

Maintaining Regulation of the Electricity Supply System

Chaim Elata

Ben Gurion University

Abstract. This paper faces the question of the required extent of the government's involvement in the control over the electricity supply system.

More than a century ago the electrical industry was based on vertically integrated monopolies, regulated by governmental institutes. Some fifty years ago, problems with regulation led in many countries to deregulation after breaking up the electrical industry and institute private, unbundled, independent, competing utilities. Recently, problems in this deregulated industry, which are listed in this paper led to the recognition that government has to maintain its control of this unique industry and can not withdraw its all encompassing supervision,

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1. History of Regulation

Network utilities are public utilities, which require a fixed network for delivering services, such as gas, electricity, water, rail and communication. These networks are durable and capital intensive. They serve mass markets and provide essential services.

Electric power is a commodity, which has some unique characteristics. Unlike other commodities, electricity is invisible and flows instantly from all its generation plants to all its customers. Even if one has a purchase agreement with one producer for "electric power", one might be supplied by "electricity" produced by another. There are other basic differences between the electric power industries and other industries. Since electricity cannot be stored, the supply system has to be able to meet maximal demand. This causes the system to be operating most of the time below its full capacity. To guarantee ample supply for years to come, resources have to be gathered and investments have to be made in the present with a much longer lead-time than in other industries.

At the end of the nineteenth century, small companies sold electricity in restricted areas. With the development of alternating current, falling costs and increasing use, larger companies were established, supplying electricity over wider geographical areas.

In the USA, private companies as well as some municipalities, which owned Public Utility Companies, have been selling power since the beginning of the last century. These companies were vertically integrated and took care of the generation, transmission, distribution and marketing of electric power. This all-encompassing vertical structure was distinctive to the electricity industry. A retail customer bought electric power from a supplier, who owned one or more generating plants and one system of transmission wires. The latter transmitted the power from the generating plant to the local distribution grid, which distributed the power to the end user. Initially, there were many such small companies, which, however, could not survive when competition started. As a result, these companies asked the state for permission to unite forces and create "monopolies" with a single set of power lines (grid) to be "regulated" by these states. Since grids constitute "natural" monopolies, they will (competition being impossible), in any case, require regulation. The companies thus formed, achieved an economy of scale and had therefore lower operating costs than smaller plants could realize.

In order to implement regulation, Public Utilities Commissions (PUC's) were established in each state of the USA, to regulate the price of electric power. Many of these regulating agencies have been in existence for almost a century. The standard procedure would be for the company to ask and negotiate the approval of the PUC for the retail price of electricity, based on its costs and a fair rate of return on its investments.

In countries other than the USA, the electricity industry has for ages been publicly owned, either by political preference, or by default, since private investors lack the confidence to make the huge investments required. In France the electricity industry, Electricité de France, has been a state-owned and controlled monopoly. In Great Britain, electric power, before being restructured, was supplied by one state-owned, vertically integrated utility.

2. Problems with Regulation

Problems with Regulation were discovered in the later part of the 20th century. During the “golden years,” when new construction of power plants actually reduced the average cost of electricity, regulation setting rates based on the average cost including the value of the new equipment worked well, since rates generally decreased. This changed from the 1970’s onwards in result of the increase of the cost of fuel and utility construction and the subsequent increase of the rates. At that time it gradually became apparent that the regulating system in the USA had inherent problems. One of the problems with regulated, privately owned companies was that under the system existing at that time, non profitable investments would not be risky and the costs could easily be charged to the customer.

The status quo was often maintained since there was no incentive to develop cheaper and more efficient production methods. Costs were covered anyway. More electricity sold meant greater profits, so conservation was not considered, and the utilization of their older generation units was extended. Solutions to the problems with regulation were looked for in deregulation.

Electric power was the last industry, which considered regulation to be outmoded by time and technology. In the case of the electric industry, free competition could however at most be partial, relating to production only. It could not apply to wiring, transmission and distribution, which remain natural monopolies in their service areas.

3. Deregulation

Over the last 50 years basic changes have been introduced in the structure of most consumer services. A process of privatization has been carried out introducing competition and allowing a gradual deregulation. There is an ideological belief in private ownership and that regulation and controls are unjustified and should be removed. It is assumed that governmental involvement creates inefficiencies and that a free market provides better products and services to consumers than those produced under a heavy regulated or government-controlled system. Deregulation was looked upon as a tool to introduce and enhance competition and allow customers to choose their supplier. The advocating of deregulation was based on the premise that the introduction of competition would lead to better and cheaper service.

Deregulation of industries became fashionable in the late seventies of the twentieth century, in such industries as telecommunications, airlines, railroads, trucking, banking and financial services.

Competitive generation could be carried out in the electricity industry by independent, privately owned production plants. It was realized, that the introduction of competition and simultaneous deregulation, necessitated a restructuring of the industry. The vertical integrated utilities had to be unbundled. In addition to competition in production, the restructuring of the electricity system involved changes in the distribution system. One was to require “open access” to the power grid and distribution system under control by local monopolies. Independent System Operators (ISO’s) were created with the task to determine access and pricing.

At the end of the last century, deregulation in the USA allowed customers to buy electricity from any company offering it. The 1990’s policy in California split up its Electric System Components. Over the past twenty years California has transformed its electric system from one that was integrated and highly regulated to one that is unbundled and increasingly subject to competitive markets and federal supervision. Although the state retains regulatory control over utility distribution systems, the FERC (Federal Energy Regulatory Commission) regulates the transmission system operations and transmission rates. In addition, power sales and transmission are mainly controlled by two non-profit organizations, the ISO and the PX (power exchange).

The deregulation reform in Britain, which involved extensive privatization, did serve as a model for privatization elsewhere. Till the early eighties, the government supplied electricity in the UK. Then government decided to perform a major reform. The market was unbundled into Generation, Transmission, Distribution and Trading. The Generation was subdivided into three companies. The Transmission remained a natural monopoly. The Distribution was divided over twelve regional companies. Traders could sell electricity to end users. A Power exchange (The Pool) was established.

A regulating agency called OFFER - Office of Electric Regulation (now OFGEM- Office of Gas & Electricity Markets) was created.

4. Power Production

The introduction in the market of new kinds of power plants has highly facilitated deregulation and the restructuring of the electric system. The classic production of power was by plants burning coal, oil and (in some cases), hydroelectric power. In the last 35 years, a new technology for power production, based on gas turbines, fed by natural gas, became a profitable, alternative method of production. Power plants based on this method require much less investment and can be constructed in one third of the time needed for conventional coal plants. They are able to run without the need for a supply of water for cooling and can be started within minutes. Their environmental damage is minute. Gas turbines can be used economically for medium load of energy and be located close to geographical areas with a need for supply, thus easing the pressure on the transmission system. In addition, gas-fired combined cycle power plants are more efficient than the large, coal fired power plants.

Here is the place to note, that alternative sources of energy such as sun and wind power, which have meanwhile been developed were (and still are!) too expensive to compete with fossil fuels, even if taking into account their environmental advantages. In addition, a drawback of these alternative energy sources is their dependence on climatic conditions. Even if major plans in Britain for a wind farm are realized, it will supply only 2.5% of the total power consumption and in the USA 2%)

5. Problems with Deregulation

Many governments around the world have deregulated and privatized their electricity systems since the mid-1980s. The principal beneficiaries of privatization have been the consultants and the banks, building societies, insurance companies, pension funds and other industrial and commercial companies that were able to invest in the newly privatized services and/or provide loans to those who do. The banks and consultants have advised on privatization schemes and helped draw up deregulation legislation around the world. They have collected fees from brokering the purchase of independent power producers (IPPs) worldwide and have been involved in energy trading themselves.

One of the big disappointments of deregulation is that the competition does not have the expected effect. Tariffs have often increased, rather than, as expected decreasing. There have been huge additional costs and cost increases stemming from the reduced benefits of coordination, the increased complexity of the system, scheduling, and other operating procedures

“Well-financed campaigns for deregulation were often centred on grandiose claims of “consumer benefits” with free-market competition. Against an onslaught of high-powered corporate lobbying, warnings and questions from citizens groups were either ignored or buried as afterthoughts in news stories and legislative hearings. All too often the rosy scenarios about consumer benefits have faded into horror stories of higher prices and poorer service and taxpayer-financed corporate bailouts.”

One reason is that, unlike state or municipality owned companies, which might agree to a very low or even zero return on their equity, a private owner will ask for a return that will cover his investment including a premium for risk.

As Price C. Watts stated: “Energy generation is a capital-intensive industry. Rate of return regulated utilities get cheap capital. Their stocks do not require high rates of return and their bonds are highly rated. If for example, we assume that half the cost of generating electricity is capital cost and that the cost of the

capital is increased by deregulation from, say, 8 percent to 16 percent, deregulation will drive up the average cost of the electricity by 50 percent”

It should be noted, that unlike other “products”, consumers don’t see the price of electricity in the process of using it and don’t know what they pay for. Certainly, there is no direct way to observe the connection between the tariff and the quality of the product and the reliability of service.

“Energy has surely been the beleaguered sector in the USA lately. First, California’s newly deregulated power system crashed, leaving bankruptcies and blackouts in its wake. Then Enron, the king of energy trading, imploded.” “Publication of internal documents from Enron seem to confirm, that Enron’s Energy traders appeared to have manipulated California’s power market, creating artificial shortages to push prices up. They played games with the system with scams known variously as Ricochet, Fat Boy, Get Shorty, Load Shift and Death Star, apparently causing billions of dollars in damages to the state’s economy. The energy crisis in California is certainly an example to be studied and from which mistakes elsewhere can be avoided. In a report to the governor of California, several years ago, even before the Enron crisis, recommendations were made for a change in the plans, accepted at that time.”

Under California's new system, California’s power consumers have paid much more for power than in the past and the system has been more vulnerable to supply shortages than ever before.

In addition California's electricity supplies have not kept pace with the state's economic growth.

Lagging investments in power plants result in part from regulatory mistakes. Power plants aged and California's economy grew. All this created a mismatch at this time between supply and demand for an essential service in an imperfect market, at a predetermined price. This shows that electric system governance is just not working for the benefit of California customers at this time. It teaches us, that deregulation does not necessarily mean a cut in prices. In addition it may cause a dangerous shortage in power. In conclusion, power supply shortages, increased demand and a dysfunctional market did converge to undermine California’s ability to assure its businesses and its citizens clean, reliable and reasonably priced electricity. It should warn us for similar catastrophic crises in other states and countries, as a result of not careful restructuring and determining prices, which have nothing to do with the changing economic conditions.

All this happened at the same time that the rest of the world was trying to push energy markets toward free competition.

At present, all states in the USA except Texas, which has a huge, 60% reserve margin, have stopped deregulation and are reviewing their schedules. There is a general consensus, that regulation of power capacity is certainly necessary. California has lately redesigned its plans. Countries around the world are presently seeking the right balance between regulated and deregulated parts of the market. For one, a more extensive, border crossing transmission system seems to be a basic requirement. The blackouts, which occurred several winters ago in Catalonia, Spain, could have been avoided to a large degree, by more extensive grid interconnections with other neighbouring provinces. Increased interstate connections are a major cost saver. They lead to better and more efficient use of equipment and necessitate lower reserves of production capacity. It should be taken into account, that transmission contributes a relative small part (often less than ten percent) to the price of electricity.

The pricing system, in combination with only small elasticity in customer’s demand and the ability of power sellers to withhold supply, results in wholesale prices that may bear no relationship to power producers' costs. At the same time, no government body is compelling power plant construction or maintenance during this period of aging plants and short supplies.

This result has not been confined to developing countries. The same has been true in many parts of the developed world. The supposed disciplines of the market have been eclipsed by price manipulation by private electricity companies seeking to boost the price of electricity and maximize profits. In places where government-imposed price caps remain in place, retail suppliers have not been able to pass these high wholesale prices on to consumers causing them to experience financial difficulties that have led to black outs and government bail outs, as in California.

Black outs, price spikes, price manipulation, bankruptcies and electricity shortages have resulted from this worldwide wave of electricity privatization and deregulation. Despite the many failures of electricity privatization and deregulation around the world there is still pressure on governments to privatize remaining government-owned systems. To support their claims advocates need models of successful privatization and deregulation that they can use to persuade governments that the IMF and the World Bank can't coerce. It is for this reason that Australia has been misrepresented as a case study of successful electricity deregulation and privatization.

Deregulation only promotes competition in the early stages. In the latter stages it actually eliminates competition as rivals are driven out of business. Owners feel the need to cut every corner possible—and both workers and consumers pay the price. And what is the result of all this perpetual elimination of business rivals?

6. Conclusion

The movement toward less regulation and more reliance on market processes in the electricity industry may have potential benefits but also potential risks. A move toward deregulation that does not take the issue of market power seriously can undermine the goals of industry restructuring and even, as in the case of England, produce a regulatory backlash. Any restructuring initiative must recognize that the lack of economic storage and of price-responsive demand can produce serious market disruptions.

Furthermore, levels of transmission capacity that may have been adequate under regulation may not be able to support effective competition. In restructured electricity markets, some level of market power seems likely to persist. Given the enormous size of this industry, even small amounts of market power imply large transfers from consumers. This means that for consumers restructured electricity markets may in fact be more costly in the short run than were their regulated predecessors.

For restructuring to benefit consumers, the long-term gains stemming from improved investment decisions on both the demand and supply sides of the industry must be sufficient to outweigh the potential short run costs. Unfortunately, measuring those long-term benefits will be very difficult because it will rest on comparing the efficiency of investment under restructuring with the investment that would have occurred in traditional systems.

Deregulation and privatization are now reaching a stage when it is possible to discern some patterns and factors emerging, based on experience rather than hypothesis about what ought to happen. Some of the outcomes are good and some are not, and liberalization has advocates and critics. Liberalization has proceeded at varying paces in different regions and countries, the most systematic regional development being in the EU.

One of the advertised advantages of deregulation is that it gives a private customer to choose its supplier, the so-called "residential choice". This result in the uncertainty of the income of competing utilities and, in result short-term price volatility is created in the spot market.

The supply of electricity is a basic necessity to the state's economy and has a major effect on its environment. The conclusion to be drawn from the recent crises is that government should not withdraw its supervision, leaving control in private hands. The guarantee of adequate supply, as well as the all-encompassing supervision of the transmission system, should be in the hands of state governed bodies.

For competition to exist, the minimal available capacity in the system should be such, that with any competitor out of action, sufficient capacity will still be available to meet peak demand. This margin, the reserve, between maximum capacity and peak demand, decreases with an increasing number of competitors. Experience has shown, that for real competition, there should be at least 5 to 6 competitors of about the same size.

Decisions about capital investments in grid expansion and a background of plans for generation plants have to be under the control of agencies under supervision of the government. This paper faces the question of the required extent of the government's involvement in the control over the electricity supply system

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