



**Third Workshop and High level Conference of the APEC-OECD
Co-operative Initiative on Regulatory Reform**

**Regulatory Reform in the Electricity Sector:
The Experience of the APEC
Economies**

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Main questions to be addressed:

- What lessons can be learned from the regulatory reform processes in the electricity markets of the APEC economies?
 - ⇒ Are they effective in developing efficient domestic and regional electricity markets?
 - ⇒ Can other public interests be also accomplished?
 - ⇒ What conditions are needed for the success of the regulatory reform processes?
- What are the key issues that need to be considered for the next phase of the APEC-OECD Cooperative Initiative?

Lessons from the regulatory reform experiences in the APEC economies

- Regulatory reform in the electricity sector of the APEC economies is critical for the development of efficient domestic and regional markets, capable of meeting the region's future demands.
 - ⇒ The effects of regulatory reform on prices and market structure depend on the ability of regulatory agencies and policies to control market power after reforms have been implemented.
 - ⇒ Need for developing better coordination mechanisms between the sectoral regulator and the competition agency.
- Some conflicts arise when other important public interests are also considered:
 - ⇒ Greater demand for energy present challenges for environmental sustainability.
 - ⇒ Better living standards, resulting from increased energy consumption, may be affected by deteriorating environmental conditions.
 - ⇒ Energy needs of the poor and reduction of poverty in the region should be considered explicitly in the policy discussion.

Key issues that need to be considered for the next phase of the APEC-OECD Cooperative Initiative

- ⇒ Previous work developed by APEC energy fora (EWG) in the analysis of regulatory reform experiences in the electricity sector: IPP Principles (1997) and the Manual of Strategic Principles for Electricity Supply Industry (2001).
- ⇒ Basic economic and policy scenario for the next two decades.
- ⇒ Energy needs of the poor and a sound poverty reduction approach.
- ⇒ Demand for greater transparency in regulatory reform processes.
- ⇒ Development of a competitive regulatory and competition framework.
- ⇒ Dynamics of the regulatory reform processes in the electricity markets.
- ⇒ Development of *benchmarking* indicators for the APEC region.

APEC Energy Demand and Supply projections for 2020 **(APEREC 2002)**

- Total APEC GDP is projected to increase at an average annual growth rate of 3,5% (DRI-WEFA)
 - ⇒ China is expected to have the highest growth rate of 7,2 per cent per annum (19,3 per cent of the increase in APEC).
 - ⇒ USA accounts for 44,8% of this increase.
- The region's population is projected to increase at an average annual growth rate of just 0,8% (2994 million in 2020).
- Total APEC final energy consumption is projected to increase at an annual growth rate of 2,2%.
 - ⇒ Southeast Asia is the fastest-growing region at 3,6% per annum (8,8% of APEC final consumption in 2020).
 - ⇒ China accounts for 26% of the increase in the period, with an annual growth rate of 2,7% (low compared with its GDP growth rate).
- Transport is the fastest growing sector at an annual rate 2,7%.
- Industry is the largest sector, consuming 36% of total final demand and is projected to grow at an annual rate of 2,4%.

APEC Electricity Sector projections for 2020

- Installed capacity is projected to increase by 1252 GW (62% increase between 1999 and 2020).
- Electricity generation is projected to increase at an annual rate of 2,9 %, lower than the 3,2% estimated for final demand.
 - ⇒ Developing economies are projected to increase their consumption at rates higher than 4%.
 - ⇒ China accounts for 30% of the increase in demand and USA for 24,2 %.
- Transmission and distribution losses are projected to fall from 17,1% of generation in 1999 to 12,8% in 2020.
- Electricity generation capacity to meet increasing demand is projected to be around 1252 GW over the period 1999-2020.
- Generation from gas is expected to almost triple between 1999 and 2020.
- Capital requirements are estimated between \$1,35 trillion and \$1,42 trillion (equivalent to \$90 billion in 2020). Local distribution and replacement capacity will demand additional resources.

APEC's institutional framework for regulatory reform in the electricity sector

- Energy Working Group (EWG)
 - ⇒ In charge of maximizing the energy sector's contribution to the region's economic and social well being, while mitigating the environmental effects of energy supply and use.
 - ⇒ Promotes economic growth, energy security and environmental protection, and the contribution of energy to the economic, social, and environmental enhancement of the APEC community.
 - ⇒ Representatives from the 21 member economies; observers from the PECC Energy Forum and the Pacific Islands Forum (PIF); the Asia Pacific Energy Research Center (APEREC); and current guest participants (Colombia, India, Mongolia, Pakistan and Venezuela).
 - ⇒ Coordination with the EWG Business Network (EBN) and the Energy Regulator's Forum.

Activities developed by the EWG in the analysis of the regulatory reform experiences in the electricity sector

- Manual of Best Practices for Independent Power Producers (IPPs) (1997):
 - ⇒ A comparative study and report on developing transparent, efficient and effective procurement processes for power infrastructure in APEC member economies
- Strengthening the operational aspects of APEC Energy Micro-Economic Reform Project: Manual of Strategic Principles (2001):
 - ⇒ To promote and implement a regional strategy for institutional strengthening and capability amongst APEC member economies
 - ⇒ High level “Best Practices” Principles for designing and implementing Electricity Supply Industry (ESI)
 - ⇒ Practical “Policy Toolkit”
- Study of the Assessment of the Economic and Sectoral Impacts of Regulatory reform in APEC Energy Industries (2002)
 - ⇒ To provide quantitative analysis of the broad economic and sectoral impacts of policies to deregulate energy markets in APEC region

Common features of APEC electricity markets

- Market characteristics and approaches to reform vary widely in the region.
- Some common features:
 - ⇒ Vertical integration in generation, transmission, distribution and retail industry is common. In many economies there is full integration from generation to retail supply.
 - ⇒ State ownership is common (exceptions for Chile and Hong Kong). All economies have some private ownership in generation.
 - ⇒ Consumer choice is limited (full retail competition in only two economies: Chile and New Zealand). Large consumers are able to choose their suppliers in several economies.
 - ⇒ Entry of IPPs, restructuring and privatisation creates competition in generation.
 - ⇒ The most common supply arrangement involves a single buyer, usually state owned, purchasing all electricity for sale to consumers (Indonesia, Japan, Korea, Malaysia, Mexico, Philippines, Thailand and Vietnam).

Rationale for regulatory reform in the electricity industry

- Main objectives of reform:
 - ⇒ Lower energy prices
 - ⇒ Poor performance by regulated utilities
 - ⇒ Fiscal pressures
 - ⇒ Security of supply
 - ⇒ Technological developments
 - ⇒ Evidence of successful reforms in other sectors and economies
- Basic model for Electric Reform:
 - ⇒ Separation of generation from transmission and distribution
 - ⇒ Competing generating companies (privately owned or corporatised) bidding into a power pool
 - ⇒ Transmission and distribution companies (privately owned and corporatised) providing access to all network users on non discriminatory terms.
 - ⇒ Establishment of an independent regulatory body
 - ⇒ All or part of the retail market open to competition

Reform proposals in the APEC region

- Introduction of private ownership, particularly in generation, through privatisation of state owned assets and entry of IPPs.
- Separation of network functions of electricity supply industry (transmission and distribution) from potentially competitive functions (generation and retail supply) has been widely adopted and proposed.
- Introduction of Independent System Operators (ISO).
- Competition in wholesale and retail supply markets, particularly for large industrial consumers.
- The approaches vary from full ownership separation to weaker forms requiring vertically integrated firms to keep separate accounts for each function.
- Introduction of full retail competition is considered the final stage of a phased program of reform.
- Independent regulators are considered a desirable feature of a liberalised economy (but only six economies have already implemented independent regulatory frameworks).

The Asian IPP model

- The Asian IPP model is a major competitor of the unbundled models.
- IPPs are traditionally developed in electricity markets characterized by the presence of government owned and vertically integrated utilities, totally responsible for supply.
- The IPP Principles developed in 1997 were structured around four themes:
 - ⇒ Institutional and regulatory structures
 - ⇒ Tender / bid processes and evaluation criteria
 - ⇒ Power Purchase Agreements (PPA) and associated power structures
 - ⇒ Financing and its implications
- The experience of implementation of the principles:
 - ⇒ A transition from one state of affairs to another and a move to broader market reforms
 - ⇒ Governments are forced with competing objectives
 - ⇒ Economic regulation of prices through PPA is wishful thinking

Conclusions from the study developed by of the EWG (2002)

- Regulatory reform in the electricity sector can generate important economic benefits, particularly for the new and industrialized economies.
- Gains in the regional GDP from energy market liberalisation for 2010 are estimated in US\$ 71 billion.
- The benefits increase if a comprehensive and broadly based approach to liberalization is adopted.
- The reform can also contribute to achieve some of the key energy policy objectives endorsed by the APEC energy Ministries (development of more efficient production, distribution and consumption of energy; development of open energy markets; promotion of capital flows and ensuring stable secure and reliable energy supplies)
- The largest contribution to GDP comes from the electricity sector.
- Shift to gas in the energy consumption mix.
- Improvements in productivity between 10% and 30%, depending on the advances in sectoral reforms.
- Average price reductions were estimated between -6,1% to -12%.

Conclusions from the experience of the OECD economies **(Steiner 2001)**

- Regulatory reforms involving vertical separation of the industry, market price determination and privatisation impacted favourably on efficiency.
 - ⇒ The ratio of industrial to residential end-user prices is reduced by the unbundling of generation and transmission, expansion of Third Party Access (TPA) , and introduction of electricity markets.
 - ⇒ The existence of these markets tends to reduce levels of industrial end-user prices.
 - ⇒ A high degree of private ownership and imminence of both privatisation and liberalisation tend to increase industrial end-user prices.
 - ⇒ Unbundling of generation and transmission and private ownership each serve to improve the utilisation of capacity in electricity generation.
 - ⇒ Unbundling of generation and transmission brings reserve margins (the ability of capacity to handle peak load) closer to their optimal level.

Problems with abuse of market power

- Cost reduction can be translated into price discrimination between different categories of consumers and small industrial customers.
- The effects of regulatory reform on prices depend crucially on the ability of regulatory policies to control market power after reforms have been implemented. There is a potential for generators to exercise significant market power by limiting supply to increase prices above estimated competitive levels:
 - ⇒ Half of the price paid for wholesale electricity in parts of Australia
 - ⇒ 22% above competitive levels in California
 - ⇒ 26% higher than the imputed marginal costs of the marginal supplier from 1992-1994 in the UK
- Options for dealing with abuse of market power:
 - ⇒ Identifying and removing barriers to entry and restrictions on generators (reducing licensing procedures)
 - ⇒ Compulsory divestiture of assets in the case of horizontally integrated generators: to create competing generators
 - ⇒ Price regulation: difficulties in designing cost-effective regulation (strategic behaviour or changing demand and capacity conditions)

Dynamics of regulatory reform experiences

- Reform tend to be a gradual process: difficulties in assessing direct and indirect effects.
- Types of impacts that could be expected over the long run:
 - ⇒ Significant falls in real average prices over time. In some cases industry prices fall more sharply than domestic.
 - ⇒ Price increases for some consumers and increased price volatility driven by the interaction of demand and supply and markets that are not insulated from external shocks.

Case of California: wholesale prices increasing up to 500% over a year

- Government pursuing social or other objectives through energy prices and supply prices can limit the scope for benefits to be realised.

Observed outcomes from privatisation schemes

- Designed for promoting better performance in utilities and more competitive industries:
 - ⇒ Turning a public monopoly into a private one encourages better performance in terms of lower prices and improved production techniques, as managers are trying to maximize profits for shareholders.
 - ⇒ The final outcomes depend on the economic and regulatory environment in which the private entity operates.
 - ⇒ Consumers may be hurt and regulation is necessary to control monopoly power and to ensure that the benefits are passed to consumers.
 - ⇒ Regulation may distort market signals for private firms.
 - ⇒ An alternative to privatisation is corporatisation: creating incentives for the state owned utility to operate like a private firm.

Peru: Regulatory Reform in the Electricity Sector

- Main objective: Promote economic efficiency and protect consumers from abuse of market position and non-competitive practices.
- The power sector completely unbundled into separate generation, transmission, distribution and retail markets.
- Privatisation of more than 60% of state owned assets.
- Pool system (COES), with participation of private and public operators.
- Wholesale market with bilateral long term contracts.
- Cap-prices established for customers in the regulated market.
- Busbar electricity prices established every six months for distributors, considering penalties for losses in the transmission process.
- Regulated and non-regulated market prices cannot differ in more than 10%.
- Annual interconnection fees for generators, covering investment, operation and maintenance costs of transmission.
- Tariffs for final users adding value added in distribution, considering investment, maintenance, operation and other costs related to distribution.

Peru: Regulatory and competition framework

- Creation of an independent regulator (Osinerg) in charge of supervising electric concessions and tariffs for regulated consumers.
- Pre-merger control in charge of the competition agency (Indecopi).
 - ⇒ To regulate potential abusive behavior of firms, mainly explained by increasing control over firms operating in generation, transmission and distribution.
 - ⇒ Restrictions on cross-ownership, enforced horizontally across generators and vertically across the three components of the production cycle.
 - ⇒ Firms with high market power, operating in any of the electrical activities, need the approval of the Free Competition Commission (FCC) of Indecopi to increase their control over the system. Restrictions may be imposed on the transaction.
 - ⇒ Limits for notification set at 5% for vertical integration and 15% for horizontal integration.
 - ⇒ Control over a firm operating in the system can be increased through purchase of stocks, special management agreements, or increasing the number of members appointed to the board of directors.

Peru: Problems with the enforcement of competition regulations in the electricity sector

- Lack of coordination between the privatisation team (Pro-Inversion), the regulatory agency (Osinerg) and the competition agency (Indecopi).
 - ⇒ Conflicting objectives (raising government revenues, reducing tariffs for domestic and industrial users, reducing barriers to entry and the degree of market concentration).
 - ⇒ Generating companies were prevented to participate in transmission and distribution operations, to avoid market foreclosure, with some exceptions for small local systems.
 - ⇒ The restrictions include limits on market share and participation in the new privatization processes.
- Industrial non regulated clients located near big distributors, have been facing abusive conditions for renegotiating their supply contracts.
- All the concentration processes have been approved by the FCC.
- Some restrictions were imposed in Enersis-Endesa transaction (voting shares and public bidding in purchases from generators).

Peru: Electricity Sector Indicators

	1992	2000
Coverage of electricity (%)	59,8	72,2
Installed capacity (approx)	4152	6070
Electricity Sales (GWh)	7261	15536
Losses (%)	22	11
Average consumption (KWh/user)	133	108
Average tariff paid per energy unit (US\$ MWh)	63	70
Users / Employee	547	693
Users (Thousands)	2005	3358
Internal resource generation (Millions US\$)	185	641

Source: CTE

Tariffs for Domestic Users (Regulated)
Tariff BT5 100 to 150 Kw/h - Cents US\$

	1994	1995	1996	1997	1998	1999	2000	2001
Lima North	7,16	10,11	9,89	9,56	9,24	9,21	9,33	9,51
Lima South	7,35	10,32	9,89	9,49	9,09	9,16	9,36	9,49
Arequipa	8,52	11,86	10,13	10,56	11	10,70	10,76	9,82
Cuzco	8,60	10,98	10,78	11,23	11,68	12,10	11,46	10,36

Source: CTE - Osinerg

Future challenges for the regulatory reform process in Peru

- Uncertainty about the political commitment and the future development of the privatisation program.
- Negative reactions from the population to recent privatisation initiatives (case of EGASA and EGESUR in the southern part of Peru).
- New regional leaderships that challenge the central government regulatory reform proposals
- Need for greater transparency and the development of effective public consultation mechanisms regarding tariff decisions and new regulations.
- Political interference in the regulatory process.
- A competitive approach to regulatory reform in the electricity sector.

Asian Development Bank's proposed strategy for regulatory reform in the electricity sector (ADB 2000)

- A phased approach for regulatory reform in the APEC region: restructuring to achieve a competitive market model with wholesale and retail competition.
- Five major steps to be considered in implementing the approach:
 - ⇒ Getting the investment framework right
 - ⇒ Deciding on the goals of restructuring and the ideal industry structure
 - ⇒ Preparing the players to participate in a competitive market
 - ⇒ Privatizing existing and new assets
 - ⇒ Ensuring that the competitive market is implemented properly

1. Getting the investment framework right

- Put in place a rational investment framework to create an enabling legal and regulatory environment to support competitive markets in electricity.
 - ⇒ Establishing a government commitment to a competitive power market;
 - ⇒ Ensuring ministry and utility compliance with that commitment;
 - ⇒ Passing a law for restructuring the power sector to be implemented over a fixed period of time;
 - ⇒ Ensuring that currency is convertible and foreign exchange is available.
 - ⇒ Strengthening local capital markets; and
 - ⇒ Setting up a credible legal framework.

2. Deciding on the goals of restructuring and the ideal industry structure

- Identifying the structure intended to be adopted for new and existing assets.
- The proposed structure considers:
 - ⇒ Unbundling of the power sector into separate generation, transmission, distribution and retailing sectors to achieve maximum benefits for customers.
 - ⇒ An independent regulator that oversees power transmission and distribution;
 - ⇒ A number of privately owned, competitive generating plants;
 - ⇒ A single regulated transmission system that includes private ownership;
 - ⇒ A number of power distribution companies with incentives for performance; and
 - ⇒ Competition for retailing power to end-use customers.

3. Preparing the players to participate in a competitive market

- Training the regulators so they can operate effectively;
- Establishing clear regulatory rules;
- Reducing or removing subsidies;
- Enlisting public support for the restructuring process;
- Reorganizing and preparing the state-owned utility for the new structure and incentives for performance that will emerge;
- Developing draft tender documents and contracts; and
- Defining a new role for the ministry.

4. Privatizing existing and new assets

- Restructuring or sale of assets.
- Tendering process carried out in a transparent and open manner, and carried out in a short period of time.
- Sale of power distribution utilities as well as generation, including existing and new assets and projects, using a transparent process.

5. Ensuring that the competitive market is implemented properly

- Implement all these changes effectively.
- Regulations and requirements must be enforced.
- Open access to transmission and distribution wires, and the ability to trade power between buyers and sellers in an open market.
- Operate the generation and retailing markets competitively, with a large number of generators selling into a wholesale electricity at prices which balance demand and supply throughout the day.
- Operate the transmission network as a concession on the basis of competitive bidding, or privatize it within a tight regulatory framework, controlling rates of return prices or gross revenue.
- The independent regulator should mainly oversee prices and incentives for transmission and distribution operations.
- Restructuring should proceed at a pace consistent with the development of a competitive and unbundled system.

Need for a poverty reduction approach to the regulatory reform experiences

- Privatization is not a substitute for responsible, redistributive welfare policies.
- Utility reform processes affect poor households in varied and often complex ways. It is not certain the vulnerable households will be hurt by reform processes.
- Governments and advisors fail to measure, anticipate and monitor the effects of privatization on the poor.
- A political commitment is required.

Recent events that affect the assessment of regulatory reform processes in the electricity sector

- Assessment of the effects of regulatory reform processes in the electricity sector has also been affected by recent events related to the California Energy crisis, September 11, the Argentina Crisis and the Enron bankruptcy scandal:
 - ⇒ The problems in California were not the result of deregulation, but a consequence of failures in the design of the regulatory model, combined with ineffective government responses to the crisis (Joskow 2001).
 - ⇒ September 11, Argentina crises and Enron bankruptcy reduced the availability of private capital flows for privatisation and liberalisation processes. Strategic investors reconsidered their portfolios in emerging markets. New multilateral Partial Risk Guaranty (PRG) schemes call for a more active participation of governments in project financing.