ASEAN ENERGY MARKET INTEGRATION (AEMI)

Energy Security and Connectivity:

The Nordic and European Union Approaches

PROCEEDINGS OF AEMI FORUM

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TABLE OF CONTENTS

PREFACE

The AEMI Initiative is aimed at formulating policy recommendations for ASEAN to proceed from energy market "coordination" to energy market "integration" within the context of the ASEAN Economic Community. It is aimed at supporting the formulation and implementation of the latest *ASEAN Plan of Action for Energy Cooperation* (2016–25), which is focused on energy market integration and connectivity. The Initiative is delivered by the AEMI Group, a network of academics and experts from across the ASEAN countries, and is hosted by the ASEAN Studies Centre, Chulalongkorn University. It is conducted in cooperation with the Norwegian Institute of International Affairs (NUPI) and is currently funded by the Norwegian Ministry of Foreign Affairs.

As part of the AEMI Initiative, the Energy Studies Institute (ESI), of the National University of Singapore, hosted a two-day AEMI Forum. The principal objective of this Forum was to develop approaches to governing energy connectivity and energy security as part of ASEAN energy market integration. Particular attention was paid to evaluating the applicability of the Nordic approach, and to contrasting this approach with that taken by the EU. This issue was particularly timely, given the ongoing deliberations on the Laos PDR–Thailand–Malaysia–Singapore Power Integration Project (LTMS PIP), as part of the deployment of the ASEAN Power Grid (APG). Participants of the Forum included academics, experts, policy-makers, ASEAN officials, as well as representatives from Embassies, the private sector, and international organisations.

These Proceedings comprise five papers written initially as background papers for the Forum and then finalised after the Forum. They are:

- "Energy Security and Energy Connectivity in the Context of ASEAN Energy Market Integration" by Philip Andrews-Speed

- "Nordic Political and Economic Cooperation: Context, History and Outlook" by Johan Strang

- "Nordic Energy Policy Cooperation" by Birte Holst Joergensen

- "The Nord Pool Market Model" by Hans-Arild Bredesen

- "Energy Security and Energy Connectivity in the Context of European Energy Market Integration" by Christian Egenhofer and Fabio Genoese

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Energy Security and Connectivity:
The Nordic and European Union Approaches

FORUM PAPER

Energy Security and Energy Connectivity in the Context of ASEAN Energy Market Integration

February 2016

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Executive Summary

Energy market integration is now firmly on ASEAN's policy agenda, and energy connectivity is a key to regional energy security and market integration in ASEAN. The ASEAN Power Grid (APG) is the most important element of energy connectivity, but progress in constructing the grid has been slower than planned and limited to bilateral connections. The construction of the APG faces numerous obstacles, the most significant of which being the weak financial incentive for investment. Other obstacles relate to a range of policy, institutional, legal, regulatory and technical issues, all of which are well recognised within ASEAN. Only recently has ASEAN emphasised the need to build a regional power market. This provides further challenges relating to harmonisation and regulation.

The obstacles faced by ASEAN in enhancing energy market integration and energy connectivity and in developing a regional power market are similar to those faced in other parts of the world. The European Union, with 28 member states, is an example which illustrates the scale of these challenges and the time and political will needed to resolve them. The Nordic states and sub-regions of the European Union provide examples of how small groups of nations can make substantial progress in building regional electricity markets. The Nordic power pool (Nord Pool) has been adapted and applied to build regional markets in southern Africa and India.

The Nordic and European experiences reflect a number of perspectives relevant to ASEAN energy market integration in general and in relation to the APG. These lines of thought deserve further deliberation:

- ASEAN should investigate how to build on the existing expertise provided by the ASEAN Centre for Energy to develop an ASEAN-wide system for collaborative energy research, education and training that can directly and indirectly support ASEAN energy policy and planning.

- ASEAN should investigate the applicability of the approach behind the development of the Nordic power market (Nord Pool) to the ASEAN Power Grid, given the apparent success of its application in Southern Africa and India.

- ASEAN's power utilities should be fully involved in decisions relating to how the regional power market is developed, and they should develop a common approach to transitioning themselves to a commercial mode of operation.

- ASEAN should choose a sub-region to develop the initial power market, but the geographic extent of this initial market should be determined on an economic rather than political basis.

- ASEAN should take great care in designing its power systems and markets to ensure that they will be suited to the future electricity supply technologies.

Introduction

In 2003, the ASEAN Member States drew up an ambitious vision through the Bali Concord II and announced their aim to establish an ASEAN Community built on the three pillars of "political and security cooperation, economic cooperation and socio-cultural cooperation".[1] They also agreed to pursue closer economic integration by 2020 through the creation of an ASEAN Economic Community (AEC).

The AEC, together with the ASEAN Political-Security Community and the ASEAN Socio-Cultural Community, form the basis for the emerging ASEAN Community (Acharya, 2012). These ideas were consolidated in the ASEAN Economic Community Blueprint issued in 2007, which set out the measures to be implemented to create a single market for goods, services and capital by 2015. Economic integration has also been driven by firms (state-owned and private) as they trade and invest across the region, and build international production networks that may, in turn, develop into subregional growth polygons (Dent, 2008).

Although energy was not explicitly identified as a Priority Integration Sector, the AEC Blueprint included the ASEAN Power Grid (APG) and the Trans-ASEAN Gas Pipeline (TAGP). The principle objectives of these two infrastructure networks are to enhance regional energy security and economic efficiency by optimising energy use. These and other aspects of energy cooperation are managed through successive ASEAN Plans of Action for Energy Cooperation (APAEC), including the most recent APAEC 2016–2025 (ASEAN Centre for Energy, 2015).

The aims of this paper are to review the nature of energy cooperation and progress towards energy market integration in ASEAN (Section 2) and then to examine the development of the APG as a case study in increasing energy connectivity and market integration (Section 3). Section 4 highlights the lessons that can be drawn from the experiences of power market integration in the European Union and, more importantly, the Nordic countries.

ASEAN Energy Cooperation and Energy Market Integration

ASEAN Energy Cooperation through APAEC

ASEAN's first policy move in the field of energy was the creation, in 1976, of the ASEAN Council on Petroleum (ASCOPE) with a specific focus on oil. This led to the ASEAN Petroleum Security Agreement (APSA) in 1986, which set up a petroleum-sharing scheme for periods of shortage or oversupply in member States. This mechanism has never been implemented as supply problems have been solved bilaterally between ASEAN members, with non-ASEAN producers or through oil traders (Nicolas, 2009). A

[1] The 2003 Declaration of ASEAN Concord II adopted by the Heads of State/Government at the ninth ASEAN Summit, Bali, Indonesia on 7 Oct. 2003. Available at http://cil.nus.edu.sg/rp/pdf/2003%20Declaration%20of%20ASEAN%20Concord%20II-pdf.pdf.

revised ASEAN Petroleum Security Agreement was signed in 2009 and ratified by all member States in March 2013. This revised agreement addresses both oil and gas. It provides for voluntary (not obligatory) measures in times of supply crisis, including emergency energy-saving measures and the sharing of oil or gas. It also allows for, but does not oblige member States to construct joint oil stockpiles.[2]

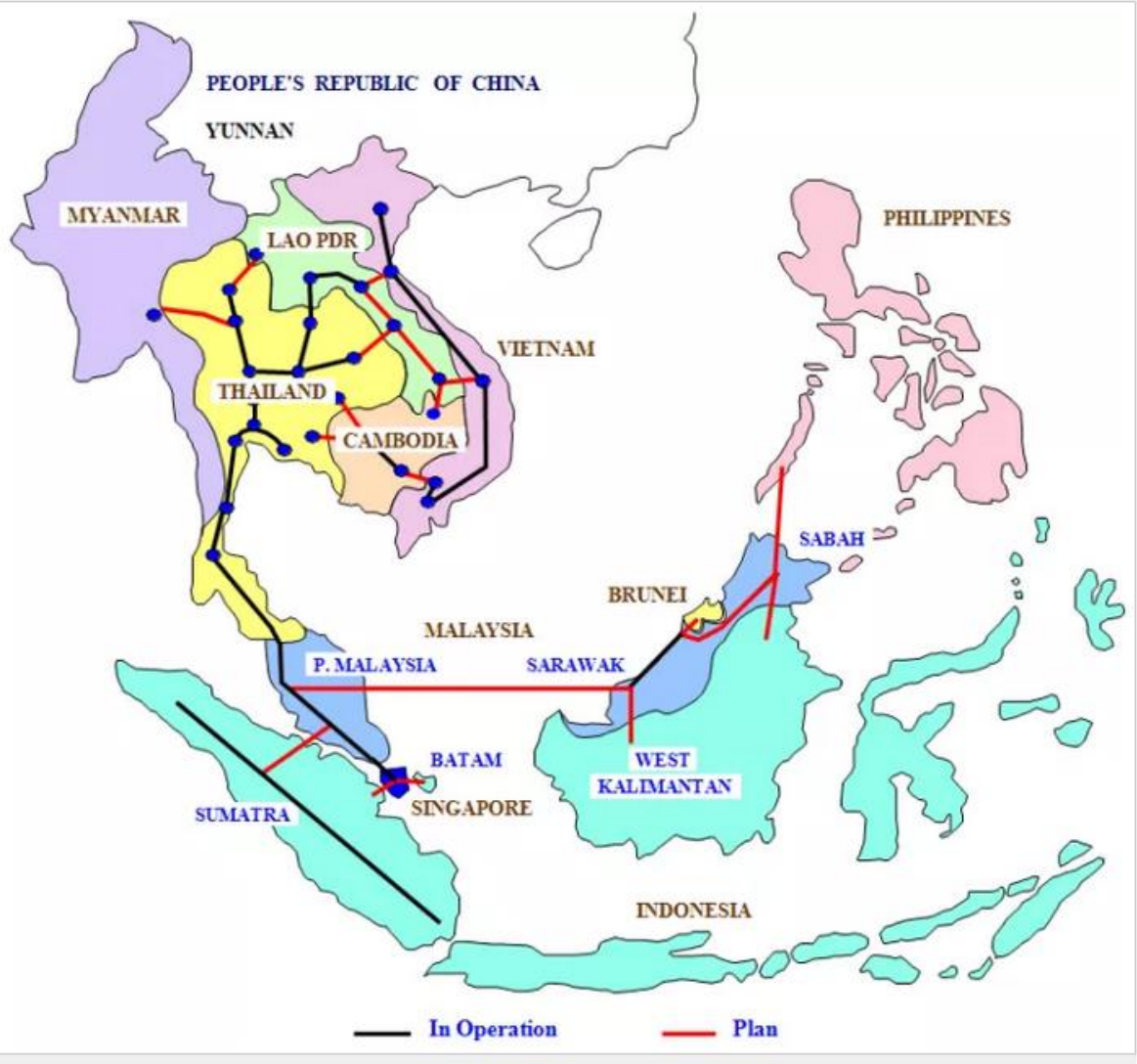
The signing of the ASEAN Energy Cooperation Agreement in 1986 marked the start of efforts to develop a more comprehensive approach to energy cooperation and policy coordination. The ASEAN Plan of Action on Energy Cooperation (APAEC), 1995–1999, established coordinating bodies for electricity, gas, coal, new and renewable sources of energy, and energy efficiency and conservation, as described above. The "ASEAN Vision 2020", published in 1997, placed emphasis on the need to construct transboundary energy networks, and this priority was embodied in the ASEAN Plans of Action for Energy Cooperation for 1999–2004 and 2004–2009, and was reiterated in the Plan of Action for 2010–2015.[3] The strategy for transboundary energy networks had two main components: the ASEAN Power Grid (APG) and the Trans-ASEAN Gas Pipeline (TAGP), both of which were included in the AEC Blueprint (ASEAN, 2008).

The ASEAN Power Grid (APG) aims to link the member states in a single network in order to maximise the efficiency and flexibility of electricity supply, to enhance the use of clean energy, and to provide access to modern energy to populations across the region. (International Energy Agency, 2015). Responsibility for implementation lies with the Working Group 2 (APG/Transmission) of the Heads of ASEAN Power Utilities/Authorities Council (HAPUA) and with the ASEAN Power Grid Consultative Committee (APGCC). Several bilateral connections exist, and a number of other projects are to be completed by 2020 (Figure 1; Tables 1–3). To expedite the harmonisation of regulatory practices and technical standards, the ASEAN Energy Regulators' Network (AERN) was established in 2012 to focus on regulatory issues related to regional power and gas trade, and HAPUA's Working Groups have conducted a number of studies to examine different aspects of APG development (see below, Section 3).

[2] See http://www.aseansec.org/22326.pdf.

[3] See http://aseanenergy.org/index.php/about/apaec.

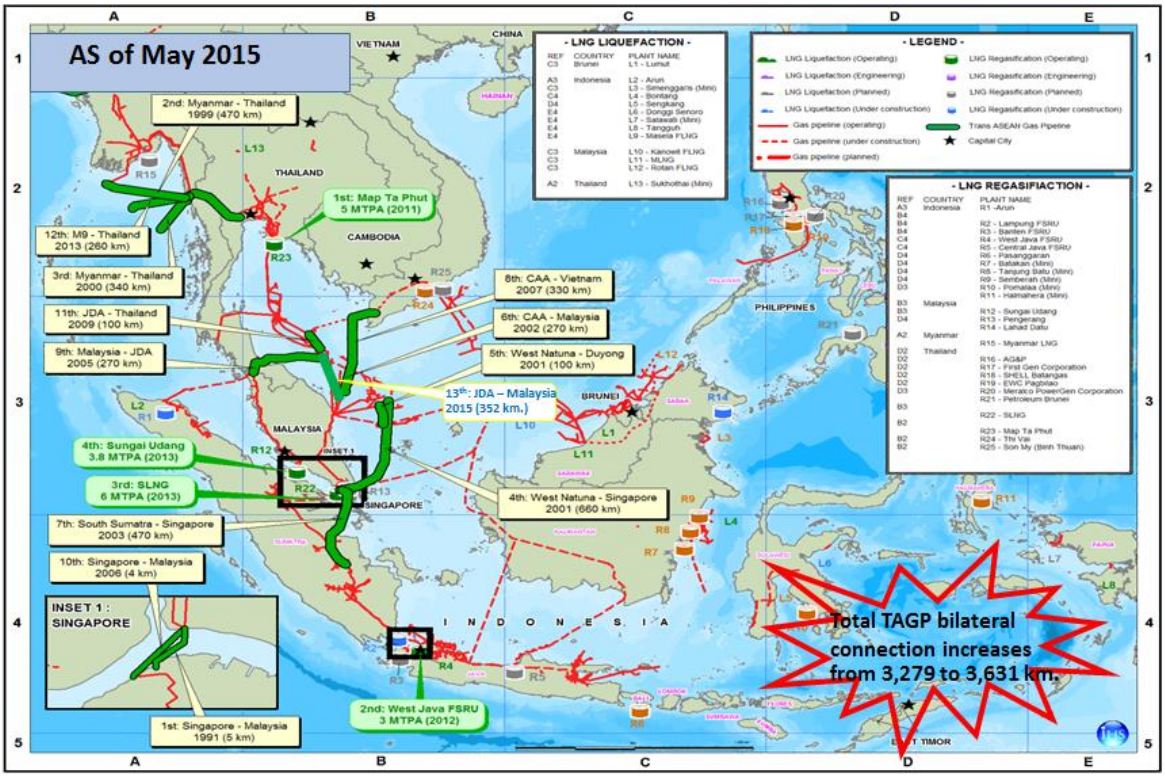
Figure 1. Simplified Map of the ASEAN Power Grid (APG).



Source: Sarawak Energy newsroom, 1 October 2014.
http://www.energyforsarawak.com/asean-power-grid-sarawak/

The TAGP aims to provide gas supplies across ASEAN, to raise the share of natural gas in the fuel mix as it is cleaner than coal, and to encourage investment in gas exploration. Responsibility for implementation lies with the Trans-ASEAN Gas Pipeline Task Group of ASCOPE. As of May 2015, 13 bilateral connectors had been built, totalling about 3,600 km of pipelines (Figure 2). These are bilateral connections driven by local private and state interests, sometimes with assistance from the World Bank and the Asian Development Bank. The original plan for the TAGP included a further 4,000 km of gas pipelines. The key connections that remained to be constructed are those from the East Natuna gas field in Indonesia to Thailand, Malaysia, Vietnam, Brunei Darussalam and the Philippines. These links would not only add an additional 2,000 km to the network, but the central position of the East Natuna field would also make them essential to the realisation of a truly regional grid. However, the development of this field continues to be delayed by commercial viability concerns (Nicolas, 2009; Doshi, 2013). Two other factors are undermining the case for such an extensive regional gas grid: first, the growing availability and economic attractiveness of LNG; and second, the declining availability of gas for export among ASEAN countries.

Figure 2. The Trans ASEAN Gas Pipeline (TAGP) as of May 2015



Source: ASEAN Council of Petroleum website, at http://www.ascope.org/projects.html

The other main priority set down by successive versions of APAEC has been the promotion of renewable energy and energy efficiency. The APAEC for 2010–2015 set targets for 2015 of an 8 per cent reduction of energy intensity compared with 2005, and an aggregate of 15 per cent of renewable energy in power generation. These collective targets were non-binding and it has been left to individual member States to set their own targets. The Sub-Sector Networks for renewable energy and energy efficiency, with the assistance of the ASEAN Centre for Energy (ACE), are responsible for assessing progress, but no formal agreement is in place to promote these initiatives (ASEAN Centre for Energy, 2013). Both targets were exceeded by 2013 when renewable energy accounted for 21 per cent of total electricity generation, and energy intensity had fallen by 8.5 per cent (ASEAN Centre for Energy, 2015). However, a closer look at the data provided by ACE (2013) reveals that the targets set for 2015 had already almost been reached in 2010, showing that the targets were set at far too low a level.

Energy Trade and Investment under AEC

The free flow of trade and investment lies at the heart of the AEC. This principle should apply equally to trade in energy commodities and services, and to investment in energy in order to pursue energy market integration. In line with this principle, the 32nd ASEAN Ministers of Energy Meeting (AMEM) held in September 2014 endorsed the idea that the APAEC for 2016–20 should embrace the theme of energy market integration as well as energy connectivity.

The two key agreements covering trade and investment are the ASEAN Trade in Goods Agreement (ATIGA) and the ASEAN Comprehensive Investment Agreement (ACIA). The goal of ATIGA is to reduce import tariffs of all goods to zero by 2015. Today, only four ASEAN members retain import tariffs for energy products such as crude oil, oil products, natural gas and coal, but these are due to be removed by 2015.[4] However, although import tariffs have been removed by most of the ASEAN members, a wide range of non-tariff barriers were identified by the ASEAN Secretariat in 2007.[5]

Many of these barriers persist today including, for example, state import monopolies and complex procedures for obtaining certificates of origin (Yulisman, 2013; Waller, 2014). As a result, the prospects for seaborne trade within ASEAN for crude oil, oil products and coal by 2015 are relatively good, but trade in oil and gas by pipeline and trade in LNG will require substantial investment. Despite this progress, some countries have long-standing domestic market obligations written into their production-sharing agreements for oil and gas, and both Indonesia and Vietnam are reported to be taking steps to limit the exports of coal.[6]

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[4] ASEAN Secretariat, "ASEAN Economic Community, Annex 2, Tariff Schedules", available at www.asean.org/communities/asean-economic-community/item/annex-2-tariff-schedules.

[5] ASEAN Secretariat, "ASEAN Economic Community, Non-Tariff Barriers", available at www.asean.org/communities/asean-economic-community/item/non-tariff-measures-database.

[6] "Indonesia Eyes Coal Export Curbs, Tax", *Reuters*, 4 June 2012, available at www.reuters.com/article/2012/06/04/coal-asia-indonesia-exports-idUSL3E8H41QS20120604; and Vu Trong Khanh, "Vietnam Clamping Down on Coal Exports as Domestic Energy Needs Rise", *Wall Street*

At first sight, ACIA appears to be, as its name suggests, a comprehensive international investment agreement designed to promote the free flow of investment across the region by providing for national treatment and investor protection. However, this appearance is deceptive, as a number of aspects of the agreement suggest a very regional character, reflecting its origin in the process of ASEAN decision-making and the need to achieve consistency with the values and priorities of ASEAN members (Zhong, 2011).

The scope of application, along with the exceptions and reservations of ACIA provide the host governments with great latitude in the application of the Agreement and thus the capability to undermine the intent of ACIA in many sectors, including energy. With regard to energy, the scope of application includes the extraction of mineral and hydrocarbon resources as well as services incidental to this extraction, but does not include the construction and operation of energy networks and utilities, notably electricity and gas. In general, ACIA is a very cautious document (Desierto, 2013) that provides little support for the free flow of investment in the energy sector.

The ASEAN Power Grid: Progress and Challenges

Building Connectivity across ASEAN

The physical connectivity of the APG has developed and continues to develop through a series of bilateral, inter-state connections, the earliest of which were built in the 1980s, well before the formulation of the APG vision. The first ASEAN Interconnection Master Plan Study (AIMS I) was completed in 2003 (HAPUA, 2003). This study concluded that it was uneconomic to create a single ASEAN grid, and recommend 11 bilateral interconnections to be built up to 2019. After the re-organisation of HAPUA in 2004, Working Group 4 embarked on a second study (AIMS II) which was published in 2010 (HAPUA, 2010a). This study was much more ambitious. In addition to the five interconnections that already existed at that time, the report listed another 12 projects that were classified as "committed" and 17 as "generic". Moreover, the AIMS II report, unlike AIMS I, concluded that it was economically viable to construct an ASEAN-wide power grid, but acknowledged that there would be intermediate steps involving three geographically separate sub-systems.

By the end of 2014, 11 interconnections between 6 pairs of countries were in commercial operation, with a total capacity of nearly 3,500 MW (Table 1). Most of these were already operational or under construction by the time the AIMS II report was published. Another 13 projects are under development, totalling over 7,000 MW (Table 2), and they have all been identified in the AIMS II report. Most of them are two years or more behind the original schedule, but due for completion by 2020. Another 20,000 MW or more interconnections are envisaged for the period after 2020 (Table 3).

Journal, 10 July 2013, available at http://online.wsj.com/article/SB10001424127887324879504578596901530238408.html.

Table 1. Existing ASEAN Power Grid Projects, as of November 2014

Project	System	Type	Original COD	Current SCOD	MW
P. Malaysia–Singapore					
Plentong–Woodlands	HVAC: 230 kV	EE	—	1985	450
Thailand–P. Malaysia					
Sadao–Chuping	HVAC: 132/115 kV	EE	—	1980	80
Khlong Ngae–Gurun	HVDC: 300 kV	EE	—	2002	300
Thailand–Lao PDR					
Nakhon Phanom–Thakhek–Theun Hinboun	HVAC: 230 kV	PP: La->Th	—	1998	220
Ubon Ratchathani 2–Houay Ho	HVAC: 230 kV	PP: La->Th	—	1999	126
Roi Et 2–Nam Theun 2	HVAC: 230 kV	PP: La->Th	—	2010	948
Udon Thani 3–Na Bong–Nam Ngum 2	HVAC: 500 kV	PP: La->Th	—	2011	597
Nakhon Phanom 2–Thakhek–Theun Hinboun (Expansion)	HVAC: 230 kV	PP: La->Th	2012	2012	220
Lao PDR–Vietnam					
Xekaman 3–Thanhmy	HVAC: 230 kV	PP: La->Vn	—	2013	248
Vietnam–Cambodia					
Chau Doc–Takeo–Phnom Penh	HVAC: 230 kV	PP: Vn->Kh	—	2009	200
Thailand–Cambodia					
Aranyaprathet–Banteay Meanchey	HVAC: 115 kV	PP: Th->Kh	—	2007	100
			Total		**3,489**

Notes:
Original COD: Original Commercial Operation Date according to AIMS II Report
SCOD: Scheduled Commercial Operating Date
EE: Energy exchange
PP: Power purchase
Source: HAPUA Secretariat, at http://www.hapuasecretariat.org/

Table 2. Ongoing ASEAN Power Grid Projects, as of November 2014

Project	System	Type	Original COD	Current SCOD	MW
Thailand–P. Malaysia					
Su-ngai Kolok–Rantau Panjang	HVAC: 132/115 kV	EE	2014	TBC	100
P.Malaysia–Sumatra					
Melaka–Pekan Baru	HVDC: TBA kV	PP: SM->PM & EE	2015	2020	600
Sarawak–W.Kalimantan					
	HVAC: 275 kV	EE	2012	2015	230
Sarawak–Sabah–Brunei					
Sarawak–Brunei	HVAC: 275 kV	EE	2012–16	2018	2x100
Thailand–Lao PDR					
Mae Moh 3–Nan 2–Hong Sa	HVAC: 500 kV	PP: La->Th	2015	2015	1473
Udon Thani 3–Na Bong–Nam Ngiep 1	HVAC: 500 kV	PP: La->Th	2017	2019	269
Ubon Ratchathani 3–Pakse–Xe Pien Xe Namnoi	HVAC: 500 kV	PP: La->Th	2018	2019	390
Khon Kaen 4–Loei 2–Xayaburi	HVAC: 500 kV	PP: La->Th	2019	2019	1220
Lao PDR -Vietnam					
Xekaman 1–Ban Hat San– Pleiku	HVAC: 500 kV	PP: La->Vn	2011–16	2016	1,000
Nam Mo–Ban Ve	HVAC: 230 kV	PP: La->Vn			TBC
Luang Prabang–Nho Quan	HVAC: 500 kV	PP: La->Vn		2020	1,410
Lao PDR–Cambodia					
Ban Hat–Stung Treng	HVAC: 230 kV	PP: La->Kh	2011	2017	300
			Total		**7,192**

Notes:
Original COD: Original Commercial Operation Date according to AIMS II Report
SCOD: Scheduled Commercial Operating Date
TBC: To be confirmed
EE: Energy exchange
PP: Power purchase
Source: HAPUA Secretariat, http://www.hapuasecretariat.org/ (with updates from HAPUA Council Joint Statement of May 2015)

Table 3. Summary of Future ASEAN Power Grid Projects, as of November 2014

Project	Type	Original COD	Current SCOD	MW
P. Malaysia–Singapore	PP: PM->Sg	2018	post 2020	600
Thailand–P. Malaysia	EE	2016	TBC	300
Sarawak- P. Malaysia	PP: Sw->PM	2015–21	2025	4 x 800
Batam–Singapore	PP: Bt->Sg	2015–17	2020	3 x 200
Philippines–Sabah	EE	2020	2020	500
Sarawak–Sabah–Brunei	PP: Sw->Sb	2020	2020	100
Thailand–Lao PDR	PP: La->Th (+ EE)	2015–23	2019–23 ->	1,000 +
Lao PDR–Vietnam	PP: La->Vn	2011–16	TBC	TBC
Thailand–Myanmar	PP: Mm->Th	2016–25	2016–26 ->	13,000 +
Vietnam – Cambodia	PP	2016	TBC	TBC
Thailand–Cambodia	PP: Kh->Th	2015–17	Post-2020	2,200
E.Sabah–E.Kalimantan	EE		Post-2020	TBC
Singapore–Sumatra	PP: Sm->Sg	2020	Post-2020	600
			Total	**22,274–25,424**

Notes:
Original COD: Original Commercial Operation Date according to AIMS II Report
SCOD: Scheduled Commercial Operating Date
TBC: To be confirmed
EE: Energy exchange
PP: Power purchase
Source: HAPUA Secretariat, http://www.hapuasecretariat.org/

Whilst there has been significant progress in the construction of interconnections, the projects are lagging behind in terms of the schedule set by AIMS II. The reasons for this delay are well understood and documented (eg HAPUA, 2003; Mulqueeny, 2011; ASEAN Centre for Energy, 2013; Shi and Malik, 2013; Shi, 2014; Hermawanto, 2015). The primary obstacle has been the lack of capital. National governments and state-owned enterprises have been unable, unwilling or slow to invest and, at the same time, many interconnection projects remain commercially unattractive to private investors. The major exceptions are the numerous projects that take power from Lao PDR to Thailand (Tables 1 and 2), as Thailand has a great need for more electricity and the end-user tariffs are relatively high. HAPUA recognises the challenge of attracting private-sector investment and has commissioned Working Group 4 to carry out a study and recommend an appropriate model for public–private partnerships (PPPs).

A second set of challenges arises from the contrasting ways in which different countries manage their energy sectors. These gaps or mismatches in policy, structure and regulation were the subject of a project report by HAPUA Working Group 5 published in 2010 (HAPUA, 2010b), and were explicitly recognised in the APAEC for 2010–15. In addition, HAPUA Working Group 2 (APG/Transmission), together with the Asian Development Bank, carried out a joint study on the harmonisation of technical codes and guidelines for grid planning design, operation and maintenance, which was completed in 2013. These documents all emphasise the need to harmonise legal and regulatory frameworks with regard to power interconnection and trade, as well as

technical standards and codes relating to planning, design, system operation and maintenance. In addition, it is necessary to develop institutional and contractual arrangements for cross-border trade, including such matters as taxation, transmission tariffs, and third-party access. In this context, HAPUA Working Group 4 has completed a study on the taxation of cross-border power transactions (HAPUA, 2015), and Working Group 2 is embarking on studies relating to setting up an APG Transmission System Operator (ATSO) and an APG Generation and Transmission System Operating Group (AGTP). The AERN has two working groups devoted to, respectively, technical and regulatory harmonisation, and creating a database of legal and regulatory documents.

A number of other aspects of national policies and laws may also constrain investors. These consist of such matters as access to land, licensing procedures, anti-competitive practices on the part of state-owned companies, the risk of expropriation, and national priorities relating to energy security. This last issue has the consequence of national governments preferring to give priority to national energy self-sufficiency over regional integration. A final challenge in building a regional energy grid arises from the need to integrate an ever-increasing proportion of intermittent renewable energy.

Building Connectivity in the Greater Mekong Subregion (GMS)

The GMS embraces five ASEAN states (Cambodia, Lao PDR, Myanmar, Thailand and Vietnam) and two regions of China (Yunnan and Guangxi) (Figure 2). Led by the Asian Development Bank (ADB), energy cooperation has been on the agenda of the GMS since 1992 (Asian Development Bank, 2012). The region is particularly well endowed with hydro-electricity resources, as well as modest amounts of fossil fuels, but the geographic distribution of these resources is uneven and does not match the centres of demand. As a consequence, an Electric Power Forum was established in1995 to build regional cooperation and specifically to promote cross-border interconnection and power despatch, and to develop an institutional framework for regional trade.

As can be seen from Tables 1 and 2, the GMS is the major centre of success in building connectivity in ASEAN. In addition to the connections between ASEAN Member States, there are links between China and three of its neighbours, namely Myanmar, Lao DPR and Vietnam, totalling about 6,500 MW (Zhong, 2014). Total trade in 2010 amounted to 34,139 GWh and could reach close to 100,000 GWh by 2020 (Asian Development Bank, 2012, 2013). However, the continued construction of interconnection infrastructure faces similar obstacles to those described above for ASEAN (Antikainen et al., 2011)

Building a Regional Power Market

In the past, formal ASEAN documents on energy matters, such as successive APAECs and both of the AIMS reports, have been silent on the issue of building a regional power market. This has now changed, with the latest APAEC for the period 2016–25 setting out its objective to introduce multilateral power trading in the first phase of this 10-year period, 2016–20 (ASEAN Centre for Energy, 2015).

In contrast, the strategy for the GMS has, for several years, been quite explicit that trade will develop from initial sales through power purchase agreements (PPAs), through grid-to-grid trading to a wholly competitive regional power market (Asian Development Bank, 2013). A Regional Power Trade Coordinating Committee (RPTCC) was established in 2005 to lay the groundwork for this evolution. A key component of the RPTCC's work is to establish a Regional Power Coordination Centre (RPCC), which involves the synchronisation of operations across the national power markets. The need to create the RPCC was first mentioned at the Ninth RPTCC meeting held in October 2010. However, as of July 2015, the Centre has not been established because the GMS Member States have yet to agree on the country that should host it.

The Laos–Thailand–Malaysia–Singapore Power Integration Project (LTMS-PIP) is a more recent initiative to establish a power market within ASEAN. This idea was launched in September 2014 to enable electricity trade from Lao PDR to Singapore using existing infrastructure. This was designed as a pilot project to trade up to 100 MW of power to be wheeled from Lao PDR to Singapore (Abidin et al., 2015). Whilst the technical aspects of the projects are can be easily addressed, those relating to commercial arrangements and legal and regulatory matters will prove more challenging. This was highlighted at the annual meeting of the ASEAN Minsters of Energy in October 2015, when a way forward for LTMS-PIP could not be agreed. Whilst Laos PDR appears to be keen to sell electricity, the government of Singapore cannot commit to purchase a fixed quantity, let alone agree to a price, as electricity in Singapore is sold in a competitive market. The power from Laos could well be competitive in this market if Thailand and Malaysia do not set their transmission tariffs too high. However, even if the government of Singapore might welcome the availability of cheaper, cleaner electricity, the interests of the incumbent power generators may be undermined, as the domestic market is already oversupplied with generating capacity.

In addition to the institutional, regulatory and technical challenges identified above in respect of connectivity, a further obstacle to converting the growing connectivity into a regional or sub-regional market is the predominance of 25-year PPAs in the governance of most of the interconnections, particularly those between members of the GMS. These PPAs provide the generator with exclusive use of the transmission infrastructure with no third-party access (Antikainen et al., 2011). Of the existing and ongoing interconnections, only those involving Malaysia are based on energy exchange. Though the insistence of the investors on the use of PPAs and the lack of third-party access are understandable, these pose a serious obstacle to any move to a truly competitive regional power market.

Whilst these constraints to energy market integration appear formidable, they are not unique to ASEAN and are faced by any regional grouping of diverse nations. As a consequence, developing sub-regional power markets from coalitions of the willing (e.g. GMS and LTMS) is probably the best way to proceed (Mundaca et al., 2013).

Relevance of the Nordic Experience to ASEAN

The Nordic experience of energy cooperation has direct relevance to ASEAN energy cooperation in general and, in particular, to the development of the APG and an integrated ASEAN electricity market. This section examines the Nordic experience at three levels, drawing on the accompanying papers:

- The general approach to political, economic and cultural cooperation (Strang, 2016)
- Energy cooperation in general (Joergenson, 2016)
- The Nord Pool, a competitive electricity market (Bredersen, 2016)

Finally, we briefly identify some key aspects of the European Union experience of energy integration that contrast with or supplement the Nordic experience.

Nordic Cooperation

Within the context of this paper, the principal Nordic countries referred to are Norway, Sweden, Denmark and Finland. These countries are geographically close and have a long history of political, economic and cultural interaction. With the exception of Finnish, their languages are very similar and the countries share a common Lutheran Christian religious heritage. The Nordic countries all have advanced economies, despite having industrialised later than most western European nations, and they share a common belief in the role of the state in providing social welfare (Strang, 2016).

Formal political cooperation began in 1952 with the creation of the Nordic Council which comprises elected politicians from each of the Nordic countries. This was reinforced in 1972 by the establishment of the Nordic Council of Ministers in 1972. This latter council has an annual budget of about €125 million and runs a number of sectoral councils, including one which addresses energy. In addition to these two high-level Councils, there are a large number of formal and informal organisations which support cooperation and communication at all levels of society and in most sectors of political, economic and societal activity.

The key principle of Nordic cooperation is consensus, as with ASEAN. As a consequence, many grand schemes proposed by the political elites from one or more Nordic countries fail to gain traction. Conversely, many successful initiatives are driven from the "bottom", by the relevant, interested actors. This success derives from the strong people-to-people connections that have been built up as a result of deliberate policy over decades in political, economic, technological, academic and social sectors. Such extensive people-to-people interaction has yet to take place between ASEAN member states despite the establishment of the ASEAN Socio-Cultural Community, on account of the strong role of the state on most member states. As a result, most cross-country collaborative initiatives require official state support.

Nordic Energy Cooperation

Energy has been an important field of Nordic cooperation ever since the creation of the Nordic Council of Ministers, on account of the oil supply crisis of the 1970s (Joergenson, 2016). One of the first grand schemes was to cooperate in oil and gas supplies, but Norway had no interest in this regard as it wished to sell its hydrocarbons on international markets. Nevertheless, an agreement was reached to work together in a number of fields such as energy policy and planning, energy efficiency, energy and the environment, and research and development. Meanwhile, efforts to build a Nordic energy market continued. Two external trends had significant consequences for Nordic energy cooperation: the sustained moves by the European Union to build a single energy market, and the international recognition of the need to address the challenges posed by global climate change. Together, these led to the progressive alignment of many components of Nordic energy markets and policies with those of the European Union.

The voluntary and consensus-based nature of Nordic cooperation has meant that formal, top-down proposals are not always successful in the energy sector. Nevertheless, the proliferation of working groups on different energy topics has led to a convergence of outlooks and practices in energy policy and planning, especially with respect to energy efficiency and clean energy. Two notable successes have been in the fields of energy research and the development of a Nordic electricity market, the Nord Pool.

The Nordic Energy Research Programme was created in 1985 with the aim to build expertise, analysis and data for decision-making, and to pool resources. Initiatives included the establishment of Nordic energy research centres and financial support for doctoral research students. This led to the creation of Nordic Energy Research (Norden), a permanent organisation with a small staff to coordinate these activities and to work with Nordic governments to set research priorities. The initial annual budget was set at 30 million Norwegian kroner in 1985, approximately US$4–6 million at the prevailing exchange rates. The size of the funding for research projects grew as Norden developed partnerships with other research institutions. After 30 years, the Norden programme has created a large cadre of research and policy expertise in the Nordic countries, and has supported different forms of energy cooperation within and outside the Nordic region. ASEAN has yet to develop such research capacity, and this deficiency greatly constrains the ability of member states to cooperate effectively in energy policy making and implementation.

The Nordic Electricity Market—"Nord Pool"

The single most important, tangible outcome of Nordic energy cooperation has been the establishment of a single, Nordic electricity market (Nord Pool), which not only links the four main Nordic nations but is also well integrated with EU power markets (Bredersen, 2016). The development of the Nordic power market began in the early 1990s in response to two pressures: to improve the economic performance of national power sectors through market liberalisation, initially in Norway; and to take advantage of the

complementary fuel mix in each of the four countries. In contrast to the top-down EU approach to market integration, the development of the Nordic power market took place on an incremental and voluntary basis, driven by the utilities themselves: first Sweden joined Norway, then Finland and, finally, Denmark. A distinctive feature of the Nord Pool power market is that it is regulated on the basis of principles rather than by an adherence to detailed rules.

Whilst the Nord Pool today is a sophisticated market involving highly developed nations with slow or negligible demand growth, the basic mechanisms can be adapted and applied to build regional power markets under quite different circumstances. The most notable example is the Southern Africa Power Pool, which allows the vertically-integrated and state-owned power companies in 12 southern African nations to trade with one another, despite the absence of any liberalisation to domestic markets and the persistence of energy subsidies to consumers. These and other successes, in India for example, show that the path to electricity market integration in ASEAN need not be so difficult, provided it is approached in a pragmatic and stepwise manner.

The European Union Experience

A key difference between the EU and the Nordic states lies in the nature of their collaborative decision-making. Whereas the Nordic nations rely on consensus at all stages, the EU has a wider range of approaches. Consensus is required in order to make a decision relating to a long-term strategic objective, but later decisions relating to implementation can be taken by a procedure known as “qualified majority”, which takes into account not just the number of countries voting in favour but also the proportion of the total EU population represented by those countries. If a member state fails to subsequently implement the agreed legislation, the European Commission can take that country to court.

The European experience of energy cooperation dates back to the 1950s with the creation of the European Coal and Steel Community and Euratom (Egenhofer, 2016). More wide-ranging engagement of the EU with energy policy matters started to emerge in the 1980s, not least due to the oil crises of the 1970s. Whilst decisions on energy mix were left to member states, the EU developed policy initiatives, first to build a single European energy market and, later, to mitigate global climate change through the use of renewable energy and the enhancement of energy efficiency.

The need to build a single energy market was identified in 1988 as an essential component of the more comprehensive single European market for goods, services, capital and labour. After much deliberation and negotiation, the first legislation appeared in 1996 for electricity and in 1998 for gas. Despite some progress made, obstacles faced included a lack of third-party access, weak regulatory authority, high market concentration and a shortage of cross-border infrastructure. Further steps were taken in 2003 and 2011 to address these and other deficiencies, along with a recognised need to create formal institutions for energy regulators and for transmission system

operators to collaborate. As at the end of 2015, national markets across most of the 28 EU states have been coupled for day-ahead markets.

The slow development of the EU internal energy market has arisen from the ability of national governments to obstruct, delay or amend EU proposals, often on account of the interests of their own utilities. In this, the EU is no different from ASEAN despite the apparently strong authority of the European Commission. One key difference is that once EU legislation is passed, the European Commission can take to court those who break the law. In other words, participation in the market is voluntary, but once a country joins the market, it must obey the rules. Two major lessons from Europe are: first, that important policy decisions must be supported by high-quality, region-wide analyses of costs and benefits; and second, that it is easier to begin the process of building a regional market by developing markets at the sub-regional scale.

At the same time that progress has been made to develop the single European electricity market, the drive to promote the deployment of renewable energy, notably wind and solar PV, has become more intense. Given that the marginal cost of these forms of renewable energy is essentially zero, this has put downward pressure on wholesale prices, and undermined the commercial viability of thermal power. This problem is exacerbated by the intermittency of renewable energy. As a result, member states are increasingly introducing capacity payments for thermal power stations. This creates a tension between the desire to reduce carbon emissions and the need for security of supply and system stability, a dilemma for which no EU-wide solution has yet been identified. ASEAN is also promoting the deployment of different forms of renewable energy, and so will face a similar challenge as it develops an integrated power market. It is therefore essential for ASEAN to design its market mechanisms such that they take into account the challenges arising from the growing deployment of renewable energy and other new technologies.

The Challenge of Enhancing Energy Connectivity and ASEAN Energy Market Integration

ASEAN has proved to be strong on visions and plans for energy, but weak on delivery. The most important components of the ASEAN Plans of Action on Energy Cooperation have been TAGP and APG. Although progress has been made on these networks, this has been driven mainly by bilateral action by member states and their enterprises (state-owned and private), with external assistance from development banks. The role of ASEAN itself has been limited. As a consequence, critical policy and regulatory tasks to ensure that these networks can indeed benefit the whole region have not yet been undertaken (ACE, 2013).

The obstacles to implementing ASEAN's energy ambitions are numerous. The first challenge is the long-standing importance that member states attach to concepts of sovereignty and nationalism, which easily translates into protectionism. Second, some member states are relatively weak in their capacity to govern a sector as technically and economically complex as energy. Third, the degree of variability across ASEAN is much

greater than across the European Union or the Nordic countries. Political, economic and social cultures vary greatly, as do the physical state of the energy sector, the manner in which it is managed, and the way in which energy is priced. Finally, the ASEAN region does not occupy a single, clearly bounded continental region; instead, it is archipelagic in nature, and spread over a wide area of peninsulas and islands. A further deficiency related to ASEAN energy market integration lies in the failure within successive versions of APAEC to address trade and investment, and the deficiencies of the two relevant agreements (ATIGA and ACIA).

As a consequence, individual states have tended to undertake only those collaborative activities that involve low costs, such as attending meetings and agreeing to plans, or which bring direct national benefits. Undertakings that entail substantial short-term costs, or sophisticated harmonisation or agreements with partners, are either left to the wealthy and willing states, or are postponed. Institutions seeking to implement collective policy decisions tend to be weak, and national priorities have generally trumped aspirations for collective action.

These factors have constrained progress in building energy connectivity and market integration across ASEAN, and notably for electricity (APG) and gas (TAGP). Whilst the TAGP programme has lost some momentum due to the growth of LNG, ASEAN is now boosting its efforts to construct the APG and to develop a multilateral power market. A significant amount of groundwork is underway to support the achievement of these goals, but as the experience of the European Union shows, the road is long and winding for a large and diverse group of countries.

In contrast, the Nordic case shows what can be achieved by a small group of countries with convergent interests. In this respect, the LTMS-PIP is an important test for ASEAN, and the way in which the Nordic experience has been applied in southern Africa indicates that a regional power market can be built even if the national utilities remain state-owned and vertically integrated.

The Nordic and European experiences suggest several lines of thinking that are of relevance to ASEAN energy market integration in general and in relation to the APG, and that deserve further deliberation.

- *Lesson*: Coherent and effective national and collaborative energy policy and planning cannot be successfully achieved without a region-wide cadre of energy professionals in government, research institutes, think-tanks and universities. This cadre of professionals should have the expertise and funds to carry out research and analysis and have frequent opportunities to interact with one another and with policy makers, both formally and informally.

    - *Recommended action*: ASEAN should investigate how to build on the existing expertise provide by the ASEAN Centre for Energy to develop an ASEAN-wide system for collaborative energy research, education and training that can directly and indirectly support ASEAN energy policy and planning.

- *Lesson*: The application of the Nordic experience to southern Africa and India shows that it is possible to establish a regional electrical power market between states or sub-national entities even though some of the power industries remain fully state-owned and vertically integrated, and consumer subsidies remain in place.

    - *Recommended action*: ASEAN should investigate the applicability of the Nordic experience to the ASEAN Power Grid.

- *Lesson*: The Nordic experience shows not only that the drive for developing a regional power market can come from the power industry itself, but also that the industrial entities may be the most appropriate ones to work out the modalities of the market.

    - *Recommended action*: ASEAN's power utilities should be fully involved in decisions relating to how the regional power market is developed and they should develop a common approach to transitioning themselves to a commercial mode of operation.

- *Lesson*: The European experience shows that success in building an electricity market across a large region like ASEAN is likely to make better progress if integration starts at a sub-regional rather than regional level.

    - *Recommended action*: ASEAN should choose a sub-region to develop the initial power market, but the geographic extent of this initial market should be determined on an economic rather than political basis.

- *Lesson*: Given ongoing technological advances and the growing roles played by renewable and distributed energy, a further lesson from Europe is that the designs of power systems and power markets of 20 years ago may no longer be suited to the world of today and tomorrow.

    - *Recommended action:* ASEAN should exercise great care in designing its power systems and markets to ensure that they will be suited to future electricity supply technologies.

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ASEAN ENERGY MARKET INTEGRATION (AEMI)

Energy Security and Connectivity:
The Nordic and European Union Approaches

FORUM PAPER

Nordic Political and Economic Cooperation: Context, History and Outlook

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Executive Summary

The Nordic countries have been brought together by the simple geopolitical fact that they are small countries with mighty neighbours. Cooperation has been necessary in order to compete with larger countries and to increase their influence in international arenas. At the same time, all grand schemes for political unification of the region have failed. Instead, the Nordic countries have succeeded in developing a piecemeal approach to regional integration, focusing on people-to-people interaction and mobility, cultural cooperation and research networks. This peculiar form of "cob-web integration" has fostered a regional identity (*nordism*) that forms an integral part of the five national identities. As a result, despite being divided in terms of NATO and EU membership, the Nordic countries form a family of nations united in a fundamental trust in one another. This has, in turn made innovative and ambitious transnational experiments such as Nord Pool possible.

However, stressing the importance of informal people-to-people cooperation, it also needs to be emphasised that Nordic cooperation benefits considerably from the fact that it takes place within the larger treaty-based European framework of the EU and the European Economic Area. Arguably, it is this mix of top-down integration and bottom-up cooperation that has made the Nordic region one of the most unified regions in the world. The lessons from Nordic cooperation inform us that, on the one hand, strong political commitment is necessary, but also, on the other hand, that cooperation in specialised fields is most effectively pursued by the relevant actors themselves. Investments in people-to-people cooperation, and especially in research networks, are likely to pay dividends.

Introduction

The aim of this paper is to provide an overview of the historical foundations, present organisation and future challenges of Nordic cooperation. The key argument is that Nordic cooperation has been most successful when it has been pursued by the relevant actors themselves (bottom-up), rather than by means of ambitious political treaties (top-down). A crucial condition for the success of this practical "everyday" cooperation is the strong sense of affinity and trust across the region, which in turn is based upon consistent generous investments in "people-to-people" activities and cultural cooperation.

The paper starts with a discussion of the historical, economic and political contexts of Nordic cooperation, proceeds with an overview of the governance of Nordic cooperation, and goes on to analyse the state of Nordic cooperation in different policy areas. It concludes with an outlook on the future of Nordic cooperation.

Context of Nordic Cooperation

Culture, Values and Sense of Affinity

The peoples of Denmark, Finland, Iceland, Norway and Sweden have a special relationship with one another. Nordic affinity is based upon geographical proximity (small countries with mighty neighbours), cultural and political similarity, and a long history of interaction and cooperation.

A key factor is the similarity of the Scandinavian languages. Swedish, Danish and Norwegian are mutually comprehensible, particularly in written form. Icelandic is usually seen as Old Norse, distantly related to the modern Scandinavian languages, whereas Finnish is of a completely different origin. However, for historical and cultural reasons, all Icelanders learn Danish, while all Finns learn Swedish in school.

Other common features include the Lutheran Christian legacy which, according to many researchers, has fostered a peculiarly close relationship between the state and church. In the Nordic societies, the civic-legal and religious-moral norms coincide, resulting in the positive effect of the Nordics being among the most law-abiding and state-trusting people in the world. However, it also gives rise to the negative effect of the Nordics experiencing certain difficulties in managing disagreement and competing value systems (Markkola, 2011; Stenius, 1997).

Also noteworthy is a fact that the Nordic countries, in the European context, were industrialised relatively later. During the phase of political and national mobilisation in the 19th century, the large majority of the Nordic citizens lived in the countryside and thus the rural population was handed a large political role at an early stage. This has had positive and inclusive societal effects; for example, the process of democratisation was comparatively peaceful for the Nordic countries (Sørensen & Stråth, 1997; Árnason & Wittrock, 2012).

The most well-known feature of the Nordic societies is their social democratic welfare state, the roots of which can be traced back to the class compromises following the Great Depression of the 1930s. The essential ingredients in the Nordic model are generous and universal social benefits financed through a high tax rate and distributed in the form of services such as free healthcare, schools and higher education (Christiansen et al., 2006; Esping-Andersen, 1990).

To sum up, the Nordics like to think of themselves as belonging to a group whose countries are regularly positioned close to one another, and often at the very top, in different international rankings relating to prosperity, transparency, gender equality or happiness. The Nordic countries still like to compare among themselves and their societies, and more often than not, there is also a strong sense of (friendly) competition between the countries.

At the same time, it should be emphasised that this “Nordicity” does not form a vivid part of the political discussion in the region. Nordic cooperation is hardly ever an issue in election debates and there is a very limited common-Nordic public sphere. The Nordics do not read one another’s national newspapers or watch programmes on one another’s TV-channels, and there is no apparent Nordic dimension to the new social

media. However, the expectation still remains that the political and cultural discussions follow the similar broad lines, that there is a basic Nordic community of shared values.

The History of Nordic Cooperation

The cultural and political affinity of the Nordic countries is a result of the long history of manifold multilevel Nordic cooperation**.** The Napoleonic wars around 1800 ended three centuries of repeated conflicts between the empires of Denmark (including Iceland and Norway) and Sweden (including Finland), and marked the beginning of the process by which the region would consist of five independent states. Having been reduced into the small state category in Europe, the Nordic countries opted for a policy of peace, non-aggression and cooperation. Intra-Nordic peace has lasted for over 200 years and the region is regularly referred to as a paradigm example of what Karl Deutsch called a "security region" (Archer and Joenniemi, 2003; Deutsch et al., 1957).

A critical contribution to the establishment of a Nordic "us" was the Scandinavist movement of the mid-19th century. Originally a liberal student movement, it soon developed into a sort of (pan-) nationalism comparable to that which produced Germany and Italy. Ultimately, however, Scandinavism failed on the issue of military solidarity when Sweden in 1864 decided not to intervene in the Danish-Prussian conflict over the Schleswig region. But a more moderate "nordism" survived and gradually evolved into a central part of the five national identities. During the last couple of decades of the 19th century, a great number of Nordic and Scandinavian associations were founded covering a wide range of voluntary organisations, professions and interest groups (Hemstad, 2008). In the first decades of the 20th century, this voluntary cooperation was gradually completed with a more formalised cooperation at the political level.

Approaching the Second World War, geopolitical concerns merged with the idea of a special Nordic social model, and the region started to brand itself as a democratic haven on a European continent plagued by totalitarianism (Kurunmäki and Strang, 2010). Once again, however, Nordic cooperation failed again to produce a formal military alliance. As a result, Finland fought two wars against the Soviet Union (1939–40 and 1941–44), while Denmark and Norway were occupied by Nazi-Germany (1940–44). Sweden succeeded in remaining neutral, balancing between its loyalties towards its neighbours and its own security concerns. These different experiences determined the ways in which the Nordic countries approached the Cold War. Discussions of a Scandinavian Defence Union fell through when the Norwegian government in 1948 opted for NATO membership, with Denmark and Iceland following suit. Restrictions put down by the Soviet Union made NATO membership impossible for Finland, but with Sweden remaining unaligned, Finland was able to distance itself from Soviet influence and pursue a politics of neutrality (Hilson, 2008; Olesen, 2004; Strang, 2016).

Despite these different security arrangements, the idea of an especially peaceful Nordic region with a unique welfare model proved to be key to the way that all five countries positioned themselves in the Cold War. This peculiar feature was labelled "the Nordic balance". The Nordic Council (NC) was founded in 1952 and the Nordic Council of Ministers (NCM) in 1971. Foreign and security policy was exempted from the agenda,

and deliberations concerning a Nordic customs union (1950s) and a Nordic economic area (1960s) proved fruitless. But the NC and NCM were very successful in initiating cooperation on mobility, social issues, and arts and culture (Strang, 2016).

After the fall of the Berlin Wall, Nordic cooperation ended up in the shadow of European integration. Denmark, a member of the European Union (EU) since 1973, was joined by Finland and Sweden in 1995. The Norwegians turned down membership in a public referendum while Iceland did not even consider membership. The Nordics were further fragmented when Finland joined the European Monetary Union (EMU) introducing the euro in 2002, with Denmark (partly) and Sweden (fully) remaining outside. The post-Cold War period was a slump in Nordic cooperation, but all Nordic countries did join the European Economic Area (EEA) in 1994 which proved essential for the integration of the Nordic economies. More recently, official political cooperation has returned to the agenda, particularly in the area of foreign and security policy.

Indeed, looking at the history of Nordic cooperation, one is struck by its endurance. The repeated failures to produce a more formalised union at the top-political level have time and again provoked alternative cooperation measures with more practical and people-oriented agendas. This has been labelled the Phoenix effect of Nordic cooperation (Anderson, 1967; Olesen and Strang, 2016).

State of Recent National Economic and Political Development

The economic development of the Nordic countries after the Second World War has in rough numbers been quite similar despite the different market orientations of the countries. Intra-Nordic trade has fluctuated, but Sweden has always been among the most important trade partners for all its neighbours. However, export to Britain, Germany and Russia (particularly for Finland) has generally exceeded intra-Nordic trade.

Having escaped direct involvement in the war, Sweden was for a long time the most affluent. A leading manufacturer of skilled goods and machines, with a highly developed steel and forestry industry, Sweden attracted many immigrants from particularly Finland in the 1960s and 70s (at least 500,000 out of a population of 4.5. million). Indeed, Finland has always lagged behind the other Nordic countries in economic terms. The market orientation is quite similar to that of Sweden (electronics, forest and steel industries), but less diverse. Relying heavily on trade with the Soviet Union and Russia, it has also been much more vulnerable to external events. Today, the sanctions put up by the EU following the Russian annexation of Crimea contribute significantly to the struggle of the Finnish economy. The decline of Nokia and being part of euro-zone do not help.

The west-Nordic countries have traditionally relied less on large-scale industry than Finland and Sweden. For Denmark, agriculture has always been the principal economic sector, with shipping and, more recently, biotechnology and pharmaceutics growing in importance. Shipping and fishing were traditionally pivotal to the economy of Norway, but with the development of hydropower during the post-war period, energy became more central. Since the 1990s, the Norwegian economy has by virtue of its oil

resources surpassed its Nordic neighbours. For Iceland, fishing remains the most important sector, although it has recently become supplemented with investments in aluminium industry, fuelled by hydro- and geothermal energy. The international offensive of the Icelandic banking sector ended in a dramatic collapse in 2008, from which the Icelandic society seems to have recovered remarkably well.

The political debates in the Nordic countries have throughout the post-1945 period largely concerned similar issues, and the menu of political parties is more or less the same. There is a large Social Democratic party and one or two minor socialist parties on the left, and a group of liberal, conservative and agrarian parties on the right. During the past decades, all Nordic countries have witnessed a gradual rise of an environmental movement represented in parliament by a variety of Green and left parties. More recently, the Nordic countries have experienced a major breakthrough of populistic parties with a welfare nationalist, anti-EU and anti-immigration agenda. The high number of parties represented in the parliament has spurred a strong tradition of (minority and majority) coalition governments.

A peculiar feature of Nordic politics is the large responsibility given to local governments (on a regional or municipal level). Quite remarkably as well, its associations are many and strong: voluntary organisations are large and have considerable political influence. The key role of trade unions and employers' organisations in negotiating salaries and labour conditions is an essential feature of Nordic political life.

Motivations for and Principles of Nordic Cooperation

Nordic cooperation is pursued out of a variety of motivations, but many of them follow from the simple geopolitical fact that the Nordic countries are small countries with mighty neighbours. Externally, the idea of Nordic cooperation is to increase one's influence in the wider region as well as in the international arena, such as with the United Nations. Closer military alignment has, however, usually been undermined by diverging security concerns: Denmark has looked south, and Finland and Sweden east. Internally, the aim has mainly been to exchange experiences and best practices, but also to pool and share resources. In some particular fields, the idea has also been to pursue harmonisation. Moreover, in some specialised fields, the Nordic countries have, by virtue of being small countries, been forced to collaborate just in order to gather a critical mass of professionals.

The most fundamental condition for Nordic cooperation is the security community based upon a mutual recognition of one another as sovereign nation-states and on the common Nordic identity (nordism). This identity has never been strong enough to push for a formal unification of the region. In fact, all such attempts have failed ignominiously: the Scandinavist movement in the 19th century, the defence union deliberations around the Second World War, and plans for an economic union in the 1950s and 60s. Instead, the Nordic countries have had more success with a more piecemeal approach, where focus has been on people-to-people interaction, professional networks and cultural cooperation. This "cob-web" model of regional integration

(Andrén, 1967) has strengthened regional trust and served as a necessary precondition for innovative transnational cooperation initiatives such as Nord Pool.

Nordic cooperation has never been pursued with supra-national ambitions: no country has been forced by its neighbours to accept policies against its will. Instead, cooperation in the Nordic Council of Ministers (NCM) is based upon the principle of consensus, which means that cooperation is pursued only when everyone is on board. The principle of consensus is a consequence of the comparatively large common budget of the NCM, to which every country contributes. While praised for being democratic, the principle of consensus has, however, been increasingly criticised recently for being slow and ineffective, and alternative principles are being explored. Established in 2009, Nordic Defence Cooperation (NORDEFCO) is instead based upon the possibility of opting out: cooperation ventures are pursued by the individual countries only to the extent that they are willing to invest in them. NORDEFCO has undoubtedly been quite successful, but it remains to be seen how far cooperation can proceed without the continuity and long-term planning enabled by a common budget and a permanent secretariat.

The strong Nordic identity or ideology (*nordism*) entails that no country is left behind against its will. When the Nordic Council was established in 1952, Finland was unable to join because of Soviet restrictions, but the Finnish government and parliament were informed about the proceedings and welcomed to participate as soon as this was possible in 1955. It also means that bilateral cooperation ventures often expand throughout the region. Recent examples include: the Nordic Defence Cooperation (NORDEFCO) and the common electricity market (Nord Pool), both of which were originally Norwegian-Swedish experiments.

The question of regional leadership is a delicate one. In the 19th century, Denmark, and particularly its capital Copenhagen, was the unquestionable cultural and economic centre of the region. However, during the latter half of the 20th century, Sweden emerged as a regional (if not global) frontrunner and model, epitomising all the virtues associated with the Nordic brand (prosperity, welfare state, gender equality and international solidarity). As a result, Denmark, Finland and Norway were for a long time united in a complicated "big-brother" relationship with Sweden. Recently, the position of Sweden has been somewhat weakened. On the one hand, this has certainly reduced the traditional Norwegian scepticism towards Nordic cooperation, but on the other hand, it can be argued that Nordic cooperation has historically been most successful with Sweden as a strong regional locomotive.

Governance of Nordic Cooperation

Key Organisations and Agencies of Official and Formalised Nordic Cooperation

The Nordic Council of Ministers (NCM),[1] founded in 1972, is the main organisation of official Nordic cooperation. An inter-governmental body for cooperation between the five Nordic countries, and Greenland, Faroe Islands and Åland Islands, the NCM has an

[1] http://www.norden.org/en/nordic-council-of-ministers

annual budget of about €125 million and is financed by tax revenues from the Nordic countries. The costs are distributed according to a scheme that roughly corresponds to the gross national income of the individual countries. In 2015, Denmark covered 20 per cent, Finland 15.5 per cent, Iceland 0.7 per cent, Norway 31.5 per cent and Sweden 32.3 per cent of the budget.

The five Nordic Prime Ministers (as well as the heads of the autonomous regions) generally oversee the NCM, but in practice this responsibility is delegated to the Ministers of Nordic Cooperation, who usually are members of the government responsible for a minor sectorial ministry. The Ministers of Nordic Cooperation are part of an executive group which, on behalf of the Prime Ministers, makes all important decisions concerning the NCM. Their work is supplemented by the Nordic Committee for Nordic Cooperation comprising senior officials (civil servants) from the national foreign ministries, which all have a Nordic office with a handful of employees, usually as part of a larger European division.

The NCM is divided in sectoral councils, each covering a particular policy area. These councils are run by the corresponding ministers from the national governments, but in practice all issues are prepared by so-called Committees of Senior Officials, which consist of civil servants from the national ministries. Currently, there are 10 Councils representing the following areas:

- Labour (annual budget in 2015: €2 million)
- Gender equality (€1 million)
- Business, energy and regional policy (€18 million)
- Culture (€22 million)
- Law (€0.2 million)
- Fishing, agriculture, food and forestry (€5 million)
- Environment (€6 million)
- Education and research (€30 million)
- Health and social affairs (€5 million)
- Finance (€0.25 million)

The NCM has a permanent secretariat in Copenhagen, with approximately 90 employees headed by a Secretary General, usually a former leading politician from one of the Nordic countries. Formally, the task of the secretariat is to arrange and prepare meetings between the national officials and ministers, but it is also expected to proactively deepen Nordic cooperation with new ideas and initiatives.

All decisions within NCM are taken unanimously, and the five governments see to their general implementation. As indicated above, the "principle of consensus" is a matter of intense debate, and in order to politicise the NCM, a rotating presidency was introduced in the 1990s. Some funds were also made available for the presiding country to launch initiatives of its own, a sum that has gradually risen to approximately €10 million.

The budget of the NCM is distributed over the different sectorial councils (see above). A large part of this money goes to the running of some 20–30 semi-independent institutions—such as NordForsk (the Nordic Research Council, €15 million from the Council of Education and Research); Nordic Innovation (€10 million from the Council of Business, Energy and Regional Cooperation); and the Nordic TV- and Film fund (€4 million from the Council of Culture)—as well as the Nordic offices, institutes and culture houses (between €0.3–2 million each) found all over the region and in the adjacent areas, particularly in the Baltic States and Eastern Europe. All these establishments are tasked specifically with furthering Nordic cooperation in particular geographic or thematic areas. Many of them also fund projects on the basis of applications handed in by researchers, innovators or artists.

The Nordic Energy Research Institute (NEF) was founded in 1999 on the basis of more project-based energy research cooperation since 1975. The annual €1 million from the NCM (the Council of Business, Energy and Regional Cooperation) is supported by funding from the national research councils. NEF is located in Oslo, Norway, in the same building as NordForsk and Nordic Innovation and has a staff of 10–12 people.

The Nordic Council (NC)[2] was founded in 1952 and was the main organisation of Nordic cooperation until the establishment of the NCM in 1971. Since then, the NC has been "downgraded" to being a mere parliamentary body that provides democratic legitimacy to the NCM. The NC consists of 87 members elected among the national MPs. Iceland has seven members, whereas the other four countries have 20 members each (with two of the Finnish members representing Åland, and four of the Danish representing Greenland and the Faroe Islands). The budget of the NC is on about €4.5 million, and it is run by a secretariat of 20 people in Copenhagen, located in the same building as the NCM. The national parliaments also have one or two civil servants responsible for NC-related matters.

On the surface, the NC works like a parliament, with the difference that the members do not merely represent a political party, but also a national delegation. The sessions of the NC are unique in the sense that a parliamentarian from one country can ask a question of a minister from another country, and expect an answer. However, the NC does not have any formal power over the NCM (except concerning its budget) or the national governments. Its main instruments are the recommendations which, despite having a certain normative force, are regularly ignored by the national governments. This has given rise to the popular criticism that the NC is a wining and dining club for elderly parliamentarians. That said, some important innovations, such as the cooperation in foreign representation, originated from NC recommendations.

The NC convenes once or twice a year, and the main annual session is considered to be the key event of official Nordic cooperation, gathering the prime ministers, government representatives, MPs as well as a plethora of NGOs for a four-day exercise in Nordic networking. In connection with the sessions, the NC arranges a gala ceremony in which the five Nordic Council Prizes (in literature, children's literature, music, film and

[2] http://www.norden.org/en/nordic-council

environment) are handed out. The literature prize is of particularly high esteem and recognised by the media from all over the region—not least because of this prize, the Nordic Council is a stronger brand than the Nordic Council of Ministers.

The Nordic Culture Fund,[3] founded in 1966, is the major regional sponsor of cooperation in arts and culture. It is led by a board appointed by the NC and NCM, and has a permanent secretariat of 5–8 persons in Copenhagen (also in the same building as the NCM). It is financed directly by the Nordic governments, and hands out a total of €4 million annually on the basis of project applications from institutions and groups of artists in the Nordic countries.

The Nordic Investment Bank (NIB)[4] was founded in 1976 (after several failed proposals in the 1960s and 70s). It is run by a board of governors with one member from each country. With its headquarters in Helsinki, Finland, NIB has approximately 180 employees. Since 2005, the Baltic States have joined the Nordics as full members, thus making NIB different from the other official institutions of Nordic cooperation. NIB finances large-scale projects that support the national competitiveness of the member states or the emerging markets, as well as projects that further sustainable development. The Bank has been very successful and its financial report stated that NIB would pay €55 million in dividends to the member countries.

Nordic Defence Cooperation (NORDEFCO)[5] is not part of the official Nordic cooperation run by the NCM. It was established in 2009 when different cooperation schemes in defence policy merged into one body. The basic idea behind this merger was to save costs and increase military capability through joint acquisitions, pooling and sharing of defence material, as well as through joint exercises and common task forces.

The Ministers of Defence are responsible for NORDEFCO, and they are supported by a Policy Steering Committee of civil servants, as well as by a Military Coordination Group consisting of flag officers representing the Chiefs of Defence. NORDEFCO is a slim organisation without a permanent secretariat. It operates with a rotating chairmanship, whereby the chairing country covers the costs for the meetings (approximately €100,000 annually). All cooperation schemes and projects are financed directly through the national defence budgets, and each country participates only to the extent desired—there is no "principle of consensus." In practice, Norway, Sweden and Finland have been the most active members, with Denmark gradually increasing its activity. Iceland does not have a military force and does not participate in NORDEFCO. However, the Icelandic foreign minister is represented at some of the ministerial meetings.

NORDEFCO is often highlighted as a model for other regions (for the Visegrad interest, see Rieker and Terlikowski, 2015; and for Nordic cooperation in other policy sectors, see Strang, 2012). Celebrated as flexible and pragmatic, its results are certainly impressive, particularly when it comes to rapidly advancing areas such as cyber defence. However, there seems to be a limit to Nordic cooperation in security policy, which has to do with the fact that Finland and Sweden remain outside of NATO on the one hand, and

[3] http://www.nordiskkulturfond.org/en
[4] http://www.nib.int
[5] http://www.nordefco.org

with different interests and needs of the Nordic countries on the other. Most notably, none of the neighbouring countries seem interested in purchasing the Swedish fighter plane, JAS.

Not being part of the official structures of Nordic cooperation, NORDEFCO lacks a formal anchorage in the parliamentary body of the NC. This democratic deficit has been somewhat amended in the annual reports by the defence ministers regarding the sessions of the NC since 1997, as well as the annual roundtable discussions between the Defence Ministers, Chiefs of Defence and leading parliamentarians from both the NC and the national parliamentary committees of foreign and defence policy, which have been arranged since 2013. In general, however, Nordic defence cooperation enjoys strong popular support among both NATO supporters (who see it as a way of preparing Finland and Sweden for membership) and opponents (who see it as an alternative to membership).

Unofficial and Informal Nordic Cooperation

Besides the organisations for official Nordic cooperation, it is important to emphasise the myriad of bilateral and multilateral unofficial or informal networks and contacts between the Nordic countries—an area that is impossible to cover adequately within the realms of this paper (see Häggman, 2013).

Nordic cooperation is part of the everyday routines at every ministry, but to various degrees and taking diverse forms. These contacts are often highly dependent on personal relations among both politicians and civil servants who have become acquainted with one another during different Nordic meetings within or outside of the NCM/NC system.

The political parties and their youth organisations are all engaged in some kind of Nordic cooperation. SAMAK—the joint committee of the Nordic Social Democratic Labour Movement—was established in 1932 and has a small secretariat in Oslo. For many of the other parties, cooperation is organised more loosely.

The labour unions have a regional trade union federation (Nordens fackliga samorganisation, NFS) that gathers the national unions to common meetings and seminars. It has a small permanent secretariat in Stockholm, Sweden, with four employees.

Voluntary associations, sports clubs, scouts, churches, schools and universities all have some form of Nordic cooperation as well, but the model of organisation varies. For example, Greenpeace has a common Nordic division (without any national organisations), whereas the scouts have a Nordic umbrella organisation responsible for joint activities. Some associations do not have any formalised organisations at the Nordic level at all, but compensate for this by arranging informal meetings and study trips. Most of this cooperation takes place without the financial support of the NCM system.

The Nordic Associations (founded in 1919) are the only voluntary associations dedicated to furthering *nordism* and Nordic cooperation. The national Nordic Associations are led by a Secretary General which usually is a leading politician from the parliament. The national Nordic associations have secretariats of their own; in addition,

there is a Nordic umbrella organisation (Föreningarna Nordens Förbund) in Copenhagen with a secretariat of around 10 people. In total, the Nordic Associations are made up of around 50,000 members from the Nordic countries.

Key Rules and Treaties Governing Cooperation

Nordic cooperation is characterised by a lack of formal rules and treaties. The Nordic Council was, for example, established in 1952 without a formal treaty, but on the basis of a legal adoption in each country (Finland was able to join only in 1955). The grand successes of Nordic cooperation are usually said to be the three conventions agreed upon in the 1950s, namely:

- The passport convention of 1954–57 that guarantees free movement in the region
- The common labour market convention of 1954 that guarantees that a Nordic citizen can apply for work in the whole region
- The social convention of 1955 that guarantees that Nordic citizens are entitled to the same social provisions as natives

The conventions were very ambitious at the time, predating similar arrangements within the EU by almost 50 years. Still in effect, they have been amended several times since. They have also been appended with conventions on taxation (1989), language (1981), and education, research and culture (1971).

The Helsinki Treaty of 1962 is usually referred to as the Basic Law of Nordic Cooperation. 70 articles long, it defines the aims and forms of Nordic cooperation with regard to both the NC and NCM framework and to specific policy fields. However, the formulations of the treaty are rather vague and do not commit the government to anything ("the governments *shall seek to*"). Still in effect, the most significant amendments were made in 1972 in connection with the establishment of the NCM.

NORDEFCO is based upon a "memorandum of understanding" signed by the Ministers of Defence in 2009. Being more a declaration of Nordic goodwill than a formal treaty, it describes the formal organisation of NORDEFCO and pays special attention to the fact that Nordic cooperation should not interfere with the NATO commitments of Denmark and Norway. In 2011 the memorandum was supplemented with a Nordic declaration of solidarity, signed by the foreign ministers. Even if the declaration focuses on issues like terrorism, environmental disasters and cyber-attacks, rather than direct military threats, there was some discussion regarding the relation between the Nordic solidarity declaration and NATO's Article 5. The general interpretation seems to be that the NATO commitments trump the Nordic declaration in all respects (Forsberg, 2013).

The non-binding character of Nordic cooperation has also become increasingly striking in comparison to the ambitious integrative and federative steps taken by the EU. Therefore, it needs to be emphasised that the Nordic countries have, during the past couple of decades, taken huge leaps in economic integration thanks to the formal and binding treaties and rules put in place by the EU and the EEA.

The lack of binding treaties is sometimes taken as an indication that Nordic cooperation is based upon democratic principles and a high degree of trust, but it is also a source of criticism, which the politicians have sought to counter with an abundance of general declarations of Nordic goodwill.

Main Fields of Cooperation

Main Fields of Intra-Nordic Cooperation

Arts and culture, social policy, law and research have traditionally constituted the core areas of Nordic cooperation. These fields were arguably selected as compensation for the impossibility of cooperation in foreign and security policy during the Cold War on the one hand, and the failures of the grand schemes of Nordic economic integration during the 1950s and 60s, on the other (Mai, 2016). At the same time, there was an idea that this was an investment in cultural belonging and a sense of "us" which would eventually pay dividends also in "hard areas" (Strang, 2016).

Cooperation in social policy was particularly lively during the period of rapid expansion of the welfare state in the 1950s and 60s, and gained additional strength because of the geopolitical ambition of establishing a welfare block in the Cold War conflict between capitalism and communism. Cooperation in the field of law started in the late 19th century and was often coupled with an explicit ambition of harmonising Nordic law. Since the accession of Finland and Sweden to the EU, cooperation in social policy and law are both in decline (Kettunen et al., 2016; Letto-Vanamo and Tamm, 2016).

Cooperation in arts and culture is based upon the affinity of the Scandinavian languages and a general sense of "Nordism", and continues to be a prioritised area within the NCM framework. Nordic cooperation in research has been pursued for similar reasons, but arguably with a stronger emphasis on pooling resources and gathering a critical mass of people working in specialised fields. In some cases, the idea has also been to come up with solutions to challenges with a transnational dimension. A special success story in this respect was the NMT and GSM standards for mobile telephony, which were developed in the 1970s, 80s and 90s, and which were applied in large parts of Europe and beyond.

Nordic cooperation has also been quite successful in **environment protection**. A significant breakthrough was the establishment of the Nordic Ecolabel (the Nordic Swan) in 1989, which has become one of the world's most successful ecolabels, covering a wide range of consumer products, from soap to hotels.

Since the end of the Cold War, **security policy** has gradually become the most thriving field of Nordic cooperation. The reasons were originally economic as the national defence ministries were struggling with the equation of rising costs following technological sophistication on the one hand, and decreasing shares of the national budgets on the other. More recently, following the Russian annexation of Crimea and repeated Russian violations of Nordic airspace, Nordic cooperation has to an increasing extent become motivated by security threats.

Another recent development is the integration of **the Nordic economies**. Historically a difficult area for Nordic cooperation, economic integration has been facilitated within larger European frameworks, such as the EU and the EEA. At a corporate level, the Nordic region has formed an extended domestic market, which companies use either defensively in order to avoid becoming absorbed by multinational companies, or offensively as a stepping stone to operations in larger European or global markets. The Nordic customers have grown accustomed to Nordic dairy products (Arla Foods), banks (Nordea), media houses (Schibsted or Bonnier), telecom operators (TeliaSonera) and forest industries (Stora Enso).

The moves toward a common Nordic **energy market** need to be understood as part of this wider economic integration. It was not a result of an articulated political ambition at the top political level; rather, it was pursued by the relevant actors themselves in order to meet the challenges of globalisation and Europeanisation. It was also based upon investments in **Nordic energy research** since the 1970s, which was motivated by several reasons listed above (pooling resources, gathering a critical mass of expertise, and forging transnational solutions).

Least Successful Fields of Intra-Nordic Cooperation

It has often been argued that Nordic cooperation has succeeded in "soft" areas such as welfare, law, and arts and culture, but failed in "hard" areas such as security policy or economy. Today, this seems to be the opposite. Cooperation and integration are flourishing in security policy and the economy, whereas cooperation in law and welfare is struggling.

Divergent economic interests have also hindered cooperation in such sectors as fishing and agriculture. Arguably, energy policy can be added to this because despite the common energy market. There have been many failed attempts at cooperation in areas such as energy research and large-scale projects (e.g. gas-pipes across the region and the case of Volvo–Statoil) (Tønneson, 2002). No country has so far been prepared to abandon its national energy strategies in favour of a common Nordic approach.

Discussion

To sum up, it seems that Nordic cooperation has been most successful during times of rapid development. Cooperation in law and in the social sector was particularly active in periods of legal codification (the late 19th century) and expansion of the welfare state (the 1950s and 60s). The Nordic Ecolabel was a success because it pushed the limits of the national environmental conscience. Lately, economic globalisation and advances in IT, defence and energy have been made cooperation more favourable.

Also, external pressure, be it in the form of economic challenges or perceived security threats, has also facilitated Nordic cooperation, and been key to the rise of Nordic defence cooperation. Similarly, Nordic energy cooperation was initiated in reaction to the oil crisis of the 1970s.

A final observation is that Nordic cooperation tends to work better among the relevant actors themselves than at the top political level. The grand schemes for

cooperation and integration fail with astonishing regularity, while cooperation continues to advance in everyday practice.

Main Fields of External Cooperation

The Nordic countries have a strong history of cooperation on an international scale: some scholars have even argued that the whole idea of a specific Nordic region was construed abroad (Götz and Haggren, 2009). A unified Nordic foreign policy was impossible in the Cold War period, but the Nordic countries succeeded in creating a common Nordic brand of peace and solidarity through cooperation in international organisations such as the International Labour Organization (ILO) or the Organisation for Economic Co-operation and Development (OECD). The UN has been of particular importance. Generous with foreign aid, the Nordic countries have also stood for one-fourth of all UN peacekeeping soldiers. The Nordic countries often negotiate a common position in the UN, and they generally support one another's initiatives as well as candidacies for internationals posts (such as a place in the Security Council).

Since the end of the Cold War, Nordic foreign policy cooperation has conquered new areas, such as foreign representation. The Nordic countries have a joint embassy complex in Berlin (*Nordische Botschaften*), and a division of labour is discussed in parts of the world where there is a limited need for five separate embassies. They have also recently made some collective efforts in nation-/region-branding, promoting Nordic companies abroad, and attracting foreign investments to the region.

Least Successful Fields of External Cooperation

The success of Nordic cooperation in the international arena needs to be moderated by stressing the lack of Nordic coordination in transnational security alignment. Denmark, Iceland and Norway are founding members of NATO (1949), while Finland and Sweden remain unaligned. The background for this is to be found in the different experiences of the Second World War.

Nordic cooperation in European affairs has also been an area of little success. The Nordic countries have never formed a united block in the EEC, EFTA or EU, and cooperation between Denmark, Finland and Sweden within the EU has also until recently been rather limited. This lack of coordination can be attributed to the diverging security and economic interests described above. Moreover, Denmark and Sweden in particular have large oppositions groups critical of the EU that have to be taken into consideration.

The Nordic countries different positions with regard to NATO and EU have been the source of much debate by those who feel that it constitutes a major impediment for closer Nordic cooperation. However, some observers also point to the fact that with the European Economic Area agreement of 1994 and the NATO Partnership for Peace-programme in which Finland and Sweden are core members, the difference between member states and non-members of both the EU and NATO is becoming less distinct.

Discussion

To sum up, external Nordic cooperation seems to work best in fields which have a more moral-political character, compared to those that require more formalised alignment. While negotiating for a joint Nordic position in security or economy policy has repeatedly proved impossible, the Nordic countries have enjoyed remarkable success in aligning on questions of disarmament, peacekeeping, foreign aid and human rights. In this way, they have established a joint brand, i.e. that of being "norm entrepreneurs" (as termed by apologists; see Ingebritsen, 2002) or "moral imperialists" (as termed by critics).

Assessment and Outlook

The future of Nordic cooperation is closely intertwined with the future of the EU. Today, a strong federative EU of 28 equally integrated member states seems unlikely. Instead, the possible scenarios are either an "EU *à la carte*" of different forms of attachment, or a return to a looser "EU of cooperating nation-states". Both scenarios allow for a strengthening of Nordic cooperation. Indeed, in contrast to the situation several decades ago, the EU is now more likely to be increasingly supportive of regional cooperation and integration initiatives.

With the economic and political struggles of the EU on the one hand, and the perceived security threats in the region following Russian mobilisation on the other, Nordic cooperation has returned to the political agenda. However, there seems to be some hesitancy in terms of determining how to navigate a debate that includes a neo-Scandinavist position on the one hand (Wetterberg, 2010), and a results-oriented NORDEFCO approach on the other (Stoltenberg, 2009).

In addition, there is the question of whether the current institutional setup is ideal for pursuing new initiatives of Nordic cooperation. The official organisations—the Nordic Council (NC) and the Nordic Council of Ministers (NCM)—have so far been unable to capitalise on the Nordic renaissance, and the two great successes of Nordic cooperation at the moment are not associated with the NC and NCM. Defence cooperation is pursued within the realms of NORDEFCO, while Nordic economic integration has been facilitated through the EU. As a result, there is a growing dissatisfaction with the Nordic organisations, and calls for revamping the NC/NCM-system are frequent.

In an increasingly global and transnational reality, Nordic cooperation needs to succeed at the top political level. At the same time, however, the Nordic countries need to recognise that one of the main strengths of Nordic cooperation is the manifold multilevel contacts between actors across the region—and that these relations are the result of a long history of generous investments in Nordic institutions and networks in fields like research, arts and culture. As an organ for top political cooperation, the NCM is slow and bureaucratic, and many initiatives would be bettered pursued elsewhere. But as a facilitator for "cob-web integration", the NC/NCM-system continues to be relevant. Indeed, the grand successes of Nordic cooperation have come about not by

means of political negotiation and bargaining at the top political level, but as a result of informal and unofficial cooperation among the relevant actors themselves.

Nordic cooperation in energy policy is a case in point. It shows how the strong cultural affinity of the Nordic countries can facilitate cooperation in areas where the provisions for cooperation and the interests of the five countries seem far apart. It also illustrates how areas of rapid technological development tend to be more easily pursued jointly, than areas with strong established national traditions. Finally, Nordic cooperation in energy can serve as laboratory of transnational cooperation. The Nordic region has unique cultural and political preconditions for forging transnational solutions, which can serve as a prototype for all-European solutions, and as a model for other regions in the world.

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ASEAN ENERGY MARKET INTEGRATION (AEMI)

Energy Security and Connectivity:
The Nordic and European Union Approaches

FORUM PAPER

Nordic Energy Policy Cooperation

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Executive Summary

A common interest in developing a reliable, sustainable and affordable energy system was the main driver for the Nordic energy policy cooperation since the creation of the Nordic Council of Ministers. The diversity of the energy systems in the Nordic countries facilitated this cooperation, not least in the power sector. Over the years, five focus areas have been addressed. Energy security of supply triggered the Nordic cooperation with the need to develop a long-term energy policy. This required decision-making support and energy systems analyses based on reliable and valid data, modelling and policy scenarios.

Energy markets developed from a political wish to make the important oil and gas sector an area of cooperation that led finally to the recognition that there was no common ground for closer cooperation in this field. However, power utilities and grid companies cooperated across the borders long before the politicians supported and pushed for further cooperation. Energy efficiency was addressed by a portfolio of activities ranging from knowledge-sharing, public campaigns, labelling and standardisation of products. The need to address environmental degradation was inspired by the UN Brundtland Commission Report, and climate change became a common concern. Energy technology cooperation was an integral part of Nordic energy policy cooperation from the very beginning. The Nordic Energy Research Programme was established with funding from each of the Nordic countries, and was earmarked for Nordic projects of common interests. This created the necessary critical knowledge base in new energy technologies, energy systems and energy markets.

Nordic energy policy cooperation followed the ordinary Nordic governance structures, rules and mode of operation with Council of Ministers, supported by a committee of senior officials and a secretariat. This was characterised by an incremental development of the cooperation based on consensus, mutual understanding and trust facilitated through exchange of experiences, work groups, seminars, educational activities and mobility schemes for energy policy officials. With the consolidation of Nordic Energy Research in 1999, the cooperation benefitted from having an institution that exclusively could focus on Nordic energy policy issues and deliver research-based decision support to decision makers in the Nordic energy sector.

Introduction

Nordic energy policy cooperation dates back to the creation of the Nordic Council of Ministers in 1972. Over the years, it has become an important area of cooperation in its own right, with high political ambitions to develop a well-functioning, sustainable, environmentally friendly and secure energy system within and across the borders. The cooperation has led to some remarkable successes, such as the liberalised Nordic electricity market and Nordic Energy Research. It has also resulted in numerous reports, discussions and visions, but without further actions. This paper aims to analyse how the Nordic energy policy cooperation has developed from its beginnings till the present day. What have been the areas of cooperation

and why have they changed over time? How has the cooperation been organised and what has been decisive for successful outcomes?

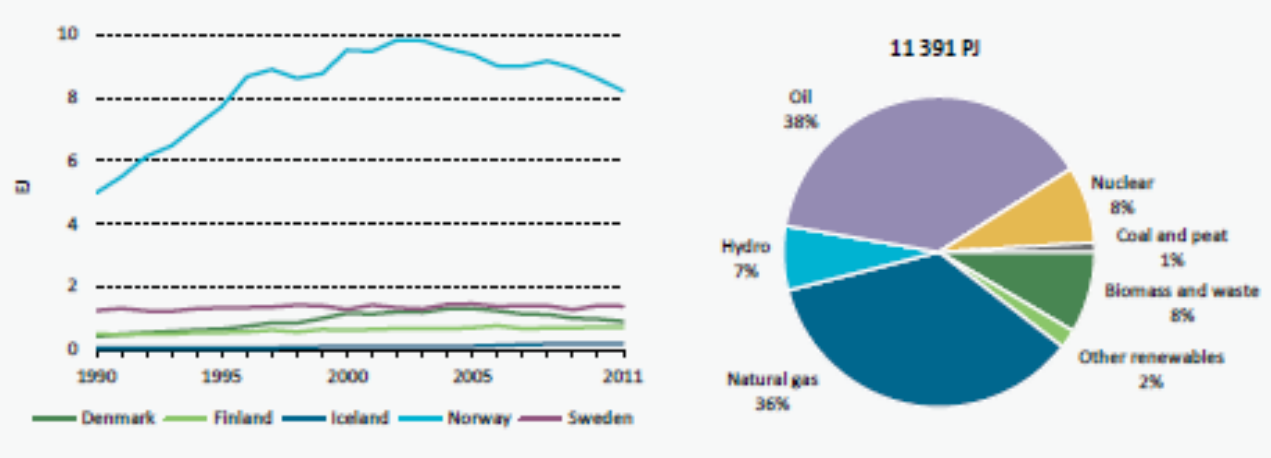
The analysis is primarily based on documents, policy action plans and reports from the archives at the Nordic Council and Nordic Council of Ministers. The academic literature on Nordic energy policy cooperation is presented to the author's best knowledge, except for the development of the Nordic electricity markets.

First, a short description of the energy systems in the Nordic countries is made. Then three stages of the Nordic energy policy cooperation are described, each of which setting the context for the cooperation. The first period from 1972 to 1988 is influenced by the first oil crisis and describes the building of the Nordic energy policy cooperation. The second period from 1989 to 2005 describes the cooperation being stuck between the European internal market discourse and the radical changes in Europe around the fall of the Wall and the dissolution of the Soviet Union. The third and last period from 2006 up to the present focuses on the political ambitions in developing energy and climate policies beyond the national boundaries. Finally, the three stages are summarised across cooperation areas and achievements are described.

The Energy System in the Nordic Countries

The Nordic region has a wide diversity of primary energy sources, comprising petroleum, nuclear power, and renewable energy sources such as hydropower, biomass, wind power and geothermal energy.[1] Norwegian oil and natural gas dominate the region's primary energy supply representing 68 per cent in 2010. Norway's oil and gas exports were the third largest in the world in 2010, after Russia and Saudi Arabia. Mainly due to a decrease in Norwegian petroleum production, overall Nordic energy production declined by about 16 per cent since its peak in 2002, but it has increased by 58 per cent since 1990.

Figure 1. Primary Energy Production; Share of Production by Fuel, 2011

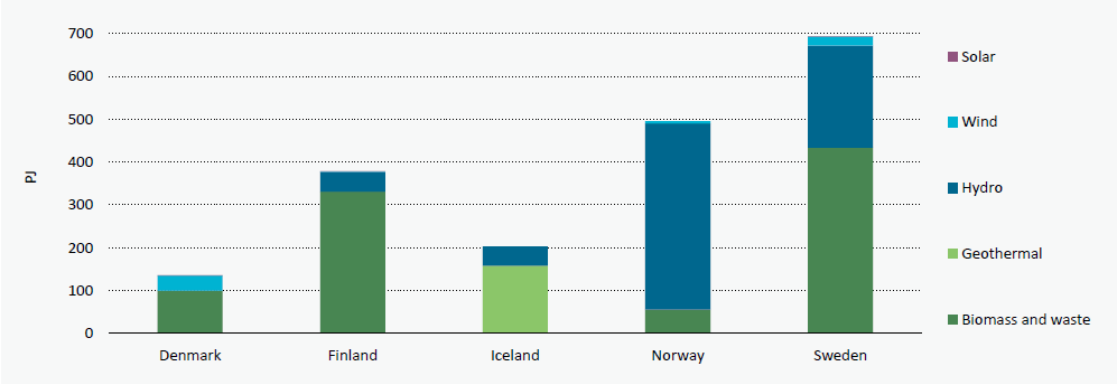


Source: International Energy Agency (IEA), 2013.

[1] This section is based on International Energy Agency, *Nordic Energy Technology Perspectives* (Paris: OECD/IEA, 2013).

Renewable energy production in the Nordic countries is dominated by biomass and hydropower. Sweden is the leading producer of renewables, dominated by biomass and hydropower. Second is Norway with its abundant hydropower. Third is Finland, mainly dominated by biomass. Iceland has geothermal and hydropower, and last comes Denmark with wind power and biomass.

Figure 2. Primary Renewable Energy Production in the Nordic Countries, 2011

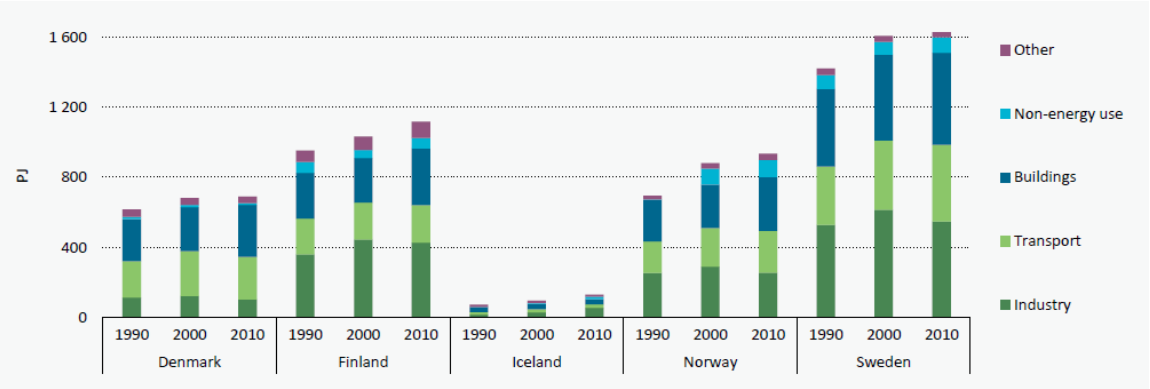


Source: IEA, 2013

Electricity generation in the Nordic region exceeded 400 TWh in 2010. 83 per cent of its electricity production is carbon neutral, with 63 per cent coming from renewables. Hydropower represents about half of the generation, with more than 50 per cent coming from Norway (118 TWh) followed by Sweden (66 TWh). The share of non-hydro generation is increasing. In Denmark, there is a steady replacement of coal-fired power plants with biomass, gas and wind. The share of wind power rose from 12 per cent in 2000 to 21 per cent in 2011 (in 2014, it was 39.1 per cent). Electricity generation in Finland is dominated by coal-fired power plants and nuclear, each providing 20 TWh out of 80 TWh. Iceland has 100 per cent renewable electricity generation, with 74 per cent hydro and 26 per cent geothermal. Norway has 95 per cent hydropower, one natural gas combined cycle power plant and a relatively modest share of wind power. Sweden has the largest power generation with mainly nuclear power, hydro power and biomass fired power plants.

Energy consumption in the Nordic region has increased by 17 per cent since 1990. The end-use sectors of industry, households and transport each represents one-third of total energy consumption. The largest increase in consumption is seen in the transport sector and commercial buildings, each with 30 per cent increase over the last 20 years. Industry accounts for 40 per cent of electricity in the region. Due to high electricity consumption by the aluminium industry, Iceland and Norway have the world's highest electricity consumption per capita. The cold climate has resulted in high rates of electricity consumption for heating, particular in Norway, Sweden and Finland.

Figure 3. Final Energy Consumption by Sector in the Nordic Countries



Source: IEA, 2013.

The energy intensity (energy consumption per unit of GDP) has remained above the OECD average since the mid-1980s, mainly due to increases in industry activity and to the high concentration of energy-intensive industries (e.g. metal and pulp and paper), as well as the petroleum industry. With the exception of Denmark, energy consumption per capita is above the OECD average. The energy sector accounted for 62 per cent of GHG emissions in 2010 in the Nordic region, has varied between 200 Mt and 250 Mt over the past decades. The transport sector has shown the largest increase in emissions. In Iceland, emissions from industrial processes have increased due to a new aluminium plant and increased capacity in others.

The Nordic region is a net exporter of energy, led by Norway's oil and gas exports. In 2011, the primary energy production was close to the double that of final energy consumption. Norway's exports account for 82 per cent of Nordic exports, while oil and gas also account for the largest share of imports, primarily to meet the demand in the transport sector. In addition to electricity trade among its participating countries, Nord Pool spot trades with Russia, Germany, Estonia, Poland and the Netherlands. Finland has been a net importer, purchasing power from Russia and to a lesser extent from Estonia. Norway, Sweden and Denmark fluctuate, being net exporter for one year and net importer for another, depending on the climate.

Stages of Nordic Energy Policy Cooperation

The stages of the Nordic energy policy cooperation are divided into three periods (Table 1).

First period (1972–88): With the establishment of Nordic Council of Ministers in 1972, these years were characterised by the overlapping regional cooperation between the Nordic countries and the European Economic Community (EEC), which Denmark together with the UK joined in 1972 while Iceland, Norway and Sweden remained in the European Free Trade Association (EFTA). The oil crisis in the 1970s brought energy policy high on the political agenda, also at Nordic level where each of the countries was forced to develop a robust national energy policy. In this period, two parallel features emerged: the environmental and natural resource concern as described in the UN Brundtland commission report; and the

common European market relaunched by the Delors Commission. At the end of this period, nuclear power was deeply challenged following the US Three Mile Island accident in 1979 and the Russian Chernobyl accident in 1986. Nordic energy policy cooperation took off with the first meeting of the Nordic energy ministers in 1980, which outlined a range of common activities relevant to the planning and development of the Nordic energy sector.

Second period (1989–2005): This was a dramatic time for the Nordic countries and the adjacent areas due to the fall of the Wall in 1989, the dissolution of the Soviet Union in 1991, the unification of Germany, and the process towards the establishment of the European Union (Maastricht Treaty, 1992). In 1992, the internal European market came into force, and the EEC and EFTA agreed to cooperate within the European Economic Agreement (EEA). Finland and Sweden became members of the EU in 1995, leaving Norway and Iceland as the remaining EEA countries. The outreach towards the adjacent areas around the Baltic Sea changed the Nordic outlook and opened up for closer cooperation. This was further strengthened with the three Baltic countries being members of the EU in 2004. Environmental issues and climate change were coming up on the international agenda, and in 1997, the Kyoto Protocol was adopted and came into force in 2005 by the ratification of Russia. These events had strong implications for Nordic energy policy cooperation in terms of energy markets.

Third period (2006–present): Security of supply and climate change are the two major issues dominating the political agenda of this period. The energy security of supply became evident in Europe in January 2007 when, due to the Russia–Ukraine conflict over gas supply and payments, the gas supply from Russia to Europe was effectively blocked. Parallel to these events, the international negotiation on a post-Kyoto regime addressed the urgent need to address climate challenge at a global level. The EU responded to these challenges by launching the ambitious 20-20-20 targets by 2020. Member states were obliged to increase the share of renewables in the energy system, and to reduce GHG emissions and energy consumption. At the same time, the third EU energy package[2] paved the way for even more integration of European energy markets. In 2008, the financial crisis hit the Nordic countries and the rest of the world, and the energy security of supply and climate change concerns were transformed into economic considerations for job creation, growth and competiveness. Despite the drop in oil prices in the autumn of 2014, energy security of supply, climate issues and competition remained high on the European agenda. In February 2015, the EU Commission launched the European Energy Union package with five mutually enforcing and closely interrelated dimensions relating to: energy security; a fully integrated European energy market; energy efficiency; a decarbonised economy; and research and innovation (European Commission, 2015).

[2] The first energy package in the late 1990s allowed the opening of the electricity and gas markets and a gradual introduction of competition. The second energy package in 2003/4 focused on the concepts of unbundling and third-party access, and defined the need for independent regulatory authorities. The third energy package in 2007 established an unbundling regime and defined the duties of national regulatory authorities. It also improved consumer rights, and promoted regional solidarity and national emergency measures in times of severe disruption to the gas supply; see also: http://fsr-encyclopedia.eui.eu/eu-energy-legislation-packages/.

Table 1. Overview of Nordic Energy Policy Cooperation

	First period 1972–88	Second period 1989–2005	Third period 2006–present
Governance	• Nordic Council of Ministers of Energy • Committee of Senior Officials • Permanent or ad hoc work groups • Nordic Energy Research		
Security	Long-term planning	Outreach to the adjacent areas	Alignment of policies in the wider EU context
Energy markets	Knowledge-sharing on oil and gas	• Action on liberalised electricity market • Knowledge-sharing on oil and gas	Nordic action plan for electricity market
Efficiency	Knowledge-sharing	Knowledge-sharing	Knowledge-sharing, especially around implementation of EU directives
Technologies	• Research (fossil, renewables and nuclear) • Nordic Energy Research Programme	Consolidation of research cooperation	• Knowledge-sharing on support mechanisms • Market pull and tech push initiatives
Environment	Increasing awareness	• Baltic Sea Region as testing ground for climate mechanisms • Post-Kyoto negotiations	Embedded in other activities

Stage One: Building the Nordic Energy Policy Cooperation, 1972–88

Economic development relies on a well-functioning energy sector. This was the rationale for the OECD as well as a core element of the European Steel and Coal Union from the very beginning. When the Nordic Council of Ministers was established in 1972, a separate Nordic Council of Ministers and a Nordic committee of senior officials for industry and energy were set up, also supported by similar resort ministries in several member states. The Nordic Industrialisation Foundation issued grants and loans to technical and industrial research, Nordtest provided cooperation on materials research, and the Nordic Investment Bank (NIB) supplied important financial instruments to facilitate the cooperation, also in the energy sector. The latter, NIB, financed a number of transmission projects in the first years and two nuclear power projects in Finland with Finnish and Swedish interests.

Following the first oil crisis, the Swedish government in 1974 approached the Norwegian government to discuss Nordic cooperation on oil and gas. Norway had little interest in Nordic cooperation and continued to give concessions to multinational companies in the exploration phase and to favour its own industry during the production phase. Further

attempts to give preferred exploration access to Swedish Volvo Petroleum also failed. Although a bilateral agreement on energy cooperation between Norway and Sweden was concluded , but it never played a substantial role.

However, at regional level, the Nordic energy ministers were ready to work more closely so as to address a common challenge: how to plan and develop a secure and robust energy sector. The Nordic Council of energy ministers met for the first time in 1980 to agree on a common four-year action plan for energy cooperation, which focused on:

- Energy efficiency
- Energy research and new technologies
- Energy planning
- Oil, gas and coal
- Electricity trade and infrastructure

For each topic, working groups were appointed, work programmes agreed upon and modest budgets provided. Central to the work was the exchange of experiences on the happenings within each country—during seminars and conferences, in reports and analysis, as well as through the organising of educational activities and mobility schemes for national energy planners and experts. The aim was to make the cooperation efficient and non-bureaucratic, relying primarily on the Nordic governance system and institutions to strengthen Nordic energy policy cooperation. This mode of operation was made from the very beginning, and has not changed much over the years.

The energy efficiency cooperation focused on the end-use sectors of households and industry. Typical activities included education of energy economists, exchanges of experiences and assessment of energy conservation campaigns, local energy planning and industrial sector guidelines for energy efficiency, and identification of "best practices" companies.

Nordic cooperation in energy research complemented the well-established Nordic cooperation in nuclear energy.[3] A contact group for energy research was set up, and its aim was to coordinate research and development in the Nordic countries. It saw to the registration of energy research projects, a catalogue of special courses in the oil and gas sectors, common review of concrete projects, and financial support for researchers to meet with one another. A special committee was tasked to make a proposal for the setting up of a Nordic Energy Research Programme to strengthen overall energy research through coordination and cooperation in areas of common interest (Nordisk Energiforsknings Utvalget, 1985). In 1985, the ministers decided to support the establishment of the Nordic

[3] The Nordic contact organ for nuclear issues (Nordisk Kontaktorgan for Atomkraftfrågar, NKA) was established in 1957 by the Nordic governments to promote Nordic cooperation related to the peaceful utilisation of nuclear energy. NKA was also the discussion forum for topics of common interest within international organisations, such as IAEA and OECD's NEA.

Energy Research Programme with approximately 30 million Norwegian kroner, paid annually and directly from the Nordic governments, and distributed according to each country's GDP.

Nordic cooperation in energy planning took its departure in the need of each country for better planning tools for the long-term planning of the energy system. Emphasis was on the exchange of experiences among national officials, the development of comparable energy statistics, and methodological development of energy modelling and systems analysis for each of the Nordic countries. These included price sensitivity studies and engineering studies of energy sources, energy transfer, and also changing energy markets and the energy policy opportunities to influence these markets. Closer cooperation between the Nordic energy planning committee of officials and the power sector's advisory body, Nordel,[4] was also established for purposes of long-term electricity planning.

Following the oil crisis, the Nordic energy ministers wanted to explore cooperation activities in the oil, coal and gas sectors to complement existing international contingency plans. But through a number of explorative studies on the oil refinery sector and the trade of coal, it soon became clear that there was little common ground for cooperation except within areas related to safety and environmental issues.

The gas sector was different. An information group with participants from state companies and ministries exchanged information and experiences, and commissioned over the years a number of studies to explore cooperation: economic aspects of liquid natural gas (LNG), prospects for coupling the Ekofisk in the North Sea with the Danish and Swedish gas systems, as well as the extension of the Swedish gas system to Norway. Conferences were also organised on topics such as contractual affairs in the offshore industry, offshore insurance issues, and oil and gas exploration in the Artic.

By end of the 1980s, Norway had become one of the main gas exporters to the European market, but had no domestic market for gas. Finland had built up a gas market entirely based on imports of gas from the Soviet Union. Denmark developed a gas market based on its own resources and exported about 25 per cent of its gas production to Sweden. Sweden had a gas market only in the south, based on Danish supplies. In 1988, a Nordic gas conference was held to discuss a common infrastructure, research and development, planning and storage. Concrete cooperation should be based on commercial conditions, including the Nordic Gas Technology Centre (NGC). The initiative was supported by the Nordic energy ministers, who once more expressed their expectations concerning the role of natural gas in the Nordic energy system (Nordisk Råd, 1989). However, by 1990, Swedish energy policy remained complicated with its moratorium on nuclear power, the status of the hydropower and biofuel preference. This forced Swedegas to drop its project of introducing gas to central Sweden. Three major gas companies (Statoil, Neste and Stoseb Gas) continued in 1991–92 to analyse the possibilities of importing gas from Norway, but they finally concluded that the market was not large enough, neither in Stockholm nor in Finland (Agfors, 1995).

[4] In 1962, Nordel was established by the power companies in Denmark, Sweden, Norway and Finland. Over the years, Nordel proved to be a very powerful advisory body to the Nordic governments as well as to its member organisations.

Stronger Nordic energy policy cooperation was not just a question of political engagement but also implied closer contact between the authorities and power producers on the longer-term planning across the borders and assessment of concrete transmission lines. The power sector had cooperated across the borders since the first transmission cable was established across the Oresund Belt between Denmark and Sweden back in 1915. After the Second World War, several cables were built across the border to assure sufficient and reliable power in the region; in addition to delivering power to its constituents, utilities were also alert to the opportunity to utilise their capacity regardless of national borders. These cross-border power supply contracts between national utilities became the seed of a Nordic power stock market (Bäckman, 2011).

By 1986, 17 connections facilitated comprehensive cooperation on the optimised use of the production system and better security of supply. In the action plan of 1986–88, the energy ministers continued the work initiated in the first years and started to consider the Nordic region as a home market for energy. They commissioned studies on how to overcome technical barriers for the flow of energy equipment products and how to promote Nordic industry on export markets. The cross-border nature of environmental problems in the energy system was also a concern; these included local pollution and CO_2 emissions.

In summary, the first period of Nordic energy policy cooperation started out as an integrated part of the economic cooperation between the Nordic countries. But following the oil crisis, the countries were ready for closer cooperation on how to tackle energy efficiency, research, planning and the very important oil, gas and coal sectors. To a lesser extent, the political attention was focused on facilitating the cross-border power exchange, which was mostly addressed by the power companies themselves and their advisory body, Nordel. The cooperation was organised around committees and working groups which, by means of studies, analyses and conferences, provided informational support for politicians and other decision-makers on issues such as what to cooperate on and what to let go of. In the oil and gas sector, it gradually became clear that it was difficult to find common ground, though all could agree on the need to explore the prospects of cooperation through further analysis and exchange of information. In the research area, there was solid ground for strengthening the cooperation, which led to the establishment of the Nordic Energy Research Programme in 1985 with direct national contributions.

Stage Two: Stuck between Internal Markets and the New European Landscape, 1989–2005

In the period of 1989–92, Nordic energy policy cooperation had ambitions to develop a home market for energy. It also took note of the Brundtland Commission Report, *Our Common Future,* and the need for a sustainable use of energy sources. Nordic cooperation could no longer take place isolated from the developments of other countries. The objectives of the cooperation were to ensure a reliable energy supply, increase energy savings, and address safety and environmental aspects through energy technologies. In the Nordic Council session of 1992, the urgent need to reconsider Nordic energy policy cooperation—in light of the

dramatic developments in the adjacent areas, such as the Baltic countries, East European countries and Russia—was apparent.

During these years, energy and economy were again merged into one Council of Ministers. Work groups were closed (energy efficiency, markets and environment), but the work groups on energy research and information carried on, as did ad hoc groups on power and gas markets, energy-related environmental issues and international cooperation. It was during these years that only areas of strict Nordic added value were prioritised. As a result, it seemed as if the strategic action plans were replaced by annual work plans until 2002.

The prioritised areas started out with four and were later narrowed down to three core areas (electricity market, climate issues and regional cooperation):

- Nordic energy market (oil and gas markets, electricity market)
- Research and development
- Energy and environment
- Energy efficiency

Regarding energy markets, the energy ministers did not put emphasis on the Nordic electricity market in the 1989–92 action plan, but continued to focus their attention on developing and improving energy planning, while taking into consideration environmental aspects. The oil and gas markets remained an area for further exploration of cooperation. Working groups with representatives from authorities and industry analysed prospects for Nordic cooperation, ranging from prospects for increased procurement in the North Sea, development of oil and energy markets in the Nordic region, integration of the Nordic gas net and consequences for infrastructure and security of supply. A working group explicitly focused on oil and gas in the West Nordic area covering Greenland, the Faroe Islands and Iceland. No substantial political decisions followed these explorative attempts.

Since mid-1995, the political focus has shifted substantially towards the Nordic electricity markets. The Nordic energy ministers met at the Louisiana Museum in 1995 and agreed on liberalising the Nordic electricity markets. An ad hoc group of senior officials was established and assigned with the tasks to analyse the future of Nordel, to assess the need for Nordic actions to develop the Nordic electricity market, and to examine the development in the European Community and the Baltic Sea region as well as its implications for the Nordic electricity markets. The Nordic activities took notice of the ongoing EU activities, which resulted in the EU directives of 1996 and 1998 outlining the common rules for the internal market in electricity and natural gas, and pushing for generation and transmission unbundling. The further development was highly influenced by the bilateral electricity market between Norway and Sweden, which created a common electricity market, Nord Pool in 1996. Shortly after, Finland (1996) and Denmark (West Denmark in 1999 and East Denmark in 2000) joined Nord Pool (Bredesen and Nielsen, 2013). This wholesale market for electricity became a role model for the development of cross boundary electricity markets, which implied supply reliability, competition and efficiency.

The 2002–05 action plan intensified the cooperation on the electricity market: it called for heightened cooperation between the transmission system operators (TSOs), the regional need for developing and strengthening the trans-border transmission grid, and the assessment of net tariffs and analyses of market-based mechanisms to stimulate sustainable power production.

Research and development (R&D) was regarded as a key to the overall development of the energy system, the energy markets and the efficient use of energy resources. With the establishment of the Nordic Energy Research Programme in 1985, continued focus was placed on strengthening the basic competences in the university and research institute sector, supporting national energy research programmes and contributing to the efficient use of scarce public financial resources. The programme was funded directly by the national energy and technology agencies, and complemented by a modest support for administration from the Nordic Council of Ministers' budget. A number of Nordic research colleges were established with delegated responsibility for seminars, PhD mobility scheme and research projects within their area. Over the years, the programme developed according to four year research strategies, reflecting also the Nordic energy ministers' priorities for energy cooperation. Accordingly, priorities have changed over the years, e.g. from oil technology, oil geology and coal technology to electricity markets and the impact of climate change on the energy system. Efficiency (district heating) and renewable technologies were prioritised throughout the years. From 1998, an additional 10 per cent funding was earmarked to strengthen research cooperation between the three Baltic countries and Northwest Russia. The governance structure of academic colleges, supported by a small secretariat under the guidance of a committee of senior officials, was challenged in an external evaluation that criticised the programme for being closed and non-transparent. In order to professionalise the cooperation, the programme was transformed into a Nordic institution in 1999 with similar governance structures as other Nordic funding institutions comprising a board, director and secretariat.

Energy and the environment took its departure in the Brundtland Commission's recommendations to facilitate a transition from fossil fuels to renewable energy, and to improve energy efficiency in order to minimise negative environmental impacts and costly investment in new capacity. In 1995, the Nordic Council of Ministers announced that Nordic strategies to address energy-related environmental problems were needed, and an ad hoc taskforce was appointed to address energy-related climate issues. In the action plan 2002–05, climate was one of three core policy areas closely linked to the other core area: international cooperation in the Baltic Sea Region and the adjacent areas. Further issues included the importance of the Kyoto Protocol that was yet to be ratified, the need to reduce industrial CO_2 emissions, the prospects for CO_2 capture as a means to minimise the impacts of CO_2 emissions and Nordic research cooperation regarding climate issues.

In energy efficiency, work continued on the economical use of energy in industrial sectors, transportation and the service sector. Activities included education, information and consultancy, labelling of energy efficient equipment and cooperation in savings.

During this period, the Nordic energy policy cooperation started to put increasing focus on international issues. Activities included information-sharing and exchange on the Energy Charter Treaty[5] and the additional protocol on energy efficiency. A number of studies were commissioned to analyse the prospects for Nordic activities in the Baltic Sea region related to the mechanisms of the Kyoto Protocol.[6] Especially in the action plan 2002–05, emphasis was put on making a framework agreement for a Testing Ground in the Baltic Sea region. This was anchored in the Bergen declaration made by the Nordic prime ministers and commitments by their colleagues from the Baltic Sea region and the EU Commission in Stavanger in 1998. Further, efforts were made to create a special Nordic investment facility to conduct climate-related projects through the Nordic Environment Finance Cooperation (NEFCO). Much emphasis was on the general energy policy situation in Eastern Europe and the Baltic countries. The aim was to develop the electricity markets in the region and to promote energy saving, energy efficiency and renewable energy. Likewise, Nordic cooperation should strive to extend the gas grid to the whole Nordic region, and to link the gas consumers with both Russian and Norwegian suppliers.

In summary, this period of Nordic energy policy cooperation was characterised by developments in the energy markets, environmental concern and geopolitical changes. Cooperation on gas infrastructure and markets remained at the explorative stage. Neverhteless, the Nordic states sought common ground in their international activities around the Energy Charter Treaty. Cooperation on the electricity markets took a huge step forward when the Nordic energy ministers in 1995 agreed to liberalise the Nordic electricity markets. In terms of Nordic energy research, the cooperation developed steadily, and was guided by strategic action plans reflecting political energy priorities. A decisive step was taken when the programme was transformed into a Nordic institution in 1999. During this period, Nordic energy policy cooperation became increasingly attune to environmental challenges related to the energy system, not least those concerning sustainable energy sources and climate change.

Stage Three: Political Focus on Energy and Climate Policy, 2006–Present Day

Nordic energy policy cooperation as described in the action plan 2006–09 was founded upon the Nordic energy ministers' vision of 2004: "The Nordic Energy Cooperation will play a strong and active role in the development of Nordic and European energy policies". Broadly defined priority areas were outlined in the work as well as in the action plans that followed, though the member state responsible for drafting the plan also left some room for other preferences. The key priority areas included:

[5] Energy Charter Treaty dates back to the early 1990s and is an international agreement which establishes a multilateral framework for cross-border cooperation in the energy sector (http://www.energycharter.org/).

[6] The Kyoto Protocol was adopted in Japan in 1997. It is based on the principle of common but differentiated responsibilities: it puts the obligation to reduce current emissions on developed countries on the basis that they are historically responsible for the current levels of greenhouse gases in the atmosphere. The first commitment period was 2008–12 and it came into force with the ratification by Russia in 2005.

- Energy markets
- Development of sustainable energy systems (renewable energy, energy efficiency, climate and sustainable energy in sparsely populated areas)
- Energy research and technology development
- International cooperation (impact on the EU agenda and regional cooperation)

The overall objective of cooperation on energy markets was to secure the best possible frameworks for the development of the Nordic markets.

As for the electricity market, the ambition was to create a borderless Nordic market with effective external trade. As laid out in the Nordic energy ministers' resolutions in 2004 and 2005, the Nordic electricity market was to become a well-functioning regional market, characterised by multiple players, and a high degree of security of supply, competition, sustainability, transparency and flexible consumption. The focus was to improve the framework conditions for the markets through harmonisation, development of the transmission grid, mechanisms to assure necessary investments in production capacity and infrastructure. Congestion management and transfer capacity of the transmission network and cooperation with EU and non-EU neighbours in developing frameworks for external trade were also high on the agenda.

Nordic cooperation was further intensified by the adoption of a Nordic action plan for cooperation in the electricity market in 2008. The focus was on congestion management and grid investment, as well as the common end-user market and development of the European electricity sector (Nordic Council of Ministers, 2009). Attention was paid to maintaining the momentum of the action plan 2010–14, and the document included national grid plans, feasibility of cost-sharing initiatives and assessment of potential areas for bids and prices by 2010. Likewise, the integration of a large share of wind power and other renewables in the system was mentioned, placing demand on additional grid investments as well as on developing new ways of integrating renewables.

The 2014–17 action plan took electricity market cooperation a step further. In addition to the Nordic wholesale market, Nordic energy ministers decided to create a common Nordic end-user electricity market. Although a detailed roadmap for harmonising the end-user market was made by the cooperating body of the Nordic supervisory authorities (NordReg), it was recognised that development in the Nordic countries did not always occur at the same rate and was not always identical. Since the Nordic electricity market was well advanced compared to the rest of the EU, the ambition was to jointly monitor the new regulatory framework of the third EU energy package and see that it did not counteract the well-functioning Nordic market. Following the EU 20-20-20 targets by 2020, rapid expansion of renewable electricity changed the conditions for electricity production in EU. Several countries decided to introduce capacity markets to balance the system in times of high consumption, which carries the risk of reducing the electricity trade across the borders and distorting the competition. The need for grid reinforcement in each country also depended on the reinforcement of other countries. The Nordic energy ministers' response to this was to

make grid investments that were socio-economical profitable from a Nordic perspective. This meant that if costs and benefits were unevenly distributed between countries, the system managers were to negotiate on sharing. The first step of this rather ambitious action was to agree on methods for assessing the socio-economic benefits of transborder transmission capacity. Cooperation on grid planning and the preparation of a Nordic development plan seemed to be more straightforward. Due to a higher share of renewables in the system, storage was mentioned as an important means, particularly in isolated or sparsely populated areas far from the central transmission grids.

Regarding the gas market, the energy ministers were at the beginning of this period still exploring possible Nordic synergies and cooperation, while also keeping an eye on the development of the natural gas markets in the EU and in the Baltic Sea region. In these years, the Russian Northstream gas pipeline[7] from Viborg to Europe was planned, and environmental impact assessments of the waters where the pipeline would be located were conducted.

Within sustainable energy systems, renewable energy was considered an area in which the Nordic countries were ahead of the EU, albeit with significant differences in resources, technologies, policies and mechanisms. A number of studies were commissioned in the action plan 2006–09, including a comparative study on Nordic framework conditions for renewable energy, and a study on the expansion of the Swedish–Norwegian green certificate market to a Nordic green electricity market. The emphasis was also on technological developments, faster market introduction and deployment, and the Nordic region as a testing ground for promising renewable energy technologies. In the 2010–13 action plan, specific technologies were mentioned, including wind power and geothermal energy, as well as the prospects of developing more efficient transport solutions. Action points included: the exploration of possible cooperation on matters related to EU directives on renewables; promotion of the integration of renewable energy in the system, very much related to the Nordic competences; and cooperation in wind power and planning issues. A special initiative to increase the use of renewable energy in the transport sector was foreseen. In the following action plan, key priority issues comprised the exchange of experiences and views on the implementation of the EU directive on renewable energy, and new initiatives from the EU Commission. Framework conditions for renewable energy were again addressed, but further to the explorative work conducted so far, it was recognised that each country should choose its support system in accordance with its own conditions and policies—something which might influence new investments in the Nordic electricity sector. The extent of Nordic cooperation was thus contingent upon finding common ground.

Energy efficiency continued to be one of the cornerstones of a sustainable energy system in the Nordic countries. As previously, knowledge-sharing was central, including reports on market-oriented incentives and price signals to increase energy efficiency. The 2010–13 action plan was more specific in terms of the three end-use sectors: housing,

[7] The construction started in 2005 and was officially inaugurated in 2011 by the presidents of Russia, Germany and France.

transport and industry. Special focus was on the prospects of influencing international negotiations relating to product labelling and standardisation. The following action plan was concerned about the implementation of the EU directive on energy efficiency adopted in 2012, including also the Ecodesign directive. Nordic actions in this area seemed to be limited to pre-studies of possible areas of cooperation, similar to, for example, the three-year Nordic programme for market supervision, Nordsyn, for energy design and energy labelling.

Nordic cooperation on climate issues featured in the 2006–09 action plan: it primarily focused on analysing the prospects of taking initiatives to open up the EU quota trading system to other non-EU players, and examined the need to further develop the Testing Ground agreement with the other Baltic Sea countries. In the following action plans, climate was considered an integral part of a sustainable energy policy and hence embedded in actions on renewable energy and energy efficiency. Nordic cooperation related to the development of the post-Kyoto regime was included in international cooperation, though mainly in terms of preparing meetings and ad hoc activities related to specific events.

Nordic cooperation on sustainable energy in sparsely populated areas addressed two issues. On the one hand, analysis of mechanisms to improve energy efficiency in the often fossil-energy-dominated systems, and on the other hand the set-up of pilot projects and demonstration of new technologies. Outreach to northern Canada and northern Russia was given attention. These priorities prevailed in the subsequent action plans, though within the framework of the North Atlantic Area and with more emphasis on small-scale plants, stand-alone systems and storage.

Cooperation on energy research further developed in this period through Nordic Energy Research, which was regarded a European role model for aligning national research programmes and operating a true common pot for Nordic projects (Jørgensen, 2006). It operated with a mission to add Nordic value to national energy research programmes by funding Nordic energy research projects of common interest. It coordinated and participated in several EU ERA-net projects together with other EU partners, commissioned policy studies on energy technology aspects, and provided secretariat support to several of the work groups of the committee of senior energy officials, e.g. the Nordic Electricity Market group. As a pendant to the European research area, the ambition was to develop a Nordic knowledge area in energy technologies and systems, and at the same time position Nordic initiatives in the wider European and international context. This included cooperation with the International Energy Agency (IEA) on a regional study, *The Nordic Energy Technology Perspective*, which involved IEA officials, Nordic research groups and Nordic Energy Research. Together with other Nordic institutions, Nordic Energy Research was involved in the implementation of the Nordic Top Level Research initiative: a five-year and 400 million Danish Kroner Nordic research and innovation programme aimed at solving the global climate crisis and strengthening the leading knowledge role of the Nordic region.

International cooperation played an important role in this period, with a clear message that Nordic energy policy cooperation strived to be at the forefront of the energy policy in general, and in EU energy policy in particular. Typical actions included the alignment of

viewpoints and preparations for meetings of the European Council of energy ministers, something which was of importance to the EEA countries Norway and Iceland. Cooperation was oriented towards further regional cooperation with adjacent areas. In the years to come, the technical and economic integration between the Nordic and the Baltic electricity markets was further developed, with Estonia, Latvia and Lithuania being part-owners of Nord Pool Spot. The cooperation with Northwest Russia aimed at creating partnerships for technological development and continuing the dialogue about key energy and climate issues and knowledge-sharing, building on the long history and energy dependence between the Nordic countries and Russia. Finally, all partners came together in the Baltic Sea Region Energy Cooperation (BASREC), which was foreseen to be the arena for implementing the EU's northern dimension and the EU–Russia dialogue. In the action plan 2009–13, international cooperation was influenced by the EU 20-20-20 by 2020 plan for Europe and the third energy package. Priority was given to EU–EEA cooperation and the exchanges and informal consultations prior to Council meetings. Nordic–Russia cooperation continued, very much supported by the Nordic Council of Ministers' offices in Kaliningrad and St. Petersburg and the Nordic financial institutions (NEFCO and NIB).

In summary, the period demonstrated two Nordic successes: the Nordic electricity market and the Nordic cooperation in energy research—both developed to a level far beyond knowledge-sharing, exchanges of experience, best practices and learning, reaching a position as a role model for regional cooperation in energy. In light of the European response to both the climate and energy security of supply challenges, Nordic cooperation continued to prioritise those areas that added value to the energy sector. By means of high political commitment, the necessary frameworks for the Nordic electricity market were developed step by step and country by country in a pragmatic opening up for cooperation of the willing. As for research cooperation, this was rather due to the allocation of relatively little but constant funding, which also allowed for the establishment of an institution that could take responsibility for commissioned reports and initiatives at the Nordic level. While the power market and research advanced, other areas of Nordic cooperation remained on the level of knowledge-sharing. This was the case for renewables where the testing ground in the Baltic Sea region never took off and where also the numerous studies on national support schemes for renewables revealed substantial differences in national policies, technologies and markets. Wider regional cooperation was further consolidated in the context of the Baltic Sea region and the North Atlantic region. But most importantly, Nordic energy policy cooperation was increasingly an integral part of European energy policy development. It was part of the EU Northern dimension in the EU–Russia dialogue. It was at the forefront of the EU 2020 targets in terms of ambitious national policies, the knowledge-sharing of those policies (e.g. support mechanisms), and demonstrated achievements in the Nordic electricity market and research cooperation.

Discussion

Nordic energy policy cooperation was an integral part of the Nordic Council of Ministers from the very beginning. It became an area of cooperation in its own right in the wake of the oil crisis in the 1970s, which forced countries to develop long-term energy policies while also optimising the supply, production and consumption of the current energy system.

The *governance structure* followed the ordinary Nordic structures, rules and mode of operation with a Nordic Council of energy ministers supported by a committee of senior officials from each of the member states, which again would make permanent or ad hoc work groups for prioritised areas of cooperation. The chairmanship of the council rotated annually as did the chairmanship of the committee of senior officials. Budgets were relatively modest and were used on smaller initiatives such as studies and analyses, conferences, as well as on time-constrained initiatives to explore prospects for further cooperation or outreach. The cooperation was lean and relied on existing structures and institutions. However, with the establishment of Nordic Energy Research Programme in 1985 and the consolidation of the cooperation in Nordic Energy Research in 1999, the cooperation benefitted from having an institution that could focus exclusively on Nordic energy policy issues. This option was actively utilised in the last period where the work often was delegated to Nordic Energy Research, which to some extent became a knowledge centre for Nordic energy [technology] policy cooperation.

The need for e*nergy security* triggered Nordic energy policy cooperation to develop a long-term energy policy, and also to assure the necessary competency building of national experts in the field. Linkages were established between the governments and the advisory body of the power sector on long-term planning. In the 1990s, the energy security experience was handed over to the adjacent areas (the Baltic countries and Northwest Russia), which at that time also had to develop their energy policies with high security, diversity and efficiency. In the last period, it became increasingly clear that Nordic energy policy was an integral part of EU energy cooperation. On the one hand, the EU would set the overall agenda, but on the other hand the Nordic countries strived to align themselves in a way to exert greater influence over EU policy.

The cooperation on *energy markets* developed from a wish to make the important oil and gas sector an area of cooperation to finally recognise that national conditions, policies, technologies and markets were not ready for Nordic cooperation. Many Nordic studies, conferences and explorative actions paved the way for that recognition. In the power market, the sector itself had initiated cooperation long before the policy took over, and once the ministers agreed to a Nordic electricity market, it took off guided by a detailed action plan. Therefore, the Nordic countries were well prepared to influence and benefit from EU energy packages.

Energy efficiency remained a priority area since the very beginning, based on the premise that the best energy is the one that we do not use—knowledge-sharing, campaigns and labelling and standardisation were good, but far from sufficient to address this challenge.

Technologies underwent an interesting development. In the beginning, technology R&D was an integral part of finding long-term solutions for a sustainable energy system. But at that time, there was little consideration given as to how to bring them to the market. In the second period, technologies did not play a larger role, at least at the policy-making level, except when discussing the implementation of the Kyoto mechanisms in the adjacent areas. At present, energy technology policy is regarded as an integral part of energy policy; thus at Nordic level as well, combining the technology push with the market pull of new energy technologies. This was further strengthened institutionally by Nordic Energy Research's financing of research projects and its support for Nordic energy policy cooperation.

Challenges arising from *environmental and climate change*, unlike technologies, became more and more embedded in other policy areas such as agriculture and transport. Energy was partly responsible for climate change, albeit also one of the solutions to mitigate harmful emissions. Recent development had also shown that in times of crisis (financial, economic and energy), security of supply took precedence over climate, the latter of which having longer-term implications.

In conclusion, Nordic energy policy cooperation has come a long way, though it still has some much more ground to cover. It has provided deep insight into each country's energy system, policies, technologies and markets at multiple levels, and been complemented by numerous studies, reports, conferences and networks. The cooperation has acted as a support for policy- and decision-making at both national (and international) levels. Last but not least, Nordic cooperation has delivered concrete actions and policies for the energy markets and for the development of new energy technologies, not only for the Nordic countries themselves, but also in a wider European context. As the former Secretary-General of the Nordic Council of Minsters, Halldor Asgrimsson, often pointed out: "Nordic cooperation is a tool for regional cooperation, which can inspire and be used by other regions in the world".[8]

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[8] See, for example, the interview recently published in relation with the obituary by the General Secretary Dagfinn Høybråten, at http://www.norden.org/da/aktuelt/nyheder/tidligere-generalsekretaer-halldor-asgrimsson-er-doed.

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ASEAN ENERGY MARKET INTEGRATION (AEMI)

Energy Security and Connectivity:
The Nordic and European Union Approaches

FORUM PAPER

The Nord Pool Market Model

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Executive Summary

The Nordic power market has, based on its over 20 years of successful operation of a regional power market, been the blueprint for the development of the European integrated energy market. Its history has shown the need for pragmatic solutions and for allowing for a stepwise approach as the basic method for market development. In other words, progress should be through evolution, not revolution. Having a regulated power market has proven beneficial for the Nordic countries, but with the regulation defining the principles rather than detailed rules and allowing the power exchange to develop its offerings together with its market participants;

Transparency, neutrality and equal treatment (and access) for all parties are key cornerstones of a sustainable market. Stepwise implementation allows all stakeholders to learn as the market evolves, and this is relevant for both the market offerings as well as the geographical expansion. The involvement of the transmission system operators is needed to ensure that the coordination between market and system operation is maintained and developed based on the same principles.

The model has proven robust through implementation in many other regions of the world, from India to Southern Africa.

Introduction

The Nordic power market is viewed as one of the most successful power markets in the world. The market was established in 1993 based on the Norwegian approach to liberalisation and the new energy act of 1991, and has through the years moved from being a Norwegian power market to becoming the Nordic power market in 2000. Following this, it extended growth to include the Baltic States and the UK, in addition to becoming a service provider for other markets in Europe and potentially other parts of the world. Therefore, in some ways, the term "Nordic" as part of the name is still an important heritage and foundation for Nord Pool Spot's market and offerings, but the focus has in recent years become more European-centric, with current developments in the European market framework.

This paper aims to highlight some of the important milestones of this development, and to create a set of "lessons learned" that could be applicable for other emerging markets.

Motivations for Creating an Integrated Power Market

Prerequisites for the Changes in Norway

In the years between 1960 and the end of the 1980s, there was considerable expansion of new hydropower production facilities in Norway. The many small, municipality-owned power companies were responsible for the local power balance and supply obligations, and were therefore entitled to expand or enter into contracts to balance out their power needs and demands in their own area. This led to over-investment, and an overcapacity in Norwegian hydropower production, which subsequently gave rise to low power prices during this period. Investments and potential profits for the companies literally disappeared "straight into the ocean". Excess power was exported to Sweden at a lower price than that paid by Norwegian industry and households. Norway had a surplus situation, with a production capacity that far exceeded power consumption. A big issue was that Norwegian end-users paid a price that had been agreed with the local power company and did not profit from the surplus situation by being offered lower prices.

This organisation and administration of the power industry eventually led to a liberalisation process. The Ministry of Finance, not the Ministry of Oil and Energy, realising that the industry was based on uneconomic principles and operations, therefore raised the question of efficiency. Norway became one of the first countries in the world to discuss liberalisation and competition in the power industry, motivated by the low contribution made by the industry to national value creation as well as uneconomic incentives to invest in new power facilities. Also internationally, there was an increasing interest in reforming the electricity supply. Chile is recognised to be the first country to do a power sector reform followed by Norway.

The challenge was to develop a model tailored to an industry, and a commodity that was produced and consumed at the same time (in real time), and that thus had special prerequisites and requirements. The reform model had to take into account technical production conditions as well as limitations in the power grid's transmission capacity. The power companies' need to optimise production within a robust, efficient marketplace based on sustainable economic principles was a considerable challenge.

The Ministry of Finance, the Norwegian School of Economics and Business Administration (NHH/Einar Hope), and the Ministry of Petroleum and Energy provided important premises in this process. Einar Hope was a business economist who worked at the NHH research foundation, Centre for Applied Research (SNF). His understanding of economic models applied to the physical needs of the power industry proved crucial for subsequent measures taken.

In retrospect, it is clear that the liberalisation of the electricity market encouraged a struggle and manoeuvring for positions between the market liberalisers and the more conservative power industry—without being clear dividing lines between the policies of those involved. Compromise became one of the basic criteria for success in the market. A solution based on economic principles lay the foundation for a reliable operation of the power system, and was/is the main reason for its success.

The Political Process

The Norwegian government first made a proposal for a new Energy Act in the late 1980s. The Brundtland administration introduced a proposal in 1989, but it was met with strong opposition in Parliament. The main objective of the proposal was to rationalise the organisation of the power industry—which at that time comprised as many as 20 regional and vertically integrated power companies (responsible for both generation and distribution)—but to keep the framework for organisation and operation in the hands of the politicians. The largest municipalities in Norway were the main owners of these companies. At the time, up to 1991, the Directorate for State-Owned Power Plants (*Statskraftverkene*) was responsible for the state's production facilities and the main transmission grid.

After the 1989 general election in Norway, the Conservative Jan P. Syse became Prime Minister and leader of a right-wing coalition that led the country until November 1990. This short period of right-wing government proved crucial for the new Energy Act and the liberalisation of the power industry. With Eivind Reiten as Minister of Petroleum and Energy, the new act was prepared, presented and approved by the Parliament.

Eivind Reiten disagreed fundamentally with the proposal from the Brundtland government, so he rewrote the Act and based it on a different framework. The revised proposal still had rationalisation and the efficiency of the power industry as its objective, but included a clearer description of future ownership and responsibility relations in the industry. Unlike the earlier proposal, the reduction of the number of power companies was

not to be enforced by the NVE (Norwegian Water Resources and Energy Directorate), but to be voluntary, using market-based solutions. This implied that, while the aim was still a reduction in the number of power companies, control of the industry's development was left to the market rather than to the politicians. This important decision laid the foundation for Nord Pool and the success of the regional market.

The new Energy Act was passed after a fierce debate in the Parliament. The revised proposal was approved on 29 June 1990 and came into effect on 1 January 1991. It was to have great importance for the power industry's future in Norway—and in the rest of the Nordic countries.

New Energy Act

The new Energy Act required further clarifications and regulations in relation to the future organisation of power production, the transmission grid, system responsibility and operation coordination. Several working groups were established to analyse and recommend alternative solutions for implementation of the Energy Act. The market working group and the grid working group became particularly important for the final solution. The majority in the grid group supported the unbundling of Statskraftverkene, in accordance with the Ministry's view. One of the challenging tasks for the market group was to decide who should be granted the licence to operate the marketplace, which was to be issued by the state.

The Ministry of Petroleum and Energy set up a new project group with a mandate to examine the unbundling of Statskraftverkene, and the assignments and responsibilities of the new grid company. The Ministry of Finance and the Ministry of Petroleum and Energy had laid down detailed provisions in the mandate, and the project group was viewed with a degree of scepticism in the power industry. This working group established itself in an old transformer station, where it was well protected from lobbying and other influences. It cooperated closely with the Ministry of Petroleum and Energy, and a proposed proposition was forthcoming in spring 1991. It suggested a separation of the production and grid facilities of Statskraftverkene, and the establishment of a grid company.

In the summer of 1991, the Ministry concluded that Statskraftverkene would be broken up and that a new grid company, Statnett SF, would be in charge of system responsibility, operation coordination and concessions for the marketplace.

Eivind Reiten, the "father" of the Norwegian Energy Act, and Einar Hope, its "grandfather", were undoubtedly both instrumental in achieving this result. Mr Hope was one of the first to find solutions for a power market design where market concepts from the economists met the technical requirements from the engineers. With his swift handling of the proposition in the Parliament, Mr Reiten demonstrated both political flair and efficiency.

However, the result would probably not have been achieved without an efficient ministry apparatus. Sigurd Tveitereid, who is still active in the Ministry of Petroleum and

Energy, played a key role in the implementation of the Energy Act. He has also been an important partner for Statnett, Statnett Marked and Nord Pool since the late 1980s.

The division of Statkraftsverkene into Statkraft (generation) and Statnett (owner of the main transmission grid and central system operation) marked the end of a long, politically conflicted discussion. In the following period, Statkraft faced major fundamental challenges and organisational changes as a result of the competition principle that was introduced by the new Energy Act. The company's role changed fundamentally from ensuring access to cheap power for all of Norway, to building up an industry that was competitive both in Norway and in the international markets.

Until 1992, there had been considerable resistance towards this development, with many people unwilling to recognise the value of implementing the liberalisation legislation in the Energy Act.

Of course the implementation of the new market model had to not only consider the market itself, but also respect the overarching requirement of security of supply. As the Norwegian power system was (and is) dominated by hydropower, to cater for seasonal variations was also important, and has also played a key role in the expansion of the market model.

Pre-existing Conditions and Pre-conditions at the National Level for Building the Integrated Power Market

Unbundling

As stated above, the starting point of the Norwegian reform was the oversupply of electricity in Norway and the inefficiency arising from this. This reform had two consequences: to allow the Norwegian customers to get access to the lower prices and then also allow for a more efficient (both technically and economically) management of cross-border flows.

One of the key tasks in most power sector reforms is the unbundling of the power companies. Historically, prior to a reform, a country's power sector is dominated by one incumbent, vertically integrated power company. It is important to unbundle this one power company into individual companies that serve the following functions:

- Transmissions system operator: owner of the main grid and also the national system operator. This needs to be regulated as a natural monopoly by the national energy regulatory authority.
- Distribution companies: distribution to end-consumers at a lower voltage level.
- Generation companies: taking care of power generation. This could also be split into several companies.

- Retailers (trading) companies: selling power to the end-consumers; could be part of either a distribution company or generation company.

This unbundling is vital to the creation of a competitive market; it was an important factor in the establishment of the Nordic market. Depending on the situation, there might be other unbundling that is required. If the incumbent company has held full control of the power generation, it must be split (divested) in smaller companies— or join a bigger market.

All the Nordic countries started their reregulation process in the first parts of the 1990s and essentially followed the same process. This allowed for an easy integration of the other countries into the Nord Pool market. The other Nordic countries had similar structures as a starting point, and many of their processes followed the same path as Norway in many respects. The following sections will discuss some of the different requirements for developing the regional power market.

Privatisation: A Potential Tool, but No Requirement

One observation that is important – and one that contradicts a lot of the requirements of some international organisations – concerns the requirement for privatisation. In the Nordic countries (and for that sake Europe), the largest power companies in both generation and distribution are state-owned, either fully or as the majority owners. These companies need to be organised as any competitive company, with a professional management and board structure, allowing them to operate on equal basis as private companies.

For Statkraft—the Norwegian incumbent power company—it took a long time for them to adapt to a "market" way of thinking and a profit-run mentality. As with many other incumbent power companies, Statkraft was "shocked" to discover that its former customers went to newly established traders to buy cheap power traded on the power exchange. Therefore, their management quickly realised that if the company were to survive and continue to produce good economic results for its owners, its strategy and business concept had to change. A new vision was thus formed, and its objective was to intensify market activities and develop product ranges in order to meet the requirements of the customers.

After market liberalisation, the power companies had two alternatives: production could be based (as before) on long-term bilateral contracts, or they could choose to exploit the potential of the new power markets. Their decision needed to be based on risk assessment, since the new power market was starting with limited liquidity and high price volatility. Therefore, it is important to be patient and not expect high liquidity from the start—the market must be allowed to earn trust and, based on this, liquidity will develop.

From the mid-1990s, Statkraft increasingly shifted its trading to the market, motivated by the growth of the market and its development towards an integrated Nordic power market. The organisation had the market advantage of a comprehensive

hydropower-based power portfolio spread out over the entire country, as well as in-depth knowledge of fundamental market drivers. It had also been conducting fundamental analyses of the underlying values of Norway's power industry for many decades. The company had acquired expertise and models that could be employed in trading strategy in the market— with increased potential for good earnings. The case of Statkraft holds an important lesson: instead of limiting and "destroying" the incumbent power company, let it become a national champion in the growing power market. The organisation has held a strong position in the Norwegian market, and its ownership share of the Norwegian generation fleet has remained strong from 1991 till the present. Its ownership in 1991 was approximately 32 per cent of total generating capacity and is, as of 2014, approximately 34 per cent (depending on how this part-ownership of some other Norwegian companies is valued). So Statkraft's dominant role has remained approximately the same, but at the same time the company has grown in size due to its international presence.

The history of large incumbent power companies and how they have evolved together with the market is another clear experience from the development of the Nordic power market. In all the Nordic companies, the large organisations (Statkraft in Norway; Vattenfall in Sweden; Fortum in Finland; DONG Energy in Denmark) have been allowed to grow with the market, and all four national champions have become some of the largest and most successful power companies in both Nordic countries and Europe. Their growth is mostly a result of their becoming more international (first in the Nordic market, then internationally). Hence, it is important to carefully assess any required split of these companies.

Acquisition and consolidation is another method chosen by all these four companies as a way of tackling new competition. With the establishment of Nord Pool in 1996, the market changed and acquired a Nordic perspective. Given the geographical extent of the market including all the Nordic countries, the size of the companies became an increasingly important competitive factor. To allow these firms to sustain their positions, it was crucial for these incumbent state-owned companies to have competitive corporate structures and operate according to sound business rules; and the state was not to have any political influence over the business.

All Nordic countries are presently abiding by EU Competition laws; this includes Norway, though it is outside the EU. As a condition for access to the EU internal market through the EEA (European Economic Area), Norway has implemented the same laws. It is also important for these companies not to be favoured by the state, e.g. when it comes to financing. One could actually argue that for some of these companies there is a disadvantage to be state-owned when it comes to financing, as the profit of these companies to a large extent is directly given back the to the state and the possibility to invest these funds is limited. For instance, in 2013, the Norwegian state took 99 per cent of Statkraft's profit.

These companies have participated in shaping the developments of the Nordic power industry, and have gone from being government-run enterprises to becoming some

of the most innovative power companies in Europe—ones that fully exploit the flexibility of hydropower. In retrospect, it was a sensible strategic decision to have spent time on the necessary changes. The extension of knowledge and competence that has been acquired over many years, while simultaneously adapting to new challenges and steadily increasing international competition, were made possible by this strategy.

Market Liberalisation

The liberalisation of the market needs to be extended to the full market. However, as with all successful power sector reforms, this will have to be done in a stepwise manner. The first task is of course the unbundling, as discussed above. Next, it is important to create an eligibility criteria for the demand side. What has been accepted as good practice is one that has set strict criteria initially that will be gradually relaxed over time to allow more companies to participate.

The same will apply for end-users. Normally, before a power sector reform, all end-consumers have a regulated (and also fixed) tariff. The best practice is to have the same stepwise approach to this—expose end-consumers progressively to competitive market prices—to allow all parties to adapt and learn.

Another related topic that is almost always discussed as part of this process, is the support for vulnerable customers. What is seen in almost any non-deregulated market is that the end-user tariff is not cost-reflective, and kept at an artificially low value to include some support and subsidy element. This is one of the strongest forces against a power sector reform—how not to hurt end-consumers with higher prices.

There are many good examples that show how to implement a power sector reform and still have a scheme to protect the vulnerable consumers. They key is, again, to make these changes in stages, and to allow for learning and adaptations along the way.

Market Regulation and Pricing

One of the key elements of the power market reform in Norway and the other Nordic countries was to have full market opening, or full market liberalisation. However, in Norway, as in any other country facing the same kind of requirement, the implementation process should be gradual. There is no need for the country to have a fully liberalised market from the start.

In Norway, it took two years from the start of the Day-Ahead market for the market to be fully liberalised. In other markets, this process has taken a longer time. The main reason behind the quicker process in Norway had to do with the fact that its power sector was very decentralised from the beginning, and there was no need for any unbundling of companies. However, in other markets such as Turkey and Romania, their power sectors have had to undergo several other reforms and unbundling, and they thus took a longer time to achieve full market opening.

There are several reasons for promoting a stepwise approach. First of all, it is important that all the key stakeholders in the market be allowed to learn. In the initial phase of introduction of a new market, it can expected that there will be relatively small volumes in the market and price formation will be effected by this. With a stepwise approach, the market participants will be allowed to learn and understand the use of the markets as part of the management of their assets. Experience also shows that having a voluntary market will assist in this learning. However, it will be important to have some liquidity-promoting measures in place. One of the most common solutions is to oblige the Transmission System Operator (TSO) to buy all their losses in the main grid from the market. This will ensure that there always will be a buyer in the market. There are many different other mechanisms that could be introduced, which will not be covered in this paper.

As a measure to promote liquidity in the Nordic power market, all available transmission capacity between the different market areas has been given to the market. This means that the market is the only route to cross-border trading. Other measures include either horizontal or vertical obligation to participate, i.e. either certain participants are obliged to be in the market with all or some volumes, or all market participants need to source at least a given percentage from the market.

Grid Connectivity

In the EU, grid interconnection capacity has been a key constraint to developing the single energy market. The Nordic region is an example of how this can be managed over time. Since the introduction of the market in Norway in 1993, and up till the present, the demand for power has steadily increased, but investments in new power generation have not grown at the same rate. This is because, in the Nordics, the interconnection capacity between the countries has tripled in the same period. This can be referred to as "utilisation of the differences in the region", meaning that we have very diversified power generation in the different countries, whereby:

- Norway is dominated by hydropower, offering short-term flexibility and cheap hydropower in wet years.
- Sweden has a more diversified power sector, with hydropower in the north and thermal (including nuclear) in the south.
- Denmark has a high penetration of wind power.
- Finland has thermal resources (including nuclear).

In a season or year with high precipitation, Norway and northern Sweden have excess of cheap hydropower—but in a dryer year, it would like to use the thermal baseload from southern Sweden and Finland. When the wind is blowing, Denmark has a lot of cheap

("free") wind power, but in other times it is reliant on the support of its neighbours. In sum, this means that we have a better utilisation of the power resources in the region, allowing the countries to support one another with reserves in different situations.

This situation will improve with the availability of more interconnections. However, each of these infrastructure projects will have its own business case and the regulatory authority will be responsible for granting the building licences. Normally, the business case will include the sourcing for financing—either through the transmission tariff or by external financing. The TSOs will typically be the ones to build these interconnections. This means that their motivations will include not only purely economic reasons, but they will also consider security of supply and system services in their valuation of the interconnection.

Another reason why TSOs build interconnections is because there is a regulation requiring congestion rent[1] between the market areas to be given to the owners (normally the TSOs). In return, the regulation specifies that all the income from congestion rent shall be used to improve the network. In the Nordic market, all the Nordic TSOs cooperate and use this income to decide the best place for these investments. The Nordic TSOs have all this while had an agency for cooperation: at the beginning this was called NordEl, and after the establishment of ENTSO-e (The European Agency for Energy Transmission System Operators), this has been maintained as one subgroup with regular meetings. The same cooperation has been there for the NRAs (National Regulatory Authorities): NordReg. Based on the history, it can be said that this approach has worked.

Congestion rent is of course the only source of income for the TSOs. In the Nordic countries, there is an ex-ante income cap based regulation where essentially the TSOs will, according to detailed documentation, create a budget that justifies a transmission tariff (for the main grid and system operation) that is approved by the NRAs.

It cannot be said that there is any minimum limit for having a regional market—as soon as there is some capacity, it can be utilised. The market model used in Europe, taken from the Nordic approach, is based on an implicit auction that will ensure that the power between the market areas will always be flowing from a low- to a high-priced area. In addition to internal interconnections between the Nordic countries, there have been built several interconnections to continental Europe, e.g. NorNed between Norway and the Netherlands; ESTLINK between Finland and Estonia; SWEDPOL between Sweden and Poland; and BALTLINK between Sweden and Lithuania.

[1] "Congestion rent" is an expression that relates to the income that is being generated when there is congestion between two market areas that will result in different prices in these areas. The market algorithm will ensure that the flow on the interconnection will travel from the low-priced area to the high-priced area. This will thus mean that all volumes flowing on the interconnection will be bought in the lower-priced area and sold in the higher-priced area, thus generating a surplus of money, i.e. congestion rent.

The Growing Membership of Nord Pool

The history of the Nord Pool market is essentially one of changes and expansion. When Norway started its liberalisation process, it took place at more or less at the same time as that of other Nordic countries. As explained above, Norwegian history is marked by certain visionary individuals who also had the ability to implement the required changes. When Sweden followed the same liberalisation process after three years, it faced some of the same issues as Norway, though it also had a major market power challenge due to Vattenfall's dominant position in the national market. The questions asked were—put in simple terms— *shall we split Vattenfall in smaller entities or shall we join Norway and thereby allow them to be unchanged?* We know the answer: they joined Norway and thus took the important first step towards creating the regional market. This was also thanks to pragmatism from the Swedish that allowed for a simple implementation. The very good interpersonal working relationship between the heads of the Norwegian and Swedish TSOs also facilitated open discussions along the way. This is also an important lesson in the Nordic history: a regional market can by itself be a means to reduce or eliminate dominant market power. The same applies if the countries are small (e.g. the Baltic states): joining a larger market will increase the competition for the national champions.

This first step was extremely crucial, because this laid the ground for how to implement further expansion; the TSOs should be the owners and share an equal position. This has since been the guiding principle for expansion of the Nordic market to all the Nordic countries as well as the Baltics.

Essentially, it took 10 years to build the Nordic market (from the Energy Act in 1991 in Norway to the inclusion of Denmark in late 2000). The process for the initial market launch in Norway and the process of creating the common market with Sweden is described above. When it comes to Finland, their main challenge was the organisation of their market before deregulation. It was a requirement from Statnett and Svenska Kraftnät that the power industry in Finland should have the same structure as in Norway and Sweden, with separate ownership of grid and production.

The Finnish power supply industry was dominated by two companies which also owned a high-voltage power grid. The state-owned company IVO (Imatran Voima Oy) dominated power production with more than 30 per cent of the total production capacity in Finland. The privately owned PVO (Pohjolan Voima) was the second largest company. In principle, the wholesale market was open in the sense that suppliers or industrial users could choose between long-term contracts and construction of their own power plants. In practice, however, the latter was the only a realistic option for a few parties.

Fingrid (the Finnish TSO) quickly realised that cooperation with other northern European countries could help Finnish power supply to become less dependent on Russia. Geographically situated in the periphery of Europe, Finland wanted to orientate itself towards Europe and their partners in the EU. Initially, from the date Finland became

integrated in the market area, Fingrid was given observer status on the board until it became owners with the creation of Nord Pool Spot in 2002.

The liberalisation process in Denmark was fundamentally different from that in the other Nordic countries. While the Ministries of Finance and Energy controlled the processes in Norway, Sweden and Finland, the process of market adaptation of the Danish power industry was run by the industry itself.

Another feature that distinguished Denmark from the other Nordic countries was its power supply which comprised two separate grids. Elsam was responsible for operating the power system in Jutland and on Funen, while Elkraft was responsible for Zealand. There was no physical link between the two. Jutland and Funen were synchronised with the central grid in Europe, and Zealand with the Nordic countries. This physical division in Denmark was not only typical of its electricity supply, but also a general outcome of the establishment of Danish industry over the years. There were strong differences of opinion between these two regions, and this was the reason for the country's integration into the Nordic power market in two steps. However, when Danish politicians finally decided to support the development, the resulting Energy Act was based on the same principles as in the rest of the Nordic countries.

After this, Nord Pool started to support other exchanges that were launched. Both the German and French markets were initiated based on support from Nord Pool, in the form of capacity-building and software. During this process, Nord Pool Consulting (NPC) was established to allow this to be done in such a manner that the internal market operation was not affected by the new services. NPC has over the years supported the market establishment in many regions of the world.

The process of progressively coupling with the EU internal market has been very time-consuming for Nord Pool. There have been many market coupling solutions over time, the main being:

- Nord Pool grew to cover the KONTEK area in Germany, thus allowing implicit cross-border trading between the Nordic area and Germany.
- The European Market Coupling Company (EMCC) was created by the power exchanges, TSOs and National Regulatory Authorities (NRA) in the northwest region of Europe, and it implemented a volume-based market coupling.
- The Price Coupling of Regions (PCR) project created by the largest power exchanges in Europe, which established a common market clearing algorithm to be used by all the power exchanges to allow for a price coupled solution. This went live in 2014, and has been a great success that enables one common implicit auction to cover all countries from Helsinki to Lisbon.

The market process in the Nordic countries as well as in Europe has been driven by the need for more economic efficiency. Without any market coupling in place, it was evident

that the overall utilisation of the power sector resources was not efficient. The object function of the market algorithm, developed first in Norway and evolved both through the Nordic and European market, is based on the *maximising of social welfare* for all market areas.

Transparency

Since the very beginning, transparency has been, and remains, central to sustaining Nord Pool's success. Why? A transparent market—where all participants have equal access to relevant information—is a prerequisite for a well-functioning, competitive and efficient market. It engenders trust, lowers barriers to entry and attracts new entrants, all of which help generate liquidity. This has proved to be true across all of the markets and makes transparency a priority when expanding geographically.

Data provision has been a major contributor to the high degree of transparency created in the Nordic power market. Comprehensive data libraries storing more than a decade's data have been built. These data include prices, capacities, flows, production, consumption, exchange and regulating power data. These are readily accessible for use, primarily by market members, and provide products developed from packaged historical data. Together this data helps keep the market transparent, as participants have equal sight of information that influences prices.

In recent years, anti-market abuse legislation and regulation designed to boost power market transparency in the European Union (EU) electricity markets has added to the amount of data available. The Regulation on Energy Market Integrity and Transparency (REMIT) requires that all EU energy market players publish price-sensitive information, and will enforce the Nordic data reporting requirement for all EU countries. These rules will be implemented in all the Nordic countries, as well as in Norway as a non-EU member. The main portion of REMIT went live in October 2015 and Nord Pool has been a pioneer in establishing the rules and systems for this.

Both regulatory demand and market expectation are driving greater transparency. As a result, there is a focus on continuously developing improved accessibility in how data is presented. There is also an equally important need for transparency in information from the whole market on developments that can affect prices; crucial among them are changes such as power outages or other information that may affect prices significantly if made public. All members are obliged to report such events to REMIT according to the market rules. They must publish information to the market, and are restricted in their trading until they do. Following up on this is the Market Surveillance team at Nord Pool Spot.

The Management of the Market

Since the start of the fully-liberalised market in Norway, the TSOs have had ownership of the physical market. There are several reasons for this. Most importantly, all the markets

for physical power will end up as a schedule that will be sent to the TSO for the ultimate balancing of the power system. Therefore, close cooperation with the TSO will be extremely important to ensure that the overall market concept—including all power markets operated by power exchanges, as well as the internal markets seeing to the TSO's needs—serves a common principle. In other words, all activities in the market are ultimately driven by planning. By having the TSO as an owner, connection and cooperation are ensured directly.

The current ownership of Nord Pool Spot is divided between the TSOs in the underlying markets according to the following shares:

- Statnett (Norway) 28.2%
- Svenska Kraftnät (Sweden) 28.2%
- Fingrid (Finland) 18.8%
- Energinet.dk (Denmark) 18.8%
- Elering (Estonia) 2.0%
- Litgrid (Lithuania) 2.0%
- Latvenergo (Latvia) 2.0%

The ownership shares are a result of the evolution of the markets: Norway and Sweden as the two first owners and the hosts of the financial market have the biggest share; Finland and Denmark have the same share, while the Baltic countries got a smaller share when they joined. The shareholdings are both a result of the process of joining, and that of the increasing value of the market operator itself and the actual cost of buying a share. What is important is that all have a seat on the board.

Nord Pool Spot operates under a licence issued by NVE. This licence comes with several conditions, and the most interesting of these pertaining to the company's operations are:

- The licensee's revenue from the organisation and operation of the marketplace shall cover its costs and provide a reasonable profit through efficient operations.
- The licensee shall have an advisory board with broad representation from the parties in the market—meaning that most of the business development is driven by the market itself.

At the same time, the organisation of the company is based on both having an efficient organisation and also recognising the characteristics of the region. Therefore, Nord Pool Spot today has offices in all the countries it covers. There are differences between the employees in each country, and each office has its own functions. The main office is still in Norway where approximately 50 per cent of its staff are based. In addition, Finland has the second largest office which houses Nord Pool Spot's IT department where the IT

organisation is located. In Stockholm, the CEO has their office in addition to some of the resources on business development. In the other countries, Nord Pool Spot has teams that see to market functions (e.g. sales and communications).

Nord Pool Spot is at present a rather small organisation with a headcount just exceeding 100 people. The Norway location of its main office is based the history: it was in Norway that Nord Pool was established, and its main operations have always been based there. Nordic and Baltic NRAs decided early on that even though the market was regulated in all the participating countries, NVE (Norwegian Directorate for Energy and Water Resources) should be the operational regulatory body for Nord Pool Spot, but with the support of the other regulators. Nevertheless, all the NRAs have access to the same information and have equal rights; but to make the regulatory tasks more efficient, the day-to-day contact is with NVE. The organisation has a normal set-up, with a special unit responsible for market surveillance.

The Nordic market has had a marketplace licence from the start, but was only formally fully regulated in 2001. This experience shows that a regulated market is good for market development. To have a competent NRA that oversees the operation has also proven to be valuable for the market.

Nord Pool can be seen as a long success story, but of course it has had to overcome several challenges throughout its development. One of the first challenges arose when Finland and Denmark were to become co-owners of Nord Pool. The problem arose from the success of the market that boosted the price that these countries would have to pay to buy a share of the company. This was mainly because the financial derivatives market had become a success, which led to the high valuation of the company. This problem was solved by splitting Nord Pool into two main units: the physical markets that then was to be owned by all the TSOs; and the financial market was to be owned by the two initial owners (Statnett, the Norwegian TSO; and Svenska Kraftnät, the Swedish TSO). This split also created some challenges in the management of these two different entities as Nord Pool Spot was in this process created to manage the physical markets while Nord Pool ASA still operated the financial market. The conclusion to all this came in 2008 when the financial market was sold to NASDAQ, and was operated by them on commercial terms thereafter.

Integration with European markets has also been challenging as the process has been very resource-intensive and has required a lot of careful management. Therefore, for several years, the business development unit was renamed “European integration”. However, with the PCR (Price Coupling of the Regions) project going live, this situation has improved.

Another important factor behind the success of the market is that the regulation of the market is based on principles, not detailed rules. This gives the power exchange the possibility of developing its offerings within these principles. The Nord Pool Spot market licence is five pages long, and just lists a set of principal requirements:

- The licensee shall as far as possible contribute to efficient price formation and appropriate energy flows.
- The licensee shall act in a neutral and non-discriminatory manner, including ensuring impartiality of all parties and efficient access to information that is of importance to price formation.
- The licensee shall design a suitable infrastructure, regulations for trade, and contracts between parties, as well as systems for collateral and settlement that ensure confidence and predictability for the parties.
- The licensee's revenue from the organisation and operation of the marketplace shall cover its costs and provide a reasonable profit through efficient operations.
- The licensee shall have an advisory board with broad representation from the parties in the market.
- The licensee has a duty to disclose information to NRA.
- The licensee shall apply to NRA for approval of measures/changes well in advance of the time when the changes have or may have an influence on price formation. The licensee must carry out an impact study in relation to the changes being presented, and the views of affected parties via the advisory board and possible comments from other market participants shall be submitted to NRA.
- Primary capital requirements
- Market surveillance
- The licensee is obliged to handle confidentially information concerning market participants' business which it will be of competitive importance to keep secret.
- Changes to conditions: in special cases, the established conditions may be changed in order to take account of public interest.
- Withdrawal of concession: the licence can be withdrawn if it was issued on the basis of incorrect or incomplete information regarding conditions that are of material importance, or if the licensee contravenes the Energy Act or regulations and ordinances issued pursuant to this act.

The detailed rules for the market can therefore be defined (and maintained) in the market participant agreements that include much more information. This means, for example, that all the detailed bidding rules, order forms, settlement calculations, order types offered in the market, security requirements, and other operational requirements are defined in the participant agreements and can thus be adapted relatively easily as long as the main operation of the market is within the licence's requirements.

Southern African Power Pool: A Case Study

The development of the Nordic market model has throughout the years attracted many other regions that want to learn from the development of this power market. Southern

African Power Pool (SAPP) has been one of the long-term relationships established. SAPP was created on 28 August 1995, with the primary aim of providing reliable and economical electricity supply to consumers in each of the SAPP member countries, consistent with the rational utilisation of natural resources and minimised negative impact on the environment.[2]

Cooperation in the electricity sector is not a new phenomenon in the Southern African region; it has taken place at policy, planning and operational levels and has involved governments, power utilities and financial agencies over a period of several decades. To formalise this cooperation, several of the utilities in the region came together to create SAPP. The members of SAPP have undertaken to create a common market for electricity in the Southern African region—the Southern African Development Community (SADC)—and to let their customers benefit from the advantages associated with this market. All utilities participating in SAPP have equal rights and obligations, and have agreed to act in solidarity without taking advantage of one another. Members share information and knowledge, and strive to be politically neutral.

SAPP cooperation includes development, common planning, and system operation. The overarching cooperation is done through an agreement between the energy ministries in the region. There is also a committee structure that enables different topics of concern to be discussed. At the top of this structure is the Executive Committee, with its supporting committees, namely: the Management, Markets, Operations, Planning, Telecommunication and Environmental sub-committees. In addition, there is a Control Centre that acts as the operational body for the cooperation and as the market operator.

The Norwegian and Swedish organisations NORAD (The Norwegian Agency for Development Cooperation) and SIDA (Swedish International Development Cooperation Agency) have been two of the main contributors to the establishment and operations of SAPP. SAPP's first decade of operation where focused on regional planning and grid development. In early 2000, its focus slowly turned to regional market development. It was in this period that contact with Nord Pool was established, mainly through Nord Pool Consulting (NPC). After a visit to Norway, a consulting agreement on market development was signed in 2004 and NPC has been assisting them ever since.

The first task was to create a market design that was based on the Nordic experience, but adapted to local conditions in the region. In 2006, a contract for development of their day-ahead market was signed with Nord Pool and a local vendor in South Africa (Enerweb), marking the start of a long journey of market development for the region. The market went live in 2009 but had a very slow start due to the fact that most interconnection capacity was sold through long-term bilateral contracts. However, the market has slowly opened for more trading and today SAPP is operating a healthy market consisting of three different market segments: FPM (Forward Physical Market), allowing for monthly and weekly

[2] SAPP membership includes utilities from the following countries: Angola, Botswana, Democratic Republic of Congo, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe.

trading; DAM (Day-Ahead Market), trading the 24 hours for tomorrow; and the IDM (Intra-Day Market), allowing for hourly trading up to one hour ahead of the actual hour.

All of these markets have been developed in close cooperation with the original partners from Norway and South Africa to ensure that all relevant experience—both international and regional—are taken into account.

One important lesson drawn from this market is that the national markets have not been deregulated—there are still national incumbent power companies acting as single buyers (and sellers) of electricity. However, this is not hindering the development of using a market model to ensure the best utilisation of the power resources in the region. In some countries, IPPs (Independent Power Producers) have been allowed to participate directly in the market and the national markets are gradually opening to the competitive market.

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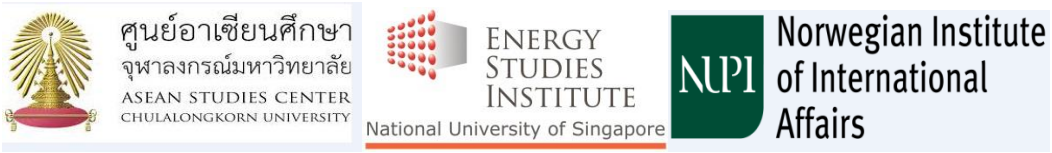

ASEAN ENERGY MARKET INTEGRATION (AEMI)

Energy Security and Connectivity:
The Nordic and European Union Approaches

FORUM PAPER

Energy Security and Energy Connectivity in the Context of ASEAN European Energy Market Integration

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Executive Summary

The first lesson drawn from the European Union energy market integration is the importance of an agreement among governments on the long-term objective to establish a market. Once all the member states had agreed on this objective in principle, the subsequent implementing decisions were taken by majority voting ("qualified majority"). The history of the EU shows that real progress can be made only when implementing decisions are taken by majority voting. But even then, trying to achieve a single integrated energy market for all 28 member states has proved to be too ambitious.

After 25 years of liberalisation, in 2014, the EU moved from a "single market" to a "regional markets" approach. Regional markets are now seen as stepping stones to an EU-wide energy market. There are presently four major regions in the EU: the Nordic region, including the Baltic republics; northwestern/Central Europe (Benelux, France, Germany, Austria and some neighbouring countries); Iberian island; and Southeast Europe. Some of these regions overlap, and opposition to market integration is best addressed by regionally focused approaches whereby concrete benefits in terms of network development, systems stability and resilience can be identified.

Region-wide analysis, e.g. on costs and benefits of cross-border integration, has been indispensable in terms of advancing projects and market integration since the benefits of integration are framed within a regional perspective. The analysis has been supported by governments and foundations, as well as interest groups that benefitted from regional integration. By now, most of the analysis in the EU has adopted an EU-wide or at least regional perspective.

A final lesson is to avoid designing the future based on the past. After 25 years, the EU energy market has started to work effectively, at least in the Nordic region and Western Europe. With the move towards decentralised power generation as a result of new political priorities, technological developments have also illustrated very clearly the need for a new way of regulating the market, planning grids, and cooperating between member states, not least on account of the intermittency of renewable energy.

Introduction

The creation of the internal market for energy has been one of the most ambitious yet controversial undertakings of the European Union (EU). Started as early as 1988, significant progress has been achieved, notably in the area of crude oil and oil products, public procurement and even the convergence of energy tax rates. More difficult proved to be the electricity and natural gas markets. More than 25 years after the objective to complete the internal electricity and gas markets was formulated, much work remains to be done. Within the Energy Union document (Egenhofer et al., 2014; European Commission, 2015a), the completion of internal electricity and gas markets is one of the five dimensions of the EU energy strategy. Energy Union can be seen as the final push to complete the internal energy market.

This article will take stock of the past and current efforts by the EU to liberalise electricity and gas markets. It will describe its motivation, the applied methods but also the specific EU institutional context. A particular focus will be on infrastructure policy

and the new challenges which arise as a result of the EU and global decarbonisation agenda.

Energy in the EU

The EU Energy Situation

In 2013, according to the European Environment Agency (EEA), the total energy consumption of the EU was as follows: 33 per cent petroleum, 23 per cent natural gas, 17 per cent coal, 14 per cent nuclear, 12 per cent renewables and 1 per cent waste (European Commission, 2015b). The EU as a whole and all member states except Denmark are net energy importers. In 2012, 53 per cent of the EU's energy needs were imported. This represents a 40 per cent increase since the 1980s when liberalisation started. The dependency rate is highest for crude oil with 88 per cent, followed by natural gas (66 per cent) and coal (42 per cent). Russia tops the table as the biggest supplier for all three fuels. Natural gas imports are highly concentrated; more than three-quarters (77 per cent) of the EU-28's imports of natural gas in 2012 came from Russia, Norway or Algeria. Most of the Central and Eastern European member states depend on Russia as the main or in some cases, sole supplier for natural gas. Overall the Russian share of EU imports is typically somewhat above 30 per cent with recently strong yearly variations as a result of market dynamics and weather variations.[1]

As a net importer, the EU has traditionally attached high importance to energy demand management through energy efficiency and conservation. High energy prices compared to other regions have made Europe's industry among the least energy-intensive as a result of specialisation in non-energy-intensive goods and energy-efficient production. High European energy prices were offset by high efficiency and specialisation in higher value-added goods resulting in moderate energy costs, keeping the European industry competitive (European Commission, 2014).

Greenhouse gas emissions in 2012 were down by 19 per cent compared to 1990, keeping the EU on track to meet its 20 per cent reduction objective by 2020. Although reductions are a result of policies, they have been "helped" by the fall of economic activity following the world economic crisis. There is also some windfall effect as a result of the economic contraction of the former GDR and the member states from Central and Eastern Europe. Due to an effective policy, renewables have been growing very fast and are expected to reach the target of 20 per cent in total primary energy in 2020. In 2013, it has been above 13 per cent of total final energy consumption, up from 8 per cent in 2007.

[1] Up to the subsequent Russia–Ukraine crises, Russia has been a reliable and relatively cheap supplier, causing few fears on security of supply. Except for oil during the oil crises, supply concerns or disruptions have been related to domestic events, e.g. strikes of coal miners, blockades of refineries by truckers, electricity blackouts and brownouts as a result of system failure. With the first Russia–Ukraine crisis in 2006, however, gas supply disruptions have become a concern for the EU and its member states.

EU Energy Policy

EU energy policy, as most EU policies, features supranational as well as intergovernmental elements, depending on the specific area of action. For example, at the onset of the "European project", there was a common "EU policy" for coal (European Coal and Steel Community "ECSC") and nuclear energy (Euratom), while later on and outside these two sectors energy policies have largely been confined to essentially voluntary intergovernmental cooperation. Such voluntary cooperation typically means that decisions are based on the lowest common denominator, except in times of crisis. As a result, typical energy policy areas such as choices about the fuel mix and (by extension) geopolitics are generally left to member states. This has resulted in a very low degree of convergence between the fuel mixes, notably in the power sector, and to a varying degree of diversification of the gas import portfolio.

In this situation, policy at the EU level has mainly focused on building an internal market for electricity and gas and horizontal measures to moderate demand, and to promote indigenous energy sources, including renewables. In the domain of the internal market, the EU decides by majority voting. The EU's Lisbon Treaty, which came into force in 2009, has not affected the constitutional situation as it yet again confirmed member states' relative freedom of choice of their energy mix.

In addition to the internal market, energy policy initiatives have often been driven by climate and environmental concerns, and under different constitutional situations. Since the 1980s, the EU has had significant legal authority, notably the possibility to take decisions by (qualified) majority vote. Many of the EU's energy policy decisions, including those on energy efficiency and renewable energy, have a legal basis stemming from environment and climate change commitments. Pursuing energy policy goals via the environment has been facilitated by the EU-wide consensus on the importance attached to addressing climate change preceding the 1997 Kyoto Protocol. This is evidenced in the EU's so-called 2007–09 Energy and Climate Change Package,[2] which established a 20 per cent greenhouse gas reduction target, a 20 per cent energy efficiency improvement, and a 20 per cent renewables production goal—all to be met by 2020. These targets are currently being updated for the 2020–30 period. On 23–24 October 2014, the European Council decided on a new set of targets for 2030 ("2030 Framework for Climate and Energy Policy"), including a 40 per cent greenhouse gas reduction, a minimum 27 per cent renewables, and a minimum 27 per cent efficiency target, as well as an interconnector target in the meantime.[3]

[2] Often also referred to as 20-20-20 by 2020 Package.

[3] The European Council of October 2014 agreed to arrive at a 15 per cent interconnection target, meaning that each member state should have interconnections to the tune of 15 per cent of electricity consumption.

The EU's Internal Market for Electricity and Gas: Motivation and Method

There are legal/constitutional and economic drivers behind the creation of an internal energy market, notably for electricity and gas. Setting up an internal market to guarantee the freedom of movement for goods, services, capital and persons is one of the most fundamental objectives of the EU, and therefore is a legal obligation under the Treaty.

The economic justification for the internal electricity and gas market is based on two arguments: (i) increased competition in order to lower costs; and (ii) scale to enhance security of supply. The European Commission has frequently argued that a unified EU electricity and gas market would be intrinsically more secure than the individual member countries' markets. A larger market—served by wider and well-interconnected networks, and which receives electricity or gas supplies from a larger number of actors—may be expected to be more stable than a combination of national markets, and often, small countries. A resilient market also fosters solidarity among EU member states, and solidarity has been a guiding principle of the Lisbon Treaty, effected in 2009.[4] An integrated market is more efficient in allocating resources across Europe than strictly nationally organised, and often small markets. It would provide a pan-European signal to promote investment in electricity and gas infrastructure.

Beginnings

Although the creation of an internal market is one of the tools for achieving European integration,[5] progress was slow for many years. A fundamental change occurred in the 1980s, with a reform of the EU Treaty through the so-called Single European Act that came into force in 1986. This was followed by the so-called Delors White Paper, which set out an ambitious programme to successfully establish the single or internal market by 1992. However, energy was neither part of the Single European Act, nor the White Paper. It was only as late as 1988 that the creation of an internal energy market was actively pursued after it became evident that energy markets were deeply affected by internal market legislation. Key areas of legislation included public procurement, which, despite a delay, soon had to be applied to the energy sector. Tax harmonisation and environment legislation also affected the sector. But the most important was the active application of the hitherto dormant competition rules (e.g. the then Art. 90 and competition rules 85, 86) to utilities for the first time. Nevertheless, it took nine years, until 1996, to reach an agreement on electricity. Not surprisingly, the resulting Directive (96/92/EC) remained cautious, and competition was slow to take off.

[4] In the absence of an integrated gas market, each member state—many of them small—was responsible for signing gas import contracts, often from a single supplier, e.g. Gazprom. In an integrated market where gas flows freely, imports are contracted by pan-European companies, which serve the whole EU market. 80 per cent of the gas is traded at gas hubs.

[5] The others have been economic tools, the Monetary Union, and common policies and activities.

The framework set by the first electricity and gas directives of 1996 and 1998 (European Union, 1996, 1998) fixed a minimum level of competition at member state level by way of agreed common rules, while progressively bringing down barriers to cross-border trade. It was expected that the cross-border market dynamics would unleash competitive forces, which would quickly remove the last remaining barriers to the functioning of a fully competitive and integrated European market.

The first electricity directive of 1996 concentrated on full liberalisation of generation, and introduced a six-year phased-in freedom for all large and medium-sized companies to choose their supplier as well as the freedom to construct lines. Access to the grid was tackled by unbundling[6] the accounts of integrated companies, and by promulgating a number of different access rules to be implemented by member states that should guarantee non-discriminatory access. The 1998 gas directive chose the same approach in principle, but with two modifications: first, the transition period was to be 10 years to accommodate long-term investment needs; and second, the unbundling provisions were lighter to avoid undermining EU companies' bargaining powers with non-EU suppliers. The gas directive allowed each power generator to choose its own supplier.

While the first electricity and gas directives constituted considerable progress, many weaknesses persisted: a lack of effective, unrestricted and non-discriminatory third-party access to networks due to vertical integration, weak regulatory function, high and increasing concentration (and market power), limited or non-existent competition in the small consumer segment and, generally, insufficient liquidity in wholesale markets and response of prices to supply and demand conditions, including network capacity.

Many of the issues in the electricity markets could also be found in the gas markets. There were problems with access and high-access charges and the inadequate independence of transmission systems operators (TSOs). There were concerns about a lack of transparency over the publication of infrastructure capacity able to dispatch both cross-border and domestic transmission, and also in relation to capacity reservation procedures. Rules that governed network balancing were sometimes seen as being too stringent, to the point that they hindered the development of market competition, while at the same time they did not reflect the costs incurred. More generally, gas import levels and cross-border trade were seen as unsatisfactory, with the existing incumbents dominating domestic markets and wholesale prices. Gas trading hubs were slow to develop.

The "Third Package"

To address the shortcomings of the first and second package, the European Union adopted what became known as the Third Package.[7] It was adopted in 2009 and entered into force in 2011. It aimed to improve the functioning of the market and resolve

[6] Unbundling describes the separation of energy supply and generation from the operation of transmission networks.

[7] The Third Package comprises a number of Directives and Regulations; see https://ec.europa.eu/energy/en/topics/markets-and-consumers/market-legislation.

structural problems, notably related to unbundling and the independence and capacity of the regulator. Practically, it consisted of:

- Fully unbundling energy suppliers from network operators
- Strengthening the independence of regulators
- Establishing the Agency for the Cooperation of Energy Regulators (ACER)
- Improving cross-border cooperation between transmission system operators and the creation of European Networks of Transmission System Operators (ENTSO-E and ENTSO-G)
- Increased transparency in retail markets to benefit consumers[8]

Most significant were the rules on unbundling, regulatory agencies and cooperation of TSOs. The Directive foresees either full ownership unbundling in cases of integrated companies, or the creation of an independent System Operator where all important decisions are taken independently of the parent company.

Independence of regulators from both industry interests and the government should, from now on, be guaranteed by creating legal entities with sufficient funds provided by national governments and authority over their budgets. Following the Third Package, regulators can issue binding decisions to companies at the member state level and impose penalties in cases of non-compliance. Regulators now have far-reaching access to data from generators, network operators and other companies. Finally, regulators from different EU countries are asked to cooperate with one another to promote competition, the opening-up of the market, and an efficient and secure energy network system. However, this cooperation has been slow to develop.

In order to boost cooperation between different national regulators, the EU established the independent Agency for the Cooperation of Energy Regulators (ACER), located in Ljubljana, Slovenia. It is not comparable to a national regulator, e.g. in the UK. Instead, it should be seen as an attempt to bundle all competencies related to cross-border trade, which is in EU philosophy an original EU task. All other regulatory competencies remain with national regulators, in line with the subsidiary principle.[9] By Europeanising cross-border competencies within one agency, the EU has attempted to: i) reinforce the European Commission's role as the responsible body for undertaking negotiations with third countries; ii) affirm the independence of regulatory authorities from both the European Commission and member states; iii) reduce the complexity of

[8] For a more detailed analysis, see, for example, the Florence School of Regulation, at http://fsr-encyclopedia.eui.eu/the-third-energy-package-2009/.

[9] The subsidiarity principle stipulates that the EU action is appropriate only if an objective cannot be sufficiently achieved by member states. In addition, EU intervention must be proportional to the objective to be achieved.

the current system; and iv) bundle technical expertise within EU bodies. The main advantage is that it could be implemented within the then existing Treaty as well as the then forthcoming Lisbon Treaty. The EU Treaties require that the delegation of powers to independent agencies must be limited to implementing powers clearly defined and entirely supervised by the delegating institution, on the basis of specific and objective criteria. Put differently, this means that delegation cannot concern discretionary powers involving a margin of political judgement, unless they are set up by the EU Treaty itself, by "quasi constitutional law" itself.

Given that networks have been and still are developed according to national, member states' interests, a particular focus has been cooperation and integration of (national) TSOs. This is attempted through the creation of the European Networks of Transmission Systems Operators, for both electricity and gas: ENTSO-E and ENTSO-G. Their task is to develop standards and draft network codes, later to be formally adopted in EU legislative processes, to help harmonise the flow of electricity and gas across different transmission systems as well as to coordinate the planning of new network investments and monitor the development of new transmission capabilities. This includes publishing a Europe-wide 10-year investment plan to identify investment gaps every two years.

This focus on TSOs has led to a surprising development: the creation of multinational network companies, such as Elia and Tennet, which own assets in several member states. On the downside, there is an unresolved conflict of interests, as ENTSO-E and ENTSO-G are responsible for network planning, while at the same time, their member companies will build and operate the assets they have been planning.

A notable development is that small consumers, such as households, have shown very little interest in retail market liberalisation. The financial savings achieved by changing suppliers are generally seen as too small and the transactions costs too high to motivate consumers to switch.

Coupling National Markets to Create a Single EU Market

Cross-border cooperation and competition is most advanced in the power sector. The EU blueprint for creating an internal electricity market foresees that national power markets should be coupled at the wholesale level. Implicitly, this means that the EU is pursuing a zonal pricing approach, not a nodal pricing approach. In most cases, price zones are currently defined by national borders, with some notable exceptions. In the Nordic markets and in Italy, there are sub-zones to reflect internal (domestic) grid congestion, while Germany, Austria and Luxembourg represent a unified market with a single wholesale electricity price for these three countries.

Market coupling has been successfully implemented for day-ahead markets, while much work remains to be done for intra-day and balancing power markets. Essentially, coupling means that generators do not have to decide whether to offer their production capacity to the domestic or a neighbouring market. Instead, electricity should freely flow from regions with high prices to regions with low prices. To this end, the various national market operators (power exchanges) combine all demand orders and supply

offers. Afterwards, the available cross-border transmission capacity is allocated in such a way that the overall costs to consumers are minimised. In this way, physical transmission rights are allocated implicitly. As of June 2015, this approach has been implemented in most EU member states.

In the current framework, transmission rights must be used day-ahead or will otherwise be released to the day-ahead market-coupling algorithm ("use-it-or-sell-it" principle). It is currently not possible to keep these transmission rights for transactions in the intra-day market, although for balancing purposes they may be reserved under specific circumstances.[10] Moreover, bilateral agreements exist to allow for some cross-border intra-day trading.

It is also possible to obtain explicit long-term transmission rights. This can be useful to contract cross-border deliveries of electricity for a period longer than one day. Moreover, it gives market participants the possibility to hedge themselves against congestion costs. One shortcoming, however, is that transmission rights across national borders can only provide hedging opportunities between two price areas, and not on a regional or even EU level.

Implementation, Enforcement and Governance

As indicated earlier, the EU features supranational as well as intergovernmental elements, depending on the specific area. This is also true for energy. While energy policy in the narrow sense, e.g. choice of fuel mix, is a member state competence and therefore subject to unanimous decision, other areas such as the internal market (including energy) or the environment (including climate change) are subject to qualified majority voting. While voting is very seldom used, the very possibility of a country being outvoted has a disciplining effect, and countries are more open to compromise. In areas where unanimity is required, controversial decisions tend to be adopted only in times of crises, such as that involving the Euro.

Nevertheless, there is an implicit understanding that the EU does not adopt measures which would put a member state government under pressure. Therefore, there is significant opportunity for member states to bargain very hard. Very often, this results in transition periods, differing options being offered to member states, or straightforward exemptions. In reality, this means that a particular policy issue is subject to recurrent changes. In the field of the internal electricity and gas markets, there have been two changes to the original decisions, in the form of three packages—with a fourth one in the making.

When it comes to enforcement, the situation is different. If member states do not implement legislation which has been adopted, the European Commission can bring them to court within four months. The difficulty is that in many cases a possible breach of EU law can be hard to identify. Given the fact that member states have very different legal systems and traditions, let alone more than 20 official languages, the EU typically leaves considerable discretion to member states when implementing legislation.

[10] The network code on "electricity balancing" allows for reserving transmission capacity for balancing markets subject to cost–benefit analysis.

In this respect, competition law, which covers state aid such as illegal subsidies and anti-trust measures, is different. Here, enforcement is entrusted to the European Commission. In this field, the European Commission can act without member states' consent.

Infrastructure Policy

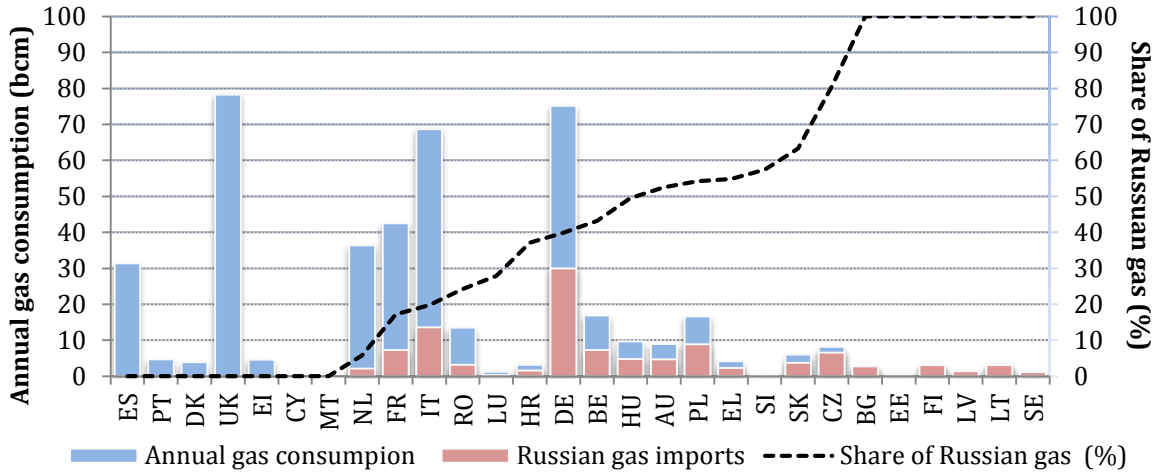
The European Commission estimates that €200 billion needs to be invested for both electricity and gas by the year 2020 to successfully establish the internal market for electricity and gas, and also to guarantee security of supply. Planning is based on the rolling so-called "10-Year Network Development Plan" (10YNDP) compiled by the EU electricity and gas TSO associations, ENTSO-E and ENTSO-G, respectively. Execution of the projects is done by member states according to national laws and regulations such as those relating to permitting and other issues. Financing in most cases is private, although supported by member state funds. The EU contribution is small and is currently limited to roughly 3 per cent of the total amount required.

A major shortcoming is the fact that the 10-Year Network Development Plans are largely a bottom-up exercise—whereby member states, and often regional and local governments, promote their own priorities based on their national or sub-national needs, interests and politics, with limited consideration for the EU perspective or the market. This is aggravated by the unresolved conflicts of interests between the TSOs, which are at the same time responsible for network planning, as well as building and operating their upcoming projects. Further, most European member states tend to be densely populated, and thus face difficulties concerning the social acceptability of infrastructure projects. This is generally seen as the biggest obstacle to the construction of new electricity and gas infrastructure.

As a result, natural gas markets and infrastructure are unequally developed within different regions of the EU, often depending on historical developments. For instance, the markets of the Baltic States are isolated and not connected to gas hubs in Central Western Europe,[11] which are generally considered competitive and liquid markets. The size of these Central Western European markets—more than 80 per cent of total EU gas consumption—also makes it easier to attract new suppliers of natural gas. The situation in southeastern Europe is similar to the Baltic States: connectivity to other parts of Europe remains low, thus forcing Romania and Bulgaria, for example, to rely on (limited) domestic production and imports from Russia. These states are also the most vulnerable to supply disruptions. In 2012, these five member states were 100 per cent dependent on natural gas imports from Russia: Latvia, Lithuania, Estonia, Bulgaria and Finland (see Figure 1).

[11] The central Western Europe electricity market region comprises Austria, Belgium, France, Germany, Luxembourg, the Netherlands and Switzerland.

Figure 1. Russian Gas in the Total Gas Consumption of the EU-28 (2012 data)



Source: Authors' own data, based on data from BP, the U.S. Energy Information Administration, and the International Energy Agency

Power markets, as with gas markets, face similar challenges of fragmentation. As in the gas sector, missing infrastructure is a key reason for fragmentation in the power market. Increasingly, there is a need for new electricity interconnectors to accommodate an increasing level of intermittent renewables, but progress is very slow.

New Challenges

The EU electricity market has been developed as a so-called energy market only (EOM), with no separate payments for capacity availability. At the core is the day-ahead market, which produces a uniform, non-discriminatory market price for each hour of the day as a result of the intersection of all offers and bids. This price is set by the variable production costs of the marginal power plant—the last power plant needed to satisfy electricity demand. All generators receive the same price irrespective of their variable production costs. As a result, generation units with variable production costs below the market price receive a so-called "infra-marginal rent". This margin— typically referred to as the gross margin—is used to cover fixed operations and maintenance (O&M) costs, as well as to recover investment costs. Thus, availability is implicitly remunerated through infra-marginal rents.

If market prices were always equal to the variable production costs of the marginal plant, this plant would not even be able to cover its fixed O&M costs, let alone recover its investment costs. This is why so-called "scarcity prices" are required to let an energy-only market function properly.[12] Such price increases are expected to occur when supply struggles to meet demand (e.g. when consumption peaks), when production from intermittent renewable sources is low, or when there are large, rapid

[12] It can be shown that such scarcity prices are needed not just for the marginal production unit but for all units in order to recover fixed and investment costs. Scarcity prices can only occur if there is no restriction on the bid price. This means generators must be allowed to bid above marginal costs. At the same time, competition authorities must ensure this does not lead to strategic bidding, i.e. exercising market power (see Joskow, 2007).

swings in demand or supply. During these hours, the price would rise above variable production costs of the marginal plant and thus offer a so-called "scarcity rent" to all resources in the market. These additional revenues are needed to fully recover both fixed O&M and investment costs.

An energy-only market attracts investment in new capacity, therefore, through either direct or indirect reliance[13] on scarcity prices. Unexpected policy interventions, erroneous demand expectations, and long lead times for planning and building new capacity tend to lead to boom and bust cycles, with times of overcapacity alternating with times of scarce capacity. When there is overcapacity, scarcity prices are not going to occur, simply because supply is always well above demand, which signals that there is no need for new capacity.[14]

Renewable Energy

The very rapid build-up of renewable generation in final energy consumption to 20 and 27 per cent in 2020 and 2030, respectively[15] has created a situation where price signals play an increasingly smaller role. Renewable energy investment has mostly not been triggered by wholesale price signals based on internal energy market regulation combined with the carbon price signal from the European Emissions Trading System (ETS).[16] To achieve this target, EU member states have primarily relied on dedicated policy instruments to support the deployment of renewables, often feed-in tariffs under long-term contracts. There are two effects of using dedicated support policies.

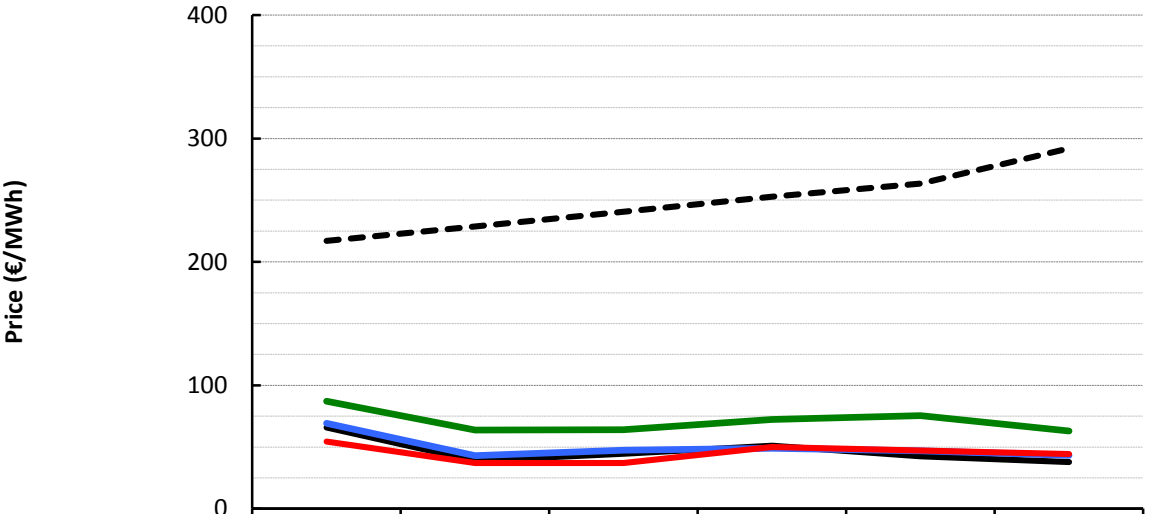
[13] Indirect reliance refers to market participants entering into commercial arrangements with one another so as to hedge their exposure to the price and volume risk.

[14] Scarcity pricing is also suppressed or distorted in energy markets, e.g. through direct public interventions or system operators (partly) socialising balancing costs.

[15] The 20 per cent renewables target of total primary energy is likely achievable, but it means that within a short period renewables will constitute some 30–35 per cent of total electricity production. This situation is likely to continue as the EU has agreed to move to a minimum level of 27 per cent renewables in total primary energy production, which would translate somewhere between 40–50 per cent of renewable energy in the electricity market.

[16] Carbon prices under the ETS have been below 10 EUR per tonne of CO_2 and the ETS, and there is little expectation that this situation will change within the next 10 years.

Figure 2. Retail (Household) and Wholesale Power Prices in Germany (DE), France (FR), Spain (ES) and Italy (IT), 2008–13



	2008	2009	2010	2011	2012	2013
DE, retail	217.2	228.8	240.7	253.0	263.6	292.0
DE, wholesale	65.8	38.9	44.5	51.1	42.6	37.8
FR, wholesale	69.2	43.0	47.5	48.9	46.9	43.2
ES, wholesale	54.4	37.0	37.0	49.9	47.2	44.3
IT, wholesale	87.0	63.7	64.1	72.2	75.5	63.0

DE: Germany; FR: France; ES: Spain; IT: Italy
Source: Eurostat and ACER (Agency for the Cooperation of Energy Regulators)

First, these policy instruments reduce the demand for electricity generated from conventional sources, resulting in falling wholesale prices, and at times even negative prices. Adding supply to an already saturated system will further depress wholesale power prices.

Second, there is more fluctuation in demand for electricity from conventional sources, because renewable generation depends to some extent on weather conditions. The reduced hours of operation of conventional power plants create a need for a different mix of conventional generation technologies, as these do not just differ in their variable production costs but also in their fixed and investment costs. So-called "base-load" capacity is used to cover the minimum continuous level of electricity demand, as it has relatively low variable but high fixed and investment costs. Consequently, when hours of operation diminish, some base-load is expected to be replaced with capacity that has lower fixed costs—natural gas, for example.

The business case for peak-load is challenging because investment costs have to be recovered from a low number of operating hours. What changes with renewables is that: (i) more of these units will be needed; and (ii) the exact amount required is subject to greater uncertainty today due to the weather-dependent availability of renewables. This comes at a time when Europe seems to be entering a situation where overall demand for electricity (even before allowing for renewables) is not growing, and in fact may decline, unless other sectors such as heating or transport are electrified. This

represents a radical change for the industry, which for over 100 years was used to steady growth (Genoese and Egenhofer, 2015a).

Reforming the Market

The policy-driven rapid expansion of renewable energy has triggered a debate on a comprehensive reform of the EU electricity markets, or as it is called in EU jargon, "market design" (Redl et al., 2015; Genoese and Egenhofer 2015b; Weale, 2015). The European Commission has launched a stakeholder consultation which closed in early October 2015.[17] The discussion intensified in autumn 2015 with a legislative proposal to be expected during the course of 2016.

In the meantime, member states have taken action and introduced new mechanisms to deal with an explicit remuneration for being available or delivering energy in times of system stress in the form of capacity mechanisms. The objective is to ensure parallel streams of revenue to allow the recovery of that portion of their fixed costs that is not recoverable in energy and balancing markets, while also reducing the dependency on uncertain scarcity revenues. Capacity mechanisms have been implemented or are in the process of being implemented in several EU member states, including France, Germany,[18] Italy, Belgium and the UK. These mechansims also have a long history in South America and in the US,[19] where several states rely on both energy and capacity markets.

Low-Carbon Investment

A largely carbon-free power sector by 2050[20] will require considerable investment, some of which will replace carbon-intensive capacity with more flexible, less carbon-intensive forms of power generation. With the drive towards a low-carbon economy, the electricity market will need to make a positive contribution to the successful delivery of these new policy objectives. It is necessary to understand how the low-carbon economy will be brought about, notably what market rules are required and whether there is a need to adapt the current framework.

Given the weakness of the wholesale price signal, the EU and its member states are discussing the role of governments in providing such a long-term price signal. A first element is a strengthening of the EU ETS in order to provide a long-term price signal for carbon allowances, which would first serve as a market-exit signal for carbon-intensive capacity. In addition, other ideas are currently under discussion. These include:

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[17] See https://ec.europa.eu/energy/en/consultations/public-consultation-new-energy-market-design.

[18] Strictly speaking, there is currently no capacity mechanism in place in Germany. Yet there is a so-called "grid reserve" (*Netzreserve*) to ensure that TSOs have access to sufficient "re-dispatch" capacity. Re-dispatch refers to a measure to resolve internal grid congestion. Since it provides a capacity-based revenue stream for generators, it acts as a kind of de facto capacity mechanism.

[19] See, for example, Hogan (2015).

[20] According to the EU Energy Roadmap, every decarbonisation scenario will feature a high share of renewables, i.e. at least 64 per cent in 2050 (European Commission, 2011)

- Contract-for-Difference related to the electricity price
- Contract-for-Difference related to the carbon price
- So-called reliability options
- Capacity auctions

From an EU perspective, these will still need to be tested against their internal market compatibility.

Conclusions

Although the creation of an integrated electricity and gas market is a legal obligation under the EU Treaty, it has been slow to take off. Following several rounds of legislation, however, the EU is getting close to a well-functioning, competitive electricity and gas markets. All electricity markets are or soon will be coupled, whereby electricity can freely flow across the EU. 80 per cent of all natural gas is traded on gas hubs, with gas-to-gas competition. The remaining 20 per cent is located in Central and Eastern Europe, in countries late to join the EU and which also embarked on liberalisation somewhat later. A major shortcoming remains the lack of sufficient cross-border infrastructure. Reasons are that infrastructure still remains to be planned and built according to national interests, and also in the face of public opposition.

The rapid investment in renewable energy supported by dedicated support mechanisms, such as long-term feed-in tariffs, has in recent years led to a situation where wholesale prices do not allow generators to be remunerated for generating electricity. This situation is likely to continue since there is a political agreement and a target to continue building massive new renewable energy capacity. This is why member states increasingly deviate from an energy market only and complement it with a separate capacity remuneration market. Looking ahead, the major question to ask is: how to generate investment signals and, in addition, give signals that the investment becomes low-carbon. This is still currently under discussion, but the likely result is a fundamental transformation of the way the EU electricity markets work today.

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