INTERNATIONAL SEMINAR ON

Restructuring and Regulation of the Electric Power Sector

November 1995 - Buenos Aires - ARGENTINA

ENRE

Ente Nacional Regulador de la Electricidad

(National Electricity Regulatory Agency)

Board of Directors

Ing. Carlos A. Mattausch
President

Lic. Alberto E. Devoto
Vice-President

*Dr. Marcos Rebasa **
Ing. Juan C. Derobertis
Ing. Ricardo Martinez Leone
Members

**** Up to April 6, 1996***

This Seminar has been sponsored by the

The World Bank

INTERNATIONAL SEMINAR ON

Restructuring and Regulation of the Electric Power Sector

Taken place November 1995 - Buenos Aires - Argentina

Av. Eduardo Madero 1020, 10°Piso - 1106 Buenos Aires
Queda hecho el depósito que marca la ley 11.723
Impreso en la Argentina

ISBN: 987-96385-1-4

List of Participants

Andrés Alonso Rivas, *civil engineer, Master of Science, University of Columbia, United States; Chief of the Electricity Area, National Commission of Energy, Chile.*

José Luis Antúnez, *engineer and General Manager of TRANSENER, concessionaire of the high-tension transmission system in Argentina.*

Vicky Bailey, *Commissioner, Federal Energy Regulatory Commission, member of the Executive and Electricity Committee of NARUC and member of the Keystone Board, Energy Center, electricity policy group of Harvard, United States.*

Luis Ignacio Betancur Escobar, *lawyer and advisor to the Energy and Gas Regulatory Commission of Colombia.*

Bernardo Bronstein, *engineer, former State Secretary of Energy and current advisor to the Secretariat of Energy and ENRE, Argentina.*

Alberto Devoto, *economist and Vice-President of the National Electricity Regulatory Agency (ENRE), Argentina.*

Gustavo Devoto, *engineer and staff-member of the National Electricity Regulatory Agency (ENRE), Argentina*

Jordi Dolader, *Vice-President of EDENOR, concessionaire of electricity distribution in Buenos Aires, Argentina.*

Daniel Fessler, *lawyer, Professor of Law at the University of California, Berkeley and President of the Public Utilities Regulatory Commission, State of California, United States.*

Claudio Guidi, *engineer and staff-member of the National Electricity Regulatory Agency (ENRE), Argentina*

Luis Alberto Haro Zabaleta, *electrical engineer and Electricity Director-General, Ministry of Energy and Mines, Peru.*

Alex Henney, *consultant and former chairman of the Electricity Consultative Council of London, former Director of the London Electricity Board and former member of the Electricity Consumers Council, Great Britain.*

Bo Lyndörn, *economist, Director of NUTEK Electricity Market, Swedish Regulatory Agency.*

David Newbery, *Director, Department of Applied Economics and Professor of Applied Economics, University of Cambridge, Great Britain.*

Martín Rodríguez Pardina, *economist, Master of Philosophy, University of Cambridge, Great Britain and staff-member of the National Electricity Regulatory Agency (ENRE), Argentina.*

Luis Rodríguez Romero, *economist, Professor of Applied Economics, Carlos III University, Madrid, and Counsellor to the National Electricity System Commission, Spain.*

Melchor Roselló, *engineer, former General Manager of SEGBA and current member of the Tucumán Thermal Plant, Argentina.*

John Henrick Sagen, *economist and Manager of the NVE, Energy and Water Resources Administration, Norway.*

Charles Stalon, *lawyer and former FERC Commissioner, United States.*

Geoff Swier, *economist, Deputy Director, ESI Reform Unit, Department of Treasury and Finance, state of Victoria, Australia.*

Introduction

At the beginning of the 1980s, the need for changes were suggested for policy-making in public utilities in general but particularly, in electricity.

In most of the countries, this service was provided by state-owned companies and the State was responsible for making the necessary investments on the basis of a generally centralized planning process.

In some countries, there was concern over the cost of the service, considered high and harmful for the competitiveness of the economy as a whole, worsened by the greater opening of international trade or the strength of free trade associations.

In other places, the problem was due to the growing difficulties of the State to obtain the necessary resources not only for the required investments but many times to maintain existing machinery in reasonably good conditions. This also brought about inefficiencies and difficulties in the economy as a whole, worsened by the loss of quality in supply. In the latter cases, it is essential to consider the problems stemming from external indebtedness and internal inflation which drove authorities to use tariffs as anti-inflationary tools for short-term effects but self-defeating in the long run, thus producing the companies' divestiture.

In the end, although the starting points were different, the solutions achieved were similar, bearing an important common feature: that is, achieving a higher level of competitiveness in the sector.

The Governments of Chile, in the first place, and then the United Kingdom started a process for introducing market and competition rules in the sector to try and correct those inconveniences. Other countries then started assimilating their experience and, particularly in developing countries, the position and action of the World Bank led to a greater incorporation of these elements. In the middle of the 1990s, the restructuring of the electric power sector is an issue which is highlighted on the agenda of a great number of countries.

The characteristics of the electric power sector somehow conditioned the proposed as well as the adopted solutions. Thus an indispensable condition for introducing competition is the need to vertically de-integrate the industry since generation may enter into the sphere of competition, but from the strictly technical point of view, vertical integration is more efficient in this segment.

On the other hand, the segments operated through networks -transmission and distribution- are natural monopolies with the implications this entails and the precautions this urges to take in order to preserve and protect the users of a service which in most legislations is public in nature.

To be able to conciliate the proposed objectives with the existing constraints, regulation appeared as an essential need in these restructuring and reform processes which were, in turn, accompanied by gradual or complete privatization processes.

However, with the exception of the long-standing U.S. tradition concerning regulatory issues, there were no appropriate experiences worldwide. All the more when considering that such a model is essentially based on the control of profitability and respects vertical integration and de-integration, whereas most of the reforms undertaken since the 1980s were oriented in another direction and more and more countries have restructured their systems or are planning to do so in the near future.

To a certain extent, solutions were prepared on the basis of the model adopted by Great Britain, and with a superficial overview, we could believe it is relatively easy to establish a system of these characteristics based on certain basic premises: vertical and horizontal de-integration of the industry, competitive market in generation, free access of third parties to the networks, freely negotiated contracts, etc. However, in practice, things were not so simple and peaceful and, as the process developed, each step offered different alternatives for a solution, all respectful of the initial premises. De-integration seems simple and more so regarding the unbundling alternative, but generation and transmission are somehow substitutes and in most cases investment in transmission was being considered as a cost linked to generation, necessary to transport energy to the market. On the other hand, in densely populated areas there co-exist systems which in nature are more inherent to transportation with networks devoted to distribution, thus complicating not only the physical separation but also a comprehensive understanding of the problems.

The idea of free access by third parties is really encouraging but when it is combined with criteria for the expansion of the transmission system or with the notion of residual capacity, very finely tuned regulation becomes a complex issue.

Anyhow, at the end of 1994, and as a result of several sort of informal contacts with other regulators, we believed in ENRE that besides the common basic principles and, in some cases, shared or specific problems of each legislation, it would be interesting and necessary to hold a meeting with most of the regulators so as to become acquainted with the prior situation in each of the countries involved, the type of regulation adopted, the main problems faced and the solutions undertaken, and to benefit from all the accumulated experience.

This proposal was conveyed to World Bank officials, who welcomed the idea and cooperated permanently to materialize it, facilitating the use of a line of credit our agency had available.

That is how the idea arose to hold this International Seminar on the Restructuring and Regulation of the Electric Power Sector which took place in the city of Buenos Aires, between 8 and 10 November 1995.

The document contained in this publication is a re-elaboration of the presentations and debates of those three very hard days of work. It has been structured according to the subject matter, but respecting the expressions used by the participants.

In view of the initiative suggested by the Swedish representation, this first Seminar will be followed by one in the city of Västerås in the month of February 1997, and we hope this will turn into a forum of periodical meetings among those in charge of regulation in the electricity sector.

Finally, I would like to express my acknowledgement to all participants -list included in this document- and my special gratitude to Mr. Nelson de Franco from the World Bank for his permanent support and encouragement.

Moreover, I wish to thank Eng. Alfredo Mirkin -current Secretary of Energy of Argentina- who shared the idea and presided over the opening ceremony; Lic. Raúl García, president of ENARGAS, in whose conference room the seminar was held; Lic. Alejandro Rausch who very efficiently coordinated the event; Lic. Javier Cardozo who edited this document; Mrs. Yvonne Fisher who prepared the English version; Miss Patricia Pereira who was in charge of diagramming the publication and Mr. Alfredo Garófano, Miss Adriana Bruzos and Mrs. Cristina Fernández, who have helped permanently in the preparation of the Seminar and in the editing and publication of this document.

Alberto Enrique Devoto

Buenos Aires, December 1996.

Regulation Of The Electricity Sector: Comments On Some Alternative Models

Opening Session

Regulation Of The Electricity Sector: Comments On Some Alternative Models

Professor David Newbery
Director Department of Applied Economics
Professor of Applied Economics
University of Cambridge, Great Britain

It's a great honour to be here and it's very exciting to be at a conference which represents so many different regulatory experiences in electricity. What I would like to do in this first presentation is to stress the differences between the problems the different countries face. And I'm acutely aware, because the British model is often held up as the one to follow, that there is no one single model.

Diagnosis: over or underinvestment?

Let me start with a fairly fundamental question: Why would one want to privatize an electricity industry? And I would like to suggest that there is a big difference between the experience of developed countries and the problems facing developing countries.

In developed countries, they started typically with spare capacity and very low demand growth and that meant that investment was not a major concern. However, they wanted to reduce the prices of electricity and they wanted to introduce greater efficiency, so the motive was to concentrate on reducing prices and not to worry so much about investment.

"In developed countries, they started typically with spare capacity and very low demand growth and that meant that investment was not a major concern. However, they wanted to reduce the prices of electricity and they wanted to introduce greater efficiency. But if we look at developing countries it's almost exactly the opposite. In many of these countries, there has been a very rapid growth of demand for electricity, especially in Asia. The problem is often that the prices are too low and that means there is not enough revenue to finance investment, which is clearly crucial to meet the rapid demand growth. So the one idea that has been put forward is that it is necessary to privatize in order to raise the prices of electricity and to finance the investment."

But if we look at developing countries it's almost exactly the opposite. In many of these countries, there has been a very rapid growth of demand for electricity, especially in Asia. The problem is often that the prices are too low and that means there is not enough revenue to finance investment, which is clearly crucial to meet the rapid demand growth. So the one idea that has been put forward is that it is necessary to privatize in order to raise the prices of electricity and to finance the investment.

I want to see if that is a valid reason for privatization. To illustrate the developed countries' situation, I would like to use some indicators of Britain since I think many countries are in the same situation.

This is the history of Britain from 1950 to just before privatization. Like many countries, we forecast the demand to, if anything, accelerate and it didn't, it flattened out. There was, therefore, a huge excess capacity built up and we still have more capacity than we need.

Let's take a look at what is happening in most developing countries. As recorded by a recent World Bank report, electricity tariffs, in constant prices in U.S. cents per KWh, have fallen and also they are very low. It follows that the rate of return on the assets has been falling towards the end of the 1980s to only 4%. Now rates of growth of demand of 8% require rates of profit of at least 8% and preferably higher if they are to be able to finance investment. So the problem here is one of too low prices, unable to finance investment.

The same World Bank report gives a measure of the amount of investment that is needed annually, something like eighty billion dollars in the developing world. This is the fiscal cost of that, which is more than the amount of investment. These industries are mostly losing money.

The paradox of privatization.

Now we come to the paradox of the privatization solution to this. The industry requires heavy investment which the State cannot finance and the industry itself cannot finance because the prices are too low. But if the solution is to privatize, then private investment is going to require high prices to earn a reasonable return on that asset. In many cases private investors will be reluctant to invest without some kind of guarantee.

If you then put those two together -the high prices and the State guarantees- it means essentially that the State is raising the price of electricity to generate the resources to finance that investment **also** *reducing the risks of such investment*, and it may just be simpler to do it that way.

Several times I have been argued that the financial logic of privatization is doubtful but there are -and I will stress this- very serious reasons for considering it, the main one being the need to create a regulation system; and with luck that will irreversibly improve things.

The next question is to whom you want to sell it. If you sell it to foreigners as a way of raising external funds, this may just turn out to be an extremely expensive form of State borrowing, especially if State guarantees are required.

On the other hand, the alternative of selling it to the domestic sector, I think, is potentially very attractive. If you sell it too cheap, at least it keeps the gains within the country. But it

does get the benefits of re-aligning the prices which is needed to finance the investment and it has the indirect benefit of widening the domestic capital market.

It follows that domestic capital market reform may be a sensible first step before privatizing such a capital-intensive industry.

Who gains and who loses in the process of privatization?

Let's look briefly at Chile. The points I want to stress are that, in many ways, everything seems to have been done right in Chile: in that the regulatory agency was created first, the structural reforms were created under public ownership and the tariffs were adjusted under public ownership to get the companies operating in a financially viable way and with a proven track record. Only after the structural reforms and competition had been introduced, was privatization embarked upon. And with quite a long delay, so there was considerable experience about how the system worked. If one were to design a very carefully structured privatization programme, surely Chile would be the example.

There is a very interesting social cost-benefit study of two of those Chilean companies to find out after the privatization who gained and who lost and how much. The study is by Galal, Jones, Tandon and Vogelsang and I recommend it to you. They looked at two companies: a generating company and a distribution company. The study found that the Government lost 1.4 % forever of the sales value. Overall, the whole operation was successful. The buyers gained 2.1% per year which may not sound very much but it is 31% of the value of the assets of the company so these are considerable gains. Anyhow, I would like to point out that two thirds of those gains went abroad to the foreign buyers. Likewise, the consumers did not benefit, the buyers primarily did and the Government lost even though this was probably the most carefully structured privatization that I've seen.

The same was true in the distribution company. The Government lost and the buyers gained and, in this case, the domestic buyers gained a larger proportion and most of the gains were kept within the country. The large loss here was to people who suddenly had to start paying for their electricity instead of stealing it.

So what do I conclude? The financial case in terms of rescuing the Government's precarious finances does not look good. There have to be other reasons why one would privatize. Now I would argue that the key factor of success is to improve the quality and quantity of investment. That is typically far more important than just getting the prices right although you need to get the prices right to finance the investment. That is particularly important with electricity utilities because they are very capital-intensive.

Private and public role in the financing of investments.

The problem under private operation is that since these industries are very capital-intensive and you cannot move the capital once its invested, you have to persuade people to risk their capital; and the gain in the future is uncertain, primarily because that will be determined by regulation. So the problem is primarily to convince people that regulation will guarantee their returns.

The difficulty the private sector faces - I've called it the regulatory trap - is that once they have put their money in, the temptation of the Government is to transfer those profits in lower prices to consumers. The evidence around the world is that prices are typically held down for electricity consumers and, if that is expected, the utility will underinvest and, if it underinvests, its performance will be so unsatisfactory that the only solution may be to re-nationalize it. So to avoid that trap, it is crucial to create a durable and credible form of regulation.

"...The gain in the future is uncertain, primarily because that will be determined by regulation. So the problem is primarily to convince people that regulation will guarantee their returns. The difficulty the private sector faces - I've called it the regulatory trap - is that once they have put their money in, the temptation of the Government is to transfer those profits in lower prices to consumers. The evidence around the world is that prices are typically held down for electricity consumers and, if that is expected, the utility will underinvest and, if it underinvests, its performance will be so unsatisfactory that the only solution may be to re-nationalize it. So to avoid that trap, it is crucial to create a durable and credible form of regulation".

I think the German solution is an interesting one and has many things wrong with it but you can see why it works and delivers the benefits that it did. The process started in 1935 by exempting the electricity industry from the Cartel Law, in exchange for the industry guaranteeing security of supply of electricity. They were allowed to be a monopoly but the price they had to pay was to make sure that the electricity was delivered. The monopoly meant that they could charge sufficiently high prices to finance that investment. Where these companies were jointly owned by the local municipality, the municipality saw this was a very useful tax base and a source of revenue. On the other hand, the system could survive against consumer pressures because in a federal system it is very difficult for the central Government to control the local states.

This works extremely well if the main objective is to finance investment, so nobody complained much during periods of rapid growth. It is also a mechanism which can be captured to benefit particular interest groups and, in Germany as in Britain, the coal companies which have very high costs need protection; undoubtedly, the electricity industry provided that protection. So the worry with this system is that it is so well protected as a monopoly to finance investment, it can also be an inefficient mechanism for using fuel and pricing the output.

Therefore, private investment runs into these difficulties of how you finance investment; but the alternative public investment also has difficulties. There is no problem, in principle, with the State raising to finance re-investment and there are obvious pressures on States especially in developed countries to meet demand; but the problem with the combination of the deep

pocket of the State and the threat that the State must meet demands made upon it, means that the private industry has very little incentive to reduce costs because it will always be financed and it will more or less be able to dictate what it needs. This may be more true in developed than developing countries but the problem has there been to create incentives to improve the efficiency of these companies and particularly to ensure that their investment is not excessive and excessively costly.

Privatization and "status quo".

What balance of forces influence the way in which these industries are regulated? The usual approach is to say: let's look at the objectives of the regulator or the State, work out what incentives are needed to make the industry behave well and then let's look at the outcomes. The problem with this approach is that it begs the question of who sets the objectives.

In fact, it is not so simple to establish the above. In Britain, if we look at the electricity supply industry, the interest groups that were influential on the behaviour of that industry were many and powerful. The industry itself, of course, was a large and very sophisticated controller of information. Moreover, in Britain, the main source of fuel is coal and electricity is the main destination for that coal, so the two industries are heavily interconnected. The coal workers are a very potent political force, and obviously so are the consumers of the electricity industry in particular, but also domestic consumers have a very important say. The outcome of all this, I would argue, is a balance of power that results in a rather inefficient allocation of resources and it is very difficult to change it because it involves a balance between these individually powerful groups.

In Britain, privatization was one of the key ways in which this balance of power could be altered and the inefficiencies therefore addressed. So that, to come back to why one wants to privatize the industry, I believe that in many cases it is to try and shake up the industry to upset the balance of forces which is causing its inefficiency and to create better incentives.

Competition and cost reduction.

What one would like to do is to try and introduce competition and if we compare competition and regulation then, what would you want to do if you were to regulate? You would want to set prices at the efficient level and you would want that to be set independently of the costs of the firm, so that the firm knew the only way to increase profits would be to cut costs. That's what competition does because the price in the market is set by somebody else, it is set by the least efficient firm in the industry so, as far as you are concerned, cutting costs is the best way to increase your profits. But for that to work you need a sufficiently large number of firms so that it is somebody else who sets the price and not you.

Of course, it needs either that there is no collusion - because if we all get together and raise the price that reduces the incentive to cut costs - or if there is collusion within the industry then it has to be possible for firms to contest the existing cartel and to enter the industry.

Consequently, competition -providing it satisfies these conditions- looks to be a very good way of providing incentives to cut costs.

Regulation is an alternative way to induce firms to cut costs but it is very difficult to detach the price that they are to face from the costs that they tell you. That reduces the incentives. If the companies know that when they cut their costs the Government will lower the price, that reduces the incentive to cut costs.

Impact of competition and de-integration of the industries.

That diagnosis leads to the conclusion that there are some parts of the industry which are natural monopolies and competition is not feasible and those will have to be regulated; but there are other parts where competition may be possible and to achieve that the industry needs to be broken up or de-integrated.

The natural monopoly parts are the wires business, the high tension transmission and the distribution at the local level. On the other hand, the competitive parts - with a question mark: the question is whether enough competition can be created to achieve the benefits -are in generation and in supply or marketing of the electricity.

In Britain the key to that has been to create, first of all, a market for generation, for the bulk electricity and secondly, to give the customers access to the pool so that they can exercise their market power. Likewise, creating competition in supply has been a key feature in introducing competition in general.

Now let me compare two industries which we privatized: the Central Electricity Generating Board (CEGB) is the electricity generation company and grid - the high tension transmission system. Productivity was uprising in industry 2% or 3% per annum and the electricity industry grew at the same rate. Therefore, the ratio of productivity in the industry to the rest of the economy stayed fairly constant until privatization. After that, productivity in the electricity industry increased very rapidly indeed because the industry was broken up and competition was introduced.

On the other hand, the British Telecom, the telephone company, was privatized and Telecoms have higher productivity growth than the rest of industries because its a very technologically innovative industry based on computer technology. What I would point out is that you cannot tell where privatization occurs. The growth trend in productivity before and after is exactly the same and that was because it was privatized as a monopoly and it is only when competition is introduced, at about 1991, that you begin to see the impact on British Telecom having to

reduce its costs in order to meet the competition. So the case for introducing competition is strong.

However, it is important to realize that the above is not the same thing as passing the benefits on to the consumer. As of the privatization, electricity prices increased. Therefore, although costs dropped, productivity increased considerably, and those benefits were achieved as profits and not as lower prices. That does not mean to say that it was a bad thing but it does mean to say that it is not an automatic consequence of competition that those profits will be passed on. It is interesting to note that the telephone company, which is very tightly regulated as a monopoly, did actually continue to lower its prices very dramatically through this entire period. So, although its productivity may not have changed, the transfer of pricing benefits to the consumer certainly did.

Objectives of regulation.

What do we want to achieve with regulation in the electricity sector? We crucially want to make sure that the investment which I argue is the most important determinant of long-run performance is taking place at an acceptable cost.

We also want to provide incentives for efficiency in the operation of the existing capital and in the pricing of the output of the industry. In many cases the balance of prices to different consumers is quite wrong in the type, location and cost of investment and, obviously, in terms of innovation. These are undoubtedly very demanding criteria.

What does it take to meet those criteria? Regulation should be predictable and credible. The investors should be confident that if they invest and they do in fact achieve these goals, they will be rewarded for doing so, that they will keep the profits they earn.

On the other hand, if we want it also to provide incentives for efficiency, it needs to be high-powered. By that I mean that a large fraction of the benefits for that reduction in cost must go to the owner, to the investor which will give him the highest incentive to make those efficiency gains.

Types of incentives: "price cap" vis-à-vis "rate of return".

The question I pose is whether it is possible to have a high-powered system of regulation which does reward the investor strongly for his efforts and which is also credible and will not lead to back-sliding by the regulatory system.

Let me contrast two different solutions to this problem. In a high-powered scheme the benefits of the efficiency are captured by the owner and there is a price-cap regulation. In the British system, a rate of productivity growth "x" is specified and then the prices are indexed to the

retail price index but lowered by "x" percent each year relative to the retail price index. That means that if you cut costs, the company keeps all of the profits until the next regulatory review.

That, of course, provides good incentives in the short run to cut costs but the worry is that if you expect that your cost-cutting will result in a tighter price cap in the next review, that the "x" will be increased, that may cause the companies to underinvest. That is the downside of the regulatory system. It is not, in other words, credible that the "x" will not be changed. Periodically it will be adjusted, and if it is adjusted, that reduces incentives to invest.

If we look at the other extreme, a low-powered incentive scheme transfers most of the benefits to the consumer and the classic form of that is cost-of-service or rate-of-return regulation. In the United States it used to be believed that this was firmly and constitutionally enshrined, so that the regulated companies could be confident that they would actually receive this. Under that system, it was argued that it gave very little incentives to reduce costs because, if you reduce costs, all the benefits will pass to the consumer so why bother.

"...In a high-powered scheme the benefits of the efficiency are captured by the owner and there is a price-cap regulation. In the British system a rate of productivity growth "x" is specified and then the prices are indexed to the retail price index but lowered by "x" percent each year relative to the retail price index. That means that if you cut costs, the company keeps all of the profits until the next regulatory review. That, of course, provides good incentives in the short run to cut costs but the worry is that if you expect that your cost-cutting will result in a tighter price cap in the next review, that the "x" will be increased, that may cause the companies to underinvest. It is not, in other words, credible that the "x" will not be changed. Periodically it will be adjusted, and if it is adjusted, that reduces incentives to invest. If we look at the other extreme, a low-powered incentive scheme transfers most of the benefits to the consumer and the classic form of that is cost-of-service or rate-of-return regulation. In the United States it used to be believed that this was firmly and constitutionally enshrined, so that the regulated companies could be confident that they would actually receive this. Under that system, it was argued that it gave very little incentives to reduce costs because if you reduce costs all the benefits will pass to the consumer so why bother. And indeed the more you invest the larger the capital base on which you earn the rate of return, so it does provide some incentives for overinvestment, providing more spare capacity and a higher quality plant than might otherwise be needed. More recently, that type of regulatory contract has broken down and it's nowhere near so clear that this does provide the credibility that one once thought it did".

And indeed the more you invest the larger the capital base on which you earn the rate of return, so it does provide some incentives for overinvestment, providing more spare capacity and a higher quality plant than might otherwise be needed. More recently, that type of regulatory contract has broken down and it's nowhere near so clear that this does provide the credibility that one once thought it did.

But roughly speaking these represent the two extremes. You can provide good incentives but run the risk that people will not believe you or you can aim to ensure that people will be rewarded for their investment and run the risk that it is inefficient and does not produce the efficiency gains.

Since the incentive properties of price-cap regulation are rather attractive, just let me dwell on some of the important differences between this and the old style of rate-of-return regulation.

Is it true, as some people have argued, that there is really very little difference and that all that happens is that every four or five years the regulator recalculates "x" and he does that by looking at the capital base and the required rate of return needed to finance investment, and he adjusts the "x" to produce the revenue flows necessary? That's a caricature of the way we do it in Britain. If that were true, then it would just be like the rate-of-return system but with a lag so that the company keeps the benefits for several years but then passes them on to consumers.

In fact, I think there are some important differences. Firstly, it gives the company more freedom to set the balance of prices. This is particularly important in telephones where the balance between long distance and local calls has always been politically very delicate. I believe it is still true in electricity that the balance between consumers: domestic consumers, commercial and industrial enterprises is often back to front and it gives the company much greater freedom to choose that balance. It does lead to a greater fluctuation in profits and that does erode credibility.

In Britain we have had serious problems in that electricity companies have become amazingly profitable, so profitable that American companies rush over and try and buy them and, when that happens, the opposition Labour Party claims that they should be subject to a windfall profits tax. That, of course, undermines the whole stability of regulation that one is aiming at. So it is risky in that sense; it requires a very firm commitment to regulation to resist the profits that it may generate.

The other argument against this - or if you like, the difference between this and the rate of return - is that it is much more up to negotiation between the companies and the regulator than the rather formal judicial approach under rate-of-return regulation.

Lessons drawn from the British experience.

The role of contracts.

The message from Britain where we have re-structured and introduced this form of price-cap regulation and introduced competition into generation, the crucial thing I think we have learned is that contracts have turned out to be absolutely critical for introducing competition. First of all, the market in contracts is itself an important market where competition can take place. But the other thing is that contracts have been the mechanism for entering the industry with no risks.

They first sign the contracts for long-term power and then, on the basis of that, enter the industry. That means that the generators inside the industry have to be very careful about the prices they charge because their customers may choose instead to sign a long- term contract with a new entrance from outside the industry. This has had a very powerful effect on moderating the prices charged by the generators, even though the market itself is not very competitive.

In order to have those contracts, the spot market is crucial. There has to be a transparent and visible price against which you can benchmark and compare the contract price. So far, and this is changing with the collapse in the price of gas in Britain, the entry needed long-term contracts and those have been provided by the distribution companies who still have a captive market of customers. But that captive market disappears in 1998 and there are questions about whether there will be long-term contracts in the future.

Competition, we have discovered, ideally requires not just many generators but many price-setting generators and that means mid-merit generators. There is no use having a lot of base-load power suppliers. They do not set the price for electricity, so one has to be very careful about interpreting what one means by enough generators to create competition. In the long run, as I have said, the important thing is that entry should be readily available.

De-integration of the sector.

Was it a good idea to break up the industry? The arguments in favour are that it did have dramatic effects not just on labour productivity, it also had huge impacts on the fuel market. The gas market is now a competitive market and the coal market is now internationally exposed. Consequently, the costs of fuel have almost halved and the costs of other services have also come down so it does indeed have those productivity benefits.

The question marks I raise are : do you need a sufficiently large system for it to work? Argentina is a big country, but what about small countries like the Philippines, for example, with five or six MW of power? Is it plausible that it has enough different generators to create competition?

A second issue is that the generators now face risks because they sell their output in a market whose price is unpredictable. What does that do to investment? If there are long-term contracts maybe there is no problem, if there are not, then that is a problem.

On the other hand, if you separate the generation from the transmission system, then it becomes very important that the transmission prices are set correctly. It is actually quite difficult to get those prices right and, in the British system, it has been very hard to change them. There are questions about who has an obligation to supply. The answer in Britain is nobody does and there are mechanisms to encourage people to invest if there is a shortage of supply. That remains a question that everybody has to address.

There are other solutions to the U.K. style of de-integration one of which is to create a market for new investment in generation but not necessarily to de-integrate the grid.

One solution that smaller countries have looked at is to have a strong grid which buys all the power and does not allow consumers to buy power directly from generators. So the generators then sign a long-term contract with the grid, and these contracts are the mechanism for sharing the risk of generation and underwriting the finance for that. The attraction of this solution is that you can pass those costs through to the customers because the customers cannot contract

directly with the generators. That works providing the customers are creditworthy and you have to ask whether the customers, presumably the distribution companies, are actually creditworthy in particular cases; sometimes they are, but not necessarily. It essentially requires that those distribution companies be profitable and in some countries, they are desperately unprofitable because of theft or because the prices are held down too low, in which case this will not work.

It does obviously require credible regulation of the transmission system and it is also essential that the distribution system be able to underwrite these contracts. If those contracts are going to be with foreign producers, they are likely in many cases to have to be State underwritten and essentially, therefore, State-financed so it is only a partial privatization.

Competition or integration?

We come back to the question: which do we want, competition or integration? What are the benefits of integration? It is good for coordinating, in principle at least, the expansion of the system because transmission and generation are in part substitutes. What you want to achieve is the least-cost combination of expansion in transmission and capacity and it may be rather difficult to achieve that if each of them is chosen by a different company.

It is also good for providing effectively long-term contracts and risk sharing. Integration just transfers the risk up and down inside the industry; it does not have to be separately contracted for and it enables the public service obligation to be met. Of course, being a monopoly, it can -if it is allowed to- raise prices and therefore generate finance.

On the other hand, competition is good for reducing inefficiency. If that is the most important factor then that is a very good argument for introducing it. If the inefficiency comes from interest groups -particularly in Europe from the fuel producers and the coal miners- then it is the fastest way as we have discovered to undermine that "status quo".

Moreover, it is good at aligning prices with costs and in some cases that is an important consideration.

Finally, competition is also very good at drawing attention to the cost of providing various services like security of supply. One of the effects of pricing these services is that we have now started to question whether we have over-engineered the grid.

It seems to me a good thing that we should ask such questions because it encourages people to find new ways of sharing risks, to devise new forms of contracts and new financial packages. Hence the entry into the British market was very much on the basis of quite ingenious financial packages which were very effective.

Public or private ownership?

Let me return to the advantages of public and private ownership. I think private ownership has considerable advantages in giving access to foreign technology. There is no longer the need that you have to buy it from within the country and that in Britain has been quite important.

It may give you access to additional foreign direct investment but that may be rather expensive. I believe it gives a much more commercial approach to procurement of capacity and investment. If the regulation is good, it generates efficient results and it is reasonably resistant to interest groups -not completely though. On the other side, if the main objective you have is not so much efficiency but financing investment then the State has, in principle, advantages in financing that more cheaply and it can provide the long-term commitment that underwrites that cheap finance. And it ought to be able to achieve the coordination in system expansion if it is reasonably competently done.

Queries addressed to the conference.

Let me leave with the questions that I hope the conference will address.

How do we devise a stable and credible form of regulation that will enable private investment to deliver the benefits that it can? Who is going to sign the long-term contracts that are going to be needed for, particularly, investment in hydroelectricity? Maybe it is not such a problem with gas-fired generation but for many forms of generation the investment costs are high and long-term contracts are needed. In some cases the answer is simple, in others it is not at all simple. The person who is going to sign the contracts -or the legal entity- has to be creditworthy.

How is that going to be ensured? How are these risk costs going to affect the costs of finance? If the system is more risky, then investors will need a higher return and that will raise the cost of finance.

If the cost of finance goes up... what happens to the economic attractiveness of very capital-intensive projects like hydroelectricity?

I would suggest that these are problems that we are not quite sure of the answers to yet. I look forward to hearing them.

First Session

Comparative Experiences Of Restructuring And Regulation Of The Electric Power Sector

Oil price shocks in the 1970s deeply changed the perception and approach to issues related to power throughout the world.

Although by that time the international economic cycle had entered one of its downward phases, many governors and leaders clearly understood that growth depended on a non-renewable natural resource which, moreover, not all countries had.

Due to the profound political implications of this new reality, in most countries the State increased its participation to improve power balance.

In the most dynamic and richest regions of the world, Governments took the lead in inducing the private sector and also cooperating with this sector to reduce costs in oil extraction, to accelerate the building of nuclear and hydroelectric plants and to find alternative sources for generation of electricity. Meanwhile, in the least developed areas an attempt was made to start up and/or complete deferred projects.

It may be said that beyond their differences both developed and developing countries expected that technology and the enhancement of capacity would free economic growth from possible energy ties.

However, during the 1980s, erratic and slow growth revealed that other variables not related to power imposed their own restrictions on the recovery of the international economic cycle, in spite of the benefits brought about by the decline in the price of hydrocarbons.

Consequently, in the most developed regions of the planet where demand showed very little dynamism, the most recent problem has been spare capacity in the generation of electricity. Towards the end of the 1980s and beginning of the 1990s, when there were no longer traces of the apocalyptic fears arisen by the price of oil, it was necessary to solve the question of how to bring down electricity prices and how to introduce greater efficiency in the global management of the companies in this sector.

Meanwhile, the interrelationship between external debt, fiscal deficit and high inflation in many countries which did not produce oil brought about, besides an economic recession, the definancing of the public companies or agencies of the power sector and, therefore, the impossibility of continuing and/or undertaking projects. All this unavoidably affected service quality and reliability. The new question mark was how to find a way to finance the continuation of projects which had been interrupted or delayed and to upgrade the standards of the electric power service.

In view of what has happened in the last ten years, it is evident that -even with their quite different immediate objectives and urgencies- several developed countries and other developing countries have converged in the search for responses to different problems through the implementation of various types of restructuring in the electric power sector.

Within a context of wider reforms which aims at upgrading the global competitive level of their economies, several countries belonging to both groups have left aside vertical integration in generation, transmission and distribution and have introduced greater competition in the electricity sector markets. Likewise, it is noted that the reforms in most of the cases aimed at giving greater responsibility to the private sector in the execution of investments and the provision of services than it had in the past. Most of the countries which participated in this Seminar chose the alternative of integral privatization programmes and the concession of different business areas. Finally, and as was to be expected, the dynamics of reform includes state-regulation of these former public utilities. According to each case, the new situations have urged either the promulgation and creation of new regulatory frameworks and control agencies or simply the amendment of prior legal and institutional grounds.

Judging by the contribution of the different participants in this International Seminar on Restructuring and Regulation of the Electric Power Sector, it is no longer expected that technological progress will alone provide a saving and final response as at the end of the 1970s. On the verge of entering the 21st century, there seems to be a new eagerness for dealing with particular problems related to the allocation of resources which were set forth by the different segments of the electricity business. With a new outlook and the wide experience provided by their neighbours, the countries are looking for the most appropriate blend of competition and regulation to allow the balanced distribution of benefits among investors and customers in each market.

The presentations which are hereafter summarized reveal the efforts made and achievements obtained with a view to start solving problems derived from spare capacity and high prices as well as the difficulties entailed by definancing and poor quality of the service.

Causes, Forms and Objectives of the Restructuring.

The comparison of different experiences indicates that the implementation of a certain degree of restructuring to the traditional vertical integration of the electric power sector was a part of the introduction of new incentives.

On one end of the spectrum of reform there appear Norway, Sweden and Colombia where the reform process did not include the total de-integration of the business segments nor their privatization. On the other hand, Spain seems to be in an intermediate position since it is planning to initiate partial restructuring and gradually introduce competition without greatly altering the balance between private companies in the sector and the State as a planner. In the United States of America, the Federal Government has just started a process of reform in which private companies are to guarantee open access to transmission services, are to be functionally de-integrated and are to allow the establishment of an information network to share what could be called an electricity information super-highway. Finally, Great Britain, Chile, Argentina, Peru and the state of Victoria in Australia are placed at the opposite end. Although pushed by different urgencies - Great Britain due to difficulties related to spare capacity; Chile, Argentina and Peru due to definancing, lack of investment and poor quality of the service; and the state of Victoria somehow for both reasons - they have all carried out an in-depth restructuring process which included the privatization of the sector.

In Norway, the changes were brought about by spare capacity and certain inefficiencies in the allocation of resources. However, and as John Henrick Sagen explained, the country chose a sort of "accounting" restructuring and the business remained State-owned.

> *"... Basically, I would say we have two problems: spare capacity and the need for improving efficiency. Among other things, this led to the building of expensive hydropower stations in some parts of the country when there were cheaper projects available in other parts of the country. And existent monopolies passed the cost on to the consumers. As a response, after the change of Government in 1989 and in one year, we introduced what I would call the most open market system in electricity in the world, in principle, and I think today also in practice. This has been the result of the application of the new 1990 Energy Act. The law established there should be open access to all networks with no restrictions and in non-discriminating conditions and this applied to big consumers, to distribution utilities, to producers, to small households and to electricity traders. There would be no separation of supply, transmission and distribution into separate legal entities but an unbundling in operation and accounts. There had to be transparency of accounts and so the only restructuring was that the State power company was split into two. The objectives listed by the Act were: economic efficiency, security of supply and national equalization of electricity prices. The idea is to use market prices wherever applicable but where there are dominating actors, there should be some formal regulation".*

Norway

CAUSES OF REFORM
Spare capacity and the need for improving efficiency

TYPES AND FORMS
Operational integration but an unbundling in operation and accounts, state ownership

Sweden will initiate its reform process in 1996. According to Bo Lyndörn the reforms include de-integration of the sector but not its privatization. Their goal is to increase efficiency and reduce costs and prices through the use of market practices.

"...In the early 1970s there was a high degree of dependency on imports of oil. In response to this, policies were implemented in Sweden which succeeded to decrease that kind of dependency. On the other hand, we have not increased the use of electricity as appropriate. Therefore, we have decided to separate the different stages of the business and introduce competition. It is forbidden to keep them in the same legal unit so that the activities of generation and sale of electricity must be separate units, divided from those which handle the transmission system. Of course, it is urgent and important to have adequate legislation that will guarantee a good system to enable efficient competition. Moreover, the aim of the reforms is to increase efficiency in the use of capital in the electricity industry and to put the customer in the centre of the market. There is no connection whatsoever between these initiatives and privatization. It is just a matter of making the industry more efficient due to competition".

Sweden

CAUSES OF REFORM
The need to increase efficiency in the industry

TYPES AND FORMS
Operational de-integration (generation and sale units separate from transmission); state ownership

The general framework of the reforms carried out in Colombia is undoubtedly the opening of its economy to international markets. However, for the time being, they have chosen to separate the different segments of the electricity business without resorting to privatization. The system operates with a high level of technical losses and power stealing. According to Luis Ignacio Betancur Escobar, the goals are to promote investment and upgrade the quality of the service.

"...The process of change started -in common with other Latin American countries- mainly because of the opening of the economy. However, for some time there had been special concern not only regarding electricity but the public services in general. The users considered them inefficient, too costly and, at the same time, expensive despite the low tariffs. Moreover, notwithstanding the high subsidies, the companies kept both maintenance and investment at a minimum level. Consequently, drawing from the experience of the British, Chilean and Argentine models, we have separated generation and trading and have introduced competition. On the other hand, transmission and distribution are regulated. In this way we want to establish a highly competitive system and, if we reach affordable tariffs, then encourage consumers -even residential ones- to choose their supplier. Privatization will probably be sought in the future; there exists the legal framework but it is not currently considered".

Colombia

CAUSES OF REFORM
Opening of the economy; need to improve efficiency, promote investment and maintenance of the industry

TYPES AND FORMS
Operational de-integration; state ownership; existing legal framework for privatization which is not envisaged at present

In the middle of the 1980s, the nuclear plants Spain had decided to build after the first international oil crisis in 1973-1974 entered into operation. As in other cases, this brought about significant spare capacity followed by a crisis of the companies in the sector. The Government thus introduced a partial restructuring of the sector. However, in the 1990s the urgent need to improve the efficiency of the electricity system triggered a second stage of reforms which will be carried out gradually and includes de-integration, less influence of State planning and an increasing introduction of market mechanisms. Luis Rodriguez Romero pointed out that:

> *"...Overdimensioning triggered a financial crisis in some of the Spanish private companies of the sector. This brought about a strong concentration: there remained two very big companies, other small ones and still other marginal much smaller firms. Consequently, the Government decided to separate transmission from the system as a whole, assigning it to a company which was also responsible for the Centralized Dispatch. However, the mixed nature of the system was not altered, mainly private but with State planning and allocation. As of the "Ley de Ordenación del Sistema Eléctrico Nacional" (Act for Ordering the National Electricity System) of December 1994, the aim is to correct negative aspects of what was implemented in the middle of the 1980s. Which are the characteristics of the system we mean to change? Firstly, the decision to increase capacity as well as its assignment to a company stem from State planning. Secondly, remuneration of the services is based on certain standards which have been indicated to the different agents of the system, in generation, in distribution, in all parts of the system. These standards are related to real costs but are not real costs. They are a sort of benchmark, a yardstick in the sense that they are a reference for the companies' management. The companies have to maximize their remuneration, diminishing as much as possible their real cost with respect to the standard cost they have been assigned. Thirdly, there is centralized dispatch which is based on economic priorities but also explicitly follows the country's priority of keeping national coal as fuel. Finally, there is a unitary tariff system at the national level and since there are different agents within the system, it is necessary to have a redistribution of the revenue among the agents in order to cover standard costs, not real costs. As a consequence of the above, the companies do not in fact have competitive autonomy; they limit themselves to merely fulfilling the objectives they are assigned in the most efficient manner. They are told -through the centralized dispatch- when they should start operating. Neither do they have any competitive autonomy from a dynamic viewpoint, that is, any decision with respect to the expansion of the system does not depend on the companies themselves, it depends on the country's energy planning decision. Technological changes are not promoted and the adjustment thereto is slow. On the other hand, the*

Spain

CAUSES OF REFORM
Spare capacity followed by financial crisis of the sector's companies

TYPES AND FORMS
Partial operational de-integration; creation of a dual system: current integrated system (which separates generation and distribution) and a new independent system; increasing competition and less influence of State planning; private and state ownership

system of establishing a model or standard for management makes all efficiency gains go to the company. The consumer has no share in these efficiency gains. Neither is there any incentive for changes in quality, that is to say, regarding distribution quality. However, our decision is to build something new on the basis of this system and gradually introduce competition".

The reforms initiated in the United States of America aim at guaranteeing greater access to electricity transmission. The prevailing trend and the reason for adopting greater access to transmission is that there already exists growing competition in the generation markets. Vicky Bailey insisted that to develop this competition on a fair basis, it is necessary that wholesale buyers and sellers gain due access.

"...The market push has probably come from the Federal Energy Regulatory Commission. There is no doubt that this Commission has been very aggressive in using its authority to create greater access to the transmission system. Of course, the Energy Policy Act of 1992 accelerated and confirmed the Commission's direction and we are now at the point of seeing this trend towards greater competition in wholesale markets with a logical conclusion, namely, comprehensive access to the grid. I would say there has been both a push and a pull for access. The wholesale power market has evolved to the point where buyers and sellers are demanding access. They have pushed us to examine market power issues that are raised when companies merge and request a waiver for departure from what have historically been cost-based rates. We have seen increasing numbers of wholesale sellers willing to compete in markets; growing numbers of utilities and independent power producers -IPPs- who have sought out market-based rates. And buyers have been beating a steady drum for years demanding access to sellers and this is the market pull that I am referring to. Consequently, the Federal Energy Regulatory Commission (FERC) has elaborated and disseminated the Notice of Proposed Rule-making (NOPR) on open access. It is our proposal to basically require open access across an already integrated grid and to also seek what we call comparability and functional unbundling. Firstly, it would require the provision of transmission services on an open, non-discriminatory basis. At the same time, we here include what we call a supplementary NOPR addressing the stranded cost recovery issue, consolidating it with an open access proposal. Secondly, it would require that the utility owner unbundle the provision of these transmission services from the operation of any generating resources that it uses for wholesale power sales. Finally, we intend to establish an information network for sharing that about the use and availability of transmission services, what you possibly could call an electricity information super-highway. Naturally, the goal of these NOPR proposals for open access is to promote competition in the wholesale

United States

CAUSES OF REFORM
The need to guarantee greater access to electricity transmission

TYPES AND FORMS
Promote competition in wholesale market; NOPR on open access to network; operational de-integration which separates transmission from generation; private ownership

market. How do we get from here to over there is what we are in the throngs of debating now. Hopefully we will get there, a little bit at a time, probably linking together several small pieces in order to achieve our goal and hopefully with success."

In Great Britain, like in most developed countries, reforms were brought about by the existence of spare capacity and very little demand growth. David Newbery stressed that investment was not an urging problem as in developing countries. The issue was to reduce electricity prices and introduce greater efficiency in the sector. To achieve this, the country decided on a deep restructuring of the sector and the privatization of most of the business units.

"...The problem was how to create incentives to improve the companies' efficiency and, particularly, to ensure there was no excessive, too costly investment. Undoubtedly, privatization was one of the keys to upset the balance of forces which caused inefficiency and to be able to create better incentives. The old system before privatization was that generation and transmission were integrated in one company. When the industry was restructured, the transmission system was separated and, on the other hand, three generation companies were formed. Currently, independent power producers can enter the industry and some of the regional electricity companies have stakes in their own generation. As in these segments of the sector competition is feasible, the industry was divided and de-integrated. However, other parts of the industry are natural monopolies and must be regulated; these are, the wires business, the high tension transmission and the distribution at the local level".

Great Britain

CAUSES OF REFORM
The need to improve efficiency; spare capacity and over-investment

TYPES AND FORMS
Operational de-integration of generation and transmission; privatization

Chile, a world pioneer in radical reforms, de-integrated the sector and in this case privatization was due to the definancing of the electricity utilities as a result of the high inflation rates in 1970-1975. According to Andrés Alonso Rivas:

"... The origin of the restructuring process was the definancing of the companies of the sector and a great concentration of the activity in only one state company with a merger of the normative and entrepreneurial roles of the State. Electricity tariffs were subsidized and the price of electricity was lower than the costs, which entailed strong State commitment in the development of the sector and, on the other hand, brought about financial problems to the companies. The electricity market was reformed at the beginning of the 1980s. The two State companies which concentrated approximately 90% of the market

Chile

CAUSES OF REFORM
Definancing of the companies due to inflation and subsidized tariffs in 1970-75

TYPES AND FORMS
Operational de-integration of both state-owned companies; privatization

were de-integrated and the different business units were privatized. The goals are to promote competition in generation, clarity in transmission and efficient delivery to the customers by the distribution companies".

In Argentina the macroeconomic crisis of the 1980s resulting from the interrelation of external debt, high inflation and a growing fiscal deficit seriously affected the installed capacity and the utilities' delivery of services. As explained by Alberto Devoto, the restructuring and privatization of the electricity sector were part of the State reform policies initiated in the 1990s so as to re-create investment in infrastructure and regain reliability and service quality.

"... Until the initiation of the reform process, all the main companies were state-owned and vertically integrated. During previous decades, the state-owned companies frequently experienced strong political interference and inefficient management. There was particularly a gap between prices and costs and an increase in macroeconomic restrictions led to a lack of investments, practically a collapse of generation. As from the 1990s, the electricity sector has undergone a process of transformation through market-opening policies which comprise the whole economic system. The new rules of the game are to consider competition where feasible and to establish a regulation system for controlling the monopolic tranches of the industry. The electricity industry was divided into three branches: generation, transmission and distribution. The existing state companies were divided into a considerable number of small business units which were then privatized. It is important to point out that, firstly, an institutional re-ordering of the sector was effected through the creation of the above-mentioned business units and the setting of the regulatory framework. The reforms give priority to the private sector and a lot is expected from its management capacity, particularly in relation to investments in equipment and operation technology. Likewise, in aspects regarding maintenance and repair, risk prevention, and a quick, efficient reaction to customers' requirements."

Argentina

CAUSES OF REFORM

The need to re-create investment and regain reliability of the service affected by macroeconomic crises in the 1980s

TYPES AND FORMS

Operational de-integration (generation, transmission and distribution); privatization

Meanwhile, in Peru, reforms -which include restructuring and privatization of the sector- arose in response to the companies' management efficiency problems, low levels of electrification and a demand which was growing more rapidly than envisaged. Luis Alberto Haro Zabaleta said that:

"...The last two hydropower plants which were built in the 1980s cost around US$ 6.000 per kilowatt and were inaugurated in 1988. Peru is geographically divided into three regions: the coast; the central part which is crossed by the Andes mountains, with heights ranging between 4.000 and 5.000 meters; and further to the East, the jungle. While in the coastal area, where most of the economic activities take place, electrification reaches around

85%, the percentage is much lower in the mountainous area and practically inexistent in the jungle. In view of these extreme differences, the national electrification average is 45%. Moreover, at the beginning of the 1990s, the expected growth of the Peruvian system was around 3 %; currently electricity demand is growing around 6 to 7% per annum. In response to all these problems, since 1992-1993, radical changes took place in the legal framework of the electricity sector. This framework basically established a free market and competition in the electricity sector, open to private participation, and the State withdrew from the areas considered as electricity business. However, the State is still responsible for the expansion of the system in all those isolated areas which have no electricity services. Regarding privatization, it is worth mentioning that there has been a separation of the generation, transmission and distribution stages of the different state companies. We expect to conclude the process during 1996".

Peru

CAUSES OF REFORM
Improvement of management efficiency; upgrading level of electrification; meeting rapidly growing demand

TYPES AND FORMS
Operational de-integration (generation, transmission and distribution); privatization (last phase)

By what Geoff Swier had to say, it arises that in the case of the state of Victoria in Australia, the causes which led to de-integration and privatization of the electricity sector have more the profile of the most developed countries but also a bit of the urgencies inherent to Latin American countries.

"...The rate of growth in the economy is relatively slow and certainly the rate of growth in electricity demand is not great either. This means that our difficulties in the electricity sector are principally ones of efficiency and price rather than financing of new capital investment. In fact, the Victorian electricity system is probably rather over-capitalized. Moreover, Victoria was in a deep recession, it had a number of financial collapses of state-owned and private sector financial institutions. State finances were in a parlous condition, there was a large budget deficit and the largest debt of any Australian state. Therefore, it may be said that electricity reform was a key policy initiative of the new Government elected in 1992 to recapture Victoria's competitive position. The aim is to derive benefits for the economy based on the low cost of energy in Victoria, to focus on efficiency gains and customer choice. So as to achieve those objectives, massive restructuring has been undertaken over the past two years. Privatization is seen by the government as a logical next step".

Australia **(State of Victoria)**

CAUSES OF REFORM
Improvement of efficiency and prices in a system rather over-capitalized to re-establish competitiveness

TYPES AND FORMS
Operational de-integration (generation, transmission and distribution); on-going privatization

Structure and Operation of the Electricity Sector after Reforms.

The Norwegian electricity system has a high internal complexity and is moreover interconnected with the thermal energy systems of the neighbouring countries. Norway is a country with 99% hydropower which accounts for 75 to 80 % of domestic consumption. The country has over 600 power stations, 30 major producers and a lot of small ones. Likewise, it has 200 distribution utilities, many of which are vertically integrated. According to what John Henrick Sagen explained:

> *"...The state power company was split in two: a grid company "Statnet" and a power company "Statkraft" which has 30 % of the production. Another 55 % of the production capacity is owned by municipalities and counties and 15 % is private. Most distribution utilities are municipal. We have a system with a central grid, a regional grid and many other distribution networks with consumers connecting at all network levels. There are generators both at the regional and main grid level and some generators also at the distribution level, even small water stations. The generators pay for their connection and can then sell to any consumer or other trader in the system. The tariff is paid at this time so there is no relation between the trading arrangements and what you pay for connection to the system. I think it is interesting to point out that we not only have a sufficient number of independent sellers and buyers but have also developed a system which includes open information on prices and conditions, free choice of contracting parties, low transaction costs and separation of trading and transmission. For the operation of the system, the spot market and the tariff system with entry/exit fees play an important role. Before, this spot market was only open to generators and used for exchange of spare production. But from 1991, the spot market has been open to all actors on the market: end customers, producers and traders. That is how we guarantee security of supply to all actors. To stress even more the fact that you can always buy power on the spot market, it has developed further, taking care of a lot of risk management and has become a futures market. We basically have the spot-day-ahead market and the market for regulating power which reflects weather short-term discrepancies and is the main instrument for dispatch. These two markets are very closely linked and the prices follow each other. Finally, we have the weekly market which is a one and a half year ahead market. It was established as a market in a physical context because the generators and producers felt that they were only familiar with physical contracts and were skeptical of pure financial contracts. Naturally, after some years, they have understood that these contracts are really only financial hedging instruments and that the market today is a pure futures market where all the trading is going to take place in the spot market. Therefore, the volume has grown substantially. Besides this, there are still bilateral contracts, now shorter than before. Mostly one-two-year contracts, and the prices are now only set according to the spot market; so really the day-ahead market is a driving force setting the prices for the whole system. In short, the introduction of the free access spot market lowered the price for most of the customers. Regarding transmission tariffs, the government's regulation states that transmission tariffs should be set on time to cover any costs, provide necessary yield on domestic capital and reflect the load on the network. The network owners must not discriminate between users.*

Finally, and with respect to distribution and transmission, I wish to stress that the system of entry/exit tariffs have showed favourable results. The tariffs are set as tariffs at connection points and are independent of the power contracts; and remember we have 30 major transmission nets and 200 distribution networks to be coordinated. The tariff paid at any connection point gives access to the national interconnected system and to all sub-systems, including low voltage. Perhaps very soon it will also allow access to the Nordic market and to the exchange with neighbouring countries. Tariffs are paid both at entry and exit points, losses are bought by the network, and costs are included in the tariffs".

In Sweden -where hydropower represents around 50 % of total supply and nuclear power contributes the other half- the generation structure is highly concentrated. According to Bo Lyndörn:

"...Although there are around 100 power generators, the largest one accounts for about 52% of the total supply and the eight largest ones altogether account for 95% of total generation. The national grid is a state-owned company. The grid authority is vested in the National Board for Technical Development and Industry Development. Then there are regional networks which have 10 operators. Finally, we come down to the local networks where you can count around 270 local operators. We hope that, in the long run, with respect to generation and supply of electricity, the rules of competition will be imposed. However, for the first five years, there will be a supply concession system which will favour the situation of the small consumers. This kind of supply concession will be the only kind of electricity price which will be regulated after 1 January 1996. I can stress perhaps that the supply concession system will have the role of a bridge between the two systems and there are also some additional roles concerning small power generators. With respect to the transmission system, which is a natural monopoly, we have separated production and sale of electricity. There will be an efficient state supervision and, of course, there are a lot of obligations to connect and transfer electricity. It must be noted that the Swedish system is very similar to the Norwegian system regarding access after paying an entry/exit fee. This means that if you pay a fee to get a connection in one point in the network, you have access to the complete national network and also, as a next step, to the Common Nordic Market. According to our new legal framework, tariffs should be reasonable and, of course, based on costs. They must not be based on distance, that is, it must not depend on what point of the net the customer is situated. On the other hand, if you have paid your fee you will not be charged an additional fee depending on where in Sweden the supplier is located".

Meanwhile, in Colombia, electricity represents 52% of their energy; oil by-products mainly gas, represent 40% and mineral coal, 8%. Hydroelectricity accounts for almost 80% of generation. The rest is mainly gas-based. Proven gas reserves have recently increased and a greater production of electricity is expected on the basis of this fuel. Moreover, residential users will be able to obtain more gas directly to replace electricity. But Luis Ignacio Betancur Escobar explained that the current configuration is being modified.

"...There is a transmission company and there are four companies devoted exclusively to generation. There are another three vertically-integrated companies in Bogota and Medellin, the country's biggest cities, and the rest are companies which produce part of their own power and occupy a marginal position. Then we have 29 distribution and trading companies which do not produce electricity. In accordance with the British, Chilean and Argentine models, we have recently separated generation and trading from regulated transmission and distribution. Regarding distribution, the owners of the networks operate them; there is freedom of entry, that is to say, that in the distribution sector -not in transmission- anyone can install lines without a specific permit. Moreover, there may exist a dealer, in the sense that he is neither the owner nor the operator of the low tension grid but uses the network of any distributor. At the beginning of 1995, a wholesale market was organized which started to operate under two modalities. On the one hand, a sort of British pool and, on the other hand, contracts which are in all cases recorded in the pool, and dispatch is effected according to economic merit. In a certain way, contracts are a sort of financial hedging instrument against price volatility in the pool. The pool is managed by the transmission company itself and the dispatch is also done there. However, the 1994 Law envisaged that -as in Argentina- dispatch and exchanges be handled by a different company which could even be a private company. In our reform process, the first thing we did was to establish charges for the use of the high, medium and low tension networks. As a result, nowadays big users -those over 2 MW- are buying in the market off companies to which they were not connected, using networks of the company which traditionally provided them with this service. Even the trading and distribution companies are obliged to buy on the basis of a free competition mechanism, that is to say, they must search on the market, even in the case of the biggest vertically-integrated companies like the ones in Bogota and Medellin, before using their own electricity, or resort to all existent generators or to those that have announced they will have plants in the next few years, to ensure the price and conditions of electricity are the best -if they do not buy off the pool. Finally, I would say we aim at the companies' self-sufficiency with affordable tariffs. This includes a mechanism which is a sort of tax on non-residential users and on the wealthiest residential users to subsidize a part of basic consumption. Therefore, for people with less resources there will be a subsidy of almost 40% of the cost for the 200 Kwh/month they consume".

In Spain where the distribution of installed capacity and power sources shows a balanced participation of hydroelectricity, nuclear power, coal -part of which is imported- oil and gas, it is still a little too soon to observe the results of the changes introduced by the latest reforms at the beginning of 1995. Particularly when the intention of the Government is to phase in competition, without breaking apart the peculiar mixed Spanish system, with a prevalence of the private sector in its composition, but with State planning and resource allocation. According to Luis Rodríguez Romero:

"...Currently there is a concentration in the sector and there are basically integrated companies. ENDESA, a state-owned company, only integrates generation and distribution because, in the middle of the 1980s, a decision was taken to separate transmission and assign this activity to an independent company which is presently responsible for the

centralized dispatch. There is also a private group, the Iberdrola company and then small companies some of which are connected to the above. The "Ley de Ordenación del Sistema Eléctrico Nacional" (Law for the Ordering of the National Electricity System) dated end of 1994, proposes to gradually correct the negative aspects of this system. The aim is to change the current system into a dual system: the existing one is maintained as it is while the bases of the independent system are set. The integrated structure will be divided into generation and distribution in the different companies with a view to forming future markets. Centralized dispatch will continue to exist and this system will provide support services to the independent system, through economic transactions with its members. The incorporation of trading companies is also envisaged. Within the centralized dispatch, a wholesale price will be set for power on the basis of a time unit: every half hour, every hour, and access will be allowed to this sort of centralized space which will act as a market for big consumers. Likewise, competitive bidding will be included to assign capacity increases together with the decision of the planning agency. Competition will be allowed to a certain extent regarding centralized dispatch in which, besides the general criteria which affect the order of entry of the different fuels, a margin will be left for the bidding of competitive tenders within the variable costs in each of them. The fixed costs are covered with standard costs and in the variable costs there will be a margin for bids. On the other hand, remunerations are still based on standard reference costs and tariffs will be fixed at the national level. However, standards will be reviewed using a sort of price-cap formula to include an estimate of the expected increases in the system's efficiency. Incentives regarding quality of the service will also be included in the distribution companies' remuneration. In the independent system, free bilateral contracts will be allowed and a non-discriminatory access will be ensured to the distribution and transmission networks including support services from the integrated system".

The same as in other experiences already mentioned, it may be too soon to visualize the changes brought about by the reform to the structure and financing of the sector in such a big country. Vicky Bailey pointed out that after the 1992 Energy Policy Act -which somehow gave a new outlook on how to approach the most competitive areas- the Regulatory Commission has made several contributions to promote competition.

"...I could mention the Exempt Wholesale Generator Rule, our Transmission Information Rule, our Regional Transmission Groups Policy Statement, our Pricing Policy. The open access NOPR is titled to promote wholesale competition. Regarding its operation, we must be sure that there is sufficient and fair competition before we release the reins of regulation. This is what we are asking and what we are getting comments on in our Notice of Proposed Rule-making. We have set out our proposal for open access and in so doing we are asking how we should allow the market to set prices for existing generation production. How should we articulate our goals for guiding this transition? I would say that probably our first goal is to encourage efficiency in the electric power business. Firstly, for the health and financial stability of the businesses in electricity. We do not want to harm the electricity industry since it is a vital component of our economy. To bring about higher prices for electricity can dampen the vitality of virtually every other sector of the economy. This is

particularly important to recognize, as the United States seeks to maintain its status in the global economy. On the contrary, our efforts aim at a lower cost power supply such as super efficient combustion turbines. It is crucial that we find ways to exploit the economic efficiencies that these facilities offer. Also because this industry is so capital-intensive, we should strive to use our assets as efficiently as possible. We do not want to create incentives for building duplicate facilities. To a great extent markets can best determine how to allocate capital and as regulators we should be aware of how our decisions may affect those allocation decisions. Therefore, we should ensure that the de-integration of generation and transmission promoted by the NOPR does not affect the reliability of the service".

In Great Britain, where privatization was one of the keys for changing the balance of forces which brought about inefficiencies, the old system before privatization was that generation and transmission were integrated in one company in England and Wales. Scotland was separate. There was also a link to France and the distribution companies were the area boards. According to David Newbery:

"...When the industry was restructured, the transmission system, the grid, was separated from the Central Electricity Generating Board and three generation companies were formed. On the one hand, National Power and PowerGen have the fossil generation and Nuclear Electric has all of the nuclear electric stations in England and Wales. These companies now are on a similar footing in access to the transmission as Scotland and France. There are generation licenses for the various generators. Nuclear Electric has a rather different one because of its special safety problems and that is specified in the license. Private electricity suppliers who can compete for customers have licenses and are called the second-tier suppliers. These two activities essentially do not have regulatory conditions. The ones that do, are the natural monopoly parts for the national grid corporation with the transmission license and the regional electricity companies which have public electricity supply licenses. They specify the form of price regulation and they lay down the desirable things that should be achieved like no cross-subsidy and economical purchase. That is important because they are also allowed to own their own generation and not to try and transfer their profits into unregulated generation. The spot price is based on daily bids. It is overlaid by financial contracts; we do not have physical contracts. The mechanism for paying for capacity is the value of lost load and the loss of load probability. This means that the generator who is not allowed to generate is paid his lost profit. And if he is compelled to run in order to meet a deficit in supply then he is paid what he did, not the pool price. The pool is a day-ahead system and it runs an unconstrained schedule which ignores all the transmission constraints to determine which plants would run if there were no constraints and then it finds which plants have to run in order to find out what the constraint payments are. Generation has free entry. The grid is responsible for expansion of the grid. That is a crucial aspect of the system and the grid has very well-defined standards of quality of service; so if generation enters and requires that the system be strengthened, that responsibility falls upon the National Grid. Transmission is regulated on a forecast weather-corrected maximum demand for the system and it does not therefore depend upon the amount of mileage of cable or whatever. It is responsible to invest so as to maintain these standards.

Distribution is regulated in the same way. It is important to point out that, as from 1998, any customer can contract with any supplier for electricity. That will remove the base on which long-term contracts can be signed with generators because the regional electricity companies will no longer have a captive market and that raises questions about future investment".

The primary source of energy for electricity generation in Chile is hydropower. Then comes oil, then coal, gas and wood. Before the reform process, there were two main vertically-integrated state companies, ENDESA and Chilectra, which covered approximately 90% of the market. As Andrés Alonso Rivas pointed out:

"...The privatization process started in 1980 when concessions were granted to two distribution companies which represented approximately 7% of distribution. The process continued until the end of the 1980s and all efforts were aimed at consolidating the entry of private companies to the sector. As from the promulgation of the "Ley General de Servicios Eléctricos" (General Electricity Services Law), no concession is needed to set up a generating plant. Dispatch is coordinated by what we call the CEDEC - Economical Load Dispatch Center - where the setting of tariffs among generators as well as to the final customer is based on marginal costs. In transmission, we have open access to the network and the value of tolls is regulated. Distribution is an activity which operates on the basis of state concession. Thus the prices which the distributor may collect off its customers are set by simulating the results of a model company in which an estimate is made of the distribution aggregate value which is to be applied to the generation/transmission prices. On the other hand, once the prices of the aggregate value of the distribution companies have been calculated, a control of joint profitability of the distribution companies is made to foster competition. It must also be mentioned that, at the same time, there is a system of free prices for two-megawatt consumption and for special service quality when the service is under twelve months. The electricity market has an economical dispatch center where different generators exchange energy and power on the basis of their pertinent marginal costs. On the other hand, these generators have access to transmission systems where tolls are regulated. The distribution concessionaire sells to the regulated customer at a price we call "node price" which is calculated by the National Energy Commission every six months and is published in April and October. On the other hand, there exists the free customer who can be served by the distribution concessionaires, when within their area of concession, as well as by generators. It is interesting to point out that recently, after 1993, the reform process tended to strengthen competition in the markets".

In Argentina, nuclear power accounts for 10% of generation. The rest is reasonably divided into equal parts between hydroelectric and thermal generation, mainly based on gas, since there is a great abundance of this resource in Argentina. Until privatization, the main companies were state-owned and also vertically-integrated. Alberto Devoto stated that:

"...The same as in the rest of the countries, after the reform process, greater competition was introduced in generation. Transmission and distribution which are natural monopolies

were granted in concession and are regulated by the State. Now access to generation is absolutely free and prices are set on the wholesale market according to marginal costs. At present, there are just over forty different types of generation companies and the biggest does not reach 8% of installed capacity. There is absolute free competition which also presupposes the lack of restrictions for entry to the generation business. Dispatch prices are set on the wholesale market according to the companies' marginal costs. The market system works through a company which administers the electricity wholesale market -CAMMESA- which, in turn, handles dispatch. Somehow CAMMESA has two functions: it is a stock company composed of private capitals, has a state-owned portion, with a "golden share", and administers the pool as well as dispatch. Dispatch is regulated by rules established by the Energy Secretariat which is the sectoral authority, rules which at present are based on the generators' short-term marginal cost. Here it must be borne in mind that generators have the possibility of setting the price of the fuel they are using. This brings about two sorts of prices: those fixed by the wholesale market and the administered prices which are then applied both to transmission and distribution. Other remunerations received by the generators are based on available power, cold reserve, reactive power and the use of resource stabilizers. On the other hand, the transmission system was granted in concession to one company which operates the national network and to five companies which operate the regional network. Transmission concessionaires are responsible for the operation and maintenance of the networks. It is an open access system, that is to say, there is freedom of access by third parties but transmission companies are not obliged to carry out the expansion of the networks. Regarding the concession of distribution, it has already been implemented in the Buenos Aires Metropolitan Area and is underway in the different provinces of the country. The state-owned company which operated in the Buenos Aires Metropolitan Area was divided into three business units which were then granted in concession. The same as in transmission, the distribution companies are obliged to supply the full demand and to open their networks for use by third parties under certain conditions. Unlike the transmission company, the distribution companies are responsible for expansions. However, since the distribution company has the concession of a monopoly in a geographical area controlled by the regulator, the aim has also been to introduce competition giving the users the possibility of exercising their right to look for supply alternatives. Originally, all big users with a demand of over five MW could freely enter into contracts with a generator, paying toll charges to the transmission and distribution companies who have the obligation of opening up their networks. Shortly after the initiation of the privatization process, this threshold was brought down to one megawatt and last year it was lowered to 100K. Consequently, at present, there are approximately 400 contracts between big users and generators outside the distribution area of the concessionaires".

At present, Peru is undergoing the final phase of its reform process and 60% of the state companies' shares are being privatized. Another 10% is being sold to the workers as a first option and the remaining 30% will be offered on the Stock Exchange. According to Luis Alberto Haro Zabaleta:

"...Until 1992 a state company was responsible for supply as well as for generation and the building of plants. In Lima we had a generation, transmission and distribution company

and in the rest of the country we had around ten regional distribution companies with different geographical coverage. Some of these companies maintained generation, sub-transmission and distribution in isolated areas. After the reform process, concessions are granted in the field of electricity generation based on geothermal or hydroelectric resources from 10 MW upwards and also for distribution and transmission activities. Tariffs in the generation business are defined every six months by an Electricity Tariffs Commission based on the simulation of expected marginal costs for the next 48 months. In order to set these tariffs in the field of generation, a Dispatch Centre was created called the "Comité de Operación Económica del Sistema" (System's Economical Operation Committee) which is made up of representatives of the generators and a representative of the main transmission system of each interconnected system. On the other hand, the System's Economical Operation Committee, on the basis of instantaneous marginal costs, sets the tariffs which regulate transactions according to the difference there may be between a generator's contract with his customers and the way in which he is dispatched. It is expected that the system's dispatch be at a minimum cost. In our system we make a difference between free customers -those with a maximum annual demand of over one MW, which negotiate their supply contracts directly with the generation or distribution companies- and regulated customers, those with a maximum annual demand under one megawatt and whose tariffs are set by the "Comisión de Tarifas Eléctricas" (Electricity Tariffs Commission). Anyhow, in no case shall the price fixed by this Commission differ in more/less 10% of the price for free customers. In other words, the free market orients the evolution of prices for the regulated sector. On the other hand, transmission is subject to concession and is of free access. Basically, we have a main system and a secondary system. The main system is the high tension system in which the beneficiaries of the transmission system are not identified and where there are directional energy flows. But the payment is made by all generators connected to the system. In the secondary transmission system which is that required by a generator to take his production to the market or that required by a distributor to buy energy off the main system, the beneficiaries may be clearly identified and they bear the expenses of this service. The setting of prices is different according to how far away one is from the generation centers. Of course, transmission and distribution prices are included in the price that the final customer pays for the service. Whoever holds a contract with the customer performs the task of collection which, in the transmission segment, is transferred to the transmission company, either by the System's Economical Operations Committee or by the generators who use a secondary transmission system. The setting of transmission prices is done on the basis of acknowledging the new replacement value of a transmission system which we call economically-adapted. That is to say, the transmission system which is the optimum one required for providing transmission services, at a minimum cost. In these terms, there is competition between the transmission company and this economically-adapted system. Payment is effected through a toll -fixed payment- and a variable toll which is in accordance with the use made of the transmission system. When setting this transmission toll, incentives are also established so that the transmission company becomes concerned about providing better quality transmission services. If there is an overdimensioned transmission system or one with excessive losses, tariff revenue may become negative in which case the transmission company does not receive any income to complete transmission costs. In the distribution

sector, the setting of tariffs is also done every 48 months according to model companies in typical distribution systems, which are determined by the Tariffs Commission according to load density. At present, we have three distribution systems: a high density system which represents the Lima metropolitan area and practically all other cities of the country; a second system with a lower load density and a third system which represents rural and isolated areas. This typification also includes design standards for each area".

In the state of Victoria, Australia, electricity generation is dominated by brown coal because of the large amounts of open cast brown coal in the region. There are also very large supplies of natural gas and hydroelectricity, including the Snowy Mountains scheme which is jointly owned by the New South Wales Government and the Commonwealth Government. According to Geoff Swier:

"...The generation sector has been disaggregated down to the individual power station level. There are three brown coal power companies: Loy Yang Power, Yallourn Energy and Hazelwood Power Corporation. There is a gas company which comprises two gas-fired power stations. There is also a hydro company which comprises a number of small hydro schemes. Finally, those companies that are owned by the Government of Victoria compete with the entitlement from the Snowy Mountains scheme. The important part of the reform structure and maybe somewhat unique, is the separation of transmission from the wholesale market. The transmission function is carried out by Power Net Victoria while the pool and system security function is carried out by a statutory authority called the Victorian Power Exchange. Finally, there are five distribution companies which participate in the retail market serving large customers, smelters and independent retailers. The distribution sector is structured so that each of the incumbent distribution companies has a distribution license which is a monopoly and another retail license which provides for them to engage in competitive supply with other retailers. To cut a long story short, the wholesale electricity market is very similar to the U.K. model. All electricity above 30 MW must bid to the pool for dispatch with hedging contracts in place to hedge pool prices to stabilize sales revenue and purchase costs. In effect, a relatively small volume of transactions is exposed to pool prices. Victorian Power Exchange is an independent, non-profit organization which administers the centralized market operations including committed dispatch, setting of a spot price and settlement of spot transactions. It also administers prudential requirements for new members and is responsible for transmission planning and contracts for new transmission capacity. That is a key difference to the U.K. model. Power Net Victoria -the transmission company- is responsible for ownership and maintenance of transmission lines and substations. Among its responsibilities, it evaluates options to extend capability of existing transmission assets and can engage in the promotion of new investment when commercially appropriate. Regarding the retail market and like in other cases of de-regulation already mentioned, currently one megawatt and above customers are subject to competitive supply. This means that about 400 customers in the state of Victoria can basically shop around for the best price. Customers are to be progressively deregulated over the next five years with complete deregulation to be achieved by December 2000. With respect to privatization, it must be pointed out that 51% of Loy

Yang B was sold to Mission Energy, California. Yallourn Energy is expected to be sold by way of trade sale in 1996. Finally, the Government intends to complete the Distribution Privatization Programme by the end of 1995, maybe beginning of 1996. United Energy was the first business to be sold for 1.15 billion to a consortium made up of Utility Corporation of Kansas, United States, AMP and State Super who are two Australian fund managers. Both Eastern Energy and Solaris Power have been sold and CitiPower and Powercor are to be sold by mid-December 1995".

Public Agencies and Regulation Systems.

One of the objectives of the reform experience in Norway was to promote competition and the mechanisms for market allocation of resources in all cases where this was feasible. That is so in electricity supply and generation. But as John Henrick Sagen argued when there are natural monopolies or dominant actors there must be some sort of formal regulation to promote economic efficiency.

"...The NVE -Norwegian Water Resources and Energy Administration- is the electricity regulator. The Act gave powers to NVE -an existing old energy administration- which was put up as a separate department in the understanding that this new regulatory function should be built on a new ground and be rather independent of the rest of the administration. As a regulator, it has two main objectives: to regulate the network as a natural monopoly and to promote competition in generation and supply. The means to deal with this regulation was by introducing new license concessions to all owners of transmission and distribution networks and to producers, suppliers and traders in electricity. The Energy Act states that a trade concession or license is intended as an instrument to enable the authorities to supervise and monitor the energy market effectively. This supervision comprises competitive behaviour in the market and control of the network as a natural monopoly. NVE is also given the power to trace guidelines for tariffs and cost recovery. The government regulation states that transmission tariffs in Norway should be set to cover any costs, provide necessary yield on domestic capital and reflect the load on the network. In case of any disagreement on terms and tariffs decisions shall be taken by NVE. Finally, it is important to stress that, within these basic ideas, NVE is rather open to use the way it finds most preferable to design and exercise our regulatory practices".

The recent reforms introduced in Sweden also aim at greater efficiency in the industry and at strengthening the role of the customer/user through the promotion of competition. The authorities trust that, in the long run, electricity generation and supply will be regulated by market rules. However, Bo Lyndörn warned that:

"...During the first five years there will be a supply concession system that will favour small customers who may use the opportunity to change supplier and thus be supplied with safer electricity at a reasonable price. This kind of supply concession will be the only kind of electricity prices which will be regulated after 1 January 1996. Maybe I should stress that

the supply concession system will have the role of a bridge between the two systems to make the transition easier for the small power generators. What is in fact necessary is to control the operation of the networks since they are a natural monopoly vis-à-vis weak customers and are also a very important piece of infrastructure in society. NUTEK Electric Market is the regulatory body responsible for efficiently supervising the transmission system with respect to price, conditions and quality of service. It must also supervise the supply concession system and is also supposed to grant net supply concessions through companies. There is a legal system and if a company is not completely satisfied with any of NUTEK's decisions they may appeal to a court. I would say that, in practice, we are quite an independent authority which acts within a well-defined legal framework. For example, NUTEK cannot decide which is a good price and which is not: it can only indicate the criteria to be applied, the methodology to be used for the calculations. In other words, it is the network operators who are supposed to calculate their prices and tariffs and then we evaluate them in case of complaints from the customers to whom we shall guarantee low, stable tariffs. In this kind of evaluation of net tariffs, we must also take into account quality of supply, if there is an interruption in the supply and so on and the efficiency in network operation and also price development over time. I could sum up by saying that, in our regulatory task, we act on the basis of a price-cap scheme over time instead of using the rate of return. Of course, we also bear in mind other indicators such as return on assets and technical performance of the networks. It must also be pointed out that the relative importance of those different arguments could vary depending on the circumstances of the case".

Also in Colombia, generation and trading are activities ruled by competition while transmission and distribution are specifically regulated through charges called tolls. According to Luis Ignacio Betancur Escobar:

"...These tolls are fixed by the "Comisión de Regulación de Energía y Gas" (Gas and Energy Regulatory Commission) which is the regulating body. However, it must be pointed out that the control and surveillance activity in itself is vested in an entity which is also new, the "Superintendencia de Servicios Públicos" (Public Utilities Superintendence).The Regulatory Commission is made up of five full-time members for a fixed period who during that term cannot be removed by the Government. However, it is relatively independent because when a resolution is voted, it requires the favourable vote of at least one of the three Ministers which are part of the Commission. Moreover, its decisions -the resolutions- are subject to review by the courts which -following the French style- we call administrative-contentious. The task of the Regulatory Commission is to mainly lay down the rules of the game, promote competition, set the tariffs for residential users and for non-residential users who have contracted under two MW. We hope to bring this figure down to at least one megawatt so as to have a more competitive market; and the Commission has the faculty of lowering the threshold in the future so the system becomes more competitive still".

Meanwhile, in Spain, regulation must be carried out at a time of transition towards a new system in which the pre-existing integrated system will co-exist with the so-called independent system. In the opinion of Luis Rodríguez Romero:

"...The "Comisión Regulatoria del Sistema Eléctrico Nacional" (Regulatory Commission of the National Electricity System) will ease the task of building on the previous system and phasing in competition. ¿Which are the competitive aspects introduced in the integrated system? The competitive aspects refer to the review of standards with a price-cap mechanism in which coefficient "x" is an estimate of expected efficiency gains in the system. The inclusion of incentives regarding quality in the remuneration of distribution, of competitive biddings for new capacity and, to a certain extent, of competition regarding centralized dispatch. On the other hand, the independent system is based on free contracts and will have differentiated transmission and distribution tariffs. To harmonize all this, the Regulatory Commission is made up of a six-member Administration Council and a Chairman. These members are appointed for a five-year period and, except for special cases, they cannot be removed by the Government. There is also an Advisory Council which expresses the interests of the parties involved, industrialists, consumers, and so on. The legal and technical support staff of the Regulatory Commission is around 100/120 persons. Although its executive members are independent, their decision-making capacity is limited to a set of issues. The Commission must inform on all relevant matters of the system and can make proposals on its operation".

The electric power market in the United States is not yet de-regulated nor is it likely to be totally devoid of regulatory intrusion. As Vicky Bailey explained, in fact, it is undergoing a transition period from the heavily regulated approach to a more market-oriented and less regulated approach.

"...Environmental regulation is a primary example. We should strive to have regulatory decisions that will work though with capital markets. Efficiency is important in terms of the environment as we all know that coal, natural gas, nuclear and even renewable sources have impacts on our environment. The Federal Energy Regulatory Commission (FERC) - made up of five members appointed by the President- acts as a regulator trying to strive for less Government intrusion into business decisions and where government regulation is necessary, to ensure it is as effective as possible. In addition to minimal Government interference and economic and operational efficiency, we must also recognize that the electric power business as the Federal Power Act states, is affected with a public interest and I think probably the term "public interest" will be re-defined as we go forward. The Public Utility Regulatory Policy Act, or purport contracts, demand- side management programmes and other government imposed or encouraged initiatives have to be accounted for now in the realities of this competitive world; and this is definitely one of the emerging issues that we are struggling with as a transition issue to this more competitive arena. How we treat this stranded investment is where equity comes into play. In the Commission's proposal, we set out a proposition that the entity that causes the cost to be stranded should bear the responsibility for recovery of those costs. We recognize that this approach may limit the immediate benefits of competition; no doubt allowing for recovery will put a damper on the prospect for lower prices in the short term but we cannot ignore stranded costs as a matter of policy and legality and it would be inequitable in our minds to do so. We do, on the other hand, expect utilities to mitigate stranded costs by remarketing or selling power

and assets; the Commission will strongly enforce any mitigation requirement. Another goal -legal analysis aside- is that public policy is best served by avoiding the creation of form shopping. As I said earlier, I was once at the state level as a state commissioner. We have kind of a bi-focated jurisdiction as it relates to the electric utility industry so, thus, the goal of a clear and consistent federal and state regulation is crucial. The overwhelming concern of states is the jurisdiction authority of a retail stranded cost and the appropriate process for resolving that issue. My preference is for as much uniformity as possible in treating stranded costs. The language in our NOPR encourages strongly the states to mirror what we do at the federal level; but it stops short of telling them exactly how to do it. It does not dictate to the states, that is up to the states. By setting up different approaches though for treating retail, wholesale or retail turnhold sales stranded costs, we could possibly run the risk of creating cracks that cost can fall into and that would not serve our purposes in the end. Last but not least, probably an overriding goal is to provide for the continuous high level of reliability and security that we have enjoyed in the United States. Many parties have expressed their concerns possibly that a free market in electricity may not protect reliability as much as it should, given basically the life and death role that electricity can play in our lives. I share these concerns on reliability impacts of the changes that we are proposing; we are greatly encouraged by the support and involvement in our process of what we have as the North American Electric Reliability Council or NERC. NERC has undergone important changes in the last few years that have assured its continuous vigilance over the reliability of the North American Electric System".

In Great Britain, the licenses granted by the Government to the companies which act in the different segments of the industry are the basis of regulation. Of course, there is a global legal framework that backs these licenses which are legally binding contracts with all the details regarding rights and duties of the parties. David Newbery pointed out that:

"...The advantage of this procedure is that, if the laws themselves contained the regulation, we would run the risk that another Government could pass new laws which might dramatically alter the way the industry would run. What the Act does is to lay down the duties of the Director-General of the Office of Electricity Regulation who regulates the industry, specifies the form of licenses and gives rather careful details about how these licenses may be modified. Of course, this is crucial because frequently the licenses do need to be modified. Since generation is not essentially regulated, the license system applies to the natural monopolies which are the national transmission company and the regional electricity companies (RECs). Obviously, licenses can be modified by agreement. In fact, that agreement is usually slightly coercive in that the alternative is something worse than changing the license. The Government can refer the case to the Monopolies and Mergers Commission if the behaviour of the firm is against public interest, for example, if they violate the Competition Act or the Fair Trading Act. I would like to point out that these routes are clearly costly to both parties. Undoubtedly, the consequences for the company would be serious if the finding is against them. But it may also be costly to the regulator if he fails because he looses credibility and standing, both important in pursuing his duties. So that these references are not made lightly and that is very important because it improves

the stability and confidence that people have in the system of regulation. We have a price-cap regulation system for both the grid and distribution companies but there is increasing competition in supply".

In Chile, although the regulatory body responsible for the market is the "Comisión Nacional de Energía" (National Energy Commission), there also exist other institutions and governmental agencies involved in the electricity business. According to Andrés Alonso Rivas:

"...The National Energy Commission is a technical advisory body to the President, headed by a seven-member Board of Directors who are, in turn, Ministers of the Cabinet. All management activities are carried out through a Secretary-General who handles the technical staff. Within the roles assigned to the National Energy Commission, it must regulate the economical load dispatch centres related to generation. On the other hand, there is the Ministry of Economy under which the Fuel and Electricity Superintendence functions, in relation to all the technical part of the electricity market. Likewise, since the "Ley Base de Medio Ambiente" (The Environment Basic Law) was approved, the CONAMA -National Commission for the Environment- must approve the studies on environmental impact derived from the investments made mainly by the generation and transmission companies, and approve the actions suggested by the latter for mitigating the impact. Finally, it must be pointed out that the electricity market as a whole is monitored by the "Comisión Anti-Monopolio" (Anti-Monopoly Commission) It must also be stressed that the National Energy Commission does all the market indicative planning. In this sense, it receives from those who are interested in carrying out generation works, their feasibility study and then evaluates it from the economic viewpoint, indicating an expansion at a minimum cost and coordinating activities with the big transmission works. Although merely indicative, the companies have generally attached this work plan for credibility reasons because, in general, the pertinent projects have received loans from financial institutions. Going back to the main tasks, the National Energy Commission is responsible for calculating the so-called "node prices" which are applied to regulated customers, as long as they are within a plus/minus 10% span with respect to free customers. Undoubtedly, the Commission has carried out a thorough job to promote competition in generation, clarity in transmission and the transfer to customers of the efficiency gains obtained by the distribution companies".

In Argentina, the legal framework established by law 24.065, on the one hand, guarantees the different actors and users legal continuity and stable rules of the game; and, on the other hand, it protects consumers from possible excesses, particularly those derived from a monopoly. The same as in other countries, the generation activity is regulated by market competition while transmission and distribution are regulated by the State. Transmission has fixed maximum tariffs and also quality controls. As Alberto Devoto explained:

"...In the field of distribution, the concession contract is the essential document for the regulation exercised by ENRE -entity headed by a Board of Directors composed of five members, a President, Vice-President and three Directors and a technical team of

approximately 80 staff members. The concession contract has supply regulations which basically regulate the relationship between the company and the user, the tariff structure and the methodology for transfer of wholesale prices or pass through, besides the procedure for adjusting the distribution aggregate value during the first ten years. Although tariffs in Argentina are set in pesos, these are convertible into dollars so that they are technically speaking, dollars. Thus the distribution aggregate value prices are adjusted or indexed by a mix of United States price indices.The contract clearly establishes the duties of the distribution companies in terms of quality of the technical product, quality of the technical service and quality of the commercial service. This is particularly important in our country because in the last decade or so of state management, quality had deteriorated considerably and the user had practically no possibility of putting in claims. The contract also establishes that the distribution company has the obligation of supplying full demand. It must open its networks to use by third parties under certain conditions and is in charge of network expansions unlike the transmission company which has an open access system but no obligation to effect expansions. Therefore, without leaving aside certain nuances, I would say it acts under the modality of a common carrier. The price-cap mechanism has been adopted for regulation purposes. There is no compulsory investment for distribution companies but instead the control of the system is basically effected by its performance, that is, quality of the service. How does all this work? On the one hand, a tariff table was initially established including the distribution aggregate value. That is to say, that the distribution companies operate with prices given in a tariff table agreed on before privatization and that, according to the concession contracts, will be reviewed for the first time after ten years and thereafter, every five years. On the other hand, we know that wholesale prices are fixed by the market and that a pass through mechanism transfers them to the tariff. In view of this mechanism for setting prices and the obligation of fully meeting demand, it is clear that the only possibility for the distribution companies to obtain benefits is through efficient management. The alternative of reducing quality of the service is penalized with severe fines. When applied, they then revert to the user. This means that the proceeds from these fines are returned to the users through a reduction in the billing of subsequent periods. Therefore, to achieve the required quality levels and avoid penalties, the distribution companies necessarily have to invest and solve the users' problems".

Mr. Luis Alberto Haro Zabaleta said that in Peru the State exercises its regulatory role through two institutions:

"...the Ministry of Energy and Mines, through the "Dirección General de la Electricidad" (General Electricity Bureau) whose function is to set forth the general instructions for the application of the legal framework in the electricity sector, to control the quality of the service and safety in electricity supply, to grant concessions and/or authorizations to participate in the electricity business. The other key institution within this legal framework is the "Comisión de Tarifas Eléctricas" (Electricity Tariffs Commission). It has a board of directors made up of a representative of the Ministry of Energy and Mines who chairs the Commission, a representative of the Ministry of Industries, a representative of the Ministry of Economy, a representative of the private generators and a representative of the

distribution companies. None of these representatives may be an official or work for one of the companies, either for the State or for one of the companies which are represented on the Electricity Tariffs Commission. The setting of tariffs made by the Commission only applies to regulated customers, that is, those with a maximum annual demand under one megawatt per annum. The "Ley de Concesiones Eléctricas" (Law on Electric Power Concessions) also establishes certain guarantees for the users. They are recognized a rationing cost. That is to say, if a user is not rendered the service due to failures in generation, the generating companies are obliged to return to the user a certain amount for rationing. In the case of unwarned failures in distribution which last over four hours, the distribution companies are also obliged to make a rationing payment to users. Likewise, the law forces the companies to reimburse their customers with shares, bonds or otherwise the amount they have paid towards enlargement or expansion of the distribution networks".

Also in the state of Victoria, Australia, the goals of regulation are to promote competition in generation and supply, to ensure the maintenance of an efficient economic system and to protect the interests of consumers. Geoff Swier said an attempt was being made to have a light-handed regulation approach:

"... That is to say, to provide a clear legal framework and information requirements to maximize the scope for negotiated outcomes, but keep an effective reserve power to ensure the protection of consumers. In other words, an attempt is made to minimize the need for direct regulation. So wherever possible competitive structures have been introduced, for example, the separation of transmission planning from ownership of transmission. We also insist on industry self-regulation through industry-defined codes. In the case of Australia, our electricity sector is regulated by the Office of the Regulator-General. There is legislation which establishes the framework within which the Office of the Regulator-General operates. The Regulator-General has statutory independence from the Government; in turn he issues licenses and, provided for in the licenses are industry codes of practice. Non-competitive activities are subject to price regulation by the Office of the Regulator-General in the sectors of transmission and distribution. The legislation provides powers for regulation of relevant prices and price setting mechanisms. In distribution a price-cap regime is applied to the wider average revenue yield for a period of five years. There is also a "cpi + y" restriction on individual network tariffs to ensure a politically acceptable process of tariff rebalancing. On the other hand, the competitive activities of Victorian Power Exchange are licensed so as to ensure their compliance with the various codes but they are not price-regulated. Unlike what happens in the United Kingdom, this Office of the Regulator-General is also responsible for the regulation of other industries undergoing reform in the State of Victoria, including gas, water and ports".

Balance and Prospects.

Four years after the implementation of the reforms in Norway, John Sagen highlighted as major achievements, the increase in competition and the reduction in prices. He was also

enthusiastic about the opportunities which will arise through the interconnection with the Nordic system.

> *"...I think we can say that in Norway there is competition in both generation and supply and all actors in the system are acting in a competitive environment. All utilities and customers have, in practice, unrestricted choice of supply. Even households -domestic customers- have a realistic, economical and practical way of choosing their supplier. New actors are acting in the market such as brokers and traders in electricity. We have brokers acting within the bilateral contracts outside the pool. Anyhow, I wish to stress that the pool has a special function in the system and we are not thinking about establishing competitive pools, but we do have competitive market places for bilateral contracts or other arrangements. Consequently, since 1991, customers have experienced power price decreases in the order of 20 to 30%. Anyhow, short-term prices are volatile. On the other hand, transmission prices are being reduced by 2 to 3% per year, mainly because the level of interest rates has come down during this time. However, there is still a lot to do. For example, there is a big discussion on how we could obtain more efficiency gains for distribution and transmission. We are trying to find new regulatory incentives to upgrade efficiency, with a benefit for the customers. That is one of our big questions at the moment. Looking forward and outward, let me outline the challenges which will arise from the international trading of electricity. As you may know, the Nordic electricity system includes Norway, Finland, Sweden and Denmark. Norway has AC connections with Sweden and some with Finland and Russia. We have DC cables to Denmark and we have TDC cables to Germany and The Netherlands for operation after the year 2000/2005. I think the gains to trade are substantial especially between a hydro system and a fuel system. The gains for Norway in an open trade could be even bigger than the opening of a trade in the country itself. Sweden and Finland have passed similar energy Acts to the Norwegian one. One future consequence of this may be that the grid companies will be responsible for operation with and/or connections to foreign countries as well as for the system's safety and services. The critical factor is equality and reciprocity in terms of trade. In Norway you still need a license to trade but the idea is to change it into an open trading system very much like the system we have today in other countries".*

From the Swedish viewpoint, it is not a time of balances but of prospects. The same as his colleague Mr. Sagen, Bo Lyndörn considered the market to Norway should be opened as soon as possible.

> *"...At least as from 1 January 1996. This would enable us to have a market place in common based on the older existing market for spot transactions. We also intend to open the market to Finland and perhaps Denmark.".*

Unlike Norway and Sweden who implemented reforms which reasserted the State's role in the electricity business, Colombia has taken no decision in this respect and as Luis Ignacio Betancur Escobar said:

"...We are not considering privatization as an alternative at present. Our legal framework has left the door open for privatizing in the future if we decide to do so".

Meanwhile, in Spain, attention is focused on how the pre-existing integrated system, with little decision-making autonomy of the companies, will co-exist with the recently created independent system. Among the many possible question marks, Luis Rodríguez Romero pointed out the following:

"...Which will be the strategic development of the independent system? Which customers can gain access to the independent system bearing in mind that the customers who have access to the independent system are those who are not in or disappear from or do not have access to the integrated system? Who enters the independent system? If new capacity is created...may capacity from the integrated system pass on to the independent system? If so... how and when? Regarding the timing of the transition...will the independent system develop quickly or will it develop gradually awaiting a convergence between both systems? Let's consider operative issues too. Then we must ask how the independent system will gain access to the pool of the integrated system. Prices, of course, tariff setting for access to transmission, access to distribution of the members of the independent system, conditions of entry to and exist from the independent system, the prices of support services provided by the integrated system to the independent system and finally -the algid point in all this- which is the contribution the independent system will make as well as all the customers and companies which are in this system to the standard costs which are included in the integrated system. From the standpoint of the integrated system, there are uncertainties regarding traders which may appear and the impact they may have on competition in the pool of the integrated system. And thereafter, the possible effect that the single power market within the framework of the European Union may have on the integrated system".

One of the many issues to be solved in the United States of America is the coordination between federal and state jurisdiction to guarantee the implementation of the NOPR standards. Vicky Bailey considered it was important to get the terms and conditions right in their tariffs and ensure that there really were safeguards in place for achieving the non-discriminatory open access.

"...The NOPR raises the issue how we at first will coordinate with the states on jurisdictional transmission facilities. We traditionally set rates, terms and conditions for transmission service in inter-state commerce. The states have historically regulated transmission service when it was bundled for serving retail customers. One of the proposals is to organize regional transmission groups as a one method for addressing this state and federal issue. The NOPR also attempts to resolve the stranded cost issue. We are allowing for full recovery of legitimate, verifiable and prudent stranded costs. Hopefully, if done right, the recovery of stranded costs should not impact the ultimate competitiveness of the market although it will likely delay the drive to a market that is determined only by marginal prices. The Commission provides its view of jurisdictional boundaries to the states for addressing stranded costs. We do not in any way dictate to the states how to address these issues. We are trying to open it up at the wholesale level so that hopefully these benefits will flow to

retail access. The NOPR asks questions about de-regulating wholesale generation markets and some have interpreted this to be a concern about market concentration and merger issues. We continue to be diligent in our concern about market power as we contemplate price de-regulation but we must not go so far as to erect regulatory barriers to mergers based on the belief that big is bad. Well conceived mergers will capture the economies of scale and other efficiencies that can result in lower prices to consumers".

In Great Britain, the significant increase which occurred in pool prices when the contracts fell due, tested the dissuasion power of the regulation scheme. David Newbery expressed that vis-à-vis this situation, the regulator decided to threaten generators to subject them to the Monopolies and Mergers Commission, unless they agreed to reduce prices.

"...The companies agreed to price caps for two years and they also agreed to sell some plants to try and increase competition. This was a time when two of the nuclear power stations ceased to be available and one of the coal-fired power stations was also unavailable. Consequently, the capacity payments increased enormously. I would say it was an exciting period because we were able to draw many lessons. It is very clear which company set the pool price, the system marginal price. At the beginning it was mostly set by National Power, increasingly as National Power has lost its market share PowerGen is setting the price and some of the time Pumped Storage is setting the price. No other generators ever set the price. So the nuclear power stations or the new gas-fired power stations or the French or the Scots, all of those new entrants into the system, never set the price. That means that we essentially have a duopoly. The threat of the Regulator to subject the two companies to the Monopolies and Mergers Commission led to an agreement to adjust the license and they agreed to hold the prices down on a time-weighted basis and on a demand-weighted basis. That is to say, they preferred to reach an agreement than to have the case referred to the Monopolies and Mergers Commission. What happened to prices? Just as prices started to decline the Government introduced a value-added tax so that the consumers actually have seen no fall in the real prices. Some of the very large users had originally experienced a rapid increase in price and only recently have the prices come down. So there were wide complaints that most of the benefits were achieved by the medium-sized industrial customers, not the large ones and not the domestic consumers.What is the overall conclusion? The Regulator has certainly had a bad press and he, in his defense, would say that most of the problems that have created that bad press were the result of poorly designed privatization. There were only two competing generators so they have a lot of market power. The Regulator had no control over the original values of the "x" component of the price regulation and, therefore, the electricity companies made huge profits. The original "x" was very generous. In fact, it allowed prices to increase although prices had been coming down steadily for the previous decade, in real terms, for the distribution margin. In 1995 the announcement of the first review was widely recognized to be very generous indeed and the shares' prices of the companies increased. One of them was targeted with the take-over and the take-over revealed huge cash reserves in this regional electricity company, sufficiently embarrassingly large, that the regulator decided that it was time to review the price cap again. Although that dramatically lowered the share prices, it did not stop a wave of mergers and vertical

integration between the generators and the distribution companies. It is important to point out that, at the moment, the issue is in front of the Secretary of State and whether he will allow a reference to the Monopolies and Mergers Commission is as yet unknown. But if the two major generators go ahead with their purchases of the two largest distribution companies then the industry will become essentially vertically integrated between generation and distribution. Another negative aspect was that the National Grid was sold before it could be properly valued and again has led to huge capital gains. On the other hand, the coal market collapsed when the contracts finished but the Regulator had no hand in the design of those contracts. If we look on the positive side, I think there are some very important benefits from this system. For example, we managed to solve the problem of British Coal really with very little political disturbance. The Government has successfully sold the coal industry which from employing something like 120,000 workers ten years ago, now has fewer than 10,000. And the gas market has been totally transformed. We have a competitive spot market in gas which has been created by the demand for gas for generation. On the other hand, Nuclear Electric has also had a great improvement in productivity in view of all the competition in the sector. We have now clarified what nuclear power costs and as a result will not build any more nuclear plants, leaving aside the plans which existed before privatization. In brief, in terms of transformation of the electricity and fuel industries in Great Britain, the consequences I think have been beneficial."

Since the reforms took place in Chile, there have been investments in the sector of between US$ 300 and US$ 350 million per year. Likewise, investments are accompanied by increases in electricity demand. Thus Andrés Alonso Rivas' concern was not the strength of the sector but the increase of competition:

"...Therefore, our current efforts aim at improving the toll system, increasing the entry of dealers in our economical load dispatch and including quality standards in the regulated service which, unfortunately, were not established when our companies were privatized. Although they are now difficult to set after privatization has taken place, we will solve this issue step by step as well as all other aspects to make it easier for users to control the quality of the service provided and, in general, to provide free clients with more and better information on the operation of the market".

For Alberto Devoto, the most remarkable effects of the reforms carried out in Argentina were a decline in wholesale prices and an increase in investments in the generation business.

"...In less than three years, wholesale prices have decreased almost permanently. From those US$ 50 per MWh, we are now in the order of US$ 30 or maybe below that figure, with a downward trend with respect to the US$ 40 per MWh in the contracts, which seemed a low price which would stabilize the system. However, now it has turned into a price above the market price, thus slightly increasing the resulting pass through price. Likewise, important investments have been made in generation, particularly on behalf of the private sector, in thermal plants located at the oil well site or in gas deposits, particularly in the South and

Northwest of the country. Currently investments are also being made in thermal plants, either by building new plants or by transforming combined-cycle existing plants, also in the Buenos Aires Metropolitan Area, with much lower foreseeable costs. It must be pointed out that, according to estimates, the price of energy without power could be around US$ 14 per MWh. Finally, it is interesting to note that there has also been a gradual improvement in the quality of the transmission system granted in concession".

En Peru, electricity tariffs increased when they were no longer set administratively and started to reflect market conditions. Luis Alberto Haro Zabaleta recalled that:

"...At the beginning of the 1990s, tariffs were on average under one cent per KWh while nowadays they are, on average, between seven and eight cents per KWh. Since there is a lot more freedom of choice on the market, the price of the industrial sector is in the order of 6 cents per KWh. On the other hand, the domestic sector which mainly consumes during peak hours pays a price in the order of 11 cents per KWh. Here it is worth mentioning that in the Peruvian tariff system the peak hours in the high tension system have a price twice as high as that of the off-peak hours. In terms of cost of power or capacity, the price in the off-peak hours is a third of that in the peak hours because of the greater existing hydraulic generation capacity".

Geoff Swier was pleased with the speed at which changes took place in Victoria, Australia.

"...Reform in Victoria has focused on the twin objectives of maximizing competition and introducing privatization. So far we can say that the reforms have been very successful and have been designed in detail; we have also learnt from other countries and reform was undertaken quickly. To such an extent that we have anticipated similar reforms underway in other States and to be implemented in the national market as from 1996".

APPENDIX - SUMMARY OF REGULATORY AGENCIES AND REGIMES

	PUBLIC AGENCIES	REGULATORY REGIMES
Norway	*NVE (Norwegian Water Resources and Energy Administration) is the electricity regulatory agency. It regulates the network as a natural monopoly and promotes competition in generation and supply. NVE also has the power to trace guidelines for tariffs and cost- recovery.*	*Regulation is carried out by license concession to owners of transmission and distribution networks, electricity suppliers and traders. Transmission tariffs should be set to cover any costs, provide necessary yield on domestic capital and reflect the load on the network.*
Sweden	*NUTEK Electric Market is the regulatory body responsible for efficiently supervising the transmission system with respect to price, conditions and quality of service. It must also supervise the supply concession system and is also supposed to grant net supply concessions through companies*	*In the long run, generation and supply of electricity will be ruled by the market. Howeer, during the first five years there will be a supply concession system which will favour small consumers who may use the opportunity to change supplier and obtain safer electricity and a reasonable price. The network operators are supposed to calculate their prices and tariffs and NUTEK evaluates them. A price-cap system is applied as well as other indicators such as profits on assets and technical performance of the network.*
Colombia	*The Gas and Energy Regulatory Commission is the regulating body. It shall promote competition, set the tolls and tariffs. The Public Utilities Superintendence is responsible for control and surveillance.*	*Generation and trading are ruled by competition while transmission and distribution are regulated through charges called tolls.*
Spain	*The Regulatory Commission of the National Electricity System is the regulatory agency. It is made up of an Administration Council and a Chairman. There is also an Advisory Council which expresses the interest of the parties involved, industrialists, consumers, different autonomies.*	*Phasing in of competition in the integrated system through a) review of standards with price-cap mechanism where "x" is an estimate of expected efficiency gains; b) the use of quality incentives in the remuneration of distribution; c) competitive biddings for new capacity and centralized dispatch. On the other hand, the independent system is based on free contracts and will have differentiated transmission and distribution tariffs.*

United States	*The Federal Energy Regulatory Commission (FERC) acts as a regulator trying to strive for less Government intrusion and ensure it is as effective as possible in the business' decisions. The North American Electric Reliability Council (NERC) ensures continuous vigilance over the reliability of the electric power system.*	*Market not yet de-regulated. It is undergoing a transition period from the heavily regulated approach to a more market-oriented and less regulated approach. The Federal Power Act and the Public Utility Regulatory Policy Act, demand-side management programmes and other government imposed or encouraged initiatives have to be accounted for in this competitive world.*
Great Britain	*The Director-General of the Office of Electricity Regulation (OFFER) regulates the industry, specifies the form of licenses and gives details about how these licenses may be modified.*	*The licenses granted to the companies are the basis of regulation. There is a legal framework that backs these licenses which are legally binding contracts with all the details regarding rights and duties of the parties. Generation is not essentially regulated. The license system applies to the natural monopolies which are the national transmission company and regional electricity companies (RECs). There is a price-cap regulation system for both the grid and distribution companies but there is increasing competition in supply.*
Chile	*The National Energy Commission is the regulatory body which also does all the market indicative planning. The Fuel and Electricity Superintendence is related to the technical part. The National Commission for the Environment must approve the studies on environmental impact. The Anti-Monopoly Commission monitors the electricity market as a whole.*	*Competition in generation is promoted as well as clarity in transmission and the transfer to customers of the efficiency gains obtained by the distribution companies. Price-cap mechanism.*
Argentina	*The National Electricity Regulatory Agency (ENRE) is the control entity. It is responsible for supervision of the fulfillment of the supply regulations which regulate the relationship between the company and the user, the tariff structure, the methodology for transfer of wholesale prices or pass-through, besides the procedure for adjusting the distribution aggregate value during the first ten years.*	*Competition in generation and state regulation in transmission and distribution. Transmission has fixed maximum tariffs and also quality controls. The concession contract is the essential document for regulation. It establishes the duties of the distribution companies in terms of quality of the technical product, of the technical service and of the commercial service. It also sets forth that the distribution company has the obligation of supplying full demand. Price-cap mechanism. There is no compulsory investment for distribution companies but service quality is controlled. Only possibility to*

		obtain benefits is through efficient management. The alternative of reducing quality of the service is penalized with severe fines which then revert to the user through a reduction in the billing of subsequent periods. To achieve the required quality levels and avoid penalties, the distribution companies have to invest and solve the users' problems.
Perú	*The General Electricity Bureau, Ministry of Energy and Mines whose function is to apply the legal framework, to control the quality of the service and safety in electricity supply and to grant concessions and/ or authorizations to participate in the electricity business. The Electricity Tariffs Commission which is made up of the Ministry of Energy and Mines, Ministry of Industries, Ministry of Economy, the private generators and distributors, sets the tariffs for regulated customers.*	*The Law on Electric Power Concessions also establishes certain guarantees for the users. They are recognized a rationing cost. In the case of unwarned failures in distribution which last over four hours, the distribution companies are obliged to make a rationing payment to users. Likewise, the law forces the companies to reimburse their customers with shares, bonds or otherwise, the amount they have paid towards enlargement or expansion of the distribution networks.*
Australia **(State of Victoria)**	*Legislation grants the Office of the Regulator-General powers for regulating the pertinent prices and sets forth the specific mechanism for their setting. This Office also regulates gas, water and ports.*	*The goals of regulation are to promote competition in generation and supply, to ensure the maintenance of an efficient economic system and to protect the interests of consumers. Separation of transmission planning from ownership of transmission. Self-regulation through industry-defined codes. The Regulator-General issues licenses and, provided for in the licenses are industry codes of practice. Transmission and distribution are subject to price regulation. In distribution a price-cap regime is applied to the wider average revenue yield for a period of five years. There is also a "cpi + y" restriction on individual network tariffs.*

First Panel

Regulation Of The Transmission System

In his capacity of moderator of this First Panel, Alberto Devoto invited the participants to debate on the problems related to the remuneration of the transmission service, conditions of access to the transmission network and responsibilities of the State and private companies with respect to the expansion of the system as from the vertical de-integration of the electricity sector. In his opinion:

> *"...Throughout the history of the electricity sector in general, and particularly under the traditional vertically-integrated State operation, the transmission system -for the purpose of its analysis- was somehow submitted to the generation segment. Within this framework, while there was normal concern over the technical characteristics of the transmission system, the same did not happen with the economic conditions of its operation. In fact, in a vertically-integrated system it was not too important to clearly know the structure and level of transmission costs. But after the restructuring and vertical de-integration of the companies, the analysis of transactions between suppliers and customers of the transmission network, this issue takes an important place in the regulation of the electricity sector. The economic implications of all this are remarkable because when a transmission system actually forms a mesh, we may say it is the physical materialization of the market. The wholesale market could not exist if there were no transmission system. Maybe there would be a great amount of isolated markets composed of generators and distributors. It is therefore clear that what supports and makes up the market are the possibilities of interconnection provided by the transmission system. Let me invite you to discuss this specific role of the transmission system, and especially the most adequate way of remunerating and regulating transmission services, as well as issues related to access to the network and to the responsibilities regarding investment for expansion of the system".*

Remuneration and regulation of the transmission systems and conditions of access to the network.

According to Geoff Swier, in Australia they are studying a series of proposals which take into account distances in order to implement a transmission pricing system in the national electricity market.

"...In my country one of the important issues to be taken into consideration when establishing pricing criteria is the impact of the vast distances you need to transport electricity. Just to give you an idea, Melbourne and Sydney are at a distance of 800 km. Currently the grid finishes in Northern New South Wales and there is a gap between Northern New South Wales and Southern Queensland. Within the next two or three years it is proposed that there be an interconnection between Northern New South Wales and Queensland. This would entail a grid running right from South Australia up to Northern Queensland which is a distance of approximately 4.000 km. What is being proposed in Australia now for the national electricity market is to define seven electrical regions. Within each of these regions there will be static loss vectors, so there will be a loss vector calculated for each half hour in the year. It will be done on an ex-ante basis, based on modern studies as to what the loss vectors should be. According to this proposal, there would be one electrical region in South Australia, there would be one that covers most of Victoria; there would be another one which would cover the Northern Victoria area and Southern New South Wales, which is the location of the Snowy Mountains hydroelectric scheme which sits in between Victoria and New South Wales. There would be another region which would cover most of the rest of New South Wales and then there would be three regions in Queensland. So in essence what we would have would be potentially seven separate pools. How will relationships and transactions among the different electrical regions be handled? Between each electrical region, financial instruments would be created which are known as interregional hedging rights. The way this will work is that whenever the links become constrained, there would be a differential open up in the pool price. So let us say that there is a constraint between a region where the price is US$ 0,04 and in another region the marginal price is US$ 0,05. In other words, there is energy trying to go from the low price region to the high price region but there is a physical limit and it is 1.000 MW. Vis-à-vis this physical limit as to how much electricity can flow, the national pooling organization would collect just one cent differential and would pay that across to whoever owns the interregional hedging rights for that particular half hour. So, beforehand, there would be a market-based process and these are the details that I was talking about which are still being developed. Now... what is the process for actually allocating these rights out? Do you vest them or do you sell them? That is perhaps a detail we will not get into right at the moment but we say that the rights are owned by market participants. We want to hold these rights so that they can write contracts with the retailers. There are various retailers in this area with confidence that they can meet the financial obligations, whether or not there is a transmission constraint that is going to occur in that particular half hour. That is the general concept of interregional hedging rights. What is proposed also is that the national market management company, the equivalent of the Victorian Power Exchange in the Victorian model would have an entity called an interregional trader. The interregional trader would have the responsibility for maintaining liquidity in the trading of these financial instruments. So the trader would stand in the market offering both a buy price and a sell price so that the holders of the rights can always easily trade them and are assured of liquidity. In addition to the constraints I have just dealt with, you must always obviously deal with losses. The losses in a system like this are fairly substantial. Just to give you an idea, a transaction between say Melbourne and Sydney has a marginal loss factor of about 20%. For losses to be charged on

a marginal basis, the proposal is to use a quadratic function to over-recover the actual losses, so in this case, the average losses between Melbourne and Sydney are maybe of the order of 10%. In Australia that money is known as "black hole money" and there is an issue as to what you do with that money. There are some who say perhaps it should go back to the grid organization but others say it should be bundled up with this right to the constraints and go back to whoever owns those rights in the market place".

According to Luis Alberto Haro Zabaleta, in Peru where there is a main system and several secondary systems whose interconnection is envisaged for around 1996, the replacement value of the system is borne in mind for transmission remuneration.

"...The main system is the one which allows us to transfer power in both directions. It is not possible to identify in detail those who trade through this system and the benefits obtained by the system may be attributed to all the system's actors. On the other hand, the secondary system is clearly the one which permits either that a generator bring its own production to the market or that a distributor buy off the system. When we talk about the benefits we not only take into consideration the benefits regarding transfer of power; there are also benefits which are evidently electrical benefits in the fact of interconnecting two systems, such as compensating the lack of power in a third system and thus act in a supplementary manner. What criteria are considered for remuneration? Regarding the main transmission system, what is acknowledged in the payment is the total cost which includes investment costs, considered as the replacement value of the economically-adapted transmission system, that is to say, a minimum cost system which fulfills all service conditions. That is, a transmission system which meets tension regulation criteria in the different bars of the main system, with stability and reliability conditions. Therefore, it considers all necessary equipment to provide this service. The total cost includes this replacement value plus a standard operation and maintenance cost. This means that if there are over-dimensioned systems or systems with redundant equipment, they are not considered when evaluating the transmission system. How is the transmission system remunerated? It is paid in two ways: through what we call "toll", which is a fixed payment, and through what we call "tariff income" which is calculated on the basis of the use made of the system. Since there are three different markets, the generation, the transmission and the distribution business, generation prices are based on the load centre of the market and then prices are expanded to the different bars of the system in accordance with marginal losses. This means that, for example, the price in Chimbote is different from the price in Lima in view of the expected average marginal losses for the coming year, with the economically-adapted transmission system. Prices are determined through simulated load flow studies for the following year, which bear in mind the marginal losses which penalize so much the transmission capacity. Once prices have been determined in each bar and, therefore once the total cost of the transmission system has been established... how do we divide the toll from the tariff income? With respect to the toll, using the real system, load flows are again simulated to determine which part corresponds to tariff income according to the expected flows for the following year. Using these expected flows, the tariff income is determined and then the toll, which is the fixed part paid by all generators, is calculated on the basis of the existing difference. In

the main system, the cost of this toll is shared among all generators connected to the system. Here we believe that the fact of connecting to the system enables access to the benefits of being able to sell at any point of the system and, on the other hand, if a generator is not capable of meeting the demand of its customers, another generator will do so through the transmission network. Therefore, he only has to pay the instantaneous costs determined by the System's Economical Operation Committee to the other generator and need not incur in rationing costs. For the secondary transmission system, however, the toll is shared only among those who produce the need for that secondary transmission system. Regarding calculation of the tariff income -nowadays basically excessive- it must be taken into account that we may be injecting power and energy at a certain point which will obviously be different to the power and energy we take out at other points due to losses. Therefore, we have different prices at both points in view of the economically-adapted system. The difference in prices, that is, the price collected at the exit of the line multiplied by the energy or capacity sold at the exit, minus what is injected, is the difference owed to the transmission system. This tariff income, if the real system is overdimensioned or if losses are excessive, may be negative which means that the transmission company which does not worry about improving its system will be penalized since it will not receive enough income to cover costs. On the other hand, the generator who sells at a certain point but generates at another point is also interested because to sell the same amount, it would otherwise have to incur in greater losses. Therefore, the generator is interested in the fact that the transmission company improves and, given the obligation of the transmission company to meet the demands of the market, if there is a requirement to increase transmission capacity, it may request financing from the generator and reimburse it afterwards".

According to Andrés Alonso Rivas:

"...In Chile the contracts between generation and transmission companies are mainly by negotiation and there is a remuneration procedure based on a similar concept to that of the replacement value of the facilities and on tariff income".

For John Henrick Sagen, the starting point of the debate is not to lose sight of the specific nature of the pricing of a natural monopoly. In this situation, the goals of recovering costs and efficiently setting prices for the short-term operations as well as for long-term investments cannot be fulfilled at the same time when you have a natural monopoly.

"...Within these market conditions, the average cost in the system is higher than the marginal cost, so it is not that easy to make a perfect tariff system to meet all these objectives. Therefore, I think, there should also be some work done on what the nature of the natural monopoly is. How far does it go? Although I know very little about the experience with the real costs and the average marginal costs of different types of systems, whether radials or interconnected, I think there is a scope for a lot of work and research to be done in this respect. In Norway, we have set the principle of a two-part tariff: the variable tariff components which are set to reflect marginal losses and the value of marginal losses at spot prices. In addition, there is a capacity component in the bottlenecks which is set according

to the pool prices, somehow similar to what happens in Australia. But then these components do not cover the costs of the system so we have to have a fixed element. We call it a residual component; it is cost-sharing and some kind of a tax element and in our guidelines it is said that, in a deal, this should be neutral regarding both use of the system as well as investment in the system. It is purely to gather the costs of the system. There could be some thinking about this fixed-cost element, whether it should in any way be used to reflect where you want investments and so on.... In our system we say it should not be that way. When you have the cost-recovery restriction on the system you cannot combine that with efficient prices for investments. So you have to consider the expansion, the investments control; you have to do that in another way".

José Luis Antúnez, representative of TRANSENER, the private company in charge of transmission services explained that, since the network expansion is not mandatory for the operator in Argentina, there is no charge to remunerate these activities and neither did remuneration cover the replacement of existing assets at the time of privatization.

"...In fact, the Argentine remuneration system is similar to the one in Norway. There is a charge for transmission capacity which indeed covers the capacity of the network, other charges for each of the connections made which are the exits of the different tension levels, and for each of the transformers connected to the network; and finally, remuneration for transmitted electricity which is the variable component of remuneration and is calculated with an algebraic method similar to that used in Peru. A peculiar characteristic of the Argentine system is that these incomes are globalized and remain stable for a period of five years, modelling the system into the future and projecting the power transmission levels to be able to stabilize the income of the transmission company".

From a conceptual viewpoint, Martín Rodríguez Pardina, member of the Argentine ENRE technical teams, suggested that the diversity of pricing systems put forward reflects the fact that the companies face different obligations.

"...Thus, the tariffs of a company which does not have expansion obligations are different regarding coverage with respect to those which have said obligations. As far as I gather from the presentations, Argentina is the only case in which the transmission company has no obligation with respect to the expansion of the system; its responsibilities are limited to the operation and maintenance of existing installations. Besides this particular feature, it is also important to distinguish the problem of which are the costs of a transmission company operating efficiently from the problem of allotting these costs among the users of the system. It must be noted that, once the system is vertically de-integrated, there appears the problem of who should pay for the use of the lines, both for existing lines as well as for the expansion. In a vertically-integrated company, this question makes no sense because the concept that the generator uses the line to reach the market may, in principle, be reversed and reformulated to read that it is the user who uses the line to obtain power from the generator. In other words, the concept of how transmission network costs are allotted, as a whole among the different agents, is probably one of the problems which cannot be easily solved.

On the other hand, in Argentina and in general, the transmission function is a complex combination of cables but also of purchase of generation due to losses, of re-dispatch of generation due to the existence of restrictions and of reactive power services and of stability, and so on. From the economic point of view, there are many interesting aspects in the transmission system such as economies of scale, very strong externalities; indivisibility of investments. When taking into account all these factors, there appears the possibility of considering alternative approaches for remuneration of the transmission services. In one case they may be treated as an integrated whole in which losses, restrictions and other aspects are borne in mind. In another case, consideration may be given to remunerating the transmission company -either public or private- who is the owner of the cables and makes the cables available, for the use of that fixed asset only".

Charles Stalon of California, United States of America, considered that for establishing transmission remuneration criteria a clear distinction must be made between what is a pragmatic possibility and what is a theoretically sound objective.

"... The theoretically sound objective ought to be, I believe, a two-part theorem where the variable component does try to recognize and charge for the marginal energy losses and therefore, congestion rents would be collected. That creates a problem that was mentioned by Mr. Sagen earlier and that is, it would be hard to reconcile any concept of cost-recovery if you are also collecting congestion rents. But it also opens the opportunity of creating a secondary market and congestion rents and creates the possibility for people to use the congestion rent rights to hedge the fluctuations in transmission costs that many parties do not like to see. That permits me to turn very quickly to what I call the pragmatic side of this. We find that many users and many generators would like to have a known cost of transmission services, that is to say, they would like to be able to sign long-term contracts and have a good feel for what their costs are going to be. Obviously, any system which bases its connection costs on longer marginal cost approximations and which bases its usage costs on congestion rents as well as on actual losses is not going to be able to give them the kind of certainty they want. But if we can create a secondary market for congestion rights so they can hedge those as a financial transaction, perhaps we can satisfy all of the requirements at once. On the other hand, there is obviously a great complexity here. In Australia and the United States of America, with systems that are simply networks of networks, where we will have control areas defined and where there will be interconnections in systems with perhaps half a dozen or more control areas, they are trying to deal with the above. So we will have flows between control areas as well as within control areas and there will be congestion rents within control areas and there will be congestion rents between control areas. These problems have not yet been solved".

For Luis Rodríguez Romero there is a very interesting aspect in the European Economic Community, particularly in Spain, and that is, the differentiation both in conditions of access as well as in the price for use of the transmission network among the different agents.

"...In Spain progress is being made towards the co-existence of an integrated system and an independent system. Within the integrated system there is a set of standard costs whose average price differs with respect to the possibilities of the independent system. One of the possibilities under consideration -in line with what is being analyzed in certain other European countries in relation to the conditions of third party access- is the inclusion in the price for use of the network of an overcharge related to the standard costs of the system. In the case of Spain, this would mean, for example, that whoever is in the independent system and uses the transmission network to compete with the integrated system should bear an overcharge determined by the standard costs of the integrated system. In the European Economic Community, in the proposals of some countries, this would mean that the tariff of a third country when gaining access to the transmission network of a certain country would also bear that overcharge due to the generation conditions of the country which sets it. This is an additional element to be taken into account within the problems related to transmission pricing".

Private sector and State responsibility in network expansion.

According to Martín Rodríguez Pardina, in Argentina there are three different mechanisms for expansion of the transmission network:

"...The simplest is an agreement between the parties in which one or more users of the system request an expansion from the transmission company of their area, either TRANSENER as a national transmission company or the "Distro", regional transmission companies, and bear the capital costs of the same. Once effected, this expansion is then remunerated basically using the same regime of existing installations. The second alternative refers to minor expansions, those which at the moment cost less than US$ 2 million. These may be requested by a beneficiary or by the transmission company itself to ENRE who will also decide who will be responsible for the payment of investments. This figure is a small amount in relation to the size of the Argentine system. The third mechanism is by public bidding. A group of beneficiaries who must prove they represent at least 30% of the benefits of the expansion may request such expansion from the transmission company. The latter, in turn, submits a report to the Regulatory Agency -ENRE- which evaluates the economic feasibility of the expansion in terms of the expected reduction in total costs of the system and then calls for a public hearing. If 30% or more of the beneficiaries identified for such expansion do not agree, it will not be implemented. That is to say, that there is a 30% with a direct right to veto with no need for justification. If they do not do so and there is no opposition which ENRE may consider sound by any other of the interested parties, the expansion is implemented. It is awarded by public tender and during a period of amortization which is set at 15 years -but may vary- all the beneficiaries of the expansion pay a percentage of the resulting bid. The tender is awarded to whoever submits the least flow of fees (cannon) for the construction of the works and their operation and maintenance for 15 years. The important issue is to define who are considered beneficiaries and here is where we come across problems. At this moment, the concept of beneficiary adopted by the

Argentine system is based on the electric use of the lines within the area of influence. Thus, for exporting areas -in the Comahue/Buenos Aires line- the beneficiaries are basically the generators. That is to say, that from the economic viewpoint, this criterion of electric use only bears in mind quantity. We are not taking into account the drop in prices produced by the line, for example, or the greater economic benefits for a generator but instead the benefits in terms of use of electricity. This has brought about a problem in the sense that, although the benefits are measured in terms of electricity, the voting of the actors when they submit a request or veto an expansion, is undoubtedly done on an economic basis. That is the expected rational behaviour of any private agent. Because of this dichotomy between the form of payment allocation and the interest which pushes the companies to implement the expansions, a recently requested work was vetoed. Finally, I would like to put forward another problem regarding remuneration which appears once vertical de-integration is achieved...what is being recovered? what service does it comprise? And when the issue of expansion arises... how well can a system like the Argentine one function when the private sector decides on the expansion, without any future planning or coordination in the medium or long run?"

David Newbery explained that in the system applied in Great Britain, the grid must undertake expansions.

"...The main issue we face is to encourage the generators to locate in the right place. Nowadays, there is an excess supply of power in the North and an excess demand in the South, so the system charges were calculated by working out how much extra costs the system would need to accept an inflow in one location or an exit from another location. These were averaged over the whole zone. Originally, they planned to look at each node within the zone but the idea was to make it reasonably simple and the outcome was a set of entry and exit charges for each zone. Some of these entry charges are negative so the generator is paid to be located in a certain place. Anyhow, the system has various political constraints because down in the very far end of the country, the exit charges would be very high and demand there would be very expensive. The local residents complained to their politicians and the overall system was constrained. I have already explained that we do not charge marginal losses and the effects of that decision are interesting. We calculated that the benefits of charging marginal losses are quite small but the impact on the revenue of different generators is very large indeed. So that some gain substantially and others loose substantially, particularly the Scots. So it would be more efficient to charge marginal losses which would be about 10% between North and South at the peak. That would change the order in which stations were dispatched quite substantially. The overall gain is relatively small and the impossibility of persuading people to accept the change -since the losses of some would be large- meant that we did not do that. At the moment all of the expansion is determined by the National Grid having to meet its safety standards. The location of generation and demand, in turn, creates demands on the system which have to meet standards of security and reliability and, therefore, have to be paid for by the transmission system".

According to Luis Ignacio Betancur Escobar:

> *"...In Colombia, the transmission company gets a remuneration which includes expansion works. Since the Electricity Regulatory Commission also regulates the gas market, charges for electricity transmission have been established in accordance with the charges of the main gas network so that -to the greatest extent possible- the location of the gas-fired thermal plants be indifferent in relation to gas transportation costs or to the main high tension network".*

As Geoff Swier detailed in his initial presentation:

> *"...In Victoria there is a separation of the responsibility for planning between the Victorian Power Exchange which also runs the pool and the security system, and the grid organization which is PowerNet Victoria. Victorian Power Exchange has a statutory responsibility to maintain standards which are set out in its license but can put out grid augmentations to tender so I think it sounds fairly similar to what happens in Argentina".*

In Sweden, according to Bo Lyndörn:

> *"...In principle, we have an open network and with the possibility of third-party access everywhere. Moreover, we do not make any difference between transportation and distribution with the exception of time-limited supply concessions. The Swedish transportation system has three levels: first, the national grid; then the regional networks and finally, the local networks. In principle, all networks have the same roles and all are obliged to have concessions. Anyone can apply for a concession but the National Grid is today at the very top. At the other levels, there are different kinds of ownership: private sector, State and local authorities. But when they got that kind of concession, they also got obligations, and it is their obligation to connect anyone who wants to be connected and to transfer electricity. One of the consequences is that they are also obliged to carry out maintenance and investment, if there is any".*

Luis Alberto Haro Zabaleta pointed out that in the Peruvian experience:

> *"...In the secondary transmission system, the toll is shared only by those who bring about the need for this secondary transmission system. Therefore, any extension of the system, beyond what is rationally necessary, has to be a decision on which is the most appropriate and economical way of meeting this new demand: either by extending the network or by using local supplies. Thus, before deciding on an interconnection, we ensure market consolidation and the necessary elements for any decision-making".*

According to Andrés Alonso Rivas in Chile:

> *"...There is no legal monopoly in the sense that anybody can make expansions to the network. On the other hand, network expansions have mainly followed a work plan -merely indicative- which the National Energy Commission prepares".*

In Spain, according to Luis Rodríguez Romero:

> *"... The transmission company "Red Eléctrica de España" is in charge of expansion by setting standard costs and the Regulatory Commission together with the General Energy Bureau are responsible for the planning decisions of the network expansions".*

Selected questions.

-- John Henrick Sagen posed a question to the Argentine participants and also to other regulators concerning the issue of by-passing the existing network. In Norway everybody can apply for a concession to build a line or a transformer. Thus when a line is built, a radio for use by a single customer, he has to pay most of the expenses by himself. But when parties are applying for building lines, or transformers or connection switches connected to the integrated system, most of the motives for this are to by-pass the existing system and not pay a part of the fixed costs of the system. They are using all kinds of technical reasons for why they should not pay the fixed costs of the system. In principle, I think that the system gives each actor, each generator, each customer a security of supply and access to the common market and they have about the same benefits according a little bit to their willingness to pay. The problem is that there are some distortions in how we are to cover fixed costs. The tax levied on these undertakings makes people want to by-pass the system just to benefit themselves, without reducing the costs to the total system and with a risk of building more expensive lines than an integrated planning could have done. Is this a problem in Argentina or in any other country?

In Argentina, according to Martín Rodríguez Pardina's response:

> *"...Physical by-passes to the existing network are not allowed. In our system, there is a concessionaire of the high tension system -TRANSENER- which covers the whole country, and there are also five regional concessionaires which cover the different areas. On the other hand, for expanding the system it is necessary to have a certificate of public convenience and need issued by ENRE, after it has ensured that the expansion will be efficient from the economic viewpoint, that is to say, that it will reduce the total costs of the system. Thus there is no space for this sort of problem".*

On the other hand, Geoff Swier answered that in Victoria, Australia:

> *"...There are no restrictions on by-pass. The system has not been in place long enough for it to really show problems but we do have three or four major industrial customers who are complaining about the connection charges and are threatening to get engineering studies done, etc. on a by-pass to have connection to the grid sort of closer into the centre. I guess we take the view that there is a sort of Ramsay pricing in action and that there are major industrial customers who can afford to spend the money to threaten to build and by-pass the system. There is going to have to be adjustments to those charges downwards to prevent that the costs be loaded on to customers who have a lower elasticity or lower responsiveness to those prices".*

- In the case of the Australian experience ... who originally issues the interregional hedging right and...how are the proceeds from the original subscription used if it is not granted free of charge?

Geoff Swier gave the following response:

> *"...Essentially there is a debate going on currently about that issue and there are two propositions on the table. One is that the rights really belong to the utilities who are the parties to what was called the interconnection operating agreement. We currently have an agreement between the three interconnected utilities in South Australia, Victoria and New South Wales which governs trade between the three states and it is very likely the traditional U.S. style option of the interchange type arrangement. So there is an argument that says these rights really should go, in the first instance, to the utilities. In the case of Victoria, there is no utility any more -it is gone- but we do have what is called the S.E.C.V. which is a residual company which continues to manage a lot of the existing contracts and obligations that could not be put into the competitive arena. Thus there is an argument which says that initially the rights will go to S.E.C.V., and then there will have to be some sort of price for working out freer allocation of rights. Once the market has settled down and there is some liquidity in the market and some confidence in that pricing, we will just option those rights off in perpetuity and we will envisage which generators may or may not be privatized. Some of them may be privatized, and will want to compete too to purchase those rights so that they can then enter into contracts with retailers in other regions. The other proposition is to say that the national market company should own the rights. The people who propose that are very concerned about regional monopolization. Obviously if you have only one generator in a region who has dormant market power and it owned all of the interconnection hedging rights, then it can potentially manipulate its dispatch to sort of set the pool price. So there are some regulatory issues that we are working through as to whether there might need to be caps placed on the ownership of rights by dominant players in the market place. In the case of the people who propose that the rights be owned by the market company, the excess money would go to reduce the fixed transmission charge component. So we are really at a stage where I guess we, from the Government, say that this is an asset which is actually worth quite a lot and we are certainly not just going to agree to give it away until we know what it is worth. That is probably the stage of the debate and hopefully in the next three or four months we will come to a landing on exactly how this will be done. By the way, it might be worth noting that we have a software simulation model that quite accurately portrays the national market rules and allows people to play games as both generators and retailers. We have got a process of simulation testing going off in the next few months, where a lot of these issues particularly the gaining and monopoly issues are going to be tested. Finally, I think that if you are sort of trying to actually implement a fairly complex sort of arrangement like we are here, I strongly suggest your getting some simulation software written so you can do testing and the fine tuning of the rules before you actually write them down and confirm them".*

- In the case of Argentina... wouldn't a macro planning of the transmission system be convenient to establish electricity corridors and their development stages to integrate, in due time, the large consumption markets to the concentrations of hydro and gas production?

In his response, Alberto Devoto recalled:

> *"...That within the current rules of the game, these are sectoral policy decisions. As has already been explained, the Argentine system has given the market the responsibility for expanding the system".*

On the other hand, José Luis Antúnez, representative of the private company responsible for the network answered:

> *"...That in view of our brief experience of 30 months operating the system, we believe that a certain degree of planning for the future is essential so that there is no lack of coordination in the expansions and thus over-investment".*

- On the basis of the Argentine experience, there is a question on whether the methodology for assigning requirements for entry to the existing lines can also be based only on energy concepts more than on benefits, or whether demand aspects should also be taken into consideration. More generally speaking, the question is ... why should regulations for payment of the expansion be different to those for the existing network?
1
The opinion of Martín Rodríguez Pardina is that:

> *"...The latter point at issue is generally applicable to any payment rules. At the time of privatization , any regulation may be imposed however unfair it may be because all it will do is re-distribute the value of the existing assets which are being privatized. That is to say, a rule may be established by which only hydraulic generators whose names start with a "j" shall pay. At the time of making a decision, there is no productive inefficiency related to the rule and since it refers to existing assets neither are there allocation inefficiencies. Although it is true that privatization gives me a certain margin to implement an arbitrary rule, the problem is that the rule is not supported by a dynamic scheme. Because once new investments are needed, whoever is being unfairly treated -that is, he who pays more, not than what corresponds in a world of equity but than the benefits brought about by that expense- of course will not invest. That is the main rule one expects from market behaviour. But the second part of the question has to do with the possibility of introducing Ramsay pricing in the system. In order to make an efficient calculation of Ramsay pricing in the system, consistent price elasticity data must be available and probably progress should be made towards some sort of two-fold tariff. Strictly speaking, Ramsay pricing would bring about serious elasticity problems for the different actors".*

- In the case of Argentina, beyond the responsibility of the transmission company... isn't it an inadequate signal to the users not to collect off them for the renewal of assets? Isn't it a sort of cross-subsidy?

José Luis Antúnez answered that:

> *"...Regulations in force envisage that the renewal of assets be given the same treatment as an expansion regarding obsolescence of assets. This somehow refers to what Mr. Stalon was saying about pragmatism in formulation. Theoretically this is all very well, but in practice we believe it is not too adequate and would prefer a system in which, within the tariff periods, the replacement of assets which will become obsolete during that period be planned and a programme be designed for their renewal. I do not think it is a cross-subsidy. In fact it defers costs for the future".*

- In the Argentine system...how is the 30% requesting or opposing to the building of a line calculated: by number of users, by effective power or by transmitted energy?

Martín Rodríguez Pardina said that:

> *"...It is basically on the basis of the electric use of the line. That is to say, areas of influence are defined with a set of nodes in which, when power is injected, the flows of energy are affected in the formula but what is taken into account are the electricity flows in the line without any sort of consideration regarding the amount of users. Moreover, measurements are also made with some sort of average between peak, off-peak and the rest, weighted differently, but it is basically a question of electric use of the line".*

- In general, the problem of establishing a tariff system to remunerate the transmission system should contemplate two aspects: how much is paid and to whom. It is understood that the collection mechanism for tariff income helps to partially solve the second problem since it creates a source of income which, in general, is below the required remuneration. Now... how much is paid, which criteria are used and who should finance the collection deficit for variable revenue?

Going straight to the point, Luis Alberto Haro Zabaleta responded that:

> *"...Finally, the user pays. Transmission costs in the Peruvian system are included in the tariff but the problem is who collects it and how it is transferred to the transmission company. With respect to how much is paid, in the Peruvian system, for example, the so-called economically-adapted transmission system takes into consideration the expansion of the network. It takes into account the reference plan and is fixed according to the conditions of service for a period which considers an expansion throughout 15/20 years. The amount is then determined on the basis of real market costs both for investment costs as well as for operation and maintenance costs and that is defined on the basis of standard costs. In the main transmission system, all those connected to the system based on the total maximum demand must pay; therefore, it is a very small percentage with respect to the generation cost itself".*

Luis Ignacio Betancur Escobar answered that:

"...In the case of Colombia, the high tension network is handled exclusively by one state company, but in the previous stage some of the large generating companies owned part of the network. Then, the Regulatory Commission forced the owners of the network, of let's say parts of the network, to hand them over to the exclusive administration of the transmission company.The payment mechanism is like in Peru where the network administrator pays them in proportion to the use of the network. In our case, the tariff is a cost which is clearly reflected in the tariff to the final user".

According to Luis Rodríguez Romero, the answer is very simple in the current Spanish system:

"...How much is paid is simply the standard cost assigned to the company which centralizes, plans and manages transmission, that is, "Red Eléctrica de España". Who pays? That is very simple, it is a cost of the system: all system costs are added up and a tariff is applied. Thus all consumers pay in proportion to their tariffs. In what I normally call the "standard world", there are no problems. Now...what is the price of this procedure which avoids all the complexities of a two-fold tariff, with a fixed part and a variable part, etc? Unfortunately, the complication is that someone sitting at a table decides where, which and what the cost of the expansions should be. What we have mentioned about other systems is that they try to give economic coherence to this second part. And therefore, bring that other world, this simple world which is sometimes complex in its results, closer to the other reality".

Andrés Alonso Rivas answered that in Chile:

"...Payment is effected according to the new replacement value which is a study developed on the basis of a profitability rate of 10% in a 30-year depreciation period and an operation and maintenance cost which is established as a standard cost. Regarding who pays , I would like to be quite pragmatic in the sense that these payments are in the end made by the user, independent of the distribution. If a rate of return is set for a given generator, the generator will enter the system when said rate is fulfilled. Therefore, any deficiency in the service is finally paid by the user. In our case, in general, the generator who wants to gain access to the central market, to the core of the system, is the one who pays".

Second Panel

Regulation Of Distribution

Alex Henney, moderator of this Second Panel, opened the debate on regulation of distribution by making an evaluation of the British experience on price control through the price-cap and of the political feasibility of this approach. From his point of view:

> *"...The British approach to regulation was, in part, a conscious rejection of certain aspects of American regulation. In the early 1980s, American regulation was perceived as being cost-plus and therefore, lacking incentives to improve performance of the regulated companies. Moreover, it was highly litigacious, involving very lengthy and complicated hearings. The alternative to this system was a fairly simple price control which was implemented by Professor S.C. Littlechild, advisor to the Government in the British Telecom privatization. The price-cap-based regulation model was advanced really as a sort of regulator's equivalent of the philosophy stone: it was going to be cheap and simple and act as a surrogate for competition. The regulator was, in ways unspecified, going to set a price control for a period of time. This price control would provide an incentive to the company being regulated to reduce its costs more rapidly than the authorized price increase since it would keep the benefit of those reductions for the period of duration of the price control. Then the regulator, in his or her considerable wisdom, would come along and re-negotiate a reduction in the price control and so the process would go on, simulating a competitive market in the sense that the supra-normal profits would be regulated away. This approach seems to have worked fairly well with British Telecom and with British Gas, and perhaps with the privatization of the water companies, but in the case of electricity it has -in my view- been a complete failure. The failure starts in 1990 when the Government is unable to set sufficiently tight price controls. Over the preceding 20 years, the productivity of the distribution companies had improved about 2.5% per annum. The electricity companies managed to persuade the government that the time of reducing costs was over and that it was necessary to renovate the network. The existing network -which underwent a major expansion after the Second World War- was 30 to 35 years old and the maintenance costs were going up. So the Government set price-cap controls which instead of being a minus "x", were a plus "k", equivalent to 1.3 % on average and this resulted in the companies rapidly washing money. Over a period of four years their profits increased by 150% , their share prices shriveled, they became debt-free, they bought back shares and gave out special*

dividends. Meanwhile, the Regulator sat on his hands talking about how he was going to benefit the customers in the future. It was only in August 1994 that the Regulator proposed to reduce the authorized percentage of price increases of the companies between 11% and 17% as from April 1995. Thereafter and for four years, the "x" of the formula would be 2% per annum. In fact, what these reductions would have done, which the regulator heralded as very tough, would have been to have brought the companies back to where they would have been if the government had set price controls at about minus 2% in the first instance. So what we see happening is that the Government sets price controls going up, the Regulator sets them a step down to where they would have been if they had been set at, I learn, the Australian minus 2%. Following these proposals, the share prices increased by 20% in three weeks. Then in December 1994 -I think it is fair to say- a frail conglomerate with a need for substantial tax allowances and a need for finding shelter from the Chinese -because it was based in Hong Kong- and also for finding ways of offsetting its tax allowances, made a bid for one of the distributors. The distributors were sold for 2.40 pounds a share. This conglomerate bid 10.50 pounds, so in real terms that was a quadrupling of the value of the shares in four years. I am sure you will agree that is not bad for the shareholders; it just was not so good for the customers. The response of the distributor was interesting. It offered to give all its shareholders five pounds back. Now bear in mind, they put out 2.40 pounds four years before, they were now being offered five pounds cash back. Again not bad, plus they would continue to own the shares. On the other hand, the Directors promised that the dividends would increase in real terms by something like 6% per annum. Again that is not bad in an economy growing at 2% per annum. The Director of Regulation then decided he would re-review the price controls and this Summer he tightened the controls yet again. Bear in mind that what he was proposing for 1996 was an "x" of minus 2%. Instead, the Regulator came in with something like minus 10% and then minus 3% thereafter. Still the share prices went up and as we sit here today, seven of the twelve RECs have been bought or have firm offers on the table. Some of those offers are driven by tax mechanics; others are driven by U.S. utilities which appear to have a lot of money and have decided that there are perhaps less exciting places than China to try to find opportunities for investment. So one can stand back and ask oneself: what went wrong and why did it go wrong? In my view, there were some fundamental problems of price-control regulation. It was originally conceived for contraceptives which is a fairly steady low-tech, low capital-intensive business. But when one is trying to regulate distribution companies, particularly those which are mature, where there is a need to re-invest, to replace assets, one has a problem, namely, the need for re-investment is basically a black hole because no one really knows the condition of all the wires and particularly, the underground wires. I think also setting a price control for five years is too long a period because the uncertainty increases over time. So I think the basic problem with price control is that, it may be the sharpest mechanism for improving efficiency, but if then as a caveat -as happened with our RECs- the Government throws money at them, some of them just sit back and they do not improve efficiency. That is not the only part of the equation. Namely, one has to consider both equity vis-à-vis the customers and political acceptability of the mechanism, because the profits of the companies and the consequential effects of the share options of the Directors of these companies is not an insignificant political issue. All this leads me to re-consider criticism

to the American model and their attempts to develop performance-based regulation. I believe that that approach offers a more successful means of achieving an equitable and politically viable approach to regulation than the sort of price control that we have had, which has turned what should be rather boring, low-risk, low-reward undertakings into fine exemplars of what the Germans see as go-go Anglo-American stock market capitalism".

Market operation and regulation performance: present and future.

Charles Stalon emphasized that distribution remains a natural monopoly which must be regulated as such and that the companies of the sector are the instrument to be used by regulators to influence the future of the industry. In his opinion:

"...As we re-structure the electrical utility industry, we are not going to bring the system into being by a matter of consumption. It is going to be brought in by muscle of the distribution companies. They are the instrument by which the regulators will influence the future of the industry and, as a consequence, their role for some time in the future will be that not merely of a wires business but also of a merchant of power. Depending on how we structure the trading relationships in the different trading areas, in the control areas, their future could continue to be very important. For example, the distribution company will probably be required to bid its demands into the pool. As long as buyers are required to bid their demands and they cannot delegate that function to the independent system operator, there is a lot of skill involved in bidding demands and the distribution company will be the carrier of that skill for small users for a very long time going forward. I see nothing on the horizon that will reduce the distribution business in the U.S. electric industry re-structuring to that of a mundane routine affaire for at least a decade down the road. If we are lucky and pull off this transition, we will give customers the option of buying directly and we will create a trading system within the control areas which will minimize the difficulty of buyers to enter into direct transactions. In that case, I can see the distribution company evolving into a wires business and, at that point, becoming a stable "widows and orphans" stock and a fairly unexciting part of the business. I think we are a long way from that. I would not say that trading and the wires business would be separately regulated any time soon. I would say that with 50 states we are going to see a lot of variety on how they are regulated. They -as I said- will be the principle instrument of the state regulators for influencing the electric industry and I would expect that, while there will be a tendency to move towards unbundling in terms of prices and actual unbundling in terms of services for the customers who want to buy directly, there will be a lot of bundled service for quite some time for smaller customers in the electric utilities industry. A lot here again depends on how the society chooses to organize trading in the control areas. If the customer is going to be required to sign fairly long- term contracts with generators that predict his use and the time of his use, we are not going to see many customers departing from their distribution company even if we allow power aggregators to come in and provide some of those services. It will be, I think, a long transition. On the other hand, if we go to a model which allows the individual customer to designate to what I call an independent system operator what

his demands will be, so the customer can buy directly out of a spot market where airs of forecast have no consequence to him, then we might see the distribution company phase into a wires business much faster. Anyhow, the changes presented certain difficulties as is exemplified in the case of gas. It was a little more than ten years ago that the Federal Energy Regulatory Commission started the biggest re-structuring of the U.S. natural gas industry. A re-structuring that allowed customers to buy gas directly from producers or from gas merchants of their choice. Even after all the time which has elapsed, the gas distribution company is not yet just a pipe business and is not going to be a pipe business for quite a few more years to go. This is partly because many customers are vigorously opposing these changes. In California one of the most vigorous proposals in opposition to the re-structuring of the electrical utility industry is a very large consumer group representing residential customers".

John Henrick Sagen started by making a comment as to whether the distribution company will be kept as it is today:

"...I think, there is perhaps some dynamics in this if you are opening up the wholesale market to competition, and you are opening up competition for big customers. Somehow I think the expectations of the other customers for taking part in this competition will be growing and this is putting some pressure on the system. In Norway where -in our way- we have unbundled the industry, where we have supply and distribution operating separately and where supply is competitive with all these 200 very small distribution companies, there has been a pressure from the customers which has brought this through in some way. There are some dynamics which I think will follow so it might not take that long after all to bring about the changes mentioned by Mr. Stalon. On the other hand, our current concern is the regulation of the 200 distribution utilities as wires businesses. There is scope for introducing new rules and regulations in trading because the electricity business is not the same as selling toothpaste. With the wires business, we adopted what we call cost-recovery or costless regulation. It has been and is still a little bit difficult to act on these 200 companies independently. But we have acted on some of them to keep costs low. This period of transition introduced the need to base prices on historical costs. Supposedly the costs of the wires would not be rising by introducing some new mechanisms or new ways of calculating the costs. So we have kept some kind of a whip on the distribution companies. The pressure is from the customers who say we should be whipping them even more, whipping them to efficiency. I think we are a little bit reluctant to do that and shall try to introduce some kind of incentive regulation. It might involve a certain kind of feature so that utilities can choose their contract to their will if they are efficient and we might introduce some kind of profit-sharing so the most efficient get a reward".

Jordi Dolader, Vice-President of the Argentine distribution company EDENOR said we cannot talk about an electricity model and its regulation in a vacuum, without having a reference framework:

"...As from 1992 and as a result of the de-integration and privatization of the sector, there appear the generation market -which is competitive-, the transmission market -mainly in

the hands of a company at national level and a monopoly by definition, although at provincial level there are smaller companies- and distribution -a monopoly in each territorial jurisdiction- which includes the responsibility for the wires business but also for trading. This is the model which was institutionalized in 1992, guided by the recently created wholesale electricity market. Three years later the situation has clearly improved. The companies started operating with very low standard costs, for example, ours in particular had losses which amounted to 30%, acknowledged in the tariffs, and now this figure stands at only 10%. This is related to the signals received by the operator, the owner to incentivate efficiency. For example, the penalties linked to tariffs when certain quality requirements are not met. As a result of the operation of the wholesale electricity market, prices have declined by 25%. Evidently, from a distributor's viewpoint this is good news. If we ask generators maybe they will think differently but I believe that for the distributor who is closer to the customers, this is good news. The tariffs of the average residential customer have declined by 12%, or an accumulated 4% per year, that is approximately half the reduction in the wholesale market prices. Meanwhile, what happened to our distribution costs? As a response to this I wish to mention that losses declined by 14%. It must be noted that we started with the concession by losing a lot of money during the first few months and then managed to achieve a balance in our last budget. I would then say that the signs of this model work. But... for how long? Review cycles have been established every five years, except for the first period which the political power who granted the concession fixed at 10 years, given the initial situation. I believe this too was a good decision. Now, we cannot refer to prices and tariffs without mentioning quality. A tariff level as well as quality standards were defined in the Argentine model. Their non-fulfillment entails penalties which are applied in the way of bonuses on the customers' bills. This is also encouraging because, for example, we managed to bring down by three times the frequency of interruptions and almost halve the average duration of the interruptions. We must recall that the distribution company is obliged to give the customer an integrated product. This means it has to transfer to customers all the quality it gathers upstream. It starts with the quality produced on the wholesale electricity market, that provided by the transmission network and the quality injected by the distribution activity itself and even quality regarding commercial or telephone services to customers. The customer perceives the whole of these qualities and the distributor is the key component of this system. Who are the customers? Are they all alike? No. There are two big markets to be defined, on the one hand, the free market and, on the other hand, the regulated market. The free market -which has been opening gradually- represents approximately 25% of the market. That is to say, that 25% of the energy traded by our big customers is bought directly off the generators. The limit is at present 100 KW, medium tension. If the market would be opened up a little more to 100 KW in low tension, this 25% could go up to 40%. In that case, the distribution company would only be responsible for the supply of 60% of the market but not for trading. The distribution function is permanent and implies continuity of the service and quality in customer attention and in the product. Does it make sense for the distribution company to trade in the free segment? This is a very sensitive issue and we are concerned about the interpretations there can be in this respect. If our starting point is that the distribution company is the natural trader in its area of concession and knows its customers and attends

to them...why can't it be a good advisor with respect to a better use of the energy? Why can't it talk about integral quality? By this I do not mean it has a dominant position and does not compete with other possible suppliers. What I mean is that it should be in equal conditions and have open access so as to somehow offer an alternative".

Claudio Guidi, member of ENRE's technical teams highlighted the relationship between quality of service and tariffs in the Argentine regulation model.

"...In the model we have implemented and have the responsibility of controlling, the companies must fulfill the demanded service quality parameters and the tariffs they charge for their services are linked to their performance quality-wise. As a result of the measurements regarding quality of the service carried out during the first year and a half of operation of the private distribution companies, ENRE applied penalties of around US$ 15 million. Undoubtedly, this had to do with a reduction in non-availabilities and the substantial improvement in service quality. The tariff structure applied to the final user is equal to the wholesale market price multiplied by a factor and distribution cost. This distribution cost will be updated after 10 years, the first time, and thereafter every five years. Prices of the wholesale market will be reviewed every quarter, following the evolution of the spot market price according to future projections. Also included is an updating of distribution costs by a combined US price index. Since the distribution companies awarded a concession by the National Executive Power have taken over -EDENOR, EDESUR and EDELAP- to date, there has been an important decrease in the tariff for users of over 50 KW and, the other tariffs, the general average tariff, for example, has kept more or less steady. On the other hand, the value of the tariff for domestic/residential users -which at the beginning had an already envisaged 30% subsidy- diminished every six months until it reached its normal value. This tariff was linked to service quality measured in terms of total interruption time per transformer and average interruption frequency per transformer. There has been a significant decrease in both parameters, so that the sign sent to the distributors was received and the quality of service provided to the user improved. Another remarkable aspect refers to a reduction in losses acknowledged by the concession contract. Those transferred to the tariffs whose value depends on the tension level, range between approximately 12.8% for low tension to 4% for high tension. With respect to the measurement of service quality, the concession contract envisaged a one-year Preliminary Stage from the date of tenure; then comes Stage 1 in which global controls are effected and penalties are applied to the companies according to the gap in relation to the established global parameters; and Stage 2 which will start on 1 September 1996 and will aim at service quality control at user level. That is to say, that each user will have a sort of "notarial certification" of service quality level and will get a bonus in proportion to the gap between expected and actual quality. It is important to highlight that there is greater demand as the stages progress. In Stage 1 the power which was not supplied was valued at US$ 1 per KW. In Stage 2 it will be worth US$ 2 and US$ 2.70 depending on the type of user. All interruptions on the network will be controlled and indicators per user will be issued. Admissible limits will depend on the characteristics of the user, according to the level of supply. For high tension users, three interruptions per semester will be admitted;

for medium tension users, four and for low tension users, six. The duration of each of the interruptions may vary between 2 and 10 hours depending also on the tension level".

Geoff Swier referred to information asymmetry and the problems it creates for regulators and to the operation of the retail business with regulated open access and full retail competition.

"...We have been looking at the medium and long-term strategic position of the distribution businesses in the context of the privatization process and we have also referred to some of the quite interesting researches that have been done in the United Kingdom, and have been looking at what is actually the retail business. The retail business basically comprises two components: one is a very large information management business and another is the provision of the service in itself. The information component is a technology-intensive business and, in some ways, it has got more in common with banking than any other industry, because it is processing very large volumes of relatively low-value transactions. That leads us to look at the economies of scale and scope that exist in information technology and also to wonder whether the future of the electricity distribution business will be similar to the banking industry, where there are a lot of mergers and consolidations going on because the industry needs the size to be able to invest and to achieve an efficient scale in information technology. An interesting study that I saw out of the U.K. -a study for one of the RECs- said that to really achieve the minimum cost point for the retailing business, you needed at least 20% of the U.K. market. None of the RECs have got anywhere near that level of market share. Applying that sort of logic to Australia, I would say there is probably only room for two or three retailers. Something that has not been mentioned but certainly comes through the U.K. experience, is that the retail business ia a very low margin business. The experience that we have had so far of the de-regulation of the customers down to the one kilowatt level -that is about 400 customers in Victoria- is that the margins that have been achieved by the distribution businesses are about 1%. It is not actually a particularly exciting look of a business from that point of view and I think that the long- term prospect, the combination of the very low margin that is in the business and the economies of scale in which you need to be efficient in the processing of these very low value transactions, will lead them down the track of either staying in the retail business but having to become bigger in order to be able to compete, or getting out of it and just being a wires business. Perhaps another sort of trend that one can see, is thinking about marketing. It was already mentioned how distribution businesses know the customers in the area and that is true. In this respect, I believe that in the United States, the United Kingdom and other places, these retailers will focus on particular customer segments. We might see retailers saying they are only going to stay in business if they can have 80% of all the retail supply to hotels or certain factories or steelworks. They will become very expert at understanding in detail how a particular type of user uses electricity and they will need to be good at that right across maybe not just one country but perhaps many countries. The other issue that I think is very interesting is the question of information asymmetry. I guess we are all very conscious of this because we have been working with the distribution businesses and negotiating with them what their "x" factors are. We have certainly become very aware of all the games that get played by the companies in terms of the way they manage information. I think this

does lead us to try to think of better techniques to bring out more information so that the Regulator can do a better job and try and pick a better balance between the customer and the company. Although I am not aware of all the details, I think it would be interesting to look at some of the examples in the U.S. telecom sector where there are various options which include three combinations of "x" factors and caps on returns, which provide the company a choice, depending on their risk profile and the information that they have. That will reveal more information to the regulator over time particularly when you are regulating a large number of companies and will help them to try and strike a better balance".

David Newbery made a few comments on the criticisms to the British regulation mechanism and the trends of distribution in the future.

"...Regarding uncertainty at the time of privatization, I think the water companies have been in a very similar position in that they have to make large investments in the pipes that are underground and nobody knows what state they are in. As the regulator has the same asymmetric information problems, the solution he has adopted -and I think this is also true in electricity- is one of yardstick pricing. I think where you have 12 RECs, that is a realistic route to take. The merger wave may reflect the over-generous terms of regulation but I suspect that it will deliver considerable productivity improvements, judging from the impact of the first merger, on the employment in Eastern Electric. So there are benefits from that take-over boom. I think the other point to realize is that the price caps have been guided by what the regulator thinks is the reasonable rate of return on the assets. In Britain there is -I think- a belief that the rate of return should be rather high and this belief has been greatly encouraged by the consultants who have been asked to advise the companies in making the case to the Regulator. I think the American take-overs illustrate that those rates of return really are rather high and people are willing to bid the prices up and drive those rates of return down. If we use that stock market information, I think we can improve price caps in the future so that there is plenty of scope for improving that system of regulation without abandoning it for some other as yet untried alternative, although to date the experience of setting price caps has been rather poor in electricity".

According to Luis Alberto Haro Zabaleta, the system applied in Peru, with a few small differences, is very similar to the Argentine system.

"...In our system, what is basically being acknowledged are investment costs plus operation and maintenance standard costs of the distribution network. It is a cost which is added to the generation and transmission costs to reach the final consumer. Tariff regulation effected by the Tariffs Commission established the free election by the user of what we call tariff options according to the different consumption characteristics. This is a signal since, as we have different prices for peak hours, the user may reduce tariffs by changing his power consumption pattern, thus also forcing the distribution company to be more efficient. On the other hand, regarding quality standards, we basically set them through the Regulatory Agency, the General Electricity Bureau, establishing two basic areas: one is quality of supply

in terms of regulating tension, reliability, the payment of rationing costs and quality standards which take into consideration the safety of the installations. Regarding the tariff system, we basically have an acknowledgement of costs which we call standard costs, which ranges between 8 and 10% depending on the distribution concession. Real losses in the system are in the order of 25% and it was established that we have 12 years divided into four-year periods to bring them down to standard losses of 8 to 10%. During the first period, the difference between real losses and standard losses should decrease by 50%. That means that the quicker the distribution company lowers its losses, the greater the profits will be. During the four-year period and also as consumption density increases, the cost per KW for the customer decreases. Competitiveness regarding supply is allowed in the Peruvian system. We have free clients and regulated clients. Free clients are those with a maximum annual demand of over one megawatt. Distribution companies compete with the generation companies to try and capture these free customers. For the rest of the customers, supply is regulated".

For Luis Rodríguez Romero the distribution business in Spain has to be analyzed in the light of the new provisions which regulate the electricity activity.

"...Law 40 for the ordering of the electricity system established, at the end of 1994, a separation of activities between generation, distribution and transmission and set a term in which the companies should proceed to the acceleration of activities so that there shall be a concentration of companies, said concentration understood as those companies which are presently offering such power generation. On the other hand, we will have distribution companies which transmit this supply to the final customer. The provision also envisages that this transmission be carried out by a different company and finally, it considers the appearance of traders, a different activity to that of supply which introduces a form of competition among distributors. However, this provision is still being developed as far as its regulation is concerned and we are initiating different studies on the forms of remuneration of distribution so as to better reflect the singularity of the different markets which the distribution companies deal with. To date, remuneration systems are quite similar to the system presented by the representative of Peru and even of Argentina, in the sense that they reflect fixed costs -including operation and maintenance- although it is true that this acknowledgement of fixed costs for low tension is made according to the variable which explains power supply. The Regulatory Commission intends to add new explanatory alternatives to better represent the phenomenon of distribution, considering the orography or market dispersion, also including incentives which nowadays are not yet efficiently used: I am referring to quality of supply and to another incentive which the regulator intends to introduce, that of demand management. This remuneration will be subsequently reviewed every year on the basis of a price-cap mechanism. The value of "x" and the period of time between reviews is still to be established by the Commission. These issues are still under consideration and in the next few months the Commission will issue instructions on the modifications to be introduced in the regulatory framework for the remuneration of distribution companies".

Bo Lyndörn repeated the peculiarity of the Swedish case:

> *"...In fact, we have not got a special distribution sector. The distributors are the same as the transporters. We have the same rules for the transportation system wherever you are in the different network levels. But I do want to point out the question of quality since in the Swedish system we cannot refer to a reasonable price without taking into account the quality of the technical service. In that sense, besides the basic demand for quality level in general, we will also take into account when we are going to evaluate what will be the reasonable price of the transmission services, what kind of technical quality it will give to the different networks in terms of frequency of disturbance in the delivery systems and, of course, if there is a high degree of interruptions. Besides that kind of evaluation, when we look at tariffs, we also publish different kinds of benchmarks in order to increase awareness regarding those matters and to create transparency within the industry. We think that customers will then either take up a debate with the transmission companies or they will perhaps choose to go to the network authority and complain. Then we have to determine whether it is a reasonable price or not".*

Luis Ignacio Betancur Escobar pointed out that the distributors represent the biggest bottleneck of the electricity sector in Colombia.

> *"...This is so because the companies are still state-owned. Not for legal reasons, because they could be sold or replaced by the free entry system to the distribution and trading businesses. The issue refers to the subsidies which exist nowadays in view of which -on average- residential users are paying only 55% of the cost calculated by the Regulatory Commission, which would be the reference cost for the different markets. Therefore, we face what we could call a political and social challenge which is not an easy task for the government, above all in Bogota and Medellin which represent 40% of the national market. To bridge that difference between cost and what is being paid, it would be necessary to practically double tariffs. We therefore face a medium-term difficulty which brings about three consequences. The first is that it is going to be very difficult to substitute these companies by others because nobody is going to come in from the private sector to a market with tariffs which are nowhere near to what costs are. The second reason is that, although we also have a mechanism of licenses or contracts which exists in several countries, there is certain skepticism as to the fulfillment of contracts signed between state companies. We have already tried this out for 10 years and it did not work because the state company knows that it does not run the risk of disappearing. The third effect is, of course, an effect which promotes inefficiency because these companies do not have enough resources to invest. Finally, losses are similar to those which occurred in Argentina and Peru but one could expect these losses to be reduced should the activity have the incentives inherent to the private sector".*

Andrés Alonso Rivas explained that, in Chile, the distribution company calculates its remuneration to reflect capital costs as well as operation and maintenance costs of a company operating efficiently.

"...What must be stressed is that the same tariff, or aggregate value as we call the remuneration received by the distribution company, is applied to all companies in the country independently of their size. It is also necessary to highlight that tariff setting for distribution companies is done every four years. Next year the National Energy Commission must set the tariffs for distribution companies but between one setting and another, tariffs are reduced by a percentage in order to reflect the efficiency of the distribution company. This tariff structure in Chile has been applied since 1982 and we have proved that the structure in fact incentivates cost reduction because we have experienced a more or less important cost reduction in aggregate distribution values between 1988 and 1992. With respect to the losses of the distribution companies, we could mention the case of the biggest distribution company in the country, Chilectra, which distributes electricity in Santiago, capital city of Chile and whose losses came down from 23% to 9.3% approximately".

Selected questions.

- Most of the criticism to the price-cap mechanism has been directed against the "x" component. Maybe the problem arose from the fact that the base price of distribution did not represent the efficient cost of distribution. How is the base price defined?

According to Alex Henney:

"...Dividing up the value in the industry between distribution, transmission and generation was a very complicated part of a total financial package and it would require quite a long time to explain how it was done. The problem was much less the level at which distribution prices were set as the fact that the government set a very lax "x" component. It set -as I said- not "rpi - x" but "rpi + k". One can, however, say that your question about the base level is definitely true for transmission. The cost of transmission in England and Wales is three times that in Sweden. If you look at the finances of the National Grid Company and you compare them with Svenster Kraftnett, you see that the pre-tax, pre-interest return on capital employed of National Grid Company is 35% and of Svenster Kraftnett, about 11% . The National Grid Company was set up by the Government as a money machine to raise the value of the sale proceeds of the flotation".

- With regulated tariffs and impediments for cross-subsidies...how can the distribution company retain large users who want to enter the free market?

Alex Henney responded that:

"...There is a whole idea regarding the competitive advantage of the distributor vis-à-vis the trader in his capacity of "trader". That is to say, that the distributor in his regulated market to which we may add part of the free market, has a great purchasing power. A generator will thus be more interested in signing an important contract, ensure it for a time, guarantee collection than in atomizing sale to many large and not so large users.

Secondly, the distributor, besides the physical services, may add other services: advisory services in the field of energy, products and application, one policy, one "abono" and one interlocutor, etc. We understand that the distributor, not only to compete but to offer an aggregate service, is an excellent referral point for trading".

Third Panel

Competition And Regulation In The Generation Market

The moderator of the Third Panel, Bernardo Bronstein, opened the debate by referring to the impact of private company activities and the specific role of regulation in generation. He recalled that:

> *"...In 1989, when I had already retired, I was invited by the new Government to collaborate with the Secretariat of Energy in the revamping of generating units which were showing a high degree of non-availability. At that time, there was a 120,000 KW five-unit power plant which was in a deplorable state. I recall we had a loan which covered two thirds of the cost of this revamping, that we were not far from obtaining the remaining third part and that we practically had the necessary technicians and know-how to hire for the project. Anyhow, after a year and a half there was nothing doing. Then came the privatization and in very little time, the private sector which took over the plant made significant improvements. Without great investments, they reversed the situation and the above-mentioned machines started to record quite an acceptable availability coefficient. What happened then, if we had the machines, the money, the technicians, and the technology... Why wasn't this done before? I believe that throughout many decades the State hindered the action of its companies' executives, so although they had the technicians as well as their own financial resources and those coming from loans, they could not purchase elements because there was so much administrative red-tape that when somebody said "I want to buy a joint for such a pipe", there was always a lawyer who said "you cannot buy that until you have done such a thing before". I mention this actual experience to show that the changes which occurred were possible because of the introduction of a new culture in the electricity sector after privatization. I thus would say that, in this segment in which the idleness inherent to the participants' activities leads to providing the service, the task of regulation is to avoid any obstacle from affecting competition. Competition in generation is closely related to transmission which imposes certain limitations on it. It is enough to think of the restrictions which could be forced on a generator which entered the business at a given time, due to a problem not exclusively linked to excess load but to oscillating problems between generators separated by 2,000 km. These limitations may only be palliated and mitigated by new investments and new lines, and issues regarding who should make decisions, who should execute the investments and how they should be financed have been*

mentioned by practically all participants as a problem to be solved. Evidently, we have to carry on working on the issue".

Load dispatch structure, pool and energy remuneration.

As from the Law of December 1994, the Spanish electricity sector is made up of an integrated system and an independent system. According to Alberto Carbajo:

"...Within the integrated system, the units are subjected by the regulator to certain cost-recovery criteria. But the new power stations which wish to be part of the integrated system will have to gain access by competitive bidding and their remuneration will be related to the contents of the bids. This will permit to get to know the reference values of the energy coming from the new plants and all the power of the integrated system will converge in a pool to constitute the integrated value of energy. In this pool, we will find the energy coming from the existing power stations and from the new power stations. This energy will be provided to distributors and, in some cases, may be assigned to the independent system in duly regulated cases. One of the characteristics of the integrated system is that four concepts converge. There is joint planning in the sector which is prepared by the Regulatory Agency and the Ministry of Industry and is then approved by the House of Representatives. There is also a separation between generation, transmission and distribution and this, of course, forces all energy to have the same characteristics with respect to source diversification; that there be comprehensive safety and that there be a physical and economic integration for remunerating the different agents of the system. Likewise, there will be a unified exploitation and a one and only tariff. Unified exploitation entails controlling electricity supply guarantees and exploitation at a minimum cost, provided the energy policy guidelines fixed by Congress are respected. Unified exploitation management is carried out by a state-owned company, it is a public service and aims at jointly using generation and transmission activities in the electricity system in the short and long run. Now...how do we effect dispatch of the thermal and hydro groups? The main principle is to obtain the allocation or programming of generation hour by hour for each thermal group, whoever is the owner, by authorizing a series of models. Due to the structure of generation in Spain where an important part is hydro and another is thermal, and more or less another third is nuclear, it must be pointed out that it is necessary to make projections on different time horizons in order to combine the management of reserves with the expected hydro contributions, bearing in mind the expected value of energy at present with respect to the replacement of such energy in the future. Therefore, there are some hydro-thermal models which optimize the calculation of substituted energy and somehow order dispatch of thermal or hydro stations accordingly. Optimization criteria are the pre-established standard costs and incentives. There are savings incentives because of the existence of these standards. There are also incentives to availability which led us to having one of the highest availabilities in generation. Then, in view of the load curve of the Spanish system and the diversified composition of generation, we need flexibility in our plants and this has made the regulator include incentives in remuneration systems, for example, so that hydro plants

do the pumping; there are also incentives to the minimum thermal level so that when promoting a reduction, load modulation may be improved. Obviously, dispatch is done on the basis of marginal costs and the calculation of marginal costs is done according to the price curve of fuel and the heat marginal consumption curve. This marginal consumption derives from the heat curve of tests previously established by the regulator himself. Technical habilitations of line loads and safety limitations of the exploitation are obviously taken into account. Also taken into consideration for the criteria are start-up and halt costs of the power stations, incremental costs of network losses and all this somehow makes up the hour by hour dispatch of each power station. Moreover, there are also hydro-thermal models which take into account with a projection of a year, then a week and then day by day, the assessment of water substituted or which may be substituted according to the contributions envisaged and the management of the dams. The innovation introduced this year under the new law is that, within the calculation of marginal costs for thermal plants, the companies will be able to offer variable costs. Within these variable costs both fuel as well as operation and maintenance may somehow alter the merit order by varying the positions of each of them vis-à-vis the rest. The objectives of the bids are to create more possibilities of secure supply by rationalizing coal exploitations which at present are providing a great deal of the fuel. It is expected that there will be a more rational adjustment, with greater freedom of exploitation and, therefore, a supply cost without producing an economic breakdown in the electricity or mining companies. There will be two supply bid terms according to the type of fuel. In the case of solid fuel, three times a year once a more or less fixed projection of demand is known as well as the prohibition of hydrolicity, and the availability of the power stations. On the other hand, in the liquid and gas-fired power stations, it will be done on a weekly basis depending on exploitation conditions. The general conditions of supply shall respond to the principles of law. They shall be objective, transparent and non-discriminatory and the offer will be made jointly for all companies. This does not mean that the offers will be for all of the possible production. They may be presented by production segments at different prices and the fuel of the selected bid must be made available to the manager of the unified exploitation one month in advance to its use. The criteria will bear in mind that, in view of the assessment of the sulphur contents of some national coals, the cheapest bids will not participate because they entail larger contents of sulphur and because by the economic optimization of the exploitation there would be a negative externality due to the environmental impact produced by the combustion of these offers. On the other hand, the stocks of the power stations will be taken into consideration as well as the possibilities of a greater allocation of officials. Operation and maintenance costs will also be taken into account. Another of the competitive elements which operate in the Spanish system is the structure of cost acknowledgement. It is based on standard costs but, regarding generation, investment in the power station is considered. The system is exploited through variable cost optimization, taking into account energy policy criteria dictated by the National Energy Plan, approved by the House of Representatives. The Plan envisages the management of water resources under technical-economic efficiency principles and with adequate hydro-thermal coordination for coverage of the system. It also establishes that the nuclear power plants shall operate according to their availability and that they will be compatible with the review and reload programmes envisaged. It also includes the

use of solid fuels in a hiperannual regime, taking into account the financial cost of the existing coal stocks. In some power plants, due to the sulphur contents of coal, it is necessary to mix it with imported coal to avoid environmental impacts. Dispatch will be in increasing order by marginal costs and here is where the element on free offers of fossil fuels has been introduced. The price of fuel will take into consideration standard values of specific consumption, variable operation and maintenance costs and the economic minimization of transmission losses. International exchanges will take place in an entourage of respect for contractual conditions and for the terms of the "bien plair" offers since they will be carried out including variable costs in decision-making with respect to the importation or not of these energies. These are basically the key factors of regulation in generation where an attempt is being made to introduce competition on the basis of an independent system and of the participation of new capacities".

Colombia has a 10,000 MW power system and generation of approximately 36,000 GWh. Hydro stands at around 80% and, according to what Luis Ignacio Betancur Escobar explained, this makes the system most vulnerable to drought.

"...Particularly because our hydro stations do not have enough reservoir capacity to counter-attack the unpredictable climate. Therefore, the wholesale market which started to operate a year and a half ago, through contracts between generators and trading companies and distributors and between generators and large users which represent 15% of total demand, has been supplemented by the pool mechanism which started operating four months ago. Dispatch is by economic order/merit and to date there is no capacity charge. The Commission is studying whether to implement this or not. There are, of course, advantages but also disadvantages because dispatch is by merit order in relation to variable costs. The interested parties of thermal plants, particularly in certain areas of the country, have argued -in our understanding without any reason- that the way in which costs are organized for merit order and for having priority in dispatch is biased against the thermal plants which nowadays are mainly gas-fired. Anyhow, the idea is to have a system in which dispatch -despite the fact that contracts are being signed for a term of two or more years- will not bear in mind the contracts for dispatch as such but instead the merit rules according to costs. Eventually, there could exist a high risk of rationing in a hydro system. There is also a decision pending as to whether the cost mechanism will be allocated so that in the case of rationing, the users who assess their energy can freely pay the price of energy at a rationing cost; and thus modify the mechanism used before in the two severe rationings we suffered in the last 12 years. The idea would be to allocate and not to rationalize the whole industry like in the previous centralized system without the opportunity, or better say the need, to pay an overcharge and, on the other hand, without giving the opportunity or incentive of separating circuits for it only being rationalized in those which are essential to its inherent productive activity. What we would like to achieve -but have not reached an agreement within the Commission- is that, in the case of rationing, those who assess their energy, those who do not want to be disconnected, pay a cost not to ever be disconnected but this price could be three times, five or even ten times more than current costs".

Norway is 99% hydro. That means that nowadays, as well as in the past, the system is planned in such a way that it sometimes enters a stage of rationing. According to John Henrick Sagen, one of the big debates before regulation was related to the connection between the pool and dispatch.

> *"...Who would be responsible for this? Should anyone be predominant? The electricity business understands that dispatching should be predominant and that the pool should be at the service of dispatching. But I think there is a very important connection and there is a symbiosis between dispatching and the pool, despite the fact that they operate separately. The aim is to make dispatch operate and, at the same time, develop the pool as an instrument based on commercial, economic and competitive demands of the system. We were afraid that too close a connection in daily operation between the pool and the dispatch responsibility could put too much emphasis on the more technical sides of dispatching and limit the development of the commercial side of the pool. But the pool was set up so there was some kind of a commitment and as a subsidiary of the national grid company which also had the responsibility for the dispatch. The subsequent development is that the pool personnel which was in the network moved across. At present, it is still a subsidiary but it has got its own staff operating independently, and we see that this change in staff contributed greatly to the development of the commercial side of the pool. But the dispatch system is the responsibility of the grid company and we have given regulations for system control and safety. Among them, those which establish the system's regulated uses, the day-ahead market and the regulated pool market as an instrument for dispatching. In fact, it means that most of the dispatching is done by this market but it is still the responsibility of the grid company to see that the safety system is taken care of. Therefore, we are trying to take care of this symbiosis between the pool and the system's safety and the ultimate responsibility for the dispatching of the system and independent development of the pool. To date I think this has been working".*

The Public Utilities Regulatory Commission of the state of California is currently working on the restructuring of the electricity industry. Although under some constraint due to the situation, its President, Daniel Fessler, outlined the general guidelines of the new system and the broad parameters of the debate.

> *"...What we would be trying to do with generation is to expose it to a transparent competitive market. The generation within the service by an independent system operator who would utilize the transmission assets in my state and, hopefully, beyond, if we can get a voluntary association from transmission facilities in other Western states, in a manner that is indifferent to the ownership of those assets and has but the singular responsibility of attempting to facilitate the movement of that electricity from the points of production to the points of consumption in the State of California. The reason we are interested in reform in California is that the rates for electricity in my state are approximately 50% above the national average. Given the downsizing of the economy with the curtailment of the military industrial complex, any factor that contributes to a lack of competitiveness is one meriting critical public attention. On the other hand, California is part of a high transmission*

infrastructure that is regional in character and transnational in nature. California, with its 34 million people, is the largest single consumer of electricity in a region that encompasses 11 states in Western United States, two Canadian Provinces and two - soon to be three - Mexican states. Those states and provinces all possess generating equipment and are all part of a market which should bring a systemic pressure on the electric rates we have in our state. The reform that we are seeking, therefore begins with dismantling the vertically-integrated utilities which today combine generation, transmission and distribution. We do so, in the first instance, by removing the physical dominion of all of California utilities, whether they are investor-owned or publicly-owned, over their transmission assets and placing them under the dominion of a single independent system operator. Having put the transmission system in the hands of one state-wide entity, our goal would be to have that one independent system operator perform the transmission function and also a dispatch function for -as in all other cases presented in this Seminar- California is contemplating disciplining a competitive market for generation, utilizing a pool. The singular factor that we are seeking to accomplish is to produce merit order. Merit for us essentially means price merit order dispatch of generating units. It is important to recall that the reform proposes to open to bidding this pool of units in the state of California by generating units anywhere within the region of North America, which includes the two Canadian provinces and the two Mexican states. That will be true, even though there may not be reciprocity for California owners of generation to have similar access to bid their systems to serve loads in other states or in Canadian or Mexican jurisdictions. If we are successful, the independent system operator will have a very similar profile to the one described in the case of Norway. Most of the time, in the absence of congestion on the transmission network, we see no necessary conflict between allowing the pool operator to select, on an hourly basis, the generating units that would be dispatched and then having those generating units dispatched against a transmission capacity that is adequate. In areas in which there is conflict or constraint on the system, it will be necessary to concede to the transmission operator the final dominion over dispatch questions. As we look at the balance of the monopoly which has the distribution function, we see it continues to exhibit the qualities of local monopolies and therefore, initially we will have our utilities, whether public or private, buying their needs for electricity out of the pool. Among the mechanisms that we are attempting to devise to provide customer choice, that we call virtual direct access, essentially there is a real time pricing option to allow customers to take advantage of load shifting to begin to take some control over their own individual electricity bills. We leave the beneficial ownership in the transmission assets where they are now because, unlike many of you who commence the process of re-regulation from the perspective of state-owned assets, we do not have the luxury of possessing ownership of the assets that we are seeking to fundamentally change in the manner in which they are used and so we must work with the concepts of private ownership that are in place".

Gustavo Devoto, a staff member of the Argentine National Electricity Regulatory Agency (ENRE) asserted that the system's success depends to a great extent on remuneration regulations which will allow investments already made to show a reasonable profitability and, above all, that will attract new investments to the sector so as to meet long-term demand.

"...I would say that the latter objective is the greatest challenge since, on the one hand, there is the obligation of meeting long-term demands and, on the other hand, there is the fact that meeting this demand be achieved at a reasonable price. In the Argentine wholesale market, remunerations established for power tend to supplement energy remuneration which follows a marginalist criterion aimed almost exclusively at the short term. We then have a remuneration of available power, a remuneration of basic reserve power for turbo vapour-fired and nuclear power stations and a cold reserve remuneration for gas-fired or combined-cycle turbo power stations. There is also a remuneration for overcharge to cover failure risks and there are also remunerations for power associated services, such as, start-up/operation and halt costs. All these concepts tend to obtain an appropriate remuneration for generators. In the light of what has happened from 1993 henceforth, if we bear in mind the new investments, particularly in the Comahue region, with turbo gas installed at the oil well site, the turbo gas power stations which are also being installed near El Bracho in Northwest Argentina, and more recently, the investments in the metropolitan region, the proposed remuneration rules have so far been successful. It is important to recall that the years 1993, 1994 and 1995 in Argentina have been years with high hydro levels and, in a system like the Argentine one, where the share of hydro generation is practically 50%, this has been an important promoter of price reduction. Moreover, at least until the end of the century, an increase in this share of hydroelectricity generation is expected due to the entry of groups from the Yacyreta power station. In relation to the issue of hydroelectricity and to a query posed by Professor Newbery with respect to remuneration rules and the concern about future investments in the hydroelectricity sector, I believe that hydro power stations vis-à-vis the alternative thermal power stations have a greater threshold for investment and a long period of return. Consequently, in the current fuel price panorama in Argentina, particularly regarding gas, it is normal for these projects not to show attractive profitability indicators. Nobody ignores that the hydroelectric power stations are of a greater technological complexity. Each job is a prototype, which places it in a disadvantageous position with respect to the modern turbo-gas power stations which are practically built in series, thus reducing costs. It is possible to imagine that if things go on like this, we will soon be able to order a turbine by catalogue and they will send it to us by mail. In this sense, I think that the prospects of hydroelectric power in Argentina, at least in the medium term, are quite somber unless there is an unexpected temporary increase in fuel prices due to an armed conflict. However, the hydro power stations could have the chance of reappearing due to growing restrictions on keeping a certain environmental quality. Neither do I think this is something to be really borne in mind because the new turbo-gas power stations have improved not only the output but also gas-emission control. On the other hand, one must not forget that the hydro power stations have to currently face other environmental impact problems such as the flooding of fertile valleys and alluvial land which are also a scarce resource".

"Central Térmica Tucuman" is an on-going private project in Northwest Argentina that is not yet operational. Melchor Roselló, its representative, showed certain pessimism regarding investments in the system.

"...As you know, the new regulatory framework brought about a fundamental change in the situation of the Argentine electricity sector in only three years. The opening of the market allowed the development of a very dynamic electricity generation market where over 30 companies compete. Most of them with shareholders and operators who are, in turn, important international generation companies from the United States of America, Europe and Latin America. The network's remuneration is based on the establishment of a price for energy which is the short-term marginal cost, determined on an hourly basis and applied to transactions on the spot market. Generators also receive remuneration for available power during off-peak hours on working days. Now, 40% of the dispatched energy is sold to the spot market. The remaining 60% is traded in term/forward contracts of which half are long-term contracts -eight years-; they are the contracts which were imposed as tender specification conditions for the privatization of some of the generation and distribution companies. Most of the remaining contracts -one or two-year contracts- are negotiated according to the spot market trends. Therefore, 70% of the Argentine electricity market transactions are carried out with a direct or indirect relationship to the spot market. Only 30% are long-term contracts. The monomic monthly average prices -that is to say, energy plus power- has ranged between 27 and 32 mils per KWh and the projections for the next three years show a remarkable downward trend. For the system's expansion, taking into consideration installation costs of state-of-the-art technological equipment, combined-cycle plants using gas as fuel and a rate of return of 12% and other conservative hypothesis for taxes and financing, operation and maintenance costs, and also bearing in mind the possibilities of management optimization, the floor expansion cost at present in Argentina is 18 to 20 mils per KWh. That is to say, if we add to this the cost of fuel, the equivalent cost is between 30 and 32 mils per KWh. The long-term monomic price should not be below this value in order to ensure the system's expansion. It must be pointed out that these expansion costs are in the same order, or maybe a little lower, to those in force at present in the United States, Europe and Japan, despite the fact that projects in these countries may be financed with around 10% annual rates. If we analyze the current situation, it may be noted that the present remuneration of the generators of 27 mil, 28 mils, 30 mils is not profitable since 32 mils would be the appropriate figure. There are several reasons which explain this lag. In fact, the spot market price declined quicker than expected and there was no time, nor was there the possibility of creating a long-term market to compensate this decline in the spot market which will be critical in the next three years, due to the impact brought about by the inclusion of Yacyreta and other equipment. On the other hand, the timely fulfillment of the Yacyreta schedule and the incorporation of new generation units have produced temporary excess offer. Likewise, the spot market which evolved from an initial situation of tight regulation to the current situation -I am referring to the gas market- which is much more marginal, has made gas distributors reduce the prices offered to the generation stations to meet demand throughout the whole year, thus clearing the "take or pay" transmission costs. On the other hand, the owners of conventional vapor-fired generation units have started to substitute them by big combined cycles, using 230-MW turbines due to their lower investment, fuel, operation and maintenance costs. This process may continue and bring about over-equipping since no investor wants to lose his current position in the market. What can be done? In fact, there do not seem to be

international experiences directly applicable to the Argentine case and the situation should be jointly analyzed by all those responsible for the different sectors: transmission companies, distribution companies, users' representatives and the Secretariat of Energy so as to find a methodology to foster the formalization of long-term contracts. The market could thus be stabilized at reasonable prices for all parties. Only if the stabilization results are not achieved in this way, should more extreme methods be applied such as an increase in the price of available power or even a temporary restriction to the access of new entries in the system. Neither of the alternatives are desirable since they would distort the model and their application would only be justified if solutions cannot be sought through natural market means".

For almost 12 years Chile has been applying a competitive theory in generation and, although it was one of the first countries to re-structure and to apply marginal costs for the remuneration of the generation sector, Andrés Alonso Rivas considered that the Chilean regulation still has challenges to face, particularly regarding greater competition.

"...With respect to dispatch, the economical dispatch centre is composed of a club of generators which are not many in comparison to the amount of generators in Argentina. While Argentina has close on 36 generators, at present, in Chile, there are four generators who participate in the pool, where only one company has over 50% of generation. This is undoubtedly an important deficiency although the problems related to lack of competition have so far been solved. There are some interesting alternatives. Instead of having only one economical load dispatch to fulfill both coordination of operation as well as trading functions within the generation sector, Argentina has found an interesting solution through CAMMESA which centralizes this operation, independent of the generators of the sector. The Norwegian and British alternatives are also interesting because the generators, instead of strictly calculating the marginal cost of the system, have gone a step further and have created a sort of pool where they offer energy blocs and the energy spot price is obtained from said pool".

Selected questions.

- In the case of the reform in the state of California...will the independent generator have the possibility of supplying an individual customer?

Daniel Fessler answered:

"...The answer to the question is emphatically yes. One of the features of the rule-making - I would drop a small footnote to the answer: there is no new legislation in California since the reforms I am speaking of are being carried out within the authority of the California Public Utilities Commission- is that it is comparable to legislation and has a definite role for bilateral contracts. Those bilateral contracts could turn on specific generators and the issue is then how they would be dispatched by the independent system operator. There are

several ways that this might be done. To date, the most widely supported in the rule-making is that on a day-ahead basis. Those customers who were going to supply their need for electricity in reliance upon bilateral contracts would inform the independent system operator of that fact. Their load projection would be debited from the load that the pool would have to supply and, by the same token, they would be stacked on the bottom as if they had bid zero into the pool. Any cost that they incurred upon the system in terms of transmission access is really where the crucial question arises, and we see that it is necessary for pool-based dispatch nominations to be treated identically by the independent system operator. That is where the real money is. If you treat the nominations of one in preference to the other, then you have doomed the experiment between a pool and bilateral contracts. So the pool would be furnishing transmission information directly to the independent system operator. The question is how we could get comparable information into the hands of the independent system operator so that it could make those decisions on a rational basis, in rationing the scarce transmission access, without violating the confidences of bilateral contracts. I believe that incremental and decremental bidding by the bilateral contract participants, as to what they would be willing to tolerate in terms to get their dispatch put on the system, is the appropriate way to do that. What California will seek to do is to, no later than 1 January 1998, bring both of these market models into existence simultaneously".

- The other part of the question was related to the legal right to supply a large customer which was in the past supplied by a public utility. Does this legal right exist or will it exist?

According to Daniel Fessler:

"...The rule-making contemplates that we will phase in the eligibility for existing utility rate-payers to become customers in this bilateral market. Therefore, as has been done in the United Kingdom and in many other countries represented here, starting with some of the largest users, we would phase this in over time".

- Which will be the economic criteria to regulate distribution: cost plus, standard costs, long run marginal costs...?

Daniel Fessler said:

"... Very briefly, Mr. Secretary. That is one of the most interesting aspects of having Commissioner Bailey and myself here. The distribution matter will be determined by the California Public Utilities Commission and we intend to use performance-based rate-making to regulate the activities of the distribution entities. Transmission will be under the authority of the Federal Energy Regulatory Commission and the transmission protocols, which are so critical to the long-term integrity of the market that I have just described to you, will be the responsibility of Commissioner Bailey and her colleagues".

- The different systems adopted in the various countries have chosen one of the following pool structures: with the participation of distributors and large users or only generators. How does it work in California?

According to Daniel Fessler:

> *"...Initially the pool will be run with the utilities acting as the purchasers so there will not be an ability for large users to buy directly out of the pool. I might tell you that if the pool achieves an absolutely transparent clearing price, it will not be easy to be convinced as to what advantage there will be to buying directly from the pool as opposed to receiving - broken down on your utility statement- exactly what the cost of the electricity was and their passing that through to you. In time, whether the pool would become enlarged or would mature to permit non-utility buyers is something that we have not foreclosed but I hope that that will be an economically rational and not emotional decision".*

- How was the transfer of transmission assets carried out in the state of California: by law, by regulation...?

Daniel Fessler answered that:

> *"...Remarkably, thus far, it would appear that dominion over the transmission assets will be voluntarily surrendered by all of the owners in the state of California so that it would be done by treaty".*

- Has this been paid for and what reactions has it brought about?

According to Daniel Fessler:

> *"...At present, the theory is that the underlined owners of the transmission assets will receive aliquot distributions from the transmission operator which will be, of course, run as a regulated monopoly under the jurisdiction of the Federal Energy Regulatory Commission; so that will be on the predicate of the aliquot share that they have in the total system and that they will share in the revenue stream. That revenue stream will be a regulated revenue stream much as it is now. The advantage to all of the participants is their belief that, as a result of this, having one independent system operator replacing 17 separate vulcanized operating systems, will bring about far greater efficiency within the state in the operation of those transmission assets and that is our goal".*

- Melchor Roselló, you mentioned a situation of excess offer and of under-remuneration in generation. How then can you explain that your company is installing new generation capacity?

> *"...A good response could be "because we are crazy". But, in fact, the situation I tried to describe is the current situation and, as I mentioned before, I think it will get worse in the next three years. An investment, such as a power station, is a long-term investment, say with a projection of 20 years. Personally, I believe that the generators are still on time if we can create a coherent forward market, where all parties take risks and also assume the costs of the activity. I think in that way and without modifying the regulation -which, on the other hand, has shown excellent results- a very competitive system with low prices can be*

maintained, and at the same time, meet reasonable expectations. When I described the cost of expansion I talked about a 12% rate of return which I think is a really austere income-yield capacity".

- From the point of view of the Chilean structure, the Argentine alternative in which generators can bid prices to the pool seems very interesting. In fact, the mechanism is that bids are made on the price of fuel, and the income-yield capacity is previously established. But the bid for fuel prices has restrictions. Thus the question is... in a competitive market of 36 generators, why are there restrictions on the bid of fuel prices?

Melchor Roselló considered that:

"...The restrictions in fact refer to the non-acknowledgement of prices above the accepted value. There are no restrictions as to lower prices, that is to say, that from the competitive point of view, lower prices can be offered to those periodically established as reference prices".

- There is an uncertainty floating in the air regarding the future of hydroelectric projects in Argentina, despite the fact that the rules of the market exist and everyone knows what to abide by. Since in Chile there is indicative planning...does this do away with that uncertainty?

Andrés Alonso Rivas responded that:

"... To date, the National Energy Commission has been doing indicative planning in generation. But...why? What happens is that the National Energy Commission must legally calculate the regulated prices at which generators are to sell to distributors or to regulated customers, which is a weighted average of short-term marginal costs. To calculate these marginal costs, it is necessary to have a planning mechanism in the generation sector".

- How many years in advance?

Andrés Alonso Rivas:

"...Studies are carried out with a projection of more or less 15 years. But lately it has been mentioned that perhaps it is not necessary to do this indicative planning. Maybe it is better to leave development of the sector up to the free market. To this effect, it would be necessary to make some adjustments to electricity legislation. Regarding the hydroelectric projects, they have been effectively materializing in Chile, including projects which are not within the indicative planning prepared by the Commission. Therefore, we think it is feasible to continue developing such projects without any need for indicative planning. There are several on-going hydroelectric projects in Chile which are now sort of deferred due to the natural gas which comes from Argentina; it is a sort of competitive form of supplying future consumption. The biggest doubt as to whether to continue building these projects or not refers to the environment due to recent environmental standards which regulate the sector".

Main Regulatory Problems and Proposed Solutions

While at present there are converging efforts to promote competition -in Chile, aimed at improving what has already been done, and in Spain and Sweden as a core part of their recent reforms-, the need to improve the signals for investment arising together with a consistent regulation has been emphasized from the Argentine viewpoint; and the Californian experience has given a sort of warning regarding some restrictions posed by the market forces' dynamics. The problems arising from remuneration and the responsibilities for the expansion of the transmission network were also mentioned by the Argentine and Peruvian delegates. Despite the fact of having different neighbours and needs, Chile, California, Spain, Sweden and Norway set forth the need and convenience of market interconnection at the regional level. To take advantage of the increasing trend towards globalization by using "benchmarking" to unify measurement and price-setting procedures, on the one hand, and to share information on "world's best practices" on the other, was the proposal of the Australian state of Victoria which was also supported by Sweden, Norway, Spain and California. Finally, and as expected, every one of the contributions revealed the existence of specific difficulties and obstacles inherent to each of the different situations, but also the alternatives under consideration to solve them.

The promotion of competition and restrictions to its scope.

In Chile, where there are only four generation companies and just one of them has more than 50% of the market share, the authorities are considering different alternatives to further encourage competition. According to Andrés Alonso Rivas:

> *"...Although the problems of lack of competition have so far been solved, we are still looking for the incorporation of new participants. Mainly, we have carried out an information campaign in other countries. On the other hand, we will try to give existing generators access to the privatized companies in an effort to improve competition. We are also studying the possibility of an interconnection with the neighbouring countries, also regarding fuel, like for example gas from the South of Argentina and/or the North of*

Argentina, and from the South of Bolivia. Finally, we are encouraging the entry of traders to the economical dispatch centres because we believe that competition is increased by the fact that generation is separated from marketing. This also simplifies the access of big customers and the traders operate at another risk rate. If it is possible to do this, the limit of 2 MW for big customers could be reduced."

While for Chile the promotion of competition would be convenient, for Spain it is the core part of the recently initiated reforms. As Luis Rodriguez Romero explained:

"...The Spanish experience is characterized by an attempt to gradually change a not very competitive present situation where there is an integrated system into a co-existence of the integrated and independent systems, thus phasing in competition. On the one hand, competition would be introduced in the integrated system, and on the other hand, the independent system would be developed. Gradually, the time will come when both systems will merge into a one and only fully competitive system. It is easy to say this here in front of a microphone and in one minute. But it will be difficult to implement, it will take a long time and it will certainly include some changes regarding what we are proposing right now.With respect to the integrated system, competition will be promoted through "competitive biddings" in the pool, the introduction of traders and the use of revision methods with a price cap for direct access to what would be the wholesale market for big consumers. The question here is the development of the independent system, who is going to be a part of this system? how will it evolve? how will it interrelate with the integrated one? In our opinion, transmission and distribution pricing is essential as well as the possible use of the independent system to finance part of the standard costs that exist at present in the integrated system. The final result would be a generalized competitive situation which, in the case of the Spanish economy, as well as in the case of other European economies, must be in agreement with the results at present envisaged by the prospective European legislation about the freedom of the market in the electricity sector. When comparing our strategy with others that have been presented here, I would like to point out that we started off with a system based on private companies which have an implicit contract regarding remuneration of the invested capitals. In other experiences that we have witnessed, at the time of privatization, the companies are positioned in a competitive situation, i.e. the possible costs of capitals derived from the existence of previous "standard costs" are assumed. Since the Spanish system is a private one, this is not possible and therefore this process should be developed as we go along".

The promotion of competition is also the axis of the reforms initiated in Sweden at the beginning of 1996. According to Bo Lyndörn:

"...The purpose of reform and de-regulation is to improve efficiency in the electricity market and, of course, to the benefit of the consumer. It means that what we have chosen in Sweden is to create competition with respect to production and supply of energy. But regarding this part of the electricity industry and market, there are no special rules. It will just rely on the General Competition Act. To get the opportunity to create that kind of competition, there

must be clear rules between the competition field and the monopolic side. The issue is that there is no opportunity to create efficient competition within the network system. There is just some kind of division between electricity supply and production, on the one hand, and on the other hand, there is the question of transmission. Neither is there any difference in the legal status between the national grid and the regional or local networks. It is just a kind of open network and when you are connected in some point to that kind of network you have an open access to all suppliers all over the country and also, in the long run, to the Common Nordic Market. We have, of course, some special questions and problems in Sweden. For example, this kind of legislation demands that competition activities, production and supply of electricity take place in separate legal units, quite separate from the transmission services. And of course, the time between the formal decision and the point when de-regulation will take place is just about too short but I think the Swedish companies will handle it. One very important aspect in this context is whether we will get correct values of the assets in the initial balance sheets. It is a very critical point. So of course we have to scrutinize that question".

Although, in principle, the forces of competition tend to induce an adequate behaviour of the parties, Martin Rodriguez Pardina -from a longer term perspective and regarding the appropriate economic signals for investment- pointed out that:

"...The relationship of the generation sector with the users through the energy-related contracts constitute an important aspect of the regulation system. Basically, the role of the "spot" markets is not to achieve productive efficiency, but to improve the allocation of resources in the long term. The electricity systems have used centralized dispatches with interchanges at marginal costs for decades. The target of this was to achieve short-term productive efficiency. However, the experience as regards the investment decisions of the companies -whether private or public- under a regulation system, has not been quite adequate. We expect that as a result of the introduction of market rules, more efficient long-term investment signals be achieved. Following these lines, the rules that are imposed for the design and implementation of contracts in the option market, will be of primary importance for an efficient industry development in the medium run".

Despite the benefits that are expected from the phasing in of competition, Daniel Fessler gave a warning with respect to taking as "Words of the Gospel" the fact that competition and market forces will somehow always sort things out. In his opinion:

"...Generation is experiencing the global competitive explosion and generation is, of course, the one area of the traditional industry which is making a case for being removed in part, if not in whole, from the forces of regulation. In my country there is now a distaste for the role of the government among the populist at all levels. There is a feeling that government can do very little well and that intrusion by government frequently makes matters only worse. However, in my brief period as a regulator, I would begin to question some of this religious fervour and wonder about the notion of withdrawing regulation in the face of competition. The Commission of the state of California -on which I am privileged to serve-

regulates telecommunications as well as energy. If we look at the telecommunications industry and its progress, we will see many analogues to what is currently going on in the world of energy. And we will see that one of the most pathetic things from the vantage point of the public well-being is for regulation to be withdrawn, not in the face of competitive pressures which will thereafter discipline market influence and market participation, but merely on the theory that there is competition. The worst of all possible worlds may be the oxymoron of regulated competition but if there is a scenario which is even more depressing, it may be the notion of there having been withdrawn the defence of the public interest by government in reliance upon market forces which have not yet arrived and are merely theorized. So I think for all of us the challenge will be to stage the decorous withdrawal of the forces of regulation in proportion to the true arrival of genuine forces of competition".

Remuneration and network expansion.

According to Martín Rodríguez Pardina, currently the most important technical problem faced by the Argentine electricity industry is the determination of remuneration procedures for the transmission sector. From his point of view:

"...To fix prices for the remuneration of transmission is a highly complex economic problem when there are, among other things, economies of scale, investment indivisibility problems and strong externalities in the networks. In the case of Argentina in particular, the five-year tariff reconsideration to be carried out in two years time is one of the challenges that appear in the near future. As Mr. Alonso Rivas from Chile stated, in general, these tariff reconsideration processes are traumatic and complex, and thus adequate training is necessary to be able to face them. On the other hand, the expansion of the transmission system is probably the most urgent problem of the electricity system in Argentina. Although big investments have been made in generation, the investments in transmission are not at the expected level due to some problems in the design of the rules that regulate them. A re-assessment of these rules so as to facilitate the smooth development of the expansion of the transmission system seems to be one of the most immediate regulatory challenges".

According to Luis Haro Zabaleta, although the tariff system applied to transmission seems to be reasonable and quite simple for a system with the configuration of the Peruvian transmission systems, the problem is to apply it to an existing system; one conceived with other design criteria. In his opinion:

"...In our actual system, there is over-dimensioning and under-utilization. Also, considering the situation faced by the country for many years, there are excessive losses. Although the tariff system is reasonable for decision-making regarding new investments in transmission, the problem appears with the existing systems. A solution intended for this is to try to take these systems to a situation where they may deserve to be converted to what we call a main transmission system where 85 to 90% of the income for the transmission system is guaranteed, a figure with which these systems could subsist".

The interconnection of regional markets.

Reasons related to the promotion of competition, as well as to the need to reduce prices, and to reach an optimal market scale and/or to diversify the electric power sources seem to explain the several attempts to create regional markets. Besides the Chilean case -where possible interconnections with neighbouring countries are analyzed-, the California case -which will constitute a market together with two Canadian provinces and two Mexican states- and the Spanish case -that presented a proposal to integrate the European Union market-, it is worth mentioning the case of the so-called Nordic market.

As Sweden is a very small market where hydroelectricity prevails, Bo Lyndörn emphasized that:

> *"...I think that it is very important that we open up this market at least as a first step. It is important from the Swedish viewpoint to have a common market with Norway as from 1 January 1996, which will also include spot prices. Anyhow, it will be necessary to work hard in order to harmonize the different legal structures, types of tariffs and taxes, particularly if our goal is to achieve a Common Nordic Market including Finland and Denmark. In the long run, this is only a step towards a Common European Market with efficient competition".*

In turn, and considering the Norwegian viewpoint, John Henrick Sagen added that:

> *"...The development of a Nordic market raises the question of how to solve the problem of "international pools", how pools could be made up covering several countries and ensuring communication among them. Likewise, it raises the question of the need for harmonizing the regulation procedure between countries where the electricity markets are developing as an international market".*

The use of "benchmarking" to unify metering and price-setting procedures, and sharing of information practices to meet the challenges of globalization.

For Geoff Swier, reform in the electricity market is to a great extent part of an industry globalization which is just beginning. Companies with investments in Argentina are also actively involved in the privatization programme of the electricity industry of Victoria. Also, the application of the best technologies and the world's best practices are part of the globalization process, and this trend will have a significant effect on costs. Swier also believes we will witness a rapid growth in the global market and some of the alternative technologies over the next ten or fifteen years, particularly to serve the huge markets of rural and isolated consumers, especially in some of the countries of Latin America and Asia where living standards are rising. Based on this diagnosis, Swier concluded that regulators can do things to support this globalization process. In his opinion, to unify metering rules is one of them:

"...There seems to be no reason why we should not be trying to develop some global standards for wholesale and retail metering and working with the equipment suppliers to develop the most efficient and effective standards. For example, trying to settle on standard integration periods for the measurement of consumption. In this way, we could accelerate by many years the day when affordable real-time meters are brought to the market for the measurement of domestic consumption, therefore bringing forward the enormous benefits that can be achieved from real-time pricing and demand management in response to the real-time spot price. These benefits would arise from the reduction in spinning and cold reserve requirements, flattening of load curves and flexible response to fluctuations on both the demand and supply side. Metering and issues such as separation rules between the retail and the distribution business are areas where we could be working together more closely".

John Henrick Sagen fully agreed with respect to the expected benefits coming from the internationalization of metering procedures and information systems:

"...I consider they are very important for setting real-time tariffs for the customers and are the main basis for demand-side flexibility and the economical and efficient use of electricity".

Geoff Swier considered that also in the field of price setting for distribution and transmission the globalization process will be unavoidable:

"...We as regulators and reformers should not simply be focusing on incremental improvements for whatever exists now, but we should be focusing on driving the regulated industries in distribution and transmission to be adopting world's best practice as quickly as possible and setting our price caps accordingly. To do this we need to know what world's best practice is. Not just what is the most efficient distribution business overall, for example, but what is the most efficient production system for each of the main cost-drivers in the distribution and transmission sectors. Of course, we need to take account of the impediments to achieving world's best practice, such as constraints on capital investment, particularly in developing countries, and labour markets inflexibilities. We have certainly found this in Victoria, and I think the same happens in Argentina: that many reforms are not expensive to introduce; they are simply a function of better management".

Daniel Fessler, as well as, Luis Rodriguez Romero and Bo Lyndörn agreed to highlight the importance of this type of Seminars to encourage the debate and re-thinking around the different regulatory experiences, and emphasized the need for some kind of programme to exchange information about "world's best practice" in this field. Geoff Swier launched several concrete proposals as follows:

"... We know that the Argentine and the Victorian transmission companies both belong to a consortium of eleven international transmission companies that meet regularly to swap information and undertake benchmarking. But there are a number of ways in which we, on the regulatory side, could also be forming some form of co-operative exercise to encourage

world's best practice. One very cost-effective way of doing this would be for as many jurisdictions as possible to set up sites on Internet and make available all the relevant details, legislation and codes. In fact, the Victorian Power Exchange in Victoria has a site on the Internet and attempts to use that as a mechanism to broadcast information to the market participants in Victoria. Maybe some international body, perhaps the World Bank or some other organization, could organize a Bulletin Board to allow coordination of information flows between the different sites set up by the jurisdictions. There are probably other forms of cooperation that could be discussed and there is obviously the need for further Seminars such as the one we are attending here today in Argentina".

A sample of specific problems.

Norway: The search for an optimal structure for the future.

For Norwegian regulators one of the most important problems has been the management of the relationship with their 200 distribution companies. John Sagen pointed out that:

"...We were able to build up good methods for regulating distribution utilities in a way that could promote long-term efficiency and good quality of supply. However, we still need to work on the development of what we call regulation schemes and share experiences of their performance. On the other hand, we wonder up to what extent this historic structure of our public facilities is optimum for the future. In Norway and in most of the Nordic countries, we have the special situation in which a lot of these companies are still publicly-owned. The problem is how we can promote efficient re-structuring, and at the same time, not go back to the vertically-integrated monopolies. Along these lines, we should take into account that the environmental demands could promote an efficient re-structuring in all the sector."

Sweden: network efficiency, users' access to the competitive market and the future of nuclear power plants.

According to Bo Lyndörn, another key issue in Sweden, as well as in Norway, is to select different means to improve efficiency within the monopolic area. In his opinion:

"...In the monopolies you can count up to 270 local network systems which is, of course, too high a number. It could be an efficient number in the long run but we have to use different means to increase efficiency and one of them is that, when we are deciding about the new concessions, we take into account if it will be favourable to a rational structure. Otherwise, we have to create incentives to increase efficiency in the network services. At present, we still use some kind of price-cap formula for yearly efficient increases. As a complement to that, we use some kind of transparency in the market, using benchmarking with respect to technical and economic performance. Another special question is that there are no limits with respect to size to be allowed to gain access to the competitive market. In

principle, everyone can choose his supplier but there is one condition: he must pay for his meter. There is a meter by which you can measure per hour but the price today is a little bit high to be profitable for a small customer. Anyhow, there is a political intention to promote measures in several ways to make it possible for small consumers to use the opportunity in the competitive market as fast as possible. To this effect, I think there are at least three ways to go. One way is to find out how to get cheaper meters. The other could be to find out if there will be technical solutions with the allowed group of consumers to buy electricity in common. The last one, of course, is to evaluate or learn from the Norwegian model where there is no need for that kind of meters for really small customers. Before I finish my presentation, I cannot avoid mentioning something that, although not connected with regulation, is a very heavy question in Sweden. Fifteen years ago there was a referendum and the result was that we would just have one generation of nuclear power plants. We have 12 of them and they produce about 50% of the total electricity supply in Sweden right now. As some kind of interpretation of the referendum, Parliament decided that all nuclear power plants should be shut before the year 2000. The consequences of this will be very bad for the Swedish economy. Fortunately, politicians have also realized the consequences and now there is a parliamentary commission that will figure out whether the phasing out of these nuclear plants will take place before or after the year 2000, in which case they will be replaced by other power sources".

Colombia: The difficulties to attract private investors.

According to Luis Ignacio Betancur Escobar, most of the problems are tightly connected to the fact that tariffs applied to residential users are 45% behind costs. In his opinion:

"...In the two biggest markets, the cities of Bogota and Medellin, the gap is even bigger and it is estimated that it reaches 100%. The Regulatory Commission needs the favourable votes of at least one of the three ministers that are part of it in order to decide on a tariff increase that, for political reasons, is very likely to take place in a period of one, two or three years at the most. However, the experience of countries such as Argentina, Chile and Peru shows that the sooner a tariff is increased, the easier it is implemented. To wait four, five or seven years to increase tariffs makes the process virtually impossible. Although at present there are no legal obstacles to privatization, should the Government intend to sell some of its generation assets, neither foreign nor Colombian customers will be easily found, while there are no solvent markets in the field of the residential service, nor in generation, and less still in the case of traders or distributors. All this has become the main obstacle to advance in the restructuring processes and, consequently, we are going to face complications should this problem not be solved soon. There is a second problem that has to do with our Civil and Commercial Law which does not make it easy to frame the wholesale market rules, particularly as regards liability in the case of failure in the rationing service. The jurists of the Regulatory Commission have tried to adapt as much as possible the wholesale market subject in the Anglo-Saxon Law. I do not know if other Latin American countries that have or at least have had the same influence of the French Law have already solved the issue. The third difficulty lies on the fact that the private investors, either because they wish

to buy generation plants or because they wish to enter in the generation business, want to have a capacity charge established. At present, we are studying the conveniences, advantages and disadvantages of doing this, and the probable effects of increasing the whole number of thermal units as regards new private investors. On the other hand, to be able to privatize a little, in substitution for the solvency of the residential markets that I have referred to, we are asking, among others, foreign bankers who are advising investors, for a capacity charge, a guarantee on the part of the Government -in my opinion totally undesirable- or a combination of both."

California, USA: The future re-regulation of electricity.

According to Daniel Fessler over the course of the next 10 years or so, interest in the re-regulation of the electric services industry will vary dramatically in the U.S.A. In his opinion:

"...California will be tremendously interested since it has very high cost electricity. The State is making a systemic re-evaluation of the institutions of that industry, looking for means of placing downward pressure on those prices. On the other hand, other states with very low cost electricity are rationally concluding that they are perfectly content with the arrangement that they have and the issue will be how long the country can remain in various states of division on this matter. That brings me to the second point. The re-regulation of the electric services industry brings issues of federalism that are peculiar to the American Republican experience but have much in common with what is going on in other countries around the world and certainly with what is emerging within the European Union. Historically, the role of the federal government in energy in the United States has been quite limited, and yet there is now an assertion of federal initiatives seeking to advance the interest of competition at a time when, on other fronts, the federal government is under significant attack and there is retrenchment with the thought that the federal government has grown too large, too distant and too impersonal, and that the states should take a greater responsibility for problems more immediate to their economies. There is thus a clash between the movement of initiatives in the federal level in the fields of energy and counter-cyclical pressures within the American political experience that will require - I believe- some very creative work on the part of state as well as federal officials. I have been moving around my country for the last two years, calling for what I term co-operative federalism which means that there is to be acknowledged by the states, a role for the federal government and mutually, by the federal government, a role for the respective states. From this viewpoint, transmission is going to be a federally dominated issue. In our country, the authority of the federal government rests primarily on the commerce clause and the concept of goods that are moving in inter-state commerce. It would be difficult to fantasize in a quite essentially inter-state commercial entity : then an electron which is literally manufactured just at the moment of its consumption, moves at the speed of light with a difference to political frontiers from the point of generation to the point of ultimate consumption. If transmission will be federal, I would be predicting to you that distribution will remain a local issue and, therefore, within the dominion of the several states. The difficulty, of course, is to determine when transmission in fact is ended and the movement

of electrons is now in a distribution state. You will watch us succeed or fail in bringing about a concord on that point within the next twelve months".

Chile: Improving the toll charging system, modernizing service quality standards and establishing price-setting procedures.

In Chile, where the Electricity Act has been in force for 13 years and the process of massive privatization took place 6 years ago, the National Energy Commission is working, among other issues, to improve the toll charging system. Andres Alonso Rivas stated that:

"...At present, in the interconnected central system there are only temporary contracts between the generators and the main transmission company. This is because no agreement has been reached and, therefore, it was decided that the status quo be maintained. This requires a solution, and so the Commission has been trying to improve the toll system and to propose a methodology which is clear, stable and economically correct within the existing legal framework. On the other hand, there are service quality standards which are obsolete. Although the distribution companies -those who deal with the customer- have improved the quality of their service at their own initiative, we believe rules should be formally established in agreement with international levels since our country is trying to become a part of different commercial agreements. Moreover, we are encouraging the users' service quality control. Likewise, we have fostered a greater exchange of information between the regulated market and the free market. Finally, as in our country pricing has always been a very painful process, the Commission has been looking for a way to reduce to a minimum level the possibilities of conflict among the parties".

Argentina: the re-determination of distribution tariffs and the interests of future users.

Though tariff redetermination is still 7 years ahead, some parties are assessing the convenience of setting it in advance in the 5th year instead of in the 10th. According to Martin Rodriguez Pardina this aims at:

"...Solving some problems that have been detected in the existing tariff systems. Among the problems is that of the rules that allow "the pass-through" of the term contracts that the distributors sign. At this moment the distributors are only allowed to transfer to the final users the market "spot price", a stabilized price, that is an ex-ante average of the "spot prices". Therefore, as this "spot price" is the opportunity cost that the generators face, there is no encouragement to sign contracts. Furthermore, there is almost a year to go before starting a new stage of quality controls, in which the measurement is going to be at the private users' level. This implies a big demand both for the private companies as well as for the state regulatory agency. In the field of distribution, we also come across toll issues of provincial distribution companies. In Argentina we have the same problem that Mr. Fessler mentioned regarding the relationship between the states and the federal government because of jurisdictional overlapping. The tariffs that the provincial distributors charge big users have to do with this problem. Lastly, and from an institutional outlook, we have

to improve coordination with the provincial regulators to mitigate the problems of jurisdictional overlapping as well as that of the roles that each of the agencies of the public sector shall play. The productive exchange that has been achieved at this international meeting, sharing experiences with other regulators from different countries, should also take place with the different Argentine distribution companies in the provinces for policy coordination purposes. Finally, all necessary efforts should be made to achieve a sectoral outlook on the issue. The regulatory problem of defending users' rights must be understood as the existing and future users' rights, by nature an inter-generation problem, which as such, needs some kind of a mid-term and long-term analysis, so as to make the present policies consistent with the future development of the industry".

Peru: Adjusting to privatization and bringing electricity to the most remote regions of the country.

According to Luis Haro Zabaleta, first and foremost, the problems in Peru are coming from the radical changes which two and a half years ago substituted a completely regulated system with state participation, with heavily subsidised tariffs, by a system of free market and competition based on private participation. In his opinion:

"...This brought about, first of all, a raise in the average tariff from less than US$ 0.01 per KWh, with a more reduced tariff for the residential sector, to between US$ 0.07/0.08 per KWh. This produced an avalanche of claims on the part of the users, and although it had not been anticipated, we coped with it anyway. We should point out that there was an improvement since we have passed from an average of 80 daily claims two years and a half ago, to less than 10 claims per week at present. We have devised ways to handle claims together with an information campaign on the value of electricity and on how to have lower electricity bills. At present, the tariffs are applied to different kinds of consumers, and customers can have access to different options and reduce their bill. An important improvement was also achieved in the companies' customer service, as a consequence of the customer service rules and the penalty system established by the authorities. Many of the officials -trained throughout years of activity in the state-owned companies and used to mistreating the customers-, had to adapt themselves to the new situation where the main element of the business was the customer. Another problem that arose after privatization and that has not been solved yet, is connected with the balance of supply and demand of energy. In 1992, there was an average reserve in the system of 15% with expected increases in demand of 3%. However, at present, electricity demand is increasing between 7% and 8% and, in 1994, it was 12% higher. Obviously the reserves were reduced when the legal framework changed, since the State ceased to be directly involved in the market, and consequently, there was no increase in the offer. Since for different reasons privatization was delayed, we are currently facing a situation where the reserve is about 5%. To solve this problem, customers were encouraged to reduce their consumption at peak hours, and to increase it in the off-peak hours, and also to save energy. Since at the peak hours the price of energy was two and a half times higher than at the off-peak hours, these tariff signals were efficient to encourage a better consumption of electricity. There were also other signals

and actions and finally, an information campaign to promote the saving of energy. Although an increase in the consumption of energy of around 2 to 3% may be observed as a consequence of these measures, for the next years we expect more standard rates of around 6% to 7%. To solve this problem completely, privatization which was delayed by the government, has been again reactivated. This privatization is being carried out in the short term with investment commitments, anticipating that for 1996 some additional 400 MW will be offered to the system. Another problem that we have detected is that, although the system is based on the free market and the regulated price is somewhat directed by the price of the free customers, neither the latter nor the companies are used to negotiating tariffs. We have also carried out promotion activities among the big customers which consisted in showing them they had the possibility of entering the business or that a third party with purchase commitments on their part could enter the system. Let me remind you that, as the system is completely open, anybody can set up a power plant, and only if they use hydroelectric or hydrothermal resources must they request a concession through a very simple process. In order to produce electricity through thermoelectric power plants, it is necessary to obtain an authorization through a very simple procedure, and if within 30 days the pertinent authority gives no answer, it is deemed granted. Another pending subject is to adapt the technical rules of the national electricity code -a very inflexible one from the technical point of view- to relate it to the criteria established by law, where basically the principles are safety and service quality. Finally, we are trying to promote electrification in areas that do not appear attractive to private investment, but without leaving aside the established legal framework which is based on the wholesale market, competition and private participation, and facing geographic difficulties. The geography of this country is very rugged and there are clearly marked areas with altitude levels on the coast of 100 meters above sea level, to heights of 5000 meters above sea level in the area of the Andean mountains, to later smooth out in the jungle of the Atlantic. Although the national average for electrification is 45%, on the coast, electrification is well over 80%, it stands at lower levels in the mountainous district and is practically inexistent in the jungle".

Australia: creating a national market.

For Geoff Swier, in Australia the main issue at stake is the creation of a national electricity market. In his opinion:

"...This market would involve Victoria, New South Wales, South Australia and Queensland and would serve the great bulk of the population of Australia which is seated on the Eastern and Southeastern coast of Australia. I see no fundamental difficulties in the creation of the market as there is a broad commonality of vision amongst the utilities and governments of the states. The Federal government does not have any major role in the creation of the market apart from actually encouraging the market to be established. Anyhow, there are issues to be resolved in developing a sound linkage with the Australian Trade Practices Law which was not originally designed to deal with open access in an industry such as electricity. However, I am confident that these issues will be resolved and that we will have a world-class national electricity market operating by 1997 based on virtual real-time access".

Presentation

Complexity And Diversity In The Regulation Of The U.S. Electric Industry

Charles G. Stalon, Ph.D.
Consultant in Energy Regulation
Former Commissioner of the Federal Energy Regulatory Commission
Former Commissioner of the Illinois Commerce Commission
United States of America

Widespread political values in the U.S., with quite a few exceptions, favor reliance on competitive markets when competition can be expected to produce efficient results. In response to this set of values, opinion leaders in the U.S. have been increasing their support for substituting competition for regulation for power generation industry for quite a few years now. The debate has become intense recently and, it is important to note that the success of the U.S. system for de-regulating gas and the resulting decline in the prices of gas have combined to create some sense of urgency, since many new producers relying on natural gas and combined-cycle generation technology can produce power at a lower unit cost than can many of the utilities with their embedded costs and plants.

Organization models and proposals for changes in standards.

The two most widely supported models for organizing trading within the control areas are the POOLCO model and the Bilateral trading model. While many versions of each model exist, it is fair to say that I think proponents of both models anticipate that users will gain the freedom to choose their suppliers rather quickly. That debate, in my view, is progressing very constructively and, in many ways California and to a certain extent New York are in the lead of this debate. Many state legislatures have appointed committees to consider their role in this process and the Federal Energy Regulatory Commission (FERC) has what we call a Notice of Proposed Rulemaking (NOPR) outstanding. In the jargon of U.S. regulation, this means that the agency says it has a rule it intends to promulgate and would like it to be considered and be told how it ought to be modified, what is liked and what is not liked about it. However, in this particular case, hardly anybody believes that the notice of proposed rulemaking issued by FERC is likely to be implemented. What they see is a Federal Energy Regulatory Commission which is very serious about making changes, and knows that such changes must be made, and to this effect has issued this notice.

Creating and preserving a governance system for the networks.

Another debate of even more importance is, however, lagging. That debate is how to create and preserve a governance system for network operations to ensure that the necessary conditions for efficient competition or a de-regulated generation sector can be created and preserved. My theme could be taken from a comment made to me a couple of months ago by a participant in a conference. He said that "it seems to be a complex but easily manageable task to create a POOLCO on the model of the U.K. system. But it may turn out to be an impossibly difficult task for the U.S. industry to create a system in which we have a set of POOLCOs which must all interact within one interconnected system". Or even more complex: maybe our job is not merely creating a governance system for half a dozen or a dozen POOLCOs which all interact with one another. In a governance system, it may well be that we will have to create a governance system to allow half a dozen different versions of POOLCO models and half a dozen different versions of the bilateral model, all working within one interconnected network in order to function efficiently.

Industry and regulation system diversity.

In order to understand the significance of the above remark, it is necessary to describe briefly the diversity of the North American electric industry and the regulation system. We not only have a Federal Energy Regulatory Commission but also other federal regulators. We have 50 state regulators of which 48 were involved as a part of the continental integrating grids, but we also have many local regulators. So we have a very complex system of regulation and a set of regulators that have played a vitally important role in the past in creating the governance system to make sure that the networks function. It is a system of self-generation that the utilities have created over the years. That, in particular, is the system that we would like and need to replace as we also reallocate the division of regulatory labor between state and federal regulators.

Size of the system.

The approximately 700.000 MW of capacity is divided up among the 250 different investor-owned utilities. That number is a little misleading because as far as important decision units, it is probably a little less than 200. Many of the 250 have been creations of recent generators under the Public Utilities Regulatory Policies Act and are not traditional vertically- integrated utilities. We also have approximately 2.000 publicly- owned utilities. Most of those are owned by municipalities, a few are owned by states, a few are owned by districts. There are 10 federally-owned utilities and there are 941 cooperative utilities. The cooperative utilities quite often have joined together in a super cooperative with municipals and others to create generation and transmission co-ops. Despite that, it must be pointed out that 7.9% of the utilities -the investor-owned utilities- actually produce about 75% of the power generated in the country. The investor-owned utilities not only clearly dominate the process of production but also dominate the governance system of the industry itself.

Integration vis-à-vis vertical de-integration.

A useful way to visualize the debate in the U.S. is to contrast two views of the industry. Corporate cultures in the industry have supported for decades a model that is composed of coordinating vertically-integrated utilities where each utility generates the power in its own generators and transmits it over its own transmission lines, distributes it over its own distribution lines to its own franchised customers. Even in areas where we have public sector and private sector integrated, we have had vertical integration by long-term contracts. That is the system that we have inherited.

In contrast, we have developed in the last 15 years an alternative view which purports to be much more useful. We have a set of generators which produce almost half the capacity of about 700,000 MW plus another almost 100,000 MW in Canada that are all integrated over some giant interconnected transmission grids. The generators feed power into the grids, the distribution companies take power out of the grids and, in a sense, reliability is a function of the load numbers as well as of the robustness of the interconnected system.

Those two views are sort of conflicting for the support of the regulatory agencies. Moreover, I would argue that part of the problem that we are seeing in the U.S. is that most of the regulatory agencies at the state level have had very strong inducements to think in cooperative and vertical integration terms. It is their utility and their state that they regulate and they like to view that their generators produce power for their customers. Therefore, they like the idea of perpetuating that image of the industry. That image, however, has not had a great deal of reality for an incredibly long time. To illustrate this a little more I need to now turn to the complexity of the regulatory system that we have created and we are now trying to re-create.

"...Part of the problem that we are seeing in the United States is that most of the regulatory agencies at the state level have had very strong inducements to think in cooperative and vertical integration terms. It is their utility and their state that they regulate and they like to view that their generators produce power for their customers. Therefore, they like the idea of perpetuating that image of the industry. That image, however, has not had a great deal of reality for an incredibly long time".

Evolution and complexity of the regulation system.

Economic regulation of the electric utility industry in the United States started with municipal regulation. The very early generators were direct current generators serving small areas of big cities and, logically, the municipality did the regulation. In order to function properly the utility had to have access to the alleys and streets and their rights and so a symbiotic relationship between the utility and the municipality was an essential ingredient. It is important to stress that in that environment each utility, or at least each city, truly was an island. There was no particular coordination between utilities. The legitimacy of municipal regulation faded with the shift to alternating current and the interconnection of cities. Cities lost their legitimacy as

economic regulators and so, in the first decade of the 20th century, almost every state in the United States created a system of state regulation which did not replace but complemented municipal regulation. There are a few cities in the United States, New Orleans is one for example, which has a very vigorous regulatory body regulating the Public Service Company of New Orleans. There are City Councils which still regulate municipal utilities, which still exert certain powers depending on the state. So we still have this heritage of municipal regulation with state regulation imposed on top of it to complement it.

That system also began to crumble in the 1920's as the transmission technology began to connect bigger and bigger areas. As utilities interconnected in order to share reserves and exploit the economies of scale in generation, they found it necessary "to sacrifice some of their sovereignty", because if two utilities interconnect they must reach some kind of an agreement. Which one is going to preserve the clock? Which are going to be the obligations to control power flows which inadvertedly in and out one another's territory? As three utilities interconnected and four interconnected and five interconnected across a state line, it became very obvious that state regulators were now experiencing the same loss of legitimacy that municipal regulators had experienced before.

And so we saw the rise of something called Federal Regulation in the 1930's. Federal Regulation, however, was very carefully drafted to complement and strengthen state regulation. It was not designed to replace state regulation. As a consequence we ended up with a federal regulation system carrying out certain functions, state regulation other functions and municipal regulation still other functions. That division of regulatory labor still exists and it obviously is not going to remain unchanged.

"Economic regulation of the electric utility industry in the United States started with municipal regulation. The very early generators were direct current generators serving small areas of big cities and, logically, the municipality did the regulation. In order to function properly the utility had to have access to the alleys and streets and their rights and so a symbiotic relationship between the utility and the municipality was an essential ingredient. It is important to stress that, in such an environment each utility, or at least each city, truly was an island. There was no particular coordination between utilities. The legitimacy of municipal regulation faded with the shift to alternating current and the interconnection of cities. Cities lost their legitimacy as economic regulators so, in the first decade of the 20th century, almost every state in the United States created a system of state regulation which did not replace but complemented municipal regulation. (...) So we still have this heritage of municipal regulation with state regulation imposed on top of it to complement it. That system also began to crumble in the 1920's as the transmission technology began to connect bigger and bigger areas. As utilities interconnected in order to share reserves and exploit the economies of scale in generation, they found it necessary "to sacrifice some of their sovereignty", because if two utilities interconnect they must reach some kind of an agreement. (...) And so we saw the rise of something called Federal Regulation in the 1930's. Federal Regulation, however, was very carefully drafted to complement and strengthen state regulation. It was not designed to replace state regulation. As a consequence, we ended up with a federal regulation system carrying out certain functions, state regulation other functions and municipal regulation still other functions. That division of regulatory labor still exists and it obviously is not going to remain unchanged".

There are three provisions of the federal law which are very important in the current debate. One of those provisions gives to the Federal Government, the federal regulators, the authority to control the rates at which transmission of electric power occurs in inter-state commerce. A very narrow grant of authority but critically important in the current debate. Regarding the second provision, the federal law says that however the Courts interpret this provision of law, it shall extend only to those areas that are not regulated by the states. The Supreme Court had earlier made it very clear that the states had no authority to regulate inter-state transactions. But the wording gives you a flavor of the times when Federal Regulation was to be a minimum regulation. It was to do only what the states couldn't do. The second provision of the law is an explicit assertion that the federal regulators have no authority -except in emergency and except for certain very special purposes- to ever tell a utility to build a transmission line or to build a generator. The federal authority does not extend to mandating construction of assets or to the planning of assets. That authority is entirely left to the states. The federal government can order interconnections between utilities under certain circumstances and it has done so occasionally. The third provision establishes that the federal regulators have absolutely no jurisdiction over federally-owned utilities or municipally-owned utilities or state-owned utilities. Their jurisdiction extends only to investor-owned utilities.

So we end up with this incredibly complex and fragmented system where some powers lie at the city level, some at the state level, some at the federal level. Moreover, those at the federal level are fragmented because other governmental agencies were given some regulatory authority over the federally-owned utilities and, to some degree, over the cooperative-owned utilities. Therefore, we end up with a very complex regulatory structure which I can summarize in the following way: the existing federal regulator -the Federal Energy Regulatory Commission (FERC)- has no authority to order a utility to build a transmission line, it has no power to grant a domain to a utility that wants to build a transmission line, and it has no authority to provide environmental clearance to a utility that wants to build a transmission line. All of those powers reside at state level.

Federal support to expand generation and power distribution.

At the same time we were creating this very complex system of interdependent regulation, the Federal Government was also acting to do something else. It was acting to expand the production and distribution of electric power by firms other than the investor-owned utility sector. Just to give you some idea of the rapid change in the industry in terms of participants after the 1930's, you may recall that, as a result of the Great Depression, there was a substantial reaction against market systems, and so there was a major move in the United States to extend the electrification into the rural areas by subsidizing the cooperatives. There was also great subsidy to the public utilities that were owned by municipalities or counties or districts. They were given special privileges to buy power from federally-owned utilities at a very low cost. The Federal Government gave them very low interest rate loans, so we succeeded in bringing into existence an enormous number of new utilities, primarily the co-ops. We also brought into existence some very large federally-owned utilities: the Water Power

Administration and the Tennessee Valley Authority are the two best known ones. There is a debate today which is not critical to anything that is going on in the electric utility industry about privatizing these federal firms. I suspect that some of them will be privatized, at least in part. Whether it is or is not, is hardly relevant in the full shape of the industry. I expect to see this configuration continue. There is no reason to think it will not. I expect to see some more mergers.

Current need for a network governance system.

I have just finished describing the diversity of the industry and of the regulatory system. Now the reality of the technology of the industry is that all of these firms must coordinate over interconnected networks. There are two giant interconnections in the North American continent. One I can call the Eastern Interconnection: it runs from the Arctic Ocean to the Gulf of Mexico and from the Atlantic Ocean to the Eastern Edge of the Rocky Mountains. It probably contains about 400,000 MW of capacity. Someone once called that interconnection "the biggest machine ever created by mankind". All of the plants in that interconnection - except for Quebec that chose to opt out because it did not want to meet reliability standards, and so the only interconnection between Quebec and all the rest of Canada and the United States is through some direct current lines- must act as a synchronized alternating current network. There are approximately 100 or more control areas in that network. Therefore, there is a desperate need for a governance system but the Federal Government gave no authority to the federal regulator to create such a governance system.

The Supreme Court denied the states any authority to control that governance mechanism, so the industry evolved its own governance mechanism. It started merely as committees of cooperation between interconnected utilities. As the system got bigger, the committees got bigger until all the utilities in the control area or in the pooling area ended up working together, in coordination with others. The important point of this system of self-regulation is that it is not constrained by forms of legal organization. Its jurisdiction extends to municipal companies, to those of the states, to the public ones and to all forms of utilities. Moreover, its jurisdiction is not constrained by city borders or state borders or even international borders. It must be noted that the Canadian utilities and the Northwestern Mexican utilities integrate into these systems.

The other interconnection is called the Western Interconnection which extends from the Arctic Ocean to the Mexican border and includes Northwest Mexico, and from the Eastern edge of the Rocky Mountains to the Pacific Ocean. Geographically it is an enormous area. It again is an alternating current synchronized network. Trading occurs all over the network but again there are almost a hundred control areas. Remember that there are 17 control areas in the state of California alone, with their hoping to condense them to one.

In order for that system to function there must be rules as to how each control area behaves. A simple example: inadvertent power flow in and out of each and every system. One of the

first questions refers to what the balancing requirements are. For example, do you require every control area to pass through zero every ten minutes or every five minutes or every eight minutes? You have to have some rules. If you have inadvertent power flow on net within a period... do you balance within a period or do you balance over time? Somebody must create these rules and the government regulators currently do not have the authority to do so. As I said, this system worked pretty well and it evolved until the great 1965 Northeast blackout. Then the Nation was suddenly faced with the crisis. People were caught for hours in elevators in New York. Would it happen a second time, there would be a rise in the streets of New York and this cannot be permitted to happen.

Consequently, the view is we must improve the reliability of the system and the mechanism for doing that is to work through the governance system. The Federal Government acted to legitimize this system of industry regulation. They did so through the creation of two types of bodies. Firstly, they divided the country into nine Regional Reliability Councils, and each one of these Reliability Councils became a system of governance for all of the control areas within that system.The utilities were all participants in this decision process. Then they created something called the North American Electric Reliability Council to be the continental-wide governing body for the Regional Reliability Councils. So many of the areas of discretion can be handled by the Reliability Councils which may include half a dozen states. On the other hand, they may include almost all the Western interconnections.

Competition eroded previous self-regulation.

This system of governance has worked fairly well to keep the lights on to define standards. The decisions on what constitutes adequate spinning of reserves, what constitutes appropriate standards for operating a grid, what constitutes appropriate installed reserves and what constitutes appropriate control system behavior are all determined by the utilities in the self-governing system. The system, however, is not well understood because the utilities went out of their way to be very quiet about this thing. The regulators understood it, the public has very little understanding of it, the politicians have very little understanding of it and nowadays the competitive pressures are beginning to erode the system. The system is dominated by the investor-owned utilities. The investor-owned utilities are all highly integrated and they are dominated by their generating interest. Because that is where their wealth is and that is where the threat to loss is. They feel no threat of risk in their distribution assets or in their transmission assets, but they do feel at risk because of their generating assets and, therefore, they have increasingly had a tendency in the Regional Reliability Councils to refuse to compromise in ways it hurts the generating interests.

The gentlemen's agreement under which the system has functioned literally now for 50 years but formally, explicitly and openly for approximately 30 years, is beginning to crumble. It is crumbling because the system earlier solved very little "wheeling of power" -to use our jargon phrase- that is, the transmission of power across utilities. It was truly a system in which each utility behaved like an island interconnected with those around it in order to share reserves

and sometimes trade power. As a result of the failed forecast of the 1970's, some utilities developed substantial excess capacity while others did not. Therefore, when opportunities for trading power exploded in the 80's, the Federal Energy Regulatory Commission encouraged the trading of power, but quite often the trade was between two utilities that were not adjoining. So then the Federal Energy Regulatory Commission, together with the utilities, created a convenient regulatory fiction for handling such trades. That regulatory fiction which nobody believed in, simplified the bookkeeping and the decision-making. The regulatory fiction was that if the buyer and the seller could trace a path through the transmission system where the trade could take place without infringing any reliability standards, then the trade could take place and the people along the path would be compensated for their transmission services. Although absurd, it was a convenient regulatory fiction, it worked well as long as there were almost no trades. And it also worked well as long as all of the vertically-integrated utilities were being regulated and earning a sufficient rate of return on their assets. So the argument was, that even if the cost was an unfair cost, the rate payers will pay it. It is not any of the stockholders' money, it does not lower any management incomes, so who cares whether we are doing this with any degree of precision.

All of a sudden in the 1980's, as the volume of trade began to grow, people cared whether you could get that transmission right or whether you could exploit your own transmission system. As a consequence, when the Regional Reliability Council would meet, they suddenly began to conflict among one another dramatically over the use of the transmission system. The system of self-governance, which the utilities have always liked to describe as a totally voluntary system, was beginning to collapse. The real meaning of being voluntary is that there are no financial penalties for violating the rules. In the entire system, there is not a financial penalty any place for violating the rules.

The entire system was built on the goodwill of professionals. People managed the system, they had a common interest to make it function well: they abided by the rules in almost all cases and so the system performed well. Obviously, today, as we bring more and more competitive generators in the game they are not a part of the old school and do not care about anything but profits. As a consequence, we are going to need financial penalties for people who break the rules, and then we need a government mandate which means much more government direct involvement in the system of self-governance than we had before.

A few conclusions.

The first point that I would make is that there is today no government regulatory body. There is no Canadian Federal Agency, no Mexican Federal Agency, no state or provincial agency, or no combination of all of them that has the authority to do any of this. It just doesn't exist. In reality, it is going to be the U.S. federal regulators that are going to pull this off because there is nobody else. If they will do what they did in the gas side, I suspect they can make it work, because one of the things we found a long time ago is that the regulatory body does a heavy lifting and creates the debate, lays out the arguments, in a sense diffuses the

issue. Then Congress will pass a law overnight and it will be legitimized and we will go forward.

The objective here is not to remove that system of self-regulation. I would describe it as removing the generating interest and preserving the system of governance created and managed by the transmission companies. There is also the task of vertically merging the transmission companies into larger and larger transmission units, so that we can then build on them. One of the interesting debates in the U.S. is how large the transmission units ought to be and how the governance structure for preserving the order in the trading system integrates with the transmission companies. In both cases, the proponents of the POOLCO model and the proponents of the bilateral model, in all versions of those models, seem to be in agreement that we will have and need to have an independent system operator who assumes responsibility for preserving reliability and, therefore, there must be a governance system that coordinates adjoining independent system operators.

All of the problems of governance I described earlier continue. Can the independent system operators be the basic units for the new system of coordination and can government authority create standards and impose penalties? That is an uncertain affair. In short, we are confronted with regulating two giant interconnections. We can leave Quebec and Texas to do whatever they want. But there is a feeling that the big problems are the two international interconnections that must be coordinated through some agency that will almost certainly be utility-created.

I think we are making slow progress in this part of the debate. All the parties currently are so hung up on how they want to control the trading in their control area that they are assuming for a foreseeable future that the existing system of control will keep the lights on and make the system function. That is largely an act of faith because I think we have not yet made an appropriate attempt to solve the problems.

Brief Taxonomy Of International Experience In The Regulation Of The Electricity Sector

Closing Session

Brief Taxonomy Of International Experience In The Regulation Of The Electricity Sector

Lic. Alberto E. Devoto
Vice-President
"Ente Nacional Regulador de la Electricidad" - ENRE
(National Electricity Regulatory Agency)
Buenos Aires, Argentina

On behalf of ENRE, I wish to thank each and every one of you for having made possible this International Seminar on the Restructuring and Regulation of the Electricity Sector. During this meeting we have been able to compare experiences regarding the transformation and reordering of the sector, to analyze in depth the segments of generation, transmission and distribution and to exchange opinions with respect to regulation problems and the possible alternatives for a solution which are being considered in each of our countries. Moreover, judging by the amusing characterization of one of our "regulatees" who said he had never before seen so many regulators per square meter, I think we have caused a great impression. Leaving jokes aside, this effort has undoubtedly been very useful for all of us and will also be so for those who in other countries decide to embark on the restructuring of the sector. Bearing this in mind and as a closing session to our deliberations, let me offer this brief classification of the alternative solutions which have been outlined to solve regulatory problems.

The State as a regulator.

During the 1970s, in Latin America, almost all public services were provided by state-owned utilities. Moreover, many times these state bodies were part of a wider, relatively centralized planning system. However, although it was possible to envisage the forthcoming crises and to guess the direction of the changes which would later take place in the 1980s and 1990s, it was not simple to modify the idleness of the state machinery and start elaborating a new role for the State.

Nowadays, when we are definitely immerse in the transformation process, it seems that the role of the State is being automatically defined. Based on the need of exercising regulation on the privatized utilities, the State finds a new reason for its existence, a defined role which is what has gathered us here and is inherent to the existence of the regulatory bodies.

Promotion of competition and regulation.

Without exception, the experiences of the participating regulators show a clear trend towards facilitating and consolidating competition in all the markets and on all possible occasions.

This can be seen from two completely different viewpoints. As was explained by Professor David Newbery, on the one hand, we have the developed countries which are characterized by a low demand growth, the need to increase efficiency and competition and that function as a mix of private and state ownership and activities. On the other hand, the least developed countries show a high demand growth, low tariffs and predominant state-ownership and activity which results in under-investment. From these quite opposite ends, however, we have been converging towards the same goal.

Converging trends in generation.

Addressing more specifically the issue of **generation**, we may note that in some systems integrated generation and distribution companies still co-exist with other independent companies. This segment is a clearly competitive activity. In Chile and Great Britain, there are very few generators. In other countries, there are more participants and the entry conditions are not all that similar. In some cases like Argentina, Chile and Great Britain, there is free entry; in others like Australia and Spain, licenses are required.

In most countries there exists a wholesale spot market, except for Spain where a single tariff is established. In many of the cases presented at the Seminar, there are physical and financial contracts; in some, only financial contracts.

Dispatch criteria are also different despite there being -I insist- a common goal. Marginal cost dispatch criteria prevail in some countries such as Argentina, Chile, Colombia and Peru. Other countries use the marginal cost criteria but limited by certain energy policy national priorities. In the case of Spain and Great Britain this has been linked to the situation of certain natural resources, mainly coal. In Norway power is offered in blocs.

"...In some systems integrated generation and distribution companies still co-exist with other independent companies. This segment is a clearly competitive activity. In Chile and Great Britain, there are very few generators. In other countries, there are more participants and the entry conditions are not all that similar. In some cases like Argentina, Chile and Great Britain, there is free entry; in others like Australia and Spain, licenses are required. In most countries there exists a wholesale spot market, except for Spain where a single tariff is established. In many of the cases presented at the Seminar, there are physical and financial contracts; in some, only financial contracts. Dispatch criteria are also different. Marginal cost dispatch criteria prevail in some countries such as Argentina, Chile, Colombia and Peru. Other countries use the marginal cost criteria but limited by certain energy policy national priorities. In the case of Spain and Great Britain this has been linked to the situation of certain natural resources, mainly coal. In Norway power is offered in blocs. Moreover, there are slight differences with respect to the responsibility concerning dispatch. While in countries like Argentina and the state of Victoria in Australia, there exists a duly organized, non-profit independent company, in Chile there is a club of generators and in Norway, Great Britain and Colombia the transmission company is in charge of dispatch".

Moreover, there are slight differences with respect to the responsibility concerning dispatch. While in countries like Argentina and the state of Victoria in Australia, there exists a duly organized, non-profit independent company; in Chile there is a club of generators and in Norway, Great Britain and Colombia the transmission company is in charge of dispatch.

Once again, I must insist that beyond these slight or subtle differences in the organizational structure, the countries have converged towards common goals.

Access to the network.

Regarding **transmission** -which is clearly a monopoly in all cases- there is a unanimous criterion with respect to non-discriminatory access to the network. I think this has been one of the important debates in recent years and has been one of the big achievements of the countries in the transmission sector: "open access".

On the other hand, in countries such as Spain, Australia and Colombia there are state-owned companies in the transmission system while in Argentina, Chile and Great Britain there are private transmission companies.

Different responsibilities regarding network expansion.

In Colombia and Great Britain, the operator is in charge of expanding the network. In Argentina and Chile it is the responsibility of the private sector -although in Chile it is state-oriented- while in Australia, the operator and the private sector are responsible for the expansion of the network.

On the other hand, Australia and Argentina differ from the rest since they have not included expansions in their tariffs; expansions have indeed been included in the tariffs in the remaining models under analysis. Some take into consideration the cost of replacement of the equipment. Regarding payment of a toll, in some cases it is only paid by generators, in others by users and still in other cases by users and generators.

"...In Colombia and Great Britain, the operator is in charge of expanding the network. In Argentina and Chile it is the responsibility of the private sector -although in Chile it is state-oriented- while in Australia, the operator and the private sector are responsible for the expansion of the network. On the other hand, Australia and Argentina differ from the rest since they have not included expansions in their tariffs; expansions have indeed been included in the tariffs in the remaining models under analysis. Some take into consideration the cost of replacement of the equipment. Regarding payment of a toll, in some cases it is only paid by generators, in others by users and still in other cases by users and generators".

Network planning.

Here we have seen models which include planning -although always indicative- and, on the other hand, we have the example of Argentina where somehow planning of the network is not envisaged. Within the countries where planning is effected, we find variables of centrally-organized planning, such as in Spain and Australia, while in Great Britain and Colombia the operator carries out the planning process. There is still a lot to be discussed on the issue to reach an agreement.

Regulated distribution.

With the interesting exception of Sweden, in all regulatory systems, **distribution** is separated from all the other activities. However, it is always a regulated activity.

Regarding tariffs, we have two possibilities or three, if we consider the Spanish alternative. The formula of the fixed cost plus the variable cost is used in most cases. Great Britain uses the "rpi - x" system which is not based on the length of the tranches. And Spain has standard costs.

On the other hand, not all the countries impose penalties for breach of quality standards. However, in all cases, it is compulsory to meet demand by making all necessary expansions, that is to say, that in the distribution sector the common carrier is the element common to all the systems we have seen.

Finally, in this segment, in some countries like Spain and Colombia, there co-exist state-owned companies and private companies. It is therefore obvious that there is great unity within diversity.

Changes in trading.

In the retail market considered as a competitive activity, there is a trend to divide trading from the operation and maintenance of networks. There is a difference between free customers and regulated customers with ceilings which are modified throughout time. That is how many countries like Great Britain have lowered it from 10 MW to 100 KW. Other countries are envisaging a total freedom of choice for users regarding their source of supply. Great Britain intends to implement it by 1998. In this sense, in Argentina we have expressed our concern regarding a relative lack of contracts because the place for this type of problems is the existence of a great amount of contracts.

Future challenges which have been considered and discussed.

One of the many preliminary conclusions of this Seminar is that in generation the issues to be solved refer to the question of how to promote or incentivate the promotion of competition. The uncertainty on future investments in generation also arose clearly from the presentations made by Chile and Great Britain and was quite precisely put forward by Argentina.

In transmission maybe the two most important issues are the problems of planning and expansion of the network. Both Argentina as well as the state of Victoria, Australia, are facing important challenges for expansion of the network. Particularly because they are the two only cases in which expansion is not included in the tariff and is consequently a response expected from the market.

In distribution, we come across the problems related to the auditing of costs and regulation based on performance. A very important issue in the "price-cap" mechanism is how to do right when establishing the value of "x" to promote efficiency.

In relation to distribution I think an issue which is common to all those present are the information asymmetries between regulators and the companies.

Future challenges pending debate.

So far the conclusions refer to some of the subjects we have developed in this Seminar. Undoubtedly, there are other subjects which were not included on the agenda whose debate cannot be delayed. I take this opportunity to at least mention them.

One issue refers to the impact of technological changes in the sector. Although these changes are not as quick or as spectacular as in other services, such as telephones, we should somehow envisage an increase in the efficiency of certain thermal machinery, the speed at which these machines are currently built and so on.... Our representative mentioned that, at some time or other, these machines would be ordered by catalogue and would be sent by mail. These are some of the technological signs which we, in our

"...We should somehow envisage an increase in the efficiency of certain thermal machinery, the speed at which these machines are currently built and so on.... Our representative mentioned that, at some time or other, these machines would be ordered by catalogue and would be sent by mail. These are some of the technological signs which we, in our capacity of regulators, should foresee because they may bring about substantial changes in the functioning of the market. Although side references have been made, there is a growing need to consider environmental problems.(...) Not only because of generation or gas emission in certain generation plants. (...) Electricité de France, for example, is already facing problems for the laying of high tension networks which are greatly objected to by environmentalists. Probably in the near future and at the cost you may imagine, it will be necessary to start thinking about underground high tension cables. Finally, we have not considered institutional aspects of regulation. Undoubtedly, we did deal with the institutional basis of the legal framework on which all of us here present must work, but on future occasions, it will be necessary to carry out a more in-depth analysis of jurisdictional matters. There are several inconveniences due to the overlapping of regulations between the national, state and municipal spheres".

capacity of regulators, should foresee because they may bring about substantial changes in the functioning of the market.

Although side references have been made, there is a growing need to consider environmental problems. Environmental problems are an issue of permanent concern in all areas and the electricity system is no exception. Not only because of generation or gas emission in certain generation plants. A few days ago, a high executive from Electricité de France told me this company was already facing problems for the laying of high tension networks which are greatly objected to by environmentalists. Probably in the near future and at the cost you may imagine, it will be necessary to start thinking about underground high tension cables.

Finally, and to conclude this brief classification, it is worth mentioning that we have not considered institutional aspects of regulation. Undoubtedly, we did deal with the institutional substratum, the basis of the legal framework on which all of us here present must work. But on future occasions, it will be necessary to carry out a more in-depth analysis of jurisdictional matters. There are several inconveniences due to the overlapping of regulations between the national, state and municipal spheres. This overlapping usually produces a certain degree of confrontation between the authorities who exercise the regulatory action.

Esta tirada de 500 ejemplares
se terminó de imprimir en
Talleres Gráficos Leograf S.R.L., Rucci 408,
Valentín Alsina, en mayo de 1997