of recent global debates on electricity restructuring. The paper first discusses the electricity price trajectories in countries that are often cited as models of reform. It then discusses several challenges to creating competitive markets in electricity. The final two sections relate international experience to the Indian context. The authors find that the full model of organised electricity markets will be extremely challenging to implement in India, and suggest a more pragmatic "no-regrets" approach. Suitably designed, competition may be one element in this approach but it is not a short-cut to larger reforms.

I. Introduction

Indian debates on electricity reform have been strongly influenced by international currents and in particular by the emergence of an international "standard model" of electricity restructuring. This paper serves as an overview to the global experience with restructuring. We draw not only on the papers in this special collection but also on the extensive international literature in order to complement and provide a context for the country and regional papers that follow. Given the recent turbulent history of the sector, and the emergence of implementation challenges in several countries, we have given rather more space to recently emergent critical and revisionist perspectives on electricity restructuring. However, we attempt to steer clear of unhelpful "for" or "against" formulations to document a set of concerns and questions with international experience that can inform the Indian debate.

We understand restructuring to be driven by the vision of increasing competition and choice as the mechanism of coordination in the electricity sector. To achieve this, the "standard model" envisions several associated reforms. Unbundling of existing utilities is the means by which separate and competing entities are created. Management and/or ownership changes, potentially including full privatisation, prepare the unbundled entities for competition. Liberalisation removes barriers to entry and increases the effectiveness of competition. And not least, new forms of regulation are necessary to ensure an effective and competitive market. Many of these measures have become important reform objectives in their own right, and separate from the issue of competition.

Of all these steps, the discussion over competition is increasingly active in India. This was not always so. In the early years of reform, liberalisation of investment was viewed as a necessary and even sufficient step to solving the ills of the sector. By the mid-1990s, the focus shifted to privatization of distribution companies as the single solution. Competition, albeit poorly understood and poorly defined, is well on its way to becoming the contemporary magic formula to a healthy power sector.

The tone is set by the Electricity Act, 2003, the preamble of which states that "promoting competition" is an end in itself, or at least as a taken-for-granted means to a better electricity sector. The Act is written to enable, if not mandate, competition in electricity although it does also encompass several other types of reform measures in its ambit.

Editorials in the business newspapers are unanimous in urging adoption of competition; a recent sample from the Business Standard declares "… critical if India is to remain competitive … is that competition be introduced in the [electricity] sector" [Business Standard 2005]. Commenting tariff hikes and their subsequent roll-back in Delhi during the summer of 2005, one of only two states to have privatized distribution, news commentators confidently assert "…competition is the only alternative" [Karnik 2005] and "competition … must be allowed in residential areas" [Times of India 2005].

At the same time, the broader debate about the Indian power sector is appropriately concerned with far more than introducing competition in electricity. Distribution reform, subsidy removal, management practices, rural electrification, and regulatory practice are all the subject of active discussion. Despite all these important concerns, in recent years competition has had an increasingly strong rhetorical hold over the debate.

For this reason, the emphasis of this paper, although not the only focus, is on understanding the international experience with organized markets and competition in electricity. Since many empirical and theoretical issues in electricity restructuring remain hotly contested, the objective is by no means to provide definitive answers, but to outline as clearly as possible the contours of the debates. In the concluding reflections on the lessons for India, we highlight the important distinction between utilizing competitive mechanisms in a manner suitable for the current Indian context, and uncritically using the standard model of restructuring as a new magic solution to side-step the more prosaic and politically challenging reforms necessary. The title of the paper reflects our conclusion that there are no easy solutions to reforming electricity in India

The paper is organized as follows. Section II focuses on the electricity price record in restructured countries, which is often considered the single most important empirical indicator of performance. Section III examines in more detail the challenge of creating competitive electricity markets. Section IV briefly reviews transition problems faced by developing countries. Section V relates this material to the Indian context, while Section VI provides a few concluding thoughts on the way forward for India.

II. The Price Record

The idea underlying electricity restructuring is ever greater efficiency driven by deepening competition. For restructuring to be politically sustainable, these gains have to be realized, and they have to be passed on to a sufficiently broad swathe of the population. Certainly in industrialized countries restructuring has been sold to the public in terms of price benefits. And drawing on this experience, industrialized country gains in price terms are used to motivate movement toward competition in developing countries.[23] In practice, establishing a causal connection between restructuring and price trends is hard because of several intervening factors. This section reviews the price record experience of a few countries that have undergone restructuring.

United Kingdom (England and Wales): A widely cited social cost-benefit study of the UK experience by Newbery and Pollitt (1997) found substantial efficiency gains from privatization and restructuring: an overall net benefit of GBP 6.0 billion and 7.5% reduction in prices driven by decreases in labour and operating costs. However, these

gains have been unevenly distributed. New private utilities -- whose share prices have tripled since flotation -- have gained disproportionately, government has gained moderately, but power purchasers are paying more than they would have under public ownership. de Oliveira, Gorini and Tolmasquim (2004) further find that fuel suppliers and employees of utilities were the big losers from the reforms, while directors, management and shareholders of the private utilities, consultants, and suppliers of equipment were the big gainers.

Thomas (this volume) digs a little deeper into the sources of the gains to cast doubt on whether price gains can be attributed to competition and whether they are sustainable.[4] First, several one-time events not attributable to competition accounted for cost reductions. These include a dramatic decrease in prices of coal (30%) and gas (50%), the end of the government's subsidy to nuclear plants, surplus capacity driven by low gas prices in the late 1990s, and the cost savings of new gas technologies. Second, a large part of price reductions were obtained in the regulated distribution segment rather than in the competitive segment of the sector. Finally, while large consumers have been able to use competitive processes to advantage, there is some evidence it is at the cost of small consumers. Following full deregulation of the retail segment, small consumers, who face high transaction costs in accessing the market, have seen price increases in 2003-04 alone that undo all the price reductions from 1987 onwards. At best, the benefits from competition in the UK are highly ambiguous and certainly problematic from a distributional perspective.

United States: As in the UK, the conventional wisdom is that restructuring is associated with falling prices [Joskow 2003a], but the clarity and causality of the linkage is debatable. Blumsack et. al. (this issue) point out that in the widely celebrated Pennsylvania-New Jersey-Maryland (PJM) market, decreases in retail prices were likely caused by a regulatory mandate rather than by competition. Even large industrial consumers, who are best placed to benefit from competition, do not appear to have done so. Industrial prices in restructured states have increased marginally, while those in regulated states have remained constant. In addition, others have pointed out that declines in retail prices may have been driven more by the glut in generation capacity in the 1990s, rather than directly by competition [Van Doren and Taylor 2004: 3].

Norway: On reviewing the Norway experience with markets, Bye and Hope (this volume) conclude that there has been a downward pressure on prices, and that there has been a narrowing of price differences between consumers. However, the Norwegian market did go through a near crisis from August 2002 to January 2003. Due to an unexpected reduction in inflow of water, there was a 17 percent reduction in annual energy production in Norway in 2002-03 [Bye and Hope this volume]. This resulted in an increase in the spot market price of about 600 percent (to about $115/MWh).

Interpretations of this episode differ quite widely. From an economic perspective, an expert group that evaluated the event concluded that the market had functioned as expected [Bye and Hope this volume], had solved the scarcity and had proved to be robust [Finon, et.al 2004]. The market cleared at an unprecedented high price but still considerably lower than the price caps set in other markets under crisis, such as California. The high prices led to increased imports from Denmark and Finland and to decreased consumption in Norway. In political and social terms, however, the event was

widely seen as a crisis in Norway. Commenting on the Norwegian experience, Finon et. al. (2004) find that using prices alone to clear electricity supply and demand comes at the cost of price volatility and social unrest. From a political perspective, the Norway price spike suggests that there are political limits to the functioning of electricity markets.

Argentina: Argentina presents perhaps the strongest case for the benefits of competition [Millan this volume]. In the Greater Buenos Aries area, the average real tariff fell by 29% in the post reform period from 1992 to 2002, accounted for almost entirely by declining cost of wholesale power, which fell by 70%. Moreover, price volatility decreased. Over this period, plant availability improved 30% and labour productivity in generation improved almost 300% in five years [Pollitt 2004a: 12-15]. After reform Argentina attracted $7.5 bn of investment in gas-based capacity, adding over 5000MW (about 25% of total capacity) between 1992 and 2002 [Pollitt 2004a: 13].

Even in Argentina, however, there are some confounding factors. Understanding Argentina's ability to attract large amounts of investment is complicated by the coincidence of electricity reform and a broader and radical 1991 macroeconomic stability plan which established parity between the peso and the dollar. This measure insulated investors from currency risk, which may have played a role in attracting capital [Haselip 2005]. Second, the effective monetary appreciation caused by the convertibility plan raised returns considerably for private utilities and investors, even while exposing small consumers to enormous price hikes in dollar terms [Kozulj and Sbroiavacca 2004]. After the economic crisis of 2002, the sector is in a state of crisis, as the government has introduced "pesofication," effectively forcing investors to accept locally denominated returns and exposing investors to considerable losses [Haselip 2005; Pollitt 2004a]. In practice, therefore, it is hard to separate the impact of liberalization and restructuring from a virtual dollarization, the latter having proved to be an unsustainable policy. [5]

Finally, as with other countries, the benefits of price decreases were unequally distributed. Industrial consumers benefited greatly, average captive customers saw a 14% decline, and the smallest residential customers (38% of the total) experienced an absolute increase of 25% [Pollitt 2004a: 14]. Despite what appear to be large efficiency gains, recent *Latinobarometro* public opinion polls find that privatization is popularly opposed, more so when the respondent is poor, and privatization involves public utilities such as electricity [Carrera, Checchi, and Florio 2005].[6]

These snapshots suggest it is extremely hard to draw definitive conclusions about price trends under electricity markets. However, it may allow the following tentative observations.

First, real electricity markets cannot guarantee lower prices. Instead, a range of intersecting and contradictory pressures shape specific national outcomes. There does seem to be evidence of efficiency gains, whether driven by privatization, or competition, or both, but the effect may be swamped by local factors such as idiosyncratic input price changes, or macroeconomic changes. In addition, price uncertainty under restructuring systematically raises the cost of capital for investment, which may work to raise the overall price to consumers [Woo et al. 2005].

Second, price volatility does indeed seem to go up in price-bid markets, as the cases of California and Norway suggest, although this factor may be absent in cost-bid markets

such as those in Latin America. Volatility may be due to gaming and the exercise of market power, or to inherently inelastic price response in electricity markets and long lag time for new capacity. Real time pricing would be one important solution to a better demand response, but as of now, it has not been fully implemented anywhere [Lave, Apt, and Blumsack 2004; Woo et al. 2005].

Third, as the UK and Argentina suggest, small consumers do not do as well as large industrial consumers (see also Millan, this volume) since gains from competition often come at the cost of the captive, normally residential, sector [Sioshansi and Hamlin 2004]. When low cost customers exit, the price for those left behind inevitably goes up.[7] Competition and choice in electricity appears to have a built in bias toward large consumers.

III. The Challenge of Creating Competitive Electricity Markets

Creating a "free" market for electricity may be a relatively straightforward task, but creating a "competitive" market that meets expected standards for reliability and technical stability, let alone social expectations around price and other factors, is far harder [Lave, Apt, and Blumsack 2004]. The distinction between a free and effective market for electricity lies behind the mixed empirical record of electricity markets. This section highlights several hurdles to creating effective, competitive and well functioning markets for electricity.

Physical Demands of the System: Is Electricity Different?

Proponents of electricity markets point to gains from restructuring in the airline industry, trucking, telecommunications and natural gas to support their cause [Malloy 2005], but electricity has several characteristics that make it stand out. Since electricity cannot be stored, demand must match production at any given moment in a manner that keeps voltage and frequency stable across the whole network [Joskow 2003a; Sioshansi and Hamlin 2004]. Sprawling transmission networks help achieve this task by providing scale over which to smooth supply and demand; network congestion reduces the efficiency of the network at performing this role. Moreover, the AC transmission network is like a gigantic commons, in which bilateral contracts between two parties can introduce externalities through loop flow effects [Joskow 2003a; Van Doren and Taylor 2004]. The balancing task is further complicated by slow supply responsiveness because generation capacity has a long lag time, and low system elasticity of demand because consumers tend not to be price responsive. Congestion in transmission networks can shrink the geographic scope for competition, exacerbating the problem of matching demand to supply. For several of these reasons, system reliability requires provision of "ancillary services" and complementary, and complex, markets for these services [Joskow 2003a; Lave, Apt, and Blumsack 2004].

On the generation end, the capacity mix matters to how electricity markets work. For example, in hydropower based systems, reservoir discharge along a river has to be coordinated to maximize production, which may result in dispatch quite inconsistent from the demands of market competition.

In brief, electricity systems are machine like in their nature. Under vertical integration, coordination is achieved through direct control, while electricity markets have to

indirectly ensure technical coordination through economic relationships. Commenting on this challenge, U.S. deregulation guru Alfred Kahn, has observed "I am worried about the uniqueness of the electricity markets. I've always been uncertain about eliminating vertical integration. It may be one industry in which it works well" [quoted in Kahn 2001].

Electricity Markets are Vulnerable to Market Concentration and Exercise of Power

As in any industry, competition requires a sufficient number of players to ensure that market power is limited and collusion is unlikely. Country evidence suggests a tendency toward concentration in ownership and an ever-present risk of market power.

The roots of market concentration may lie in the early struggle to sufficiently horizontally unbundle generation. Thomas (this issue) reports that after restructuring, the UK system has come to resemble a duopoly, and the regulator has had to intervene twice to force the two largest companies to sell plant. Millan (this volume) notes that across Latin America, the generation sector is highly concentrated: the three largest firms control more than 50% of supply in most countries. Even in the best cases of Argentina and Brazil, the largest three firms control 30% and 40% respectively, and in the deeply problematic case of El Salvador, there are only two generating companies in a tiny market. In electricity markets, the lumpy nature of power investment, and the challenges of managing the transition away from an integrated and publicly owned entity, suggests that achieving a competitive market structure is difficult even in relatively large markets such as the UK and Brazil.

Since electricity cannot be stored, market concentration in particularly a problem. Under some conditions electricity generators can exercise market power even if they control a relatively small share of supply -- the "pivotal supplier" problem – a problem that grows more severe if firms collude [Blumsack et. al. this volume]. Moreover, U.S. market simulations suggest that based on knowledge of bidding strategies, 2-6 generators colluding implicitly could cause black-outs in much of the US. These are more than theoretical concerns; Woo et. al. (2005) cite examples of the exercise of market power in a range of situations, including California, PJM, Texas and New York (USA), Alberta (Canada), Australia, UK and Germany.

Vertical re-integration or inadequate vertical unbundling, which allows for "cross-dealing" across segments of the industry, provides further scope for market power. Vertical integration is attractive for a power company because it allows generators to have at least the potential of an assured market for their power, and thereby raise capital at lower costs. In the case of the UK, Thomas (this volume) suggests that integration has indeed lent a competitive advantage. Moreover, he finds that electricity retailers were allowed to invest in generation precisely to dilute the power of the generation duopoly, in effect trading off one kind of market power for another. In Brazil, fear of insufficient investment in generation has led the government to allow reintegration as a way of reassuring generators [Millan this volume]. In El Salvador, the US company AES plans ownership of generation capacity to complement its control of 80% of the distribution business. In short, countries face considerable structural pressures in favour of vertical reintegration both as a way of bringing down risk of investment in generation, and

because the players in the electricity business are limited, forcing a trade-off between horizontal and vertical unbundling.

There is No Single, Proven Electricity Market Design

After two decades of electricity restructuring, there are almost as many electricity market models as there are restructured countries. Most countries seek the same outcome – reliable, efficient and competitive markets. However, in attempting to juggle contending objectives such as clear price signals, stability, and limits on market power, countries have come up with a bewildering array of institutional designs. Electricity markets illustrate convincingly that markets are institutions shaped by history and politics, not some pure abstraction. This section cannot possibly detail the enormous and complex literature on electricity markets, but will instead illustrate the variety of models and make a few summary observations.

Chile: Chile uses a cost-based bidding process from which a spot price is derived. It was heavily shaped by the realities of the hydro-dominated Chilean generation sector [Pollitt 2004b]. Trying to deal with similar concerns of hydro dependence, Brazil eschewed daily auctions in favour of a mandatory forward market and a spot market for balances, with each hydro plant allowed to negotiate terms only on a portion of energy generated [Millan this volume].

UK: The UK established a compulsory power pool based on half-hourly price bids, but allowed bilateral contracts with side payments to compensate for deviations from the pool price. Because of political compulsions relating to coal and nuclear power,[8] plus perceived flaws in the pool structure itself, less than 5% of power was transacted through the pool. In 2001, the pool was replaced by the New Electricity Trading Arrangements (NETA) based heavily on bilateral contracting [Thomas this volume].

Norway: The Norwegian Pool (Nord Pool) began with the premise that not all electricity would pass through the pool, and is structured around a two tier market – a day-ahead market, and a balancing market. In addition, there are markets for derivatives that help participants manage risk from market uncertainty and price volatility [Bye and Hope this volume].

US: In the US there are wide differences across states or regions [Blumsack et al. this volume]. Most Regional Transmission Organizations (RTOs) operate an hourly auction for electricity, and many coexist with a bilateral long-term contracting mechanism. The Texas market is entirely based on bilateral transactions, while California's approach attempted to replace bilateral contracts with a day ahead power market in addition to an hourly auction. For four years, the debate in the US centred on a "Standard Market Design" put forward for debate by the federal regulator, heavily based on the Pennsylvania, New Jersey Maryland (PJM) regional model. Debates on these various models continue. While most agree that California's approach had some fundamental flaws [World Bank 2001; Joskow 2001; Brennan 2001; Borenstein 2002; Bushnell 2004], even the highly touted PJM model is not entirely free of criticism; industrial consumers have argued that generators are not bidding their marginal cost but are side-stepping the system to bolster revenues [Kelly and Moody 2005].

These snapshots suggest four tentative observations. First, market designs have to anticipate and design for a wide range of unpredictable circumstances, an extremely difficult task. The innovative UK pool provided an unpredictable price signal leading to declining confidence in the mechanism and its ultimate replacement. Doubts continue about the arrangement which replaces it. While the California market was heavily criticized after the crisis, the same structure may well have shown far more reasonable results had there not been a sequence of un-correlated but coincident circumstances that placed the system under stress. As Joskow (2003a: 27) argues, it is only under tight supply conditions that markets are truly put to the test.

Second, in most countries, market design does not take place in a vacuum, but has to accommodate the local and historical context, including political priorities. In the UK, market design had to contend with the viability of politically important coal mining and nuclear generation industries. In California, as in much of the US, the transition system had to accommodate utilities' demands for a mechanism to reimburse them for their "stranded costs" of uneconomic prior investments. In Norway, the market had to be designed around the energy demands of historically important energy intensive industries. In Chile and Brazil, the market had to accommodate the system's dependence on hydro electricity. The lesson is that countries cannot count on unlimited flexibility in market design but will have to work within political constraints and live with the resultant second-best solutions.

Third, design involves a range of trade-offs. For example, a market designed to provide clear and unmuddied price signals may also increase uncertainty and stifle investment in new generation. Arrangements that limit risk – long term contracts and vertical re-integration – may compromise the ability of the market to send clear signals. This trade-off appears to have applied in the UK and Brazil.

Fourth, Woo et. al. (2005) observe that a complicated market design opens the door to gaming by traders and retailers. Indeed, the example of Enron in California suggests market designers will be hard pressed to stay ahead of those who seek to game the market. For example, Enron took advantage of the two part market in California by over-scheduling load such that they could sell more power in the lucrative hour ahead market, a strategy they called "Fat Boy" [Woo et al. 2005].[9]

Joskow (2003a) has compiled a list of ten design lessons drawn from the experiences of the past decade. While not insurmountable, the task implicit in following these lessons is daunting, leading some to question whether the compromises and the cumulative costs involved in implementing the lessons learnt may overwhelm the presumptive benefits of restructuring [Lave, Apt, and Blumsack 2004]. The early vision of elegant markets has given way to a bewildering array of unwieldy structures with an array of patches and fixes to address the challenges of real electricity markets.

Restructuring may Dampen Incentives for Generation Capacity Addition

An important benefit of restructuring over regulation is that it appropriately shifts investment risk from consumers who have little control over investments, to investors who do [Van Doren and Taylor 2004]. Indeed a "bedrock assumption" of restructuring is that wholesale competition is sufficient to discipline price and send adequate signals to investors in new generation [Kelly and Moody 2005]. However, the experience from

much of Latin America [Millan this volume], which has suffered capacity shortfalls, suggests that price signals alone may not be sufficient to ensure adequate investment in generation. In Norway, which has enjoyed surplus capacity in the past, there is an emergent debate about how to ensure adequate capacity in the future [Finon et. al. 2004; Bye and Hope this volume].

The problem is illustrated by the US and UK, where de-regulation has led to a boom and bust cycle of investment in generation, and a resultant heightened perception of risk in the sector. In the US, low gas prices led to an investment boom, followed by a bust when gas prices rose. The market responded by downgrading merchant generating companies: in 2001, the lowest rating among the eight largest US merchant generators was BB+ while by 2003, the highest among the eight only had a B+ rating [Joskow 2003a; Woo et al. 2005].

An increased risk perception translates to a higher cost of capital.[10] To reduce risk, generating companies seek to sign long-term contracts, but this only shifts risks to electricity retailers [Woo et al. 2005]. In the UK, greater risk led to re-integration, which has been accepted as the price of avoiding further market power in generation which would have resulted from a drop off in generation investment [Thomas this volume]. In signs of the same pressures in the US, there were no takers for distressed merchant generators other than incumbent utilities,[11] and utilities are increasingly turning to their own affiliates to contract long-term generation [Woo et al. 2005].

In a sign that price signals alone may provide inadequate incentives for investment in generation, countries are experimenting with markets for installed capacity, or capacity payments of various sorts. However, there is a risk that separate payments for capacity combined with restructuring may be just as prone to incentives for excess capacity as the pre-restructuring world of regulated investment [Van Doren and Taylor 2004; Kelly and Moody 2005]. If so, the net result may be the same outcome through more complex means.

Restructuring Places Greater Stress on Transmission Infrastructure

As customers search for low cost power the number of electricity transactions increases, which requires a more extensive transmission network [Gellings and Lordan 2004; Lave, Apt, and Blumsack 2004: 24]. Inadequate transmission networks can exacerbate the potential for the exercise of market power, already a potential problem in restructured markets. Since transmission networks built for integrated systems are not designed for competition [Joskow 2003a: 70], restructuring likely needs to be accompanied by substantial additional investment in transmission.[12]

The complexities of managing transmission systems under competition are manifold, and an extensive literature has sprung up around both the problems and the solutions.[13] These issues include: mechanisms to handle congestion management; the effectiveness of locational marginal pricing at sending investment signals; the scope for merchant transmission investment; and the challenges of providing appropriate incentive mechanisms for efficient network expansion [Brunekreeft, Neuhoff, and Newbery 2005].

Finally, decisions about transmission investment in a restructured environment can be deeply political. New transmission line can create winners and losers among generators

and even distributors, since it shifts the sources and costs of customers and power respectively. For this reason, among others, there is a strong argument for central system-wide planning for transmission, particularly in a developing country context of rapid economic growth and growing electrification.

Few Takers for Retail Competition

Retail competition, or allowing all customers to have access to competing suppliers, is the final step toward a complete electricity market [Hunt and Shuttleworth 1996]. By bringing all consumers within the market, retail competition is intended to strengthen the price signal that forms the glue of restructured markets. However, implementation is complex, requires a complex settlement mechanism, and considerable investment in real-time meters or load-profile estimations. Moreover, most residential and even commercial customers may not be willing to bear the short-term volatility associated with retail markets [Chao, Oren, and Wilson 2005]. For these reasons, full retail competition often lags the establishment of a wholesale market by many years, and is not a priority in most developing countries.[14] [15]

More relevant is better demand responsiveness through real time pricing, which was a key part of the original intellectual rationale for restructuring [Van Doren and Taylor 2004; Lave, Apt, and Blumsack 2004]. Real time pricing would allow consumers to modulate their demand, flattening the load curve and diminish the need for expensive peaking capacity. In practice, however, real time pricing has not been fully implemented anywhere, both because of the costs of additional metering and the risk that consumers would not tolerate fluctuating electricity prices.[16] Whatever the merits and practicalities, it is important to note that real time pricing could be realized quite independently of retail competition.

Market Institutions are Costly and Complex to Establish

International experience suggests it would be a mistake to assume that creation of electricity markets allows for the government to shrink its role in the sector. Instead, market monitoring and scrutiny, especially in the early stages when course corrections may be needed, are essential [Costello 2003]. The resultant regulatory burden can be heavy. For example, in 2003 the UK Office of Gas and Electricity Markets (OFGEM) employed 312 people and spent GBP38 million a year. Interestingly, the budgetary allocation toward making markets work effectively (57%) was about twice that of regulating the monopoly business (28%) [Thomas this volume]. As another point of comparison, the US Federal Electricity Regulatory Authority (FERC) has a staff of about 1200 [Hunt 2002]. Despite these considerable resources, the Chairman of FERC was quoted in the aftermath of the California crisis as saying that US regulators had “a long way to go” to match the sophistication of the companies it regulates [Egan 2005].

In addition, a full blown wholesale electricity market carries with it heavy institutional costs. The start up costs of markets institutions such as a system operator and its supporting infrastructure –mechanisms for communication between market players and the system operator and market making software – can be considerable [Wolak 2004]. Moreover, a competitive market requires that all parts of the market – spinning and non-spinning reserves and reactive power – are competitive. The establishment, operation, and monitoring costs for all these functions can be extremely high. For example the start

up cost of the California Independent System Operator are variously reported as USD250 million [Wolak 2004] and between USD 300 million – 1 billion [Lave, Apt, and Blumsack 2004], with operating costs of USD 200 million a year. Moreover these costs are largely fixed costs, and do not shrink if small amounts of power are being transacted in an electricity market [Wolak 1997]. While the costs will be lower in the developing world due to lower salary costs, the under-resourced state of most regulators in India and other developing countries does not inspire confidence that the capacity necessary to run a sophisticated electricity market will be met.

IV. Experience of Developing Countries

The challenge of implementing electricity restructuring is compounded in most developing countries by unfavourable initial conditions. Since electricity restructuring was developed for essentially well functioning systems, developing countries have faced the uphill task of strengthening weak institutions and systems, managing weak finances, and addressing entrenched political interference, all while transitioning to market systems. This has proved to be a tall order.

As with industrialized countries, national political compulsions have invariably shaped reform efforts. For example, apartheid in South Africa, debt burdens in Latin America, and rural electrification in sub-Saharan Africa have placed their stamp on national restructuring experiences. Finally, the growing debate over the viability and applicability of the restructuring model in countries like the US and UK has resonated in the developing world. In particular, the California experience has highlighted the potential downside risks and high costs of flawed restructuring.

In the developing world, restructuring efforts and their outcomes differ widely by region, as the papers in this collection suggest. With the possible exception of Latin America, however, the initial experience of a decade of electricity restructuring in the developing world has been less than salutary. A significant assessment by the World Bank of its turn toward a private sector led development of electricity concludes that the organization "underestimated the complexity and time required for reforms … to achieve lasting … outcomes" that the rural poor have been overlooked, and that there is no "one-size-fits-all" model for power sector reforms [Manibog et. al. 2003: 31]. The same pessimism is evident in a review by consultants from the National Economic Research Associates of their experience with a range of developing countries: "most of these privatization-focused power sector reforms have stalled, and some have been abandoned in all but name" [Rosenzweig, Voll, and Pabon-Agudelo 2004]. They go on to ask: "why there is so little to show for the expenditure of so much time, thought and treasure?" In further examining this question, it is instructive to explore some key themes that emerge from developing country experiences with electricity restructuring.

The Experience with Privatization

Due to a history of state-owned public utilities, privatization has been an essential part of electricity restructuring in most developing countries. Since the establishment of competition is a slow and amorphous process, privatization has been the most visible and controversial face of reforms in the developing world. With the exception of the early Latin American countries, particularly Chile and Argentina, most developing countries that have initiated reforms have had trouble attracting buyers. This problem has been

exacerbated by a global downturn in investor interest following the Asia crisis that has only partially been reversed.

As a result, there has been no or very little competition in the sale of assets to private players. Wamukonya (this volume) cites the examples of Senegal and Mauritania that have had difficulties achieving privatization. This experience is echoed in India. Privatization of the distribution business in Kanpur was unsuccessful. In Delhi there were only two bidders for the purchase of the three distribution companies in Delhi, and since the government wanted a basis for benchmarking performance, each bidder was guaranteed at least one company.

Wamukonya (this volume) also notes that in many cases foreign investors are able to extract better terms than are local buyers. For example, in Tanzania, AES was awarded favourable dollar-denominated terms not offered to the local utility for the lucrative gas to electricity Songo-Songo project.

However, the track record of private companies that have taken over the distribution business does suggest they have some success at improving efficiency. In Cote d'Ivoire, Wamukonya finds power outages decreased from 50 hours to 19 hours per month in a four year period, and Tanzania records similar improvement in quality and supply. The most dramatic data are from Latin America. Millan (this volume) notes that the private utility in Bogota cut its T&D losses from 24% to 12.5%, increased customers per employee from 800 to 1900 and reduced the frequency and duration of interruptions by 30% in two and a half years. Similarly, the two distribution companies supplying the Greater Buenos Aires area in Argentina reduced losses from about 25% to 8-10%, and increased labor productivity from less than 2 GWh per employee to 5.7 GWh per employee between 1993 and 2001 [Pollitt 2004a: 15-16]. These striking improvements reflect, in part, the sorry state of the sector prior to privatization, but nonetheless also point to the ability of the new private owners to actually realize large efficiency improvements.

Other evidence suggests that efficiency gains from privatization cannot be taken for granted nor are they automatic. Millan (this volume) notes that in the Dominican Republic, Nicaragua, and the North Coast of Colombia, private distribution companies are struggling to control losses, and have failed to counter factors such as strategic behavior to influence tariffs, extreme poverty, a culture of non-payment, and weak law enforcement. Also, not all private actors make equal efforts to improve performance. Rosenzweig et. al.(2004) point out that for the first several years after privatization of a major Brazilian utility, the new owner deployed not a single staff member from its parent company to Brazil, calling into question the conventional wisdom about privatization leading to the automatic transfer of skills and management techniques. Finally, even in countries with rapid efficiency improvements, such as Argentina, the public perception of privatization remains overwhelmingly negative [Carrera, Checchi, and Florio 2005], suggesting that the public remains unconvinced that they will share in any gains realized.

Settling the controversial issue of privatization is well beyond the scope of the limited empirical material available in this collection. However, this discussion underscores the need for greater research and understanding of the role of ownership, as separate from other factors, in achieving efficiency gains, the conditions under which private ownership

is beneficial, and indeed whether privatization is a viable strategy given the difficulties of attracting private capital to the distribution sector, in particular, in developing countries.

Regulatory Inadequacy

Almost all the reform models that have been recommended for developing countries assume the presence of an independent regulatory agency. However, truly independent regulatory agencies have been rare in the developing countries. For example, in many Latin American and African countries regulatory agencies report to the Minister for Energy considerably reducing their independence [Millan this volume; Wamukonya this volume]. In Namibia, for example, the regulator was pressured into issuing a license to a company that it did not feel had the expertise or finances to handle the task [Wamukonya this volume].

The weakness of regulatory institutions is exacerbated by the lack of qualified staff. Many of the staff members are ex-employees of the public utility being regulated creating a potential for biased decision making. For example, most of the initial staff at the South African National Electricity Regulator (NER) were ex-Eskom employees a situation that is only being overcome through deliberate investment in regulatory capacity building [Eberhard this volume].

In addition, regulatory capacity has been further strained by an unrealistic fascination with and use of complex market models and regulatory regimes that are incompatible with local capabilities [Rosenzweig, Voll, and Pabon-Agudelo 2004; Millan this volume]. Such models have been developed for highly developed power systems with compatible commercial and legal systems. For example, due to insufficient metering and lack of audits even the true extent of electricity use and losses is unknown in much of India. Under such conditions, innovations such as performance based regulation are inconceivable in much of the developing world [Rosenzweig, Voll, and Pabon-Agudelo 2004]. Developing, regulating, and monitoring complex market structures are even more so.

The Challenge of Increasing Access to Electricity

A major difference between the power sectors of developed countries and developing countries is that the latter have a significant fraction of the population without access to electricity. Despite this, as Wamukonya (this volume) points out for Africa, there has been little effort in the early years of reform efforts to integrate electricity access into larger sector reform, an observation that holds true for India as well. Ensuring that rural electrification is not cast aside during the long and tortuous process of restructuring and reform has proved to be a difficult task for many developing countries.

When electrification is explicitly considered, Eberhard (this volume) argues that the success of programs can be independent of the industry structure. There are examples of Government owned vertically integrated utilities doing an excellent job as in South Africa where the goal of electrifying 2.5 million new homes between 1994 and 1999 was exceeded. However, in the rest of Africa the utilities have done a disastrous job of increasing access. There are also examples of privately owned competitive utilities that have advanced electrification as in Chile, where the percentage of rural households without electricity has decreased dramatically from 62% in 1982 to 14% in 2002 [Pollitt

2004b: 11]. Explicit policy goals, regulatory instruments, dedicated implementing institutions and funding are required.

Multiple and Contradictory Roles of the Government

As the challenge of rural electrification illustrates, in much of the developing (and industrialized world) provision of electricity has long been a public service and the responsibility of governments. While restructuring may seek to shift ownership to the private sector and regulation to independent authorities, the public perception of electricity provision as the responsibility of the government is not easily undone. Bad electricity provision can lose governments elections, and in times of crisis, governments are expected to step in and pick up the tab, whether in Brazil or California. For this reason, governments are often reluctant, and understandably so, to entirely release control over the sector. It also explains why governments in South East Asia and South Africa have stepped back from restructuring after the growing perception that it brings a high down-side risk.

The result is often an unsatisfactory half-way house. Millan (this volume) notes considerable continued government ownership of electricity assets even after privatization. By playing the multiple role of policy maker, regulator, and owner of assets, the government can introduce conflicts of interest which erode the confidence of private players and have a detrimental effect on the performance of the sector. Even if regulation is handed over to an independent body, typical regulatory tools such as financial incentives and penalties are relatively effective on state-owned enterprises directed by political rather than commercial interests. This reduces the regulator to a "toothless tiger" [Rosenzweig, Voll, and Pabon-Agudelo 2004].

Developing countries today have no good solution to the dual nature of electricity – commercial good and public service. The traditional answer – retain policy control with government but devolve ownership to private companies and regulation to independent bodies – does too little to insulate governments from a political backlash against tariff hikes and anti-privatization protests. At the end of the day, the biggest problem with the restructuring model may be its incompatibility with the politics of electricity in the developing world.

V. What does International Experience Mean for India?

In this section, we turn to an explororation of what the global review of experience with competition holds for India by asking:

1) what are the key lessons of global experience with electricity competition?

2) how viable is the standard model given the current Indian context? and

3) how do we understand the current limited form of competition – introduction of open access – that is at the root of debates over electricity competition in India today?

1. Key lessons of global experience

After a slow start – India is a relative laggard in power sector reforms – the global "standard model" has been embraced enthusiastically by substantial and powerful segments of Indian society. Ironically, this embrace and acceptance comes at a time of

great ferment in global intellectual debates about the track record and theoretical merits of electricity markets.

Our review of the international experience in power sector reforms suggest grounds for caution in treating the model of full electricity restructuring as the single long run vision for India's electricity sector, and the sole guiding principle behind policy. This is not to overstate the case of the critics and suggest that electricity restructuring is passé, but to point out that debate is fierce and the future of the model uncertain. As a recent World Bank sponsored review of the econometric evidence cautiously concludes, until there is more knowledge about outcomes, "…implementation of reforms will be more based on ideology and economic theory rather than economic evidence" [Jamasb et al. 2005]. There currently exists a divide between those who feel that the standard model can and should be fixed, and those who think the fixes are too onerous and will impose very heavy costs. However, everyone agrees that getting the standard model to work in practice is much more difficult than was initially believed.

Specific criticisms of the standard model that have particular resonance for India are:

- Spot markets do not appear to credibly and reliably send signals to investors for investment in generation;[17]
- Transmission capacity to connect different regions can be a constraint to effectively functioning markets;
- The cost and challenges of new institutional arrangements are enormous; Electricity markets require regulatory skill and capacity that is arguably far greater than a regulated market;
- The benefits for small consumers have been much less than the benefits for large consumers, a result that has political costs;
- Since government often has to bear the up front costs of compensating those who lose as a result of restructuring, reforms may place more, not less, burden on public finances in the short to medium run.

2. Viability of the Full Restructuring Model in India

Competitive energy markets were designed to squeeze additional efficiency gains out of well functioning and financially viable systems. Even under these circumstances, introduction of competitive energy markets has been a challenge. There are good reasons to believe the challenge will be considerably greater under current Indian conditions. Indeed, commenting on the viability of restructuring in the Indian context, the well-regarded energy economist Frank Wolak (2004: 3) has observed "It is difficult to imagine more adverse circumstances."

First, no country has ever introduced competitive electricity markets in the context of shortages. Instead, most countries have started out with surplus capacity (indeed, this was a motivation for reform in some cases) and several have run into trouble when the surplus was exhausted and restructuring failed to provide sufficient inventive for investment in new capacity. By contrast, India will start with a position of massive shortages, forcing policy-makers either to stifle price signals at birth by using price caps or the safety net of the public system (thereby further stressing it), or face politically unviable price spikes.

Second, establishing a market when a large proportion of potential buyers – SEBs – are financially unviable is unwise at best. For example, the resulting counterparty risk would limit interregional trade [Neuhoff 2005] and likely reduce investor interest in generation.

Third, the existing transmission system is likely inadequate for competitive electricity markets. Nagrare (2005) points out that inadequate interregional transmission capacity will lead to bottlenecks and low inter-regional flows of electricity.

Fourth, it is difficult to imagine that poorly staffed regulatory commissions will be competent, effective, and agile enough to deal with the considerable challenges of managing electricity markets. The experience from around the world, and perhaps most saliently Latin America, suggest that competition requires even greater regulatory skill and capacity than a regulated sector. This capacity by no means exists in India today [Prayas 2003a].

Perhaps with these challenges in mind, the National Electricity Policy takes a cautious approach, proposing a limited experiment allowing about 15% of new generating capacity to be sold within a market framework. While there may be some learning from such an experiment, it is worth noting that the fixed costs of market institutions and other systems development (settlement mechanisms, software etc.) may be prohibitive when spread over such a small proportion of electricity demand.

Finally, empirical evidence suggests that "aggressive but plausible" estimates of price savings from wholesale electricity competition are 10%, translating to retail price savings of about 5% [Wolak 2004]. By contrast, subsidy reform, loss reduction, and a host of other more prosaic improvements are likely to result in savings many times greater, with far fewer downside risks. From this perspective the preoccupation with electricity competition in India is somewhat perplexing.

3. The Economics and Politics of Open Access

Apart from corporatization of SEBs, open access is the only part of the restructuring prescription actually mandated in the Electricity Act 2003, and the only part likely to be fully implemented in the near future. A closer look at the economics and politics of open access sheds some light on the preoccupation with electricity competition in India.

Open access to transmission and distribution networks – a necessary component of the restructuring prescription -- allows generators to directly compete for consumers. In India, the Electricity Act mandates open access must be provided within five years (by June 2008) to customers with a peak demand of more than 1 MW.

Open access has several implications. First, it will potentially stimulate investment in generation, by providing generators with credit-worthy industrial buyers to replace bankrupt SEBs. Second, by allowing industrial customers to exit, open access will force the cross-subsidy inflow from industry to other consumer classes to decline, forcing a tariff rebalancing, a task that has been near impossible to achieve by political means. Third, open access allows industrial buyers a built-in price ceiling, since buyers who leave the utility system always have the option of returning to it and the regulated industrial tariff if the market price is too high,[18] burdening SEBs with tremendous uncertainty regarding their capacity planning. If open access were to be seen as the first

step toward a true market where price were allowed to rise to indicate scarcity, this option of return would not exist.

Viewed thus, open access is hardly the beginning of a well laid out program toward a restructured sector organized around competition and choice. Instead, it is as much a political strategy to side-step the political roadblock of hard-to-reform SEBs even while increasing the pressure for internal reform, as an efficiency enhancing economic strategy.

Is open access, then, an effective strategy against the entrenched politics in the sector? There is no denying that reform of the SEBs is long overdue, that the array of forces against reform is formidable and that progress is painfully slow. Forcing the issue by squeezing the SEBs financially may, indeed, be an effective way to accelerate the process. At the same time, it is important to consider the full political implications of open access.

Open access will segment the electricity market, but will also likely segment electricity consumers.[19] Large, mostly industrial, consumers will have a mechanism to escape the poor service of SEBs. The rump SEB that remains will not only face loss of revenue, but it will also increase the challenge of planning and management, leading to a downward spiral of declining financial health and quality of service. Small consumers will bear the cost of increasingly dysfunctional SEBs.[20] The Government's plans to accelerate rural electrification, while laudable, will scarcely help the situation by adding some 70-80 million new low-paying and likely loss-making consumers.

Perhaps for these reasons, the open access regime has an important political safety valve. The Electricity Act provides for an open access surcharge on customers leaving the SEB to compensate SEBs for the loss of revenue with which to cross subsidize agricultural and residential consumers. The magnitude of this surcharge is a political hot potato. As Singh (2005) shows, if the surcharge is low enough to make open access economically viable, the revenue loss to SEBs will be enormous. If it is too high, open access will be a non-starter.

Open access is as much a political as an economic strategy in India. However, clothed in the rhetoric of competition, open access[21] is uncritically associated with the global model of restructuring and its presumptive virtues without accounting for the wide-ranging critiques of the model that have emerged in the past five years. It would be more honest, and productive, to debate the merits of open access with these critiques taken into account, and explicitly examine its merits as a means of forcing reform of the public sector.

VI. Conclusion: Future Directions for the Indian Power Sector

The Indian electricity sector is between a rock and a hard place. The recent past of state-led dysfunction offers few reasons for hope, and the future, at least in the form of the international model of restructuring and competition, promises more confusion and only uncertain success. Electricity market optimists declare the problems with the model can be fixed. Pessimists suggest that once all the fixes are in place, the costs may well outweigh the benefits, and price signals will have been considerably muddied. Both agree that electricity markets have been far more challenging to implement than anyone had earlier thought. In this context, organizing the sector around improved regulation

becomes a viable alternative option. In reality the long-term choice for India is not the easy one between a discredited state-led past and a shining market future, but the far more difficult one between flawed regulation and imperfect competition.

For countries like India, there is a strong case for stepping back to look at specific national priorities, rather than examining every option only through the lens of a market-based structure, which in the case of India is anyway a distant and uncertain dream.

First, it would be wise to adopt a "no-regrets" strategy on reforms that goes beyond the wish list approach of the National Electricity Policy to more concrete and time bound steps. Debate over competition should not be a delaying tactic or hindrance toward progress on more prosaic and necessary reforms. Leading the list of "no-regrets" measures is certainly management improvements in the distribution sector, whether under public or private ownership. Closely related is the need to strengthen the ability of regulatory institutions, which have already improved transparency in the sector and are undoubtedly critical to ensuring distribution improvements. Again, even if competition is introduced in the future, investment in strong regulatory institutions will certainly not have been wasted. Similarly, investment in transmission upgrades will be beneficial irrespective of industry structure.

Second, the sector is currently trapped between the ephemeral promise of the invisible coordinating hand of the market, and the reality of weakened and uncertain planning institutions. In the short to medium term, more deliberate planning is inevitable, particularly for generation capacity. Indeed, one of the weaknesses of fully restructured markets has been inadequate incentives for generation. Open access for a small proportion of demand in India is unlikely, by itself, to result in the desired investment. Instead, there is a strong case for use of Integrated Resource Planning (IRP) techniques to ensure that low cost generation (or demand side) options are fully explored. Additionally, there is no reason why IRP cannot be mated to competitive bidding mechanisms to enhance efficiency.[22]

However, planning needs to go beyond the short term needs of the sector, to develop and embrace a cohesive long-term vision. The recent example of rural electrification efforts perhaps best illustrates the dissonance that results from the absence of cogent planning. The coexistence of enormous pressures to shrink cross-subsidies and public financial support for the sector, with plans to add 70-80 million low-paying rural customers on a war-footing, defies credulity. The looming issue of energy security and import dependence in the light of high oil prices, accelerating demand, and ambitious plans for rural electrification is another example. Finally, even if competition is, indeed, the future mechanism of choice, a planning framework is nonetheless needed to ensure the sector achieves the minimal entry conditions for competitive markets, and to manage the transition period.

Third, a preoccupation with organized electricity markets and in particular the full standard model obscures a more productive discussion to be had on emergent new directions in electricity reform that stress hybrid approaches.[23] For example, experience in major developing countries such as South Africa, China, and Brazil suggest that both the state and the private sector will continue to play a major role in electricity through mixed or hybrid structures. Competitive bidding and other forms of market discipline can

certainly be fruitfully incorporated within such larger hybrid structures. Some scholars have begun developing hybrid approaches to electricity that seek to retain some of the benefits of vertical integration while incorporating elements of liberalization [Chao, Oren, and Wilson 2005]. Similarly, it is important to engage with the growing body of literature on regulation, some of which stresses transparency and demand pressures as a means of increasing regulatory effectiveness [Hira, Huxtable, and Leger 2005]. While much of this work is preliminary, and needs to be further explored in an Indian context, it represents an important and necessary openness to new thinking that goes beyond the binary debate – state or market – of the 1990s.

Finally, thinking sector reform would be aided by more explicit discussion of political problems that are stalling reform but are not openly acknowledged. For example, if open access is a tool toward subsidy reform, it should be discussed as such, rather than cloaking it as an efficiency enhancing measure. Doing so may well allow for an explicit transition plan and budget necessary to mitigate the burden on small consumers and agriculturalists.

The recent past of the Indian electricity sector is littered with failed attempts at a unitary "silver bullet" solution to the ills of the sector. In the early 1990s, the introduction of IPPs promised to fix the ills of the sector. In the late 1990s, privatization of dysfunctional SEBs was supposed to do the job. More recently, competition, or more accurately open access cloaked in the garb of electricity restructuring, is advocated as an unavoidable and necessary panacea for the sector. All these measures have their place, and all are potentially useful policies to pursue. However, this review of international experience with competition and choice in electricity suggests that India would be better served by focusing on fundamental, if unexciting and challenging, basic management reforms in the sector, particularly at the distribution end. Under the right conditions, competition can be a tool to an end. It is unlikely to be a shortcut.

References

Blauvelt, Euan C (2004): 'Deregulation: Magic or Mayhem?', *The Electricity Journal*, Vol. 17, No. 7, August/September, pp. 39-47.

Borenstein, Severin (2002): 'The Trouble with Electricity Markets: Understanding California's Restructuring Disaster', *Journal of Economic Perspectives*, Vol. 16, No. 1, pp. 191-211.

Brennan, Timothy (2001): 'Drawing Lessons from the California Power Crisis', *Resources*, No. 144, Summer, pp. 8-12.

Brunekreeft, Gert, Karsten Neuhoff, and David Newbery (2005): 'Electricity Transmission: An Overview of the Current Debate', *Utilities Policy*, Vol. 13, No. 2, pp. 73-93.

Bushnell, James (2004): 'California's Electricity Crisis: A Market Apart?', *Energy Policy*, No. 32, pp. 1045-1052.

Business Standard (2005): 'Roosting Chickens', *Business Standard*, July 15.

Carrera, Jorge, Daniele Checchi, and Massimo Florio (2005): 'Privatization Discontent and its Determinants: Evidence from Latin America', IZA Discussion Papers, No. 1587, Germany: IZA, available online at ftp://repec.iza.org/RePEc/Discussionpaper/dp1587.pdf, last accessed on 12 September 2005.

Chao, Hung-po, Shmuel Oren, and Robert Wilson (2005): 'Restructured Electricity Markets: Reevaluation of Vertical Integration and Unbundling', available online at http://faculty-gsb.stanford.edu/wilson/selected%20working%20papers%20and%20publications.htm, last accessed on 18 August 2005.

Costello, Ken (2003): 'The Shocking Truth about Restructuring of the U.S. Electricity Industry', *The Electricity Journal*, June, pp. 11-19.

D'Sa, Antonette (2005): 'Integrated Resource Planning (IRP) and Power Sector Reform in Developing Countries', *Energy Policy*, Vol. 33, No. 10, pp. 1271-1285.

de Oliveira, Ricardo Gorini, and Mauricio Tiomno Tolmasquim (2004): 'Regulatory Performance Analysis Case Study: Britain's Electricity Industry', *Energy Policy*, Vol. 32, No. 11, pp. 1261-1276.

Egan, Timothy (2005): 'Tapes Show Enron Arranged Plant Shutdown', *New York Times*, February 4.

Finon, Dominique, Tor Arnt Johnsen, and Atle Midttun (2004): 'Challenges when Electricity Markets Face the Investment Phase', *Energy Policy*, No. 32, pp. 1355-1362.

Gellings, Clark W., and Richard J. Lordan (2004): 'The Power Delivery System of the Future', *The Electricity Journal*, January/February, pp. 70-80.

Haldea, Gajendra (2004): 'Introducing Competition in Generation of Electricity', available online at http://www.cercind.org/08052004/introducingcompetition.pdf, last accessed on 23 June 2005.

Haselip, James (2005): 'Renegotiating Electricity Contracts after an Economic Crisis and Currency Devaluation: The Case of Argentina', *The Electricity Journal*, April, pp. 78-88.

Hira, Anil, David Huxtable, and Alexandre Leger (2005): 'Deregulation and Participation: An International Survey of Participation in Electricity Regulation',

Governance: An International Journal of Policy, Administration, and Institutions, Vol. 18, No. 1, January, pp. 53-88.

Hunt, Sally (2002): 'The State of U.S. Electricity Restructuring', *The Electricity Journal*, June, pp. 11-19.

Hunt, Sally, and Graham Shuttleworth (1996): *Competition and Choice in Electricity*, New York: John Wiley and Sons.

Jamasb, Tooraj, Raffaella Mota, David Newbery, and Michael Pollitt (2005): 'Electricity Sector Reform in Developing Countries: A Survey of Empirical Evidence on Determinants and Performance', World Bank Policy Research Paper, No. 3549, Washington DC: The World Bank.

Joskow, Paul L (2001): 'California's Electricity Crisis', NBER Working Paper, No. w8442, National Bureau of Economic Research.

Joskow, Paul L. (2003a): 'The Difficult Transition to Competitive Electricity Markets in the U.S.', presented at the conference on *Electricity Deregulation: Where from Here?* At Bush Special Conference Center, Texas, A & M University, 4 April 2003.

——— (2003b): 'Electricity Sector Restructuring and Competition: Lessons Learned', *Cuadernos de Economía*, Vol. 40, No. 121, pp. 548-558, available online at http://www.scielo.cl/scielo.php?pid=S0717-68212003012100023&script=sci_arttext&tlng=en, last accessed on 26 August 2005.

Kahn, Joseph (2001): 'Utility Deregulation: Square Peg, Round Hole?', *New York Times*, March 4, pp. 4.

Karnik, Kiran (2005): 'Utilities and the Subsidy Syndrome', *Economic Times*, September 7.

Kelly, Susan, and Diane Moody (2005): 'Wholesale Electric Restructuring: Was 2004 the Tipping Point?' *The Electricity Journal*, March, pp. 11-18.

Kozulj, Roberto, and Nicolas di Sbroiavacca (2004): 'Assessment of Energy Sector Reforms: Case Studies from Latin America', *Energy for Sustainable Development*, Vol. VIII, No. 4.

Kozulj, Roberto, Nicolás Di Sbroiavacca, and Lic. Daniel Bouille (2003): 'Assessment of Energy Reforms Case Studies for Latin America and the Caribbean', presented at *Energy Access Working Group*, Global Network on Energy for Sustainable Development (GNESD).

Lave, Lester B., Jay Apt, and Seth Blumsack (2004): 'Rethinking Electricity Deregulation', *The Electricity Journal*, October, pp. 11-26.

Malloy, Ken (2005): 'Clash of World Views Over Electric Competition', *Natural Gas and Electricity Journal*, Vol. 21, No. 7, pp. 1-31.

Manibog, Fernando, Rafael Dominguez and Stephan Wegner (2003): *Power for Development: A Review of the World Bank Group's Experience with Private Participation in the Electricity Sector*, Washington DC: World Bank Operations Evaluation Department.

Nagrare, Sanjay (2005): 'Power Market Design: Choice of Model for Indian Power Market', presented at *International Conference on Power Market Development in India: Reflections from International Experience*, Kanpur, India: Indian Institute of Technology - Kanpur.

Neuhoff, Karsten (2005): 'Transmission Rights for the Indian Power Market', presented at *International Conference on Power Market Development in India: Reflections from International Experience*, Kanpur, India: Indian Institute of Technology - Kanpur.

Newbery, David M., and Michael G. Pollitt (1997): 'The Restructuring and Privatization of the U.K. Electricity Supply -- Was it Worth It?', *Public Policy for the Private Sector*, Note No. 124, Washington DC: World Bank.

Pollitt, Michael G. (2004a): 'Electricity Reform in Argentina: Lessons for Developing Countries', Cambridge Working Papers in Economics, No. 0449, Cambridge: MIT Institute, available online at http://www.econ.cam.ac.uk/electricity/publications/wp/ep52.pdf, last accessed on 14 March 2005.

Pollitt, Michael G. (2004b): 'Electricity Reform in Chile: Lessons for Developing Countries', prepared as part of the research programme on Industrial Organisation Policy for Development at the Development Research Group of the World Bank, Washington DC: The World Bank.

Prayas (2005): 'Comments on the Draft National Tariff Policy', Pune: Prayas, Energy Group.

Prayas (2003a): *A Good Beginning but Challenges Galore: A Survey Based Study of Resources, Transparency, and Public Participation in Electricity Regulatory Commission in India*, Pune: Prayas, Energy Group.

Prayas (2003b): 'Comments by Prayas (Energy Group) on the First Draft of Discussion Paper on Tariff Policy by MoP', Pune: Prayas, Energy Group.

Rosenzweig, Michael B., Sarah P Voll, and Carlos Pabon-Agudelo (2004): 'Power Sector Reform: Experiences from the Road', *The Electricity Journal*, November, pp. 16-28.

Singh, Daljit (2005): 'Open Access: Methods for Calculation of Cross-Subsidy Surcharge and Assessment of the Financial Impacts on Utilities', *Economic and Political Weekly*, September 10-16, pp. 4062-4067.

Sioshansi, Fereidoon, and Lawrence D Hamlin (2004): 'Competitive, Regulated, or Somewhere in Between? Where do we go from Here?', *The Electricity Journal*, Vol.17, No. 5, June, pp. 87-94.

Times of India (2005): 'No Jurassic Park: Why Delhi, and India, Can't Afford to Return to SEBs', *Times of India*, September 13.

Van Doren, Peter, and Jerry Taylor (2004): 'Rethinking Electricity Restruturing', *Policy Analysis*, No. 530, 30 November, CATO Institute.

Watts, Price C. (2001): 'Heresy? The Case Against Deregulation of Electricity Generation', *The Electricity Journal*, May, pp. 19-24.

Wolak, Frank A. (1997): 'Market Design and Price Behavior in Restructured Electricity Markets: An International Comparison', California: Program on Workable Energy Regulation (POWER), University of California Energy Institute.

——— (2004): 'Reforming the Indian Electricity Supply Industry', available online at http://scid.stanford.edu/events/India2004/Wolak.pdf, last accessed on 25 July 2005.

Woo, C. K., M. King, A. Tishler, and L.C. H. Chow (2005): 'Cost of Electricity Deregulation', *Energy*, Forthcoming.

World Bank (2001): *The California Power Crisis: Lessons for Developing Countries*, Washington D.C.: The World Bank.

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[1] Navroz K. Dubash is IDFC Chair Professor of Governance and Public Policy at NIPFP and can be reached at ndubash@nipfp.org.in. Daljit Singh is Visiting Research Fellow at Prayas Energy Group and can be reached at daljitss@gmail.com. The authors thank Ashwini Kumar Swain for research assistance. We also have benefited from and are grateful for comments from Amaresh Bagchi, Torstein Bye, Seth Blumsack, Shantanu Dixit, Anton Eberhard, Subhas Garg, Einar Hope, Jaime Millan, Partha Mukhopadhyay, Narasimha Rao, Girish Sant, and Stephen Thomas. However, all responsibility for errors of fact and interpretation of the material rests with the authors.

[2] See for example, a consultation paper produced by CERC that argues for competition by citing price trends in the UK, USA and Argentina [Haldea 2004].

[3] However, energy market advocates are increasingly arguing that the stronger case for restructuring is the dynamic efficiencies or innovation that competition will introduce, rather than the static or allocative efficiency gains [Malloy 2005].

[4] Blauvelt (2004) corroborates these findings for Europe in general. He finds no clear trends in prices across countries and concludes that it is hard to disentangle the effects of deregulation from those of fuel prices and the effects of privatization.

[5] The impact of macroeconomic reforms on Argentine's electricity reform continues to be a debatable point. For example, Millan (personal communication) argues that Brazil and other Latin American countries also received considerable investment without introducing convertibility. On the other hand, there are strong opinions within Argentina that "…in no way can … macroeconomic policies be considered alien or secondary to energy sector reforms" notably because it allowed companies to have high profits without raising tariffs [Kozulj, Sbroiavacca, and Bouille 2003: 30]

[6] Negative perceptions of privatization are also additionally shaped by the existence of an economic crisis, and high income inequality levels. Both these conditions hold true in Argentina as well.

[7] Joskow (2003a) notes in the US context, the flawed arithmetic of promising price gains across the board even while allowing utilities to recover the "stranded costs" of uneconomic past investments in capacity was never reconciled.

[8] For example, to avoid collapse of the coal industry, the government mandated that generators buy coal from British Coal for three years, and mandated that distributors by the resultant power under bilateral contracts. As a result, some 40-60% of generation was transacted out of the pool for much of the 1990s.

[9] In another example, since market operators' knowledge about transactions was limited only to its area, Enron developed a strategy called "Death Star" to create complex schedules linking power flows in and out of the state. Although no physical power flowed under these schedules, the exercise enabled Enron to earn congestion payments.

[10] A potentially problematic side-effect of higher cost of capital is that is skews incentives toward low capital cost and high operating cost technologies, exposing the system further to fuel price risk [Watts 2001].

[11] Kelly and Moody (2005)report that a financier of merchant generation recommended to FERC that utilities not be barred from bidding for distressed merchant plants as doing so would shrink the potential market, making it hard for investors to recover their investment [Kelly and Moody 2005]

[12] Just as a focus on reliability led to overcapacity in generation under regulation, with restructuring proper functioning of electricity markets may require additional capacity in transmission.

[13] See, for example, a special issue of *Utilities Policy* Vol. 13, No. 2, June 2005, entirely on transmission systems.

[14] In practice, retail customers have been "sticky" [Joskow 2003b] perhaps because of high transactions costs for small consumers. In deregulated US states, fewer residential customers than expected have taken advantage of choice; the number who have switched varies from below 5% to a high of 20% in Texas [Kelly and Moody 2005].

[15] Retails markets have some fierce critics. By introducing uncertainty into the customer base, they argue, retail markets scare retailers away from signing long term contracts. The lack of contracts, in turn, makes it

harder to attract investors in generation and removes an important mechanisms of damping volatility and stemming market power in spot markets [Kelly and Moody 2005; Watts 2001].

[16] Prices to residential households in the city of San Diego were allowed to float for a year in 1999-2000. During this period, prices doubled, leading to a consumer rebellion and the re-enactment of price controls [Van Doren and Taylor 2004].

[17] Currently in India, unscheduled interchange (UI) charges as outlined in the availability based tariff (ABT) order by CERC act as a proxy for a balancing market. It needs to be seen whether a well-managed UI regime would obviate the need for a balancing market.

[18] Conversely, prices set by private suppliers could act as a price ceiling on the public utilities, forcing them to reduce industrial tariffs to attract industrial buyers. Either way, price signals as a way of indicating scarcity would be muddled.

[19] Prayas (2003b) describes how the Government's policies segment the consumers into four classes: (1) large industrial; (2) urban; (3) rural; and (4) unconnected consumers.

[20] Prayas (2005) discusses how the open access policy discriminates against captive consumers because of costs which are not imposed on open access customers such as: (1) costs of the non-fossil fuel levy to support renewables; (2) past inefficiencies of the SEBs; (3) cost of spinning reserves and other costs.

[21] The provision of the Electricity Act, 2003 allowing a parallel distribution license raises many of the same issues that are raised by the open access provisions.

[22] For a review of the use of IRP in developing countries, including in a restructuring context, see [D'Sa 2005].

[23] We are indebted to Anton Eberhard for stressing this point.