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Electricity industry reforms in smaller EU countries: Experience from the Nordic region

by

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1. Introduction

In 1996, the European Union passed an Electricity Directive (96/92/EC) that required the 15 Member States to liberalise their electricity industries. This was replaced in 2003 by a new Directive (2003/54/EC) that places more stringent requirements on Member States to de-integrate their electricity industries and introduce competition in generation and retail supply. This paper shows how these requirements are being implemented in the smaller EU countries¹. It examines what lessons Hong Kong can learn from European reforms, especially those in the Nordic countries, Sweden, Norway, Finland and Denmark, which have apparently reformed successfully by merging their national systems into one market.²

In the section 2, the paper examines the provisions of the Electricity Directives, showing how the two Directives differ. It identifies areas of flexibility for Member States in how they implement the Directive. It also examines a draft Directive published in December 2003 on electricity supply security showing what measures Member States will be required to take to ensure electricity supply security. Section 3 contains an overview of how the Electricity Directive (2003/54/EC) is being implemented in the smaller EU countries other than those from the Nordic region. It shows that in many of these countries, little has been done to reduce the dominance of the existing companies. In section 4, experience in the Nordic countries (Norway, Sweden, Finland and Denmark) is examined. The single electricity market that has been established there is widely perceived as being one of the few successful market reforms. The paper identifies some of the factors particular to the region that have contributed to its apparent success. It assesses how fully proven the reforms are and how transferable this experience is to other countries. Section 5 gives conclusions on European experience of electricity reforms and its applicability to Hong Kong.

2. The EU Electricity Directives

2.1. The first Electricity Directive (96/92/EC)

The first Electricity Directive (96/92/EC) was passed after about five years of negotiation and in the face of determined opposition from the electric utilities. Member States were required to include its provisions in national law by February 1999, although Ireland and Belgium were allowed to one year more to implement the Directive and its provisions and Greece two years.³ The Directive contained provisions in four main areas: construction of new generation capacity; unbundling; retail competition; and access to the network.

2.1.1. Construction of new generating capacity

Member States were given two options. Under the first, authorization, developers of new generation basically had to do no more than comply with national planning law for any industrial facility. No specific electricity sector planning procedures to determine need were required. Under the second, tendering, an official authority would determine generating capacity need and allocate the construction of this plant through an open non-discriminatory process.

¹ This paper covers Austria, Belgium, Netherlands, Denmark, Finland, Greece, Greece, Ireland, the Netherlands, Norway, Portugal and Sweden. It does not cover the 10 new Member States that became members in 2004.

² Norway is not a member of the European Union, but is a member of the European Economic Area. It is part of the EU Single Market and complies fully with the Electricity Directives.

³ The Directive did not specify beyond 'specific technical characteristics of their electricity systems' why these countries were allowed derogations, although for Ireland and Greece, it seems likely it was because the systems were small and had few international inter-connections.

2.1.2. Unbundling

Member states were required to designate operators for the transmission and distribution systems. These could be part of integrated electricity companies but the management of the Transmission System Operator (TSO) and Distribution System Operator (DSO) had to be separate from the competitive activities in electricity, generation and retail.

2.1.3. Retail competition

Member States were required to allow consumers using more than 40GWh per year choice of supplier from as soon as the Directive entered force (January 1997), extending competition to those using more than 20GWh per year 3 years later and to consumers using more than 9GWh per year in 2003. In this case, 'consumers' could include distribution companies. The proportion of the market opened varied from country to country according to the percentage of power going to large users but was expected to average about 30%.

2.1.4. Access to the network

The TSOs and DSOs were required to grant non-discriminatory access to the network under either negotiated or regulated third party access (TPA), or under the 'single buyer' option. Under negotiated access, generators and retail suppliers were required to negotiate with the system operators for access to the network, although an indicative range of prices had to be published. Under regulated access, generators and retail suppliers were to be allowed access at published tariffs. Under the Single Buyer option, as the name implies, a Member State could designate a 'single buyer' that would be responsible for purchasing the country's (or region of the country) electricity needs.

2.1.5. Assessment

The Directive was criticised by some as allowing countries too many ways of avoiding complying with the spirit of the reforms. The Directive did not require a wholesale market to be set up, so even if companies were free to build new power plants, they had no means to bring their power to market. Nor did it require an independent sector regulator so there was not necessarily any independent eye to ensure the rules were being followed⁴. The unbundling requirements did not seem to guarantee independence and the negotiated TPA option seemed to offer the incumbent companies a way to keep out competitors. Retail competition was very restricted, with no more than a few thousand consumers able to choose even in the largest countries.

Despite these criticisms, in practice, most countries went much further than was required to meet the terms of the Directive and chose the more liberal options. Only Germany opted for negotiated TPA and did not appoint a sector regulator; no country opted for the 'single buyer' or for 'tendering', while most countries opened their retail markets much further and more rapidly than was required. This encouraged the European Commission to introduce new proposals that closed the 'loopholes' in the earlier Directive.

2.2. The Second Electricity Directive (2003/54/EC)

The new Electricity Directive (2003/54/EC) was agreed in June 2003 and Member States were required to include its provisions into national law by July 2004.⁵ The new Electricity Directive places requirements in the four main areas covered by the earlier Directive but also requires the appointment of a sector regulator.

⁴ Member States were merely required to ensure there was a disputes resolution procedure.

⁵ In fact, of the 25 Member States, only two (Netherlands and Slovenia) met the deadline of July 1 for transposing the Directive into national law. Most countries hope to comply by the end of 2004 and the European Commission will then have to scrutinise the legislation to ensure it does meet the requirements of the Directive.

2.2.1. Construction of new generating capacity

New generating plant can be constructed under an 'authorisation' procedure with no national system planning requirements. The 'tendering' procedure is only to be allowed if the authorisation procedure fails to produce sufficient capacity to ensure supply security.

2.2.2. Retail competition

All non-residential consumers must be able to choose their retail electricity supplier by July 2004 and the market must be opened up for all consumers by July 2007.

2.2.3. Unbundling

Operation of the networks should be by companies that are legally independent of those buying and selling electricity. The TSOs or DSOs could be under the same ownership as a company active in generation and or retail but they have to be legally distinct companies

2.2.4. Access to the network

The negotiated TPA and single buyer options were withdrawn and access to the network has to be via regulated TPA.

2.2.5. Regulation

Member States must appoint an independent sector regulator with powers to ensure 'non-discrimination, effective competition and the efficient functioning of the market'.

2.2.6. Assessment

These requirements seem to require comprehensive reforms along the lines of the 'British Model'. However, many of the Member States are dragging their feet in implementing these measures. In fact, of the 25 Member States, only two (Netherlands and Slovenia) met the deadline of July 1 for transposing the Directive into national law. Most countries hope to comply by the end of 2004 and the European Commission will then have to scrutinise the legislation to ensure it does meet the requirements of the Directive. Germany has agreed to appoint a sector regulator (it will be formed by extending the remit of the existing telecoms regulator) but this will not be given legal status until 2005 at the earliest.

Examination of the Directive shows that Member States determined not to open their electricity sector can still frustrate the aims of the Directive. For example:

- There is no specific requirement to introduce a wholesale electricity market. Without a competitive and liquid wholesale market, provisions liberalising the retail market and the construction of new power plants are pointless;
- The network can still be owned by integrated companies and its operation carried out by a separate company, but still owned by an integrated company;
- There are no specific measures to break the control of dominant companies.

This third problem is perhaps the most serious. Member States and the Commission do not seem committed to the break-up of dominant companies. They seem to prefer to maintain or allow the emergence of 'national champions' in the electricity sector. Of the 14 pre-2004 expansion Member States (excluding Luxembourg) 11 have companies that have strong or even dominant market positions. In most cases, far from reducing their market power, most of these companies now appear to have a stronger market than they did before the first Directive was passed. For its part, the Commission is 'schizophrenic' in its attitude to market power. Its rhetoric is all about markets but its actions reflect more the attitude of its officials. When challenged on the issue of market dominance, their response is: 'many product markets are operated by oligopolies; we know how to control oligopolies'. It also claims that the relevant market is now Western Europe, not the national markets and in that context, the large companies do not have excessive market power. It seems

content to allow the European electricity sector to be dominated by a handful of large companies allowing little scope for new entrants. Whether this is because it genuinely does believe it can control oligopolies or it wants to see the emergence of European electricity companies as global powers, or whether it believes that Europe can become just one electricity market is not clear.

2.3. The draft Security of Supply Directive

At the same time as Commission was negotiating a Electricity Directive that required greater reliance on markets for the electricity sector, it was also bringing in a Directive on Security of Supply (COM(2003) 740 final) that required much greater government involvement in sector planning to ensure security of supply.⁶ The draft Directive resulted from a green paper on supply security from 2000, but the process was given impetus by the ‘blackouts’ in Europe and the USA of 2003 that put question marks in the public mind about the prudence of relying on market signals to ensure electricity supply security.⁷

The draft Directive will impose on Member States a range of responsibilities aimed at ensuring security of supply. On network security, it will require (article 4) Member States to:

‘ensure that minimum operational standards on network security are observed by the transmission system operators’.

On maintaining a balance between supply and demand, it will require (article 5) Member States to:

‘ensure that there is a balance between the demand for electricity and the availability of generation capacity.’

It also imposes obligations on network investment to ensure demand side management measures and renewable generation can be prioritised (article 6). It will require (article 7) regulatory authorities to submit reports on international inter-connectors to the European Commission.

The provisions on balancing supply and demand are of particular concern and build on the Electricity Directive (2003/EC/54). In paragraph 23 of the Directive, the Commission states:

‘In the interest of security of supply, the supply/demand balance in individual Member States should be monitored, and monitoring should be followed by a report on the situation at Community level, taking account of interconnection capacity between areas. Such monitoring should be carried out sufficiently early to enable appropriate measures to be taken if security of supply is compromised.’

In the Notes⁸ to the Directive, the Commission states:

‘However, Member States should ensure the possibility to contribute to security of supply through the launching of a tendering procedure or an equivalent procedure in the event that sufficient electricity generation capacity is not built on the basis of the authorisation procedure.

Member States shall ensure the monitoring of security of supply issues. Where Member States consider it appropriate they may delegate this task to the regulatory authorities referred to in Article 23(1). This monitoring shall, in particular, cover the supply/demand balance on the national market, the level of expected future demand and envisaged additional capacity being planned or under construction, and the quality and level of maintenance of the networks, as well as measures to cover peak demand and to deal with shortfalls of one or more suppliers. The competent authorities shall publish every two years, by 31 July at the latest, a report outlining the findings resulting from the monitoring of these issues, as well as any measures taken or envisaged to address them and shall forward this report to the Commission forthwith.’

⁶ http://europa.eu.int/comm/energy/electricity/infrastructure/doc/2003/com_2003_743_en.pdf

⁷ The first sentence of the press release referred to the blackouts. ‘The Commission proposed today a new legislative package to promote investment in the European energy sector to both strengthen competition and help prevent the reoccurrence of the blackouts that took place this summer.

⁸ http://europa.eu.int/comm/energy/electricity/legislation/doc/notes_for_implementation_2004/security_of_electricity_supply_en.pdf

The Commission does recognise the dangers of such an approach and notes:

‘The Commission submits that the tendering procedure has the advantage of being relatively easy to organise and will ensure that investors will actually construct the capacity tendered (as opposed to the authorisation procedure where the grant of an authorisation is no guarantee that the capacity authorised will be built). However, the tendering option equally gives rise to a number of important [concerns] which should be considered by Member States:

- Launching a tendering procedure constitutes an intervention on the market from the part of the authorities;
- Such a procedure, as is the case with other interventions, distorts the investment signals that exist in the market and could lead to ‘a wait for the tender to be launched’ approach on the part of investors.

2.4. Evaluation of the Directives

The Commission seems ambiguous about competition. It loses no opportunity to extol the virtues of competition but its measures on security of supply and its failure to deal with market power betray a distrust of the market and a lack of commitment to competition. Some observers believe that the real objectives of the reforms were to break up the nationally-owned, monopoly utilities particularly those from the large countries, such as EDF (France) and ENEL (Italy) and to take control of the electricity industries away from national governments and place it with the Commission.

3. Implementation in the smaller countries

3.1. Compliance with the Directives

Outside the Nordic countries, the smaller countries have generally been slow in implementing the Directive (see Tables 1 and 2). Only Austria and the Netherlands have introduced full retail competition with Greece, Ireland and Portugal only allowing retail competition for large consumers. There is little experience of residential retail competition in these countries on which to make judgements. Greece and Ireland also are far from complying with unbundling requirements.

The position of these countries with regard to interconnections is markedly different. Three of them, Netherlands, Austria and Belgium, are situated in the heart of Europe and easily comply with the Commission’s policy that Member States should have international interconnections equivalent to at least 10% of installed capacity. The other three countries are all on the periphery and either do not comply or in the case of Greece, only just comply albeit with weak connections that are not really suitable for trade.

If we look at the corporate structure, it can be seen that these countries have done little to comply with the spirit of the Directive. In Greece and Ireland, the nationally owned former monopoly companies, PPC and ESB, still dominate the system, owning generation, transmission, distribution and retail. In Belgium, Electrabel (a subsidiary of the French company Suez) has a dominant position and it controls much more of the retail market through joint ventures than the figures show. Portugal has had plans for more than a decade to break up the part-privatised EDP, but these have not been carried out and Portugal now plans to merge its electricity market with that of the much bigger Spanish system.

Even in the countries that seem to have complied fully, such as the Netherlands and Austria, few consumers are switching supplier and the liquidity of wholesale markets is low. For the Netherlands, most generation is owned by four generation companies, while two of these companies and a third, non-integrated company dominate retail. It seems likely that this already concentrated structure will concentrate further and there is pressure not to allow the three remaining large Dutch companies (Essent, Nuon and ENECO) to be taken over and a merger has been mooted. In Austria,

the Commission's figures were calculated before it allowed the creation of Energie Austria (in June 2003) from the merger of the largest company, the Verbund with a group of 5 regional companies (EnergieAllianz).

The regulatory bodies are relatively large, although their resources appear limited compared to the UK regulator, which has a staff of more than 300 and an annual budget of €57m. The picture amongst the smaller countries is either one of existing dominant companies not being broken up or (Austria and Netherlands) of strong new alliances and companies being allowed to emerge.

Table 1 Implementation of the Directive in smaller countries

	Retail competition % market / year	Unbundling TSO	Unbundling DSOs	Regulator Staff/budget €m	Installed capacity GW (A)	Import capacity GW (B)	B ÷ A %
Austria	100 / 2001	Legal	Accounts	60 / 8	17	5.1	30
Belgium	80 / 2004/2007	Legal	Legal	99 / 17	16	4.6	29
Greece	34 / 2007	Legal/management	Accounts	40 / 4.4	10	1.0	10
Ireland	56 / 2005	Legal/management	Management	39 / 10	5	0.3	6
Netherlands	100 / 2003	Ownership	Legal	55 / 7	20	4.7	24
Portugal	45 / 2004	Ownership	Management	53 / 6.4	11	0.9	8

Source: European Commission (2004) 'Third benchmarking report on the implementation of the internal electricity and gas market' DG Tren draft working paper, European Commission, Brussels.

Table 2 Electricity market structure in smaller EU countries

	Largest generator % of cap	Largest 3 generators % of cap	Largest 3 retailers % market share	Integration of generation & retail
Austria	36	63	67	Part
Belgium	88 Electrabel	95	51	Part
Greece	95 PPC	97	100	Full
Ireland	85 ESB	95	100	Full
Netherlands	Not known	67	62	Part
Portugal	67 EDP	82	97	Full

Source: European Commission (2004) 'Third benchmarking report on the implementation of the internal electricity and gas market' DG Tren draft working paper, European Commission, Brussels.

3.2. Assessment

The smaller EU countries outside the Nordic region are being slow to implement the Directive. There may be a number of factors behind this, including:

- A reluctance to commit to an industry model that is, at best, unproven;
- A desire to protect and perhaps nurture national champion companies, limiting their exposure to competition, because of their importance as employers in their home markets (companies such as PPC and ESB are amongst the very largest companies in their home countries) and export earners in foreign markets; and
- The special position of small countries. Small countries in the heart of Europe may lose control of their electricity systems if they open them up to their much larger neighbouring countries, especially Germany and France. The peripheral countries may be too small to sustain a competitive electricity market.

In the long run, unless the liberalised model unequivocally fails, it is likely that the smaller countries will have to take further steps to break up companies like PPC, ESB and perhaps

Electrabel. It remains to be seen whether this will result in genuinely competitive industries or, more likely, in oligopolies with a veneer of competition.

4. The Nordic country reforms

4.1. Resources

The four Nordic countries have very different resource use profiles in generation (see Table 3). Norway is almost 100% hydro, Sweden is split between hydro and nuclear, Finland is split between nuclear, thermal (forestry waste products as well as fossil fuels) and hydro, while Denmark is mostly fossil fuel, although alternative energy sources now make a significant contribution. Overall, this gives the Nordic region a well-balanced portfolio of generation with hydro-electric accounting for about half demand with the rest split between fossil fuel and nuclear.

Table 3 Capacity and production of electricity in the Nordic countries (2002)

	% capacity / % generation			
	Thermal	Nuclear	Hydro	Renewable
Denmark	83 / 87	-	-	17 / 13
Finland	60 / 61	19 / 27	21 / 12	-
Norway	-	-	100 / 100	-
Sweden	18 / 10	31 / 49	50 / 40	-
Nordic region	30 / 28	15 / 24	53 / 47	2 / 2

Source: Platts (2004) 'European Energy review 2004', Platts, London.

4.2. Liberalisation

Norway was first amongst the Nordic countries to liberalise its electricity market in 1991, following closely the 'British Model' in most respects, but without privatisation. The Norwegian electricity sector remains almost entirely in public hands. Rather than implement national reforms, the other Nordic countries chose to reform by merging with the existing Norwegian market with Sweden joining the expanded NordPool in 1996, Finland in 1998 and Denmark in 1999.

Table 4 Implementation of the Directive in the Nordic countries

	Retail competition % market / year	% small consumers switching pa	Unbundling TSO	Unbundling DSOs	Regulator Staff / budget €m	Install capacity GW (A)	Import capacity GW (B)	B ÷ A %
Denmark	100% / 2003	n.a	Legal	Legal	25 / 2.5	8	4.1	51
Finland	100% / 1997	10	Ownership	Accounts	16 / 1.25	14	2.1	15
Norway	100% / 1991	14	Ownership	Accounts	33 / 1.8	23	4.2	18
Sweden	100% / 1998	10	Ownership	Legal	42 / 3	27	7.8	29

Source: European Commission (2004) 'Third benchmarking report on the implementation of the internal electricity and gas market' DG Tren draft working paper, European Commission, Brussels.

Experience in Denmark must be treated with care as Denmark comprises two separate systems of comparable size with no direct electrical connection. The Western part of the system is synchronised to the UCTE system that covers most of Europe including Germany and France, while the Eastern part is synchronised to the Nordel system that includes the Scandinavian countries. There are DC links between the West and Sweden and between the East and Germany that allow both parts of Denmark to trade in both the UCTE and Nordel system.

If we look at the Nordic countries and their compliance with the Directive, a very different picture appears to the one that emerged with the other small countries (Tables 4 and 5). All have fully opened their retail markets, although the annual switching rates are still well below the levels (about 20%) that would imply a fully competitive market. TSOs are fully independent although DSOs are

not yet fully unbundled in Finland and Norway. Interestingly, the regulatory bodies are very much smaller than in other small EU countries. This may reflect the fact that unlike most other European countries where the regulator sets the monopoly charges, in the Nordic countries, the companies set their own charges and the regulator is only involved if a complaint is made. All four countries have strong international connections, meeting the Commission's recommendation that international connections are equivalent to at least 10% of national capacity.

4.3. Corporate changes

At a corporate level, there was some degree of concentration. Finland, Norway and Sweden all had nationally owned companies (IVO, Statkraft and Vattenfall) that were strong presences in the national markets prior to liberalisation. The transmission network was fully separated at time of liberalisation (Fingrid, Statnett and Svenska Kraftnät), but the rest of the businesses remained intact. IVO became Fortum and was part-privatised although the national government still owns the majority of the shares, while the Vattenfall and Statkraft remain 100% nationally owned. The rest of the industries were owned by a large number of local companies, often publicly-owned.

In Denmark, the sector is almost fully owned by local authorities. For generation and transmission, the western part of the country was dominated by Elsam while the east was dominated by Elkraft, which were both not for profit co-operatives. The transmission systems were separated as Eltra for the west and Elkraft Transmission for the east.

Since liberalisation, the Norwegian companies have not chosen to expand outside Norway. However, Vattenfall is now one of the four major companies in Germany and has expanded into Finland and Norway, while Fortum bought the third largest electricity company in Sweden (Birka). The Danish sector has not seen any foreign entry nor have the Danish companies tried yet to expand outside Denmark. However Elsam has moved into eastern Denmark taking over an important generator (E2) and the largest distributor (NESA).

Table 5 Electricity market structure in the Nordic countries

	Largest generator % national cap / % Nordic cap	Largest 3 generator % national cap / % Nordic cap	Largest 3 retailers % market share	Integration of generation & retail
Denmark	37 / 4	76 / 8	<20	No
Finland	26 / 5	44 / 9	29	Part
Norway	30 / 10	42 / 13	40	Part
Sweden	45 / 17	79 / 30	70	Part

Source: European Commission (2004) 'Third benchmarking report on the implementation of the internal electricity and gas market' DG Tren draft working paper, European Commission, Brussels.

4.4. Factors behind the apparent success of the Nordic model

There are many specific factors that may have contributed to the apparent success of the Nordic reforms.

4.4.1. The resource base

The Nordic region has a balanced portfolio of generating plant. The national systems are complementary with Norway able to export to thermal systems such as Denmark in wet years and import in dry years. Of particular importance is the hydro capacity. In Norway, this is mostly of the storage type allowing generators effectively to trade water in the spot market. A generator with a shortage of water in their dam can 'buy' water by purchasing their contracted power supplies from the spot market while a generator with surplus water can sell the water to the spot market. The hydro plant with its very rapid response time means meeting demand peaks and system balancing, a very problematic area in the UK, can be easily and cheaply done.

4.4.2. Dominance of public ownership

The system is dominated by publicly-owned companies. It seems likely that publicly-owned companies are much less likely to engage in market exploitation than privately-owned, especially foreign companies. A privately-owned company would be likely to see it as its duty to its shareholders to exploit loopholes in the market to increase its profits, while a foreign company would probably be less concerned about protecting its reputation as an 'ethical' company than it would in its home market.

4.4.3. Pre-existence of a wholesale spot market in Norway

Long before the reforms were planned, there was a market for 'occasional power'. This had operated since 1971 and allowed generators to trade water. It was a voluntary market set up and run by the generators, so they had every incentive to make it work well. By the time it was transformed into the spot market for generators in January 1992, it was familiar and well-trusted by generators. This market has continued to develop and now forms the basis for the markets (day-ahead, weekly etc) that form the NordPool. The pre-existence of this market meant that there was no need to overcome the 'Catch 22' of lack of liquidity causing unreliable prices that other markets have suffered from.

4.4.4. An existing fragmented industry

Unlike most countries, the Nordic countries all had large numbers of electricity companies, both in generation and distribution so there was little need to restructure the sector, other than separate the transmission network, to achieve a large field of potentially competing companies.

4.4.5. A partnership of 'equals'

The four member countries have electricity systems of the same order of size and all are backed by very strong, well-maintained networks, so there are no clear net winners and losers from the partnership. While some reinforcement of international links was needed, the networks were already reasonably well adapted for international trade.

4.4.6. Very low electricity demand growth

Per capita demand in the Nordic countries was already very high before the reforms, based on high residential usage (often for heating) and location of electricity-intensive industries such as metal manufacture, chemicals and paper and there is little scope for demand growth, so the surplus capacity that existed before liberalisation has been enough to keep pace with demand growth.

4.4.7. A tradition of national co-operation between Nordic countries

The Nordic countries have a tradition of pragmatic social democracy and of finding consensual Nordic solutions to common problems. Thus, unlike most countries, the Nordic countries have long relied mainly on a Nordic airline, SAS, rather than national carriers.

4.5. New generating capacity

Despite the positive reputation of the Nordic system and these favourable factors, in one important respect, the Nordic reforms remain unproven. Since the reforms were implemented, there has been minimal investment in new generation. A small amount of renewables has been built in Denmark, but this is fully insulated from the market. A new nuclear power station was ordered in Finland in December 2003. However, this is being built by a company owned by a consortium of industrial companies, PVO, which supplies the power to its members rather than the market and operates on a not-for-profit basis. It is therefore a special case.

As with other liberalised markets, the problem of investment is simply stated. A power station represents a huge investment, perhaps of the order \$1bn with a lead-time, including planning of at least 5 years. If the wholesale electricity market is genuinely competitive, prices will inevitably be

volatile: even a small shortage will lead to very high prices, while a surplus will lead to a price collapse. To expect investors to build new plant on the basis of volatile price signals with no guarantees of how much power can be sold and no guarantees of the price does not seem reasonable. The risk can be reduced by allowing generators to also be retailers (bypassing the wholesale market) or allowing long-term power purchase agreements (if the market is competitive, a long term PPA would probably be worthless), but these will be to the detriment of the competitiveness of the market.

Unless major new capacity is built soon, the Nordic market will start to run short of capacity, reducing security of supply and causing major price increases.

5. Conclusions

While the EU Electricity Directive appears to require radical transformation of Member State's electricity systems, in most countries, including the smaller systems, there is still little real competition. The one set of countries where reforms have been carried out, apparently successfully, is the Nordic countries. However, closer examination shows that the apparent success of the reforms is based on a number of very specific factors found in the Nordic countries. This paper argues that at least seven specific factors have been important in the apparent success of the Nordic reforms, none of which apply to Hong Kong or most other countries. In one crucial respect, the ability to stimulate investment in new generating capacity, the Nordic reforms remain unproven.

Since the reform of the British electricity system in 1990, many countries and international organisations seem to have followed a 'one-size-fits-all-approach' with electricity industries. This neglect of national factors, such as resource availability, specific national requirements, existing structure of the electricity industry and national cultural and economic traditions has resulted in attempts to implement systems that were totally inappropriate for the requirements of the country. While there are no ready models from Europe that Hong Kong can follow, there are at least five important lessons it can learn:

- Clearly successful reforms are the exception in Europe, not the rule;
- Efficient competitive markets are not easily introduced into electricity;
- Competition in electricity is not a free good; costs may outweigh any benefits;
- Regulating to prevent abuse of market power is a difficult challenge that few countries can claim to have met; and
- There is a strong risk that electricity industry reforms will result in a change from a regulated monopoly to an inadequately regulated oligopoly.