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EUROPEAN POWER UTILITIES UNDER PRESSURE?

HOW THE ELECTRICITY MAJORS ARE DEALING WITH THE CHANGING INVESTMENT CLIMATE IN THE EU POWER SECTOR

BY KOEN GROOT

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EXECUTIVE SUMMARY

The European power sector is challenged by a series of developments. These range from planned changes to the institutional environment and the functioning of the market, to unforeseen external shocks like the decline of demand as a result of the economic and financial crisis and the German decision to completely phase out nuclear energy after all. The challenges also include the unexpected results of foreseeable developments, such as the impact of renewable energy sources (RES) on business models terms of profit margins and system requirements.

Lower demand for electricity, energy efficiency measures and the rapid expansion of RES has strained the power majors' business models, whereas in many cases operating margins are under pressure and the returns on investments are poor. It is the confluence of circumstances, which has already been referred to as 'a perfect storm' for power utilities in Europe that is creating stress among the existing power majors.

A new context seems to emerge in which earlier premises of EU energy policies and corresponding corporate strategies no longer hold. Companies in the EU power sector are being forced to adapt to new circumstances and adjust their strategies in order to move forward. The arrangements the power utilities are now taking are characteristic for firms operating in an industry in distress. Shedding non-core functions, becoming more agile and focused are typical strategies in that sense. At the same time, we see the EU power majors making inroads, if not expanding their footprints, in business activities outside of the EU power sector. Whenever possible, firms seek to diversify their portfolio towards markets outside the EU power sector, in order to become less dependent on a market in which the fundamentals are characterised by declining demand due to energy efficiency, substitution and a continued negative economic outlook.

In the process of long-term strategic restructuring, we observe some trends. While the firms take on different approaches, we do see a differentiation along three lines: (i) the increased presence over the energy value chain, investing in energy services, upstream and other non-power generation activities; (ii) increased generation activities in growth markets in the Americas, Asia and the Middle East; and (iii) increased investments in (subsidised) RES projects within and outside the European

market. In other words, the major EU power utilities choose to scale up traditional activities by expanding geographically and realise that a change in the business models is needed, thereby developing new activities.

Regarding their activities in the European power sector, the EU power majors will continue operations as long as economically feasible, whereas, based on the current market conditions, for new investments, the firms will only invest in capacity with guaranteed incomes. For now, this seems to be limited to RES, in which continued investment by the EU power majors is indeed expected.

How this will fit in the policies of the EU and Member States remains to be seen. A critical success factor for the continued success of the major European power utilities may be to better align the corporate and national interests.

1 INTRODUCTION

The nuclear disaster in Fukushima, Japan, the prolonged economic crisis in Europe and the shale gas boom in the United States have all left their mark on the EU power sector. These and other events in the sector's external environment, as well as recent changes within the power sector itself, have created challenging conditions and an uncertain outlook for today's major European power utilities[1].

If the stream of messages currently being conveyed by representatives of the European power majors is any indication, the situation in the EU power sector is dire[2]. The profit margins of individual plants and entire generation portfolios are under pressure, and as a result, firms are considering mothballing their generation assets. Neither the current market conditions nor the prospects for the immediate future seem to provide any relief. At the same time, the costs of transitioning towards a sustainable energy economy are increasing for governments as well as for consumers. In the case of governments, this has to do with much needed subsidy schemes, while for consumers the increase is due to higher surcharges and tax rises. The rocky situation in today's electricity market in the EU confronts policymakers, investors in generation capacity and consumers alike.

1 In the power sector of the European Union, seven firms stand out in size when it comes to installed capacity, electricity production and revenues. These are E.On, EDF, Enel, GDF Suez, Iberdrola, RWE and Vattenfall. In this study we focus on power generation activities, the operation of transmission and distribution systems are outside the scope of this study.

2 E.On CEO Teyssen at the EU Energy Roadmap 2050 stakeholder conference: 'When you invest in new generation, you can write it off the day you start', stated while discussing the current climate and policy stance in the EU power sector (European Energy Review, 29 February 2012, http://www.europeanenergyreview.eu/site/pagina.php?id=3522). In addition, E.On has hinted at closing power plants. Coal and especially gas-fired power plants have been 'largely uneconomic[al] to operate'. CEO Teyssen said that under these conditions the firm 'can't continue operating conventional plants in the hope something changes'. (Financial Times, 20 January 2012, 'E.On Eyes Closure of Gas-fired Power Plant', http://www.ft.com/intl/cms/s/0/edf37798-6aec-11e2-9871-00144feab49a.html#axzz2K2PQpNvv). RWE considers firing 2400 employees as part of a million euro cost-cutting to counter declining returns; these come on top of the resignation of 8000 employees, announced in 2011, related to the closure of nuclear plants (Financial Times, 14 August 2012, 'RWE Cost Cuts Threaten 2,400 Jobs', http://www.ft.com/intl/cms/s/0/8d8536f0-e5d4-11e1-a430-00144feab49a.html#axzz2FJV9mRAY). GDF Suez Energie Nederland CEO Bos has alluded to the possibility of blackouts if market conditions do not alter and investments in generation capacity that can function as a back-up to renewable generation sources do not emerge (Financieel Dagblad, 3 October 2012, 'Extra Energieheffing Dreigt', http://fd.nl/economie-politiek/848010-1210/extra-energieheffing-dreigt). Iberdrola warns on profit as demand falls (Financial Times, February 2012, http://www.ft.com/intl/cms/s/0/a333baf0-5e0f-11e1-b1e9-00144feabdc0.html#axzz2FJV9mRAY). 'Enel to Cut Costs in Push to Reduce Debt' (Financial Times, 8 March 2012, http://www.ft.com/intl/cms/s/0/da510f6c-6902-11e1-956a-00144feabdc0.html#axzz2FJV9mRAY).

The power sector in Europe faces challenges that stem from a series of consecutive developments. These range from planned changes to the institutional environment and the functioning of the market, to unforeseen external shocks like the financial crisis and the German decision to completely phase out nuclear energy (*Atomausstieg*). Yet sources of distress also include the unexpected results of foreseeable developments, such as the impact of renewable energy sources (RES) on business models[3] in terms of profit margins and system requirements.

The prolonged economic crisis has created a downturn in electricity demand on the one hand, while endangering the attainability of renewable support schemes on the other[4]. The current market dynamics have contributed to a situation of overcapacity in the electricity market, a bane to the owners of conventional and especially gas-fired power plants. This confluence of circumstances has already been referred to as 'a perfect storm' for power utilities in Europe[5]. Due to these developments, a new context seems to have emerged in which earlier premises of EU energy policies and corresponding corporate strategies no longer hold. Compelled by the challenging conditions in the EU power sector, all major European power utilities appear to be in a process of strategic re-orientation.

In this paper, we provide answers to two questions:

– What are the sources of the distress among power utilities in the Northwest European market[6]? and
– How do the major EU power utilities respond?

In order to do so, we first focus on various aspects of EU energy policy and their influences on the sector. We furthermore assess the impacts of the enduring economic crisis and the unilaterally implemented nuclear phase-outs in various EU Member States. Next, we examine changes on the supply side and address how these changes influence the portfolios and thus the business models of industry

3 I.e. RES generally drive down the load factors of conventional generation sources.

4 In Spain and Italy, government-financed support schemes have been stopped. Due to budgetary constraints, the funding for these programmes could no longer be realised. In Germany, the costs are passed on to households through electricity bills, with increasing electricity costs as a result, which might turn out to be troublesome in times of economic recession when customers' budgets become stretched. See also Section 2.2.

5 The Wall Street Journal, 2012, 'Germany's Utilities Caught in a Perfect Storm', http://online.wsj.com/article/SB10001424127887324556304578116240833080594.html

6 While we focus on the Northwest market, the subject of this paper, the portfolios of the major power utilities active in these markets also compel us to pay attention to adjacent markets. In our definition of the Northwest European market, we follow earlier CIEP publications. Here the Northwest European market consists of the Benelux countries, France, the UK, Germany, Denmark and Norway (Meulman et al., 2012, 'Harvesting Transition? Energy policy cooperation or competition around the North Sea', CIEP).

participants. Most importantly we look at the impact of still relatively small shares of RES on the system and at the downward pressure on European coal prices resulting from the US switch from coal to gas during the shale gas boom.

After charting these developments, we assess how they together affect the activities of the European power majors. Finally, we provide a picture of how the companies are dealing with these changes and, moreover, the influence these changes are exerting on the corporate strategies of the EU power majors.

2 A CHALLENGING ENVIRONMENT

2.1 A SECTOR DETERMINED BY EXTERNAL DEVELOPMENTS

The liberalisation of the EU power and gas markets began in the second half of the 1990s, when the EU introduced policies to remove obstacles between Member States' electricity and gas markets[7]. The liberalisation agenda aimed to create a single European market for gas and electricity, in order to satisfy the competitiveness objective of the EU energy policy by enabling the supply of relatively cheap energy[8]. The implementation of the liberalisation agenda has led to several changes in the structure of the EU power sector[9]. Unbundling, privatisation and the investment in cross-border interconnection capacity have contributed to a sector characterised by competition, non-public players and cross-border exchanges of gas and electricity on a much larger scale.

This has provided the firms in the EU power sector with a stimulus to develop international portfolios, leading to a phase of cross-border mergers and acquisitions in Europe[10]. These strategies were propelled by the continuing growth of the internal market and gained strength as the result of the EU enlargement strategy. Anticipating the accession of Central and Eastern European states, the major power utilities in Europe continued their foreign investments and acquisitions in these states[11]. Firms employed holistic strategies[12] for the European market, largely treating it as a single market. Even as the full implementation of the internal electricity and

7 The EU went through three waves of legislation: the first set of directives (96/92/EC and 98/30/EC) in 1996 for electricity and in 1998 for gas; the second package in 2004 (Directive 2003/54/EC for electricity and Directive 2003/55/EC for gas); and most recently the Third Energy Package (Directive 2009/72/EC) adopted in 2009 and implemented in 2011.

8 Meulman et al, 2012, 'Harvesting Transition? Energy policy cooperation or competition around the North Sea', CIEP.

9 See for an in depth review the publication of IFRI (2010, 'The EU's Major Electricity and Gas Utilities Since Market Liberalization') and CIEP (2010, 'Energy Company Strategies in the Dynamic EU Energy Market, 1995-2007').

10 E.g. E.On's acquisition of British Powergen (2001); RWE's purchase of Innogy (2002); the acquisition of Electrabel by Suez (2003); EDF's taking of a substantial shareholding in Edison (2005); Enel's purchase of Spanish Endesa (2007); Spanish Iberdrola's purchase of Scottish Power (2007); EDF's acquisition of British Energy (2008); the purchase of Dutch Nuon by Swedish Vattenfall (2009); and the acquisition of Dutch Essent by RWE (2009).

11 Several of the major power utilities in the EU have activities in Central and Eastern European countries (non-EU-member and Member States). RWE is active in Poland, Czech Republic (directly and via NET4GAS), Hungary, Slovakia (through its share in VSE since 2002) and Croatia; GDF Suez is active in Poland, Czech Republic, Lithuania, Hungary, Romania, Croatia and Serbia; Enel is active in Slovakia (since 2006) and Romania, as well as in Moldova and Bulgaria through its subsidiary Enel Green Power; E.On is active in Hungary, Czech Republic, Slovakia, Poland, Russia, Bulgaria, Romania and Russia; EDF is active in Hungary, Poland and Slovakia (annual reports of respective firms).

12 E.g. GDF Suez in 2001 regarded the entire continent as its domestic market (GDF Suez, 2012, 'GDF Suez 150 Years in World Markets: Shared Energy')

gas market is still underway and doubts remain regarding the viability of the aim to complete the internal market in 2014[13], the process is afoot and the results are already significant.

In addition to the development of an internal market, EU energy policy also upholds the sustainability objective. The market alone has so far been unable to enforce the transition to a low-carbon system, making it necessary for policymakers to step in. This has resulted in the integrated energy and climate change package, the 20-20-20 policies, an effort shared by all Member States to strive for three targets[14] to be attained by 2020 with the corresponding policy tools, namely the Renewable Energy Directive[15], the Energy Efficiency Directive[16] and the Emissions Trading Directive[17]. These directives have brought about the implementation of policy measures by the 27 Member States at the national level.

In response to the energy and climate directives, the European power utilities ventured into renewable energy projects all over Europe. This triggered a wave of international investments by power utilities. Most often it has been domestic firms that have dominated the (large-scale) subsidised investment projects throughout the EU. In the deployment of RES capacity in the EU, we can observe some geographic trends. Large-scale instalments of wind power generation capacity predominantly have taken place in the UK, Spain, Portugal, Germany and Denmark, while solar power generation capacity instalments have been highly concentrated in Spain, Italy and Germany. These investments were mainly driven by national policy, but also by the direct and indirect subsidies provided through the different National Renewable Energy Action Plans[18]. Although some of the major power utilities had specific strategies to develop renewable champions[19], without the subsidies many of these investments would not have been viable.

13 EU Commissioner Oettinger, 29 September 2012, DG Energy Internal Market Conference, http://europa.eu/rapid/press-release_SPEECH-11-614_en.htm

14 A 20% reduction in EU greenhouse gas emissions from 1990 levels, raising the share of EU energy consumption produced from renewable resources to 20%, and a 20% improvement in the EU's energy efficiency. http://ec.europa.eu/clima/policies/package/index_en.htm

15 Directive 2009/28/EC on the promotion of the use of energy from renewable sources, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=Oj:L:2009:140:0016:0062:en:PDF

16 Directive 2012/27/EU on energy efficiency amending Directives 2009/125/EC (on Ecodesign) and 2010/30/EU (Energy labelling) and repealing Directives 2004/8/EC (on Cogeneration) and 2006/32/EC (on Energy Efficiency).

17 Directive 2003/87/ establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC (on Internal Pollution Prevention and Control)

18 National Renewable Energy Action Plans

19 Iberdrola Renovables, DONG, EDF Energies Nouvelles, Enel Green Power, RWE Innogy

Apart from stimulating specific investments, the 20-20-20 policies have hindered the completion of the internal market by creating discord among the Member States' policies. The policy aim to produce twenty percent of energy through renewable energy technologies by 2020, guided by EU RES directive[20], has resulted in a myriad of nationally devised support mechanisms[21]. These support programmes take the form of market interventions aimed at providing a stimulus for the deployment of renewable generation technologies on a large scale. The lack of alignment between the various national policies, as well as the perceived lack of coherency and consistency with there being 27 different support schemes, potentially creates policy competition and investor uncertainty, the latter due to the fact that it constrains the ability of firms to create strategies that incorporate multiple Member States.

EXTERNAL SHOCKS

Interventions in the market, however, are not all related to EU energy policy. For example, the meltdown of reactors in the Fukushima Daiichi Nuclear Power Plant in 2011 were what brought about anti-nuclear marches in Germany. In an unexpected turn of events, these protests resulted in the redefinition of the German policy to transition to entirely renewable energy sources, or the *Energiewende*. The German government decided that all nuclear power generation in Germany was to stop by January 2023[22]. Since that announcement, other EU Member States have followed suit by adapting their own policies toward limiting or outright abolishing nuclear power production in the near future. The Belgian government has decided to phase out nuclear power production completely by September 2025[23], and in Switzerland the last nuclear power generator will go offline by 2034[24]. In France, there is an ongoing discussion about reducing the share of nuclear energy in the power mix from 75% to 50%[25]. Because of the phase-out in Germany, power utilities that operate nuclear generation plants there already had to shut down eight plants in

20 Directive 2009/28/EC on the promotion of the use of energy from renewable sources, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=Oj:L:2009:140:0016:0062:en:PDF

21 'In addition to the different sectorial prices, there are at least 28 prices for carbon, namely one in the ETS and at least one per member state for non-ETS emissions' (European Investment Bank and Bruegel, 2012, Investment and Growth in the Time of Climate Change, p. 189).

22 *This Atomausstieg* was written into law on the first of August 2011 (http://www.gesetze-im-internet.de/bundesrect/atg/gesamt.pdf).

23 FPS Economy, 2012, 'The Phasing-out of Nuclear Power', http://economie.fgov.be/en/consumers/Energy/Nuclear_energy/Nuclear_power_plants/The_phasing-out_of_nuclear_power/.

24 Swiss Broadcasting Corporation, 25 May 2011, 'Swiss to Phase Out Nuclear Power by 2034', http://www.swissinfo.ch/eng/politics/internal_affairs/Swiss_to_phase_out_nuclear_power_by_2034.html?cid=30315730.

25 Reuters. 14 November 2012, 'Nuclear Power Champions Japan and France Turn Away', http://www.reuters.nl/article/2012/09/14/us-energy-nuclear-idUSBRE88D1DR20120914; France 24; France 24, 17 September 2012, 'President Hollande Promises to Revamp Energy Sector', http://www.france24.com/en/20120914-hollande-promises-to-revamp-energy-sector.

2011, the others needing to plan their closures by 2023 at the latest. The earlier than planned shutdown[26] of nuclear assets in the portfolios of the major European power utilities operating in Germany forced the firms to adopt major write-offs on assets and goodwill impairments[27]. This has forced mainly E.On and RWE to sell assets in order to reduce debt and make up for lost earnings. Ambivalently, some perceived the *Atomausstieg* as an opportunity to internationally commercialise the lessons learned from the laboratory the German power sector had become[28].

A second external shock was the economic crisis, starting with the financial crisis in 2008 and continuing to date in Europe, where the burden has shifted to sovereign debt and the euro system. The current economic climate has resulted in lower primary energy demand in the EU (see *Figure 1: EU primary energy consumption and power generation*). Concordantly, electricity demand both from industrial consumers and from households has declined[29].

Besides affecting EU electricity market fundamentals, the euro crisis has also forced governments to tighten their budgets. Given that the majority of renewable energy projects were backed by government subsidies, the impact of austerity in the power sector has been substantial. The governments of Spain[30] and Italy[31] have cancelled the majority of incentives and subsidisation schemes. In Germany, the government

26 In 2001 the Germany government targeted an exit out of nuclear energy by 2022. In September 2010 the law establishing the 2022 phase-out was reversed, in effect extending the lifetime of nuclear power plants by an average of 12 years (Meulman et al., 2012, 'Harvesting Transition? Energy policy cooperation or competition around the North Sea', CIEP).

27 EY, 2012, Utilities Unbundled, Issue 12: 'Europe's Utilities Take Multi-Billion Asset Impairment Hit', http://www.ey.com/GL/en/Industries/Power---Utilities/Utilities-Unbundled---4---Europes-utilities-take-multi-billion-euro-asset-impairment-hit.

28 Bloomberg, 27 June 2011, 'E.ON's Teyssen Sees Opportunity in German Energy Shift, FT Says', http://www.bloomberg.com/news/2011-06-27/e-on-s-teyssen-sees-opportunity-in-german-energy-shift-ft-says.html.

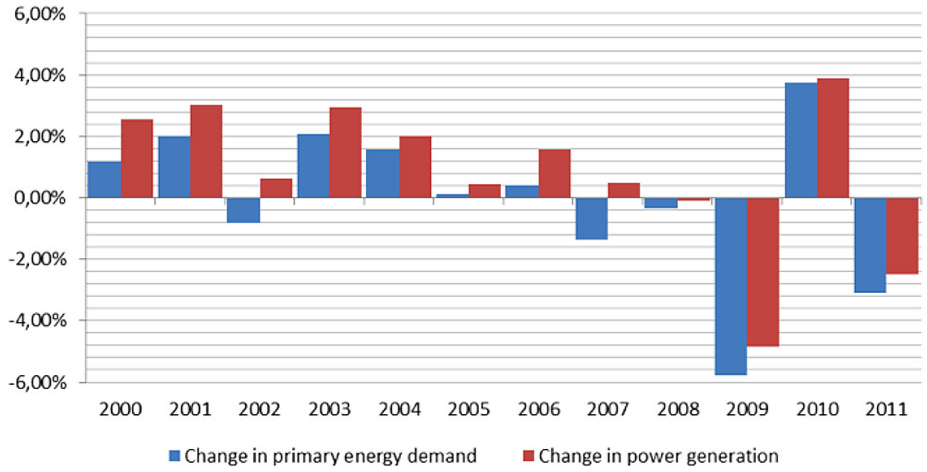
29 In Germany industrial sales are down noticeably, while Spanish industrial demand has fallen 7% and electricity volumes sold in Italy have declined by 10% year on year. (The Wall Street Journal, 14 November 2012, 'Germany's Utilities Caught in a Perfect Storm', http://online.wsj.com/article/SB10001424127887324556304578116240833080594.html) In the Netherlands year-on-year electricity consumption has declined by nearly 3% (Tennet, 2013, 'Energieverbruik in December Gedaald', http://www.tennet.org/tennet/nieuws/energieverbruik-in-december-2012-gedaald.aspx_.

30 The Italian government announced per decree the replacement of the green certificate support for large-scale wind with reversed auctions; and in the fifth Conto Energia it announced a 39-43% cut in the FiT, starting in August 2012.

31 In January 2012 Spain introduced a reform in its renewable subsidy policy, annulling the feed-in-tariff for renewable energy. This reform withstood various juridical claims on a breach by the government of the principle of legal certainty. (El Pais, 21 August 2012, 'Montoro Desautoria la Reforma Energética que Plantea Soria'). Amidst the government deficits, Spain also had to deal with a tariff deficit, meaning that full system costs supersede the income generated by the system, which has been attributed to regulated end-user prices and renewable subsidies (HSBC, 2011, 'European Utilities', p. 35).

has revised the renewable support arrangements[32]. The UK reduced the feed-in tariff for solar installations in 2012[33], while its government proposed a complete overhaul of the system by introducing the Electricity Market Reform Bill[34].

FIGURE 1. EU PRIMARY ENERGY CONSUMPTION AND POWER GENERATION CHANGE IN PERCENTAGES



SOURCE: BP STATISTICAL REVIEW OF WORLD ENERGY 2012

Another effect of the economic crisis has been the impact of the economic downturn on ETS prices. The downward development of total economic production contributes to an oversupply of carbon credits. As a result, the price of EUA (EU emission Allowance) has dropped since 2011, to a level in early 2013 of around €5/ton of CO_2[35]. The current low prices for EU carbon allowances have the adverse effect of not stimulating investments in innovative climate change abatement technologies by the major EU power utilities.

32 In Germany, in June 2012, a new category for small-scale solar PV (10-40kW capacity) was introduced that allows them to benefit from unchanged FiTs. Generation capacity modules/plants excluded from this category enjoy a tariff reduction of 20-29%. However, this reduction is only granted to modules/plants with 52 GW or less of installed capacity, beyond which the subsidy is terminated. In an attempt to phase out FiT entirely, the German government introduced a market premium for renewable generators as an alternative to feed-in tariffs, creating a new system which is based on market prices instead of a fixed rate.

33 Department for Energy and Climate Change, 24 May 2012, 'Announcement: Certainty for Solar', https://www.gov.uk/government/news/certainty-for-solar.

34 https://www.gov.uk/government/policies/maintaining-uk-energy-security--2/supporting-pages/electricity-market-reform

35 EEX, 'European Carbon Futures', accessed on 7 February 2013, http://www.eex.com/en/Market%20Data/Trading%20Data/Emission%20Rights/European%20Carbon%20Futures%20%7C%20Derivatives.

The economic crisis has also had a direct effect on several of the major European power utilities. Downgrades in sovereign bond credit ratings is seeping through in the valuation of firms because of the public holdings in many of these EU power majors[36]. In the past three years the credit ratings of several Irish, Greek, Italian and Spanish power utilities have been downgraded[37]. This is likely to complicate the refinancing of on-going operations and the financing of new investments by these firms. These downgrades are best understood in the context of the already grim outlook within the European power generation sector, where demand is expected to continue to decline because of the pressure on operating and profit margins, which is not expected to lift anytime soon. The impoverished economic outlook and the impact of this on sales has also hurt the credit ratings of RWE and E.On, which were downgraded in 2012[38].

A third external shock for producers in the EU power market is the effect of the US revolution in shale gas production[39] on coal prices in Europe. In the US the low prices for natural gas – the result of a dramatic increase in domestic gas production – has resulted in a feedstock switch among US power utilities, with an increase of 23.6% in gas fired-power generation in 2012, predominantly at the cost of coal fired-power generation[40]. Coal from the US has found its way to world markets through exports, which increased by 22.8% from 2011 to 2012[41]. As a result, the European price for coal has declined[42].

2.2 UNFORESEEN EFFECTS OF A CHANGING FUEL MIX

The fuel mix for electricity generation in the European Union has changed significantly over the past ten years (see *Figure 2: Installed power generation capacity in the EU*). This coincided with a substantial increase in total installed capacity, from 575 GW in 2000 to 932 GW in 2012. Driven by EU policy and national incentive schemes, renewable energy (excluding hydro) had grown to a 19% share of total installed capacity in the EU power market by 2012. Eighteen percent of this is

36 The French government is a majority shareholder in EDF and a large shareholder in GDF Suez; the Swedish government fully owns Vattenfall; the Danish government is the majority shareholder in DONG Energy; and the Italian government is a shareholder in Enel.

37 This is the case for Enel, Endesa and Iberdrola (Eurelectric, 2012, 'Powering Investments: Challenges for the Liberalised Electricity Sector').

38 Bloomberg, 27 July 2012, 'Germany's Largest Utilities Downgraded by S&P on Weak Profits', http://www.businessweek.com/news/2012-07-27/germany-s-largest-utilities-downgraded-by-s-and-p-on-weak-profits.

39 Six, 2013, 'US Refining Dynamics: Why the European Refining Sector Should More Closely Observe the Ongoing Tight Oil Boom in the US', CIEP.

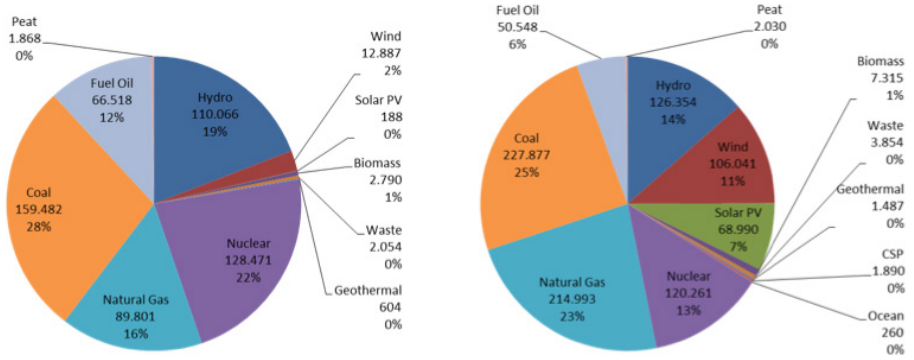
40 EIA, 2013, 'Electric Power Monthly', http://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_es1b.

41 EIA, 2012, 'Quarterly Coal Report'.

42 Bloomberg, 24 January 2012, 'European 2014 Electricity Prices Decline as Coal Drops to Record', http://www.bloomberg.com/news/2013-01-24/german-2014-electricity-prices-decline-as-coal-drops-to-record.html.

intermittent wind and solar power generation capacity, which has a significant impact on the market, given the zero marginal costs of these energy sources and the political priority[43] allotted to them in the merit order. Online RES drive down wholesale prices[44] and lower the generation time of conventional generation sources. Under the current market conditions, especially gas-fired power plants are suffering, as their uptime is limited and their generation spreads have weakened. For investors in gas fired-generation capacity, who had expected gas to have a prominent place in the fuel mix (because of its CO_2 properties and its flexibility), this is an unwelcome turn of events. Their investments had created the vast increase in gas-fired generation capacity, the other prominent feature in the development of installed capacity over the past decade.

FIGURE 2. INSTALLED POWER GENERATION CAPACITY IN THE EU (IN MW), COMPARISON BETWEEN 2000 AND 2012



SOURCE: EWEA (2012)

The unforeseen effects of RES in the EU power market predominantly relate to their rapid and concentrated deployment on a large scale and to their subsequently significant impact on the system. Propelled by policymakers, wind- and solar-powered generation capacity grew from 13 GW in 2000 to 177 GW in 2012 and continues to increase. Compared to conventional sources, wind and solar power account for a relatively small share. Wind and solar made up only 18% of total EU installed electricity generation capacity in 2012, yet the effect of this rapid emergence is considerable.

43 E.g. in Germany and the Netherlands in relation to congestion and/or preferred dispatching.
44 Méray, 2012, 'Wind and Gas: Back Up or Back Out, That's the Question', CIEP.

In the Northwest European power market[45], the increased share of power generated by renewable energy sources (RES) contributes to a situation of overcapacity. Under normal market conditions, overcapacity leads to a stop in the creation of new capacity. The increase in RES capacity, however, is not based on market signals but is made possible by RES support schemes. In some countries, these support schemes have been cancelled as the result of austerity measures. Yet in other countries the schemes are still intact, most often in those countries where subsidies are financed through (renewable) energy charges to households[46]. In 2011 solar energy contributed 41.5 TWh to the European power sector (as compared to 7.4 TWh in 2008)[47]; this equalled 1.3% of total EU power production[48]. Given that the EU is on its way to become a single market through interconnections and market coupling, the impact of price changes resulting from national fuel mix characteristics is exported to surrounding countries[49].

On days when the conditions for wind or solar generation are favourable, in some markets up to 50% of power generated can be produced by renewable energy sources. In February 2013, the German installed solar generation capacity equalled 32.88 GW[50], approximately equal to that of 30 large nuclear reactors[51]. During some sunny days in May 2012, solar power contributed 22 GW to the German market, or approximately half of total demand[52]. When generated, this power comes online simultaneously with the other, more steady, energy streams, and with priority, causing large load jumps. This forces other generators to switch off. This not only occurs in the country of origin, but also affects (connected) neighbouring countries.

45 See Section 1: Introduction.

46 For example in Germany

47 ACER/CEER, 2012, 'Annual Report on the Results of Monitoring the Internal Electricity and Natural Gas Markets'.

48 Total 2011 generation equalled 3116.94 TWh. http://epp.eurostat.ec.europa.eu/statistics_explained/images/f/f6/Electricity_Statistics%2C_2011_%28in_GWh%29.png

49 Although as of late, power prices in the Northwest European electricity markets have been diverging rather than converging. This is attributed to the fragmentation in national energy policies (European Energy Review, 7 February 2013, 'European Power Markets are Being Split Apart by Political Fickleness', http://www.europeanenergyreview.eu/site/pagina.php?id=4049).

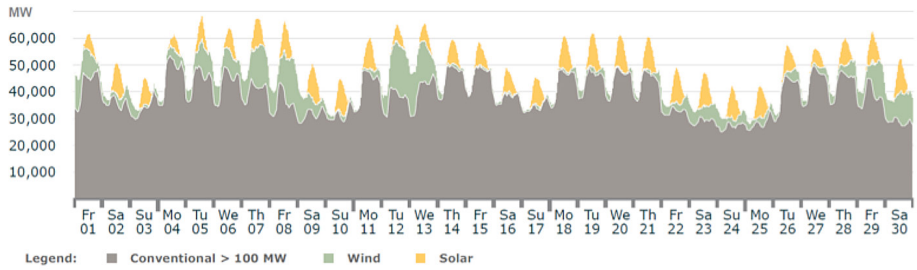
50 Bundesnetzagentur, 'Monatliche Veröffentlichung der PV-Meldezahlen', http://www.bundesnetzagentur.de/cln_1911/DE/Sachgebiete/ElektrizitaetGas/ErneuerbareEnergienGesetz/VerguetungssaetzePVAnlagen/VerguetungssaetzePhotovoltaik_Basepage.html?nn=135464.

51 The Wall Street Journal, 14 November 2012, 'Germany's Utilities Caught in a Perfect Storm', http://online.wsj.com/article/SB10001424127887324556304578116240833080594.html.

52 Reuters, 2012, 'Germany Sets New Solar Power Record', http://www.reuters.com/article/2012/05/26/us-climate-germany-solar-idUSBRE84P0FI20120526.

The timing with which renewables – especially solar power – come online is another challenge for conventional power generators. The peaks for solar power generation perfectly coincide with peak demand, as can be seen below in *Figure 3: Electricity Production in Germany*. Hence solar and wind generation replace conventional sources during the most profitable generation hours.

FIGURE 3. ELECTRICITY PRODUCTION IN GERMANY, APRIL 2011 IN MW



SOURCE: FRAUNHOFER ISE[53]

A second effect relates to (wholesale) electricity prices. The addition of renewable electricity generators has the adverse effect of creating demand-induced overcapacity. This situation can only lead to more pressure on prices. In the largest EU markets – Germany, the UK and France – wholesale prices for year-ahead base load and peak load power have decreased significantly[54], to some degree because of solar power's addition to the energy mix. As this effect takes on larger and larger proportions, wholesale prices are becoming depressed in a market already characterised by declining overall demand. The deterioration of wholesale prices and the displacement of conventional generation by renewables paint an increasingly daunting picture for the major power utilities. To a large extent, this is attributable to the configuration of their business portfolios which predominantly consist of thermal generation capacity and only for a much smaller part of wind and solar generation capacity.

53 Fraunhofer ISE, 8 January 2013, 'Electricity from Solar and Wind in Germany in 2012', http://www.ise.fraunhofer.de/en/downloads-englisch/pdf-files-englisch/news/electricity-production-from-solar-and-wind-in-germany-in-2012.pdf.

54 In Germany on November 28, 2012, the year-ahead base load power contract averaged €46.10 per megawatt hour, down from €56.10 in 2011. (World Gas Intelligence, 19 September 2012; 5 December 2012). In France on December 20 last year, the year-ahead base load power contract stood at €47.53 per megawatt hour (EEX, 25 December 2012), while year-ahead peak load prices were only €60.25 per megawatt hour.

In addition to this, the success of RES support schemes leads to another painful problem, namely that the support schemes are becoming unaffordable. The associated costs directly affect already austere government budgets and contribute to rising consumer costs[55]. Connecting the newly added RES capacity to the grid is one aspect of the spiralling cost increases. Another is that the perceived lack of (international) co-ordination between investments in infrastructure and generation capacity remains unresolved. These rising costs in a time of crisis have forced several countries to redraft their renewable energy support schemes, adding to the uncertainties.

2.3 A COMBINATION OF PRESSURES

Dwindling demand for power in the EU has contributed to lower power prices. While the circumstances differ per country, this situation of overcapacity is unlikely to change in the near future, given the continued installation of RES production and the significant size of gas and coal[56] generation capacity (respectively 18.5GW and 10 GW) under construction in the EU. Nevertheless, the sector awaits some relief starting in 2015, when both the EU Large Combustion Plants Directive[57] and the EU Industrial Emissions Directive[58] will force a significant outtake of generation capacity.

The impact of these outtakes will differ among Member States, depending on the number and capacity of old plants still in operation. In the UK some 12 GW of power generation capacity is expected to be dismantled on behalf of these EU directives[59], or approximately 13% of total installed generation capacity[60]. In the UK market, this could imply a return to higher wholesale power prices and resulting higher margins after 2015. More conventional generation capacity is, however, still underway. For example, in the German market more new plants will be completed than old plants

55 In Germany, consumers are to face a 47% hike in the contribution to renewables subsidy, which is part of their electricity bill; following an increase of 72% in 2010; the gross national surcharge is expected to be around 20.4 billion EUR in 2013, compared to 8.3 billion EUR in 2010. The reason for this is the vast expansion of RES generators in Germany – 5/7 GW annually – and the heavily subsidised industrial power rates with households footing the bill. (Petroleum Intelligence Weekly, 24 October 2013).

56 Approximately 10 GW of coal-fired generation capacity is under construction in the Netherlands, Germany, Romania and Greece. Approximately 18.5 GW of gas-fired power generation capacity is under construction in the UK, the Netherlands, Italy, Greece, Germany, Cyprus and Belgium. (World Gas Intelligence, 23 January 2013, 'Brussels Aims for Hands-on Revival of European CCS').

57 Directive 2001/80/EC on the limitation of certain pollutants into the air from large combustion plants, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2001:309:0001:0001:EN:PDF.

58 Directive 2010/75/EU on industrial emissions (integrated pollution prevention and control), http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:334:0017:0119:en:PDF.

59 Credit Suisse, 2012, UK Power Generators.

60 In 2011 the total generation of the UK was approximately 94 GW.

retired[61]. Combined with the continued deployment of RES capacity, this will result in even less dispatch time for conventional generation sources, plus lower prices during dispatch.

All of the major EU power utilities have significant shares of conventional thermal generation capacity, which makes them even more susceptible to depressed generation margins. The owners of gas-fired power plants suffer more than the owners of coal-fired generation because of the higher cost of generation feedstock. The reduced demand for power is one of the drivers for the reduction in gas-fired power generation, whereas sources with lower marginal costs outperform gas-fired generation capacity with its (relatively) high marginal costs: the so-called merit order effect[62].

The other aspect behind the dwindling demand for conventional power is that during uptimes, renewable energy sources push out conventional power sources. The current feedstock prices provide coal fired-generators with favourable margins compared to gas-fired plants, albeit that these margins are only slightly better, as the depressed power prices barely leave a margin sufficient to meet long-term capital costs let alone to provide a return on investment. Because of this, gas-fired power plants and new coal-fired power plants are financially underwater. Towards the end of 2012, operators of gas-fired power plants faced near-zero clean spark spreads[63]. Firms with nuclear generation capacity in their portfolio are also vulnerable to (downward) price swings, given the stable and relatively low operational costs but high capital costs.

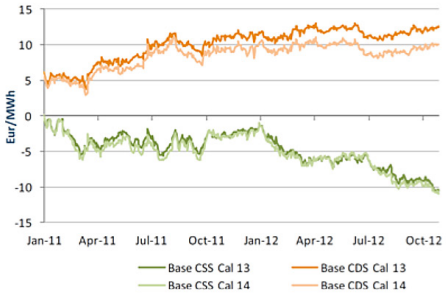
61 In Germany, in the base case scenario more new plants will be completed than retired (World Gas Intelligence, 5 December 2012).

62 Méray, Wind and Gas: 'Back Up or Back Out, That's the Question', 2012, CIEP.

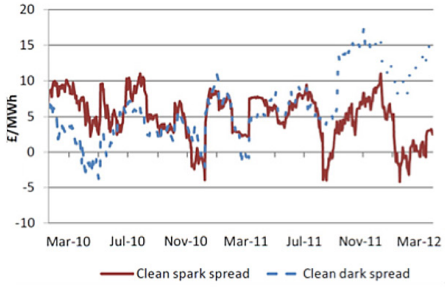
63 GDF Suez trading.

FIGURE 4. CLEAN DARK AND CLEAN SPARK SPREADS

GERMANY



UNITED KINGDOM



SOURCE: ARGUS, PLATTS AND GDF SUEZ TRADING; BLOOMBERG, LONDON ENERGY BROKERS' AND DECC

In *Figure 4: Clean dark and clean spark spreads*, the development of generation margins in the British and German power market is displayed. While we understand that an outright comparison between the two markets cannot be made, due to inherent differences, for example in gas and power prices, we can nevertheless abstract a trend. In both markets the clean spark spread is declining over time, albeit more pronounced in Germany than in the UK, while the clean dark spread is increasing in both markets, more noticeably so in Germany. Rising gas prices have driven down clean spark spreads, while dwindling coal prices are responsible for the increase in the clean dark spread. Meanwhile, the inertia of EUA prices does little to change these spreads. Part of the difference observed between the pace of divertion of clean dark and spark spreads between the UK and Germany might relate to the shares of RES in total electricity generation. In the period 2011-2012, in the UK approximately 11% of power was produced by renewable generators[64], while in Germany, wind, solar and other renewable energy sources generated approximately 25% of electricity needs[65].

64 Datamonitor, 2013, 'DECC UK Renewable Energy Roadmap Update', http://www.datamonitor.com/store/News/decc_uk_renewable_energy_roadmap_update_january_2013?productid=7A0F286C-0241-4488-AF50-D13B01FC8D75.

65 Spiegel, 2012, 'The World from Berlin: Germany Hits Brakes on Race to Renewable Energy Future', http://www.spiegel.de/international/germany/germany-addresses-problems-with-renewable-energy-subsidy-system-a-852549.html.

The changing clean dark and clean spark dynamics now result in larger shares of coal-fired and less gas-fired power plant production. Year-on-year use of lignite and black coal jumped by 6.7 percent and 3.2 percent respectively[66], while the contribution of gas-fired power production has dropped to a long-time minimum[67]. This leads to a situation in which the share of coal in power generation is growing, to the detriment of gas. This provides power utilities with coal-fired generation assets in the portfolio with an advantage. As a result, coal-fired power generation accounts for higher shares in generation in Germany, among others. Regardless of this increased consumption of coal, prices remain low.

None of the major power utilities in Europe has a portfolio that evades the challenges posed by the current market conditions. The share of renewable energy sources in power generation has increased in virtually all markets of the EU. The economic recession is taking its toll throughout the EU. All owners of nuclear capacity are exposed to countries looking to shrink or diminish their share of nuclear power generation. All power majors have a significant share of gas-fired power plants in their generation fleet. All have opted for strategies to increase invest in RES capacity, the subsidies of which are subject to restructuring.

The developments in the EU power sector seem to alarm both industry participants and policymakers. The latter are preoccupied with the costs of transition and the ability of existent policy to steer the development of the EU power sector towards the policy aim of a low-carbon sector. This enforces the feeling of apprehension amongst industry leaders about the investment climate and possible political interference.

66 Petroleum Intelligence Weekly (20, July, 2012).

67 UK 14-year low for gas, and 6-year high for coal; Spain 14.2% electricity generated by gas in h1 2012 as opposed to 23% in 2010, while coal accounted for 19% in H1 2012 vs. 8% in 2010. (Petroleum Intelligence Weekly, 20, July, 2012).

3 THE CONUNDRUM FOR EUROPEAN POWER UTILITIES

3.1 CHANGES IN THE BUSINESS ENVIRONMENT OF THE EUROPEAN POWER MAJORS

Three years ago, the EU seemed well on its way to recovering from the economic crisis, and after a dip in 2009, demand for primary energy appeared to be picking up again (see *Figure 1: EU primary energy consumption*). Now, five years after the outbreak of the crisis, the economy has still not turned around, with a significant decrease in power consumption as a result. In 2013 the outlook for the sector has changed drastically. In addition to the usual competitive pressures, the European utilities are facing a larger set of challenges. The mothballing of power plants, announced reorganisation, impairments and divestments[68] are a clear indication of the troublesome situation this creates for many European power utilities. The current dynamic has the potential to change the makeup of the sector. The reduced power demand, combined with the surplus and intermittent generation by renewables, make the business case for running thermal power plants less attractive. When governments then press the firms to keep money-losing plants open, this only adds to potential problems[69]. The impact of RES on the system and the seeming inability of power utilities to come to terms with the effects on generation margins add to the uncertainty for investors in generation capacity. It appears that the market has thus not yet adapted to the new conditions.

INFRASTRUCTURAL CHALLENGES

Unattractive as the outlook for the generation part of the power sector may be, even more uncertainty exists on the infrastructural side. In order to support the transition envisioned in EU Energy Policy, eventually to a low-carbon economy, the infrastructure is in dire need of additions and upgrades. Investments are required in interconnectors, storage capacity, super grids and smart grids. In the EU infrastructure package released in 2011[70], the required investment is estimated at €210 billion[71,72].

68 See Section 4.1 for a more detailed description.

69 The German government has threatened power producers with a ban on shutting down unprofitable power plants. (Handelsblatt, 15 September 2012, 'Regierung droht mit Abschalt-Verbot für ältere Kraftwerke', http://www.handelsblatt.com/politik/deutschland/blackout-gefahr-regierung-droht-mit-abschalt-verbot-fuer-aeltere-kraftwerke/7137864.html).

70 EC, 2011, 'Energy Infrastructure Priorities for 2020 and Beyond', http://ec.europa.eu/energy/infrastructure/strategy/2020_en.htm.

71 EC, 19 October 2011, 'The Commission's Energy Infrastructure Package', http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/11/710&format=HTML&aged=0&language=EN&guiLanguage=en.

72 An approximate €140 billion is needed to establish a more interconnected and powerful network by constructing electricity transmission systems, storage and smart grid application. The remaining share of the estimate is directed at gas, and to a much smaller extent CCS infrastructure.

Germany alone needs an approximate €20 billion to adapt the system to the new realities of large RES shares[73] and the nuclear phase-out, described in the national grid plan[74]. Large RES shares in the power system require investments in interconnection capacity, as well as the expansion of existing transport capacity, e.g. in Germany from North to South. In addition, the actual connection of RES generation capacity might also pose a challenge in terms of cost. This is the case especially for offshore wind parks.

In an unbundled market, this co-ordination challenge is exacerbated. Especially the uneasy co-ordination between investments in (renewable) generation capacity and in transmission and distribution infrastructure may contribute to suboptimal outcomes in terms of cost. The unbundling of generation and infrastructure companies has led to the externalisation of the connection cost of generation capacity. Substantial investment capital shortages exist and are likely to increase.

Government programmes are unlikely to overcome these shortcomings. This predominately ties in to the austerity measures taken by national governments in response to the economic downturn plus the expenditures related to the bailing out of various EU Member States. Nevertheless, the needs remain and only seem to be increasing with the emergence of a better understanding of the impact of larger shares of renewable intermittent generation. The costs and the effort involved in co-ordinating cross-border investments in infrastructure can result in collective action problems. In order to alleviate the problems more co-ordination between the interests of the major power generators and those of their (former) governmental shareholders, the Member States is required.

This creates uncertainty among investors in generation capacity. Apprehensive of government interference, the infrastructural problem makes investments in regions where this occurs less interesting for the EU power majors.

COMPETITIVE PRESSURES

Legally binding targets for energy efficiency measures and RES capacity instalments in the various Member States will contribute to a stagnation of previous growth in power demand in the EU. For power utilities, a decrease in demand or a substitution of their product is perceived as a threat to future income. Social and technological

73 In order to attain the EU 2020 RES aim of having 18% of primary energy be derived from renewables, Germany will have to increase its current 20/25% share of RES electricity generation to an approximate 35% by 2020 (Petroleum Intelligence Weekly, 24 October 2012, 'Germany Rethinks Green Subsidy Regime as Consumer Costs Soar').

74 The Economist, 28 July 2012, 'Energiewende'.

developments could lead to an increased independence of electricity consumers from the electricity grid, and thus from the power suppliers. The instalments of small-scale renewables, in combination with micro storage capacity to bridge the intermittency gap, is already possible with existing technologies[75]. The rising prices for household power in countries like Germany have the potential to create a precarious situation. Higher prices for power combined with decreasing prices for renewable energy generation equipment, such as solar PV, create the conditions for so-called 'socket parity' when the cost of installation for RES to household consumers is lower than power from the grid. In addition to the substitution of centralised power supply by individual consumers, we see the rise of co-operative power generation ventures organised on the level of housing blocks. This emancipation of the electricity consumer has the potential to eradicate a fair share of the retail market for EU power firms.

Industrial power consumers are investing in renewable generation technologies to leverage expected growth in energy costs in the future. Additionally, the scaling back of centralised energy production to the level of municipalities could pose a threat. In Germany, the portfolio restructuring by some of the EU power majors has resulted in power generation ownership being returned to the level of the municipality. The *Stadtwerke*, municipal multi-utility services, also develop their own strategies, which could threaten the market share of the EU power majors in Germany[76] .

The power utilities also likely face outright competition from established energy firms that do not yet have a major presence in the EU power sector. These could be either sub-major power utilities operating in the EU power markets or entries in the generation sector by energy firms from other parts of the value chain. Sub-major power utilities in Central Europe have engaged in vertical integration strategies to integrate their gas and power businesses. This is the case for both Austrian OMV and Polish PGNIG, while at the same time these firms are off selling of non-core assets[77]. If successful in these endeavours, these firms could very well turn out to be formidable competitors in new generation projects, especially in the Central and Eastern European markets.

75 Nedap, http://powerrouter.com/, accessed 20 February 2012.

76 Der Spiegel, 22 December 2012, 'Milliarden-Plan: Stadtwerke attackieren Stromriesen', http://www.spiegel.de/wirtschaft/soziales/milliarden-plan-stadtwerke-attackieren-stromriesen-a-805247.html.

77 World Gas Intelligence, 2 January 2013, 'Pole's Output Vault'.

Forward integration into the electricity sector by upstream and midstream gas players already present in the EU is the other case in point. As the result of developments in the Russian power sector, European power generators have entered the Russian market arena[78], to the detriment of Russian upstream firms with power generation capacity in Russia. These firms could assert their position in Europe by entering the European power markets. International energy firms with midstream operations in Europe such as the Abu Dhabi National Energy Company could develop their portfolios towards power generation. The development of new technologies in order to mitigate the intermittency problem of RES by storing power in gaseous forms could offer opportunities for these types of firms. Other candidates could be power firms from China which have already made inroads into Europe, for example China Three gorges Corporation (CTC)[79], which has purchased a share in Portuguese power utility EDP (EDF), or the State Grid Corporation of China[80], which has taken a share in Portugal's grid operator REN. The continued privatisation of predominantly Southern European national assets provides plenty of opportunity to non-European energy giants.

The arrival of new competitors, some with different business models, combined with the substitution of electricity demand by self-generating consumers and energy efficiency, all contribute to uncertainty regarding future power demand in the EU and the ability of the EU power majors to serve this demand. This introduces yet another source of pressure for these EU power majors.

3.2 THE OUTLOOK FOR THE EUROPEAN POWER UTILITIES

Developments in the economic, competitive, technological and policy environments are affecting the firms in the European power sector. The confluence of these developments has been referred to as 'the perfect storm' for power utilities in Europe[81]. So how does this reflect on the EU power majors?

Figure 5: Major EU power utilities' core data provides an overview of some key indicators for the major power utilities in Europe. In order to grasp the size of these firms we compare the firms' total installed capacity of 552 GW to the total installed

78 Enel OGK-5, May 2012, Enel OGK-5 Investor Presentation, http://www.ogk-5.com/upload/Investor%20Relations/2012%20IR%20docs/presentations/Enel%20OGK-5%20Investor%20Presentation%20(May12).pdf.

79 EDP, 2011, 'Partnership with China Three Gorges', http://www.edp.pt/pt/investidores/DiaInvestidor/Investor%20Day%202012/7.%20JMC%20-%20Partnership%20with%20China%20Three%20Gorges.pdf.

80 State Grid Corporation of China, 5 February 2012, 'State Grid Corporation of China Successfully Acquires a 25% Stake in REN Portugal' , http://www.sgcc.com.cn/ywlm/mediacenter/corporatenews/02/265956.shtml.

81 The Wall Street Journal, 14 November 2012, 'Germany's Utilities Caught in a Perfect Storm', http://online.wsj.com/article/SB10001424127887324556304578116240833080594.html.

capacity in Europe, which is 895 GW in the same year. As the majority of these firms also own generation capacity outside of the EU market, the comparison is not perfect. The total installed capacity of these firms in the EU, however, was 433 GW, approximately 50% of total EU installed capacity. The numbers for power generated are higher, where the EU majors generated 1760 TWh of electricity in 2011 compared to an EU total of 3117 TWh[82], or over 56% of all power produced in the single market. Another highlighted aspect is the share of revenue generated outside the EU power sector. While most of the major EU power utilities derive more than half of their income from activities in this sector, we observe a difference between firms that generate less than ten percent of their turnover outside of the EU power sector and others for whom this share is twenty percent or more.

FIGURE 5. MAJOR EU POWER UTILITIES' CORE DATA

	Revenue (EUR Billions)	Non-EU power sector revenue (% of total[83]	Net profit (EUR Billions)	Capacity (GW)	Production (TWh)
E.On	142.94	20%	2.18	70.00	271.20
EDF	72.73	4%	3.32	134.79	631.28
Enel	84.89	41%	0.87	97.34	291.09
GDF-Suez	97.04	65%	1.55	117.31	465.00
Iberdrola	34.75	24%	2.84	46.03	145.13
RWE	50.77	8%	1.31	49.24	205.70
Vattenfall	19.22	4%	1.98	35.85	153.70

SOURCE: CIEP RESEARCH[84]

82 Eurostat, 28 November 2012, 'Electricity Statistics 2011', http://epp.eurostat.ec.europa.eu/statistics_explained/index.php?title=File:Electricity_Statistics,_2011_(in_GWh).png&filetimestamp=20121128151011.

83 E.On: In 2011, Russian power generation activities generated revenue of €1.62 billion and gas sales accounted for €23.01 billion. EDF: In 2011, at least 4% of sales occurred outside of the EU: €2.81 billion. Enel: In 2011, Enel generated 112TWh outside of Europe, of which 66TWh was in Latin America. The 66TWh accounedt for €32.65 billion, i.e. 41.1% of revenue. In addition, Enel has invested in vertical integration through investing in E&P for predominantly gas in Russia, Algeria, Italy and Egypt. GDF-Suez: In 2011, GDF Suez generated 33% of revenues in the power sector, predominantly in Europe, 32% in its natural gas division and 33% in its energy services division (Tractebel, Cofely and Fabricom) and environmental services (Suez environment). Iberdrola: In 2011, revenues from Latin American and United States generation activities equalled €7.65 billion. RWE: In 2011, oil and gas revenues at RWE DEA totalled 8.49% of total revenues in 2011 an amount of €4.17 billion. Vattenfall: In 2011, the firm generated income through German TSO and Dutch E&P, amounting to 4% of revenue, or €0.81 billion (both units were divested by 2012).

84 Revenue and Net Profit are 2012 data, others are 2011 data. Annual reports and corporate websites of respective firms; Financial Times Markets Data by Thomson Reuters, http://markets.ft.com/research/Markets/Companies-Research.

EU POWER MAJORS' PORTFOLIOS

Although we refer to the EU power utilities as a group, they are by no means a homogeneous group. *Figure 5: Major EU power utilities' core data* alludes to inherent differences between these firms. From *Figure 7: Major EU power utilities' generation mix in 2011* and *Figure 6: EU power utilities' installed capacity in the EU in 2011* it becomes clear these firms are different in terms of exposure to the problems in the EU, its Member States' markets and the different generation types. On top of this divergence come the activities of these firms that are outside of the power generation industry. GDF-Suez realises 32% of its revenues from its gas business and 33% from energy and environmental services, predominantly related to water and waste disposal[85]. Through RWE Dea, the gas and oil E&P subsidiary, RWE generated €4.17 billion in revenues in 2011, although in early 2012 RWE signalled that it was looking to sell the division as part of its divestment programme[86]. RWE additionally produced 90 million megatons of lignite in its opencast mines in Germany[87]. Vattenfall also operates lignite mines in Germany[88]. All of the major power utilities have upstream oil, gas or mining assets. The gas division of E.On, nearly ten years after the acquisition of Rurhgas, is still a significant driver of revenue, producing approximately 8.2 BCM in 2011[89]. Enel has invested in E&P activities in Russia, Algeria, Egypt and Italy. Enel's investment in Russia resulted in the production of 2.2 BCM in 2012[90].

The differences continue when we look at the structure of the power generation portfolios. In most cases, the firms still derive the majority of their incomes from activities in the EU power sector. However, the geographical focus within Europe differs (see *Figure 6: Major EU power utilities' installed capacity in the EU in 2011*).

85 GDF Suez, 2012, 'Activities Report 2011'.

86 Financial Times, 5 March 2013, 'RWE to Quit Oil and Gas Exploration', http://www.ft.com/intl/cms/s/0/ef00d724-856e-11e2-9ee3-00144feabdc0.html#axzz2OjEm0S2Y.

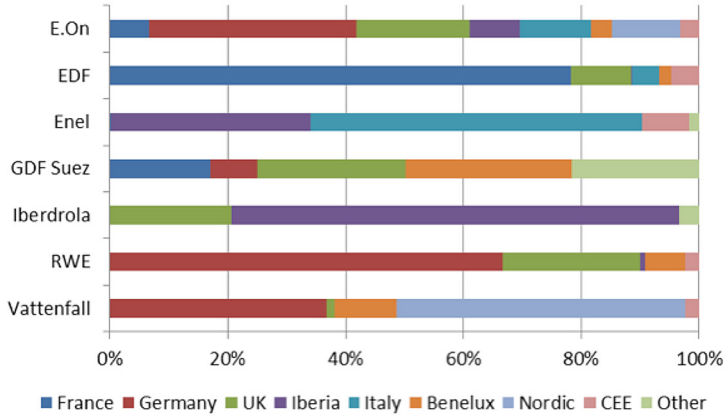
87 RWE, 2012, 'Facts and Figures 2011'.

88 Vattenfall, 3 December 2012, 'The Generation Heart of Vattenfall', Presentation by Tuomo Hatakka, Head of Business Division Production.

89 E.on, 2011, 'Facts and Figures 2011'.

90 Enel, 9 November, 2012, 'Enel Announces New Gas Discovery in Algeria', http://www.enel.com/en-GB/media/press_releases/enel-announces-new-gas-discovery-in-algeria/r/1655925/.

FIGURE 6. MAJOR EU POWER UTILITIES' INSTALLED CAPACITY MIX IN THE EU



SOURCE: CIEP RESEARCH[91]

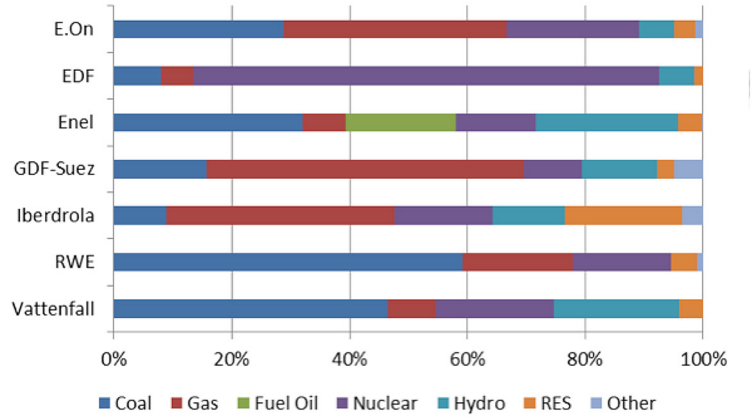
Apart from French GDF Suez, all EU power majors still have the largest share of their generation fleet installed in their home country. In the case of French EDF, German RWE, Italian Enel and Spanish Iberdrola, their home markets still harbour more than half of their European production capacity. Nevertheless, all firms have established significant production facilities in other EU countries through mergers, acquisitions and direct investments. This has contributed to more exposure and has a direct effect on how changes in their external environments affect their businesses.

Much about the portfolios of the major power utilities is historically determined; this is referred to as 'heritage'[92]. This, among other things, influences what types of generation technologies prevail, where the portfolios are located geographically, as well as how the businesses are organised. Most of the power majors, for example, still focus on a limited set of production technologies; in all of the power majors one or two 'core' technologies account for more than half of total installed capacity. These aspects are also influenced by merger and acquisition activities, which might lead to a new focus in production technology or geographic market.

91 Annual reports and corporate websites of respective firms; 2011 data; based on installed capacity (GW). In the case of Enel, 'Other' is dispersed over Ireland and Greece. In the case of GDF Suez, 'Other' is dispersed over, among others, Spain, Portugal, Hungary and Poland. In the case of Iberdrola, 'Other' is dispersed over Ireland and Portugal. Nordic consists of Sweden, Denmark and Finland. Iberia consists of Spain and Portugal. CEE refers to Central Eastern Europe and consists of Poland, Czech Republic, Slovakia, Hungary, Romania and Bulgaria.

92 Van den Heuvel, 2010, 'Energy Companies' Strategies in the Dynamic EU Energy Market (1995 – 2007)', CIEP.

FIGURE 7. MAJOR EU POWER UTILITIES' PRODUCTION MIX



SOURCE: CIEP RESEARCH[93]

Technological developments – for example with regard to renewable energy technologies – are a major driver for change in the configuration of generation portfolios. How has the large-scale introduction of renewable generation sources influenced the generation portfolios of the seven EU power majors? Hydropower is by far the largest source of renewable energy in the portfolios of the power majors. Overall, the seven EU power majors make a distinction between hydro and other RES capacity. The majority of growth in renewables is aimed to take place in renewable energy generation technologies other than hydropower. In general, wind is the renewable energy source of choice among the power majors.

– The renewable portfolio of E.On (excluding 5.2 GW of hydropower) predominantly consists of wind capacity. E.On operates 3.5 GW of onshore wind capacity and 1 GW of offshore wind capacity. In addition to this it operates a much smaller share of biomass and solar (total approximately 0.5 GW)[94].

– EDF (excluding hydropower of approximately 21GW) owns 4.7 GW of wind power and 0.5 GW of solar generation capacity[95].

– Enel operates 5.49 GW of renewable capacity, in addition to 30.44 GW of hydropower, of which it is the largest operator among the power majors. In its portfolio Enel disposes of 4.3 GW wind capacity, 0.77 GW of geothermal capacity and 0.28 GW of solar and biomass[96].

93 Annual reports and corporate websites of respective firms; 2011 data; based on produced electricity (TWh).
94 E.On, 2012, Annual Report.
95 EDF, 2012, Corporate Website, http://www.edf-energies-nouvelles.com/fr/activites/energies/accueil.
96 Enel, 2012, Results and 2013-2017 plan.

– The renewable portfolio of GDF Suez consists of a 3.5 GW wind generation capacity and 1 GW biomass generation capacity. In addition to this, GDF Suez runs 16 GW of hydropower, while another 4 GW of hydropower and 0.8 GW of wind power is under construction[97].

– Iberdrola champions wind power, with 13.62 GW of installed onshore capacity and 6.3 GW of offshore wind capacity under development[98]. Apart from wind, Iberdrola operates 9.89 GW of hydropower and 0.42 GW of, among others, solar, mini hydro and biomass capacity[99].

– Total installed RWE renewable capacity, including hydropower, equalled 4.1 GW[100], of which approximately half is onshore and offshore wind capacity, a third biomass and twenty percent hydropower[101]. In 2012, RWE produced 5.5% of electricity from renewable sources, roughly equally divided over wind, biomass and hydro.

– Hydropower is the largest contributor to Vattenfall's renewable portfolio (11.4 GW), followed by wind (1.4 GW)[102]. Vattenfall describes biomass as the third most important renewable energy source in the European energy mix[103]. The company focuses on co-firing biomass in existing coal-fired plants as well as on biomass power plants. So far, however, biomass contributes less than one percent to Vattenfall's total power production[104].

From the above we deduct a strategic focus on centralised generation capacity by the power majors. All firms focus on wind projects, both onshore and offshore. In addition to wind, we observe that the firms invest in biomass, which most often entails the transformation or adjustment of existing coal plants, again in line with the centralised business models. This is not to say the firms do not invest in other renewable power generation technologies, but so far this has occurred on a significantly smaller scale.

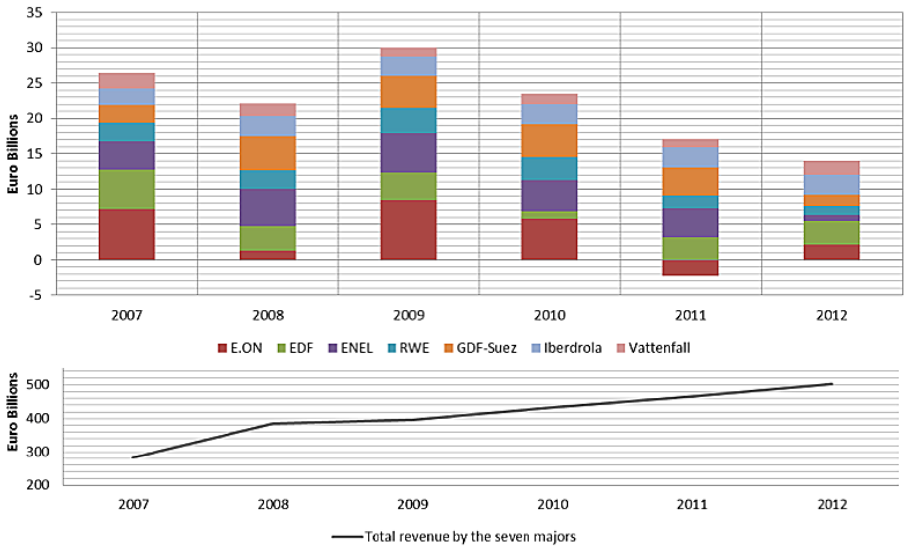
97 GDF Suez, 2013, 'Sustainability: GDF Suez Strategy to Foster Long Term Value Creation'.
98 Iberdrola, 2012, Results.
99 Iberdrola, 2012, Results.
100 RWE, 2012, Annual Report.
101 RWE, 2012, 'Factbook Renewable Energy', http://www.rwe.com/web/cms/mediablob/en/108824/data/114404/25/rwe/investor-relations/factbook/factbook-renewable-energy-new.pdf.
102 Vattenfall, 2012, 'The Generation Heart of Vattenfall', http://www.vattenfall.com/en/file/6_BD_Production_CMD2012_23656712.pdf.
103 Vattenfall corporate website, http://www.vattenfall.com/en/biomass-energy.htm.
104 Vattenfall, 2011, Annual Report.

EU POWER MAJORS' PERFORMANCE

The total turnover of the seven major power utilities in the EU does not seem to provide a picture of an industry in distress (see *Figure 8: Net income of the seven major EU power utilities*). Total revenue of the seven firms combined increased from €282 billion in 2007 to €502 billion in 2012, with all individual firms experiencing significant growth in revenue over these five years[105]. This growth in turnover can be explained, as it is partly the result of the integration of acquired business units and companies by the major power utilities over this period[106]. The trading activities provide another explanation. From the development of total revenue, we cannot perceive possible negative effects of the current market conditions. However, the current market conditions do hamper the profit margins of the European power utilities[107].

The influence of a shrinking market, depressed operating margins and changes in support policy for nuclear and renewable energy does become visible from the development in net income of the power majors. The harsher conditions for these firms are clearly reflected in the total net income of the power majors in course of the past years, from €26 billion in 2007 to €14 billion in 2012[108].

FIGURE 8. NET INCOME AND TOTAL REVENUE OF THE SEVEN MAJOR EU POWER UTILITIES



SOURCE: CIEP RESEARCH[109]

105 CIEP research, annual reports of respective firms.

106 Among others Essent by RWE, Nuon by Vattenfall, Endesa by Enel, British Energy by EDF, International Power by GDF Suez and Edison by EDF.

107 See Figure 8: Net income and total revenue of the seven major EU power utilities

108 Annual reports of respective firms.

109 Annual reports of respective firms.

Looking at the development of the total profit of the seven large European power utilities, we first see a dip in 2008 related to the outbreak of the economic crisis. In 2009, however, the net income of all firms levelled out again. The period from 2007 to 2012 was a turbulent time for most firms. Apart from EDF and Vattenfall, the power majors saw their profit margins decrease significantly in this period. A part of the decrease in net income relates to impairments on the generation portfolio, whether related to specific events such as the *Atomausstieg*, market conditions related to the profitability of gas- and coal-fired generation assets, or the macro-economic conditions in specific EU markets such as Spain. In addition to impairments, lay-offs and divestitures have been instrumental in dealing with the affected income of EU power majors. Given that the market dynamics do not seem to be improving, restructuring and divestments are expected to continue.

3.3 THE IMPACT ON EU POWER MAJORS' ACTIVITIES

While struck by the changes in their external environments, various power firms were already in the process of updating or even transforming their portfolios. Counting on demand for power to grow, but unsure what the future power source of choice would be, firms invested in capacity additions focused on differentiation. Now some years on and faced with deteriorated market conditions, the EU power majors are trapped in new generation projects for which the decision to develop was made some years ago. As a result, European power utilities continue to add new capacity. This is not only the case for renewable generation capacity, but also for gas and coal-fired power production[110]. The outlook per firm changes both technologically and geographically, depending on the composition of its portfolio. Firms with portfolios focused in Northern Europe face different problems from those predominantly positioned in Southern Europe. Firms with large shares of coal generators are likely to have a better short-term outlook than those with large shares of gas generation capacity.

– E.On seems to have overcome the blow received from having to shed its nuclear activities, albeit at the detriment of various assets it has divested from in order to rebalance the books. E.On is unlikely to enter into new nuclear projects in the short term, possibly moving strategically away from nuclear[111]. E.On, because of the large share of gas fired-power plants in its portfolio, suffers from the depressed operating margins on gas-fired power production and has had to make significant impairments on these assets.

110 See Section 2.4: A combination of pressures.

111 Der Spiegel, 29 June 2012, 'CEO of Energy Giant RWE: 'The Nuclear Power Chapter Has Come to an End'', http://www.spiegel.de/international/business/rwe-s-new-ceo-terium-to-halt-nuclear-power-and-invest-in-renewables-a-841260.html.

– EDF is the largest contributor to the French electricity market, where it operates all nuclear power plants[112]. As a result, EDF is very vulnerable in this period in which governments are reassessing the role of nuclear energy in their national fuel mixes. Although the French government has plans to limit the contribution of nuclear energy to the power generation mix by 33%[113], it aims to do so by replacing this with renewable energy sources. EDF might be well placed to do the replacement investments in RES capacity, whereas through its EDF Energies Nouvelles arm, it is already engaged in ambitious renewable projects[114]. While EDF seems able to manage the pressures, the rising costs of new nuclear generation capacity development might pose new challenges[115].

– Enel holds a significant market share of RES in Italy and Spain through the Enel Green Power subsidiary. Enel will have to come to terms with the revisions in the renewable support schemes. Besides the impact on the renewable portfolio, Enel owns a large generation fleet in the EU Member States hit hard by the economic crisis, Spain, Italy and some assets in Greece, which have already forced significant write-downs.

– GDF Suez is the largest operator of gas-fired power plants in the EU market and as such suffers from the poor market conditions for this generation type. The largest share of the company's portfolio is comprised of gas-fired power generators. Adding to the challenge for GDF Suez is the decision by the Belgian government to phase out nuclear power, because of which it faces the decommissioning of its nuclear fleet. On the other hand, GDF Suez only derives about a third of its income from electricity production and a smaller segment from the EU power sector.

– With a significant portion of its fleets installed in Spain and Portugal, Iberdrola is affected by the deteriorated market conditions there. In addition, Iberdrola has a considerable share of wind generation capacity in its portfolio in the Iberian Peninsula and as such will have to come to terms with the Spanish cutbacks in renewables support.

112 France's installed nuclear capacity consists of 58 plants (OECD Nuclear Energy Agency, accessed 11 February 2013, Country Profile France, http://www.oecd-nea.org/general/profiles/france.html). EDF has 58 nuclear reactors in France out of its 82 total global nuclear fleet (EDF, accessed 11 February 2013, EDF's technical expertise, http://www.edfenergy.com/energyfuture/edf-energys-approach-why-we-choose-new-nuclear/technical-expertise).

113 See Section 2.2: Unforeseen effects of a changing fuel mix.

114 Bloomberg, 13 November 2012, 'EDF Completes Europe's Largest Photovoltaic Plant in France', http://www.bloomberg.com/news/2012-11-13/edf-completes-europe-s-largest-photovoltaic-plant-in-france.html.

115 The Guardian, 7 December 2012, 'Nuclear Giant EDF Postpones Decision on New Hinkley Point Reactor', http://www.guardian.co.uk/business/2012/dec/07/nuclear-edf-hinkley-point.

– RWE also seems to have overcome the blow received by the impact of the German nuclear phase-out and, similar to E.On, is unlikely to engage in new nuclear projects[116]. RWE, by far the largest producer of coal-fired power in the EU, has an advantage over utilities that suffer from depressed margins on gas-fired power generation. Nevertheless it suffers, as margins on coal-fired power generation are also depressed. Adding to the pressure for RWE is the uncertain future of coal in Europe. Without carbon capture and storage technologies, it will be impossible to maintain the operation of these plants in the future, given the emissions. In the long run, especially RWE faces compromising tasks, which is especially daunting because the current market conditions do not provide much return on recent investment in coal-fired generation assets.

– Vattenfall suffers from the depressed market conditions and as a result is undergoing significant corporate restructuring[117]. In the meanwhile, Vattenfall is likely to become instrumental in the (Swedish) transition towards a low-carbon economy. In this respect, it should be noted that Vattenfall already operates a power generation fleet comprised for over 50% of low-CO_2-emitting technologies, namely nuclear, hydro and other RES capacity.

As long as the economic downturn overshadows Europe, the outlook does not bear much hope. The on-going economic crisis has various impacts on the EU power utilities: it causes the market to shrink, the conditions for investment in new generation technologies to deter, various support schemes for renewable generation technologies to be adjusted and the rating of their credits to go down. As a result, the investment outlook for the firms operating in the European power sector has deteriorated.

On the operational level, individual assets of firms are financially underwater[118]. In case of power generation assets characterised by high short-run marginal costs related to power generation feedstock, this is likely to lead to the mothballing of power plants. Shutting down plants brings with it write-downs of investments and dismissals. Apart from the conventional thermal power plants, the operators of

116 Der Spiegel, 29 June 2012, 'CEO of Energy Giant RWE: 'The Nuclear Power Chapter Has Come to an End'', http://www.spiegel.de/international/business/rwe-s-new-ceo-terium-to-halt-nuclear-power-and-invest-in-renewables-a-841260.html.

117 Addressed in Section 4.1.

118 Resulting in mothballing of generation capacity because of unfavourable generation margins, e.g. in the case of GDF Suez (GDF Suez, 6 December 2012, Investor Day presentation) and E.On (Bloomberg, 12 March, 2013, 'Europe Gas Carnage Shown by E.On Closing 3-Year-Old Plant', http://www.bloomberg.com/news/2013-03-12/europe-gas-carnage-shown-by-eon-closing-3-year-old-plant-energy.html).

nuclear facilities suffer from the consequences of lower power prices. Investors in nuclear power generation are unlikely to have accounted for long times of price falls in the EU power market. High capital costs drive the long-run marginal cost of their plants, which are hard to service under the current market conditions.

The abovementioned is detrimental to the investment climate. For businesses looking for growth rather than a consolidation of their position, the European power market is in most instances an unwelcoming place. Investments in coal- or gas-fired generation capacity are unlikely to occur for the time to come, given the unfavourable market conditions. The decreasing support for nuclear power generation in the EU will not lead to the construction of new nuclear plants anytime soon, unless support policies such as envisioned in the UK are established. For now, the only business case to be made for investors in EU power generation is in renewables – that is, as long as subsidies remain in place.

4 HOW THE EUROPEAN POWER MAJORS ARE RESPONDING TO THE CHALLENGES

4.1 STRATEGIC ADAPTATION AND RESTRUCTURING

European power majors are facing an environment in flux, with no certainty for economic growth to settle in any time soon, leaving power prices depressed. Technology- and policy-driven developments continue to affect the ability of these power majors to maintain their revenues, margins and therefore income. Driven by the effects of a changing European power system, all major European power utilities seem to be in a process of strategic re-orientation. In the assessment of how the major European power utilities are responding to these drivers of change, we make a distinction between ad hoc reactions focused on easing the currently felt pressures and strategic shifts aimed at the longer-term consolidation of income.

AD HOC RESPONSES

The write-downs on nuclear assets have forced E.On, RWE and Vattenfall to rebalance their portfolios, which has resulted in the firms divesting from (non-core) assets. In an attempt to limit costs and reduce debt, Vattenfall and RWE have announced reorganisations resulting in significant losses of jobs[119]. As a result of the dificult market conditions in the power sector in Europe, power majors that have not been exposed to the German *Atomausstieg* are now also being forced to make significant write-downs and announce divestments programmes[120], as is the case with GDF Suez, Iberdrola and Enel.

In order to execute its divestment programme, RWE will need an approximate €5 billion before the end of 2013[121]. In mid-2012 E.On had already divested for €12.5 billion, expected to amount to €15 billion by the end of 2013[122]. Vattenfall completed its envisioned divestment of non-core assets by 2012, after which it imposed an

119 RWE announced to cut 2400 jobs (Reuters, 10 August 2012, 'RWE to Cut 2,400 Jobs', http://www.reuters.com/article/2012/08/10/us-rwe-jobs-idUSBRE8790FC20120810). Vattenfall announced that it would cut 2,500 jobs (Wall Street Journal, 6 March 2013, 'Swedish Utility Vattenfall Cuts 2,500 Jobs', http://www.reuters.com/article/2012/08/10/us-rwe-jobs-idUSBRE8790FC20120810).

120 GDF Suez wrote down €2 billion over 2012 (GDF Suez, 6 December 2012, Investor Day presentation), while Enel made impairments of €2.58 billion over the same period (Enel, 2012, Results and 2013-2017 plan).

121 RWE, January 2013, 'Value in uncertain times', http://www.rwe.com/web/cms/mediablob/de/649048/data/105818/42/rwe/investor-relations/08.01.2013-Unternehmenspraesentation-Januar-2013-Nur-in-englischer-Sprache-.pdf.

122 E.On, July 2012, 'We Make Clean Energy Better. An overview of our business activities. Q2/2012', http://www.eon.com/content/dam/eon-com/%C3%9Cber%20uns/Globale-Einheiten/ECR%20Company%20Presentation%202012-Q2.pdf.

additional reduction to be realised by the end of 2013[123]. GDF Suez is looking to free up €11 billion, while Iberdrola is looking to make divestments in the order of €2 billion. In addition to these divestments, major investment decisions in non-subsidised generation activities in Europe have been postponed or outright cancelled.

FIGURE 9. EU POWER UTILITIES' GAS CONTRACT RENEGOTIATIONS[124]

	E.On	EDF/ Edison	Enel	GDF Suez	RWE
Eni		Ruled in arbitration		In negotiation	
GasTerra				In negotiation	In negotiation
Gazprom	Renegotiated	Renegotiated		In negotiation	In negotiation
RasGas		Ruled in arbitration			
Sonatrach		In arbitration	In negotiation	In negotiation	
Statoil	Renegotiated	Renegotiated		In negotiation	Renegotiated

SOURCE: CIEP RESEARCH[125]

In response to the negative returns on gas-fired plants, firms are considering mothballing their gas-fired power plants[126]. Most European power firms procure their gas via long-term oil-indexed contracts, often on a take-or-pay basis. The current clean spark spreads are driving firms to assess the viability of keeping gas-fired power plants online. In an attempt to overcome the situation, various European power utilities have entered into gas contract renegotiation with their suppliers, while others resort to arbitration at the International Chamber of Commerce (see *Figure 9: EU power utilities' gas contract renegotiations*). Several utilities have already succeeded in their attempts, which have led to substantial increases in income and profit, with retroaction. Because of the deleveraging and renegotiation of gas supply contacts, the performances of several hard-hit power utilities are already improving[127].

123 Vattenfall, 3 December 2012, 'Our Strategy in Challenging Markets', http://www.vattenfall.com/en/file/3_CEO_presentation_CMD2012_23656617.pdf.

124 Publically known status on 31 December 2012.

125 Various articles in World Gas Intelligence and Financial Times (World Gas Intelligence 4 July 2012, 3 October 2012, 7 November 2012; Financial Times, 6 November 2012, 18 December 2012).

126 Petroleum Intelligence Weekly, 20 July 2012; GDF Suez, 6 December 2012, Investor Day Presentation, http://www.gdfsuez.com/wp-content/uploads/2012/12/ID_dec2012_Global_Diff_DEF.pdf.

127 See Section 3.3 The impact on EU power majors' activities

RESTRUCTURING

Apart from a response to the current pressures, the actions taken by firms allude to a general process of re-orientation. The power utilities are deleveraging in certain markets while investing in others. We see a refocus of firms to their core competences on the one hand, while on the other they still engage to some degree in the development of new markets. Several of the EU power majors are applying a combination of the two. Apart from dealing with the existing problems, the major European power utilities are thus seeking to develop strategies that will make them more resistant to current and future pressures. The restructuring of their corporate portfolios seems to be taking place along two lines. We see that firms apply a more specific, geographically directed focus, away from the numerous cross-EU activities. Yet we observe that other firms are focusing on certain generation technologies or activities. The combination of both also occurs. Clearly, while divesting in order to deleverage, the firms are seeking to develop or strengthen a strategic focus.

Some firms focus on specific types of power generation, as is the case for Vattenfall with its emphasis on nuclear and renewables. Vattenfall has divested from its upstream assets in the Netherlands[128] and its transmission system in Germany[129]. Vattenfall has also sold its Belgian activities to Italian ENI and its Finnish electricity and heating distribution assets to a financial market consortium, while Polish firms PGNiG and Tauron have acquired Vattenfall´s heat, electricity distribution, network services and electricity sales interests in Poland[130]. GDF Suez is taking a geographically focused approach and has shed various distribution assets in Italy, France and Belgium[131], while it seeks to expand its activities outside of Europe[132]. An example of the combination of both trajectories is Iberdrola. Iberdrola has integrated its renewables business unit in its general portfolio, whereas it is looking to sell non-core assets in Poland and has sold a minority stake in Scottish Power's network business[133]. At the same time Iberdrola focuses investments in markets outside the EU, with over 25% of installed capacity being in North and South America. All these are examples of firms seeking to adjust their portfolios from (highly) differentiated activities in different generation and geographical markets into much more focused portfolios.

128 Divested to UK Independent Tullow in 2011 (http://www.upstreamonline.com/live/article1210389.ece).
129 Vattenfall: Other businesses, both divested sectors: German TSO and Dutch E&P: 4% of revenue €0.81 billion.
130 PWC, 2011, Power Deals.
131 Wall Street Journal, 1 July 2007, 'GDF Suez Plans Sale of Assets'.
132 See Section 4.2.
133 Financial Times, 28 September 2012, 'Iberdrola Weighs Scottish Power Options'.

The development of portfolios that cover different steps in the energy value chain is a trend we see strengthening. Through its acquisition of Edison, EDF seeks to become a significant producer of gas and gas-fired power[134]. RWE, with its vast shares of coal-fired power production, is looking for ways to modernise its fleet, making it more compatible, as a backup, with intermittent generation sources as a backup[135], in order to maintain synergy with its mining activities. RWE, however, has shed infrastructural assets and has diminished share holdings in smaller regional utilities[136] as part of its portfolio restructuring. GDF Suez is by far the most diversified of all EU power majors and continuous to develop its energy services and liquefied natural gas operations outside of the EU[137]. Enel & E.On also focus on upstream activities, among others in Russia.

4.2 EXPANDING HORIZONS

BEYOND THE CORE MARKETS IN EUROPE

The major European power utilities that have the ability to do so will restructure their assets such that they become less dependent on the mature economies in Europe and generate more revenue in other markets. Growth potential for power generation across the globe (see *Figure 10: Global electricity demand development*) is not dispersed equally over OECD and non-OECD states. The majority of growth in electricity demand will come from Asian countries like China, India and Russia, as well as the Middle East and Latin America.

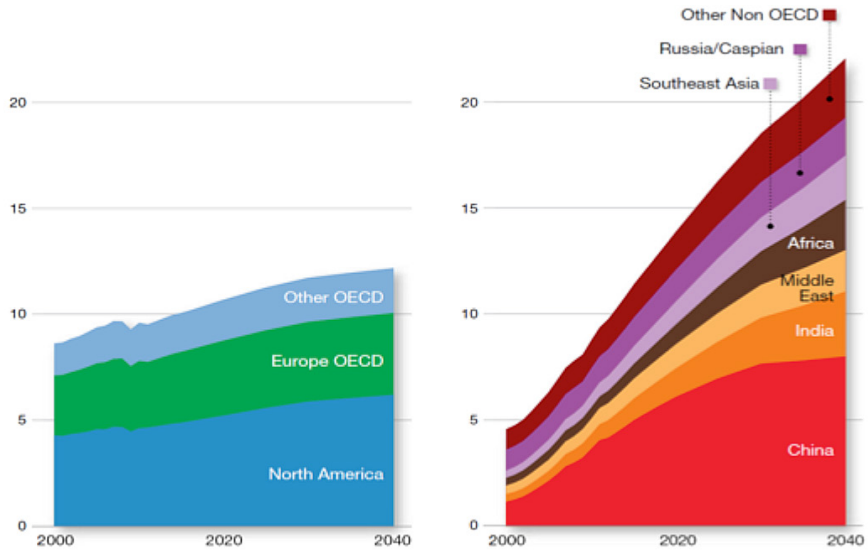
134 EDF seeks to become the electric company of choice across the value chain, the leader in renewables with EDF Energies Nouvelles and, through the integration of Edison, to execute its gas strategy (EDF, 2011, Facts and Figures).

135 RWEs attempt to make coal generation more flexible by adding silos for lignite/coal granulite or pulverised coal (RWE, accessed 8 February 2013, Lignite Energy Plant Engineering, http://www.rwe.com/web/cms/en/496012/lignite-energy/process-heat-generation/lignite-energy-pulverized/plant-engineering/).

136 RWE, 14 August 2012, 'Divesting from Saarland-based Utility VSE'.

137 'GDF Suez will allocate up to 50 percent of its medium-term capital expenditure in these areas, compared with 30 percent currently', Financial Times, 5 December 2012, 'GDF Suez Warns of Lower Profits Next Year', http://www.ft.com/intl/cms/s/0/67d6fd0e-3f15-11e2-9214-00144feabdc0.html#axzz2LG7H2Tou.

FIGURE 10. GLOBAL ELECTRICITY DEMAND DEVELOPMENT (IN THOUSANDS TWH)



SOURCE: EXXONMOBIL[138]

Recognising the changes in economic outlook and profit margins, firms are enlarging their extra-EU activities, developing geographically differentiated portfolios. All but one of the major EU power utilities are directing their strategies to regions outside of the EU. For some firms these efforts are rather new; the power generation portfolios of Vattenfall and RWE primarily focus on Europe. Several of the EU power majors, however, already have considerable experience outside of the EU (see *Figure 11: EU power utilities' geographic mix of installed capacity in 2011*). E.On is active in Russia, through a subsidiary where it operates various plants. Iberdrola and Enel (previously Endesa assets) own a wide range of generation assets in the Americas. EDF operates (nuclear) power plants in North America and growth markets in Latin America and Asia. GDF Suez has a geographically diversified generation portfolio. In recent years we have seen investments by the EU power majors expand in electricity sectors outside of the EU.

– Apart from its upstream and power generation activities in Russia, E.On has set up a joint venture in Brazil with Brazilian MPX Energia Brazil and has pushed into Turkey by acquiring a 50% share of Austrian Verbund in Enerjisa[139]. E.On seeks to expand its Turkish activities from the current 1.7 GW of generation capacity to

138 ExxonMobil, 2012, 'The Outlook for Energy: A View to 2040'.

139 E.On, 4 December 2012, 'E.On establishes Market Position in Turkey', http://www.eon.com/en/media/news/press-releases/2012/12/4/e-on-establishes-market-position-in-turkey.html.

8 GW of installed capacity by 2020, while in Brazil the joint venture with local MPX seeks to add 20 GW of generation capacity by 2020[140].

– Enel focuses 56% of its CAPEX on power generation activities in the Americas[141]. Enel, through its Spanish subsidiary Endesa, is increasing its ownership share in Enersis, a Chilean utility. Enersis has generation, transmission and distribution assets throughout the major economies of the South American continent: Brazil, Chile and Argentina, as well as Columbia and Peru. Up to 2017 Enel's renewable energy subsidiary, Enel Green Power will invest €4 billion in emerging economies[142].

– EDF is limitedly active outside the EU marketplace, as it operates a number of nuclear facilities in the US and China, hydropower facilities in Brazil and Laos, as well as wind power generation assets in the US and Canada.

– GDF Suez aims to direct up to 50% of its capital expenditures in the medium term to power generation and LNG facilities in Latin America, Asia and the Middle East, a significant increase of the 30% it has dedicated to these regions to date[143]. In 2012, 90% of added power generation capacity took place in growth markets like Brazil, Indonesia and Thailand[144]. Of the 10 GW of generation capacity the firm currently has under construction, 80% is outside of the EU[145].

– Iberdrola is another example, spending nearly €3 billion on the purchase of Elekro Electricidade e Servicos SA, a Brazilian utility. Iberdrola is looking to increase its already substantial share of generation capacity installed outside of the European market.

– RWE is seeking to extend its business in Turkey from trade and sales into generation activities with the development of a gas-fired power plant[146]. RWE

140 E.On, 2013, corporate website, http://www.eon.com/en/about-us/strategy/strategic-priorities/outside-europe/new-markets.html.

141 Enel, corporate website, http://www.enel.com/en-gb/investors/our_business/industrial_plan/renewables/.

142 Financial Times, 17 April 2013, Enel Green Power Bullish on Expansion

143 GDF Suez, 5 December 2012, Press Release, http://www.gdfsuez.com/wp-content/uploads/2012/12/Accelerating_GDF_SUEZ_transformation.pdf.

144 Reuters, 28 February 2013, 'GDF Suez Writes Down European Assets, Expands in Asia', http://www.reuters.com/article/2013/02/28/gdfsuez-results-idUSL6N0BS2C920130228.

145 GDF Suez, March 2013, 'GDF Suez at a Glance', https://www.gdfsuez.com/wp-content/uploads/2013/03/GDF-SUEZ-at-a-glance-FY2012.pdf.

146 Denizli power plant with an installed capacity of 775 MW, co-owned for 30% by Turkish energy company Turcas (RWE, Annual Report, 2011).

will direct 20% of its capital expenditures to (South) Eastern Europe, focusing on Poland and Turkey[147].

FIGURE 11. EU POWER UTILITIES' GEOGRAPHIC MIX OF INSTALLED CAPACITY (IN GW)

	EDF	Enel	E.on	GDF Suez	Iberdrola	RWE	Vattenfall
EU	128.94	70.89	59.00	55.13	34.10	49.24	38.23
Other Europe		9.03	10.00				
North America	2.00	1.01		15.25	6.12		
Latin America	0.87	16.24		11.50	5.86		
MENA		0.12		22.29			
Asia	2.22			12.90			

SOURCE: CIEP RESEARCH[148]

Whether the expansion of activities by major European power utilities, beyond their traditional home market, is another temporary engagement remains to be seen. Some firms are already able to offset the losses in net income of their European power generation portfolios via their investments in other parts of the world. As long as the outlook for the European power sector, especially for utilities with large shares of conventional generation sources, does not improve, we should not be surprised to see an increase in the share of turnover generated by these major EU power utilities coming from non-EU markets.

Southern countries of the European Union might also draw future investments by the power majors. The privatisation of assets by indebted European countries like Greece, Italy, Portugal and Spain might turn out to be attractive. So far, the sale of Portugal's assets and the auction of Greek natural gas company DEPA and transmission company DEFSA have not attracted the power majors. While the Portuguese assets were sold to Chinese corporations, EDF has been the only power major to enlist in the auction of the Greek assets, through its Edison subsidiary, while deferring from a non-binding offer[149].

147 RWE, January 2013, 'Value in Uncertain Times', http://www.rwe.com/web/cms/mediablob/de/649048/data/105818/42/rwe/investor-relations/08.01.2013-Unternehmenspraesentation-Januar-2013-Nur-in-englischer-Sprache-.pdf.

148 Annual reports and corporate websites of respective firms; 2011 data.

149 Natural Gas Europe, 9 January 2013, 'DEPA Privatization gets a Boost', http://www.naturalgaseurope.com/depa-defsa-greece-privatization-boost.

FIGURE 12. EU POWER MAJORS' RENEWABLES STRATEGIES

	RES Focus	Aim	Indicated CAPEX
EDF[150]	Onshore and offshore wind and solar; both in the EU and North America		€1 billion in 2013 (out of €12 billion total); expected to continue to 2015
Enel[151]	Wind and biomass in the EU. Wind, biomass and hydro in Latin America and MENA	Additional 4.4 GW by 2017	€1.3 billion annually up to 2015 (out of €5.6 annually up to 2015); to a total of €6.1 billion before 2017
E.On[152]	Onshore and offshore wind, distributed solar and biomass in the EU, and onshore wind in the US	Additional 1.8 GW of wind and 360 MW of photovoltaic in 2015. Convert 2-4 fossil plants to biomass.	€1.3 billion (20% of total in 2013) and (25% of total in 2014)
GDF Suez[153]	Wind, solar, hydro and biomass in the EU; hydro, wind and biomass in Latin America and geothermal in Asia	Additional 2 GW by 2017 in the EU	
Iberdrola[154]	Onshore and offshore wind in the EU and the US	Additional 1.5 GW by 2015	€2.6 billion by 2014 (out of €3.4 billion annually by 2014)
RWE[155]	Onshore and offshore Wind in the EU	RWE Innogy 3.5 GW of installed RES by 2014 (adjusted downward from the original 4.5 GW)	€2 billion up to 2015 (downward adjusted after 2012) (out of €4.4 billion annually)
Vattenfall[156]	Onshore and offshore wind, hydro and biomass in the EU	Outpace the growth of renewables in the Northern and Central European market	Up to 2017: Wind €2,3 billion, Hydro €0.9 billion, biomass €0.7 billion (out of €14.1 billion)

SOURCE: CIEP RESEARCH[157]

150 EDF, €1 billion in RES CAPEX out of €12 billion total CAPEX in 2013 (EDF, 14 February 2013, EDF Annual results Free translation from French).

151 Enel, 13 March, 2013, '2012 Results. 2013-2017 Plan'; Financial Times, 17 April 2013, Enel Green Power Bullish on Expansion; World Gas Intelligence, 20 March 2013.

152 E.On, July 2012, 'We Make Clean Energy Better. An overview of our business activities. Q2/2012'; E.On, 2012, Annual Report.

153 GDF Suez, 13 March 2013, 'At a Glance'.

154 Iberdrola, 24 October 2012, 'Outlook 2012/2014.

155 RWE, 2012, Annual Report; World Gas Intelligence, 20 March 2013.

156 Vattenfall, 3 December 2012, 'Our Strategy in Challenging Markets'; Vattenfall, 2012, Year-End Report; Vattenfall CAPEX from SEK to EUR, based on the ECB reference exchange rate for 2012, http://sdw.ecb.europa.eu/quickview.do?SERIES_KEY=120.EXR.A.SEK.EUR.SP00.A.

157 Annual reports, corporate documents and corporate websites of respective firms; World Gas Intelligence, 20 March 2013.

GREENER PASTURES

Under the current subsidisation schemes EU power firms are likely to engage in large-scale investments in RES (wind and solar). EU Member States will continue to look for ways to entice investors in renewable capacity investments, as states seek to attain their shares of renewable energy laid down in the legally binding EU 2020 policy. In the UK the Electricity Market Reform Bill (EMR) proposes to support renewable power generation from offshore wind, in order to stimulate the installation of vast shares of this generation type along Albion's coastline. In an effort to diversify their energy mix, to decrease dependency on expansive energy flows and to diversify their economies, the southern European countries hit hardest by the crisis aim to develop their RES potentials. Various initiatives in the Mediterranean focus on extensive RES capacity[158]. Meanwhile, as 2020 is nearing, not all EU Member States seem able to satisfy their RES objectives yet. Hence, the governments of these Member States, e.g. France and the Netherlands, are expected to take action in order to accommodate RES investments by creating a benevolent investment climate.

The nourishing and further development of renewable business units is likely to proceed, especially as renewable energy projects, certainly in the case of wind energy, take on a much larger scale. Thereby these projects are becoming more akin to the EU power majors' traditional activities of large-scale centralised production. In absolute figures, by comparing total 2011 installed (non-hydro) renewable capacities, Iberdrola stands out with over 14 GW of installed capacity, followed by E.On, GDF Suez, Enel, EDF and RWE, all having approximately 4-5 GW of installed capacity in the same year, and Vattenfall with approximately 2 GW of renewable generation capacity, apart from hydro. However, when comparing this to the relative shares of renewable energy generation and the investment plans, we observe the following (also see *Figure 12: EU power majors' renewables strategies*).

– Iberdrola is on the vanguard, with over 50% of installed capacity in hydroelectric, wind, solar or other RES generators. Seeking to solidify its position, Iberdrola has unlisted its Iberdrola Renovables arm as a means to fully integrate the assets in its portfolio. Iberdrola will invest approximately €1 billion annually for the year to come in the development of renewable generation capacity, a significant decrease from the €5.5 to €6 billion it has spent in the period 2009 to 2011[159]. In

158 E.g. the Mediterranean Renewable Energy Centre (MEDREC), http://www.medrec.org/en/index.php.

159 Iberdrola, 23 November 2012, 'Renewable Business Outlook', https://www.iberdrola.es/webibd/gc/prod/en/doc/Perspectivas12_5.pdf.

order to deal with setbacks in demand and renewable support, the firm is strategically shedding assets.

– Vattenfall, as a Swedish state-owned enterprise, will be instrumental in the effort of developing a low-carbon energy mix and thus a low-carbon portfolio for Vattenfall, already producing about 25% of its electricity by its nuclear, hydroelectric and other RES assets. In the medium term, Vattenfall envisions directing 33% of capital expenditures to RES generation, predominantly wind[160]. Nevertheless, the firm regards biomass as the cornerstone of its strategy to obtain near-term CO_2 reduction[161].

– A significant share of Enel's RES portfolio consists of hydroelectric assets and of renewable generation assets, with significant RES projects in Spain and Latin America. Enel expects the contribution from its renewable portfolio to grow steadily by more than 50% in the next four years. In order to bring this about it will spend €6.1 billion, more than half of which in the Americas[162]. Enel is looking to reduce installed capacity in the mature Iberian and Italian markets by 11.9% (to 52 GW) in the period 2012-2017. By the same year, 45% of earnings should derive from RES and non-EU activities (up from 40% in 2012 and 11% in 2005). The renewable capacity additions will consist for 66% of wind, 14% of solar, 9% of hydro, 9% of geothermal and 2% of biomass assets[163].

– RWE is seeking to catch up in the RES rat race, with capital expenditures equalling about €1 billion annually for the years to come. Through its RWE Innogy renewable arm plans and builds its renewable power generation facilities[164]. RWE focuses primarily on wind and hydro, as it has voiced its intention to move away from biomass[165]; 70% of RWE Innogy investments are focused on onshore and offshore wind[166].

160 Vattenfall, 3 May 2012, 'Vattenfall Q1 Results', http://www.vattenfall.com/en/file/Q1-2012-Presentation_20598590.pdf.
161 Vattenfall, 30 October 2012, 'Biomass and Waste Co-firing Experience at Vattenfall', Presentation by Daniel Seibt, Head of Power Plant Engineering and Ronald Rost, Head of Sales.
162 Enel corporate website, http://www.enel.com/en-GB/investors/our_business/industrial_plan/renewables/.
163 Enel, 2012, Results and 2013-2017 plan.
164 RWE, September 2012, 'Factbook Renewable Energy', http://www.rwe.com/web/cms/mediablob/en/1464826/data/86190/2/rwe-innogy/news-press/dl-factbook-new.pdf.
165 Bloomberg New Energy Finance, 26 February 2013, 'RWE to Sell German Biomass in Absence of Government Support', http://about.bnef.com/bnef-news/rwe-to-sell-german-biomass-in-absence-of-government-support/.
166 RWE, 2012, 'Tapping Tomorrow's Energy Sources Today, RWE Innogy', https://www.rwe.com/web/cms/mediablob/en/592806/data/86642/2/rwe-innogy/sites/wind-onshore/RWE-Innogy-company-broschure.pdf.

– GDF Suez aims to increase its RES capacity by 2 GW in 2015[167]. GDF Suez devotes the majority of its capital expenditures to investments in growth markets rather than in the EU power sector. The renewable strategy of the firm prioritises onshore wind and hydropower[168].

– E.On aims to invest €1.6 billion of growth CAPEX in renewable investments[169]. As part of the cost-cutting programme, E.On will reduce capital expenditures in the medium term by at least 25%[170]. Given the size of the total portfolio, the new share of renewables remain limited even if the 2015 aims are obtained; hence it will be some time before RES become a core activity.

– EDF is likely to be instrumental in the French RES efforts. Through its recently reintegrated subsidiary EDF Energies Nouvelles, it can become the foremost RES player in France. In Italy EDF is predominantly active in hydroelectric generation through its Edison assets. The French power utility is internationally active through its renewable energy subsidy and aims to strengthen its position; in 2011 EDF invested €1.8 billion in renewable energy[171].

When it comes to making investment decisions focused at stimulating growth in profits, through increases in generation and market shares, the major EU power utilities will increasingly look to expand their portfolios outside of conventional power generation in Europe. While the firms take on different approaches, we do see a differentiation along three lines: (i) the increased presence over the energy value chain, investing in energy services, upstream and other non-power generation activities; (ii) increased generation activities in growth markets in the Americas, Asia and the Middle East; and (iii) increased investments in (subsidised) renewable energy projects within and outside of the European market. In other words the EU power majors choose to scale up traditional activities by expanding geographically and realise that a change in the business models is needed, thereby developing new activities.

167 GDF Suez, July 2012, 'GDF Suez at a Glance. A Unique Value Proposal Among the Industry', http://www.gdfsuez.com/wp-content/uploads/2012/07/GDF-SUEZ-at-a-glance-060712-final.pdf.

168 GDF Suez, 13 March 2013, 'At a Glance'.

169 E.On, 2012, 'Interim Report III/2012'.

170 E.On, July 2012, 'We Make Clean Energy Better. An overview of our business activities. Q2/2012' http://www.eon.com/content/dam/eon-com/%C3%9Cber%20uns/Globale-Einheiten/ECR%20Company%20Presentation%202012-Q2.pdf; E.On, 2012, 'Interim Report III/2012'.

171 EDF, 2011, 'Facts and Figures'.

5 CONCLUSION

In this paper, we have sought to provide answers to two questions: firstly, what are the sources of distress amongst power utilities in the Northwest EU market? Secondly, how are the major EU power utilities responding? Developments in the external environments of the major power utilities in the EU have affected their outlook. Consequently, the companies are being forced to adapt to new circumstances and adjust their strategies in order to move forward. Five years after the outbreak of the financial crisis and still no sign of relief, the impact has turned into a lasting one and as such has resulted in structural changes. Lower demand for electricity, energy efficiency measures and the rapid expansion of renewable energy complicate the opportunities for growth. This has strained the power majors' business models, whereas in many cases, operating margins are under pressure and the returns on investments are poor. In addition, the nuclear phase-outs have forced firms into significant write-downs. This has forced strategic readjustment by the major power firms. In the short term, this has brought about divestments from non-core assets, the renegotiations of gas procurement contracts with suppliers and budgetary cuts resulting in the resignation of employees.

Apart from the short-term alleviation measures, the major power utilities in the EU electricity generation sector are going through a process of long-term strategic re-orientation. It remains uncertain whether this implies that firms adapting to changing practices will indeed secure future income. Perhaps the changing practices driven by new technologies and new players will bring about new business models, making the current ones redundant. The arrangements the power utilities are now taking are characteristic for firms operating in an industry in distress. Shedding non-core functions, becoming more nimble and focused are typical strategies in that sense. At the same time, we see the EU power majors making inroads, if not expanding their footprints, in business activities outside of the EU power sector.

In the process of strategic restructuring, we observe some trends. The strategies employed by the EU power majors no longer seem focused on the perception of the European continent as one single market in which firms hold dispersed portfolios. Rather, these portfolios focus on specific regions. Whenever possible, firms seek to diversify their portfolio towards markets outside of Europe, even outside the power generation business. They are doing this in order to become less dependent on a

market in which the fundamentals are characterised by declining demand due to energy efficiency, substitution, increased shares of renewable energy and the continued negative outlook. Regarding their activities in the European power sector, the EU power majors will continue operations as long as economically feasible, whereas, based on the current market conditions, for new investments the firms will only invest in capacity with guaranteed incomes. For now, this is limited to renewables, in which continued investment by the EU power majors is indeed expected.

How this will fit in the policies of the EU and Member States remains to be seen. The economic crisis has strained government budgets, while the costs of integrating renewables are increasing. Firms are worried about the future, one that remains unpredictable precisely because of policy, regulatory and technological developments. A critical success factor for the continued success of the major European power utilities may be to align the corporate and national interests.

When the storm settles, which will most likely occur only when the economic recession starts to ebb away, demand for power will again increase. By then, the EU power sector will have undergone restructuring. The ones to come out on top of this process will presumably be those firms that were most successful in the adjustment process. After a period of turbulence, it is likely that major merger and acquisition activities between and among the major EU power utilities will take place. Then another step will have been taken in the further consolidation of the EU power sector.

When thinking about policy for the power sector in the European Union, it is recommendable to bear in mind the developments central to this study. The investment climate of the EU power sector has deteriorated due to a combination of policy measures, economic stagnation and increased shares of RES. For businesses looking for growth rather than consolidation of their position, the European power market is in most instances an unwelcoming place. Investments in coal- or gas-fired generation capacity are unlikely to be made for the time being, given the unfavourable market conditions. The decreasing support for nuclear power generation in the EU-15 will not lead to the construction of new nuclear plants anytime soon, either, unless support policies such as those envisioned in the UK are established. The only business case for investors to be made in EU power generation seems to be in renewables – that is, as long as subsidies remain in place. Virtually all the EU power majors have significant operations in markets other than the EU power sector. Given the abovementioned, they are likely to increasingly divert their capital allocations to other markets.

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