WORLD ENERGY COUNCIL
Weltenergierat - Deutschland
WEC Netherlands – *under formation*

The benefits of coordination

Increasing welfare through coordination of German and Dutch energy markets and policies

WORLD ENERGY COUNCIL
CONSEIL MONDIAL DE L'ÉNERGIE

World Energy Perspective

Published 2014 by:
World Energy Council
Regency House
1–4 Warwick Street
London W1B 5LT
United Kingdom

Registered in England and Wales

No. 4184478
VAT Reg. No. GB 123 3802 48
Registered Office
Regency House
1–4 Warwick Street
London W1B 5LT

ISBN: 978 0 94612 126 7

The benefits of coordination

Increasing welfare through coordination of German and Dutch energy markets and policies

By means of glasses, hotbeds, and hotwalls, very good grapes can be raised in Scotland, and very good wine too can be made of them at about thirty times the expense for which at least equally good can be brought from foreign countries. Would it be a reasonable law to prohibit the importation of all foreign wines, merely to encourage the making of claret and burgundy in Scotland?
- Adam Smith (1776), The Wealth Of Nations, Book IV, Chapter II, p. 458, para. 15.

Markets don't always self-correct fast enough. Until they do there is an immense amount of damage that has been done which is why we need government intervention.
- Joseph E Stiglitz (2008)

Executive summary

The European Union has set ambitious goals for energy sector change. The central goal is to achieve CO_2 mitigation at lowest possible cost, while maximising security of supply. Integration of European electricity markets towards a competitive internal market, with common rules throughout Europe, plays an essential role in meeting these goals. Yet in practice, many policy competencies in relation to electricity remain at the member state level, which often results in a variety of policy solutions chosen at a national level.

In the increasingly international energy landscape, implementing nationally optimal energy policies may prove to be suboptimal from a European perspective, as economic theory predicts. Benefits arise from cross-border coordination of the use of existing assets (static efficiency) and of investment in production capacities and transmission networks (dynamic efficiency), allowing electricity and investment flows the flexibility to find their welfare-maximising routes.

To remain competitive and to achieve climate policy goals, we need a harmonised common electricity market that is open and competitive, flexible, well-connected, well-regulated, transparent and predictable. This truly integrated and harmonised electricity market is crucial if Europe is to return to growth. Individual consumers benefit from an integrated market via lower prices resulting from increased competition. Electricity producers and grid companies benefit from a stable investment climate and clear, non-discriminatory rules. In a fully competitive environment, energy companies will be more strongly motivated to invest, which translates into greater energy security.

Though policy coordination is a sine qua non for effective integration of European electricity markets, it is also a contentious political issue. Electricity policy affects the competitiveness of individual member states and is a preferred tool for national redistribution politics (for purchase power). Therefore, it is necessary to find a workable compromise that will allow Europe to unlock value from an integrated market while delivering a palatable solution for political leaders.

Electricity policy coordination and achieving a harmonised common electricity market is also a highly relevant topic for the German and Dutch governments. Because of the closely integrated economies and physical electricity infrastructures, policies heavily influence cross-border market outcomes. Germany's Energiewende and the Netherlands' Energieakkoord are both promising examples of comprehensive longer term energy transition framework policies that form a basis for the implementation of the EU policy goals. At the same time, they are also markedly different, not only as a consequence of national historical differences in energy systems and industry structures, but also because of different political contexts.

The benefits of the coordination of electricity policies and markets could be substantial for both the German and the Dutch governments. These benefits consist of direct as well as indirect effects. The **direct benefits** include benefits of market integration like operational costs (decreased fuel costs and decreased balancing costs) and investment cost (decreased needs for additional transmission and production investments). A feel for what the size of the European benefits of coordination might be can be obtained from several studies, which focus mainly on the improvements of operational costs due to market integration: i) benefits of market integration could between €12.5 and 40 billion annually (Booz & Co, 2013[1]), ii) academic literature estimates benefits to be 1-10% of system costs (Booz & Co, 2013), iii) a study of welfare gains per border (ACER, 2013) identifies benefits ranging from several millions of euros – to over € 250 million of trade gain per year per border. Extrapolation of these studies to Germany and the Netherlands suggests that the benefit potential of coordination lies in the range of hundreds of millions of euros per year to several billion[2]. The benefits of coordinated (RES) investments are not yet taken into account in this estimation, and could substantially increase this amount. **Indirect benefits** include benefits such as the improved investment climate and new economic activities related to innovation. Those effects may very well be larger than the direct effects in the longer run, but they are much more difficult to quantify.

By means of this report we want to stimulate the German and Dutch governments to lead the way in showing how coordination and cooperation can maximise welfare, so other European countries will be inspired to follow their example. Based on the essays of this report, we set directions and recommendations to better align policies in order to achieve CO_2 mitigation at lowest possible cost, while maximising security of supply and obtaining a more optimal allocation of funds and resources.

To be able to do this, we recommend:

- further exploring harmonisation of subsidies and taxes facing renewable energy producers to align incentives, enhancing efficiency of investments and creating technology neutrality. A restructured EU ETS is vital in reaching a higher CO_2 price that truly incentivises investments in low carbon technologies.

- improving market integration by increasing market transparency and aligned market rules. Though markets do not necessarily need to be fully open for integration benefits to materialise, further harmonisation of regulatory models can contribute to better functioning price signals and the further removal of impediments to trade. A prime example is the harmonisation of balancing responsibility for all market participants and in all markets to efficiently achieve stable networks and further enhance market integration of renewable electricity.

- cooperating in challenges of grid integration, such as (cross-border) infrastructure planning and the development of off-shore grid infrastructure. Proper coordination will reduce local uncertainties for investments and improve the attractiveness for investors.

- developing joint projects and using statistical transfers in the field of renewable generation. These instruments, foreseen by the 2009 Renewable Directive, will provide the opportunity for the Dutch government to reach renewable energy targets and for the German government to reach the targets at lower costs and thus reduce the burden on the consumer.

- stimulating innovation through cooperation on R&D and industrial policies for renewables, storage and energy efficiency products between nations, creating joint innovation clusters.

This document has been prepared by the WEC's national member committees of the Netherlands and Germany in cooperation with Nuon-part of Vattenfall, DNV GL, E.ON, Vopak, and PwC.

1 Source: Booz & Company. Benefits of an integrated European energy market, 20 July 2013

2 This reflects the total benefits compared to a situation where there is no market integration.

Introduction

Purpose of this document

This document has been prepared by the WEC's national member committees of the Netherlands and Germany in cooperation with Nuon-part of Vattenfall, DNV GL, E.ON, Vopak, and PwC. The purpose of this document is to open a discussion on the cost of non-coordination of Dutch and Germany markets and policies. We hope to inspire the agenda setting of an energy policy debate between Germany and the Netherlands. In this summary we point out our main ideas and suggestions that result from three essays which are added in the remainder of this document.

The European energy transition is about to gain momentum – but national policies are not aligned

Energy policy in Europe is a balancing act between three, often competing, objectives – security of supply, sustainability, and competitiveness. As a continent, Europe is increasingly dependent on imports to meet fossil energy demand. At the same time, Europe wishes to reduce the potentially harmful effects of fossil fuel use on the climate. This transition is a bold ambition with potentially enormous positive effects on society and the economies for the next generations. But it is also costly for several reasons. One reason is that building up the massive capacity of renewables production needed to supply a substantial share of demand requires an enormous effort, not only in terms of sheer capex, but also in terms of organisation, logistics, legislation, and adjustment of the energy infrastructure. Besides society at large, individual actors are also impacted. Margins on conventional generation have dropped together with prices, and gas plants are in operation for fewer hours throughout the year. Another reason lies in the current cost and risk profiles of most renewable energy projects. Many technological hurdles need to be overcome, both at generation and at grid level, and many of the potential solutions are still in a laboratory or pilot stage.

An exacerbating factor is that nationally determined energy policies act as a barrier to a well-functioning European internal energy market. Of considerable concern however is the fact that the policy frameworks are developed on a national level, without too much realisation of mutual impact between neighbouring countries. In the increasingly international energy landscape, implementing nationally optimal energy policies may prove to be internationally suboptimal, as economic theory predicts.

In this set of essays, we will focus particularly on electricity markets as these are the most developed and as it is here that the benefits of coordination are most pronounced. But the concept of the benefits of coordination also applies to other energy markets, in particular gas markets.

The benefits of coordination – an economic perspective

The benefits of coordination have occupied economists since Adam Smith first put forward the principle of absolute advantage. In energy markets, benefits arise from cross-border coordination of the use of existing assets (static efficiency) and of investment in production capacities and transmission networks (dynamic efficiency), allowing energy and investment flows the flexibility to find their welfare-maximising routes. One example of the first is the financial gain of replacing electricity produced from a gas turbine on one side of the border with electricity produced from a windmill on the other. An example of dynamic efficiency is, instead of building two power plants for backup capacity - on each side of the border – to build one backup capacity to be shared by the two countries[3].

The benefits of coordination increase as countries become more reliant on renewable electricity (RES-E), especially if countries have different characteristics. RES-E technologies are inherently more dependent on the characteristics of the environment and countries have distinct advantages in generating specific forms. As such, it is beneficial to realise wind and hydro projects in places with beneficial environmental conditions. Additionally, it will be increasingly important to balance intermittent renewables capacity with base load, notably from gas turbines. In the European energy market of the future, complementarity will become a more relevant characteristic and an integrated market will be able to deliver security of supply at lower overall cost than individual member states. For example, Dutch gas-fired power plants could serve as a backup for German wind power, which could avoid additional capacity investments.

The overall benefits on the European level are potentially substantial but few studies have attempted a comprehensive quantification.

- A recent study by Booz & Co (now PwC Strategy&) in 20134 finds that the benefits of integration in electricity markets at the European level are substantial. It estimates an economic benefit of € 12.5-40 bn annually in terms of static efficiency and € 15.5-30 bn in dynamic efficiency terms. Comparable studies arrive at benefits from integration of 1-10% of system costs, with most studies on the lower end of that range (see Booz & Co, 2013 for a comprehensive literature review). These benefits do not account for the losses that energy companies will incur associated with any write-offs for production facilities.

- ACER published in their annual market monitor5 the benefits of current market integration (allowing the lowest cost producers to serve demand in neighbouring countries) and described the welfare gains per border. These vary largely depend on the countries involved (ranging from a couple of million € trade gain per year between Norway and Sweden to a trade gain higher than € 250m for Swedish/Danish border). Also, additional benefits are modelled per 100MW of interconnection capacity added.

3 Source: Breugel institute (2013), Electricity without borders: a plan to make the internal market work. As opposed to static efficiencies, dynamic efficiencies take a long time to realise as they are related to investment decisions, which depend on investment cycles with typically long durations (in the electricity market).

4 Source: Booz & Company. Benefits of an integrated European energy market, 20 July 2013

5 ACER (2013) Annual Report on the Results of Monitoring the Internal Electricity and Natural Gas Markets in 2012.

Maximise welfare by optimising energy market coordination between Germany and the Netherlands

Electricity policy and market coordination is also a highly relevant topic for the German and Dutch governments, because of the closely integrated economies and physical energy infrastructures. The Energiewende in Germany and the Energieakkoord in the Netherlands are very promising examples of comprehensive longer term energy transition framework policies. At the same time, they are also markedly different, not only as a consequence of national historical differences in energy systems and industry structures, but also because of different political philosophies. These historical differences have led to very different systems, for instance in terms of renewable energy incentives. This lack of policy coordination persists despite closely integrated economies and physical energy infrastructures. We therefore see strong potential for both governments to lead the way in showing how coordination of energy policies can maximise benefits for both countries.

The benefits of the coordination of energy policies and markets could be substantial for both the German and Dutch governments. These benefits consist of direct as well as indirect effects. The **direct benefits** include benefits of market integration like operational costs (decreased fuel costs and decreased balancing costs) and benefits of decreased investment cost (less need for additional transmission and production investments). A feel for what the size of the benefits might be can be obtained from studies such as Booz & Co (reflect total European benefits[6]) and ACER (reflect German and/or Dutch benefits[7]). These studies focus mainly on the improvements of the first category of direct benefits – decrease of operational costs due to market integration. Extrapolation of these studies to the total benefit potential[8] for Germany and the Netherlands suggests that the benefits of coordination lie in the range of hundreds of millions of euros to several billions of euros per year[9]. **Indirect benefits** include benefits like the improved investment climate and new economic activities related to innovation. Those effects may very well be larger than the direct effects in the longer run, but they are much more difficult to quantify. Further detailed analysis of both the direct and indirect benefits of coordination could be beneficial to the German and Dutch governments, to serve as a justification for joint policy actions.

Coordination does not mean that all energy policies should be harmonised. Next to harmonisation, coordination is about identifying the effects of certain energy policies on neighbouring countries and together developing policies that lead to the most beneficial outcome for both countries. It is this spirit of and willingness to compromise that can inspire further cooperation at the European level and unlock economic benefits.

6 Source: Booz & Company. Benefits of an integrated European energy market, 20 July 2013: Literature study shows that the available research indicated a possible benefit of market integration of 1-10% of total system costs. For the Netherlands and Germany, the lower limit is used in our estimation. Second methodology used is to translate the potential benefits of market integration as calculated in the report of € 12.5-40 bn for Europe to the Netherlands and Germany based on energy production of total EU energy production.

7 ACER 2013 Annual Report on the Results of Monitoring the Internal Electricity and Natural Gas Markets in 2012 (€ 170m of benefits of situation now compared to a situation without integration, every 100MW interconnection added could lead to an additional € 5m benefit per year. A second source (Energieactueel interview ACER 16 May 2014) reveals that so far for the Netherlands, € 50m per year has been achieved, and further coordination could mean several tens of millions of euros in additional benefit.

8 This reflects the total benefits compared to a situation where there is no market integration.

9 The benefits of coordinated (RES) investments are not yet taken into account in this estimation, but could potentially be large, given the estimation in the Booz & Co report of € 15.5-30bn for Europe as a whole.

We urge the German and Dutch governments to lead the way in showing how coordination can maximise welfare, so hopefully other countries will join the debate. To inspire agenda setting on this topic between the two governments, we have created three essays on topics where we believe further coordination could lead to additional welfare. Each essay highlights a different aspect to the benefits of coordination. The recommendations made in these essays should be taken as suggestions to inspire the policy debate.

Essay 1 - The benefits of coordination for economic development of countries: improving competitive positions and creating new economic activities

Essay 2 - The benefits of coordination of renewables and grid development policies: meeting renewable targets at lowest possible cost

Essay 3 - The benefits of coordination by markets: realising flexibility at lowest possible cost

Essay 1

The benefits of coordination for economic development of countries: improving competitive positions and creating new economic activities

There are currently substantial differences between German and Dutch energy policies, driven by differences in the structure of the economy and energy supply in these countries. These policies have helped shape divergent energy market policies in the past, which have led to varying energy prices between these countries. A greater deal of policy and market coordination between the two countries would harness economic benefits as market players make cost-efficient production and investment decisions. In this essay, we make two suggestions to improve electricity market coordination to stimulate welfare –harmonisation of subsidies and taxes facing renewable energy producers to align incentives for energy producers and energy users, and alignment of R&D policies to create economic clusters with regards to renewable energy, storage and energy efficiency technology. Additionally, we point to the distortionary effects of different levels of energy taxes and spur both governments to lead the way towards a greater deal of harmonisation of European energy taxes.

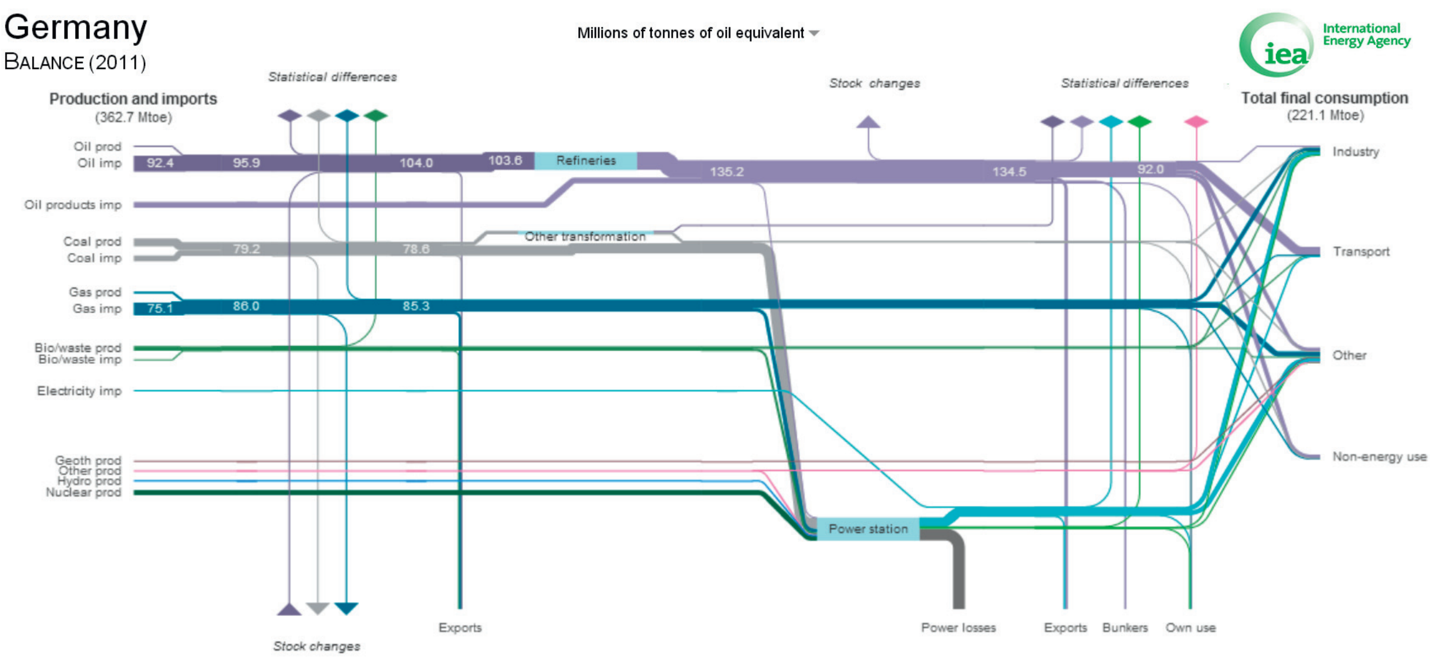
Variety in German and Dutch energy profile influences energy policies and energy costs

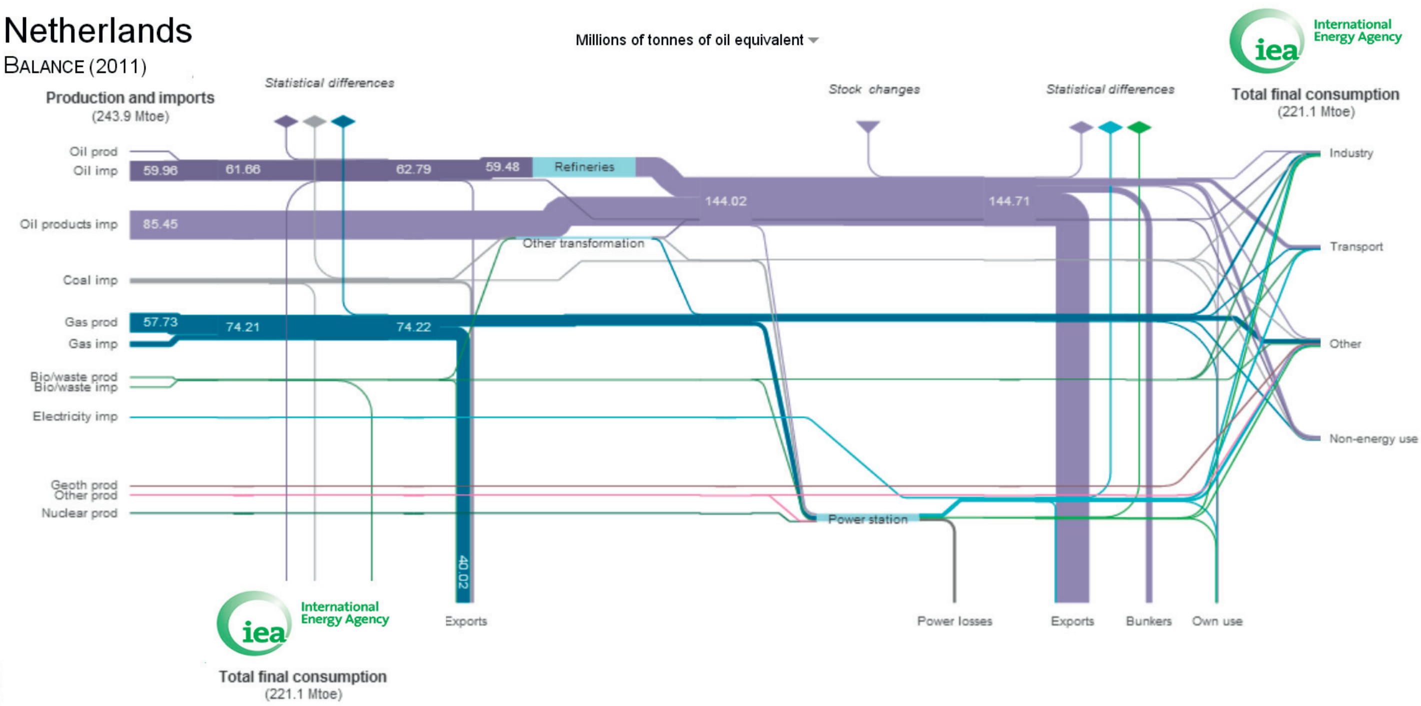
Keeping energy affordable is a primary goal of energy policy; further goals are security of supply and sustainability. The balancing act for various goals, combined with the domestic availability of natural resources, the economic demand structure of a country and the political philosophy, drive the development of national energy policies (see figure 1 for the energy flows in the Netherlands and Germany). This pattern is clearly reflected in the energy policies of the Netherlands and Germany, where different national energy policies have developed over time. Differences between the two countries include the availability of natural resources and the prioritisation of climate policy, leading to, among other things, very different renewable energy policies.

The availability of domestic energy sources has historically heavily influenced the types of energy used in both countries. Because of its own natural gas reserves, the Netherlands are much less dependent on energy imports at the macro level (Dutch gas production coincides with ~2/3 of Dutch total energy use). Of course this does not take away import dependency altogether, because a great deal of consumption is tied to other energy sources -primarily oil – and natural gas is exported to other countries. Furthermore, the Netherlands is a large transit country, where imported oil is transformed to other energy carriers and exported again. Germany imports energy mainly for domestic use. For natural gas, Germany depends on pipeline gas import where 1/3 is imported from Russia. In contrast, Germany uses domestic lignite to cover a significant part of its power production. Thirdly, economic structures and consequently the energy intensity of the industry differ between the countries.

Because of these (historic) differences in energy profile the countries have created different energy policies, stimulating different fuel types and creating different incentives for increasing energy efficiency. For Germany, security of supply is a more pressing matter than for the Netherlands. Besides for oil and coal, Germany is also dependent on imports for its gas supply. Increasing the level of renewable energy serves not only environmental goals for Germany but also security of supply goals, since this creates new domestic sources of energy.

Figure 1
Energy flow diagrams of the Netherlands and Germany (2011, in Mtoe)

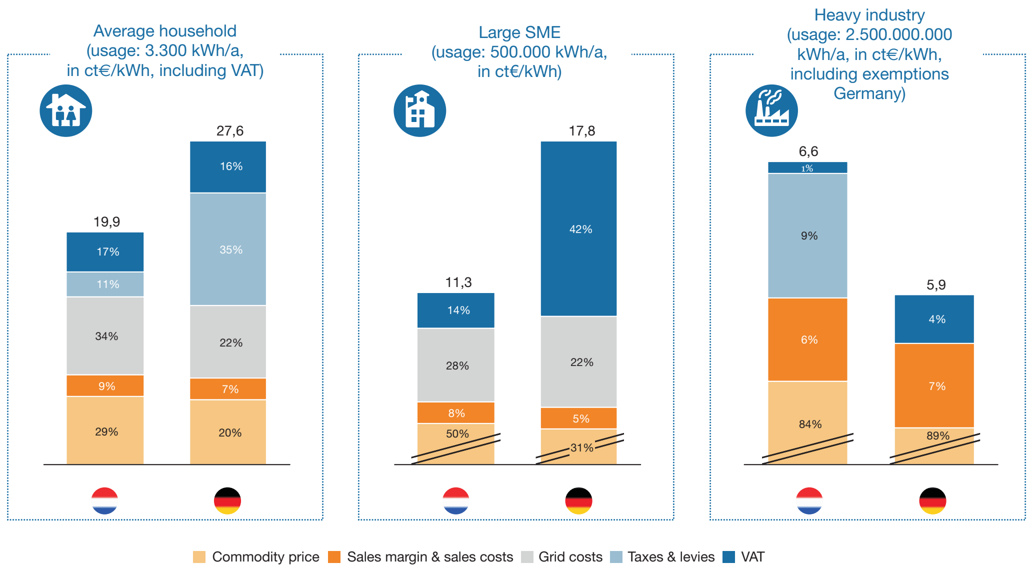




Source: IEA Sankey diagrams

These historically varying energy policies have led to differences in energy prices (see Figure 2 for electricity)[10]. For residential users, the electricity prices in Germany are 29% higher than in the Netherlands. For large industrial users, the energy price is lower than in the Netherlands (about 12% in 2012). These differences frequently lead to discussions on competition between countries and the economic impact of energy prices.

Figure 2
The costs of electricity in Germany and the Netherlands (2013)



Source: PwC research[11]

National taxation and subsidies could lead to increased costs and suboptimal location incentives for renewable energy

As figure 2 shows, an important part of the electricity price in the two countries is determined by energy taxes and levies. There are a number of differences: in Germany the cost of the renewable energy levy to support the 'Energiewende' is largely forwarded to consumers[12], while large industrial users are exempted. Other taxes and levies, however, are much higher than Dutch taxes (cf. figure 2). To avoid damages to its large, energy intensive industry, and to maintain their European competitiveness, Germany has granted a legally controversial exemption (now reduction[13]) from network charges for these companies, resulting ultimately

10 There is a substantial difference between Germany and the Netherlands (see PwC, 2013 for a complete comparison of electricity prices for Dutch and German users). Germany has generally decided to tax consumers and small to medium sized corporate users more heavily than the Netherlands and large industrial users less heavily. As a result, a German company using 2,000 MWh/year will pay 13.7-14.1 ct/kWh (depending on whether a full tax exemption applies) while a Dutch company will pay 9.5 ct/kWh. A large German industrial user (2.5 GWh/year) will on the other hand only pay 5.9-6.4 ct/kWh while a large Dutch industrial user will pay 6.6 ct/kWh.

11 The prices for electricity use in some processes in the heavy industry can be further exempted (to ct € 5,9).

12 Currently the European Commission has opened an in-depth investigation to examine whether the reduction granted to energy-intensive companies on a surcharge for the financing of renewable energy sources in Germany is compatible with EU state aid rules.

13 The exemption was successfully challenged in court by companies that are not covered. The government has offered to introduce (strongly reduced) network charges for energy intensive industries; it remains unclear whether this regulation will be acceptable to the plaintiffs.

in retail power price levels being even lower than in the Netherlands for large energy consumers. At the same time, small and middle-sized companies in the Netherlands profit from lower energy taxation than their German counterparts (cf. Figure 2, middle). Generally, such differences in energy taxation lead to distortions of competition and thus inefficiencies.

Besides taxes acting as a source of revenue, governments often use them to combat market failures (externalities). Costs of pollution and greenhouse gas emissions are not taken into account in market prices and it is questionable whether the market will realise sufficient levels of security of supply. Therefore taxes and subsidies are developed by governments to create incentives for switching towards cleaner fuels, to stimulate energy efficiency and provide incentives for maintaining the desired levels of security of supply.

The designing of these incentives is not easy – a bad design could lead to suboptimal market outcomes. Efficient environmental policies aim at achieving equalised marginal cost of pollution reduction – the effective levy on the pollutant – such as CO_2 in climate policy- should be equal no matter how it is produced[14]. In practice, due to differences in subsidy policies, investors might decide to invest in the country with the highest subsidies rather than the best underlying economics. For society as a whole this will lead to inefficient investments and high costs of subsidy schemes.

Energy costs influence economic performance, but the effects can be negative as well as positive

As shown in the previous paragraph, energy policies (taxation and subsidies) heavily influence energy prices and non-coordinated energy policies lead to varying end user prices, which influence the competitive position of countries.

Conventional economic wisdom dictates that increasing energy costs depress economic activity. This happens through two channels as higher energy prices negatively impact (1) the competitive position of the tradable sector and (2) consumers' buying power. This view was recently reiterated in the European Commission's Draft Report on Energy Prices and Costs in Europe (Feb 2014), using extensive computer modelling (GEM-E3 global general equilibrium model). The conclusions of the work are not very favourable[15].

This conventional view is however rooted in a static view of the economy. In their seminal publication, Porter and Van der Linde (1995) argue that properly designed environmental standards can trigger innovation that may offset the costs of complying with them. They argue that they can even lead to absolute advantage as reducing pollution often coincides with improving efficiency of resource use. Additionally, introduction of environmental regulations can spawn new industries and a first mover advantage applies. It may very well be for this reason that there are about 381,600 people working in the renewable energy industry in Germany (about 1% of the working population)[16]. Furthermore, they state that environmental regulation should focus on outcomes, not technologies. This allows companies to innovate and achieve the goals in the most cost-efficient way.

14 In the case of climate policy- the EU ETS is set up to achieve this goal for the sectors it covers; national taxation on CO_2 emissions or other pollutants often vary considerably, with considerable overall efficiency gains to be expected from harmonisation.

15 See pages 223 and 224 of the report.

16 Federal Ministry for the environment, nature conservation and nuclear safety (2012), Zeitreihen zur Entwicklung der Herneurbaren Energien in Deutschland

So, even though increasing energy prices may affect the competitive position of European industry in the short run, it is not unthinkable that increased innovation and economic activity will offset this effect in the long run. It does however mean that policies targeting a more secure and renewable energy supply should be designed in such a way that they optimise incentives for market participants to realise efficient market outcomes.

Further coordination of the German and Dutch energy policies could decrease competition issues and maximise new economic activity

We have identified two areas in which improving electricity policy coordination could stimulate welfare for Germany and the Netherlands:

A. Harmonisation of subsidies and taxes facing renewable energy producers to align incentives for energy producers and energy users, and

B. Alignment of R&D policies to create economic clusters with regards to renewable energy, storage and energy efficiency technology.

A. Harmonisation of subsidies and taxes facing renewable energy producers to align incentives for energy producers and energy users

Since energy taxes and levies contribute significantly to the overall energy bill, these are the first subjects that come to mind for coordination. Harmonisation can be done at a production side as well as an end user side. By increasing policy coordination, inefficient distortions of competition could be avoided.

Harmonisation of subsidies and taxes facing renewable energy producers
One essential element for effective electricity market coordination is the set of government policies that directly affect prices. The incentives facing market participants for investing are disrupted on both sides of the border by various subsidy and taxation schemes. Climate policies should aim at equalising marginal carbon abatement costs, so investments will be made at lowest possible cost. Reforms of EU ETS should generally aim at this, and so should national policies such as carbon taxes.

Divergent policies on both sides of the border, however, lead to market distortions as they affect locational signals for investments in renewable energy. In essay 2, we further explore the differences in subsidy schemes that affect the location decision for wind energy investments. Besides subsidies, taxes also play a role in providing locational signals. Corporate income taxes and tax incentives for investing in energy and/or environmental assets are currently not harmonised. Both countries could consider aiming at the same 'net tax advantage'.

Harmonisation of energy end user taxes
Public policy does not just affect the production side of the energy market. The demand side is impacted by taxes and surcharges levied that affect energy prices. As shown in the previous paragraphs, differences in energy prices could lower the competitive position of countries. Energy prices could be harmonised through tax and subsidy harmonisation.

Furthermore at the energy end use side, differences in tax levels between countries impact the location decision of companies. They therefore tend to lead to policy competition, where countries compete for the favour of these internationally mobile corporations by lowering their tax rates below those of other countries. To prevent this type of policy competition within the European Union, Member States should strive to coordinate the setting of their individual energy tax rates so that differences are minimised without dropping to the lowest common denominator.

B. Alignment of R&D policies to create economic clusters with regards to renewable energy, storage and energy efficiency technology.

To stimulate the economic activity resulting from the Energiewende and the Energietransitie, the German and Dutch governments could consider further aligning R&D policies. Despite strong economic integration, the research environment in general, and for renewable technologies in particular, is still hardly integrated across borders.

The AWT (the Dutch Advisory Council for Science and Technology Policy) recently looked into the Dutch-German cooperation on innovation as part of wider research into the German science- and R&D-policy. They found that German and Dutch bilateral cooperation on R&D "could be stronger" (AWT, 2012). There is cooperation at the European level (e.g. through the COST and EUREKA programmes) and between individual institutions (e.g. the cooperation between NWO, DFG, and the Alexander von Humboldt foundation). Yet, the Dutch and German governments have no formal cooperation programmes; in fact, the Netherlands were not even mentioned in the latest Bundesbericht für Forschung und Innovation 2012, the most important German document on innovation policy. This lack of coordination is also prevalent in research on renewable energy technologies.

Better alignment could not only reduce the costs for both countries, but could furthermore increase the impact of the policies. In this way, clusters of economic activity around renewable energy, energy storage and energy efficiency could be created, in which activities can strengthen each other.

Essay 2

The benefits of coordination of renewables and grid development policies: meeting renewable targets at the lowest possible cost

Renewable energy expansion is driven largely by national-based energy policies. These policies have been more ambitious in Germany compared to the Netherlands, resulting in a faster development towards meeting their renewable energy targets. Nevertheless, the Netherlands actually have a higher renewables potential which could be met in a more cost efficient manner, in particular with respect to wind energy. National energy policies do not therefore lead to the most cost efficient path towards reaching renewable energy targets. As a result, in this essay we identify opportunities to work more closely together in the expansion of renewable energy. The Dutch and German governments could consider further cooperation with regards to i) realising the roll-out of renewable energy projects (joint projects and statistical transfers), ii) resolving challenges of grid integration, in particular the tackling of cross-border loop flows and the joint development of off-shore grid infrastructure R , and iii) creating economic clusters for renewable energy;

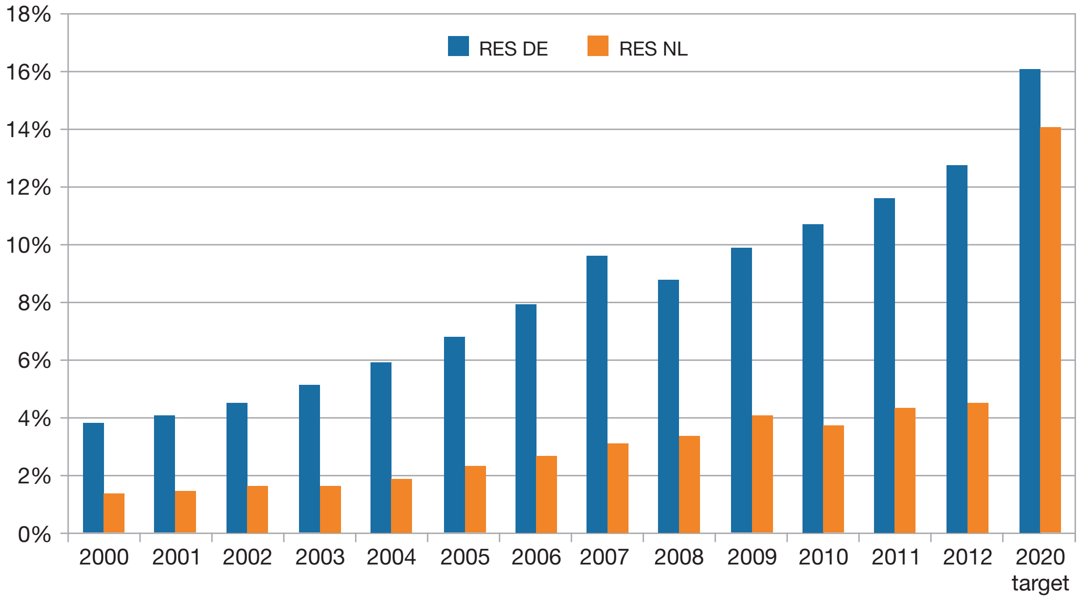
Renewable energy policies in Germany and the Netherlands are not coordinated

As part of its climate policy, the EU has fixed a 20% renewable energy target for the year 2020, based on its policy analysis published in the "Renewable Energy Roadmap" (2007). Renewable expansion is at the heart of the energy transition of the power sector. In its Renewable Energy Directive (2009/28/EU) the EU has defined binding targets for the share of energy from renewable sources (RES) for each Member State. For the Netherlands and Germany, these are 14% and 18% respectively. These national targets are planned to be met by using national renewable energy policies. Coordination of renewable energy policies has, so far, not been on the agenda of national governments.

Of the two countries, Germany has made greater progress in achieving their renewable energy goal over the past few years (see Figure 3). As part of the Energiewende, Germany has vigorously pursued its renewable targets, in particular in the electricity sector, with an ambitious national feed-in tariff support scheme. Many observers expect Germany to exceed its 2020 target of an 18% renewable share in final energy use, because it surpassed its interim target in 2010 by more than two percentage points. The debate over the cost for society of this support scheme featured prominently in the 2013 federal election campaign. The Netherlands on the other hand have implemented a renewable energy support system that aims at market integration of renewable energy and has produced lower subsidy costs (per kWh). Given the recent development of renewable energy shares in total energy use (cf. Fig. 3), many observers are sceptical, however, as to whether the Netherlands will reach their renewable energy targets, although the Dutch government has recently recommitted to reaching its 2020 target.[17]

17 PBL, ECN (2013): Het Energieakkoord: wat gaat het betekenen?

Figure 3
Share of RES-E in gross final electricity consumption in NL and GER



Source: Planbureau voor de Leefomgeving, "Erneuerbare Energien in Zahlen", published by the German Federal Ministry for the Environment in 2012

Non-coordination leads to costs: sub-optimal location choices and inefficient grid investments

These national energy policies do not seem to lead to the most cost-efficient path towards reaching renewable energy targets. While the Netherlands has rolled out fewer renewable energy projects than Germany, it actually has a higher renewable energy potential, in particular with respect to wind energy. The REShaping project[18], commissioned by DG ENER, reports an economically realisable wind potential of 37 TWh p.a., in contrast to 105 TWh for Germany, i.e. potential that is viable under current economic conditions. This is equivalent to about one third of Dutch electricity consumption, and one sixth of German electricity consumption. An estimate based on the cost potential curve for wind published by the REShaping project shows that in the Netherlands, these projects can be realised at a discount of € 1-5 ct/kWh compared to Germany, so that in comparison to Germany a TWh of green electricity generated in the Netherlands would save 10 to 50m Euro.

Further coordination of energy policies could lead to advantages for both countries. Joint investments into renewable production in the Netherlands seem very reasonable for both countries: for Germany, because it could realise its ambitious RES expansion goals at lower cost, and for the Netherlands, because it would benefit from foreign direct investments.

The successful expansion of RES-E does not depend on support systems for stimulating production alone; it also brings considerable challenges for grid operators. In fact, the integration of intermittent electricity feed-in by wind and solar is one of the greatest challenges of the energy transition. In both countries, network operators are obliged to provide network access to RES-E and to extend the network where necessary to fully accommodate renewable capacity on all network levels. Also, RES-E plants are guaranteed priority dispatch, allowing for curtailment only to uphold grid stability in case of congestion.

18 Cf. http://www.reshaping-res-policy.eu/

The grid integration of renewable energy results in challenges for German and Dutch grid companies. Firstly, the huge and fast expansion of wind farms in Northern Germany over the past few years challenges network stability and has already created frequent congestion problems on the transmission level. Secondly, connecting future offshore wind farms to the mainland grid requires a great deal of investment and planning. Due to increasing interconnection and market integration, these issues have a cross border impact. The expansion of wind farms in Germany affects the Netherlands through cross-border loop flows. TenneT, the TSO in Northern Germany, is owned by the Dutch state and has a role in solving both problems.

Solving these issues at the lowest possible cost for society requires a higher level of coordination. Insight is needed into cross-border effects to determine optimal investments in finding optimal locations for RES production and necessary grid development. Both countries could benefit from these insights.

There are many opportunities to work more closely together and therefore maximise welfare

Our analysis gives an indication that there is considerable additional welfare to be gained by coordination of investments in renewable energy projects across the Dutch-German border. We understand that these are the result of different underlying political philosophies. Nevertheless, we have identified three areas where we think that exploring further cooperation could increase welfare:

A. Realising the roll-out of renewable energy projects;
B. Stimulating joint innovation to reduce costs for renewable energy;
C. Resolving challenges of grid integration.

A. Realising the roll-out of renewable energy projects

As analysed above, there is a discrepancy between Germany and the Netherlands with regards to the renewable targets and performance on the one hand and renewable (cost) potential on the other. Economic gains might be achieved through cooperation. In order to allow for cross-border support of renewable energy in a cost efficient manner, articles 6 to 11 of the Renewable Energy Directive introduce three cooperation mechanisms between Member States:

1. EU Member States may resort to a so-called **statistical transfer**, i.e. virtual transfers of renewable energy produced in one Member State to the RES statistics of another Member State. The Member States agree on the amount of kWh transferred and a price for the transaction.

2. EU Member States are allowed to statistically split the renewable energy generated in **joint projects**. This may either involve joint projects between Member States, where the partners agree on the relative share of statistical accounting of the RES value produced, or joint projects between Member States and third countries outside the EU, where electricity produced from RES is to be imported into the EU.

3. EU Member States are allowed to engage into **joint transnational support schemes** between Member States. These provisions are in line with the Commission's goal to create an internal and sustainable energy market in the European Union.

The first case of a statistical transfer is economically sensible, but entails political difficulties. A statistical transfer offers Germany the opportunity to recuperate part of the cost for its ambitious renewable expansion policy and the Netherlands the guarantee that renewable targets will be met, thus avoiding possible penalties for non-compliance with EU climate policy targets. However, the renewable cost differentials between the two countries might lead to political difficulties. Germany would likely regard the renewable subsidy per kWh – i.e. average support cost minus market prices – as a basis for negotiations of the price for a statistical transfer. Given the higher cost of German renewable projects, Dutch politicians would likely be unwilling to pay a price that is higher than for renewable electricity generated in the Netherlands, unless facing a particularly high penalty for missing the renewable target imposed by the EU. In contrast German politicians may not like the prospect of statistically "selling" renewable electricity at a price below the average support cost in Germany, incurring the risk of bad press, even when some of the cost could thus be recuperated.

Unlike statistical transfers, the second option – joint renewable investment projects between Germany and the Netherlands – should be far less prone to such political difficulties. Clearly, the cost for the subsidies would have to be shared. The European Commission has to be notified in advance about the planned statistical accounting of renewable generation, but furthermore there are few restrictions of such cooperation resulting from the Renewable Directive. Joint projects could be beneficial for both countries since they generate lower overall subsidy cost – when compared with the partially retrospective subsidy costs in the EEG – as investment projects with most favourable economic conditions can be chosen, such as the installation of a joint on-shore wind farm in a border region with strong winds or a joint PV installation in a region with high solar radiation.

Both the realisation of statistical transfers and the development of joint projects would be greatly helped if recent plans of the German Minister for the Economy to reform the EEG fall through. The plans foresee the introduction of a mandatory premium system for new investments by 2017, which would be much closer to the Dutch SDE+ model[19]. As the price tags associated with support in the two countries become more directly comparable, this would facilitate the negotiations of a transparent remuneration scheme for statistical transfers between Germany and the Netherlands, or even the development of a joint transnational support scheme – the third possibility for coordination under the RES-E directive.

B. Stimulating joint innovation to reduce costs for renewable energy

In essay 1, we recommended improved coordination of innovation policies to create internationally competitive clusters of renewable energy research. Besides clustering effects, joint innovation may also improve efficiency by removing overlaps and creating larger networks, thereby reducing costs and/or making new technologies feasible in a shorter timeframe. As such, we expect substantial efficiency gains from joint programs between, for example, the Energy Centre of the Netherlands and Fraunhofer ISE. Coordination would allow investors from both countries to profit from the knowledge that so far has mostly been generated separately, and to use unrealised synergies. Germany could in particular profit from the Netherlands' experience in offshore wind farming, and the Netherlands from Germany's experience with photovoltaic.

19 The EEG of 2001 currently provides digressive feed-in-tariffs for virtually all RES-based generation. Since 2012, RES producers can voluntarily switch to a market-premium system, where they take full responsibility for their sales. The Dutch Besluit stimulering duurzame energieproductie (SDE) of 2007 on the other hand natively builds on a premium on top of the wholesale price of electricity generated from conventional fuels. Funds are capped and allocated through an auction system that is designed to minimise producer surplus.

C. Resolving challenges of grid integration

Due to its geographical nature, grid expansion is primarily a national, respectively local task. However, due to the growing market integration, coordination of the expansion efforts between neighbouring countries is essential:

- The frequent occurrence of loop flows in the Dutch transmission network, caused by wind feed-in from Northern Germany, has been a contested issue between the two countries in the efforts to coordinate cross-border grid regulation. The crucial deficiency, in our view, is the present remuneration mechanism for cross-border flows that does not adequately compensate the network use for transition flows. The current revision of rules for network coupling and studies into market zones should be complemented by a revision of the compensation mechanism for cross-border flows along the lines of cost calculation used in transmission fee derivation. These measures would accommodate objections to the use of the Dutch grid to cope with German wind feed-in.

- In the long-run, European market integration calls for a harmonisation of network regulation and financing. Institutional differences – e.g. different grid codes - can hamper cross-border trade as much as physical bottlenecks; and only common rules will assure equal access to the networks by generators and consumers alike that is a prerequisite for fair competition. Common grid regulation will create a level playing field for competition in the power markets. Also it would allocate network costs more appropriately than today's uncoordinated regulation.

- As for the development of off-shore grids, joint efforts between the two countries should be undertaken. While there are no easy solutions for the present difficulties in the development of German off-shore wind farms, the more successful implementation of their Dutch counterparts offers a number of lessons to be learnt. A wider connection of off-shore grids in the North Sea, including the installation of new lines connecting Norway and Central Europe, offers plenty of opportunity for joint investments under harmonised regulation.

Essay 3

The benefits of coordination by markets: realising flexibility at lowest possible cost

European electricity markets are increasingly exposed to intermittent generation. As a result, power prices are getting more volatile and conventional power producers are facing increased volume and price risks. This has engendered fears that the rise of RES-E could ultimately endanger the system stability of power systems across Europe. Currently power producers are considering taking capacity out of the market – capacity that could still be needed for generation adequacy.

An integrated Dutch-German energy-only market will reduce price and volume volatility, improving market efficiency and decreasing the need for Capacity Remuneration Schemes (CRMs) that can be costly for society if introduced in a non-coordinated way. This essay presents some realistic policy options to improve the current functioning of the market.

Introduction - system adequacy, generation adequacy and flexibility

Since the early '90s, European electricity markets have been in constant change, mainly as a result of several regulatory interventions. In the late 2000s, the EU put forward three main energy policy objectives: competitiveness, security of supply and sustainability. These objectives have been underpinned by the Energy and Climate packages and the 20-20-20 targets.[20] The integration of renewable –intermittent – energy sources into the system has raised concerns over security of supply, the main topic of this essay.

Since the adoption of these policies and targets, European electricity markets are increasingly exposed to intermittent generation, which affects security of electricity supply. While the transition to a sustainable energy system is desirable and mostly welcomed, it also brings new challenges for energy producers. The rapid deployment of renewables and the economic crisis have resulted in a sharp decrease in wholesale electricity prices. Consequently, energy companies are considering the continued mothballing or the shutting down of generation capacity. With increasing levels of intermittent generation, conventional generation is still indispensable in the energy mix to ensure full system adequacy.

Although the capacity situation might regionally be tight, Europe as a whole rather has a surplus of generation capacity. Most European countries have healthy reserve margins and sufficient installed and available capacity. In particular in the Netherlands and Germany, there is more than sufficient installed capacity available. The "Best Estimate Scenario" from ENTSO-E indicates that sufficient capacity is expected to be maintained during the entire forecasted period until 2020, even after the expected shut-down of German (and Swiss and Belgian) nuclear power plants.[21 22]

20 In the Netherlands, the Energy Agreement stipulates that there should be 10,450 MW of wind power by 2023. Also the proportion of solar energy will have to increase considerably to achieve the Dutch target of 16% renewables by 2023.

21 http://www.entsoe.eu.

22 However, due to the intermittent nature and grid-bottlenecks, there might be a few rare cases in which the security of supply is not ensured locally and must be solved by grid enforcement.

Since the liberalisation of the Energy Market, it seems the case that the energy market has given the right signals over the past years. Energy producers are investing in times when the expected wholesale prices are high, and are decommissioning when the prices are low and there are hardly any periods of high prices in times of overcapacity and vice versa.

As well as having sufficient installed capacity – the ability of the power system to provide sufficient electricity at all times – it is important that the energy system is also sufficiently flexible to react to unforeseen changes. In a power system with a large share of variable RES, this implies an insurance against times when the sun is not shining or the wind is not blowing.

Current status of the Capacity Remuneration Mechanisms in Europe

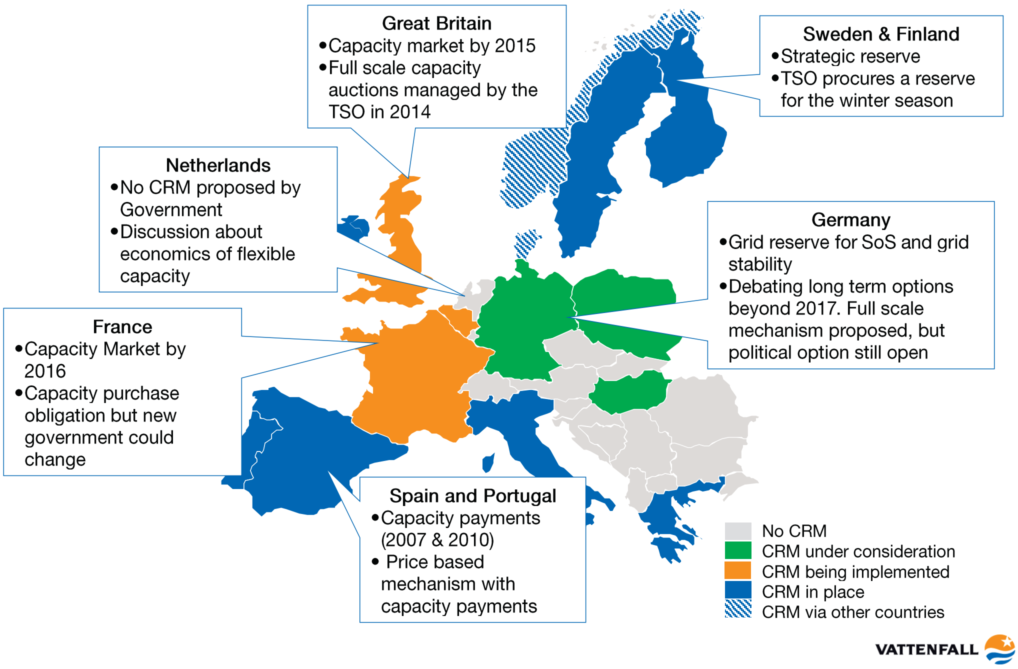
Recent concerns about the adequacy of generation investment and the fear of the “missing money problem”[23] have led to the consideration of introducing “capacity remunerations mechanisms” (CRMs). The basic idea of CRMs is that power plants are remunerated for capacity, or the power that they will provide at some point in the future. CRMs can be distinguished as: mechanisms that function outside the energy-only market and mechanisms that function within the energy-only market[24].

In European power markets, most notably Germany, CRMs are discussed as a means of ensuring backup capacity for intermittent renewable energy sources feeding into the grid. The German energy regulator, for example, has stated that supply shortages in Southern Germany are conceivable in the mid-term (mainly due to the nuclear phase-out). Amongst other things, a strategic reserve is being considered. The Dutch government and the regulator are of the opinion that CRMs are not needed on the short term, due to the current situation of overcapacity.

23 Academics have noted that a variety of factors, including energy price caps set well below the putative scarcity value of energy, result in a “missing money” problem. The consequence is that prices paid to suppliers in the “market” are substantially below the levels required to stimulate new entry.

24 Moreover, there is a basic distinction between selective and comprehensive CRMs, where the former remunerates a specific share of all generation capacity, characterised by a technological standard, while the latter provides a remuneration for a total capacity target. CRMs are usually financed by a levy on power use. A strategic reserve is a selective CRM operated outside the energy market, activated by a central coordinator under previously fixed conditions (usually by a strike price in the electricity wholesale market). Other CRMs allocate a remuneration to existing or newly planned capacity, either by direct payments or an auction process with a pre-determined capacity target.

Figure 4
CRMs in the EU: diversity in existing schemes and proposals



Source: CREG 2013, ACER 2013

On a European level, CRMs are addressed in detail in the "Guidelines for generation adequacy instruments" which accompany the EU Commission's Communication "Making the internal energy market work".[25] This document shows against which guidelines the EU Commission will judge CRMs introduced by the Member States. The EU Commission seems to advocate a restrictive approach to CRMs, however it is questionable whether there will be any binding policy initiatives.

In Europe there is a wide diversity in existing schemes and proposals that are currently being discussed (see figure 4):

- In Spain, Portugal, Italy Sweden, Finland and Ireland, national governments already have some kind of capacity mechanism in place. In France, UK and Belgium, CRMs are now being implemented.

- The German energy regulator, BNetzA, has undertaken steps to guarantee security of supply. This includes an obligation to German TSOs to contract interruptible loads (Abschaltverordnung) and the current practice of regulated operation of "indispensable" power plants such as Irsching in Munich. Moreover, BNetzA has tendered a project to develop the details of a full-size Strategic Reserve for Germany, following the Scandinavian example. Further implementation of CRMs is under consideration given the background of large increases in the share of RES-E and a large decline in electricity wholesale prices. The German Government is expected to work on a proposal on CRMs which should be published after the summer break, starting a legislative process. In theory, the content of the proposal could still go anywhere, from a strategic reserve to more far reaching models.

25 http://ec.europa.eu/energy/gas_electricity/internal_market_en.htm

- The Dutch government is of the opinion that CRMs are not needed on the short term, due to the current situation of overcapacity. However, there is a political discussion about the financial health of flexible, thermal plants.

Overall, it can be concluded that countries have chosen varying policy routes and that approaches are not aligned. Since CRMs can influence cross-border market outcomes[26], the effects of a lack of coordination should be carefully considered before implementing these mechanisms.

Next to the possible negative effects of lack of coordination, CRMs in themselves entail a number of problems. To mention the most important ones (a full discussion is out of the scope of this document), the main concern with comprehensive CRMs that function within the energy market is that they run the risk of over-subsidising existing (inefficient) generation that is damping peak prices, and therefore undervaluing flexibility instead of rewarding it. Such capacity mechanisms have a risk of crowding out non-remunerated investments that are inherently put at a disadvantage.

The current functioning of the electricity market

Energy companies are exposed to fluctuations in wholesale commodity market prices. As a result they hedge this price and volume exposure to stabilise and protect financial results. After exposures are hedged in the forward markets, energy companies trade on the day-ahead and intra-day market to match their customers' profiles. Intraday and balancing markets enable Balancing Responsible Parties (producers and consumers) to manage their imbalances. More importantly, the associated market prices reflect the scarcity and gives proper incentives to keep sufficient flexibility available in the market.

Due to the high level of intermittent generation, the market risk for producers has increased. Until recently, production patterns for individual power plants were predictable, but this has changed. Both volume and price risks have changed. There will be wind and solar output for some but not for all hours resulting in lower and less predictable operating hours for thermal generation. Photo Voltaic (PV) in particular has influenced the CCGTs in Germany a lot, influencing the neighbouring markets (e.g. the Netherlands).

Since the position of gas-fired power plants in the merit order will often change depending on the weather conditions (e.g. wind), prices are becoming more volatile and more peaky. For example, on a grey day with no wind and high demand, peak prices will be higher than before. And vice versa, on a sunny windy day with relatively low demand, prices can come close to zero or even negative. Therefore, flexible gas-fired power plants are not likely to run baseload and have to rely on the revenues in the less predictable peak hours.

Given the developments described above, reliance on an energy market becomes more risky since the business case of an investment relates to the volatile scarcity rent and less on the infra-marginal rents (which conventional baseload plants can rely on). Furthermore, market risks for producers have not only increased, but are also more difficult to hedge due to less predictable generation profiles.
In conclusion, there seems to be sufficient and available installed capacity for the coming years. In addition, TSOs have several ancillary services to cope with sudden demand variations or generation outages. Market risks for flexible generation plants have gone up, but these plants are still needed in times when flexibility is needed. Before considering CRMs, which could possibly create significant cost increases, what are the realistic policy options to

26 See Sweco (2014) 'Capacity markets in Europe: impacts on trade and investments', or ECN (2013) discussion paper 'Generation capacity investments and high levels of renewables - The impact of a German capacity market on Northwest Europe'. Positive as well as negative effects are identified in these studies (lower consumer costs cross-border, but negative effects on security of supply for neighbouring countries).

improve the current functioning of the market? How can further coordination through existing markets provide benefits? This is particularly relevant for the Netherlands and Germany, which have much to gain from improved cooperation, given the structure of their electricity markets: Northern Germany being marked by a high share of installed wind capacity, and the Netherlands having at its disposal a particularly flexible power system.

Recommendations for an improved electricity market

Before embarking on major reforms such as CRMs, one should first consider incremental changes that allow the improvement of the current functioning of the market, so future generation adequacy will remain sufficient. Although the Dutch and German markets work fairly well, they can still be improved to achieve even better results. For illustration, we mention below a few areas where significant improvements may be gained by further developing existing rules and regulations, and increasing the level of regional integration.

1. Enforce balance responsibility for all market participants

Parties responsible for balancing (producers and consumers) can trade their imbalances on different markets. However, currently not all market participants are fully responsible for their own balancing. This results in a lack of incentives to adequately forecast supply and demand and creates unnecessarily big imbalances.

Currently in Germany, many producers of renewables receive a (fixed) feed-in tariff from the TSO and are not required to pay for their imbalances. This has led to the undesirable situation that variable generation from RES has no incentive to properly forecast their production and sometimes even produces against the market rationale (see also below in the box: Case Study).

If all market participants are exposed to the entire range of market risks, balancing responsible parties are incentivised to sell their production into the market, and meet scheduling, nomination and balancing requirements. As a consequence, market prices will better reflect demand & supply variations; in other words, the true value for flexibility will be revealed in the market (e.g. intraday markets). Only in this way will the market find different ways to hedge their risks with new products or contracts.

Case study:

On 16th June 2013, Germany's nuclear power plant fleet was reduced by a third as output from wind and solar reached a record of 60% of total electricity consumption. According to data from Germany's four grid operators collated by EEX transparency, nuclear output dropped to 5,900 MW for hour 15, some 36% below available capacity with seven reactors fully online. At the same time, combined wind and solar output was around 29,500 MW, with solar generating some 20,300 MW and wind adding 9,200 MW, the data shows.

[…]

However, the ramping down of conventional production could not prevent prices from falling below zero as the spot price for 16th June 2013 delivery settled at minus € 3.33/MWh, with hours 14 and 15 clearing at minus € 100/MWh on Epex Spot. Low demand and high levels of "non-flexible generation" from nuclear, hydro, wind and solar sources caused an oversupply across the region, with spot prices also negative in France and Belgium, the regional power exchanges said in a statement on Monday. French and Belgian generation forecasts for non-flexible generation (nuclear, hydro, wind, PV) were higher than the actual load forecasts, it said. Hourly prices in France dropped to minus € 200/MWh for hours 6 to 8 on Sunday on Epex Spot.

Source: Platts Power Daily, 20th June

2. Encourage demand-side response.

Flexible resources will be used during only a few hours of the year or only as a reserve. It is predicted that Germany for example will need about 20 GW of backup capacity by 2020. Peak load can either be met reliably by firm generation capacity, or can be reduced through demand-side measures. This is relatively attractive as about a quarter of the (peak) demand only occurs in a very limited number of hours in the year (<200 hours). Especially in these cases, demand response is a much more (cost-)efficient option than the development of additional backup capacity.

It is estimated that demand response can provide up to 10% of peak load capacity. Energy-intensive industries already participate in the spot markets and offer ancillary services to the TSOs. However, the rest of the demand side also needs to be engaged much more actively than has so far been the case.

For this to happen, market design and regulation should be further developed to promote the participation of (especially) smaller parties in the market. Similar to the participation of aggregators in the German balancing market, room should be created for market parties that can aggregate and control the demand of various smaller customers, who will not otherwise be able or willing to actively follow market price movements.

3. More flexible rules for cross-border gate closure times

Currently national intraday markets allow bids until 15 minutes before delivery, whereas the deadline of 1 hour applies to cross-border exchanges. Therefore the cross-border gate closure times are not synchronised. Due to this inconsistency it could be the case that flexible power is in theory available for the European market but remain practically unused because of the limitation in cross-border trade. This can be solved by synchronising cross-border lead times so that flexibility (and balancing) is produced and used across borders in the most efficient manner.

4. Allow prices to reflect long run marginal costs

As explained above, peak capacity has a scarcity value. Peaking generators increasingly have to rely on infrequent peak prices to cover their fixed costs. In order to enable these generators to recover their costs, there should be no undue price caps or other limitations, but generators should be able to place bids in the market that reflect their long run marginal costs, without the threat of regulatory control. It is important that this is continued in both countries in the future.

5. Improve transparency on balancing prices

Imbalance charges are aimed at providing incentives to market participants to minimise their own imbalances, or potentially even to help to reduce the system imbalance. In order to optimise efficiency, imbalance charges should therefore reflect the current state of the system as well as the (marginal) cost of balancing. Ideally, market participants should thus be informed about balancing prices with a minimum delay, or even in real time, as is currently the case in the Netherlands.

About the World Energy Council

The World Energy Council (WEC) is the principal impartial network of leaders and practitioners promoting an affordable, stable and environmentally sensitive energy system for the greatest benefit of all. Formed in 1923, WEC is the UN-accredited global energy body, representing the entire energy spectrum, with more than 3000 member organisations located in over 90 countries and drawn from governments, private and state corporations, academia, NGOs and energy related stakeholders. WEC informs global, regional and national energy strategies by hosting high-level events, publishing authoritative studies, and working through its extensive member network to facilitate the world's energy policy dialogue.

Further details at **www.worldenergy.org** and **@WECouncil**

World Energy Council
Regency House 1–4 Warwick Street
London W1B 5LT United Kingdom
T (+44) 20 7734 5996
F (+44) 20 7734 5926
E info@worldenergy.org
www.worldenergy.org

For sustainable energy.
ISBN: 978 0 94612 126 7