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High Voltage Issues

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Within the past decade, electricity has burst headlong into the realm of international affairs. Controversies involving governments, companies and international organisations are proliferating across the world.

In early 1998, Brazil's National Electricity Regulatory Agency ANEEL imposed a swingeing fine on Electricite de France, for letting the lights go out in Rio de Janeiro. You may think that is a non sequitur. Think again. If you live in Rio, the system that keeps your lights on belongs to Electricite de France, Houston Industries and another US company called AES. If you live in Bogota, the power network belongs to Endesa of Spain and Enersis and Chilectra of Chile. If you live in Melbourne, Texas Utilities, Utilicorp or another US company supply your power. If you live in London, the system belongs to a US company called Entergy, which has just agreed to sell it to Electricite de France.

In February, as the European Union continues its drive toward a single market, the EU Directive on electricity comes into effect. Member governments must begin opening their electricity systems to cross-border competition. Some governments, notably that of the UK, are wholeheartedly behind the idea. Others, most conspicuously that in Paris, are less so.

Outside French borders, where electricity is being liberalised from Austria to Brazil, Electricite de France is an enthusiastic major player. It is buying with gusto power stations, distribution networks and whole systems. Within France, however, Electricite de France has stubbornly opposed liberalisation, defending its near-monopoly, fending off foreign interlopers with the assertion that it provides an essential *service publique*, that must not be jeopardised by outsiders.

Other EU countries and their electricity companies are growing increasingly testy about this asymmetry. They are starting to insist that cross-border competition should be permitted only to the extent that a country's own system is reciprocally open to competitors.

Electricite de France, for instance, sends power to the UK through a cable under the Channel. The cable was originally intended for two-way traffic; but Electricite de France uses it exclusively for exports, not imports.

The company may now find that its unconditional offer to buy London Electricity falls foul of the European Commission and the British government, unless France allows UK companies such as National Power and PowerGen to export electricity to French customers. Given the influence with the French government of Electricite de France, the confrontation could be tense.

National Power, meanwhile, is facing a much uglier international problem. When Pakistan opened its electricity system to independent power producers (IPPs), including power stations with foreign ownership, National Power became a major equity participant in a company called Hubco, owners and operators of the flagship Hub River plant.

In the summer of 1998, however, the new Pakistan government of Prime Minister Nawaz Sharif accused eighteen IPPs of overcharging, and insisted they lower the prices previously agreed with Pakistan's Water and Power Development Authority. Nine IPPs complied; the government then announced that it was cancelling agreements with the other nine, two on technical grounds and seven because of alleged corruption. It cut Hubco's price by more than half, blocked it from taking proceeds out of the country and harassed Hubco's foreign directors. The matter is now in the courts; its resolution will be messy.

IPPs elsewhere have been crossing swords with host governments. In the mid-1990s the newly-elected Indian state government of Maharashtra abrogated a contract agreed by its predecessor with Enron of the US, precipitating a ferocious clash in the courts and setting back progress on Enron's Dabhol IPP for more than a year.

Last year the financial meltdown in Southeast Asia derailed a number of IPP projects with foreign participation, in Thailand, Malaysia and Indonesia, underlining the riskiness of the new international dimension of electricity.

Even the UK has proved risky. In early 1998 the British government, attempting to preserve a share of the market for UK coal, imposed a moratorium on the construction of new combined-cycle gas turbine (CCGT) stations, blocking projects by Enron and others, who raised a storm of protest.

As well as governments and companies, international organisations too are caught up in electric conflicts. In Ukraine, for instance, efforts to shut down the remaining unit at the notorious Chernobyl nuclear station are blocked by a long-running wrangle involving the European Bank for Reconstruction and Development (EBRD), Euratom and the G7 group of industrial countries.

In exchange for shutting down Chernobyl, the Ukraine government wants western financial assistance to complete new nuclear plants at Rivna and Khmelnytsky. But independent consultants disagree as to whether completing these plants would be the leastcost option, as EBRD rules require. Nothing happens, and Chernobyl continues to operate.

As this cursory sample indicates, the new international dimension of electricity abounds in controversy. Other electricity debates are boiling up within national borders. The liberalisation of electricity in the US, for instance, has already triggered a furore over 'stranded assets'. Hundreds of billions of dollars worth of plant, built by investor-owned companies under monopoly franchises with an obligation to supply, is now unable to compete in a market context when franchises are abolished. Who takes the loss - shareholders or electricity users? A similar issue may soon arise in Japan and Germany, as the first tremors of liberalisation shake the powerful private monopoly companies.

Week by week, meanwhile, the international financial press reports on a frenzy of mergers, acquisitions and hostile take-overs, national and international, as the first wave of electricity multinationals jockey for position, and electricity becomes a global industry. World electricity is in an unparalleled upheaval.

As a result, many electricity people are so preoccupied with the turmoil in the foreground that they may not notice what is coming over the horizon. Under the combined influence of liberalisation,

technical innovation, financial pressures and environmental constraints, the world's electricity systems are undergoing changes that will be more far-reaching, more fundamental and faster than most governments yet realize.

In the late 1980s, Chile and the UK began electricity liberalisation. A lengthening catalogue of other governments rapidly joined in. In just a few years they have overthrown key guiding premises that shaped electricity systems for most of the century. Yet they appear to believe that electricity systems will continue to look much the same, and operate in much the same way. They are wrong.

Captive customers escape

For a century, electricity systems of significant size have usually generated power with either water turbines or steam turbines; both exhibit impressive economies of scale. All over the world systems have come to conform to a common technical model. Large central stations, usually remotely sited, generate power in the form of so-called 'synchronised alternating current', delivered to users over a network including long high-voltage 'transmission lines'.

Traditionally, a better power station has meant a bigger power station. Moreover, until the 1990s, electricity systems have almost invariably been franchised monopolies, under the explicit or implicit aegis of government. Anyone wanting to use power from the system has had to obey its conditions and pay its charges. Captive customers purchasing an essential good from a monopoly guarantee a revenue stream.

System planners have thus been able to order and finance power stations of enormous size, taking six years or more to construct, and having to operate for at least another twenty years to pay off the investment. The captive customers bear the risk.

Liberalisation, and especially the introduction of competition, has fundamentally altered these financial ground rules. In a competitive environment, shareholders and bankers, not captive customers, bear the risk. Investing thousands of millions of dollars or their equivalent in a single vast hydro dam, coal-fired or nuclear power-station with uncertain long-term prospects makes investors nervous.

Your own power plant

At the same time, new options for electricity generation have emerged, with attributes different from traditional steam and water turbines. The most spectacular arrival has been the inexpensive, efficient gas turbine, fuelled by cheap, abundant natural gas.

A gas turbine generator can be installed and brought into service in less than three years. The gas turbine is modular. It is economic in smaller sizes and exhibits economies of series manufacture, with a rapid learning curve for innovation. To add more capacity you add another module.

A gas turbine is easy to site, comparatively clean and convenient, requiring no fuel storage or waste management. It can therefore be located close to, or indeed on the premises of, an electricity user. If the user also requires heat, in the form of process steam or hot water, it can provide cogeneration of both electricity and heat, raising fuel efficiency to better than eighty percent.

In a liberal competitive context, therefore, major international companies are now eager to offer you your very own power station, on your own site and under your own control. They will design, build, operate and maintain it for you, arranging finance, permits and fuel contracts.

New generating technologies - mini- and micro-turbines, fuel cells, and renewable energy including wind, biomass and solar power, so-called photovoltaics or PV - are rapidly enlarging the portfolio of smaller-scale options.

The traditional electricity system, based on large-scale remote central stations, is beginning to evolve toward a much more decentralised system, with many more smaller-scale generators much closer to users. The implications are profound.

This evolutionary pressure will intensify the tensions and the turmoil affecting world electricity. Some governments, and some companies, will cling to the traditional model; others will drive for innovation. Clashes and conflicts are inevitable. After decades of sedate self-satisfaction, world electricity is plunging into interesting times.

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