

INTERNATIONAL EXPERIENCES IN DEREGULATING ELECTRICITY MARKETS

The chapter analyses the international experiences in electricity deregulation over the years and compares it with the Indian electricity regulatory experiences. A number of important factors have contributed to the far-reaching changes in global electricity markets focusing on economic efficiency. Micro-economic reforms in many developed economies in the early 1980s were driven by severe fiscal crises, in turn brought on by the ramifications of the 1973 OPEC oil embargo and subsequent oil price hikes. An attempt has been made to compare the experiences of two countries firstly of the UK, as the electricity institution set up we had inherited being a colony under British rule and the UK's electricity privatization reform efforts have been among the world's most ambitious and path breaking .

Secondly the experiences of the Chile, being the one of the first in the developing nation started the power sector deregulation. Given the common characteristics with other developing economies and the time that has passed since the beginning of the process, its study can provide insights into issues for the economies which plan to restructure will probably face. An analysis of the reform process has been discussed in the chapter and the lessons learnt in the context of India. The UK and Chile are the two main reforms models that are followed globally. In the UK model disputes with the electricity regulator are adjudicated by the monopolies and mergers commission while the regulator reports to the executive. In the Latin American model typified by Chile in which the regulator's powers are set out in detail in the legislation so that there is far less flexibility in interpretation given to the regulator. India having a federal structure, the central regulator has to set guidelines for the state regulators so that there is an integrated national grid in which trading and market can function at a national level.

The two cases were chosen to reflect specific and interesting contexts, while still sharing commonalities in their reform context. They all shared some

similar conditions of power sector mismanagement like India, and were established with similar policy objectives through state reforms that envisioned or enacted privatization: UK provides an example of best practice, by reputation; Chile has a sound reputation of keeping consumer interests; and Delhi offers an actual case of private sector distribution privatization.

6.1 INTRODUCTION: THE ELECTRICITY INDUSTRY RESTRUCTURING AND DE-REGULATION

The transformation in the electricity industry took place in many countries during the 1990s. The success of privatization of the airline, telecommunications industries has motivated the deregulation and restructuring of the electricity industry. Globally the power sector is moving from a monopoly structure to a more competitive one, as are the transportation and telecommunications sectors for example in Latin America, Chile was a pioneer in the early 1980s with the development of a competitive system for electricity generation based on marginal prices. In 1992, Argentina privatized an inefficient government-owned electricity sector, splitting it into generation, transmission, and distribution companies, and introduced a competitive generation market. These experiences were repeated in other countries in the region, such as Bolivia, Peru, Colombia, Guatemala, El Salvador, Panama, and, to a limited extent, Brazil and Mexico.

In 1989, the UK became one of the pioneers in privatizing its vertically integrated electricity industry. Norway and California followed in 1990 and 1996 respectively. The success of energy privatization in the UK and Norway has encouraged other countries worldwide to follow the trend. In New Zealand, Australia, and some provinces of Canada (Alberta and Ontario), deregulation of the electricity industry is being introduced as a way of increasing efficiency and reducing prices. This is also true in some states of the United States (US); restructuring legislation has already been enacted in half the states, with California and Pennsylvania-New Jersey-Maryland (PJM) in the lead. However, the California electricity crisis of 2000 and 2001 has slowed the move toward electricity deregulation in the United States. Under restructuring and deregulation, vertically integrated utilities, in which

producers generate, transmit and distribute electricity, have been legally or functionally unbundled. Competition has been introduced in the wholesale generation and retailing of electricity. Transmission and Distribution are still considered natural monopolies. To achieve effective competition, regulation is still needed to ensure open, nondiscriminatory access to the transmission grid for all market participants.

6.1.1 Structure and Organisation of Electricity Companies

The reforming countries can be broadly divided into three categories. Deregulation and restructuring involve a transformation in the structure and organization of electricity companies. Traditionally, a single utility, vertically integrated, was the only electricity provider in its service territory and had the obligation to supply electricity to all customers in its territory. This provider could be

- Owned by a national, regional, or local government
- Owned by a cooperative of consumers
- Owned privately

After World War II, in many countries, for strategic reasons, the electricity industry was gathered in a single, nationalized company. This situation was common in Europe and Latin America. But public ownership has been in crisis during the last decade for various reasons. For instance, in Latin American countries that had high rates of electricity demand growth, the State, with a significant external debt, was unable to carry out the needed generation investments. This situation, plus the recommendations of international financial institutions, such as the World Bank and the Inter-American Development Bank, led governments to initiate privatization and restructuring.

Also, the internationalization of fuel markets raises the question of national subsidies to specific primary energy sources. In several countries of Europe, the State has been subsidizing the coal industry. Low international coal prices prompted governments to progressively abandon this type of intervention because of (and the usual environmental problems associated with) burning low-quality domestic coal.

Similarly, the nuclear power industry was developed with a high level of State support. However, political opposition has undercut this support, postponing or stopping new investment in nuclear plants. Finally, information technologies and communication systems are making possible day-ahead and on-line electricity markets with multiple agents and multiple types of transactions. Further, metering, billing, quality control, and load management options based on new information technologies and communication systems are being offered under restructuring and deregulation. Also, retail competition and customer choice based on these technologies encourages entry of new electricity service providers with new commercial relationships, offering attractive prices, high quality, and other integrated services.

6.1.2 Motivations for Deregulation

There are many factors which have promoted the political will to deregulate. Nationally owned systems have been segregated into different companies and then privatized under a new regulatory competitive framework. This is the case for the experiences in Argentina, Chile, England and Wales, where the ideology of the government was clearly oriented toward a general liberalization program in the country. In Argentina, in addition, the situation of a chronic lack of investment, high growth in demand, and frequent power outages, encouraged the adoption of dramatic changes.

Electricity prices higher than those in neighboring countries or regions have also pushed deregulation. In high-price areas, customers and governments influenced by a general wave of deregulation have advocated restructuring for example; Spain was encouraged by European Directive 96/92/EC that called for the introduction of competition. The objective pursued by deregulation is to avoid cross-subsidies among different customer classes by designing more transparent tariffs. Electricity is bought in the market at posted prices, whereas regulated costs (e.g., for transmission services) are charged under a separate system through access tariffs. Additionally, under deregulation, subsidies to domestic primary fuels, such as coal, and to nuclear power, progressively disappear, as in Spain, England and Wales.

6.2 FRAMEWORK AND DRIVERS FOR REGULATION: THE UK EXPERIENCE

The United Kingdom was one of the first nations to embark upon widespread privatization of its electric utilities. Although a growing number of nations have privatized their electricity industries since (or are currently undertaking such efforts), the UK's electricity privatization reform efforts have been among the world's most ambitious and path breaking. Several other nations have subsequently followed their example, using the UK experience as a policy guide in their own electricity restructuring, privatization, and regulatory reform efforts. In particular, Argentina and Australia have adopted variations of the UK model.

Prior to reforms, power sector of Britain was dominated by monopolistic vertically integrated utilities. It lacked competition and thus consumer interest had taken a back seat. A primary goal motivating electricity reform was to achieve lower electricity costs for consumers through encouraging efficiency improvements in the electricity industry. Power reforms in UK were designed to permit the introduction of competition at both the retail and the wholesale level which was lacking earlier in the power sector. Also one another important driving force was that government wanted to remove the dependence of power sector from the government funding.

The overall privatization of industry was initiated shortly after a conservative government came to power in the United Kingdom in 1979 under the leadership of Margaret Thatcher. The primary aim of the new administration was to reduce government's role in the economy. The electricity privatization and reform started off to a relatively late start in the United Kingdom in 1989. One of the main objectives of privatization was to promote competition. This has focused on the supply (i.e. the retailing) of electricity and gas and has encompassed the associated aspects of metering, transmission and distribution needed to be treated as natural monopolies for the indefinite future. Regulation would therefore gradually be withdrawn for the former segments but remain for the latter. For the still regulated segments, a new form of regulation (based on a price cap) was introduced--along with a new regulatory authority, the Office of Energy Regulation (OFFER). The creation of a national wholesale electricity pool was another important area where the United Kingdom charted new ground in electricity reform.

6.2.1 The Framework of UK Electricity Prior to Privatization

The central government's role in electricity has grown gradually since the industry's beginning in the latter part of the nineteenth century. A Electricity Generation Board in 1926 was established whose mission was to construct a national transmission grid, to coordinate the transmission of electricity across the country, and to establish a set of common technological standards.

In 1947, all segments of the industry became government owned and operated. So the newly-nationalized electricity company comprised most of the country's generation capacity, the national grid, as well as the 12 semi-autonomous regional distribution boards in England and Wales, two vertically-integrated companies in Scotland, and one vertically-integrated company in Northern Ireland.

The Central Electricity Generating Board (CEGB) was responsible for the operation of electricity generation and transmission facilities and all related investment decisions. The twelve regional electricity boards remained semi-autonomous. An Electricity Council acted as a form of regulator between 1947 and 1990—the period of nationalization—the two major competing national ruling political parties pursued various and often conflicting energy policies. Often electricity policy directives were guided by some overriding macroeconomic objective. A major UK government policy goal for roughly forty years has been the sustenance of the national coal industry—which by the early 1990's had grown vastly inefficient by world standards. Another major policy goal of the UK government since the 1950's was the promotion of nuclear power as a secure and economical source of electricity. Nuclear power has also generally been a target of large government-imposed subsidies, again underwritten by the electric utility industry. As elsewhere in the world, when the United Kingdom embarked upon its nuclear power program, nuclear power was perceived as an economically viable form of energy and as a means of achieving energy security. In reality, nuclear power's full costs have far exceeded the costs of non-nuclear forms of electricity generation.

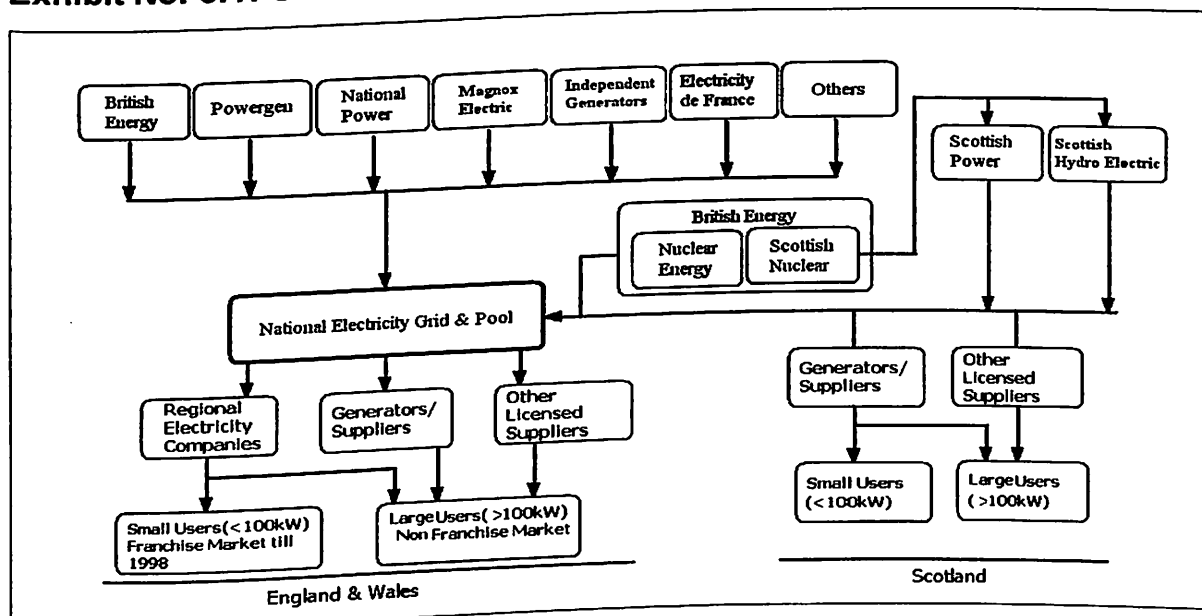
Privatization became an important element in the Thatcher government's overall economic program. Privatization of nationalized industries was

intended to achieve several goals. Foremost among them were to reduce the central government's role in economic decision making; to force privatized companies to become more accountable to owners; to increase net state revenue through asset sales and divestiture of fiscally draining state enterprises; and to encourage the creation of a shareholder society through widespread stock ownership.

6.2.2 The Development of competition: The Electricity Acts

The most important reorganization came in 1957 when the Electricity Act of that year established a structure for England and Wales which persisted until the industry was privatized in 1990. The 1957 Act created the Central Electricity Generating Board (CEGB), responsible for both generation and bulk transmission in England and Wales: the CEGB controlled the bulk of the industry's investment and was *de facto* its most powerful organization. Twelve Area Boards took electricity from the CEGB's bulk supply points, then distributed and supplied it within their designated areas. Initially, the former Central Electricity Generating Board was restructured into four separate organizations: two power producers, a transmission company, and a distribution network consisting of the twelve regional electricity companies (RECs) created out of the twelve former regional area boards. The structure of the UK electricity industry resulted from this process and is depicted below in Exhibit No. 6.1.

Exhibit No. 6.1: Structure of the UK Electric Power Industry



The Central Generating Board's non-nuclear power units were assigned to two companies, National Power and Power Gen, both slated to be privatized. Ownership of the national grid was initially transferred to the RECs upon their privatization. However, in December 1995, the RECs were required by the UK government to divest their shares in the national grid, at which time it became a separate publicly-traded company, the National Grid Company.

The twelve regional electricity distribution companies initially created out of the former Regional Area Boards underwent more changes. In regulatory matters there was to be a separation between the wires (distribution) side of the RECs' business (which was to be continually regulated) and the marketing function of the RECs (which was to be gradually deregulated). The RECs were also the first segment auctioned off to the public by the UK government. Northern Ireland and Scotland's electricity industries were restructured at about the same time as the industries in England and Wales. However, Northern Ireland and Scotland, taken together, account for only about 12 percent of the UK electricity market.

The UK has three separate and differently organized electricity markets in:

1. England and Wales,
2. Scotland, and
3. Northern Ireland (with no physical connection to Great Britain and without having achieved a market opening yet). The electricity Act (1990) created the market system of England, Wales, and Scotland. Before reforms Central Electricity Generating Board (CEGB) held the monopoly for generation and transmission. Competition was introduced by separating generation, transmission and distribution and by adding intermediary systems that allowed the cheapest generator to produce more by being able to sell more to the grid and by contracts between generators and large consumers.

The main features of UK privatization are

- Entry is now permitted to both the generation and supply businesses whereas previously it was prohibited by the state;

- The electricity companies now have private shareholders, instead of being owned by government;
- Regulation is by an independent body instead of being conducted behind closed doors, with unclear rules, by politicians, civil servants and industry managers.

6.2.1.1 Chronological Order of Reforms

In the United Kingdom, electricity reform initially involved the complete restructuring (unbundling) of the industry along segmental lines: electricity generation, transmission, distribution, and marketing all became separate operations. Prior to privatization, the United Kingdom created two large power generation companies, one national transmission company, and twelve regional generation companies. A newly-evolving electricity marketing segment was to be gradually developed, where sales, brokerage, and billing operations each became a separate function.

In the United Kingdom, widespread privatizations of electricity assets followed shortly after the restructuring. These privatizations were achieved through public auctions. Eventually, virtually the entire UK electricity industry was privatized with the exception of some relatively old nuclear generation plants. After privatization, the most innovative reform was the establishment of competitive electricity market. The generators sell all power to a pool. In this power pool (operated by the national grid company), generators bid to supply various units in half-hour slots during the next twenty-four hours. Dispatch is carried out by choosing plants in merit order of these bids, up to the point at which demand is satisfied. The UK electricity pool is operated by the National Grid Company, which is also responsible for electricity transmission. The UK pool has generally operated efficiently, although concerns have been raised over its tendency to produce price volatility and an unfair playing field between electricity suppliers (again, primarily the two now-privatized dominant generation companies) and electricity consumers. A secondary market, called a contract for differences market, has evolved in the United Kingdom. This secondary market allows participants to hedge a large fraction of their pool purchases.

Privatization in Generation Field

Generation was both vertically and horizontally separated from transmission. The sector was almost completely privatized-only the nuclear capacity was left in public hands and regulation was applied both to promote competition and to ensure that the remaining monopolies did not exploit their advantage. The new industry structure emerged with three generation companies: National Power (52 percent of capacity at that time) and Power Gen (33 percent), which were privatized, with 60 percent of their shares sold initially, and Nuclear Electric (15 percent), which was left under public ownership.

Privatization in Distribution

The national grid company – after separation from the generating companies – was transferred to joint ownership by the twelve privatized regional distribution companies. Each of the twelve regional distribution companies (RECs) has two separate functions – distribution (through low voltage wires or, more simply, grid to door) and retail supply (the sale of electricity to final customers) – and these functions must be accounted separately. Access to the distribution operation of the RECs is regulated so that any seller of electricity has the right to “use” the associated distribution network when selling to a final customer. Transmission remained with public sector.

The UK power system features a high percentage of thermal generation (and a small percentage of nuclear generation) with an increase in the use of coal after the lifting of the ban on gas for electricity generation. Owing to privatization, independent power producer (IPPS) have emerged in the market and many high efficiency combined cycle gas fired plants are being built. In principle, these changes should have been beneficial which have brought increased rivalry in generation and supply, leading to increased efficiency pressures and lower costs. And this leads to benefit to the consumer in the form of reduced prices and better standards of service. The industry's entry into the market for corporate control had enhanced efficiency pressures and reduced the incentives which existed under nationalization to concentrate resources on political lobbying: the industry's decisions about which fuels to

use, which investments to make, whether to purchase British or overseas equipment and services and what prices to charge should no longer have been subject to government influence.

6.3 LESSONS LEARNT FROM UK REGULATION

The British electricity supply industry was privatized after many years of state ownership. At this stage, however, some lessons emerge from this attempt to privatize and liberalize a complex industry within which were previously embedded both naturally monopolistic and potentially competitive activities. The principal lesson is indeed that most of the problems which have appeared are due to the government's failure, at the time of privatization, to make a clearer separation between these two types of activities and to ensure that in the potentially competitive sectors the privatization scheme encouraged a competitive process to begin.

Even though there has been a significant drop in electricity prices in England and Wales since privatization, this price does not fully emulate the cost of reduction of generation. These lower prices are not passed on to customers entirely but are partially retained by generation companies in the form of high profits. Also there has not yet been a significant decrease of price in the retail market. A possible reason for the inefficiency in the wholesale market was that the three largest generators could game and manipulate the wholesale market. The market lacks small IPPS which could potentially favor competition and reduce the market power of the large generator.

The six lessons that should be learned from electricity privatization in the United Kingdom. :

- The first is the separation of the natural monopoly activities from potentially competitive activities and regulating only the former. Regulation is such an unsatisfactory business that it should, be avoided wherever possible: it involves attempts to gather centrally information which is unlikely to be revealed except by market processes. The area of genuine 'natural monopoly' needs careful consideration to avoid inclusion of any activities where competition is possible and the market should be allowed

to redefine natural monopoly as technological change occurs.

- Second, Price Cap Regulation - despite the problem of determining X factors and the tendency to move towards Rate of Return Regulation - generally provides better efficiency incentives than does a rate of return regime. The regulator does, however, need to establish a stable framework of regulation which is expected to last for a period of years.
- Third, an independent regulatory office has many advantages over direct regulation by government. The system is more open and less susceptible to short-term political pressures.
- Fourth, giving the regulator the duty to promote competition provides him or her with a powerful incentive to stimulate rivalry and helps avoid 'capture' and the other problems which can afflict regulated systems if regulators are over-influenced by pressure groups.
- Fifth, the market for corporate control not only directly increases efficiency pressures, as is generally recognized. In general, pressures to reorganize industries arising from the market for corporate control should not be resisted unless there are very powerful anti-monopoly reasons.
- Sixth, the gains from privatization and deregulation appear over a period of many years as market entry is stimulated, the market for corporate control operates, and rivalry results in technological and managerial advances, ensuring that benefits are passed on to consumers. Such gains are essentially dynamic: they cannot be captured by calculations of static efficiency benefits which are indeed irrelevant to the case for privatization and deregulation.

The success of the UK model is attributed to a well-structured and sequenced regulatory and unbundled system and the maturity of the restructured components that enhanced investor confidence in their potential profitability, thus increasing investment in the sector. This led to more competition and consequently greater efficiency. The ultimate aim of the U.K. reforms were to remove the sector from government funding and to reduce prices for consumers through the increased efficiency of private sector operation and the pressure of competition. Broadly speaking, the first objective has been accomplished, but the second objective has yet to be convincingly achieved.

Many of the difficulties in achieving this second objective are related to the speed with which the restructuring and privatization had to take place. The political pressures at the time allowed a relatively short "window of opportunity," but the desire to privatize the whole system and to introduce as much competition as possible demanded the creation of entirely new market forms for the industry.

6.4 FRAMEWORK AND DRIVERS FOR REGULATION: THE CHILE EXPERIENCE

6.4.1 Introduction

Chile was the first country in the world to implement a comprehensive reform of its electricity sector in the recent period. Before the restructuring of the electricity sector, ownership was mixed with dominant state presence in generation, transmission and distribution through vertically-integrated utilities. Regulation and long-term planning were undertaken by the state. The history of the Chilean reform, which began in 1982 and is the world's longest running comprehensive electricity reform in the post-World War II period.

Chile's case presents the reforms which were first conceived in 1978 when the National Energy Commission was established and the reform act – the 1982 Electricity Act – was the most important law regulating the current organization of the sector. This led to the vertical and horizontal break up (beginning in 1981), commercialization and part privatization of the existing state owned electricity system. Large scale privatization began in 1986, four years before the reorganization of the electricity sector in England and Wales, arguably the world's most comprehensive electricity reform. Chile's electricity reform has been hailed as a highly successful example of electricity reform in a developing country and a model for other privatizations in Latin America and around the world.

6.4.1.1 The Framework of Chile Electricity Prior to Privatization

Chile's electricity demand is closely linked with respect to GDP. The electricity demand has grown in the last 20 years (1977 to 1997), at an average annual rate of 7.4 percent mainly met with hydropower and to a lesser extent with

thermal generation .Total installed capacity in Chile was 7,858 MW in 1998. Electricity generation and demand were respectively 33,417 GWh and 29,180 GWh, which represent a 12.7 % in losses. Growth in electricity demand has been steady at a 7% per year rate. The Chilean power network consists of two systems, the Central Interconnected System (SIC), which includes the capital Santiago, its surroundings and the Great Northern Interconnected System (SING) which supplies the mining region in the north.

The main actors in the system were:

- **ENDESA:** A state-owned utility created in 1943 with the objective of carrying out the National Electrification Plan. It developed into Chile's major vertically-integrated utility, responsible for not only constructing and operating most of the system, but also –amongst other tasks– of prospecting hydrological resources and developing a long-term electricity plan.
- **CHILECTRA:** The major distribution company, supplied by ENDESA and by its own generation facilities was privately-owned until 1970, when it was nationalized.
- **AUTOPRODUCERS:** Mainly of the mining sector in the North. Especially relevant was the Tocopilla thermal plant, which supplied power not only to the state-owned copper company, but also to other industrial and residential customers.

The State implemented its policies mainly through ENDESA. Price regulation considered cost recovery plus a 10 percent margin. The construction of combined cycle plants results in, the share of thermal generation to increase. The ownership was mixed with dominant state presence in generation, transmission and distribution through vertically-integrated utilities before the restructuring of the electricity sector. Regulation and long-term planning were undertaken by the state. Price regulation considered cost recovery plus a 10 percent margin.

The sector was mostly vertically and horizontally unbundled though legally the functional separation of commercial activities was not required. However,

major concerns persisted regarding horizontal and vertical integration. The ownership and operating control of the Central Interconnected System (SIC) was under a corporate entity, Transelec had the same shareholders as Endesa, the largest generator in the region. In addition, Enersis, the holding company for the largest distribution company in Chile, owned around 25% of Endesa's shares.

In the northern system (SING), Edelnor remains as a vertically integrated utility pending the establishment of a separate corporate entity to hold its transmission assets. The centers for economic load dispatch (CDECs) were autonomous groups that coordinate the operation of the two major interconnected systems. Any electricity system with more than 100 MW of installed capacity must have its own CDEC with governance controlled by the largest generators i.e. a generators' club. This arrangement has been highly controversial. The market to large (>2 MW) consumers was deregulated and the main motivation for the deregulation and privatization process in Chile was restructuring of the economy, and to a lesser but nonetheless important degree, the investment requirements in and outside the power sector that demanded significant resources, which the state had difficulty in providing (PRIEN, 1995).

In 1974 Chile's electricity utilities were in a mess and inflation, high fuel prices and price controls on final prices had led to large losses and a lack of investment under public ownership. This situation reflected the impact of nationalisation and the OPEC oil crisis. The government wanted to reorganise the sector in order to introduce economic discipline. Economists in the government were charged with redesigning the regulatory and legal framework within which the companies operated. In the first years of the 1980s they designed the legal framework established in the 1982 Electricity Act, which is still the most important legislation governing the sector.

Deregulation Process

Reforms implemented in the late 1970s and during the 1980s resulted in the separation of the state's commercial interests from its policy-making and regulatory functions. The government does not participate in the commercial

activities and the Comisión Nacional de Energía (CNE) performs the regulatory and policymaking functions. A second agency, the superintendence of electricity and fuels (SEC), under the ministry of economy, holds additional regulatory and oversight functions for the sector.

The process began in 1978, with the creation of the National Energy Commission, which designed the new framework, enacted by law in 1992. The law established competition in generation and recognized transmission and distribution as natural monopolies. It is important to note that no restrictions were imposed as to the property of transmission lines. Transactions among generators would follow marginal cost pricing practice, while prices charged to distributors and retail consumers would be regulated. Large consumers (with a power demand greater than 2 MW) were allowed to freely choose their supplier and negotiate prices. The Economic Dispatch Load Centre (CDEC), created in 1985, would coordinate the generation, operating under a merit order rule.

The unbundling of companies started in 1981, and their privatization commenced in 1985. Major actors in the privatization process were the AFP (private pension funds) that bought shares in the stock market. The following Exhibit No. 6.2 summaries the main events and some key elements of the Chilean reform process.

Exhibit No. 6.2: Chile Reforms History

Year	Reform initiative/ Related event	Comments
1978	Creation of the National Energy commission(CNE)	Designed the basic institutional, legal and policy framework that change the energy sector during the eighties.
1980	Change of tariff calculation criteria	The criteria to determine tariffs based on minimum return on investment of 10% is changed to marginal cost pricing
1981	Unbundling of distribution from ENDESA (major utility)	The distribution business was separated into 9 companies
	Unbundling of Chilectra (major distribution company)	The company was transformed into holding composed of : Chilgener (generation, now gener), Chilectra Metropolitana (distribution) and Chilectra V Region (distribution)
1982	Electricity power Services Law (DEL 1) was enacted.	Legal framework for the restructuring process.

	ENDESA registered as a per-share society	The stock market especially through institutional buyers (AFP ¹ , international investment funds etc.) would play a key role in the privatization process.
	Separation of some of ENDESA's generation facilities	Three generation units were separated from ENDESA, but remain as subsidiaries
1982-83	Economic recession	Delayed the privatization process
1985	Separation of some of two of ENDESA's generation subsidiaries	The subsidiaries remained as owned companies under CORFO (state development agency)
	Creation CDEC-SIC ²	All major generators became subject to central cost – based dispatch. Application of marginal cost whole sale pricing regulation
1985-87	Privatization of Chilectra	The shares were sold to its employees and in the stock market.
1986	Introduction of retail supply competition	Limited to consumers with a demand over 2 MW (the so called "free clients")
		The state absorbs US\$ 500 million of ENDESA's external debt
1987-90	Privatization of ENDESA	Shares were initially sold or exchanged for indemnisation compensation to selected groups ³ and later floated in the stock market ⁴
1988	Creation of ENERSIS	Created from the transformation of the compania Chilena de Electricidad SA. Will later become a major actor in Chile and Latin America ⁵
1990	Privatization process practically completed	
	ENERSIS single largest shareholder of ENDESA	Enersis has interest in generation, transmission and distribution.
1993	Separation Endesa's transmission business	Created a separate company (Transec) and transferred the ownership to its shareholders.
1997	Privatization of EDELAYSEN	With the sale of this small utility privatization reaches 100%
1999	ENDESA- Spain single largest shareholder of ENERSIS and ENDESA- Chile	ENDESA-Spain owns 63.9% of ENERSIS, which owns 60% of ENDESA- Chile. In Latin America. Its interest in generation, Transmission and distribution are located in Argentina, Chile, Brazil, and Peru and in the SIEPAC project, which will interconnect 6 Central American economies.

At the time there was not a lot of recent reform experience in electricity generation markets to draw on. But these countries were having the experience of separating generation and distribution companies where power was paid for according to a formula based on the cost (as UK Area Boards then paid the Central Electricity Generating Board), a dispatch system based on marginal cost pricing (as perfected by the French company, EDF) and a system of trading power between generators to meet customer contracts (as existed in Belgium). These observations gave rise to the partial vertical disintegration of the sector and the formation of a wholesale power trading mechanism. Vertical disintegration and power markets are central to modern ideas of electricity reform. There are two main regional power markets: the SIC – covering the southern and central areas including Santiago – and the SING covering the northern part of the country.

Types of Customers

The concept of two types of customers – regulated and free – was established in the 1982 law. Free customers were those with maximum demand above 2MW. These customers were free to contract directly with generators for the supply of power. Regulated customers were customers of the local distribution companies who could not contact directly with generators. These customers paid the regulated price of distribution plus a node price of energy which was based on the combination of the forecast short run marginal cost of energy, the capacity charge and the relevant transmission charge. Although not envisaged as being a radical new development at the time – no one even in Chile foresaw full supply competition – this distinction did create opportunity for some customers of the distribution companies to seek alternative suppliers.

Detailed Lessons from the Reforms of the Chilean Electricity Sector

To summarise the reforms of the Chilean Electricity Sector as:

- A. Generation markets work best when characterized by a lack of integration with monopoly transmission and distribution networks, low degrees of

- concentration in the price setting segment of the market and when generators freely contract with customers.
- B. Transmission systems need appropriate regulation of incumbents to ensure both fair prices and an adequate rate of return on investment. There needs to be some institution charged with proposing and overseeing system wide planning to ensure timely building of new transmission links.
 - C. Distribution companies need to be regulated to ensure that distribution charges both incentivize efficiency and are fair.
 - D. Economic regulation of the electricity sector is best practiced by a single independent regulatory agency with minimal ministerial control. Statutory duties to ensure adequate planning of future demands in the sector can be effectively delegated to this body.
 - E. The general institutional environment in which the electricity sector is placed must be stable and foster long-term investment based on protection from arbitrary changes in government policy. Legislation regarding the electricity sector should be credible and sustainable. However there should be the capacity for the regulation regarding the system to respond to new information. The ability of the regulator and the Independent System Operator (ISO) to do this requires clear and quick dispute resolution/review mechanisms especially in the case of disputes between companies and the regulatory agency.
 - F. Although the system was currently very tight, the planned construction of large power projects to back up the entrance of various international transmission and natural gas lines will result in possible overcapacity in the system. For this reason, nodal price projections have a diminishing trend. This trend could result in pressures from the generators to change the pricing rules, so their contract prices could be higher.

Chile's Power Sector

The Chilean electricity system illustrates that it is possible to have effective competition and privatization in a relatively small power market with significant hydro generation. The integration of distribution and generators leads to an

inability for nonintegrated generators to compete for the customers of the distribution business.

The power market in Chile was mainly of two types. A deregulated market between generators (or other agents) and large consumers and a regulated market, for inter-generators transfers and sales to distribution companies. The deregulated market represents around 27% of the demand.

Regulated spot pricing applies to inter-generator transfers (via a generators' pool) and to system spot sales to distributors. Spot prices are set at each node of the interconnected system and are based on the weighted average of short run marginal costs (SRMC) of generation for the entire system optimized over a 12- or 48-month horizon (which accounts for reservoir levels, plant availability, thermal plant operating costs, new capacity and rationing). A 50-MW gas turbine increment is used to set the capacity component of the price, and transmission losses are incorporated for sales to distribution companies, prices are calculated adding up node prices plus the cost of the transmission service.

Experiences of Chile's Power market

The regulatory agencies face difficulties in obtaining the necessary level of detailed information from sector enterprises, particularly regarding costs, that may impede them from performing effectively on issues dealing with pricing and competition. Recent studies are focusing on changing CNE's structure, trying to provide it with more independence and reducing the influence of the different parties in its operation.

The major concerns raised by the sector's reform framework relate to the real curbs on competition and the perceived loss of benefits that could be achieved under greater competition. These limiting factors on competition, ultimately have an impact on new investments, economic costs of service, quality of service, and end-consumer options and prices. For example, limiting factors include:

- Endesa's market power, as a single generator has been too overwhelming, representing more than 60% of the capacity and 65% of the generation in SIC.
- The exclusion of smaller generators as members of the CDEC committee (i.e., in SIC, only the 5 largest generators are represented) has raised other issues of fair competition, pricing, and rulemaking.
- The coupling of the ownership and operation of the main transmission system with Endesa's dominant generating capacity has led to major concerns about the transparency and fairness of Endesa's marketing and wheeling terms.
- Enersis' holding of significant ownership shares in Endesa while owning Chilectra raised anti-trust issues and brought about consideration of limiting cross-ownership of different sector activities. The obligation to distribution companies to compete their contracts with generators might reduce Enersis' market power.
- The pricing in the deregulated market, representing about 27% of total demand, is seen as being constrained by the regulated bulk power prices, whereas the node prices cannot vary by more than 10% of the deregulated prices. Moreover, the difficulty of negotiating wheeling fees for power transfers over transmission and distribution grids has proved to be an impediment to greater purchases under negotiated contracts, particularly since there is no well-defined legal or regulatory basis for network tolls.

The Chilean experience of electricity reform is the longest amongst both developed and developing countries and deserves to be studied for this reason. However, it should be stressed that the particular institutional designs adopted in Chile reflect very clearly the legacy of the economic policies of the military dictatorship. That painful experience, in this instance, has had a lasting positive economic legacy: an institutional bias towards a status quo which protects the property rights of initial owners of capital in the electricity sector.

Many of the problems of the Chilean electricity sector are hence problems of loosening the restrictions which the initial legislation placed around changing

the regulatory regime in ways that might disturb those initial rights. While such restrictions were a deliberate attempt to tie the hands of future .

Chile's electricity reforms very clearly reveal how the protection of property rights within a regulatory system which limits the ability of incumbents to exploit market power can capture most of the gains from reform.

6.5 CONCLUSIONS: LESSONS LEARNT FOR INDIA FROM OTHER COUNTRIES

The winds of change that have swept electricity sectors worldwide have also buffeted Indian shores, bringing the promise of an entirely new framework and approach for electricity and few short –term results. Indian policies and approaches are heavily influenced by the theoretical model and empirical results derived from international experiences.

The challenge of implementing electricity restructuring is compounded in most developing countries by unfavorable initial conditions. The electricity restructuring was developed for essentially well functioning systems, developing countries have faced the task of strengthening weak institutions and systems, managing weak finances, and addressing entrenched political interference. In developing world, restructuring efforts and their out-comes differ widely by region. A major difference between the power sector of developed countries and developing countries is that the latter have a significant fraction of the population without access to electricity.

Reforms in the industrialized world took place in the context of well functioning electricity systems providing reliable power to all on a financially viable basis. By contrast, the developing world faced quite different problems: public debt in Latin America, capacity shortfall in Asia, low level of electricity access and mismanagement in many different countries.

6.5.1 Viability of the Full Restructuring Model in India

The challenge of the introduction of competitive electricity market is considerably greater in the Indian context as compared to the developed countries.

Firstly, no country has ever introduced competitive electricity markets in the context of shortages. Instead, most countries started out with surplus capacity and several have run into trouble when the surplus was exhausted and restructuring failed to provide sufficient incentive for investment in new capacity. By contrast India has started with a position of massive shortages, forcing policy-makers either to stifle price signals.

Secondly, establishing a market when a large proportion of potential buyers-SEBs-are financially unviable.

Third, the existing transmission system is inadequate for competitive electricity markets.

Fourth, it requires greater regulatory skill and capacity.

These are the challenges in the mind of policy makers. The recent past of state – led dysfunction offers few reasons for hope, and the future, at least in the form of international model of restructuring and competition, promises more confusion and only uncertain success. The other concern of the policy makers is that once all the fixes are in place, the cost may well outweigh the benefits. In 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. The need is to strengthen the ability of regulatory institutions, which have already improved transparency in the sector. A planning mechanism is nonetheless needed to ensure the sector achieves the minimal entry conditions for competitive markets and to manage the transition period.

The experience in major developing countries such as South Africa, China and Brazil suggest that both the State and 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. 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. Recently, competition, or open access cloaked in the garb of electricity restructuring. However in view of lessons from international experiences it emerges that competition and choice in electricity suggest 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.

In India electricity was made a concurrent subject under the constitution, this has led to state governments coming under considerable pressure from consumers and to the sector's commercial unviability. The electricity Act 2003 introduces many new initiatives since it frees generation capacity creation from regulation ;introduces such a loose definition of "captive generation" that it is now possible for many users to become part of a captive generator and enjoy open access with no surcharge and wheeling and no permissions required as would have been the case for the third-party sales; mandates open access to transmission; recognizes electricity trading as a distinct activity and ensures coordination in generation and transmission tariffs amongst a host of initiatives that should help add to capacity and its utilization. Over the years of independent central electricity regulation, the CERC has introduced many new initiatives.

- Issuance of the availability –based tariff notification, leading to merit order dispatch, disciplined operation of the grid and stable frequency conditions, enabling trading and setting up of inter-regional grids.
- Issuance of grid codes, which sets out rules for participants in the system to follow and creates the basis for market –like conditions in centrally administered inter-state and inter –regional power markets.
- Direct contracts between generators /distant distributors and large consumers, especially in small hydro projects.

The law enables the CERC to regulate state –owned transmission lines, whenever central electricity passes through these lines, thus enabling the creation of a national transmission grid.

Regulatory reform in the electricity sector, characterized by deregulation and privatization is beginning to become common phenomena amongst various economies. Some are well advanced while others are still in the early stages of planning. When one takes into consideration the circumstances of individual economies, in terms of social, political, legal and financial frameworks, and stage of economic development, it is easy to see how there can be substantial hurdles to the introduction of fully competitive electricity markets. Policymakers and energy industry analysts in well-developed economies may sometimes lose sight of the fact that these hurdles may prevent rapid reform - or for that matter, any significant reform. Despite this, there is a consensus for concentrated efforts to be made for :

- (1) To introduce competition into wholesale and retail markets by deregulating generation and opening retail
- (2) Continuing to regulate network activities.

But the experiences also shows that those governments that started deregulation are continually revising their regulations. Argentina, California, England and Wales are still carrying out important revisions. The regulatory solutions adopted and the design of a transitional period to implement the new organizational structures is strongly influenced by the starting point of the industry and the political and institutional constraints in each country.

One of the theoretical arguments in favour of the introduction of full-scale competition in the electricity supply industry is that the cost of generating and supplying electricity will decline, as operational efficiencies in managing generation and network assets improve, and competition leads to wider choice and higher quality services. Investment decisions with respect to new generation capacity and the upgrading and/or extending of networks have become more transparent as they have become more commercially oriented, and a host of new and improved goods and services are beginning to be offered.

As reform advances, and it becomes more difficult to meet social policy objectives, new sets of regulation are required to deal with environmental impacts, rural electrification and support programs for low-income consumers. The

problem of meeting social policy objectives is more difficult in those economies where electricity supply is barely keeping up with ever increasing demand.

Although it is relatively clear what is required to introduce competition into the electricity supply industry – the separation of the competitive from the natural monopoly elements, desegregation to reduce market power etc, the design of a satisfactory regulatory framework is less straightforward. The electricity supply industry is unusual in a number of respects: the product (electrons) cannot be easily stored. An optimal regulatory framework needs to take into account these factors, and the likelihood that post-reform a potentially high degree of re-concentration will occur (requiring robust competition law). Also important is the flexibility to accommodate technological development, changes in industry structure (particularly if disseminated power systems become important in the industry), and the need for consumer education, especially at the household level.

Thus it is our view that regulatory reform ought to be as flexible and performance oriented as possible, so as not to inhibit competition at any level, and to foster the adaptability of the regulatory regime to both anticipated and unanticipated future events, including technological advances.

6.6 CONCLUSIONS

Restructuring and deregulation of the electricity industry is a movement with the aim of achieving lower prices to customers through cost savings. However, the brief history of this process shows that there is still much to be learned. Despite this, there is a consensus

- (1) To introduce competition into wholesale and retail markets by deregulating generation and opening retail and
- (2) Continuing to regulate network activities.

Thus it is our view that regulatory reform ought to be as flexible and performance oriented as possible, so as not to inhibit competition at any level, and to foster the adaptability of the regulatory regime to both anticipated and unanticipated future events, including technological advances.