

# Electricity Liberalization Experiences in the World

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## 1. Introduction

Over the past 10-15 years, there has been a worldwide trend to change the way in which electricity industries are organised, from an integrated monopoly, often owned by central government, to a de-integrated structure, usually privately-owned and operated, where possible, within a competitive market. This paper reviews the experience of these changes and draws lessons from a number of countries that have undertaken reforms.

A particular problem in discussing changes to the electricity industry is terminology. These changes are variously described as: 'reforms'; 'privatisation'; 'liberalisation'; 'deregulation'; and even 'modernisation'. These words often have positive connotations with the public when used in a publicity campaign for change, instead of being debated ahead of their implementation as critically as they should have been. More importantly, they do not accurately describe the changes that have taken place. Most changes have required a major strengthening of the regulatory regime so deregulation is certainly not appropriate. None of the terms describes a change from a monopoly to a competitive market (we argue that the competitive market in electricity cannot exist), arguably the most important justification advanced for making these changes. In this paper, we use either 'change', or 're-organisation' unless the meaning is more specific, e.g., privatisation.

## 2. What is the liberalised model and what is its rationale

### 2.1. The model

Electricity industries were aiming to replicate the model that the 1990 changes to the UK electricity industry were meant to accomplish, which, themselves, drew on experience in Chile in the early 1980s. The fundamental objective is to, wherever possible, replace (public) monopoly with (private) competition. To achieve this, the sector is divided into four separate activities:

- **Wholesale:** Electricity generation;
- **Retail:** Retail to final consumers;
- **Transmission:** The national (or regional) transmission networks that takes electricity at high voltage from point of production to centres of demand; and
- **Distribution:** The local distribution networks that take electricity from the transmission networks to final consumers.

According to theory, the rationale for this separation is that wholesale and retail can be made 'competitive' with prices set by markets. It is assumed that sectors run on competitive lines are invariably more efficient than those run as monopolies and as a result, consumers will benefit through lower prices. Transmission and distribution are natural monopolies and prices will be set by an independent regulator.

The most important element of the model is the creation of a wholesale market as this is the largest element of an electricity bill, typically making up more than 50 per cent of the overall charge for electricity. Reductions in the cost of generation can make a significant difference to consumers' bills. Transmission (5-10 per cent) and distribution (25-35 per cent) remain regulated monopolies so re-organisation here would not make a significant difference to their cost. Retail is only about 5 per cent of the cost to consumers, so retail competition should not, in theory, be able to make much impact on overall prices unless the wholesale market was so imperfect that some retailers are able to buy much more cheaply than others. A market with such serious flaws is unlikely to be efficient.

For this model to work, the following conditions are generally seen as necessary:

- An hourly or half hourly wholesale market should exist buying and selling electricity and would provide reliable price signals for purchases made outside this market and for investment decisions in new generating capacity;
- A retail market should exist, in which all consumers are able to switch readily between retailers. This would place competitive pressure on suppliers to purchase wholesale power as cheaply as possible and inefficient or high-priced suppliers would be squeezed out of the market;
- Access to the networks should be available to all wholesalers and retailers on equal terms. This would require some form of 'unbundling' of the network businesses from the retail and wholesale businesses; and

- A regulatory body should exist to ensure that competition is fair, access to networks is impartial, competitive fields of companies exist in both wholesale and retail activities, and consumers are protected from exploitation by companies.

One policy measure adopted by some countries was to unbundle or separate generation and retail. This would appear to be a necessary step if wholesale markets are to be 'liquid', in other words, a significant proportion of sales pass through the market. If the market is dominated by integrated generator/retailers, there will be no 'liquidity' in the wholesale markets and the main justification for the changes will be lost because price signals will not be reliable enough for buyers and sellers to trust. As a result, in some countries that followed the British model, such as Brazil and Colombia, integration of generation and retail was made illegal.

However, integration of generation and retail is highly desirable, and probably necessary for generation companies because it means that, instead of selling their power into an unpredictable wholesale market where they cannot know from one 30-minute period to the next how much power they will sell and at what price, if they integrate generation and retail, they sell directly to final consumers with price and volumes that are much more predictable.

In the Chilean and British electricity models, a key goal was to change from national public ownership to private. For some organisations promoting changes to the electricity sector, such as the World Bank, privatisation is still the main objective and the introduction of competition is a much lower priority. However, the European Union (EU) has no jurisdiction over ownership of member states' industries so change of ownership is not, and cannot be, any part of the EU's attempts, through its Electricity Directives, to create a single European market in electricity. But it is forcing open markets, meaning that private owners must be allowed into the sector.

The Scandinavian countries of Norway, Finland and Sweden did open their markets with some success, but the industry remains mainly in public hands and change of ownership has not been part of the changes.

### 3. Criteria for judging electricity re-organisation policies

An important issue is the criteria against which these changes should be judged. The most obvious starting point for judging a policy is to evaluate it against the objectives that the policy was expected to achieve. There have been a wide range of motivations for undertaking re-organisations of the electricity sector. Some are explicit and relate to the sector, such as improving the efficiency of the electricity industry by introducing competition. These are the most straightforward, although not necessarily the easiest to evaluate. However, other objectives are not specific to the sector. For example, privatisation programmes frequently sought to sell all state-owned assets simply because they were state-owned, not to address any particular problems in the electricity sector. In other cases, the motivation was not explicit at the time. For example, Ministers in Mrs Thatcher's government acknowledged after they left power that a primary reason for privatising the electricity industry was to reduce the power of the trade unions.<sup>1</sup> In this objective, the changes were undoubtedly successful, and the British coal-mining union now has few members and minimal power.

In other cases, changes to the electricity industry were imposed on national governments by international agencies such as the International Monetary Fund and the World Bank who have frequently made loans conditional on the recipient country undertaking a privatisation programme. The objective for the country involved was simply to gain access to funds from the IMF or World Bank. For the World Bank, the changes were predicated on the assumption that privately-owned companies were sure to be more efficient than publicly-owned companies. The World Bank also assumed that foreign owners from developed countries would bring expertise and access to investment capital. This expertise would improve the efficiency of the utility and reduce prices, while the access to private sector capital would reduce the amount of capital that government-owned enterprises would need to borrow.

Thus, a policy that brought no net benefit to electricity consumers might be regarded by government as successful if, for example, it facilitated a World Bank loan or reduced the power of trade unions. However, while it is important to recognise this diversity of motives, in terms of drawing lessons for countries considering re-organising their electricity industry, the relevant question is: has the re-organisation brought a

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<sup>1</sup> See for example, Ridley, N., 1991. *My style of government*. Hutchison, London, Walker, P., 1991. *Staying Power*. Bloomsbury, London, Parkinson, C., 1992. *Right at the centre*. Weidenfeld and Nicholson, London, and Lawson, N., 1992. *The view from no 11*. Bantam Press, London.

net benefit to electricity consumers and in this paper, this is the question we seek to address. For some developing countries where coverage of the network is not complete, a particular issue is how far the policy allows for all citizens to gain access to affordable electricity supplies

## 4. Case studies

### 4.1. Countries that have chosen not to re-organise

An increasing number of countries have taken political decisions to abandon plans to re-organise their electricity sectors before competition or privatisation had been introduced. These include: Korea, Thailand, Indonesia, South Africa, Mexico and Sri Lanka. The reasons for these changes of political direction have varied. In Korea, the government, after powerful opposition to privatisation by Korean unions, commissioned the Korean Tripartite Commission to carry out a detailed investigation of the results of re-organisations elsewhere in the world. On the basis of its investigations, the Commission recommended that privatisation be abandoned, a recommendation accepted by the Korean president in 2005.

In Thailand, the privatisation process was declared illegal in March 2006 by the Supreme Administrative Court on a variety of grounds. It ruled that: 'The government has abused its power in privatizing the state enterprise'. A similar verdict was passed in Indonesia in 2004, where the Constitutional Court stopped privatisation of the nationally-owned utility, PLN on grounds that it violated the country's constitution. However, in 2007, the government was again planning to sell shares in PLN's largest subsidiary, Indonesia Power in the second part of 2007, so the future of PLN is still in doubt.

In South Africa, Sri Lanka and Mexico, governments have withdrawn plans to privatise the main electricity companies. How far these decisions are pragmatic ones based on the implausibility of attracting a good field of reputable companies to buy the companies, how far they are a response to the unpopularity of these privatisations and how far they are considered decisions based on experience elsewhere is difficult to say. However, these decisions are far from immutable. In some cases, such as Korea, national companies had already been split up into several parts in preparation for privatisation and introduction of competition. Unless governments take a decision to recreate the old companies, the new structure will be ready-made for a future government to resuscitate the privatisation policy. In others, such as Mexico, the government placed restrictions on the part the nationally owned companies could play in new investment and, ultimately, this will lead to a withering away of such companies as the sector is increasingly dominated by new privately-owned entrants.

The lesson from these countries is that the momentum for privatisation and introduction of competition is strong and decisions not to adopt these options should not be regarded as immutable.

### 4.2. 'Success' stories

#### 4.2.1. The UK

While changes in the Chilean electricity industry pre-dated the UK's 1990 privatisation, UK experience was the first where the model became clear. The industry in England & Wales was previously nationally owned<sup>2</sup> and comprised a generation/transmission company (CEGB) and 12 regional distribution/retail companies. The CEGB was split into a privatised transmission company (NGC), two privatised fossil-fuel generation companies (National Power and Powergen) and a publicly-owned nuclear generation company (Nuclear Electric). The 12 regional electricity companies (RECs) were privatised intact with an accounting separation between their retail and their distribution businesses. The much smaller, but interconnected Scottish system previously comprised two regional, fully integrated companies, also both publicly owned. These companies were privatised intact apart from the nuclear plants which remained in public ownership in a new company, Scottish Nuclear.

However, the model was severely compromised by practical considerations. These included:

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<sup>2</sup> In fact there are three electricity systems in the UK. One covers England & Wales, one covers Scotland and is synchronised to the England & Wales system and one covers Northern Ireland. The latter was recently connected by DC cable to Scotland and is synchronised to the Republic of Ireland system. The Scottish system is now largely integrated with that of England & Wales. This account mainly describes the England & Wales system that accounts for about 90 per cent of UK electricity demand.

- The wholesale market was badly designed and the government imposed transitional contracts and purchase obligations. The Regulator also allowed new long-term power purchase contracts. These arrangements meant that, until 1998, the amount of power that could be bought and sold at spot-prices or spot-related prices was only 1-2 per cent of total demand. This meant that the wholesale market could not play a major role in price setting, and prices were volatile and unreliable;
- There was ambiguity about how far the generation and retail sectors should be separated. The 1990 structure created separate sectors, but generators were allowed to sell to large consumers and retailers were allowed to build their own power plants;
- An attempt to privatise the nuclear plants failed and left the system dominated by just two privatised fossil-fuel generation companies with little incentive to compete. The nuclear plants were separated and owned by a new, subsidised and publicly-owned company that could play no part in price-setting;
- There was only a minimal unbundling of the RECs' distribution and retail businesses and the RECs also jointly owned the transmission company;
- Retail competition was phased in over eight years with residential consumers only able to choose after 1998; and
- The Scottish system had few competitive mechanisms, no wholesale market, and little opportunity for new entry.

Since then, the system in Britain has evolved considerably, in some respects towards the 'ideal' model and in some respects away from it.

### **Moves towards the ideal**

The networks have been much more fully separated from retail and generation. In 1995, NGC became a fully-independent company and in 2001, the RECs were required to make a legal split between their distribution and retail businesses. This meant that these businesses must be in separate companies, although they could be subsidiaries of a common owner. Retail competition is now open to all consumers.

The generation duopoly of National Power and Powergen has been progressively broken up so that there are now about eight generation companies, none with a market share of more than about 20 per cent. In 1996, Nuclear Electric was re-organised into a small publicly-owned company with the oldest plants and a privatised company (British Energy) with most of the capacity and with no explicit subsidies.

The Scottish system is now effectively integrated into the England & Wales system, with the wholesale market now including Scotland and much stronger connections between Scotland and England allowing greater trade across the border.

### **Moves away from the ideal**

Attempts by the generators to buy the retail businesses of the RECs were resisted by government until 1998, when the government caved in. As soon as government allowed such takeovers, the 12 retail businesses of England & Wales were quickly taken over by generation companies. The generation and retail markets are now dominated by six integrated generator/retailers. These are the successor companies to the two large privatised generation companies (National Power and Powergen), the two Scottish companies, which expanded into England & Wales, the French electricity company EDF, which bought three retail businesses and some generation capacity and the privatised gas retail company, Centrica, which sells gas and electricity as a package.

Virtually all the independent generators collapsed in 2002 when the wholesale price fell and at one point, about 40 per cent of the Britain's generating capacity was owned by collapsed companies. About a third of the capacity was nuclear and the privatised nuclear company had to be rescued (see below) by government. The rest of the plant was largely bought by the six large integrated generator/retailers.

A decision was taken to abandon the original wholesale market design (a 'gross pool' type model) in 1998 and it was replaced in 2001 by a more complex voluntary ('net pool') market. In practice, the difference between the two systems is quite small because, as before, the vast majority of power sold does not pass through the visible market. Most is self-dealing by integrated generator/retailers or via long-term confidential contracts. The amount of power bought and sold at known prices is still less than about 2 per cent of the market. Inevitably visible prices are too volatile and unreliable for companies to rely on the market to buy power and companies are even less likely to use these prices as an investment signal.

## Other changes

The progressive loosening on restrictions on the takeover of the privatised companies has seen the UK electricity industry fall largely into foreign hands. The main investors initially were US electric utilities from 1995-98 taking over RECs. However, after losses in markets outside the USA, American utilities began to withdraw from foreign markets from 1998 onwards and US utilities now have a negligible presence outside the USA.

The two privatised generation companies (National Power and Powergen) were not successful and were taken over by the two largest German electricity companies (RWE and E.ON respectively). Despite their dominant position, they made serious errors in the UK and in the foreign investments that left them vulnerable to take-over. One of the Scottish companies was taken over by a Spanish electricity company (Iberdrola) and EDF bought into the UK market by buying generating capacity and several retail and distribution businesses. The two remaining UK-owned companies (Centrica and the other Scottish company) are not expected to remain independent for long and are expected to be taken over by foreign companies.

British Energy collapsed in 2002 and had to be rescued at huge cost to UK taxpayers (ca US\$20-30bn). As part of the deal, the British government took a 65 per cent stake in the rescued company although it subsequently sold 25 per cent of the shares in May 2007.

The electricity and downstream gas industry has effectively merged. All the major electricity retailers sell gas and the major gas retailer has been the only successful new entrant into the electricity market. The gas and electricity transmission networks are owned by the same company and there is strong overlap in the ownership of the gas and electricity distribution networks.

## Evaluation

If the objective was to create an industry in which prices would be set by an open market and investment decisions would be taken on the basis of market signals, the UK experiment has not succeeded yet and there are strong reasons why, with the current market structure, it cannot.

The dominance of the six large generator/retailers means new entry by generators or retailers is implausible especially after experience in 2002 when virtually the entire independent power generation sector was wiped out. Given the minimal liquidity of the wholesale market to whom could a new generation company sell its power? And from whom could a new retail company buy its power? There are already strong suspicions that the six companies are not behaving competitively and with mergers and takeovers likely amongst these six companies, the oligopoly nature of the industry will be strengthened.

For consumers, the UK is one of the few countries that have introduced retail competition where switching supplier amongst residential consumers is common. However, the evidence is that by making the retail business a market, small consumers have to compete against electric intensive industry to get cheap power and, as a result, large consumers have done much better than small consumers. The process of switching is chaotic and the evidence is that consumers are not able to identify the cheapest deal<sup>3</sup>.

### 4.2.2. The Nordic market

#### The reforms

The Norwegian government's re-organisation of its electricity sector in 1991 followed closely on the heels of the UK's. In many respects, and not by coincidence, the model was similar to that followed in the UK<sup>4</sup>. However, there were important differences.

- The Norwegian electricity was fully publicly owned through the nationally owned Statkraft (about 25 per cent of generation and all of transmission) and through a large number of locally owned companies. The changes did not in any way affect this ownership pattern. The large number of generation and distribution/retail companies meant that the only restructuring necessary to create a potentially competitive market was the separation of the transmission network as Statnett.

<sup>3</sup> Effect of Liberalising UK Retail Energy Markets on Consumers, in D. Helm (ed), The New Energy Paradigm, Oxford University Press, April 2007, Part III, Chapter 12, pp348-371.

<sup>4</sup> The Norwegian government was in the process of re-organising the Norwegian electricity system on regional monopoly lines, but the attractions of the British model persuaded it to change direction at the last minute and go for a competitive model.

- The Norwegian electricity system is 100 per cent hydro-electric mostly through storage dams. Even before the changes, a spot market for surplus power had existed for 20 years to allow companies with low water stocks to buy power from companies with surplus water in their dams through a voluntary balancing spot market (net pool). The wholesale market created was simply a development of this existing structure. Unlike the UK Pool, it was not a compulsory market and bi-lateral contracts outside the visible market were expected to be the main vehicle for power sales. However, perhaps because it built on an existing and trusted market, from the start, liquidity has been high, contracts reflect Pool prices and prices are generally seen as accurately reflecting the supply and demand position.
- Retail competition was allowed for all consumers from day one. However, the electric-intensive industry that the Norwegian economy depends on was given 15-20 year contracts outside the market at low prices, insulating them from the effects of the market.

The Nordic countries, Norway, Sweden, Finland and Denmark, had historically traded electricity to balance their systems. Sweden is about 50/50 hydro and nuclear, Finland is divided between hydro, thermal and nuclear, while Denmark is largely fossil fuel. This trade was advantageous to all four countries reducing the reserve margins needed, allowing the hydro-generators to sell surplus hydro-power in wet years to the fossil-fuel based systems and in dry years for the trade to reverse. In the late 1990s, the Norwegian market was expanded to include the other three Nordic countries in a single electricity market, NordPool. Sweden and Finland both had nationally owned companies that were dominant in the home markets with much of the rest of the market made up by locally owned companies and in the case of Finland, plant owned by manufacturing industry. There were a large number of companies in Denmark almost all of which were owned by local government.

### Outcomes

Unlike the UK market, the Nordic market has not seen massive changes since its creation. The company structure has evolved a little but there have been no major changes and only limited entry by companies from outside the Nordic region.

The wholesale market, Nordpool, retains high liquidity (over 30 per cent) and high credibility with bilateral contracts between generators and retailers and some retail contracts indexed to the spot price. Retail competition for small consumers seems relatively effective in some countries, e.g., Norway, but in Denmark and Finland, switching rates between companies are minimal.

However, the major question mark over the changes is the ordering of new generating capacity. Since the mid-1990s, there has been minimal investment in new generating capacity other than for renewable sources, especially in Denmark, which are subsidised and do not have to compete in the market. A large nuclear plant in Finland is also being constructed, but this is being built under very special terms. It has a fixed price construction contract, a customer prepared to contract for the output of the plant at cost-plus terms for the life of the plant, access to very low cost finance (interest rate of 2.6 per cent) and export credit guarantees for much of the finance.

Being a hydro-based system, there is more spare capacity than there would be in a thermal system to cover the risk from dry years but with demand growing (albeit slowly) this margin has been eroded and dry winters present an ever-increasing threat to supply security. Availability of power in Norway could be more than 50 per cent higher in a wet year than in a dry year and if, at the end of summer, levels in reservoirs are low, prices could be high and equally if there has been a warm, wet winter, prices in January could be low.

In 1996, prices were at a historic peak, nearly three times the level they were at in 1993, but declined over the next four years before beginning to rise slowly to mid-2002. From July to December 2002, however, prices rose by a factor of more than five to a peak of NOK550/MWh (€66/MWh). Prices fell somewhat after then but remained at levels near the 1996 peak until winter 2005, when prices began to rise, continuing to rise after the winter had finished. By August, prices were near the peak levels of 2002/03, about 75 per cent higher than the previous August high. This was only partly the result of problems with the Swedish nuclear sector that resulted in the unplanned closure of two units at the end of July, but even before this, prices were around NOK400/MWh in July, 60 per cent higher than in any previous July. Subsequently, a very wet autumn saw prices fall steeply. However, while wet winters might disguise the problem for a few more years, the threat to security of supply if substantial new capacity is not built is clear.

Equally important, it is not clear how consumers, especially electric-intensive industry and residential consumers in Norway can tolerate this volatility and unpredictability of prices. Electric-intensive industry, for which electricity purchasing might account for about half their costs, will be insulated from market volatility until its 15-20 year contracts run out, but unless these are renewed, it will then be exposed to the full risk of market-based prices. Space-heating is almost always through electricity and in such a cold climate, the effect on residential consumers of high prices will be serious. Even if the changes do produce a more efficient industry, this will be little consolation if price volatility means the country's electric-intensive industry is forced out of the market and residential consumers are too scared of their electricity bills to heat their dwellings to an adequate level.

## **Evaluation**

The Nordic market is clearly one of the most successful, if not the most successful, electricity industry re-organisation worldwide. It has seen few of the abuses of markets that other markets, such as UK, Spain and Italy have seen. How far this success is due to the moderating influence of public ownership and the perception that Nordic business is conducted more ethically than in Anglo-Saxon countries is hard to determine. Nevertheless, if new capacity is not soon constructed and prices become even more volatile, the political pressure to abandon the market experiment will be overwhelming.

### **4.3. Failures**

#### **4.3.1. Brazil**

The Brazilian electricity industry is effectively 100 per cent hydro-electric, based on huge storage dams (the largest is the 12,000MW Itaipu plant), often with a capacity of three years' of water. Demand has grown strongly since the mid-80s, typically at 7 per cent per year.

Up to 1995, the system was primarily publicly owned. A federally-owned holding company, Eletrobras, owned the five main regional generation companies and the transmission company. The distribution sector was primarily owned by state government. Brazil was one of the first developing countries to try to emulate the British model. Under pressure from the World Bank, it embarked on a programme of privatisation selling some distribution companies even before the model for the electricity sector to be adopted had been decided. Brazil received advice from Coopers & Lybrand in 1995 on how to restructure their electricity industry. Its advice, in Ukraine and Colombia, was to implement a system that was effectively identical to that chosen in Britain in 1990 despite the very different priorities, resource dispositions and geographic characteristics of the two countries. The distribution companies were progressively sold over the following five years, mainly to utilities from the USA, Spain, Portugal and France. However, attempts to privatise the generation sector came to nothing. Restrictions on public spending meant Eletrobras could not fund new generation and foreign investors did not build a significant amount of new plant. After a couple of years when water levels were dangerously low at the start of the wet season but were replenished by wet rainy seasons, water levels were again low in 2000. This time, rain levels were still low at the end of the wet season. It became clear that supply until the next rainy season was about 25 per cent below expected demand. A crash programme of power reductions did mean that there were no major blackouts and the subsequent rainy season was wet enough to replenish water stocks. A very expensive programme of emergency generation such as diesel generators was also implemented.

Much of the demand reduction, through measures such as energy efficient light bulbs and greater public awareness of demand, meant that demand did not rebound strongly and the immediate shortage of capacity passed although the expensive emergency generation measures still had to be paid for. Soon after, the Lula government was elected on a promise to halt privatisation and severely reduce the expected role of markets in the electricity sector.

Most of the foreign companies owning the distribution companies withdrew and ownership of these companies is now generally in Brazilian private hands. The system for building new plants has been taken back under the control of the government through a new Energy Planning Agency (EPE). This effectively reviews supply and demand, and commissions the construction of new capacity on the basis of a competitive bidding process in which the publicly owned companies can take part. The Brazilian government has negotiated a relaxation to its public spending limits for expenditure in productive investments and although this is not sufficient to allow Eletrobras to fulfil all the investment needs of the electricity sector, it is an important concession. Experience with the new system is limited but so far seems good.

### 4.3.2. Ontario, Canada

In 2002, the Canadian province of Ontario opened its electricity market to competition with the introduction of a wholesale spot market and, from May 1 2002, the launch of retail competition for all consumers. Small consumers could either purchase from a competitive retailer (about 1 million of Ontario's 4.4-million retail customers chose this option) or 'standard supply service' (SSS) from their local distribution utility. Those that chose the latter paid rates based on the fluctuating price in the Ontario wholesale market. In 1999, in preparation for this, the integrated company, Ontario Hydro, owned by the government of Ontario was split into a network company, Hydro One and a generating company, Ontario Power Generation (OPG). Measures were introduced to break the dominance of OPG in generation partly through plant sales, for example, the Mississagi River system was sold to Brascan in 2002 and partly through leasing facilities, for example, the Bruce nuclear power plant was leased to a consortium known as Bruce Power in 2001. However, plans to privatise Hydro One and OPG failed and OPG still remains the dominant generator in the province. The distribution sector, previously dominated by municipal companies was not restructured but the municipal companies were turned into 'for-profit' companies with the opportunity to privatise or part-privatise.

By November 2002, after a series of price spikes, which saw retail rates nearly double in the peak-demand summer months, the Ontario government suspended the retail market. They capped the price small consumers paid at 4.3 cents per kWh and refunded amounts paid over that price cap level. The privatisation of Hydro One was stopped. In March 2004, the price cap was raised to 4.7 cents per kWh for the first 750 kWh and 5.5 cents for energy used above that.

In 2004, new proposals were put forward under which the key body would be a new Ontario Power Authority, a public body, at arm's length from government, set up in January 2005. The Ontario Power Authority has the responsibility to monitor supply and demand and, where appropriate, to commission the construction of new supply facilities and implement demand reduction measures. The wholesale electricity market continued, largely unchanged and choice of retail supplier would be available to all consumers, although small and domestic consumers would be able to choose a regulated tariff. There are still doubts whether the new system will provide enough generating capacity especially if the Ontario government sticks to its plans to close its coal-fired plants and the nuclear plants nearing the end of their life are not refurbished.

## 5. Lessons and Issues

Despite nearly two decades of experience with competitive electricity markets, the new model cannot be claimed to have been proven. Some areas remain untested while important lessons have been learnt in other areas.

### 5.1. Lessons

#### 5.1.1. Competitive markets will not produce diversity of energy supplies

It is often claimed that private industry is much better than publicly-owned industry at dealing with risk and as a result, it is expected that privatised electricity companies will develop diversified portfolios of generation to hedge their risks. For the electricity sector, this has proved not to be the case. The introduction of markets has shifted some of the risk of investment from electricity consumers to the companies with the result that the risk premium on investment is much higher. This has made investment in high capital cost options such as nuclear power, unattractive, and favours options where costs and performance can be guaranteed, notably for combined cycle gas turbine (CCGT) gas-fired stations. As a result, in markets where competition has been introduced, new investment provided by the market without consumer or government subsidies and guarantees has almost invariably been for CCGTs. If climate change objectives are to be met, new non-fossil fuel options, such as renewables and nuclear power will have to be built and there is no evidence the market will be willing to build these unless they are removed from the market and given publicly funded subsidies and guarantees.

#### 5.1.2. Privatisation and introduction of markets do not remove risk from consumers

One of the major criticisms of the old system was that consumers bore all the investment risks. If a utility made mistakes, the costs of these mistakes were often passed on to consumers. In fact, this was well recognized by US regulators who had detailed procedures to prevent utilities passing on unjustified costs to consumers. However, risk exists and if the risk is not going to be borne by consumers, private industry will

have to be paid for bearing this risk. While this may act as a discipline on utilities to control costs, the introduction of markets brings in a new risk, market risk. Essentially, the situation is analogous to a consumer deciding whether to buy insurance. If the consumer does not buy insurance, they will bear the full risk if anything goes wrong. However, if they opt for insurance, they will have to pay an insurance premium, which, in the long-term will cost as much as the potential losses and will also include a fee to the insurer. It is far from clear whether replacing monopoly by markets will reduce costs for consumers by reducing the price they have to pay to deal with investment risk.

#### **5.1.3. Foreign investors do not generally bring major new skills**

There is little evidence that, as promised by the World Bank, Western utilities would bring skills that did not exist in countries where they invested. Arguably, the reduction in R&D and training and the substantial redundancy programmes that have always followed privatisation of electricity industries have eroded local skills and capabilities. Many of the foreign investors have re-sold the companies they bought within a few years leaving the local industry in a poorer shape than when the foreign companies first moved in.

#### **5.1.4. Foreign investors do not bring additional capital**

One of the paradoxes of the World Bank's privatisation policy is that, while it is supposed to bring in foreign capital, by channelling the capital to buy existing companies, the incoming capital is being used to buy existing assets. It would seem more logical if the objective was to access capital for new investments for it to be channelled into new investments. Evidence from Africa shows that foreign investors will only invest if there is clear evidence that they will make a commercial rate of return on that investment<sup>5</sup> and, as acknowledged by the World Bank, the rate of return for foreign investors in the electricity sector has been poor<sup>6</sup> (Estache et al, 2005) and unlikely to encourage investment.

#### **5.1.5. The field of foreign investors is small and unlikely to grow**

The mid-1990s saw a huge growth of investment outside the USA by American companies. Some were companies that were not traditional utilities, such as Enron, AES and Dynegy, while others were traditional utilities operating through subsidiaries, such as Mission Energy (SoCalEd), Entergy, Duke, Reliant, TXU, PSEG. By the late 1990s, it was becoming clear that these foreign investments were far more risky and less profitable than expected and the companies started to dispose of their acquisitions, in some cases, simply surrendering the asset to the banks that had financed the acquisition. The European utilities were more cautious and only EDF (France), Tractebel (Belgium/France), Endesa (Spain), EDP (Portugal) and Iberdrola (Spain) made major acquisitions. The results were also disappointing and in some cases, (EDF), assets outside Europe have been sold and in others, no new investments will be made.

In recent years, the main investors in foreign electricity sectors have been Pacific Rim companies such as Cheung Kong (Hong Kong), YTL (Malaysia) and Singpower (Singapore). These companies are relatively small compared to earlier US and European investors and have tended to focus on purchasing networks rather than buying more risky generation assets. Whether their experience will be better than that of their European and US predecessors remains to be seen, but it seems unlikely they will have the financial power to become major investors.

It is therefore probable that for the future, foreign investment through traditional utilities with existing skills in the sector will not be significant and countries privatising their electricity industry with the expectation that they will see major foreign direct investment will be disappointed.

#### **5.1.6. Labour conditions are likely to deteriorate due to out-sourcing and cost-cutting**

Wherever privatisation and introduction of competition has taken place, there have been major reductions in employment in the electricity sector. This is often portrayed by advocates of privatisation and introduction of competition as being solely due to the improved efficiency that private ownership and competition bring. In fact the reasons are more complex and often less worthy. They include:

- Changes in generation technology;

<sup>5</sup> Hall D. 2007 'Electrifying Africa: power through the public sector', PSIRU, London. <http://www.psiru.org/>

<sup>6</sup> Estache A., Perelman S. and Trujillo L. 2005. Infrastructure Performance and Reform in Developing and Transition Economies: Evidence from a Survey of Productivity Measures. World Bank Policy Research Working Paper 3514, February 2005. [http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2005/03/06/000090341\\_20050306101429/Rendered/PDF/wps3514.pdf](http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2005/03/06/000090341_20050306101429/Rendered/PDF/wps3514.pdf)

- Out-sourcing of non-core activities;
- Out-sourcing of more central activities;
- Reductions in R&D;
- Mergers and takeovers; and
- Short-term cost-cutting.

Overall, EPSU has estimated that 300,000 jobs have been lost in the EU's electricity industries since 1990. A rigorous Austrian study compared experience in a number of foreign service sectors with that of Austria.<sup>7</sup> It found:

- Extensive staff retrenchment in all sectors;
- Reduction of labour cost through income cuts and changes in pay structures;
- Flexibilisation, condensation and lengthening of working hours;
- Flexibilisation and individualisation of employment relationships;
- Adverse changes in working conditions;
- Basic and advanced training possibilities deteriorate; skill building options are limited to the core staff. Measures aimed at promoting women appear to be more rhetorical than real; and
- Deteriorating conditions for collective workers' representation.

#### **5.1.7. Training and R&D budgets are likely to be cut**

Under the previous model, utilities had strong incentives to carry out training and R&D. They would benefit from a well-trained work-force and from new technology. Because they had monopoly status, the 'free-rider' problem of competing companies poaching their workers and taking advantage of their R&D was not a threat. As a result, research and training was often done on a collaborative basis. If electricity is made a competitive activity, the 'free-rider' problem becomes serious and money spent on R&D and training is discretionary spending that can be, and generally is, saved and distributed as extra profits.

#### **5.1.8. Companies will frustrate the aim of introducing competition if they can**

Whilst some companies claim to relish competition, the reality is that a company's first duty is to their shareholders and to maximise profits for them. Competition is risky and, in theory, will force prices and profits down to a minimum level. There are a number of ways that companies can frustrate the aim of competition apart from the unlawful trading practices such as those adopted by Enron. The first is mergers and takeovers so that the field of competing companies is small enough that companies know that their interests are best served by not competing aggressively. If the market is dominated by very large companies, this will be a strong disincentive for small companies to enter the market because of fear of the market power of the dominant companies.

Another strategy is to integrate generation and retail businesses. This will mean the generation business is not exposed to the risk and volatility of the wholesale market and, if as in the UK, the market is dominated by a few larger generator/retailers, the wholesale market will become meaningless and entry barriers will be insurmountable.

#### **5.1.9. IPPs are risky and are anti-competitive**

Independent Power Producers (IPPs) have been used in a number of countries either to provide additional generating capacity that the incumbent supplier could not finance or to diversify the field of generating companies. However, IPPs will only be feasible if they are given a long-term contract for power at prices that are guaranteed to cover all costs, a Power Purchase Agreement (PPA). Particularly for foreign investors, these guaranteed profits must be denominated in a tradable currency like the US dollar. This has proved to be a major risk to countries commissioning IPPs and IPP contracts have brought a number of utilities in the Pacific Rim to the brink of bankruptcy. This has happened when local currencies fell sharply and when demand also did not grow as expected. The take-or-pay provisions of these contracts mean that power plants owned by the local utility, which generated at a much lower price than the IPPs, could not be used. Even if we put these heavy risks on one side, IPPs are blatantly anti-competitive. They typically have take-or-pay contracts for base-load power at pre-determined prices. The power they supply is therefore completely insulated from the market for the duration of the PPA.

<sup>7</sup> R Atzmüller & C Hermann (2004) 'The Liberalisation of Public Services and Its Effects on Employment, Working Conditions and Industrial Relations' Working Life Research Centre, Vienna.

## 5.2. Issues

### 5.2.1. Generation security of supply

One of the promises of those advocating markets is that markets would be much more accurate in matching supply and demand avoiding over-investment whilst still ensuring there is enough capacity to guarantee security of supply. This is based on the premise that the wholesale market will provide accurate price signals. A high price will indicate when new investment is needed and a low price will force the least efficient suppliers to exit the market.

Whilst this sounds plausible in theory, it does assume, first, that the price signals are reliable, second that the signals will appear in time for the companies to respond efficiently and third, that it will be in companies' interests to respond to the price signals. None of these assumptions is credible. The liquidity of markets has been very low with the result that price signals are not credible. Indeed, it is in the interests of companies to make the price signals unreliable because it will convince customers to buy power on more certain, long-term contracts outside of the market.

Signals could appear at very short notice. The low elasticity of demand for power means that if demand is satisfied, with, say, a 5 per cent margin of spare capacity, prices will be low, but if supply and demand are very close, prices will sky-rocket because consumers will pay a high price just to keep the lights on. This means price signals will only be felt only a short time before there are shortages, far less time, five or more years, than it would take to expand capacity by anything other than expensive emergency measures.

As was demonstrated in California, generators make most money from a shortage, so unless entry barriers are very low, companies will have a disincentive to invest because investment will reduce the price and hence their profits. As argued above, oligopolisation and integration of generation and retail mean barriers to entry will be high.

### 5.2.2. Climate change

It is now widely acknowledged that climate change is a major global threat and strong measures to reduce consumption of fossil fuels are needed. The European Union (EU) headlines its energy policy, an 'integrated climate and energy policy', implying that policy has been developed to simultaneously satisfy the objectives of reducing greenhouse gas emissions and maximising economic efficiency. Blatantly, this is not what has happened in the EU. Policy has been derived with the objective of economic efficiency only in mind with climate change measures grafted on at the end. This will only be an efficient way to meet the twin objectives if competition/liberalisation measures are, at worst, neutral to meeting climate change objectives.

This is clearly not the case. In a monopoly market, generators can be instructed ('command and control' policies) as to what technologies to deploy and measures can be taken to ensure that the profits of retailers are not dependent on how much power they sell. This means they have no incentive to sell more electricity. Retailers can be used as a vehicle for implementing energy efficiency measures through 'least cost planning' policies. These are based on the assumption that consumers want an energy service, not kWh *per se*. It may be cheaper to buy energy efficient equipment and pay a small amount extra per kWh than to meet the demand that would have arisen if energy efficiency measures had not been undertaken.

All the evidence suggests if companies are left to choose, they will buy fossil fuel plant and they are highly unlikely to choose low carbon sources such as renewables and nuclear power. With a field of competing retailers, companies will make more money the more power they sell, and implementing energy efficiency measures with a consumer who could opt to switch retailer at short notice would make no commercial sense. So, meeting environmental objectives can only be at the expense of compromising competition. The 'market-based' mechanisms, such as the EU's carbon trading scheme, are a poor substitute for a real market and companies generally find ways to exploit these mechanisms for their own advantage rather than meeting the explicit objective.

### 5.2.3. Will retail competition lead to a fair allocation of costs?

One of the claimed advantages of competition is that cross-subsidies (usually from large consumers to small consumers but sometimes in the reverse direction), seen by free market economists as wasteful and inefficient, will be driven out, implying that competition will lead to a fair allocation of costs, in other words, the prices a consumer paid would reflect the costs they imposed.

In fact, in a free market, the price a consumer pays will reflect their bargaining power, and introducing retail competition pits residential consumers against electric-intensive industry in buying power. This is of course

an uneven contest and, an aluminium smelter, for example, will have far more knowledge of costs and far more bargaining power than an individual small consumer with the result that disproportionately low prices will go to the aluminium smelter, at the expense of the residential consumer.

Retail competition for small consumers has invariably proved problematic with high transaction costs, logistical difficulties in switching and very low switching rates implying that consumers either have no incentive to switch or lack the confidence that they can identify the best deal. This is not surprising because, at best, the only information consumers have is the price on the day they try to identify the cheapest supplier. It could easily happen, as happened to the author, that the cheapest supplier was identified, but 10 days later, before the switch took place (which actually took nearly 5 months), the new supplier raised its charges.

#### **5.2.4. Network ownership and security**

One of the main priorities in Europe has been to ‘unbundle’ the networks so fully that access to the networks by competing generators and retailers on equal terms can be guaranteed. The first EU Directive (1996) required integrated companies to make only an accounting separation between their network activities and their generation/retail activities. This was deemed to be inadequate and in the revised Directive of 2003, companies were required to make a legal split between their network and the competitive activities. This meant that the networks had to be owned by a legally separate company, although this network company and, say, a generating company could be subsidiaries of a common parent company.

Again, the Commission believes this separation is inadequate and is now pressing for a new Directive that will enforce ownership separation. In other words, the owners of the network companies should have no interest in any electricity generation or retail activities. This seems sensible in theory, but in practise, it raises the issue, not addressed by the Commission, of who should own the networks.

In terms of security of supply, the networks are the most important part of the system. Power station failures can usually be dealt with resulting in no inconvenience to consumers but a network failure could ‘black-out’ a region or an entire country. It seems sensible that the owners of the network should have a strong incentive to maintain and develop the network in a way that ensures long-term supply security rather than short-term profit. Increasingly infrastructure industries are being bought by companies with no obvious commitment to the sector and, for example, some electricity networks in the UK have been bought and sold 4-5 times in less than a decade. To deal with this risk, some countries have chosen to take networks into public ownership. This is feasible for the high-profile transmission networks which represent perhaps 5 per cent of the cost of power, it is more problematic for the more labour intensive and much larger distribution networks.

The risk for a country is that crucial networks will fall into the hands of companies that will ‘sweat’ the assets, cutting back on maintenance and investment, and sell them before the impact of their neglect is apparent. As Britain has found with its privatised rail network, it is a long and expensive process bringing a neglected network back to an appropriate condition.