



# Sustainability in the Power Sector

**Update 2010 - Belgium**

Tim Steinweg, Albert ten Kate & Kristóf Rác

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**Tim Steinweg, Albert ten Kate  
& Kristóf RÁCZ (SOMO)**

**Amsterdam, November 2010**

## Colophon

### Sustainability in the Power Sector

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**Cover design:** Annelies Vlasblom

**ISBN:** 978-90-71284-62-5

#### Funding

This publication has been produced with the financial assistance of Greenpeace Nederland. The content of this publication is the sole responsibility of SOMO and can in no way be taken to reflect the views of Greenpeace Nederland.

#### Published by



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## Abbreviations and terminology

<b>CHP</b>	Combined Heat and Power
<b>EdF</b>	Électricité de France
<b>GW(h)</b>	Gigawatt (hour)
<b>MW(h)</b>	Megawatt (hour)
<b>kW(h)</b>	Kilowatt (hour)
<b>CCGT</b>	Combined Cycle Gas Turbine
<b>CCS</b>	Carbon Capture and Storage
<b>GDF</b>	Gaz de France

# Introduction

## Aim and context of the fact sheet series

This 2010 series of power companies and thematic fact sheets aims to raise public awareness about sustainability issues in the electricity sector and to improve the sustainability of power companies operating in the Netherlands. The fact sheet series investigates the companies' performance on incorporating renewable energy sources into their fuel mix for both generation and supply of electricity, and on their investments and future plans with respect to energy sources at both the Dutch and European level. The 2010 fact sheet series is the annual update that is going into its fourth year, and builds on the work from previous years (available at [www.somo.nl](http://www.somo.nl)), but includes a slightly different range of companies due to a number of recent and pending mergers and acquisitions among power companies with operations in the Netherlands. For the first time this year, Essent is fully incorporated in the RWE company profile. SPE, a company covered for the first time, is included in the company profile of its owner EdF. The Vattenfall and Nuon fact sheets were drafted and reviewed separately, and combined into one company profile afterwards. In total, the 2010 series consist of ten company fact sheets: Delta, Dong Energy, E.ON, EdF/SPE, Eneco, Enel, GDF Suez/Electrabel, Iberdrola, Vattenfall/Nuon and RWE. The company fact sheets form the basis of three separate reports, covering companies active in 1) The Netherlands, 2) Belgium, and an overview of 3) the largest European companies.

This report is the version for Belgium, and covers the following companies, all active on the Belgian market;

- EdF
- GDF Suez/Electrabel
- RWE
- SPE
- Vattenfall/Nuon

## Report structure

After this brief introduction, Chapters 1-7 comprise the ten company fact sheets. Each company fact sheet contains information on four measures of sustainability: the company's current fuel mix for installed capacity and electricity generation in Europe, current fuel mix of electricity supplied in the Netherlands (or Belgium), investments in new generating capacity in Europe, and the socio-economic impacts of the company, with a specific focus on issues present in their supply chains (eg. the sourcing of coal, uranium or biomass). The four thematic fact sheets found in Chapters 8-11 focus on these same four areas and compare the eight companies' performance in each area.

## Methods and scope

The selection of companies to include in the fact sheet series is based on a number of considerations. The companies that are covered in the Belgian version of this report are selected because they either have installed capacity in Belgium, or are investing in new



capacity. They are also all active in the Belgian supply market. The scope of the information varies slightly per section. For all generation capacity and investments, use is made of European figures, excluding Russia but including Turkey. For the supply figures, use is made of figures for The Netherlands.

Information for the fact sheets was gathered from news articles and databases; company sources such as websites, annual reports and CSR reports; and direct contact (through emails and telephone calls) with company representatives. For the first time this year, a questionnaire was sent to each of the companies.

All of the companies were given the opportunity and ample time to review a draft of their fact sheet, provide comments, and correct any factual errors. Most companies provided comments and corrections on the drafts that were incorporated into the final version. More information on the methodology used and different distinctions and classifications made in the fact sheets can be found in the Methodology chapter in Annex 1.

## **Information about SOMO**

The Centre for Research on Multinational Corporations' (SOMO) activities and research on corporations and their international context focus on sustainable economic and social development and are aimed at promoting sustainable development and the structural eradication of poverty, exploitation, and inequality. SOMO has the following primary goals:

- Change through knowledge building: The research SOMO carries out is aimed at stimulating change. This means that on the one hand, SOMO fulfils a 'watch dog' function; SOMO collects the necessary information and carries out analyses to reveal unsustainable corporate conduct and contradictions in economic and political systems. On the other hand, with its analyses and its alternative proposals, SOMO contributes to the policy development of governments, international organisations, NGOs and corporations.
- Strengthening of civil society in the global North and South: By providing information and facilitating cooperation, SOMO helps to strengthen civil society in the global North and South. SOMO's activities focus on the disclosure of previously fragmented information, the building of networks of NGOs and the training of NGOs. SOMO concentrates its efforts on NGOs that work with Multinational Enterprises and international trade, such as labour unions and human rights, consumer, environmental, gender and development organisations.
- Increasing the impact of civil society organisations: Through its research as well as cooperation with partners from the South, and joint initiatives with other NGOs, SOMO contributes to the debate on CSR. SOMO targets its policy influence, workshops, and public meetings at opinion leaders and decision makers from governments, civil society organisations and the media. SOMO promotes the interests of the global South when participating in policy dialogues, lobby activities, conferences, expert meetings, and other fora.

# 1 EdF Group

## Basic company information

The Électricité de France (EdF) Group is an important player in the European electricity industry. The EdF Group is present in all areas of the electricity value chain (from generation to trading) and is increasingly active in the European gas chain. Its total sales comprised €66 billion in 2009, of which 49% outside France. The EdF Group leads the French electricity market. It also has important positions in the United Kingdom, Germany and Italy, as well as in several other European countries. Finally, the EdF group owns some industrial operations in Asia and the United States.<sup>1</sup> The main shareholder of EdF is the French State, with a 84.5% stake as of 31 December 2009.<sup>2</sup>

In 2009 EdF Belgium acquired a 51% stake in SPE-Luminus (SPE), the second-largest Belgian energy company. In June 2010 EdF raised its stake in SPE from 51% tot 63.5%.<sup>3</sup>

This fact sheet combines fact sheets of EdF and SPE that SOMO has sent for review to EdF and SPE respectively. EdF declared that it did not want to make use of the opportunity to review the fact sheet and answer to the questionnaire sent by SOMO.<sup>4</sup> So, the findings in this fact sheet should be interpreted with caution. SPE has responded to both a draft fact sheet and questionnaire.<sup>5</sup>

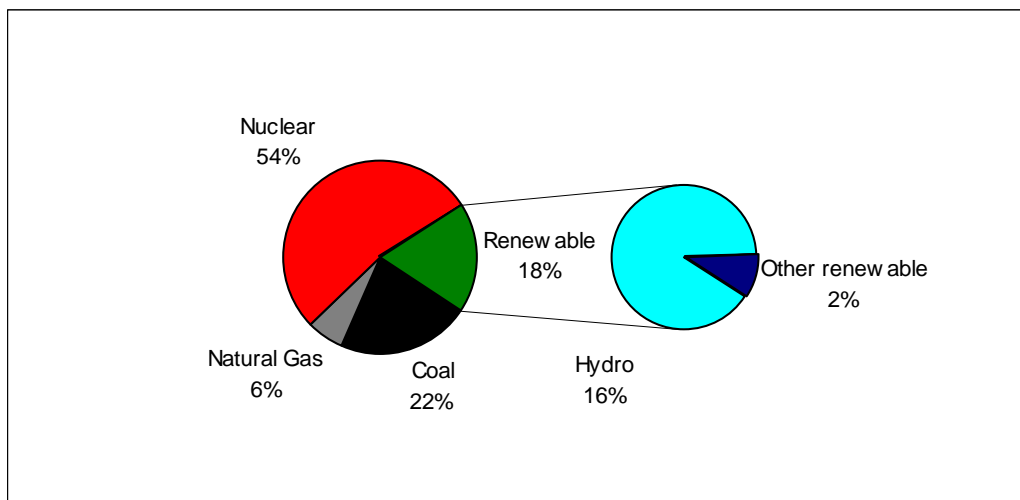
## Installed capacity and electricity generation in Europe

For 2009, EdF had no public information on its capacity and actual electricity generation in Europe specifically. Therefore, its figures for the entire world were used in this fact sheet. France, the United Kingdom, Germany and Italy accounted for more than 90% of EdF's capacity and actual electricity generation in 2009. The remaining percentages comprise other countries in Europe, as well as the United States and countries in Asia.<sup>6</sup> For this study, no information could be found regarding the fuel types of installed capacity at 31 December 2009 and electricity generation in 2009 for Europe specifically. EdF and GDF Suez were the only companies reviewed in this study for which this was not possible.

France accounted for more than 70% of EdF's capacity and actual electricity generation in 2009. The electricity generation capacity of EdF in France is composed of 64% nuclear, 21% hydro and 15% fossil fired.<sup>7</sup>

Figure 1 reveals the fuel mix of EdF's worldwide electricity generation capacity for the year 2009. Figure 2 shows the fuel mix for electricity actually generated worldwide in 2009.

**Figure 1: Fuel mix of EdF's installed capacity worldwide, 2009**



**Figure 2: Fuel mix of EdF's electricity generation worldwide, 2009**

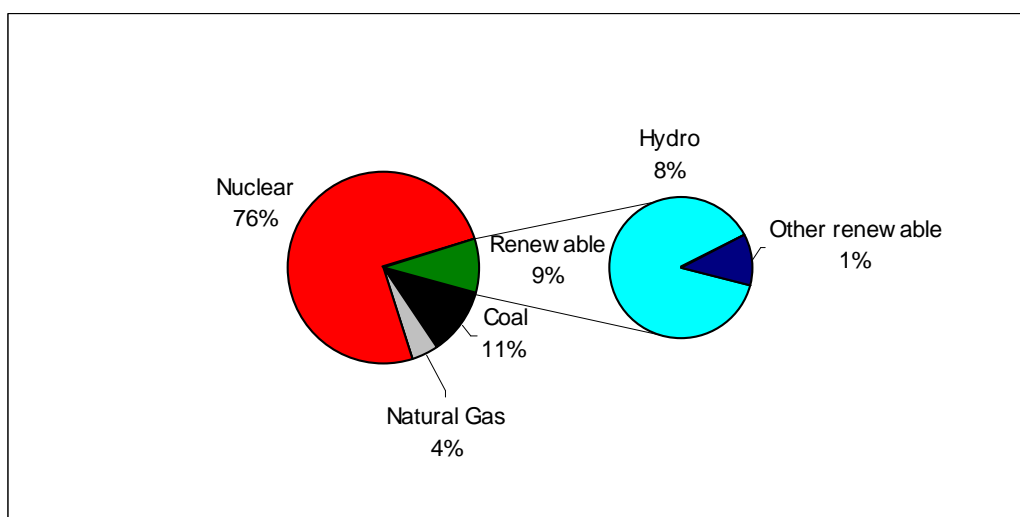


Table 1 gives the absolute figures of both the installed capacity and EdF's electricity generated.

**Table 1: Fuel mix of EdF's electricity generation and installed capacity worldwide, 2009**

	Generated (TWh) <sup>8</sup>	Capacity (GWe) <sup>9</sup>
Fossil-fired (excl. gas)	69.0	31.2
Gas (CCGT and co-generation)	26.8	8.5
Nuclear	466.1	75.0
Hydro	49.9	22.9
Other renewable energies	6.7	2.5
TOTAL	618.5	140.1

## Electricity supplied in Belgium

The electricity supplied to all customers in Belgium amounted to 72.5 TWh in 2009.<sup>10</sup> EdF Belgium sold 1.3 TWh, which corresponds to 1.8% of all supplies. The customer base of EdF Belgium essentially comprised industrial companies and SMEs.<sup>11</sup>

The share of SPE-Luminus (SPE) in the supply of electricity to Belgium amounted to 13.7% in 2009.<sup>12</sup> The company supplies 1.6 million private and business delivery points with electricity and gas. Luminus is the brand name for this.<sup>13</sup>

No information was provided regarding the fuel mix of EdF's supplied electricity in Belgium.

## Investments in new generation capacity in Europe

Net cash outflows for investing activities (cash movements due to net acquisitions of companies and purchases of property, plants, equipment and intangible assets) of the EdF Group amounted to €25 billion in 2009, compared to almost €17 billion in 2008. The main acquisition in 2009 was British Energy. For a 80% stake in the company EdF paid more than €8 billion.<sup>14</sup>

Table 2 reveals EdF's generation capacity investments that are currently under construction.

**Table 2: EdF's investments in new generation capacity in Europe**

Project name	Location	Fuel Type	Date in operation	Amount (million €)	Capacity (MW)	Project Status
EnBW: RDK 8	Rheinhafen-Dampfkraftwerk Karlsruhe (DE)	coal	end of 2012	461 <sup>15</sup>	420 <sup>16</sup>	under construction
EnBW: GKM 9	Grosskraftwerk Mannheim (DE)	coal	2013	177 <sup>17</sup>	134 <sup>18</sup>	under construction
EnBW: Rostock power station	Rostock (DE)	coal	2010	148 <sup>19</sup>	118 <sup>20</sup>	acquisition January 2010
EdF: two combined-cycle gas turbines	Martigues (FR)	gas (CCGT)	2011/2012	n/a	930 <sup>21</sup>	under construction
EdF: combustion turbines	Montereau (FR)	gas	end of 2010	n/a	374 <sup>22</sup>	under construction
EdF: combined-cycle gas turbine	Blénod (FR)	gas (CCGT)	2011/2012	n/a	440	under construction <sup>23</sup>
Alpiq: gas-fired combined cycle	Bayet (FR)	gas (CCGT)	start 2011	78	107	under construction <sup>24</sup>
Alpiq: gas-fired combined cycle	San Severo, Italy	gas (CCGT)	end of 2010	n/a	63	under construction <sup>25</sup>
Edison/Hellenic Petroleum	Thisvi (GR)	gas (CCGT)	n/a	n/a	103 <sup>26</sup>	under construction
EdF Energy: West Burton	Nottinghamshire (UK)	gas (CCGT)	mid 2011	n/a	1,049 <sup>27</sup>	under construction
SPE peak unit Angleur	Liège, Belgium	gas	2011	27	65	under construction <sup>28</sup>
Acquisition more shares SPE	SPE, Belgium	mainly gas	2010	n/a	248	June 2010 <sup>29</sup>
EdF: European Pressurized	Flamanville (FR)	nuclear	2013	3,500 <sup>30</sup>	1,400 <sup>31</sup>	under construction

Reactor (EPR)						
EdF: Rizzanese River dam	Corsica (FR)	hydro	2012	150	55 <sup>32</sup>	under construction
EdF/EnBW: fifth turbine	Iffezheim (DE)	hydro	2012	72 <sup>33</sup>	28 <sup>34</sup>	under construction
EnBW	Rheinfelden (DE)	hydro	2010	175 <sup>35</sup>	34 <sup>36</sup>	under construction
EnBW	Esslingen am Neckar, new plants	hydro	n/a	n/a	n/a	under construction <sup>37</sup>
EnBW/Borusan	Turkey	hydro	late 2010	18	12	under construction <sup>38</sup>
EnBW: 7 onshore wind farms	Onshore (DE)	wind	mid 2010	n/a	24 <sup>39</sup>	acquisition in Dec 2009
EnBW: Baltic 1	Baltic 1 (DE)	wind	end of 2010	55 <sup>40</sup>	23 <sup>41</sup>	under construction <sup>42</sup>
EdF Énergies Nouvelles	Europe	wind	n/a	n/a	183 <sup>43</sup>	under construction
SPE Wind parks	Belgium	wind	2011	10	12	under construction <sup>44</sup>
EdF Énergies Nouvelles	Europe	solar	n/a	n/a	47 <sup>45</sup>	under construction

Table 3 shows all investment plans that EdF has announced or that have appeared in newspaper reports, but for which construction has not yet been initiated.

**Table 3: EdF's announced plans for investment in new capacity in Europe**

Project name	Location	Fuel Type	Date in operation	Amount (million €)	Capacity (MW)	Status
ERSA: renewal of 4 coal production units of 220 MW	Rybnik (PO)	coal	2015	1,137	538	decision in mid-2010 <sup>46</sup>
EnBW: gas power station	Karlsruhe (DE)	gas	n/a	n/a	n/a	in study <sup>47</sup>
Edison	Italy	gas (CCGT)	n/a	n/a	392 <sup>48</sup>	in study
Nest-Energie (99.6%-owned by EdF).	Evergem, East Flanders, Belgium.	gas (CCGT)	2015	750	920 <sup>49</sup>	to be developed; subject to EC decision <sup>50</sup>
Dils-Energie (99.6%-owned by EdF).	Dilsen-Stokkem Belgium.	gas (CCGT)	2012	750	920 <sup>51</sup>	to be developed; subject to EC decision <sup>52</sup>
SPE	Navagne (Belgium)	gas (CCGT)	2012	280	439	In study/to be developed <sup>53</sup>
EdF: EPR	Penly site, Normandy (FR)	nuclear	n/a	n/a	825 <sup>54</sup>	public debate set up in 2010
EdF: uprate capacity 20 units 1,300 MW	France	nuclear	gradually from 2017	n/a	1300	study <sup>55</sup>
EdF: EPR	Poland	nuclear	before the end of 2020	n/a	n/a	feasibility study <sup>56</sup>
EdF: EPR	Italy	nuclear	2020?	n/a	800	license in 2011? <sup>57</sup>
EdF: three EPRs	Italy	nuclear	n/a	n/a	n/a	feasibility study <sup>58</sup>

EdF Energy: EPR	UK	nuclear	end of 2017	n/a	1,600	investment decision by EdF in 2011 <sup>59</sup>
EdF: three EPRs	UK	nuclear	after 2017	n/a	n/a	pre-development <sup>60</sup>
EdF: small hydro	France	hydro	2010-2014	n/a	54 <sup>61</sup>	In study/to be developed
Alpiq: two more hydro turbines	Switzerland	hydro	n/a	n/a	42 <sup>62</sup>	in discussion
EdF/EnBW: additional group	Gambenheim (FR)	hydro	n/a	n/a	20 <sup>63</sup>	construction to start in 2010
EdF Energy: offshore wind farms	Teesside, Fair Field and Royal Oak (UK)	wind	n/a	n/a	49 <sup>64</sup>	planning phase
EnBW	Baltic 2 (DE)	wind	2013	386 <sup>65</sup>	133 <sup>66</sup>	supply contract June 2010
EnBW	North Sea (He dreiht and Hochsee) (DE)	wind	n/a	922 <sup>67</sup>	397	to be developed <sup>68</sup>
SPE	Belgium	wind	2011-2015	n/a	est. 51	In study/to be developed <sup>69</sup>
EdF Énergies Nouvelles	Toul-Rosieres (FR)	solar	2012	n/a	143	to be developed <sup>70</sup>

## Responsible sourcing

In its brochure (made in 2009) that outlines the companies' sustainable development policy, EdF makes no reference at all to supply chain responsibility.<sup>71</sup> The same applies for its Activity and Sustainable Development Report 2009.<sup>72</sup> Finally, on the website of the EdF no reference could be found regarding responsible sourcing of uranium and coal.

France uses some 12,400 tonnes of uranium oxide concentrate (10,500 tonnes of U) per year for its electricity generation. Much of this comes from Areva in Canada (4,500 tU/yr) and Niger (3,200 tU/yr) together with other imports, principally from Australia, Kazakhstan and Russia, mostly under long-term contracts. All French nuclear reactors are operated by EdF.<sup>73</sup>

For its nuclear power fleet in France and the United Kingdom, the main supplier of uranium to EdF is the AREVA group. EdF is pursuing a policy of diversifying its sources of supply in order to balance market shares between the AREVA group and other suppliers. In the United States, its 49.99% owned Constellation Energy Nuclear Group CENG purchases uranium and conversion, enrichment and assembly services from several suppliers.<sup>74</sup>

In its Activity and Sustainable Development Report 2009 EdF declares it has used 24 million tonnes of coal in 2009.<sup>75</sup>

<sup>1</sup> EdF Group Activity and Sustainable Development Report 2009, p. 5, <[http://www.EdF.com/html/RA2009/uk/pdf/EdF\\_RA09\\_full\\_va.pdf](http://www.EdF.com/html/RA2009/uk/pdf/EdF_RA09_full_va.pdf)> (11 June 2010)

<sup>2</sup> EdF group 2009 Document de Référence, April 2010, p. 229, <[http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF\\_DDR2009\\_va.pdf](http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF_DDR2009_va.pdf)> (15 June 2010)

<sup>3</sup> EdF, press release "EdF is to buy the shares of shareholders exiting SPE-Luminus, thereby bringing its holding in the Belgian energy company to 63.5%", June 1st 2010, <[http://shareholders-and-investors.EdF.com/fichiers/fckeditor/Commun/Presse/Communiqués/EdF/2010/cp\\_20100601\\_va.pdf](http://shareholders-and-investors.EdF.com/fichiers/fckeditor/Commun/Presse/Communiqués/EdF/2010/cp_20100601_va.pdf)> (11 June 2010)

- 4 E-mails Jean-Michel Guibert (Délégué éthique, EDF - Directeur Ethique & Reporting, Direction du Développement Durable) on 16 and 20 July 2010.
- 5 E-mail Els Devalez (External Communications Officer, Corporate Affairs, SPE-Luminus) on 5 August 2010.
- 6 EdF Group, "Activity and Sustainable Development Report 2009", page 45 onwards,  
<[http://www.edf.com/html/RA2009/uk/pdf/EDF\\_RA09\\_full\\_va.pdf](http://www.edf.com/html/RA2009/uk/pdf/EDF_RA09_full_va.pdf)> (11 June 2010)
- 7 Included around 2 GW capacity in Corsica and the French Overseas departments. EdF Group Activity and Sustainable Development Report 2009, p. 46,  
<[http://www.edf.com/html/RA2009/uk/pdf/EDF\\_RA09\\_full\\_va.pdf](http://www.edf.com/html/RA2009/uk/pdf/EDF_RA09_full_va.pdf)> (11 June 2010)
- 8 According to p.40 of the EdF Group Activity and Sustainable Development Report 2009, the generated electricity in 2009 amounts to 618.5 TWh. According to the chapters on Businesses operating performance by country (p.45 onwards; France, United Kingdom, Germany, Italy, other countries, other businesses) the generated electricity in 2009 amounts to 632.8 TWh.
- 9 EdF Group Activity and Sustainable Development Report 2009, Businesses operating performance by country (France, United Kingdom, Germany, Italy, other countries, other businesses), p. 45 onwards,  
<[http://www.EdF.com/html/RA2009/uk/pdf/EdF\\_RA09\\_full\\_va.pdf](http://www.EdF.com/html/RA2009/uk/pdf/EdF_RA09_full_va.pdf)> (11 June 2010)
- EdF states that its worldwide installed power capacity amounts to 136.3 GW as of 31 December 2009 (134.0 GW in Europe). The company does however not provide for a breakdown of this figure into fuel types. EdF group 2009 Document de Référence, April 2010, p. 38,  
<[http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF\\_DDR2009\\_va.pdf](http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF_DDR2009_va.pdf)> (14 June 2010)
- 10 CREG, VREG, CWAPE, BRUGEL, "De ontwikkeling van de elektriciteits- en aardgasmarkten in België, Jaar 2009", <<http://www.vreg.be/vreg/documenten/persmededelingen/PERS-2010-2.pdf>> (13 August 2010)
- 11 EdF Group Activity and Sustainable Development Report 2009, p. 79,  
<[http://www.EdF.com/html/RA2009/uk/pdf/EdF\\_RA09\\_full\\_va.pdf](http://www.EdF.com/html/RA2009/uk/pdf/EdF_RA09_full_va.pdf)> (11 June 2010)
- 12 CREG, VREG, CWAPE, BRUGEL, "De ontwikkeling van de elektriciteits- en aardgasmarkten in België, Jaar 2009", 27 April 2010, <<http://www.vreg.be/vreg/documenten/persmededelingen/PERS-2010-2.pdf>> (13 August 2010)
- 13 EdF Group Activity and Sustainable Development Report 2009, p. 18,  
<[http://www.EdF.com/html/RA2009/uk/pdf/EdF\\_RA09\\_full\\_va.pdf](http://www.EdF.com/html/RA2009/uk/pdf/EdF_RA09_full_va.pdf)> (11 June 2010)
- 14 EdF group 2009 Document de Référence, April 2010, p. 169 - 172,  
<[http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF\\_DDR2009\\_va.pdf](http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF_DDR2009_va.pdf)> (14 June 2010)
- 15 Total investment is more than €1 billion. EdF has a 46.07% stake in EnBW. EdF group 2009 Document de Référence, April 2010, p. 93,  
<[http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF\\_DDR2009\\_va.pdf](http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF_DDR2009_va.pdf)> (14 June 2010)
- 16 Total capacity is 912 MW. EdF has a 46.07% stake in EnBW. Shareholders EnBW:  
<[http://www.enbw.com/content/en/investors/share/shareholder\\_structure/index.jsp](http://www.enbw.com/content/en/investors/share/shareholder_structure/index.jsp)> (14 June 2010)
- 17 Total capacity is 911 MWe. Total costs are €1.2 billion. EdF has a 46.07% stake in EnBW. GKM is owned by RWE Power AG (40%), EnBW Kraftwerke AG (32%) and MVV RHE GmbH (28%).  
Grosskraftwerk Mannheim Aktiengesellschaft (GKM), "Der Baustellenreport Nr. 1 / 2010",  
<[http://www.gkm.de/projekt\\_block\\_9/block\\_9\\_aktuell/](http://www.gkm.de/projekt_block_9/block_9_aktuell/)> (16 June 2010)
- Website GKM, "Unsere Aktionäre", <<http://www.gkm.de/unternehmen/struktur/>> (16 June 2010)
- 18 Total capacity is 911 MWe. Total costs are €1.2 billion. EdF has a 46.07% stake in EnBW. GKM is owned by RWE Power AG (40%), EnBW Kraftwerke AG (32%) and MVV RHE GmbH (28%).  
Grosskraftwerk Mannheim Aktiengesellschaft (GKM), "Der Baustellenreport Nr. 1 / 2010",  
<[http://www.gkm.de/projekt\\_block\\_9/block\\_9\\_aktuell/](http://www.gkm.de/projekt_block_9/block_9_aktuell/)> (16 June 2010)
- Website GKM, "Unsere Aktionäre", <<http://www.gkm.de/unternehmen/struktur/>> (16 June 2010)
- 19 The purchase price amounted to €321 million. EdF has a 46.07% stake in EnBW. EnBW Energie Baden-Württemberg AG, annual report 2009, 10 March 2010, p. 135,  
<[http://www.enbw.com/content/en/investors/media/pdf/annual\\_reports/ar\\_2009.pdf](http://www.enbw.com/content/en/investors/media/pdf/annual_reports/ar_2009.pdf)> (14 June 2010)
- 20 EnBW acquired 50.4% in the coal-fired power plant at Rostock (i.e. 256 MW). EdF has a 46.07% stake in EnBW. EdF group 2009 Document de Référence, April 2010, p. 93,  
<[http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF\\_DDR2009\\_va.pdf](http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF_DDR2009_va.pdf)> (14 June 2010)
- 21 EdF group 2009 Document de Référence, April 2010, p. 58,  
<[http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF\\_DDR2009\\_va.pdf](http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF_DDR2009_va.pdf)> (14 June 2010) Three oil-fired units of 250 MW each are to be converted at the Martigues site into two combined-cycle gas turbines of 465 MW each.
- 22 EdF group 2009 Document de Référence, April 2010, p. 58,  
<[http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF\\_DDR2009\\_va.pdf](http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF_DDR2009_va.pdf)> (14 June 2010)
- 23 EdF group 2009 Document de Référence, April 2010, p. 58,  
<[http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF\\_DDR2009\\_va.pdf](http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF_DDR2009_va.pdf)> (14 June 2010)
- 24 EdF has a 26.1% stake in Alpiq. Total capacity 410 MW. Total costs €300 million.  
EdF Group 2009 Document de Référence, April 2010, p. 104,  
<[http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF\\_DDR2009\\_va.pdf](http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF_DDR2009_va.pdf)>



- (16 June 2010)
- 25 Alpiq, <<http://www.alpiq.com/news-stories/stories/stories.jsp?story=tcm:95-56487>>, (16 June 2010)  
EdF has a 26.1% stake in Alpiq. Alpiq has a 60% stake in EnPlus, together with Avelar Energy Group (30%) and En&En (10%). Total capacity 400 MW. Alpiq, <<http://www.alpiq.com/what-we-offer/our-assets/thermal-power-plants/combined-cycle-power-plants/san-severo-thermal-power-station.jsp>> (16 June 2010)
- 26 Total capacity of the plant is 420 MW. Edison has a 50% stake. EdF owns 48.96% of Edison's shares. EdF group 2009 Document de Référence, April 2010, p. 99, <[http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF\\_DDR2009\\_va.pdf](http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF_DDR2009_va.pdf)> (14 June 2010)
- 27 Total capacity 1,311MW. EdF has a 80% stake in EdF Energy. EdF group 2009 Document de Référence, April 2010, p. 89, <[http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF\\_DDR2009\\_va.pdf](http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF_DDR2009_va.pdf)> (14 June 2010)  
EdF Energy website, About us, "West Burton Combined Cycle Gas Turbine Station", <<http://www.EdEnergy.com/about-us/energy-generation/power-generation/west-burton-combined-cycle-gas-turbine.shtml>> (16 June 2010)
- 28 As of 31 December 2009, EdF had a stake of 51% in SPE. European Commission, "Case No COMP/M.5549 - EDF/ SEGEBEL Regulation (EC) NO 139/2004 merger procedure", 12 November 2009, p. 10, <[http://ec.europa.eu/competition/mergers/cases/decisions/m5549\\_20091112\\_20212\\_en.pdf](http://ec.europa.eu/competition/mergers/cases/decisions/m5549_20091112_20212_en.pdf)> (23 June 2010)  
Rolls-Royce, "Rolls-Royce wins Trent 60 business in eight countries", 5 June 2008, <[http://www.rolls-royce.com/energy/news/2008/rr\\_wins\\_trents60.jsp](http://www.rolls-royce.com/energy/news/2008/rr_wins_trents60.jsp)> (23 June 2010)
- 29 In 2009 EdF Belgium acquired a 51% stake in SPE-Luminus (SPE), the second-largest Belgian energy company. In June 2010 EdF raised its stake in SPE from 51% to 63.5%. EdF, press release "EdF is to buy the shares of shareholders exiting SPE-Luminus, thereby bringing its holding in the Belgian energy company to 63.5%", June 1st 2010, <[http://shareholders-and-investors.EdF.com/fichiers/fckeditor/Commun/Presse/Communiques/EdF/2010/cp\\_20100601\\_va.pdf](http://shareholders-and-investors.EdF.com/fichiers/fckeditor/Commun/Presse/Communiques/EdF/2010/cp_20100601_va.pdf)> (11 June 2010)
- 30 At the end of 2008 the overnight cost estimate (without financing costs) was updated by 21% to €4 billion (under 2008 conditions). These costs were confirmed in mid 2009, when EdF had spent nearly €2 billion. Enel is assumed to have paid €500 billion for its 12.5% stake. Source: World Nuclear Association, "Nuclear Power in France", June 2010, <<http://www.world-nuclear.org/info/inf40.html>> (14 June 2010)  
Two French dailies, Le Figaro and Les Echos, reported in January 2010 the cost of the unit had risen to €5 billion. Source: Nucleonics Week, "French union: Flamanville-3 delayed", 28 January 2010.
- 31 This will be the third reactor at the site of Flamanville, France. Flamanville 3 is scheduled to be commissioned in 2012 and to start generating electricity for the market in 2013. Source: EdF Group Activity and Sustainable Development Report 2009, p. 57, <[http://www.EdF.com/html/RA2009/uk/pdf/EdF\\_RA09\\_full\\_va.pdf](http://www.EdF.com/html/RA2009/uk/pdf/EdF_RA09_full_va.pdf)> <[http://www.EdF.com/html/RA2009/uk/pdf/EdF\\_RA09\\_full\\_va.pdf](http://www.EdF.com/html/RA2009/uk/pdf/EdF_RA09_full_va.pdf)> (11-06-2010)  
Pursuant to an agreement signed in November 2007 ENEL France holds a 12.5% interest in Flamanville 3. The EdF-capacity will be 87.5% of 1600 GW, being 1,400 GW. Source: ENEL - Società per Azioni, "Offering Circular", 3 September 2009, <[http://www.enel.com/en-GB/doc/investor/Final\\_Offering\\_CIRCULAR\\_en.pdf](http://www.enel.com/en-GB/doc/investor/Final_Offering_CIRCULAR_en.pdf)> (14 June 2010)
- 32 EdF group 2009 Document de Référence, April 2010, p. 76, <[http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF\\_DDR2009\\_va.pdf](http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF_DDR2009_va.pdf)> (15 June 2010)  
EdF, Tackling climate change, no date, <[http://www.EdF.com/html/RA2007/uk/pdf/ra2007DD\\_09\\_va.pdf](http://www.EdF.com/html/RA2007/uk/pdf/ra2007DD_09_va.pdf)> (16 June 2010)
- 33 Total investment €100 million. Owners 50/50 EdF/EnBW, so stake EdF is 72.51%. EnBW Energie Baden-Württemberg AG, annual report 2009, 10 March 2010, p. 20, <[http://www.enbw.com/content/en/investors/media/pdf/annual\\_reports/ar\\_2009.pdf](http://www.enbw.com/content/en/investors/media/pdf/annual_reports/ar_2009.pdf)> (14 June 2010)
- 34 Fifth turbine with a capacity of 38 MW. Owners 50/50 EdF/EnBW, so stake EdF is 72.51%. EdF group 2009 Document de Référence, April 2010, p. 58, <[http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF\\_DDR2009\\_va.pdf](http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF_DDR2009_va.pdf)> (14 June 2010)
- 35 Total investment is € 380 million. EdF has a 46.07% stake in EnBW.
- 36 Increase in capacity from 26 MW to 100 MW. EdF has a 46.07% stake in EnBW. EdF group 2009 Document de Référence, April 2010, p. 93, <[http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF\\_DDR2009\\_va.pdf](http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF_DDR2009_va.pdf)> (14 June 2010)
- 37 EnBW has a 49.98 stake in Stadtwerke Esslingen am Neckar GmbH & Co. KG. EdF has a 46.07% stake in EnBW. EnBW Energie Baden-Württemberg AG, annual report 2009, 10 March 2010, p. 263, <[http://www.enbw.com/content/en/investors/media/pdf/annual\\_reports/ar\\_2009.pdf](http://www.enbw.com/content/en/investors/media/pdf/annual_reports/ar_2009.pdf)> (14 June 2010)
- 38 EnBW and the Turkish group Borusan created a 50/50 joint-venture in April 2009. EdF has a 46.07% stake in EnBW. Total investment €77 million, total capacity 50 MW. EnBW, "EnBW stärkt ihre Erzeugungsposition und wächst im In- und Ausland", 29 April 2010, <[http://www.enbw.com/content/de/presse/pressemittelungen/2010/04/PM\\_20100429\\_HV1\\_mw01/index.jsp](http://www.enbw.com/content/de/presse/pressemittelungen/2010/04/PM_20100429_HV1_mw01/index.jsp)> (17 June 2010)
- 39 Total power of the 7 onshore wind farms acquired is 53 MW. EdF has a 46.07% stake in EnBW. EdF group 2009 Document de Référence, April 2010, p. 93,



- <[http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF\\_DDR2009\\_va.pdf](http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF_DDR2009_va.pdf)> (15 June 2010)
- 40 Total investment was €3 billion. Divided by ratio of capacity (Baltic 1 has 4% of total capacity of projects Baltic 1, Kriegers Flat, He Dreih and Hochseewindpark Nordsee). EdF has a 46.07% stake in EnBW. EnBW, "Startschuss für EnBW Baltic 1: EnBW legt Grundstein für den ersten kommerziellen Offshore-Windpark in der deutschen Ostsee", 6 May 2010, <[http://www.enbw.com/content/de/presse/pressemitteilungen/2010/05/PM\\_20100506\\_baltic1\\_mw01/index.jsp](http://www.enbw.com/content/de/presse/pressemitteilungen/2010/05/PM_20100506_baltic1_mw01/index.jsp)> (17 June 2010)
- 41 In May 2008, EnBW acquired two project development companies (EOS Offshore AG and Offshore Ostsee Wind AG), which hold the rights to offshore wind energy projects in the Baltic Sea and the North Sea for a total of 1,200 MW. The initial project in the Baltic Sea is approximately 50 MW. EdF has a 46.07% stake in EnBW. EdF group 2009 Document de Référence, April 2010, p. 93, <[http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF\\_DDR2009\\_va.pdf](http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF_DDR2009_va.pdf)> (14 June 2010)
- 42 May 2010 public utilities acquired options on equity investments, totaling 24 MW. EnBW website, <<http://www.enbw.com/content/de/baltic1/news/index.jsp>> (16 June 2010)
- 43 EDF Énergies Nouvelles, Press release "Full-year 2009 results up sharply and ahead of objectives", 10 February 2010, <[http://www.EdF-energies-nouvelles.com/admin/upload/communiquer/PR\\_2009AnnualResults\\_100210\\_ENG.pdf](http://www.EdF-energies-nouvelles.com/admin/upload/communiquer/PR_2009AnnualResults_100210_ENG.pdf)> (14 June 2010) The stated capacity represents halve of the capacity under construction by EdF Énergies Nouvelles. EdF has a 50% stake in EdF Énergies Nouvelles.
- 44 As of 31 December 2009, EdF had a stake of 51% in SPE. SPE, "De windmolenparken van SPE-Luminus, elektriciteit voor generaties", March 2010, p. 3, <[http://www.spe.be/pdf/brochure\\_eol\\_nl.pdf?21spe2020=0b50f13659b0cd62bc762894cd22e940](http://www.spe.be/pdf/brochure_eol_nl.pdf?21spe2020=0b50f13659b0cd62bc762894cd22e940)> (23 June 2010)
- 45 EdF Énergies Nouvelles, Press release "Full-year 2009 results up sharply and ahead of objectives", 10 February 2010, <[http://www.EdF-energies-nouvelles.com/admin/upload/communiquer/PR\\_2009AnnualResults\\_100210\\_ENG.pdf](http://www.EdF-energies-nouvelles.com/admin/upload/communiquer/PR_2009AnnualResults_100210_ENG.pdf)> (14 June 2010) The stated capacity represents halve of the capacity under construction by EdF Énergies Nouvelles. EdF has a 50% stake in EdF Énergies Nouvelles.
- 46 EDF holds a direct holding of 46.05% in ERSA (Elektrownia Rybnik), plus an indirect holding of 18.82% through EC Wybrzeze, a company owned at 96.73% by EDF. Finally, EnBW holds a 32.44% stake in ERSA. EdF has a 46.07% stake in EnBW. So EdF stake is 80%. EdF Group 2009 Document de Référence, April 2010, p. 93, <[http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF\\_DDR2009\\_va.pdf](http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF_DDR2009_va.pdf)> (15 June 2010) Total capacity 950 MW. Total investment 5,700 million Zloty. Exchange rate: 0.24987 (average 01/01/2010-19/06/2010, <<http://nl.exchange-rates.org/history/EUR/PLN/T>> BRE Bank Securities, "Update power engineering", 12 March 2010, <[http://i.wp.pl/a/dibre/aspolek/energy\\_120310.pdf](http://i.wp.pl/a/dibre/aspolek/energy_120310.pdf)> (18 June 2010)
- 47 EdF Group 2009 Document de Référence, April 2010, p. 93, <[http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF\\_DDR2009\\_va.pdf](http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF_DDR2009_va.pdf)> (15 June 2010)
- 48 Total capacity 800MW. EdF has a stake of 48.96% in Edison. EdF Group Activity and Sustainable Development Report 2009, p. 77, <[http://www.EdF.com/html/RA2009/uk/pdf/EdF\\_RA09\\_full\\_va.pdf](http://www.EdF.com/html/RA2009/uk/pdf/EdF_RA09_full_va.pdf)> (17 June 2010)
- 49 The investment is subject of a decision by the European Commission concerning the acquisition by Electricité de France S.A. (EdF) of Segebel, a holding company of which its only asset is a 51% stake in SPE S.A. The decision concerns the planned CCGT-plants of Evergem and Dilsen-Stokkem. EDF commits to divest, or procure the divestiture of the [CCGT 1] Assets or [CCGT 2] Assets. EDF commits to divest, or procure the divestiture of the remaining asset (the [CCGT 1] Assets or the [CCGT 2] Assets) in the event that EDF would not have taken a Final Investment Decision or have taken a Negative Investment Decision by the Final Investment Decision Date (not specified). European Commission, "Case No COMP/M.5549 - EDF/ SEGEBEL Regulation (EC) NO 139/2004 merger procedure", 12 November 2009, p. 49, <[http://ec.europa.eu/competition/mergers/cases/decisions/m5549\\_20091112\\_20212\\_en.pdf](http://ec.europa.eu/competition/mergers/cases/decisions/m5549_20091112_20212_en.pdf)> (23 June 2010)
- 50 Nest-Energie is 99.6%-owned by EdF. It is developing a 2 x 460-MW CCGT plant on undeveloped land in an industrial zone at Evergem, East Flanders, Belgium. Construction could start in 2012 with completion in 2015. Source: Platts Power In Europe, "Nest-Energie seeks OE for Evergem", 31 May 2010. NEST-energie website, "feiten en cijfers", <<http://nestenergie-be.edf.com/het-project/feiten-en-cijfers-46205.html>> (23 June 2010). EdF owns 99.6% of the company.
- 51 The investment is subject of a decision by the European Commission concerning the acquisition by Electricité de France S.A. (EdF) of Segebel, a holding company of which its only asset is a 51% stake in SPE S.A. The decision concerns the planned CCGT-plants of Evergem and Dilsen-Stokkem. EDF commits to divest, or procure the divestiture of the [CCGT 1] Assets or [CCGT 2] Assets. EDF commits to divest, or procure the divestiture of the remaining asset (the [CCGT 1] Assets or the [CCGT 2] Assets) in the event that EDF would not have taken a Final Investment Decision or have taken a Negative Investment Decision by the Final Investment Decision Date (not specified). European Commission, "Case No COMP/M.5549 - EDF/ SEGEBEL Regulation (EC) NO 139/2004 merger procedure", 12 November 2009, p. 49, <[http://ec.europa.eu/competition/mergers/cases/decisions/m5549\\_20091112\\_20212\\_en.pdf](http://ec.europa.eu/competition/mergers/cases/decisions/m5549_20091112_20212_en.pdf)> (23 June 2010)
- 52 Dils-Energie, "Feiten en cijfers", <<http://dilsenergie-be.edf.com/wie-zijn-wey/dils-energie-47249.html>> (23 June 2010) EdF owns 99.6% of the company.

- 53 As of 31 December 2009, EdF had a stake of 51% in SPE. SPE, press release “CCGT power plant in Navagne: SPE receives initial permit”, 24 February 2009, <<http://www.spe.be/index.php?page=press&subpage=pressreleases&section=more&id=55>> (23 June 2010)  
European Commission, “Case No COMP/M.5549 - EDF/ SEGEBEL Regulation (EC) NO 139/2004 merger procedure”, 12 November 2009, <[http://ec.europa.eu/competition/mergers/cases/decisions/m5549\\_20091112\\_20212\\_en.pdf](http://ec.europa.eu/competition/mergers/cases/decisions/m5549_20091112_20212_en.pdf)> (23 June 2010)
- 54 In January 2009 President Sarkozy confirmed that EdF would build a second EPR, a 1650 MWe reactor at Penly. EdF will hold a 50% stake in the project company. GDF SUEZ and Total will be involved with a 33.33% stake in the project company. The remaining 16.66% probably includes Enel, which established a cooperation agreement with EdF, and E.ON. EdF Group 2009 Document de Référence, April 2010, p. 52, <[http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF\\_DDR2009\\_va.pdf](http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF_DDR2009_va.pdf)> (15 June 2010)
- 55 EdF Group 2009 Document de Référence, April 2010, p. 50, <[http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF\\_DDR2009\\_va.pdf](http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF_DDR2009_va.pdf)> (15 June 2010) One Terawatt-hour is equal to approximately 114 megawatts for a period of one year.
- 56 On November 17, 2009, EdF and Polska Grupa Energetyczna (PGE, Poland’s leading electricity operator, which is listed on the Warsaw stock exchange) signed a cooperation memorandum in the field of nuclear energy. The memorandum is particularly concerned with the carrying out of feasibility studies into the development of EPR nuclear reactors in Poland and the construction of the first Polish EPR in Poland before the end of 2020. EdF Group 2009 Document de Référence, April 2010, p. 102, <[http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF\\_DDR2009\\_va.pdf](http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF_DDR2009_va.pdf)> (15 June 2010)
- 57 Capacity 1650 MWe EPR unit. Enel expects the first site to be licensed in 2011, a construction and operating license to be issued in 2013, construction start in 2015, and operation of the first unit in 2020. Source: World Nuclear Association, “Nuclear Power in Italy”, May 2010, < <http://world-nuclear.org/info/inf101.html#References>> (14 June 2010)  
SNI (Sviluppo Nucleare Italia) is a 50:50 joint venture of Enel and EDF that plans to build at least four nuclear units in Italy on the basis of the Areva 1,600 MW-class EPR reactor. Source: Platts Power In Europe, “Nuclear sites ‘by early 2011’”, 5 April 2010.
- 58 Enel, press release “Enel and EdF announced the creation of an equal basis joint venture for the nuclear development in Italy”, 3 August 2009, <[http://www.enel.com/en-GB/investor/press\\_releases/release.aspx?iddoc=1618970](http://www.enel.com/en-GB/investor/press_releases/release.aspx?iddoc=1618970)> (16 June 2010)
- 59 EdF and Centrica set up an 80/20 joint venture for pre-development of a nuclear renewal programme in the UK. The two companies’ objective is to build and operate four EPR-type nuclear reactors due to be commissioned successively from 2017. Subject to all conditions being met, a final investment decision by EdF for the first EPR is expected around 2011. EdF Group 2009 Document de Référence, April 2010, p. 88 and 151, <[http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF\\_DDR2009\\_va.pdf](http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF_DDR2009_va.pdf)> (15 June 2010)
- 60 EdF and Centrica set up an 80/20 joint venture for pre-development of a nuclear renewal programme in the UK. The two companies’ objective is to build and operate four EPR-type nuclear reactors due to be commissioned successively from 2017. Subject to all conditions being met, a final investment decision by EdF for the first EPR is expected around 2011. EdF Group 2009 Document de Référence, April 2010, p. 88 and 151, <[http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF\\_DDR2009\\_va.pdf](http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF_DDR2009_va.pdf)> (15 June 2010)  
EDF is planning to build four Areva EPR reactors in the UK, two each at Sizewell in Suffolk and two at Hinkley Point. For Hinkley Point the EPR reactors would be 1,600 MW each. Source: Platts Power In Europe, “EDF opens UK EPR tendering”, 31 May 2010.
- 61 Small hydropower plants (18MW) and generation from reserved flows (36MW). EdF group 2009 Document de Référence, April 2010, p. 57, <[http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF\\_DDR2009\\_va.pdf](http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF_DDR2009_va.pdf)> (15 June 2010)
- 62 EdF has a 26.1% stake in Alpiq. Nant de Drance SA operates the project (company owned by Alpiq 54%, SBB 36% and FMV 10%) The plan is to increase capacity of the plant from 600 to 900 MW by adding two 150 MW sets to the four turbine sets originally planned. Alpiq, “Further step towards an increase in the capacity of the pumped storage power station”, 15 June 2010, < [http://www.alpiq.com/news-stories/press-releases/press\\_releases.jsp?news=tcm:95-71312](http://www.alpiq.com/news-stories/press-releases/press_releases.jsp?news=tcm:95-71312)> (16 June 2010)
- 63 The Gamsheim hydropower plant will be reinforced by the installation of an additional 28 MW group. Owners 50/50 EdF/EnBW, so stake EdF is 72.51 %. EdF group 2009 Document de Référence, April 2010, p. 57, <[http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF\\_DDR2009\\_va.pdf](http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF_DDR2009_va.pdf)> (15 June 2010)
- 64 Teesside has a total capacity of 62.1 MW (27 turbines, 2.3 MW each). Fair Field and Royal Oak both have a capacity of 6.5 MW (5 turbines producing 1.3 MW). Source: EdF Energy Renewables, <<http://www.EdF-er.com/Projects/Consented-Teesside-Details.htm>>, (16 June 2010). EdF Energy Renewables is a 50/50 joint venture of EdF Energy and EdF Énergies Nouvelles. EdF has a 50% stake in EdF Énergies Nouvelles. EdF has a 80% stake in EdF Energy. 65% of 75.1 = 49 MW.
- 65 Total investment was € 3 billion. Divided by ratio of capacity (Kriegers Flat has 28% of total capacity of projects Baltic 1, Kriegers Flat, He Dreiht and Hochseewindpark Nordsee). EdF has a 46.07% stake in EnBW.
- 66 Baltic 2 will have a total capacity 288 MW. EdF has a 46.07% stake in EnBW. Siemens AG and EnBW Erneuerbare Energien GmbH, joint press release “EnBW offshore wind farm Baltic 2”, 9 June 2010,

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- <<http://www.siemens.com/press/en/pressrelease/index.php?content=energy>> (16 June 2010) Project is previously called Kriegers Flak.
- <sup>67</sup> Total investment was € 3 billion. Divided by ratio of capacity (He Dreiht and Hochseewindpark Nordsee have 68% of total capacity of projects. EdF has a 46.07% stake in EnBW.
- <sup>68</sup> In May 2008, EnBW acquired two project development companies (EOS Offshore AG and Offshore Ostsee Wind AG), which hold the rights to offshore wind energy projects in the Baltic Sea and the North Sea for a total of 1,200 MW. Baltic 1 (50MW) and 2 (288MW) are closer to realisation and listed apart in this fact sheet. EdF has a 46.07% stake in EnBW. EdF Group 2009 Document de Référence, April 2010, p. 93, <[http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF\\_DDR2009\\_va.pdf](http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF_DDR2009_va.pdf)> (16 June 2010)
- <sup>69</sup> As of 31 December 2009, EdF had a stake of 51% in SPE. European Commission, "Case No COMP/M.5549 - EDF/ SEGEBEL Regulation (EC) NO 139/2004 merger procedure", 12 November 2009, p. 10, <[http://ec.europa.eu/competition/mergers/cases/decisions/m5549\\_20091112\\_20212\\_en.pdf](http://ec.europa.eu/competition/mergers/cases/decisions/m5549_20091112_20212_en.pdf)> (23 June 2010)
- <sup>70</sup> Agence France Presse, "France builds world's biggest photovoltaic solar plant", 2 March 2010.
- <sup>71</sup> EdF group, "CORPORATE SUSTAINABLE DEVELOPMENT POLICY, Leading the energy change", <[http://about-us.edf.com/fichiers/fckeditor/Commun/Developpement\\_Durable/Publications/Annee/2009/edf\\_brochure\\_DD\\_061009\\_va.pdf](http://about-us.edf.com/fichiers/fckeditor/Commun/Developpement_Durable/Publications/Annee/2009/edf_brochure_DD_061009_va.pdf)> (23 June 2010)
- <sup>72</sup> EdF Group Activity and Sustainable Development Report 2009, <[http://www.EdF.com/html/RA2009/uk/pdf/EdF\\_RA09\\_full\\_va.pdf](http://www.EdF.com/html/RA2009/uk/pdf/EdF_RA09_full_va.pdf)> (23 June 2010)
- <sup>73</sup> World Nuclear Association, "Nuclear Power in France", June 2010, <<http://www.world-nuclear.org/info/inf40.html>> (14 June 2010)
- <sup>74</sup> EdF Group 2009 Document de Référence, April 2010, p. 25 and 32, <[http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF\\_DDR2009\\_va.pdf](http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddr/EdF_DDR2009_va.pdf)> (23 June 2010)
- <sup>75</sup> EdF Group Activity and Sustainable Development Report 2009, p. 98 <[http://www.EdF.com/html/RA2009/uk/pdf/EdF\\_RA09\\_full\\_va.pdf](http://www.EdF.com/html/RA2009/uk/pdf/EdF_RA09_full_va.pdf)> (23 June 2010)

## 2 GDF Suez/Electrabel

### Basic company information

GDF Suez was created in the merger between Suez and Gaz de France (GDF) that took place in July 2008. The company is one of the main energy providers in the world. GDF Suez is active across the entire energy value chain, in electricity and natural gas upstream to downstream. In 2009 the company's revenue amounted to €79.9 billion, of which 86% achieved within Europe.<sup>76</sup> The main shareholder of GDF Suez is the French government, with 35.9% of the shares as of 31 December 2009.<sup>77</sup> In Europe, GDF Suez is established in France, Benelux, Germany, United Kingdom, Norway, Switzerland, Russia, Poland, Romania, Hungary, Italy, Greece, Spain, Portugal, Slovakia and Turkey.

Electrabel is part of GDF Suez, and is present in the Benelux. Electrabel is by far the leading producer of electricity in Belgium. Its fleet represents approximately two-thirds of the country's total installed capacity. Electrabel is currently also the Netherlands' leading electricity producer, with a share of 20-25% of the country's generating capacity.<sup>78</sup>

The fact sheet and a questionnaire was sent by SOMO for review to a representative of Electrabel Nederland. There has been no response to this request. Later on, the fact sheet was sent for review to a representative of GDF Suez Energy Benelux & Germany. The response comprised mainly the Belgium operations of GDF Suez.<sup>79</sup> Therefore, the findings in this fact sheet should be interpreted with caution.

### Installed capacity and electricity generation in Europe

Worldwide, GDF Suez has the capacity to produce 60.5 GW of power. In Europe, the total generation capacity is 38.7 GW. This is 64% of GDF Suez's worldwide capacity.<sup>80</sup> For this study, no information could be found regarding the fuel types of installed capacity at 31 December 2009 and electricity generation in 2009 for Europe specifically. Figure 3 reveals the fuel mix of GDF Suez's electricity generation capacity in Europe at the end of 2008. It should be noted that the hydro in the figures 3 and 4 and table 4 includes pumped storage power stations. This is not part of renewable energy, so the actual percentages of hydro may be a few percentages lower.

**Figure 3: Fuel mix of GDF Suez's installed capacity in Europe, end of 2008<sup>81</sup>**

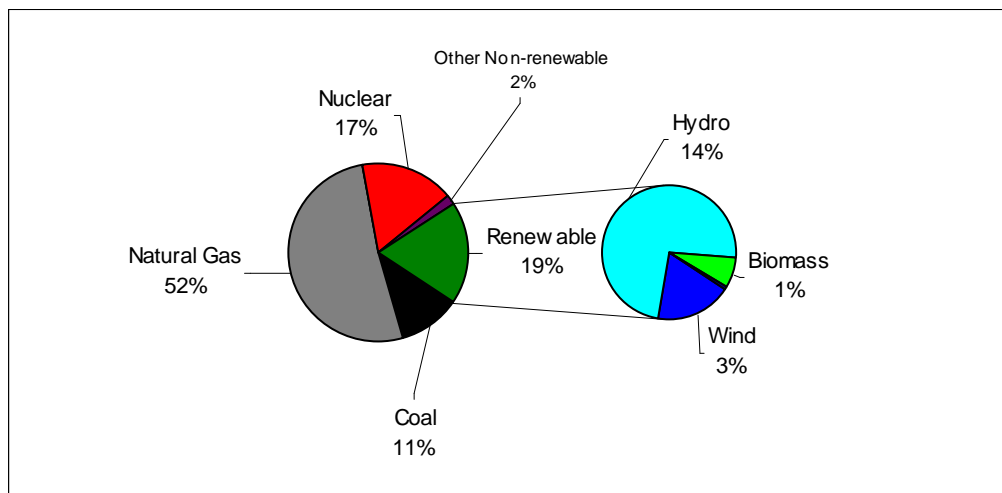


Figure 4 reveals the fuel mix of GDF Suez's electricity generation worldwide in 2009.

**Figure 4: Fuel mix of GDF Suez's electricity generation worldwide in 2009<sup>82</sup>**

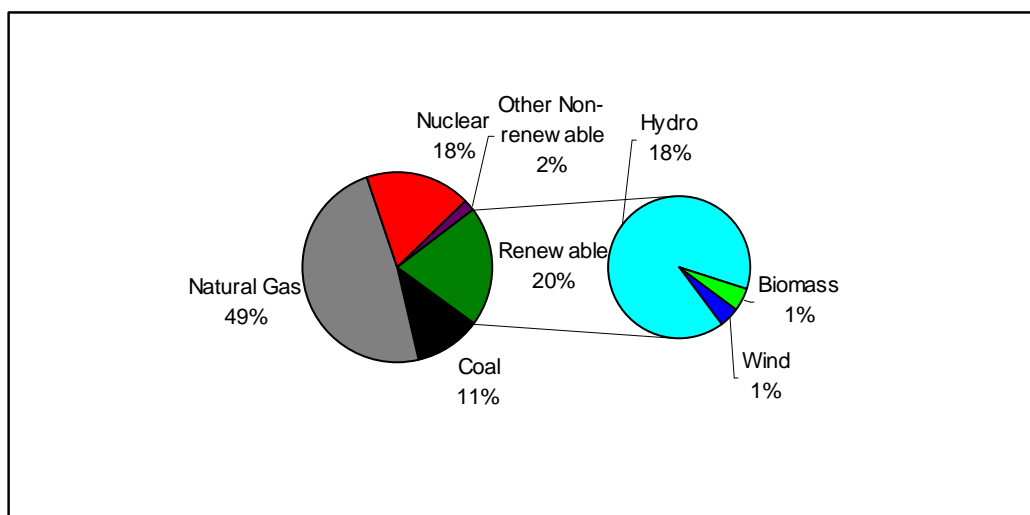


Table 4 shows the absolute figures of the installed capacity of GDF Suez in Europe at the end of 2008 and its worldwide capacity and actual generation in 2009.

**Table 4: GDF Suez's fuel mix of installed capacity in Europe at the end of 2008, and GDF Suez's worldwide capacity and actual generation in 2009**

Fuel type	European capacity as of 31 December 2008 (MW) <sup>83</sup>	Worldwide capacity as of 31 December 2009 (MW) <sup>84</sup>	Worldwide generation in 2009 (GWh) <sup>85</sup>
Coal	4,162	6,700	27,800
Natural Gas	19,598	30,300	124,000
Nuclear	6,356	6,000	45,600
Other non-renewable	643	3,000	5,100
Biomass	530	600	2,500
Wind	1,286	1,200	2,500
Hydro	5,221	12,700	45,600

Other renewable	38	0	0
<b>Total</b>	<b>37,834</b>	<b>60,500</b>	<b>253,100</b>

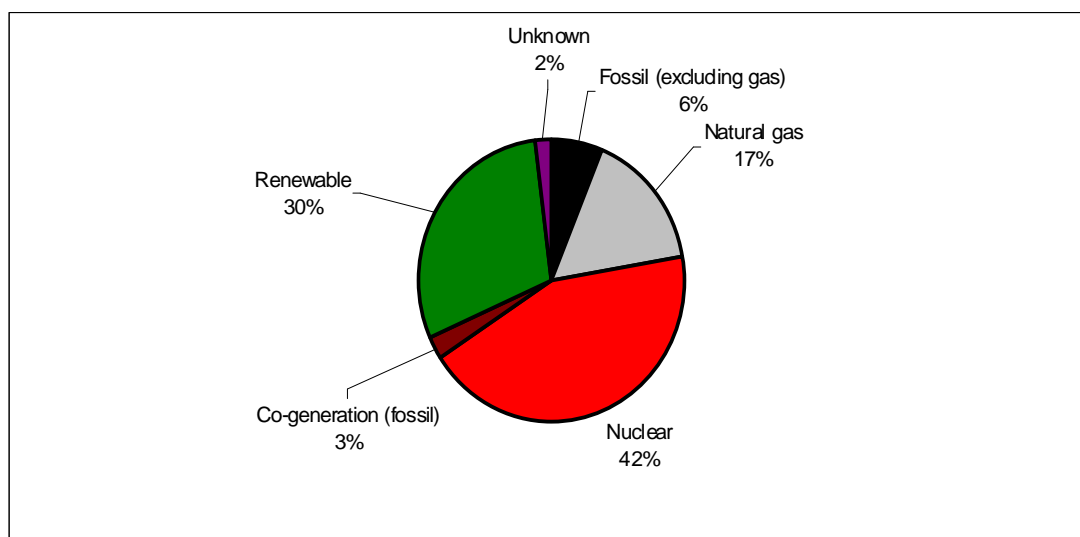
## Electricity supplied in Belgium

GDF Suez's generation capacity in Belgium was 11.8 GW in 2009, and the generated electricity amounted to 66,000 GWh.<sup>86</sup> The capacity includes seven nuclear power units in Doel and Tihange, several thermal power plants (mainly gas fired) and renewable energy installations.<sup>87</sup> The generating capacity of renewable energy was 419 MW in 2009, comprising 3.6% of the total generating capacity.<sup>88</sup>

In Belgium, GDF Suez, through its fully owned subsidiary Electrabel, is the leading supplier of electricity. Electrabel supplies power to 3.6 million Belgian customers.<sup>89</sup> The sales of electricity by Electrabel Belgium comprised 68.9 TWh in 2009, including electricity sold to non-end customers.<sup>90</sup> The supply of electricity (to end customers) in Belgium comprised 70,6% of the total supply in 2009 in Belgium. This amounts to 51.2 TWh.<sup>91</sup>

Figure 5 shows the origin of the electricity supplied by Electrabel in Belgium. Compared to the renewable generation capacity by Electrabel in Belgium (3.6% of total) the supply of renewables stands out (30% of supply). This is due to bought green energy (hydro energy labelled AlpEnergie produced by French daughters of Electrabel: Compagnie Nationale du Rhône and Société Hydroélectrique du Midi, and on the market).<sup>92</sup> Electrabel estimates that the natural gas component comprises 85% combined cycle gas turbine (CCGT) plants and 15% conventional power stations.<sup>93</sup>

**Figure 5: Fuel mix of Electrabel's supplied electricity in Belgium, 2009<sup>94</sup>**



## Investments in new generation capacity in Europe

Table 5 indicates the projects GDF Suez is currently developing in Europe.

In addition to the investments explained in the tables 3 and 4, as of first half of 2010 Electrabel's conventional power plant in Gelderland (590 MW coal) will allow to use up to 25% biomass in co-combustion with coal. The construction has started in January 2009 and the facility has started operating in March 2010. The total capacity of the primarily coal-based power plant will remain unchanged.<sup>95</sup> For this reason the investment is not included in the table below. The biomass consists of wood pellets (compressed sawdust). The conversion involved an investment of more than €40 million.<sup>96</sup> Wood pellets will also be used in the coal-fueled unit 4 of Rodenhuize (Belgium), which is transformed into a 100% biomass plant with a capacity of 180 MW.<sup>97</sup> This transformation involves an investment of €125 million.<sup>98</sup> The new plant will be in operation in 2011.<sup>99</sup>

**Table 5: GDF Suez's current investments in new generation capacity in Europe**

Project name	Location	Fuel Type	Date in operation	Amount (million €)	Capacity (MW)	Project Status
Power Plant Maasvlakte	Rotterdam (NL)	coal/biomass	2013	1,200	736 <sup>100</sup>	under construction <sup>101</sup>
Power Plant Wilhelmshaven	Wilhelmshaven (DE)	coal	2012	568 <sup>102</sup>	422 <sup>103</sup>	under construction
Flevo	Lelystad (NL)	gas (CCGT)	2010	n/a	870 <sup>104</sup>	under construction
SPEM	Montoir de Bretagne (FR)	gas (CCGT)	2010	n/a	435 <sup>105</sup>	already built
CombiGolfe	Fos-sur-Mer (FR)	gas (CCGT)	mid 2010	270	424 <sup>106</sup>	already built
Degussa	Antwerp (BE)	gas-fired CHP	mid 2010	21	22	under construction <sup>107</sup>
Heron II	Viotia (GR)	gas (CCGT)	2010	n/a	225	under construction <sup>108</sup>
Repowering Dunamenti	Szazhalombatta (HU)	gas (CCGT)	2011	149 <sup>109</sup>	138 <sup>110</sup>	under construction
Acquired by Nuon	Almere (NL) <sup>111</sup>	Natural gas (CHP)	2010	n/a	-120	Sold late 2009
Reactors 3 + 4	Cernavoda (RO)	nuclear	Unit 3: 2016 Unit 4: 2017	366	132	under construction <sup>112</sup>
Doel 1, upgrade capacity	Doel 1, Belgium	nuclear	n/a	n/a	40.5	under construction <sup>113</sup>
France, Italy and Belgium	France, Italy and Belgium	biomass & biogas	n/a	n/a	23	under construction <sup>114</sup>
Several projects	France	wind	2010/2011	n/a	273 <sup>115</sup>	under construction
Generg wind farms	Portugal (PT)	wind	n/a	n/a	102	under development <sup>116</sup>
Wind parks	Belgium	wind	n/a	n/a	24	under

						construction <sup>117</sup>
Scotia Wind Craigenfelt	South-west of Stirling, Scotland (UK)	wind	2010	n/a	20	under construction <sup>118</sup>
Wind farm	Jarogniew – Moltowo (Poland)	wind	early 2011 <sup>119</sup>	n/a	20	under construction <sup>120</sup>
AceaElectrabel Produzione Group (AEP)	Italy	wind	n/a	n/a	35	under construction <sup>121</sup>
Other renewables	Italy	other renewables	n/a	n/a	9	under construction <sup>122</sup>
Curbans	Alpes de Haute Provence (France)	solar	August 2011	n/a	33	under construction <sup>123</sup>
More solar projects	France	solar	n/a	n/a	11 <sup>124</sup>	construction permits obtained
Generg Photovoltaic solar	Portugal	solar	n/a	n/a	5	under construction <sup>125</sup>

Table 6 lists GDF Suez's investments that are either still awaiting permission or have merely been announced as plans. A project for an 800 MW planned coal power plant in Stade (DE) was abandoned in February 2010.<sup>126</sup>

**Table 6: GDF Suez's announced plans for investment in new generation capacity in Europe**

Project name	Location	Fuel Type	Date in operation	Amount (million €)	Capacity (MW)	Project Status
Power Plant Brunsbüttel	Brunsbüttel (DE)	coal	n/a	n/a	800	in study <sup>127</sup>
Unit at Vado Ligure	Vado Ligure (IT)	coal	n/a	n/a	161	awaiting permission <sup>128</sup>
Power plant	Police near Szczecin (PO)	coal	n/a	2,147	1,432	concept design <sup>129</sup>
Power plant	Lublin (PO)	coal (bio-mass co-fired)	n/a	536	358	concept design <sup>130</sup>
Power Plant Romania	Constanta (RO)	coal and biomass	n/a	2,400	1,600	suspended indefinitely <sup>131</sup>
Power station	Polaniec (south-east Poland)	biomass	end of 2012	240 <sup>132</sup>	190	building contract signed <sup>133</sup>
Power plant	Polaniec (south-east Poland)	gas	n/a	666	833	concept design <sup>134</sup>
Electrabel Polaniec S.A.	Near Wloclawek (PO)	gas	n/a	500-720	900	construction start within two years <sup>135</sup>
GDF Suez Energy Romania and Termoelectrica	Borzesti, Bacau county, (RO)	gas	n/a	400	400	feasibility study finalised <sup>136</sup>
Morata de Tajuña	Morata de Tajuña (ES)	gas (CCGT)	n/a	500	1,200	halted by supreme court <sup>137</sup>



CombiGolfe, second 400 MW tranche	Fos-sur-Mer (FR)	gas (CCGT)	n/a	n/a	400 <sup>138</sup>	engineering study underway
Ploufragan	Brittany (FR)	gas	n/a	n/a	200	administrative approvals pending <sup>139</sup>
AceaElectrabel Produzione	Pontinia (Italy)	gas (CCGT)	n/a	n/a	162	waiting for permission <sup>140</sup>
Horizon Energy/AceaElectrabel	Molise (Italy)	gas (CCGT)	n/a	n/a	81	waiting for permission <sup>141</sup>
gas fired plant	Schwandorf (DE)	Gas (CCGT)	n/a	n/a	800?	project stopped? <sup>142</sup>
One or two gas fired plants	Calbe and Stassfurt in Saxony-Anhalt state (DE)	gas (CCGT)	n/a	n/a	800	feasibility study <sup>143</sup>
Second EPR reactor (25% stake)	Penly site, Normandy (FR)	nuclear	2017	n/a	412 <sup>144</sup>	public debate set up in 2010
Third EPR reactor	Rhone Valley (FR)	nuclear	n/a	n/a	1,100	candidate <sup>145</sup>
One or more nuclear reactors, together with Iberdrola and SSE	United Kingdom	nuclear	2020-2025 <sup>146</sup>	n/a	1,350 <sup>147</sup>	pre-development stage <sup>148</sup>
Renewal concessions by government, total 5,300 MW	France	hydro	2015	n/a	1,600	operatorships expected to be awarded between 2013 and 2015 <sup>149</sup>
Tirreno Power: hydroelectric power station IT	n/a (IT)	hydro	n/a	n/a	10	n/a
Compagnie du Vent, Deux Côtes project	Offshore Somme and Seine-Maritime districts (FR)	wind	n/a	1,137	401	preliminary studies <sup>150</sup>
Compagnie du Vent and Shell WindEnergy, Libron	Offshore, France	wind	2014	71	29	pre-development stage <sup>151</sup>
Compagnie du Vent, several small projects in France	Onshore, France	wind	2011/2013	396	281	pre-development stage <sup>152</sup>
Blue4Power I, zone I and II	North Sea (BE)	wind	2012	n/a	n/a	early 2010: request concession granting rejected <sup>153</sup>
Winds mills next to highway E40	Belgium	wind	2011	70	40	construction permits obtained <sup>154</sup>
Four wind turbines along a canal	Zomergem (Belgium)	wind	n/a	n/a	12	environmental permit requested <sup>155</sup>
Wind farm Poland	North of Poland (PO)	wind	n/a	n/a	n/a	several projects in development <sup>156</sup>
Wind farm Italy	Site to decide (IT)	wind	n/a	n/a	50	n/a

Wind farms Romania	Romania	wind	n/a	n/a	n/a	budget allocated <sup>157</sup>
Tirreno Power photovoltaic Italy	Campania a Sessa Aurunca (It)	solar	n/a	n/a	6.9	preliminary plan completed <sup>158</sup>
Solar projects ground-level	France	solar	n/a	n/a	206 <sup>159</sup>	in study

## Responsible sourcing

In its Activities and Sustainable Development report 2009, GDF Suez makes no reference to supply chain responsibility.<sup>160</sup> The company does have an Ethics charter, which includes requirements for suppliers. Among other adherence to the OECD Guidelines for Multinational enterprises is required.<sup>161</sup>

All Belgium nuclear reactors are operated by GDF Suez. The fuel cycle for Belgian nuclear plants, including the sourcing of uranium oxide concentrate is managed by Synatom (Société Belge des Combustibles Nucléaires), a wholly-owned subsidiary of Electrabel (although the government holds a golden share with special rights).

In 2008, Synatom announced a strategic partnership with Powertech for development of Powertech's U.S. uranium mining projects in the US states of Colorado, South Dakota and Wyoming. Synatom currently owns 19.6% of Powertech.<sup>162</sup> It was the first time Synatom invested in mining projects. The projects are at the stage of preparation.<sup>163</sup>

Coal input comprises some 10% of GDF Suez's generation capacity. The company does not make public how many metric tonnes coal it yearly uses for electricity production.<sup>164</sup>

Each year GDF SUEZ consumes over 2 million metric tons of various types of biomass, to supply electrical and heating plants across Europe, the United States and Brazil.<sup>165</sup> GDF Suez has its own certification scheme for biomass. The minimum criteria used focus on: energy balance or CO<sub>2</sub> balance for the supply chain; traceability of the primary resources and final product; report by a third party on local resource management and respect of legislations. The company mainly uses wood pellets, wood chips and agricultural waste.<sup>166</sup>

<sup>76</sup> GDF Suez, "2009 Activities and Sustainable Development report", May 2010, <[www.gdfsuez.com/document/?f=files/en/gdf-suez-radd-09-vus.pdf](http://www.gdfsuez.com/document/?f=files/en/gdf-suez-radd-09-vus.pdf)> (24 June 2010)

<sup>77</sup> GDF Suez Reference Document 2009, April 2010, p. 265, <<http://www.gdfsuez.com/en/finance/investors/publications/publications/>> (18 June 2010)

<sup>78</sup> Electrabel Nederland website, "Onze dienstverlening", no date, <<http://www.electrabel.nl/Over-Electrabel/Wie-zijn-we/Wat-doen-we.aspx>> (2 July 2010)

GDF Suez Reference Document 2009, April 2010, p. 37, <<http://www.gdfsuez.com/en/finance/investors/publications/publications/>> (24 June 2010)

<sup>79</sup> E-mail by Robert Imler, corporate communication GDF SUEZ Energy Benelux & Germany on 30 August 2010.

<sup>80</sup> These capacities are on "share data basis". The "share data" include the total capacities of the fully consolidated companies and the capacities of proportionally consolidated and equity method consolidated companies in proportion to the share held. GDF Suez Reference Document 2009, April 2010, p. 10, <<http://www.gdfsuez.com/en/finance/investors/publications/publications/>> (24 June 2010)

<sup>81</sup> Figures as of 31 December 2008, e-mail by W. Wolters, Manager Strategy & Regulatory Affairs, Electrabel Nederland, 06 July 2009.

<sup>82</sup> On "share data basis". The "share data" include the total capacities of the fully consolidated companies and the capacities of proportionally consolidated and equity method consolidated companies in proportion to the share held. GDF Suez Reference Document 2009, April 2010, p. 11, <<http://www.gdfsuez.com/en/finance/investors/publications/publications/>> (24 June 2010)

- <sup>83</sup> Figures as of 31 December 2008, e-mail by W. Wolters, Manager Strategy & Regulatory Affairs, Electrabel Nederland, 06 July 2009.
- <sup>84</sup> On "share data basis". The "share data" include the total capacities of the fully consolidated companies and the capacities of proportionally consolidated and equity method consolidated companies in proportion to the share held. GDF Suez Reference Document 2009, April 2010, p. 11, <<http://www.gdfsuez.com/en/finance/investors/publications/publications/>> (24 June 2010)
- <sup>85</sup> On "share data basis". The "share data" include the total capacities of the fully consolidated companies and the capacities of proportionally consolidated and equity method consolidated companies in proportion to the share held. GDF Suez Reference Document 2009, April 2010, p. 11, <<http://www.gdfsuez.com/en/finance/investors/publications/publications/>> (24 June 2010)
- <sup>86</sup> Electrabel Belgium website, "Key facts", <<http://www.electrabel.be/whoarewe/companyprofile/corebusiness.aspx>> (24 June 2010)
- <sup>87</sup> GDF Suez Reference Document 2009, April 2010, p. 17 and 36, <<http://www.gdfsuez.com/en/finance/investors/publications/publications/>> (24 June 2010)
- <sup>88</sup> Electrabel Belgium website, "Key facts", <<http://www.electrabel.be/whoarewe/companyprofile/corebusiness.aspx>> (24 June 2010)
- <sup>89</sup> GDF Suez Reference Document 2009, April 2010, p. 17 and 36, <<http://www.gdfsuez.com/en/finance/investors/publications/publications/>> (24 June 2010)
- <sup>90</sup> Electrabel Belgium website, "Key facts", <<http://www.electrabel.be/whoarewe/companyprofile/corebusiness.aspx>> (24 June 2010)
- <sup>91</sup> CREG, VREG, CWAPE, BRUGEL, "De ontwikkeling van de elektriciteits- en aardgasmarkten in België, Jaar 2009", 27 April 2010, <<http://www.vreg.be/vreg/documenten/persmededelingen/PERS-2010-2.pdf>> (13 August 2010)
- <sup>92</sup> E-mail by Robert Imler, corporate communication GDF SUEZ Energy Benelux & Germany on 30 August 2010.
- <sup>93</sup> E-mail by Robert Imler, corporate communication GDF SUEZ Energy Benelux & Germany on 30 August 2010.
- <sup>94</sup> E-mail by Robert Imler, corporate communication GDF SUEZ Energy Benelux & Germany on 30 August 2010.
- <sup>95</sup> GDF Suez Reference Document 2009, April 2010, p. 37, <<http://www.gdfsuez.com/en/finance/investors/publications/publications/>> (17 June 2010)
- <sup>96</sup> Electrabel, press release "Opening biomassa installatie Centrale Gelderland", 22 April 2010, <<http://www.electrabel.nl/Over-Electrabel/Nieuws-en-Pers/Persberichten/Opening-biomassa-installatie-Centrale-Gelderland.aspx>> (17 June 2010)
- <sup>97</sup> Electrabel, press release "Electrabel, GDF SUEZ Groep, en Pacific BioEnergy tekenen samenwerkingsakkoord", 16 February 2010, <[http://www.electrabel.com/newsroom/pressreleases\\_new.aspx?id=1385083](http://www.electrabel.com/newsroom/pressreleases_new.aspx?id=1385083)> (17 June 2010)
- <sup>98</sup> Electrabel, press release "100% biomassa in Rodenhuize", 29 October 2009, <[http://www.electrabel.com/newsroom/pressreleases\\_new.aspx?id=1351285](http://www.electrabel.com/newsroom/pressreleases_new.aspx?id=1351285)> (17 June 2010)
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- <sup>102</sup> Total investment over 1 billion. Stake GDF Suez is 56.82%.
- <sup>103</sup> Total capacity 742 MW. End 2008 GDF Suez has a 33.1% stake in WSW Energie & Wasser. WSW has a 15% stake in the Wilhelmshaven power plant. BKW FMB Energie AG (33%) has a 15% stake in the Wilhelmshaven power plant. This puts the stake of GDF Suez at 56.82%. GDF Suez Reference Document 2009, April 2010, p. 37 and 107, <<http://www.gdfsuez.com/en/finance/investors/publications/publications/>> (17 June 2010)
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- <sup>104</sup> GDF Suez Reference Document 2009, April 2010, p. 37 and 107, p. 26, <<http://www.gdfsuez.com/en/finance/investors/publications/publications/>> (17 June 2010)
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- <sup>107</sup> Added capacity 22 MW. Total investment €45 million. 50/50 joint venture between E.ON and Electrabel. Platts Power In Europe, "PIE's new power plant project tracker - April 2010", 3 May 2010. E.ON website, <[http://www.eon-energy-projects.com/pages/eep\\_en/References/References/CHP\\_Plant\\_Evonik\\_Degussa\\_Antwerpen/index.htm](http://www.eon-energy-projects.com/pages/eep_en/References/References/CHP_Plant_Evonik_Degussa_Antwerpen/index.htm)> (29 June 2010)
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- <sup>110</sup> The capacity of the unit will be raised from 215 MWe currently to over 400 MWe. CMI, press release "Dunamenti Erőmű Power Plant (Hungary): corner stone laying ceremony in the presence of CMI", 4 June 2009, <<http://www.cmigroupe.com/vpage.php?id=420>> (18 June 2010)
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- <sup>111</sup> Nuon website, Over Nuon, Pers, Persberichten, "Nuon neemt warmtekrachtcentrale in Almere over van Electrabel", 15-12-09, <http://www.nuon.com/nl/pers/persberichten/20091215/index.jsp> (08-07-10).
- <sup>112</sup> Total capacity 1,440 MW. As of 31 December 2009 GDF Suez still has a 9.15% share in Energonuclear. GDF Suez Reference Document 2009, April 2010, p. 37 and 107, p. 462, <<http://www.gdfsuez.com/en/finance/investors/publications/publications/>> (17 June 2010) In November 2008 an investment agreement was signed between the state nuclear power corporation Societatea Nationala Nuclearelectrica (SNN), with 51% of the project, and Enel, CEZ, GDF Suez, RWE Power (each 9.15%), Iberdrola (6.2%) and ArcelorMittal Galati (6.2%). The consortium, called EnergoNuclear, was formally established in April 2009. Construction cost is expected to be about €4 billion. By September 2009 it was evident that SNN could not raise its share of the funds, and would contribute only 20 to 25%, mostly in kind - heavy water and fuel. The other participants would increase their shares. The first unit is still expected on line in 2016. World Nuclear Association, "Nuclear Power in Romania", February 2010, <<http://www.world-nuclear.org/info/inf93.html>> (17 June 2010)
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- <sup>115</sup> This includes the Hauts Pays (78 MW in Haute-Marne, developed by Erelia) and Germinon (75 MW in the Marne, developed by Eole Generation) facilities, which are among the largest wind farms in France. GDF Suez Reference Document 2009, April 2010, p. 26, <<http://www.gdfsuez.com/en/finance/investors/publications/publications/>> (17 June 2010)
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- <sup>116</sup> GDF Suez holds a 42.5% stake in Generg. Total capacity wind projects under development is 240 MW. GDF Suez Reference Document 2009, April 2010, p. 39, <<http://www.gdfsuez.com/en/finance/investors/publications/publications/>> (17 June 2010)
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## 3 RWE/Essent

### Basic company information

RWE is present in all areas of the electricity and gas value chain. Europe is its market. In addition to Germany, its strategic focus is on the UK, the Benelux region, Central and South Eastern Europe as well as Turkey. The company is the number one power producer in Germany. In terms of sales of electricity, RWE is number two in Germany and the Netherlands, and number three in the UK. The European market position of the RWE Group in terms of sales is number three for electricity and number six for gas. In 2009 the revenue of the RWE Group amounted to €47.7 billion.<sup>167</sup>

In previous years, SOMO made separate company fact sheets for Essent and RWE. The RWE Group has taken over Essent NV as of 30 September 2009. Essent NV is now responsible for the Benelux market within the RWE Group. This report now only features a fact sheet of the RWE Group.

RWE has made use of the opportunity to review the fact sheet and answer to the questionnaire sent by SOMO. RWE's response was coordinated by Essent in the Netherlands.<sup>168</sup>

The RWE Group is streamlined according to functional and geographical companies:

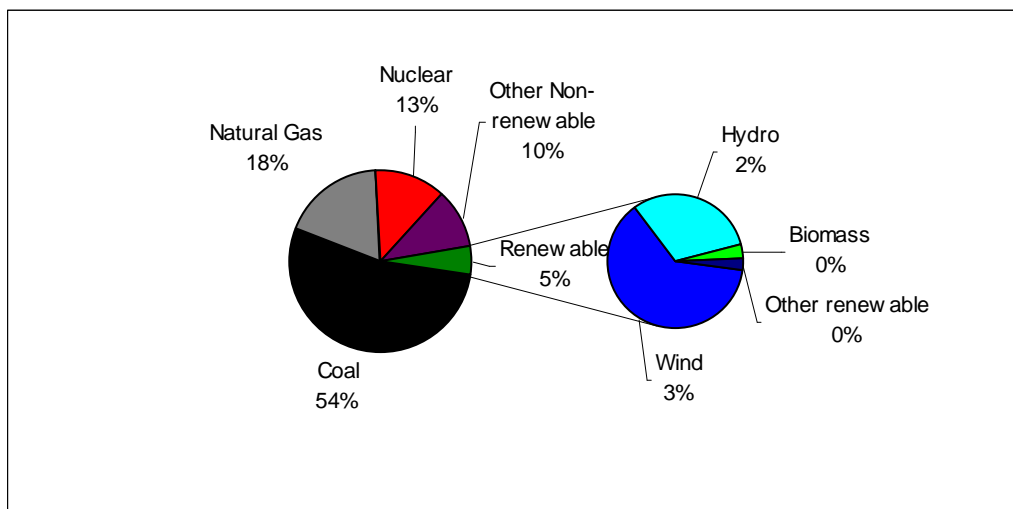
- The functional companies RWE Innogy (electricity generation from renewable sources of energy), RWE DEA (upstream oil and gas) and RWE Supply & Trading (trading and gas midstream) have a trans-national setup.
- RWE npower encompasses RWE's entire UK generation and supply business with the exception of electricity production from renewables, which is overseen by RWE Innogy.
- RWE Group pooled its business in the Netherlands and Belgium in Essent, which was consolidated for the first time as of 30 September 2009. Essent NV is now responsible for the Benelux market. As such the activities of RWE Energy Nederland NV are integrated within Essent NV, effective from 1 October 2009.
- In Germany, RWE Power mines lignite and operates its own fossil-fuel and nuclear power stations. The German electricity production from renewables is run by RWE Innogy. RWE Vertrieb and five regional sales subsidiaries supply private and commercial customers with electricity and gas. RWE Rheinland Westfalen Netz operates RWE's distribution networks. The electricity transmission grid is operated by the independent electricity transmission operator Amprion. RWE's energy efficiency activities are concentrated in the RWE Effizienz GmbH.
- In Poland, RWE focuses on electricity supply and the electricity distribution network. In Hungary, RWE concentrates on lignite-based electricity generation, which is managed by Mátra. Via minority interests, RWE is also active in gas sales and water supply in Hungary. In the Czech Republic, the main activity is on gas. The RWE local operations encompass regional supply, distribution, supra-regional transmission, transit and storage. In Slovakia, RWE is active in the electricity network and electricity-end customer businesses as well as gas supply.<sup>169</sup>



## Installed capacity for electricity generation in Europe

Figure 6 reveals the fuel mix of RWE's electricity generation capacity in Europe for the year 2009. The installed capacity was 49.6 GW.<sup>170</sup> RWE's acquisition of Essent added 3.6 GW of installed capacity in The Netherlands. Last year, SOMO made a projection of the fuel mix of RWE's and Essent's capacity combined.<sup>171</sup> Compared to those figures, we see a slightly larger share for coal and lignite in this year's figures, and a slightly lower share of natural gas. The 5% renewable capacity was as projected last year.

**Figure 6: Fuel mix of RWE's installed electricity generation capacity in Europe, 2009**



The company's generated electricity amounted to 187.2 TWh in 2009, of which 78% was generated in Germany and 14% in the United Kingdom.<sup>172</sup> Figure 7 shows the fuel mix for electricity actually generated in Europe. These figures only include the fourth quarter production figures for Essent and should therefore be interpreted with caution. The figures for renewable production were only reported as a whole, and not broken down per fuel type.

**Figure 7: Fuel mix of RWE's electricity generation in Europe, 2009**

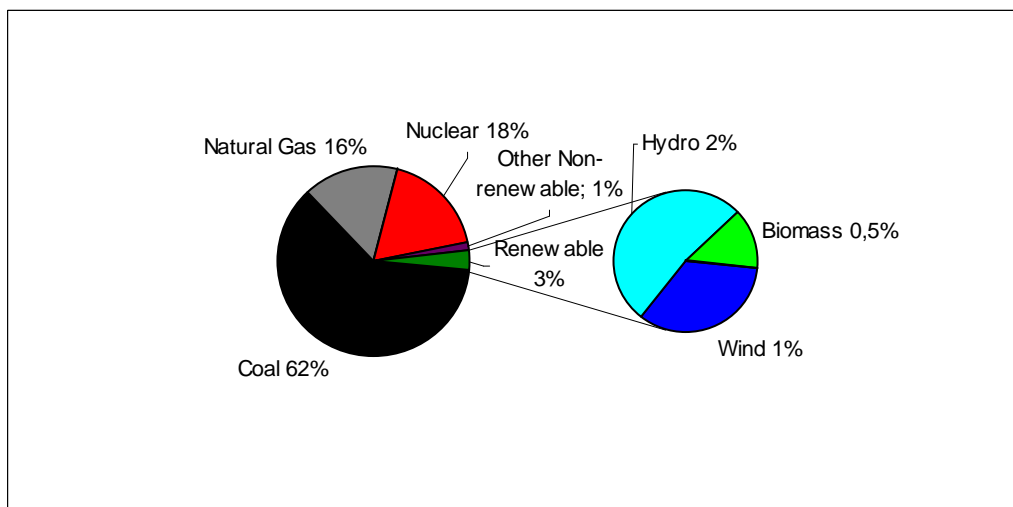


Table 7 gives the absolute figures of both the installed capacity and RWE's generated electricity.

**Table 7: Fuel mix of RWE's electricity generated and installed capacity in Europe, 2009<sup>173</sup>**

Fuel type	Installed capacity 2009 (MW)	Generated electricity 2009 (GWh)
Hard coal	15,540	44,100
Lignite	10,925	70,900
Natural Gas	9,144	29,700
Nuclear	6,295	33,900
Other Non-renewable	5,146	2,100
Renewables	2,532 <sup>174</sup>	6,500
Wind	1,574 <sup>175</sup>	2,200 <sup>176</sup>
Hydro	793	3,400
Biomass	98 <sup>177</sup>	900
Other renewable	67	-
Total	49,582	187,200

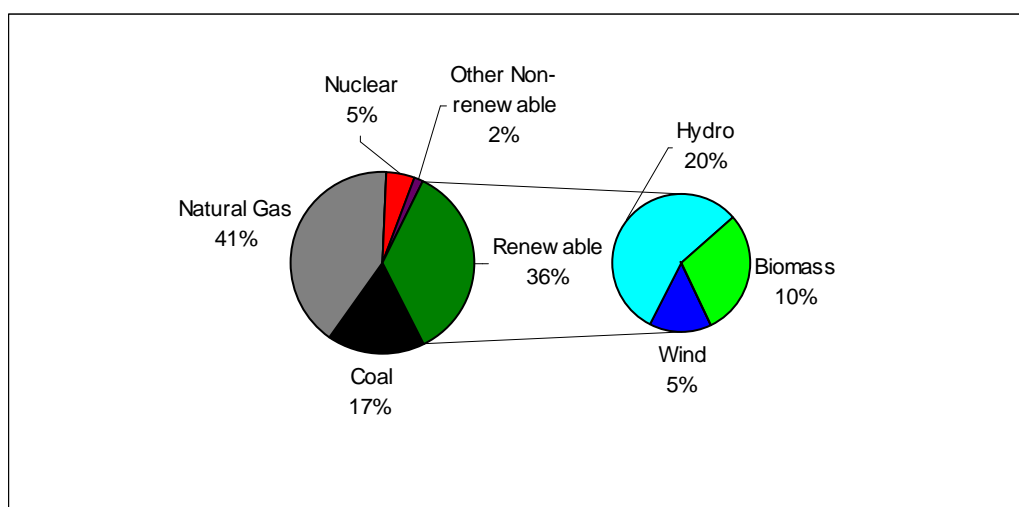
## Electricity supplied in Belgium

RWE Group, by means of Essent NV, is the number three in the Netherlands as to power generation.<sup>178</sup> In 2009, RWE supplied 3.5 TWh of electricity to private and commercial customers in the Netherlands and Belgium and 2.0 TWh to industrial and corporate customers in the Netherlands and Belgium.<sup>179</sup> The supply of electricity by Essent Belgium in Belgium amounted to 1.5 Twh in 2009. The total supply of RWE/Essent may however have been slightly bigger, because some small suppliers within RWE/Essent are not part of this calculation (Essent Energy Trading and RWE Key Account)<sup>180</sup> Essent Belgium had a market share of 2.1% within electricity supplies in Belgium.<sup>181</sup>

Companies supplying electricity in the Netherlands are obliged to disclose the fuel mix of the electricity as supplied to their customers. This is done by means of the "Stroometiket" (electricity labelling). For this study it was not possible to get a clear view on the fuel mix of the electricity supplied by the RWE Group in the Netherlands in 2009. At first, this is due to the take over by RWE of Essent, officially on 30 September 2009. Electricity supplies by the RWE Group in 2009 comprise supplies by Essent and supplies by RWE Energy Nederland NV. Secondly, the stroometiket of Essent does not reflect its supplies to Belgium only, but includes supplies to The Netherlands and Germany. Essent has not provided figures for the Belgium specifically.

Figure 8 reveals the fuel mix of electricity supplied by Essent in the Netherlands, Belgium and Germany during 2009.<sup>182</sup> The figure represents Essent's electricity supply to all clients.

**Figure 8: Essent NV fuel mix of electricity supplied by Essent in the Netherlands, Belgium and Germany, 2009**



Based on: Essent<sup>183</sup>

Table 8 presents the CO<sub>2</sub> emissions and radioactive waste production resulting from the electricity supply by Essent in 2009.

**Table 8: Emissions and waste resulting from Essent's electricity supply in 2009 (Essent NV mix and Essent Retail mix).<sup>184</sup>**

Indicator	Essent NV mix (2009)
CO <sub>2</sub> (g/kWh)	303
Radioactive waste (µg/kWh)	140

The fuel mixes of electricity supplied by Essent during 2009 do not include supplies by RWE Energy Nederland NV. RWE Energy Nederland NV is a very small player in the Dutch market, compared to Essent. Therefore the fuel mix for the electricity supplied by RWE Energy Nederland NV in the Netherlands in 2009 is not included into this fact sheet. RWE Energy Nederland NV offers its clients a renewable energy product called Windkracht220 that consists of 100% wind energy.<sup>185</sup>

### Announced investments in new generation capacity in Europe

The planned annual capital expenditures of the RWE Group from 2009 to 2012 comprise €1,700 million for RWE Power (power generation), €1,100 million for RWE npower (power generation/retail), €1,000 million for RWE Innogy (renewable energy), €900 million for RWE Dea (upstream oil & gas) and €1,800 for grid and retail business.<sup>186</sup> Essent's onshore wind project at Westereems has gone into full operation in 2009, and has been included in the installed capacity section.<sup>187</sup> Table 9 indicates the projects of the RWE group that are currently under construction in Europe.

**Table 9: RWE's announced investments in new production capacity**

Project name	Location	Fuel type	Date in operation	Amount (million €)	Output Capacity (MW)	Project Status
Hard coal twin unit facility	Eemshaven, Netherlands	coal/ biomass	2013/2014	2,200 <sup>188</sup>	1,560 <sup>189</sup>	under construction
Hamm	Westfalen, Germany	coal	2012	1,550	930	under construction <sup>190</sup>
Neurath	Grevenbroich, Germany	lignite	2011	2,500 <sup>191</sup>	700 <sup>192</sup>	under construction
GKM 9	Grosskraftwerk Mannheim, Germany	coal	2013	480 <sup>193</sup>	364 <sup>194</sup>	under construction
Moerdijk II	Moerdijk, Netherlands	gas (CCGT)	end of 2011	500 <sup>195</sup>	430 <sup>196</sup>	under construction
Claus unit C	Maasbracht, Netherlands	gas	2012	1,000 <sup>197</sup>	1,275 <sup>198</sup>	under construction
CCGT power plant	Lingen, Emsland, Germany	gas (CCGT)	April 2010 <sup>199</sup>	500 <sup>200</sup>	876	under construction
4 new 58 MW units	Lingen, Emsland, Germany	gas	2011	200	122	under construction <sup>201</sup>
Staythorpe power station	Nottinghamshire, England, UK	gas (CCGT)	Late 2010	900	1,650	under construction <sup>202</sup>
Pembroke power plant	Pembroke, Wales, UK	gas (CCGT)	2012	1,100	2,000	under construction <sup>203</sup>
Denizli	Western Turkey.	gas (CCGT)	2012	350	542	under construction <sup>204</sup>
Reactors 3 + 4	Cernavoda, Romania	nuclear	Unit 3: 2016 Unit 4: n/a	366	132	under construction <sup>205</sup>
Selset	Scotland, UK	hydro	2010	2.8 <sup>206</sup>	0.7	under construction <sup>207</sup>
Black Rock	Nearby Evanton, Scotland, UK	hydro	2010	n/a	3.5	under construction <sup>208</sup>
Ruivares	Ruivares, Portugal	hydro	2011	n/a	3.6	under construction <sup>209</sup>
Siadar	Isle of Lewis, Scotland, UK	tidal scheme	n/a	n/a	4	under construction <sup>210</sup>
Stallingborough Alpha	Lincolnshire, England, UK	biomass	2013	n/a	65	under construction <sup>211</sup>
BMHKW Goch	Goch, Germany	biomass	2011	n/a	5	under construction <sup>212</sup>
BMHKW Wittgenstein	Wittgenstein, Germany	biomass	2010	n/a	5	under construction <sup>213</sup>

Tullis Russel	Markinch, Scotland, UK	biomass	2012	200 <sup>214</sup>	50	under construction <sup>215</sup>
Südlohn	Münsterland region, Germany	biogas	2010	n/a	4.1	under construction <sup>216</sup>
Nordsee Ost offshore wind farm	30 kilometres north-west of Helgoland, Germany	wind	2013	1,000	295	Investment decision made <sup>217</sup>
Greater Gabbard offshore wind farm, together with SSE	25km off the east coast of England.	wind	2011	750 <sup>218</sup>	250	under construction <sup>219</sup>
Thornton Bank	Offshore, next to Oostende, Belgium	wind	2013	254	80	under construction <sup>220</sup>
Tychowo	West Pomerania, Poland	wind	2010	50 <sup>221</sup>	34.5	under construction <sup>222</sup>
San Basilio	Onshore, Sardinia, Italy	wind	2010	n/a	12.6 <sup>223</sup>	under construction <sup>224</sup>
Ururi	Onshore, region Molise, Italy	wind	2010	n/a	13 <sup>225</sup>	under construction <sup>226</sup>
Danto de Energias S.A.	Castille-Leon, Spain	wind	2011	n/a	40	under construction <sup>227</sup>
Guilhado	Onshore, North Portugal	wind	2010	n/a	2	under construction <sup>228</sup>
Causeymire extension	Onshore, Scotland, UK	wind	~2011	n/a	7	under construction <sup>229</sup>
Novar extension	Onshore, Novar Estate, Scotland, UK	wind	2011	n/a	32	under construction <sup>230</sup>
Kildrummy	Onshore, 6 km west of Lumsden, Scotland, UK	wind	2010	n/a	10	under construction <sup>231</sup>
An Suidhe	Onshore, 5 miles west of Inverary, Scotland, UK	wind	2011	n/a	19.2	under construction <sup>232</sup>
Lochelbank	Onshore, Ochil hills nearby Perth, Scotland, UK	wind	2010	n/a	9.6	under construction <sup>233</sup>
Middleton Farm	Onshore, 5.5 km Northwest of Newton Mearns, Scotland, UK	wind	2012	n/a	15	under construction <sup>234</sup>
Middlemore	Onshore, near Alnwick,	wind	2011	n/a	54	under construction

	England, UK					235
Bradwell	Onshore, Bradwell, England, UK	wind	2014	n/a	30	under construction <sup>236</sup>
Hellrigg	Onshore, Hellrigg, England, UK	wind	2011	n/a	9	under construction <sup>237</sup>
Kiln Pit Hill	Onshore, Kiln Pit Hill, England, UK	wind	2011	n/a	13.8	under construction <sup>238</sup>
Goole	Onshore, Goole, England, UK	wind	2011	n/a	37	under construction <sup>239</sup>
Lindhurst	Onshore, next A614, England, UK	wind	2010	n/a	9	under construction <sup>240</sup>
Bard Offshore 1	Offshore, 90 km from Borkum, North Sea, Germany	wind	n/a	n/a	6	under construction <sup>241</sup>
Andasol 3	Granada, South Spain	solar	2011	n/a	6.4	under construction <sup>242</sup>

Table 10 lists RWE's investments that are either still awaiting permission or have merely been announced as plans.

**Table 10: RWE's announced plans for investment in new capacity**

Project name	Location	Fuel type	Date in operation	Amount (million €)	Output Capacity (MW)	Status
Niederaußem BoA 4 + 5	Niederaußem, Germany	lignite	2015	n/a	2,200	planning phase <sup>243</sup>
Arneburg	Arneburg, Germany	coal	2015	n/a	1,600	planning phase <sup>244</sup>
Lignite power plant with coal gasification and CO <sub>2</sub> capture	Hürth, Germany	lignite (IGCC)	later than 2015	800 <sup>245</sup>	450	planning phase <sup>246</sup>
RWE Elektrownia Czacott	Silesia region, Poland	coal	n/a	1,125	600	Operation date was 2015, now suspended <sup>247</sup>
Willington	Derbyshire, England, UK	gas (CCGT)	n/a	n/a	2,000	planning application submitted <sup>248</sup>
Gas Fired Power Station	Genk – Zuid, Belgium	gas (CCGT)	2014	n/a	400	planning phase <sup>249</sup>
Tilbury	Tilbury, Essex, England, UK	gas (CCGT)	n/a	n/a	2,000	feasibility study to be started <sup>250</sup>
Horizon Nuclear Power	Wylfa, Anglesey, Wales, UK	nuclear	2020	4,200	1,650	planning application scheduled for 2012 <sup>251</sup>

Horizon Nuclear Power	Oldbury, Gloucestershire, England, UK	nuclear	2025	4,200	1,650	planning application once construction at Wylfa is underway <sup>252</sup>
The rivers Danube, Morava and Drina	Serbia and Bosnia-Herzegovina	hydro	n/a	n/a	1,500 <sup>253</sup>	Memorandum of Understanding signed In November 2009 <sup>254</sup>
Cia Aig	near Fort William, in the Scottish Highlands, UK	hydro	2012/2013	n/a	3	building permission received <sup>255</sup>
Braan	Trochry, Perthshire, Scotland, UK	hydro	n/a	n/a	3.5	planning phase <sup>256</sup>
Maldie Burn Hydro Project	Kylestrome, Scotland, UK	hydro	n/a	n/a	4.5	planning phase <sup>257</sup>
Extra 200 MW generating unit	Vianden, Luxembourg	hydro	2013/4	n/a	80	Permission granted <sup>258</sup>
Anglesey Skerries Tidal Stream Array	off the coast of Anglesey, north Wales, UK	tidal stream	n/a	n/a	10.5	planning phase <sup>259</sup>
Triton Knoll Offshore Wind Farm	off the east coast of England, UK	wind	2020	n/a	1,200	in study <sup>260</sup>
Gwynt y Môr	Liverpool Bay, Wales, UK	wind	2014	1,200	346	planning phase <sup>261</sup>
Atlantic Array project	off the coast South Wales and North Devon, Wales, UK	wind	n/a	5,000 <sup>262</sup>	1,500	Zone Development Agreement signed <sup>263</sup>
Dogger Bank Zone	off the Yorkshire coast, England, UK	wind	n/a	n/a	2,750	investment decision anticipated around late 2014 <sup>264</sup>
Innogy Nordsee 1 offshore wind farm	40 km north of Juist, North Sea, Germany	wind	~2015	2,800 <sup>265</sup>	960	in development <sup>266</sup>
Tromp	75km off the coast Callantsoog, Netherlands	wind	~2015	1,000	300	in development <sup>267</sup>
Several projects	Poland	wind	2015	500	300	RWE target <sup>268</sup>
De Ruijter Oost	Netherlands	wind	n/a	n/a	256	planning phase <sup>269</sup>
Allt Duine	Onshore, Scotland, UK	wind	n/a	n/a	more than 50	planning phase <sup>270</sup>
Brechfa Forest	Carmarthenshire, Wales, UK	wind	n/a	n/a	up to 107	planning phase <sup>271</sup>

Carnedd Wen Wind Farm	north western region Powys, Wales, UK	wind	n/a	n/a	161	planning phase <sup>272</sup>
Clocaenog Forest Wind Farm	North Wales, UK	wind	n/a	n/a	up to 85	planning phase <sup>273</sup>
East Heslerton	North Yorkshire, England, UK	wind	n/a	n/a	n/a	planning phase <sup>274</sup>
Mynydd y Gwair Wind Farm	Near Pantyffynnon, Wales, UK	wind	n/a	n/a	38 - 57	planning phase <sup>275</sup>
Rowantree Wind Farm	Scotland, UK	wind	n/a	n/a	60 - 90	planning phase <sup>276</sup>
Nun Wood Wind Farm Proposal	Near Northampton, England, UK	wind	n/a	n/a	32 - 36	planning phase <sup>277</sup>
Stroupster Wind Farm	Wick, Caithness, Scotland, UK	wind	n/a	n/a	24 - 35	planning phase <sup>278</sup>
Batsworthy Cross Wind Farm	Devon County, England, UK	wind	n/a	n/a	13.5 - 22.5	planning phase <sup>279</sup>
Burn of Whilk Wind Farm	11km south west of Wick in Caithness, Scotland, UK	wind	n/a	n/a	up to 27	planning phase <sup>280</sup>
Cotton Farm Wind Farm	Huntington, England, UK	wind	n/a	n/a	18 - 24	planning phase <sup>281</sup>
Fforch Nest Wind Farm	Wales, UK	wind	n/a	n/a	25	planning phase <sup>282</sup>
Kirkharle Wind Farm	Northumberland, England, UK	wind	n/a	n/a	18 - 24	planning phase <sup>283</sup>
Raera Forest Wind Farm	Argyle & Bute, Scotland, UK	wind	n/a	n/a	up to 25	planning phase <sup>284</sup>
Saxby Wold Wind Farm Proposal	Lincolnshire, England, UK	wind	n/a	n/a	up to 21	planning phase <sup>285</sup>
Hampole	near Doncaster, England, UK	wind	n/a	n/a	10 - 15	planning phase <sup>286</sup>
Earls Hall	Clacton on Sea, England, UK	wind	n/a	n/a	10 – 11.5	planning phase <sup>287</sup>
Langham Wind Farm	Skegness, England, UK	wind	n/a	n/a	9 - 15	planning phase <sup>288</sup>
Stobhill Wind Farm	County Durham, England, UK	wind	n/a	n/a	up to 7	planning phase <sup>289</sup>

## Responsible sourcing

The RWE group has defined ten areas upon which its CSR strategy rests and where action is needed: climate protection; energy efficiency; security of supply; pricing; community engagement; demographic change; supply chain; innovations; occupational health and safety; environmental protection. Supply chain is one of ten defined areas, and the company has a target that at least 95% of the Group-wide procurement volume meets internationally recognised social and environmental standards. All suppliers to the RWE group are subject



to the RWE Code of Conduct as introduced in 2005. The code also applies to RWE's own mining activities of lignite. The code rests on the principles of the United Nations' Global Compact and the OECD guidelines for multinational corporations.<sup>290</sup> In its Code of Conduct RWE states that it does not have business relationships with suppliers who are publicly known to be in violation of the Global Compact Initiative of the United Nations in the areas of human rights, labour standards, the environment, and anti-corruption.<sup>291</sup> Primary fuels and electricity are procured through RWE Supply & Trading.

### **Coal and lignite**

In 2009 the use of lignite in power stations of the RWE Group amounted to 92.3 million metric tonnes.

The RWE Group extracts the lignite in Germany's Rhineland and to a lesser extent in Hungary (annually about 8.5 million tonnes).

The use of hard coal in RWE power stations amounted to 11.5 million metric tonnes. The RWE group publicly reported about its hard coal purchases by country of origin in 2009. The origin countries were: Russia (37%); Germany (22%); Columbia (15%); UK (10%); South Africa (9%); other (7%).<sup>292</sup>

The company did not publicise the names of its suppliers of hard coal and the origin of the coal on mine level.

Essent has published the origin countries of the coal it used in 2008 and 2009 in its main power plant Amercentrale. The Amercentrale consumed 2.3 million tonnes of coal in 2009 originating from Columbia (52%), South Africa (30%), Russia (9%), Indonesia (8%) and the USA (1%).<sup>293</sup> The Amercentrale consumed 1.7 million tonnes of coal in 2008 originating from South Africa (44%), Columbia (35%), Indonesia (20%), and the USA (1%).<sup>294</sup>

As of 31 December 2009, the RWE Group has introduced a Counterparty Risk Assessment for assessing coal suppliers in order to ensure that the requirements of the RWE Code of Conduct will be met.<sup>295</sup> Essent states that it purchases coal either from international mining companies, or on the global spot market.<sup>296</sup>

### **Uranium oxide**

RWE does not make known the suppliers and origin of the uranium oxide (country/mine level) and how it addresses potential problems with environment, human rights and labour rights during mining. In its CR-report 2009 the RWE Group makes notice of 114 tonnes spent fuel elements in 2009.<sup>297</sup>

### **Biomass/biofuels**

In its CR-report 2009 the RWE Group states that Guidelines for the procurement of biomass are being drafted and purchasing guidelines for biofuels are being considered.<sup>298</sup> According to the report 'the various rules governing the use of biomass currently in force throughout the RWE Group are to be standardised in the course of 2010'.<sup>299</sup> The RWE group did not report the type of materials (palm oil, soy, rapeseed, jatropha, wood waste, etc.) it had procured in 2009. Excluding Essent, the RWE Group used 1.4 million metric tonnes of biomass in 2009.<sup>300</sup> In 2009, Essent used only wood as a biomass.<sup>301</sup>

Essent has its own internal sustainability policy for the sourcing of biomass, to avoid conflicts over environmental and landuse issues. It can track & trace the origins of biomass and it uses a certification scheme called Green Gold Label.<sup>302</sup> In 2009 73% of the biomass used by Essent fell under the certification scheme.<sup>303</sup>

RWE Innogy is to build a factory to produce biomass pellets in the southern part of the US state of Georgia. The plant will have an annual production capacity of 750,000 tonnes, which RWE claims makes it the biggest and most modern of its type in the world. The pellets will be used in pure biomass power plants as well as for the co-firing of coal and biomass. The pellets plant is due to take up operation in 2011. The total investment volume amounts to approx. €120 million.<sup>304</sup>

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## 4 SPE

### Basic company information

SPE-Luminus (SPE) is the second-largest Belgian energy company. The company supplies 1.6 million private and business delivery points with electricity and gas. Luminus is the brand name for this. SPE has a generation capacity of 1,969 MWe.<sup>305</sup> Its share in the production of electricity in Belgium comprises 13%.<sup>306</sup>

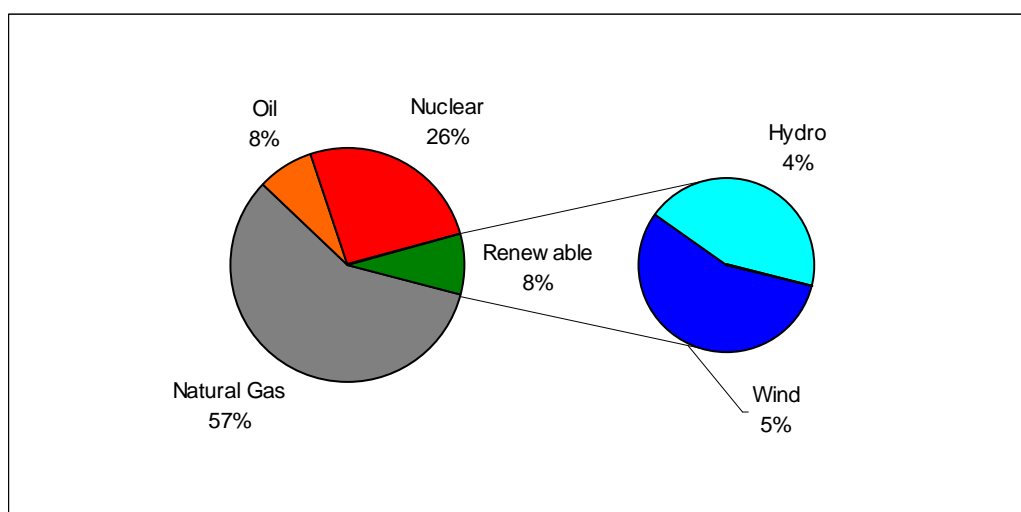
In 2009 EdF Belgium acquired a 51% stake in SPE. June 2010 EdF raised its stake in SPE from 51% to 63.5%. It concluded agreements with three Belgian shareholders. The purchase amount for their SPE-stock has been fixed at 215 million Euros. One of the shareholders – the bank Dexia – decided to divest its 6.13 percent stake in SPE in full.<sup>307</sup> The remaining 36.5% are owned by ALG, Ethias, Publilec, Publilum, Socofe and VEH.<sup>308</sup>

SPE has made use of the opportunity to review the fact sheet and answer to the questionnaire sent by SOMO.<sup>309</sup>

### Installed capacity and electricity generation in Europe

SPE has a generation capacity of 1,985 MW. The following table breaks down the fuel mix of SPE's installed capacity for electricity generation in Belgium in 2009.

**Figure 9: Fuel mix of SPE's electricity generation and installed capacity in Belgium, 2009**



**Table 11: Fuel mix of SPE's electricity generation and installed capacity in Belgium, 2009**

Fuel type	Capacity (MW)
Diesel <sup>310</sup>	156.7
Gas <sup>311</sup>	1,152.3
Nuclear <sup>312</sup>	511.5
Hydro <sup>313</sup>	72.6
Wind <sup>314</sup>	92.2
<b>TOTAL</b>	<b>1,985.3</b>

No information could be found with regard to the electricity generated by SPE in 2009.

## Electricity supplied in Belgium

SPE has a share of 20% in the Flemish residential electricity market and a 25% share in the Walloon residential electricity market.<sup>315</sup> According to the company its fuel mix of electricity supplied to its costumers in 2009 was 100% green, as approved by the Belgian energy market regulators.<sup>316</sup> The exact fuel mix of supplied electricity in Belgium was not known by SPE at the time of request by SOMO. The mix comprises hydro and wind only. For its non-renewable production of electricity, green certificates were purchased by SPE to achieve the 100% green status.<sup>317</sup>

The share of SPE-Luminus (SPE) in the supply of electricity to Belgium amounted to 13.7% in 2009.<sup>318</sup> The company supplies 1.6 million private and business delivery points with electricity and gas. Luminus is the brand name for this.<sup>319</sup>

## Investments in new generation capacity in Europe

Table 12 indicates the SPE-projects that are currently under construction in Europe.

**Table 12: SPE's announced investments in new European production capacity**

Project name	Location	Fuel type	Date in operation	Amount (€)	Output Capacity (MW)	Project Status
Wind parks	Belgium	wind	2011	n/a	24	under construction <sup>320</sup>
peak unit Angleur	Liège, Belgium	gas	2011	53	128	under construction <sup>321</sup>

Table 13 lists SPE's investments that are either still awaiting permission or have been announced as plans.

**Table 13: SPE's announced plans for investment in new capacity**

Project name	Location	Fuel type	Date in operation	Amount (€)	Output Capacity (MW)	Status
SPE	Navagne (Belgium)	gas (CCGT)	2012	550	860	In study/to be developed <sup>322</sup>
SPE	Belgium	wind	2011-2015	n/a	est. 100	In study/to be developed <sup>323</sup>

## Responsible sourcing

SPE has stated that its Corporate Social Responsibility policy is under construction. Regarding responsible sourcing of coal and uranium, it is important to notice that SPE states that it does not buy coal and uranium as it only has a minority share in nuclear reactors for which it is not the operator.

In 2009, SPE has bought 33,528 tonnes RSPO-certified palm oil from Malaysia. Regarding monitoring of compliance with sustainability criteria, SPE stated that regarding palm oil this is monitored through an external audit of suppliers and the VREG audit.

Of all electricity sold by SPE in 2009, 87% was generated by the company itself. The other 13% was purchased on wholesale or spot markets (7%) and purchased directly from small producers (6%; mainly renewables/co-generation).<sup>324</sup> Compared to previous years, the percentage of electricity generated by the company itself has increased. This is explained by increased production out of own facilities and the Pax Electrica II agreement, through which SPE obtained some rights to nuclear production from Electrabel.<sup>325</sup>

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- <sup>312</sup> SPE has a 10.2% share in the reactors No. 2 and 3 of the nuclear plant Tihange and the reactors No. 3 and 4 of the nuclear plant Doel.<sup>□</sup> This participation is equivalent to about 420 MW generation capacity.<sup>□</sup> World Nuclear Association, "Nuclear Power in Belgium", June 2010, <[http://www.world-nuclear.org/info/inf94.html#Note\\_c](http://www.world-nuclear.org/info/inf94.html#Note_c)>, (11 June 2010)
- Electrabel, website "nuclear", <<http://www.electrabel.com/whoarewe/nuclear/nuclear.aspx>> (11 June 2010)
- <sup>313</sup> Elia, "Overview of Generating Facilities - Technical Parameters Detail Belgium", 12 January 2010, <[http://www.energeia.nl/upload2/Opgesteld\\_netgekoppeld\\_vermogen\\_elektriciteit\\_Belgi%EB\\_2010-1.xls](http://www.energeia.nl/upload2/Opgesteld_netgekoppeld_vermogen_elektriciteit_Belgi%EB_2010-1.xls)> (24 June 2010)
- <sup>314</sup> SPE, "Waar haalt SPE-Luminus zijn groene elektriciteit?", <<http://www.spe.be/index.php?page=production&subpage=wherogreen&section=company>> (24 June 2010)
- <sup>315</sup> SPE website, "kerncijfers", <<http://www.spe.be/index.php?page=who&subpage=numbers&section=company>> (24 June 2010)
- <sup>316</sup> E-mail Els Devalez (External Communications Officer, Corporate Affairs, SPE-Luminus) on 5 August 2010.
- <sup>317</sup> Personal communication Anne Grandjean, head of External Communications, Corporate Affairs, SPE-Luminus, 2 September 2010.
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- <sup>319</sup> EdF Group Activity and Sustainable Development Report 2009, p. 18, <[http://www.EdF.com/html/RA2009/uk/pdf/EdF\\_RA09\\_full\\_va.pdf](http://www.EdF.com/html/RA2009/uk/pdf/EdF_RA09_full_va.pdf)> (11 June 2010)
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- <sup>321</sup> European Commission, "Case No COMP/M.5549 - EDF/ SEGEBEL Regulation (EC) NO 139/2004 merger procedure", 12 November 2009, p. 10, <[http://ec.europa.eu/competition/mergers/cases/decisions/m5549\\_20091112\\_20212\\_en.pdf](http://ec.europa.eu/competition/mergers/cases/decisions/m5549_20091112_20212_en.pdf)> (23 June 2010)  
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- <sup>322</sup> SPE, press release "CCGT power plant in Navagne: SPE receives initial permit", 24 February 2009, <<http://www.spe.be/index.php?page=press&subpage=pressreleases&section=more&id=55>> (23 June 2010)  
European Commission, "Case No COMP/M.5549 - EDF/ SEGEBEL Regulation (EC) NO 139/2004 merger procedure", 12 November 2009, <[http://ec.europa.eu/competition/mergers/cases/decisions/m5549\\_20091112\\_20212\\_en.pdf](http://ec.europa.eu/competition/mergers/cases/decisions/m5549_20091112_20212_en.pdf)> (23 June 2010)
- <sup>323</sup> European Commission, "Case No COMP/M.5549 - EDF/ SEGEBEL Regulation (EC) NO 139/2004 merger procedure", 12 November 2009, p. 10, <[http://ec.europa.eu/competition/mergers/cases/decisions/m5549\\_20091112\\_20212\\_en.pdf](http://ec.europa.eu/competition/mergers/cases/decisions/m5549_20091112_20212_en.pdf)> (23 June 2010)
- <sup>324</sup> E-mail Els Devallez (External Communications Officer, Corporate Affairs, SPE-Luminus) on 5 August 2010.
- <sup>325</sup> Personal communication Anne Grandjean, head of External Communications, Corporate Affairs, SPE-Luminus, 2 September 2010.

## 5 Vattenfall/Nuon

The Nuon and Vattenfall company profiles were drafted and reviewed separately, and combined in the final phase of this research.

### Basic company information

#### Vattenfall

Vattenfall is Europe's fifth largest generator of electricity and largest producer of heat. Consolidated sales in 2009 amounted to €19.8 billion. Vattenfall's main products are electricity, heat and gas. In electricity, Vattenfall works in all parts of the value chain: generation, transmission, distribution and sales. In heat, Vattenfall is active in production, distribution and sales. Vattenfall is also engaged in production and sales of gas, energy trading, and lignite mining. Vattenfall has approximately 40,000 employees and is 100%-owned by the Swedish state.<sup>326</sup>

Vattenfall operates in four different markets; Benelux (The Netherlands and Belgium), Central Europe (Germany and Poland), the Nordic countries (Sweden, Finland and Denmark) and the United Kingdom.<sup>327</sup>

The Group's operations in 2009 were conducted primarily in six operating segments:

- Business Group Pan Europe comprises three Group-wide business units: Wind, Nuclear and Engineering.
- Business Group Central Europe conducts operations in Germany and Poland.
- Business Group Nordic conducts operations in Sweden, Finland and Denmark.
- Business Group Benelux conducts operations in the Netherlands and Belgium, and consists of all the Nuon activities, except for its windparks.
- Supply & Trading has Group-wide responsibility for market access, price hedging, fuel purchasing, dispatching for the German and Dutch power plants, and trading.
- The segment Other includes treasury operations and other group functions.

A draft version of this profile has been sent to Vattenfall, but the company was unable to respond in time. Therefore, the information in this profile has not been verified by Vattenfall and should be interpreted with caution.

#### Nuon

N.V. Nuon Energy is a non-listed public limited liability company incorporated in 1998 with its registered office in Amsterdam. On 1 July 2008 Nuon was split into a distribution company (Alliander) and a production and supply company (N.V. Nuon Energy) to prepare for the implementation of the Dutch Independent Network Operations Act (Won), which came into effect one year later. Nuon has operations in the field of generation, trade and supply. In addition to being one of the largest energy suppliers in the Netherlands, the company has interests in energy generation and supply in Belgium, and has trading activities with, among others, the UK and Scandinavia. Nuon provides electricity, natural gas, cooling and heat to approximately 2.6 million customers in the Netherlands and Belgium.<sup>328</sup> The company also

markets and trades energy, and it offers energy-related services, such as equipment installation and energy saving products.

With effect from 1 July 2009, Nuon's trading activities have organisationally been integrated in Vattenfall's central energy trading unit and its wind activities organisationally form part of Business Group Pan Europe. As long as these activities are not legally transferred within the Vattenfall Group, the results of these activities will be included in the financial reports of Nuon. Nuon Energy's business units Exploration & Production, Power Heat & Services, Sales and Business Development & Projects form Vattenfall's new regional Business Group Benelux.

The information that applies to N.V. Nuon Energy has been verified by the company, who used the same scope for the review as for Nuon's reporting. This includes all of Nuon's activities in The Netherlands, Belgium and Germany.

### Purchase and integration

On 1 July 2009, Vattenfall acquired 49% of the Nuon shares, for an amount of € 4,833 million, giving the company operational control over Nuon. Vattenfall will acquire the remaining 51% of shares in the coming five years under fixed terms. As one of the conditions of the European Competition Authorities, Vattenfall sold off Nuon's activities in Germany. In March 2010, it was announced that Enervie (formerly Sewag) acquired all of Nuon's German operations.<sup>329</sup>

## Installed capacity for electricity generation in Europe

### Vattenfall (including Nuon)

Figure 10 shows the fuel mix of Vattenfall's installed capacity in Europe as of 31 December 2009. Compared to the situation at the end of 2008, about 4.4 GW is added to the electricity generation capacity. Of this expansion 4.0 GW is explained by the acquisition of 49% of N.V. Nuon Energy. Nuon forms the new operating segment Business Group Benelux, with the exception that the wind power operations of Nuon have been integrated with Business Group Pan Europe.<sup>330</sup> The generation capacity of Nuon is 100% incorporated in the capacity figures of Vattenfall as of 31 December 2009.

Figure 10: Fuel mix of Vattenfall's installed capacity in Europe, 2009

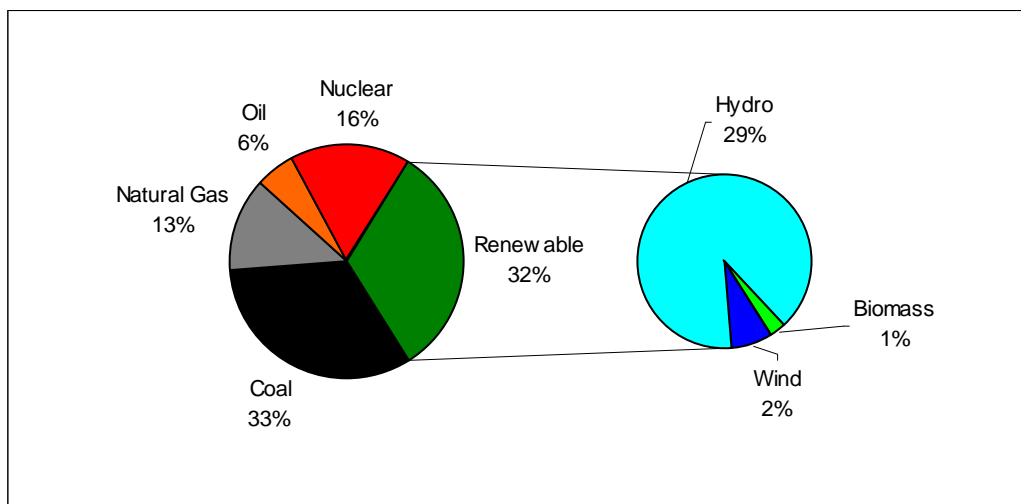


Table 14 shows the absolute figures for Vattenfall's installed capacity in Europe per fuel type.

**Table 14: Vattenfall's installed capacity in Europe (MW) per division and per fuel type, 2009<sup>331</sup>**

Fuel type	Business Group Pan Europe	Business Group Nordic	Business Group Central Europe	Business Group Benelux	Total
Coal <sup>332</sup>	0	1,490	9,825	883	12,198
Natural Gas	0	320	1,725	2,835	4,880
Oil	0	1,280	788	0	2,068
Nuclear	6,146	0	0	0	6,146
Wind	859	0	0	0	859
Hydro	0	7,989	2,880	0	10,869
Biomass	0	322	44	0	366
<b>Total</b>	<b>7,005</b>	<b>11,401</b>	<b>15,262</b>	<b>3,718</b>	<b>37,386</b>

Figure 11 shows the fuel mix of the actual generated electricity in Europe by Vattenfall in 2009.

**Figure 11: Fuel mix of Vattenfall's generated electricity in Europe, 2009**

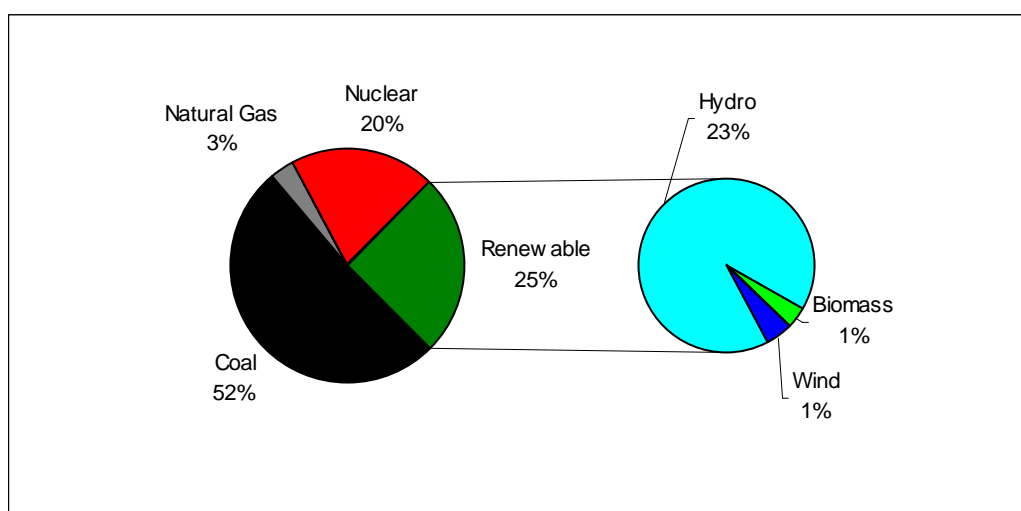


Table 15 shows the absolute figures for Vattenfall's generated electricity in Europe per fuel type. As in 2008, the installed capacity for fuel type oil was not used for actual generation of electricity in 2009. Contrary to the installed capacity, the generated electricity by Nuon is not fully incorporated in the figures, but according to the official ownership by Vattenfall (49% as of 31 December 2009) and the official date of the acquisition (1 July 2009).

Compared to 2008 and despite the acquisition of Nuon, the amount of electricity generated by Vattenfall decreased in 2009 by 4.5% in 2009.<sup>333</sup> The decrease can be mainly explained by smaller output of hydro (15% less due to lower water supply) and nuclear (10% less due to outages).<sup>334</sup>

**Table 15: Vattenfall's generated electricity (TWh) in Europe per division and per fuel type, 2009<sup>335</sup>**

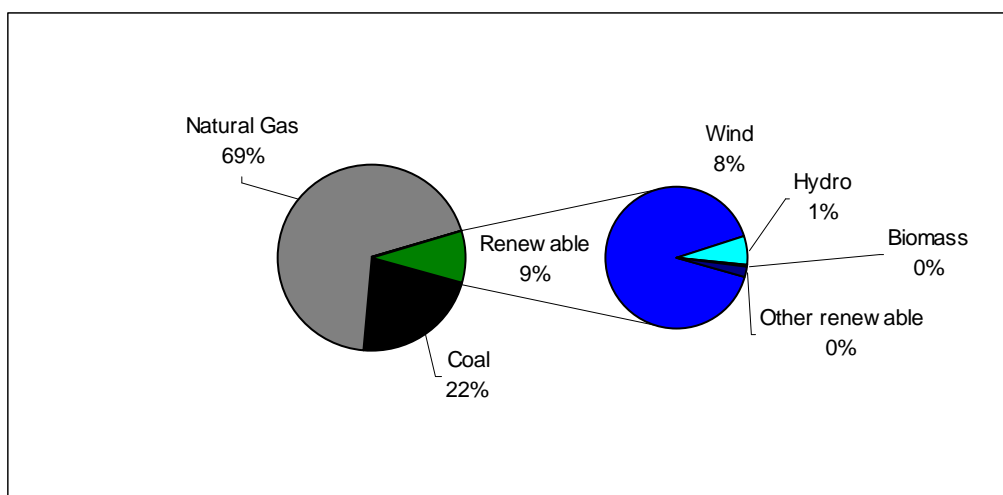
Fuel type	Business Group Pan Europe	Business Group Nordic	Business Group Central Europe	Business Group Benelux	Total
Coal <sup>336</sup>	0	6.7	61.9	2.6	71.2
Natural Gas	0	0.6	3.5	0.6	4.7
Oil	0	0	0	0	0
Nuclear	28.3	0	0	0	28.3
Wind	1.7	0	0	0	1.7
Hydro	0	29.1	2.5	0	31.6
Biomass	0	0.3	1.1	0	1.4
<b>Total</b>	<b>30.0</b>	<b>36.7</b>	<b>69.0</b>	<b>3.2</b>	<b>138.9</b>

### Nuon

The information below is gathered separately for Nuon. These figures have also featured in the tables for the Vattenfall section (columns Business Group Benelux), but are provided here with a bit more detail. The notable differences in the figures (Vattenfall section versus this section) can be explained by differences in scope of reporting. This is the case for the installed capacity, where Nuon provides slightly higher figures than Vattenfall's Benelux division, and for the generated electricity, to which Vattenfall only reports its ownership share.

Figure 12 shows the fuel mix of Nuon's installed capacity. For the large part, this fuel mix has remained the same compared to the previous year. A number of small wind projects became operational in 2009.<sup>337</sup> Nuon still has the large majority of its installed capacity in The Netherlands, and most of the 9% renewable capacity is accounted for by offshore and onshore wind projects.

**Figure 12: Fuel mix of Nuon's installed capacity in Europe, 2009**

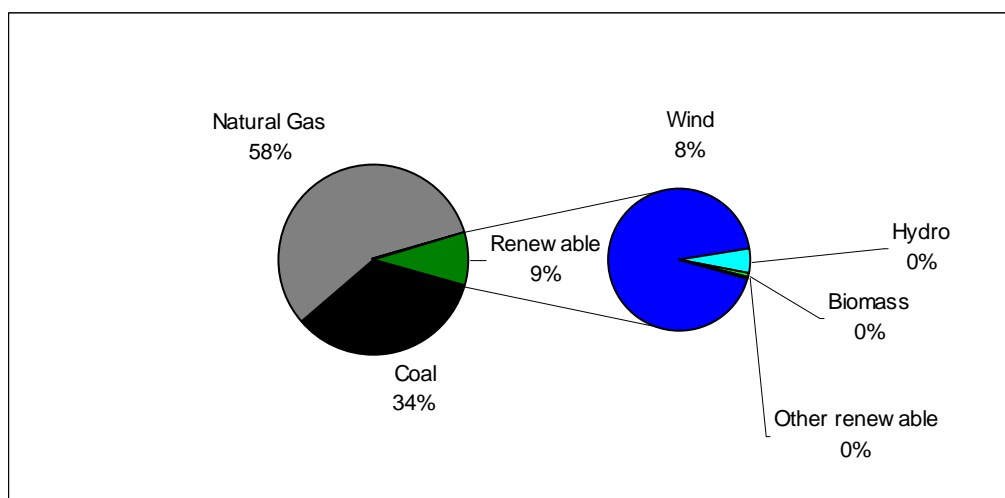


Based on: Nuon<sup>338</sup>

Nuon provides detailed figures on the generated electricity in 2009. Figure 13 shows the fuel mix, and shows slightly higher coal figures and slightly lower natural gas figures than its installed capacity. The renewable share is similar to the figures for the installed capacity.



**Figure 13: Fuel mix of Nuon's generated electricity in Europe, 2009**



Based on Nuon<sup>339</sup>

Table 16 shows the absolute figures for Nuon's installed capacity and electricity generation. Under the category "Natural gas", Nuon makes the distinction between three different types of gas from which it produces electricity: 12.6% of the generated electricity comes from blast furnace gases generated at the Corus, 28.5% from combined heat and power (CHP) plants, and 15.8% from conventional natural gas plants.

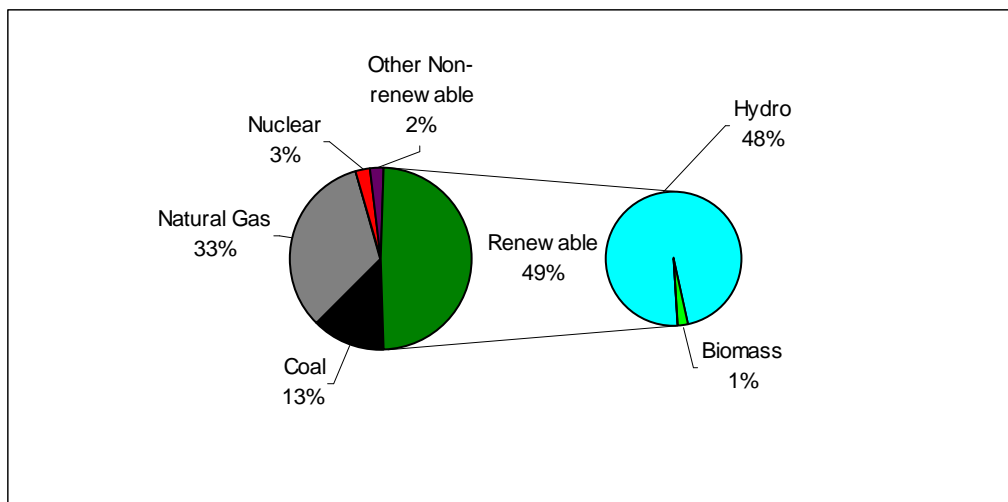
**Table 16: Fuel mix of Nuon's installed capacity and electricity generation in Europe, 2009<sup>340</sup>**

Fuel type	Installed capacity (MW) <sup>341</sup>	Generated electricity (GWh) <sup>342</sup>
Coal	883 <sup>343</sup>	5,262
Natural Gas	2,767 <sup>344</sup>	8,758
CHP		[4,387]
Regular		[2,427]
Blast Furnace		[1,944]
Oil		
Nuclear		
Other Non-renewable		
Wind	334 <sup>345</sup>	1,275
Hydro		72
Large scale (>10MW)		0
Small scale (<10MW)	24 <sup>346</sup>	[72]
Biomass		16
Stand alone	2 <sup>347</sup>	
Co-fired		
Other renewable	8 <sup>348</sup>	4
<b>Total</b>	<b>4,018</b>	<b>15,387</b>

## Electricity supplied in Belgium

Figure 14 shows the fuel mix of electricity supplied by Nuon in Belgium, where it supplied a total of 2.7 TWh in 2009.<sup>349</sup> This is 3.7% of the total supply of electricity in Belgium in 2009.<sup>350</sup> The large share of hydro power is accounted for by Nuon's purchases of green certificates.

**Figure 14: Fuel mix of Nuon's supplied electricity in Belgium**



Based on Nuon<sup>351</sup>

**Table 17: CO<sub>2</sub> emissions and radioactive waste production for Nuon's supplied electricity in Belgium, 2009**

Indicator	Amount
CO <sub>2</sub> (g/kWh)	268.7
Radioactive waste (µg/kWh)	70

## Announced investments in new generation capacity in Europe

### Vattenfall

Vattenfall's investment plan for the period 2010–2014 is worth €19.4 billion<sup>352</sup>, excluding any acquisitions. The investment plan also encompasses the acquired operations in the Netherlands and Belgium. Most of the investments comprise electricity generation facilities, the rest mainly pertains to electricity and heat networks.

Investments in fossil-based electricity generation amount to 53% of the investment plan.<sup>353</sup> The breakdown of the fossil-based investments totalling €10.4 billion is as follows: coal €3.9 billion; lignite €2.3 billion; gas €3.8 billion; CCS (carbon capture and storage) €0.4 billion.

Investments in renewable energy amount to 17% of the investment plan. The breakdown of the investments totalling €3.2 billion is as follows: wind power €1.9 billion; hydro power €0.7 billion; biomass and waste €0.7 billion. The company also invests €1.4 billion in nuclear power operations in order to improve safety and boost generation capacity.<sup>354</sup>

In addition to the investments explained in table 18 and 19, Vattenfall plans to rebuild its three coal-fired power plants in Denmark in order to use large quantities of biomass fuel. The MaxBio plan comprises investments of around 700 million, scheduled in the period 2010–2018. In 2018, around 0.7 million tonnes of coal per year will be replaced by biomass in combination with coal.<sup>355</sup> The total capacity of the plants will remain unchanged. For this reason the investment is not included in the tables below.

## Nuon

Table 18 shows Vattenfall/Nuon's current investments in new installed capacity. It includes the takeover by Nuon of a natural gas power plant from Electrabel announced in December 2009.

In addition to the new plants that Nuon is building, it also announced the replacement of an existing natural gas plant at the Hemweg location, for a more modern and efficient one with a slightly lower capacity.<sup>356</sup> It also exchanged some wind assets in a swap with Electrawinds and Aspiravi.<sup>357</sup> This is taken up in the table below as a negative figure in order to avoid double counting. It should be noted that the lower capacity could still generate an equal amount of electricity or more due to a better efficiency.

Nuon resumed construction on the first phase of the large, multi-fuel Magnum power plant after having suspended construction for a year and a half. The first phase consist of natural gas facility, while the new coal capacity with gasification technology will be built in the second phase.

**Table 18: Vattenfall's investments in new production capacity**

Company	Project name	Location	Fuel type	Date in operation	Amount (€ million)	Output Capacity (MW)	Project Status
Vattenfall	Moorburg	Germany	coal	2012	2,600	1,640 <sup>358</sup>	under construction <sup>359</sup>
Vattenfall	new unit Boxberg	Germany	lignite	late 2010	1,000	675	under construction <sup>360</sup>
Vattenfall	combined heat and power unit, Siekierki	Warsaw, Poland	coal/ biomass	2014	800	480	almost tendered <sup>361</sup>
Vattenfall	boost generation capacity	Forsmark and Ringhals plants, Sweden	nuclear	2011/2014	1,250 <sup>362</sup>	450 <sup>363</sup>	under construction
Vattenfall	Abelvattnet	Sweden	hydro	2010	10	4.6	under construction <sup>364</sup>
Vattenfall	Ormonde wind farm, offshore	In the Irish Sea, 10km off Barrow-In-Furness, England, UK	wind	2011 /2012	545	150	under construction <sup>365</sup>
Vattenfall	Thanet wind farm, offshore	off the south-east coast of Kent, England, UK	wind	2010	945	300	under construction <sup>366</sup>
Vattenfall	Stor-Rotliden, wind power project, onshore	municipality of Åsele in northern Sweden	wind	2011	135	78	under construction <sup>367</sup>

Vattenfall	Alpha Ventus	45 km off the coast of the island of Borkum, Germany	wind	April 2010	66	16	in operation <sup>368</sup>
Vattenfall	Repower older turbines	Denmark	wind	n/a	n/a	35	under construction <sup>369</sup>
Vattenfall	Edinbane, onshore wind power project	the Isle of Skye, Scotland, UK	wind	2010	61	41.4	under construction <sup>370</sup>
Nuon		Almere (NL) <sup>371</sup>	natural gas (CHP)	2010	n/a	120	Plant acquired from GDF Suez/Electabel
Nuon	Nuon Magnum (Phase I) <sup>372</sup>	Eemshaven (NL)	natural gas (part of a multi-fuel installation)	2012	1,800	1,200 <sup>373</sup>	Construction resumed
Nuon	Hemweg <sup>374</sup>	Amsterdam (NL)	natural gas (CCGT)	2012	n/a	435	under construction
Nuon	Oom Kees <sup>375</sup>	Wieringermeer (NL)	wind	2010	n/a	6	under construction
Nuon	Les Eoliennes de Perwez	Perwez (BE)	wind	2010	n/a	-4.5	asset swap

Table 19 shows Vattenfall/Nuon's announced plans for future investments in new production capacity.

Nuon is no longer developing the 450MW natural gas plant in Griesheim, as it will no longer be active on the German market after the mandatory sale of Nuon Germany.<sup>376</sup> New plans now only feature investments in natural gas and wind facilities, including a new natural gas plant to be built in Seneffe, Belgium.

Nuon has also announced plans for the 'largest off-shore wind farm in Belgium', named Seal.<sup>377</sup> This project is expected to go into operation in 2012. As no details are given about the investment amount or the output capacity, this project is not taken up in

Table 19. Nuon is also constructing a 299 MW wind park in Wales, called Pen Y Cymoedd, which is also not taken up in the table for reasons of scope and consistency.<sup>378</sup>

**Table 19: Vattenfall's announced plans for investment in new capacity**

Company	Project name	Location	Fuel type	Date in operation	Amount (€ million)	Output Capacity (MW)	Status
Vattenfall	Vattenfall and ZA Puławy	Puławy, Poland	Undecided <sup>379</sup>	2016-2018	650-900	700	planning phase <sup>380</sup>
Vattenfall	Elektrownia Koźienice	South east Poland	coal	2015	288	187	planning phase <sup>381</sup>

Vattenfall	Elektrownia Kozenice	South east Poland	coal	n/a	288	187	considered <sup>382</sup>
Vattenfall	Elektrownia Gniew – Opalenie	Opalenie, Poland	coal	n/a	2,560	1,660	planning phase <sup>383</sup>
Vattenfall	Jänschwalde	Near Brandenburg, Germany	coal/ CCS	2015	n/a	250 <sup>384</sup>	planning phase <sup>385</sup>
Vattenfall	EC Pruszków	Poland	coal/ biomass	n/a	740	480	planning phase <sup>386</sup>
Vattenfall	EC Zerań	Warsaw, Poland	coal/ biomass	n/a	740	480	planning phase <sup>387</sup>
Vattenfall	Heizkraftwerk Lichterfelde	Berlin, Germany	gas (CCGT)	2014/2015	n/a	300	planning phase <sup>388</sup>
Vattenfall	Heizkraftwerk Klingenberg	Berlin, Germany	gas (CCGT)	2016/2019	n/a	300	planning phase <sup>389</sup>
Vattenfall	Enea	Poland	biogas	2020	n/a	28	planning phase <sup>390</sup>
Vattenfall	CHP plant Haferweg	Hamburg Altona, Germany	biomass	n/a	n/a	5	approval received in January 2010 <sup>391</sup>
Vattenfall	district heating plant Märkisches	Märkisches, Germany	biomass	n/a	n/a	5	approval received in March 2010 <sup>392</sup>
Vattenfall	Biomass CHP plant Klingenberg	Klingenberg, Germany	biomass	n/a	n/a	40	planning phase <sup>393</sup>
Vattenfall	Aegir	Shetland Islands, UK	wave power	2014	n/a	10	planning consent needed <sup>394</sup>
Vattenfall	Tonn Energy	Ireland	wave power	2020	180	125	in study <sup>395</sup>
Vattenfall	Dan Tysk	70 km northwest of Sylt, Germany	wind	n/a	n/a	400	construction starts 2011. <sup>396</sup>
Vattenfall	first project East Anglia offshore windfarm zone	14km off the coast of Norfolk and Suffolk, England, UK	wind	n/a	n/a	600	construction expected to commence in 2015. <sup>397</sup>
Vattenfall	other projects East Anglia offshore windfarm zone	14km off the coast of Norfolk and Suffolk, England, UK	wind	n/a	n/a	3,000	construction expected to commence after 2015. <sup>398</sup>
Vattenfall	Kriegers Flak II	Baltic Sea, 30 km south of Trelleborg, Sweden	wind	n/a	n/a	640	no investment decision yet. <sup>399</sup>
Vattenfall	Taggen	Offshore Sweden	wind	n/a	n/a	150	possible construction start 2012 <sup>400</sup>
Vattenfall	Trolleboda	Offshore Sweden	wind	n/a	n/a	150	not economically viable according to company <sup>401</sup>

Vattenfall	Aultmore, onshore	Aultmore Forest, Banffshire Scotland, UK	wind	n/a	n/a	n/a	awaiting permission <sup>402</sup>
Vattenfall	Clashindarroch, onshore	near Huntly in Aberdeenshire Scotland, UK	wind	n/a	n/a	50	awaiting permission <sup>403</sup>
Vattenfall	Kyle, onshore	east of Dalmellington, Scotland, UK	wind	n/a	n/a	n/a	in study <sup>404</sup>
Vattenfall	Logiealmond, onshore	Perthshire, Scotland, UK	wind	n/a	n/a	n/a	awaiting permission <sup>405</sup>
Vattenfall	Minch Moor, onshore	near Peebles, Scotland, UK	wind	n/a	n/a	n/a	awaiting permission <sup>406</sup>
Vattenfall	Ray, onshore	near Kirkwhelpington. England, UK	wind	n/a	n/a	n/a	awaiting permission <sup>407</sup>
Vattenfall	Whitton, onshore	east of Jedburgh, Scotland, UK	wind	n/a	n/a	15	awaiting permission <sup>408</sup>
Vattenfall	Enea	Poland	wind	2020	n/a	75	planning phase <sup>409</sup>
Nuon		Velsen <sup>410</sup>	natural gas	n/a	100	200	proposed
Nuon		Diemen (NL) <sup>411</sup>	natural gas (CHP)	2012	n/a	500	proposed
Nuon		Seneffe <sup>412</sup> (BE)	natural gas (CCGT)	n/a	n/a	450	proposed
Nuon	Beaufort <sup>413</sup>	Noordzee	wind	2015	950	300	awaiting subsidies
Nuon	De Zuidlob <sup>414</sup>	Zeewolde	wind	2012	n/a	108	proposed
Nuon		Duiven (NL) <sup>415</sup>	wind	n/a	n/a	12	awaiting permits
Nuon		Büren (NL) <sup>416</sup>	wind	n/a	n/a	8	awaiting permits
Nuon	Nuon Magnum (Phase II) <sup>417</sup>	Eemshaven (NL)	coal and biomass	n/a	n/a	800	proposed
Nuon	Nuon Magnum (Phase II) <sup>418</sup>	Eemshaven (NL)	natural gas	n/a	n/a	-800	proposed

## Responsible sourcing

Vattenfall/Nuon's approach to sustainability can be described as aiming to find a balance between electricity reliability, cost and sustainability.<sup>419</sup> Nuon's CSR report states: 'In our view a sustainable energy supply is clean, affordable and reliable. We want to occupy a prominent position in renewable production capacity, energy saving and clean fossil technologies'. In addition to annual CSR reporting, the company has a Code of Conduct for Employees.

Vattenfall has a code of conduct for suppliers. Within the code of conduct a reference is made to the UN Global Compact and all ten principles of the Global Compact are elaborated specifically, e.g. the prohibition of forced and compulsory labour, the obligation to provide a

safe and healthy workplace, the recognition of the rights of employees to freely associate and the prohibition of any form of discrimination. The code of conduct also mentions that Vattenfall may conduct on-site reviews or audits at suppliers in order to assess 'progress towards the principles'. Vattenfall also expects suppliers to apply the company's minimum standards to their subcontractors and sub-suppliers. 'Suppliers' as such are not specifically defined, although the website does mention that 'the broad spectrum of different goods and services procured ranges from fuel for our generation units to outsourced works and services; from large scale investments like turbines to office material and IT solutions'.<sup>420</sup> Nuon's suppliers are also bound to Vattenfall's Code of Conduct for Suppliers.

### Raw materials

The procurement of coal is not specified by Vattenfall. Vattenfall uses hard coal in its power plants in Germany, Poland and Denmark. When purchasing hard coal, Vattenfall requires its suppliers to adhere to the principles of the UN Global Compact.<sup>421</sup>

Vattenfall owns and operates lignite mines close to its lignite-fired power plants in the Lausitz region, in eastern Germany.<sup>422</sup> Vattenfall is planning to extend its lignite mining in Germany by opening three new lignite mines (Jänschwalde-Nord, Welzow-Süd räumlicher Teilabschnitt II, Nochten Vorranggebiet). The company already has approval to mine 1,340 million tonnes lignite in the Lausitz region. The three extra areas are expected to have a mining capacity of 760 million tonnes of lignite. Nearly 4,000 people would have to be resettled. The company has also plans to open an opencast lignite mine at Gubin-Brody in Poland. At a local referendum conducted in the autumn of 2009 in Gubin 1,855 people voted against the mine compared to 874 being in favour.<sup>423</sup>

Nuon explicitly states that it does not provide figures for the quantities of raw materials it purchases, because this information would be 'competition-sensitive'.<sup>424</sup> It does indicate that it sources most of its coal directly from coal mines, and that it performs risk reviews on human rights and corruption before closing coal contracts. The results of these risk reviews have not been made public. Nuon mentioned that it is involved in sector wide initiatives to address the sustainability issues identified in the mining phase of the coal supply chain.<sup>425</sup>

Regarding biomass, Vattenfall does not mention where the biomass used in its plants comes from. However, it does publish an opinion paper on biomass, stating that 'Vattenfall supports the development of generally adopted sustainability criteria for biomass' and that 'Vattenfall's minimum requirements on all suppliers are criteria based on UN Global Compact. In addition, Vattenfall supports voluntary certification schemes for biomass fuels. Certification schemes referred to by suppliers are assessed by Vattenfall to determine reliability'.<sup>426</sup>

Nuon mentions that the company applies the 'Cramer criteria' for its purchase of biomass. It also actively participates in the "Commissie-Corbey" and the NTA8080 to improve the quality of biomass sustainability standards. In its CSR report, Nuon provides insight in the origin of the biomass it uses: 'At the biomass plant in Lelystad, about 20 to 25 thousand tonnes of clean wood cuttings are burned annually to provide about 3,000 households with district heating and power. These wood chips come from local woodland of Staatsbosbeheer, the Dutch Forestry Commission. Biomass is co-fired in our power plant at Buggenum, which means that part of the coal is replaced with biomass prior to combustion. This generally takes the form of sawdust and agricultural residues from neighbouring countries'.<sup>427</sup> 49% of the wood waste it uses is sourced from Germany, the other 59% from The Netherlands.

Vattenfall does provide information regarding the origin of the uranium it uses; the uranium is procured from mines in Australia, Namibia and Russia. All suppliers in the uranium purchasing chain are visited and assessed by Vattenfall Nuclear Fuel staff in order to ensure their operations follow Vattenfall's policies. The company indicates on its website that it makes a thorough evaluation of the uranium suppliers through onsite visits and assessments according to Vattenfall's environmental and social criteria.<sup>428</sup> Nuon does not own any nuclear capacity, and therefore does not purchase uranium as a raw material.

### Electricity trading

In response to the questionnaire sent to Nuon as part of this research, Nuon explains how the electricity it generates bears no link with the electricity it supplies. It states that: 'All generated power can be offered on the wholesale market, where contracts change hands multiple times and can be split up and combined by various traders and brokers. These contracts do not stipulate the origin of the power produced, other than the country of origin [...] This means that it is not possible to trace back from which power producers the energy sourced for end customers originates'.<sup>429</sup>

Nuon also explains how the fuel mix of the electricity purchased on the spot market is estimated on the basis of the Dutch Standard Fuel Mix and the Imported Fuel Mix, as reported by EnergieNed, the business association of the electricity industry.

No information was found regarding Vattenfall's trading activities.

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- <sup>326</sup> Vattenfall, "annual report 2009", p.2 and 3, <<http://www.vattenfall.com/en/file/2-20100524-110100.pdf>> (16 July 2010)
- <sup>327</sup> Vattenfall website, "Market operations", updated 21 June 2010, <<http://www.vattenfall.com/en/market-operations.htm>> (16 July 2010).
- <sup>328</sup> Nuon, Annual Report 2009, p.4.
- <sup>329</sup> Energiea website, "Nuon Duitsland definitief in handen van Enervie na Europees groen licht", 19-03-10, <<http://www.energiea.nl/news.php?ID=42683>> (08-07-10).
- <sup>330</sup> Vattenfall, "annual report 2009", p.94, <<http://www.vattenfall.com/en/file/2-20100524-110100.pdf>> (16 July 2010)
- <sup>331</sup> Data corresponding to Vattenfall's ownership of the respective facilities. Vattenfall, "annual report 2009", p.133, <<http://www.vattenfall.com/en/file/2-20100524-110100.pdf>> (16 July 2010)
- <sup>332</sup> Vattenfall reports separately for its lignite and hard coal capacity. This table has combined these figures for reasons of comparability.
- <sup>333</sup> In 2009 it was 138.8 TWh, in 2008 it was 145.4 TWh. Vattenfall, "annual report 2009", p.133, <<http://www.vattenfall.com/en/file/2-20100524-110100.pdf>> (16 July 2010)
- <sup>334</sup> Vattenfall, "annual report 2009", p.22 and 133, <<http://www.vattenfall.com/en/file/2-20100524-110100.pdf>> (16 July 2010)
- <sup>335</sup> Data corresponding to Vattenfall's ownership in the respective facilities. Vattenfall, "annual report 2009", p.133, <<http://www.vattenfall.com/en/file/2-20100524-110100.pdf>> (16 July 2010)
- <sup>336</sup> Vattenfall reports separately for its lignite and hard coal capacity. This table has combined these figures for reasons of comparability.
- <sup>337</sup> Nuon, Annual Report 2009, p.22.
- <sup>338</sup> Nuon Corporate Social Responsibility Report 2009, p.78.
- <sup>339</sup> Nuon Corporate Social Responsibility Report 2009, p.19.
- <sup>340</sup> The figures given in this table are based on Nuon's CSR report, which provides the most detailed figures for capacity and generation.
- <sup>341</sup> Some of these figures are based on SOMO's own calculations. In its CSR report, Nuon indicates that reporting on "total installed capacity by fuel source is not always possible due to combined fuel applications in the installations" (Nuon CSR report, p.78). These figures should therefore be interpreted with caution.
- <sup>342</sup> Nuon's comments to a draft version of this report, email received 06-08-10.
- <sup>343</sup> This is the combined capacity of the Buggenum (253 MW) and Hemweg (630 MW) coal plants.
- <sup>344</sup> This is calculated by taking the total grey capacity (3,650 MW) minus the coal capacity (883 MW).
- <sup>345</sup> Nuon Corporate Social Responsibility Report 2009, p.50.
- <sup>346</sup> Idem.
- <sup>347</sup> Idem.
- <sup>348</sup> Idem.
- <sup>349</sup> Nuon, Annual Report 2009, p.19.



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- 351 Nuon Corporate Social Responsibility Report 2009, p.37.
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- 353 SEK 100 billion. Exchange rate SEK 10.35 = € 1
- 354 Vattenfall, "annual report 2009", p.10, <<http://www.vattenfall.com/en/file/2-20100524-110100.pdf>> (16 July 2010)
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- 398 ScottishPower Renewables (50%) and Vattenfall (50%) are the developers of the East Anglia Array offshore windfarm zone. The proposed first project will consist of approximately 240 turbines and will have the capacity to generate up to 1.2 GW of electricity. The East Anglia Array, located in the North Sea off the coast of Norfolk, will have a capacity of up to 7.2 GW and is projected to commence construction in 2015. ScottishPower, press release "ScottishPower Renewables And Vattenfall Award Gardline Hydro Multi Million Pound Contract", 17 June 2010, <[http://www.scottishpower.com/PressReleases\\_2038.htm](http://www.scottishpower.com/PressReleases_2038.htm)> (21 June 2010)
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## 6 Fuel mix of installed capacity and electricity generation in Europe

This chapter provides a comparison of the fuel mixes of each of the companies' installed capacity and electricity generated in 2009. It has to be noted that the figures for installed capacity and electricity generated in Europe for EdF were not available, so all the aggregate figures presented in this chapter are EdF's worldwide figures. Taking up worldwide figures for one company could be misleading in comparison with other companies, but it should be noted that France, the UK, Germany and Italy account for more than 90% of EdF's capacity and actual electricity generation in 2009.

### Installed capacity in Europe

Table 20 shows the installed generation capacity in Europe of each company in MW. EdF is the largest company taken up in this research, with over 140 GW of installed capacity in Europe. EdF also has the largest overall renewable capacity out of the studied companies.

**Table 20: Fuel mix of installed capacity in Europe by company, in MW, 2009**

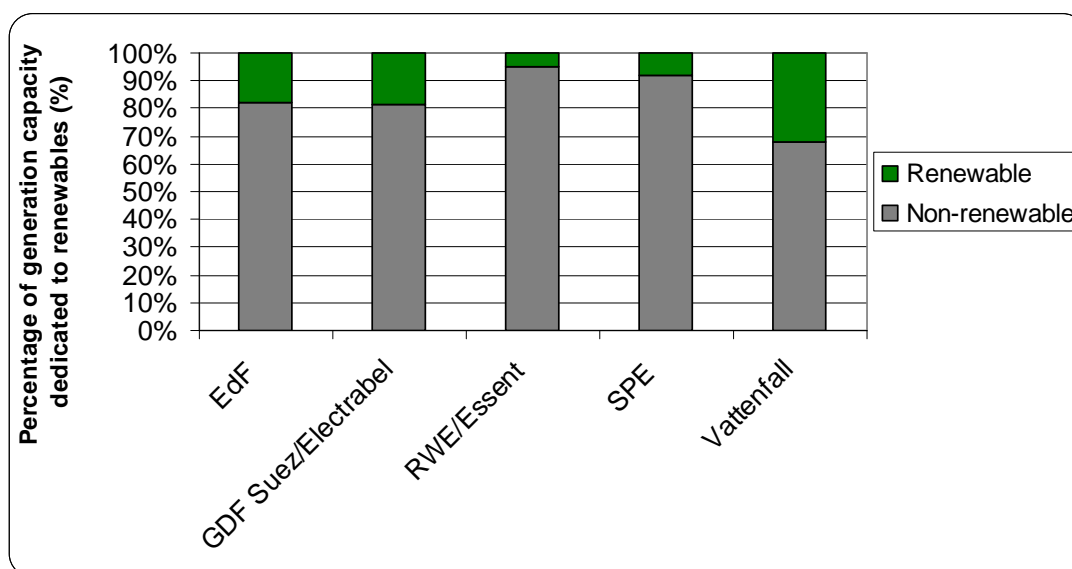
Fuel type	EdF	GDF Suez / Electrabel <sup>430</sup>	RWE / Essent	Vattenfall / Nuon	SPE
Coal	31,200	4,162	26,465	12,198	0
Natural Gas	8,500	19,598	9,144	4,880	1,152
Oil	0	0	0	2,068	157
Nuclear	75,000	6,356	6,295	6,146	512
Other Non-renewable	0	643	5,146	0	0
Wind	0	1,286	1,574	859	92
Hydro	22,900	5,221	793	10,869	73
Large scale	-	-	-	-	-
Small scale	-	-	-	-	-
Biomass	0	530	98	366	0
Stand alone	-	-	-	-	-
Co-fired	-	-	-	-	-
Other renewable	2,500	38	67	0	0
<b>Total renewable</b>	<b>25,400</b>	<b>7,075</b>	<b>2,532</b>	<b>12,094</b>	<b>165</b>
<b>Total</b>	<b>140,100</b>	<b>37,834</b>	<b>49,582</b>	<b>37,386</b>	<b>1,985</b>

SOMO compilation based on company data

Figure Figure 15 reflects the fuel mix of the installed capacity of the companies based on the percentage that renewable energy comprises of the total mix.



**Figure 15: Installed capacity in Europe dedicated to renewable energy, by company, 2009**



SOMO compilation based on company data

## Electricity generated in Europe

Table 21 shows the electricity that was actually generated in 2009 from the companies' installed capacity listed above. It should be noted that some companies do not provide figures on their generation figures, so there are a number of gaps in the tables and figures in this section. Looking at the overall figures, it is not surprising that EdF, the company with the most installed capacity, also generated the most electricity in general and the most electricity from renewable resources in particular in 2009. No figures were available at all for SPE.

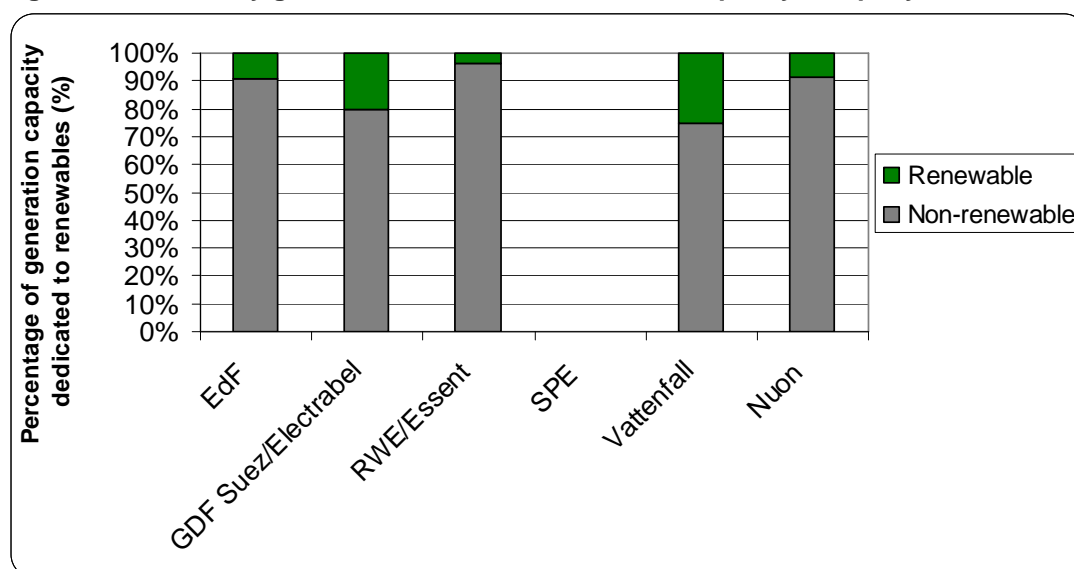
**Table 21: Fuel mix of electricity generated in Europe by company, in GWh, 2009**

Fuel type	EdF	GDF Suez / Electrabel	RWE / Essent	Vattenfall / Nuon	SPE
Coal	69,000	27,800	115,000	71,300	n/a
Natural Gas	26,800	124,000	29,700	4,700	n/a
Oil	0	0	0	0	n/a
Nuclear	466,100	45,600	33,900	28,300	n/a
Other Non-renewable	0	5,100	2,100	0	n/a
Wind	0	2,500	2,200	1,700	n/a
Hydro	49,900	45,600	3,400	31,600	n/a
Large scale	-	-	-	-	-
Small scale	-	-	-	-	-
Biomass	0	2,500	900	1,400	n/a
Stand alone	-	-	-	-	-
Co-fired	-	-	-	-	-

Other renewable	6,700	0	0	0	n/a
<b>Total renewable</b>	<b>56,600</b>	<b>50,600</b>	<b>6,500</b>	<b>34,700</b>	<b>n/a</b>
<b>Total</b>	<b>618,500</b>	<b>253,100</b>	<b>187,200</b>	<b>139,000</b>	<b>n/a</b>

Figure 16 reflects the fuel mix of the electricity generated by the companies. It shows that Vattenfall has the highest percentage of electricity generated from renewables. It should be noted that the figures for Vattenfall and Nuon are presented separately here, because of the difference in scope and timing of reporting. RWE is the company with the lowest percentage of renewable electricity generated in Europe in 2009.

**Figure 16: Electricity generated from renewables in Europe, by company, 2009**

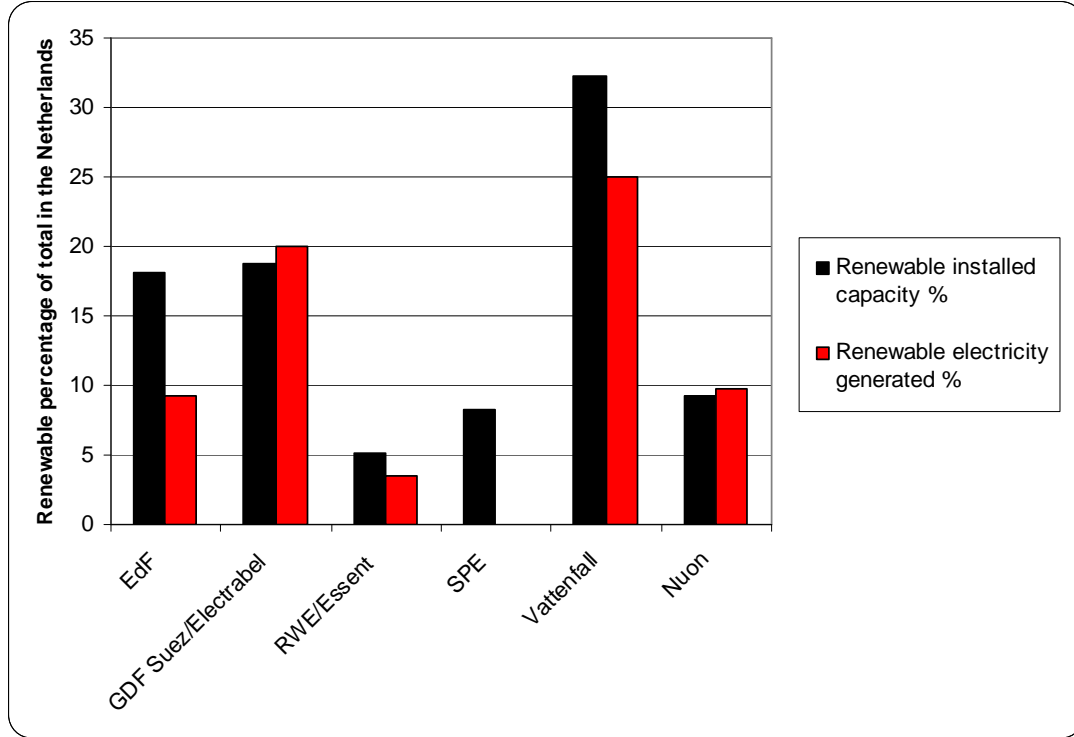


SOMO compilation based on company data

An interesting picture emerges when we compare the renewable share of each of the companies' installed capacity, with their generated electricity.

Figure 17 gives a bar chart of these relative figures. We see that EdF and Vattenfall have a much smaller share of renewable energy generated that could be achieved with their renewable capacity.

**Figure 17: Renewable installed capacity and electricity generated as percentage of the total, by company, 2009**



<sup>430</sup> Figures for 2009 were not available, so 2008 figures were used.



## 7 Fuel mix of electricity supplied in Belgium

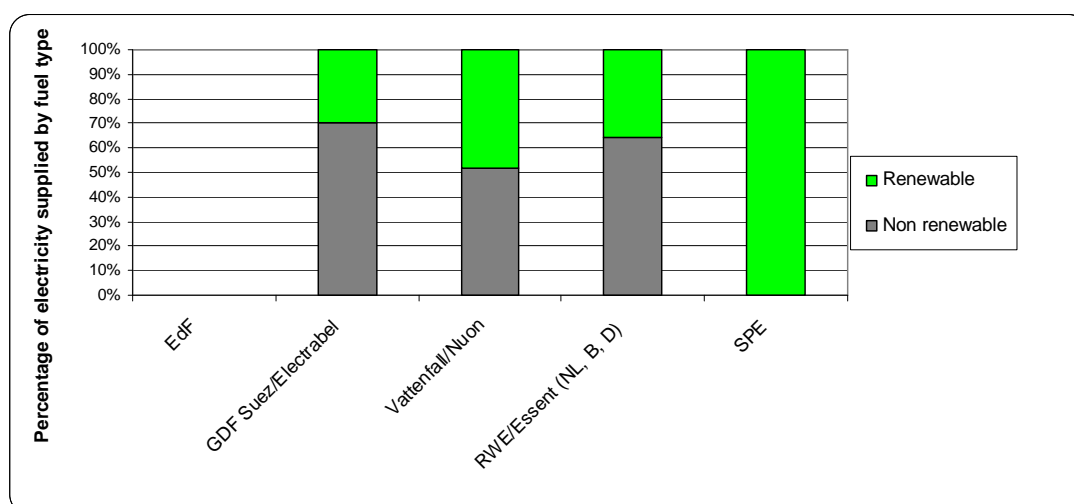
This fact sheet compares the companies regarding the fuel mixes of the electricity they supply in Belgium or in some cases when no sufficient information was found also including neighbouring countries. As opposed to the practices in the Netherlands, energy companies in Belgium are not obliged to present energy labels ('stroometiketten') to the federal regulator of the electricity market, CREG.<sup>431</sup> This is why the only available information for the data in this chapter are the numbers which the companies themselves present on their websites or in their reporting. The supply figures for Flanders were available; these are presented at the end of the chapter.

### Percentage of renewable energy in electricity supplied

Figure 18 illustrates the fuel mix of electricity supplied by the various companies, on the basis of their reported figures. Of all the companies, SPE supplies the most renewable energy, followed by Vattenfall/Nuon. It should be noted that the 100% renewable energy which SPE supplies to its customers is due to the green certificates which the company buys to compensate for their non-renewable supply. GDF Suez / Electrabel supplies the least renewable energy. No figures could be given for the RWE Group's activities in Belgium, only figures for the company's Dutch, Belgian and German aggregate numbers were available. The figures for EdF Belgium were not available.

It should be noted that as only part of the Belgian supply figures were available, this comparison should be interpreted with caution. No information was available from the Belgian regulatory authorities, so the big differences in renewable percentages could be explained by the fact that every company reports on these numbers using their own methodology.

**Figure 18: Renewable and non-renewable electricity supplied in Belgium, by company, 2009**



SOMO compilation based on company data

Table 22 provides a numerical overview of the percentages given in Figure 18.

**Table 22: Fuel mix of electricity supplied in Belgium by company, in percent, 2009**

Company	Non renewable	Renewable	Total
EdF	n/a	n/a	n/a
GDF Suez/Electrabel	70	30	100
Vattenfall/Nuon	51.6	48.4	100
RWE/Essent (NL, B, D)	64.5	35.5	100
SPE	0	100	100

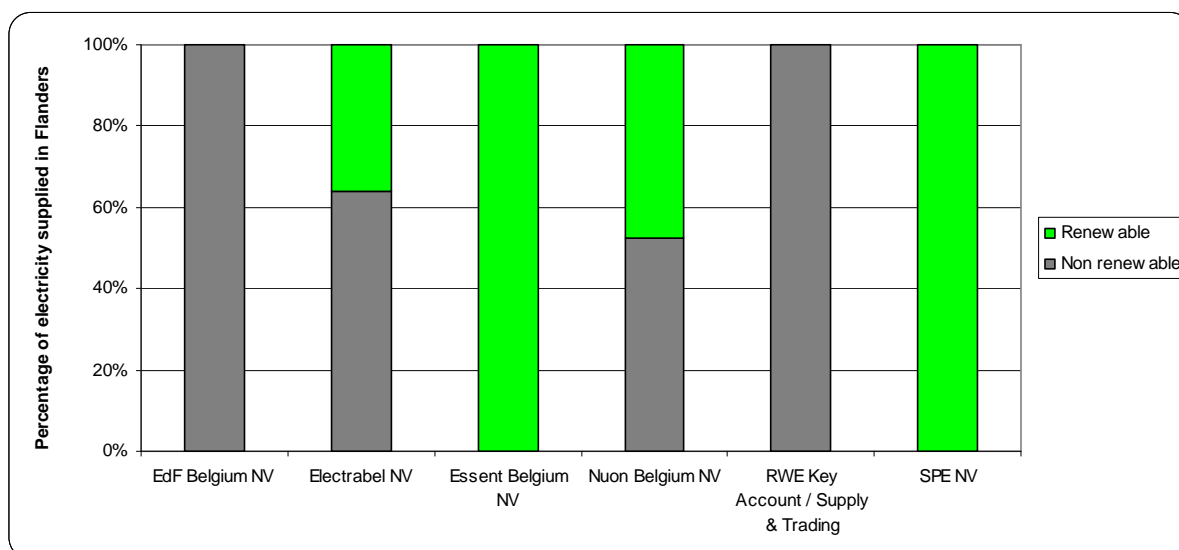
SOMO compilation based on company data

### **Electricity supplied in Flanders**

Figure 19 gives an overview of the renewable and non renewable figures of the companies' electricity supply in Flanders, Belgium. The figures are based on a report published by VREG, the Flemish regulatory body for the electricity market. Although the scope of these figures is limited (Flanders only), it can be seen as an extra source of information on the companies' performance in Belgium.

In Flanders Essent and SPE claim to be supplying 100% renewable, which is again due to the green certificates purchased on the market. This does not mean that the electricity that consumers get purely comes from renewable sources, but that all the electricity that these companies supply at least have a green label. The issue of green certificates is further explained in the methodology chapter. Both EdF and RWE only supply electricity in Flanders that is generated using non renewable sources.

**Figure 19: Renewable and non-renewable electricity supplied in Flanders, by company, 2009**



Source: VREG<sup>432</sup>

Table 23 provides a numerical overview of the percentages given in Figure 19

**Table 23: Fuel mix of electricity supplied in Flanders by company, in percent, 2009**

Company	Non renewable	Renewable	Total
EdF Belgium NV	100	0	100
Electrabel NV	63.8	36.2	100
Essent Belgium NV	0	100	100
Nuon Belgium NV	52.4	47.6	100
RWE Key Account / Supply & Trading	100	0	100
SPE NV	0	100	100

<sup>431</sup> Telephone conversation with Han de Leeuw, CREG, 30/08/2010

<sup>432</sup> "Rapport van de Vlaamse Reguleringsinstantie voor de Elektriciteits- en Gasmarkt van 4 mei 2010 met betrekking tot de oorsprong van de in 2009 geleverde elektriciteit in Vlaanderen", VREG, 04/05/2010, modified on 12/08/2010, VREG website, Publicaties, [http://www.vreg.be/nl/03\\_algemeen/05\\_publicaties/02\\_rapporten.asp](http://www.vreg.be/nl/03_algemeen/05_publicaties/02_rapporten.asp) (18/08/2010). The report can be downloaded from <http://www.vreg.be/vreg/documenten/rapporten/RAPP-2010-2.pdf>.

## 8 Investments in new generation capacity in Europe

This thematic fact sheet examines the companies' current and announced investments in new electricity generation capacity in Europe, according to the companies' data. Based thereupon it also provides a forecast of the companies' future relative renewables capacity. A distinction is made between current investments (definite investments in projects that were already under construction as of 31 December 2009) and announced plans for investments (projects that are in various stages of planning and which could still be cancelled or modified by the company).

### Investments in renewables

This section analyses the share of renewables in the current and announced investments and provides a forecast of the companies' future relative renewables capacity.

#### Current investments

It should be noted that it was not possible to gather the capacity information for all the current investments. Therefore, some of the figures given in the tables are incomplete and should be interpreted with caution. For example, for EdF no complete figures were found regarding its wind projects under construction in France as of 31 December 2009. Also, it should be taken into consideration that investments in co-fired plants (coal and biomass) are accounted for as fossil-fuel investments (see methodology) and investments replacing coal by biomass are not taken into account.

In some cases the European capacity as of 31 December 2009 might be less secure. For example, for EdF the table represents its capacity worldwide. The European capacity might be 0-10 per cent less. For GDF Suez/Electrabel the European capacity as of 31 December 2008 was used.<sup>433</sup>

Table 24 shows the current investments (in MW) compared to the electricity generation capacity in Europe as of 31 December 2009. Looking at the figures, RWE/Essent is by far the largest investor in new capacity.

**Table 24: Current investments compared to electricity generation capacity, in Europe, as of 31 December 2009, per company, in MW.**

Company	Capacity	Current investments	% Investments of capacity
EdF	140,100	5,869	4%
RWE/Essent	49,582	11,707	24%
GDF Suez/Electrabel	37,834	3,879	10%
Vattenfall / Nuon	37,386	5,627	15%
SPE	1,985	152	8%

Table 25 shows the renewables percentage in the electricity generation capacity as of 31 December 2009 versus the renewables percentage in the current investments of the

companies. Again, some of the figures given in this table are incomplete and should be interpreted with caution for the same reasons as described above for table 24. However, from the table it can be analysed that there are great differences in the relative renewables capacity of the companies (ranging from 5% for RWE/Essent to 32% for Vattenfall/Nuon). Further on, at present only RWE/Essent and SPE invest more in renewables than the present share of renewables in their capacity. As for current investments, all companies together do not seem to increase their share of renewables.

**Table 25: Renewables percentage in the capacity as of 31 December 2009 versus renewables percentage in current investments, per company, in Europe, in MW.**

Company	Capacity			Current investments		
	total	renewables	%	total	renewables	%
EdF	140,100	25,400	18%	5,869	439	7%
RWE/Essent	49,582	2,532	5%	11,707	1,126	10%
GDF Suez/Electrabel	37,834	7,075	19%	3,879	555	14%
Vattenfall/Nuon	37,386	12,094	32%	5,627	627	11%
SPE	1,985	165	8%	152	24	16%

### Announced plans for investments

In addition to the projects that are currently being developed, companies have announced plans for various investments to be made in the future. The announced plans have a varying level of concreteness; some plans have been developed in detail and are only awaiting permits, while others are vague plans of possible future investment strategies. The figures for announced investments are more incomplete than the current investments, because for more projects the exact amount of the to be generated electricity in megawatts (MW) was not known. Only the known investment figures (MW) are taken up. This means that a number of projects that are in some stage of planning, but for which no details have been disclosed, are not taken up in this table. It should also be taken into consideration that the announced investments can still be cancelled or modified by the company.

Table 26 distinguishes the renewables share in the capacity after the current investments have been realised and the renewables share in the announced plans for investments. RWE has announced most investments in new renewable capacity (in MW). Vattenfall/Nuon also stands out positively towards renewable energy, compared to the fuel mix of their capacity after the current investments. At the same time, the company capable of producing most electricity (EdF) has announced little investments in renewables, compared to their renewables share in the capacity after the current investments.

**Table 26: Renewables percentage in capacity after current investments versus renewables percentage in announced plans for investments, per company, in Europe, in MW.**

Company	Capacity after current investments			Announced plans for investments		
	total	renewables	%	total	renewables	%
EdF	145,969	25,839	18%	10,723	889	8%
RWE/Essent	57,631	3,658	6%	22,720	10,170	45%
GDF Suez/Electrabel	41,713	7,630	18%	15,815	2,826	18%
Vattenfall / Nuon	43,013	12,721	30%	11,415	5,721	50%

SPE	2,137	189	9%	960	100	10%
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Table 27 shows the relative renewable generation capacity whenever the current investments and the announced plans for investments were to be completed. It should again be noted that only limited weight should be given to the projections summarised in Table 27.

**Table 27: Current and prospected relative renewable generation capacity, in Europe, per company, in percent.**

Company	Capacity 31-12-2009	Capacity 31-12-2009 + current investments	Capacity 31-12-2009 + current investments + announced plans for investment
EdF	18%	18%	17%
RWE/Essent	5%	6%	17%
GDF Suez/Electrabel	19%	18%	18%
Vattenfall / Nuon	32%	30%	34%
SPE	8%	9%	9%

## Investments per fuel type

This section overlooks the current and announced investments of the companies per fuel type. The data provide for some insights to which fuel types are popular for present and future investments in electricity generation capacity.

Table 28 shows the current investments per fuel type of each company. Of all fuel types, investments in natural gas power plants are dominant, followed by coal, wind and nuclear. RWE/Essent and Vattenfall/Nuon invest most in coal.

**Table 28: Current investments (MW) in new generation capacity in Europe, by company and fuel type**

Company	Wind	Hydro	Other renewables	Natural gas	Coal	Nuclear	Other non-renewables	Total
EdF	254	138	47	3,275	672	1,464	19	5,869
RWE/Essent	979	8	140	6,895	3,554	132	0	11,708
GDF Suez/ Electrabel	474	0	81	1,994	1,158	172	0	3,879
Vattenfall/ Nuon	622	5	0	1,755	2,795	450	0	5,627
SPE	24	0	0	128	0	0	0	152
<b>Total</b>	<b>2,353</b>	<b>151</b>	<b>268</b>	<b>14,047</b>	<b>8,179</b>	<b>2,218</b>	<b>19</b>	<b>27,235</b>
%	9%	1%	1%	51%	30%	8%	0%	100%

Table 29 shows the monetary investments per company per fuel type.

**Table 29: Investments in new generation capacity in Europe, per fuel source (million €)**

Fuel type	EdF	GDF Suez/ Electrabel	RWE/Essent	SPE	Vattenfall/Nuon
Renewable	-*	-*	-*	-*	1,762*
Gas	-*	-*	4,550	53	1,800*
Coal	786	1,768	6,730	-	4,400
Nuclear	3,500	366	366	-	1,250
Oil	-	-	-	-	-
Other	-	-	-	-	-
<b>Total</b>	<b>4,286</b>	<b>2,134</b>	<b>11,646</b>	<b>53</b>	<b>9,212</b>

\* Incomplete information

Table 30 shows the announced plans for investments per fuel type of each company. Investments in wind energy are most popular, followed by natural gas, coal and nuclear. Again, it should be noted that a number of projects that are in some stage of planning, but for which no details have been disclosed, are not included in this table. It should also be taken into consideration that the announced investments can still be cancelled or modified by the companies. Most of the announced investments in new nuclear generation centre around 2020, while the planning period for wind, coal and natural gas may be less long. This also influences the outcomes.

**Table 30: Announced plans for investments (MW) in new generation capacity in Europe, by company and fuel type\***

Company	Wind	Hydro	Other renew- ables	Natural gas	Coal	Nuclear	Other non- renewab les	Total
EdF	630	116	143	2,671	538	6,625	0	10,723
GDF Suez/ Electrabel	813	1,610	403	5,776	4,351	2,862	0	15,815
RWE/Essent	8,402	1,663	105	4,400	4,850	3,300	0	22,720
SPE	100	0	0	860	0	0	0	960
Vattenfall/ Nuon	5,508	0	213	950	4,044	0	700	11,415
<b>Total</b>	<b>15,453</b>	<b>3,389</b>	<b>864</b>	<b>14,657</b>	<b>13,783</b>	<b>12,787</b>	<b>700</b>	<b>61,633</b>
%	25%	5%	1%	24%	22%	21%	1%	100%

\* Incomplete information; SOMO calculation from company data<sup>434</sup>

Table 31 shows the monetary amounts for the announced investment plans per company and per fuel type.

**Table 31: Additional investment plans for new generation capacity in Europe, by company and fuel source (million €)**

Fuel type	EdF	GDF Suez/ Electrabel	Vattenfall/Nuon	RWE/Essent	SPE
Renewable	1,308*	1,914*	950*	10,500*	-*
Gas	1,780*	2,176*	100*	-*	550
Coal	1,137	5,083*	-	1,925*	-
Nuclear	-*	-*	-	8,400	-



Oil	-	-	-	-	-
Other	-	-	775	-	-
<b>Total</b>	<b>4,225</b>	<b>9,173</b>	<b>1,825</b>	<b>20,825</b>	<b>550</b>

\* Incomplete information

## Investments in nuclear generation

This section presents the combined current investments and announced plans for investments in nuclear generation by companies active in Belgium.

**Table 32: Investments in new nuclear generation capacity in Europe**

Company	Country	Project	Date in operation	Amount (€ million)	Capacity (MW)
RWE/Essent, Enel, GDF Suez/Electrabel (each 9.15%), Iberdrola (6.2%)	Romania	Reactors 3 + 4 Cernavoda	Unit 3: 2016 Unit 4: 2017	1,346	485
Vattenfall/Nuon	Sweden	boost generation capacity Forsmark and Ringhals plants	2011/2014	1,250	450
GDF Suez/Electrabel	Belgium	Doel 1, upgrade capacity	n/a	n/a	40.5

**Table 33: Announced plans for investments in nuclear generation capacity in Europe**

Company	Country	Project	Date in operation	Amount (€ million)	Capacity (MW)	Project status
E.ON (50%), RWE/Essent (50%)	England, UK	Horizon Nuclear Power, Oldbury (Gloucestershire)	2025	8,400	3,300	Planning application once construction at Wylfa is underway
E.ON (50%), RWE/Essent (50%)	Wales UK	Horizon Nuclear Power, Wylfa (Anglesey)	2020	8,400	3,300	planning application scheduled for 2012
GDF Suez/ Electrabel (37.5%), Iberdrola (37.5)	England, UK	Sellafield, Iberdrola/GDF Suez/SSE	2020-2025	n/a	2,700	pre-development stage
GDF Suez/ Electrabel	France	Rhone Valley, third EPR reactor	n/a	n/a	1,100	Candidate
EdF (50%), GDF Suez (25%)	France	Penly site, Normandy, second EPR reactor	n/a	n/a	1,237	Public debate set up in 2010

## 9 Responsible sourcing

This thematic factsheets provides an overview of the measures that the companies have taken to make their sourcing more responsible. In particular, this fact sheets looks at the supply chain responsibility approach of each of the companies, with a particular interest in the way they source their raw materials. Each company was asked to provide information about its CSR policies, its Supply Chain Responsibility approach, where they source their coal, biomass and uranium from, whether they apply sustainability criteria when they source their raw materials, and whether suppliers are audited on these criteria.

The information on the efforts per company is provided in the company fact sheets in Chapters 1-5. A description of the methodology can be found in Annex 1.

Table 34 provides a schematic overview on each of these points for all the companies covered in this report. It should be noted that with regard to the transparency on the origin of the used raw materials, the electricity sector as a whole is less transparent that some other sectors. While some companies indicate what countries their coal, biomass or uranium comes from, none of the companies provides full disclosure on the names of the companies they source from.

**Table 34: Measures for responsible sourcing of the companies**

Indicator	EdF	GDF Suez/ Electrabel	RWE/Essent	SPE	Nuon	Vattenfall
CSR policy	X	X	X	(X)	X	X
Supplier Code of conduct that applies to raw materials	-	(X)	X	-	X	X
Transparency on origin coal	-	-	X	N/A	-	-
Transparency on origin biomass	-	(X)	(X)	X	X	-
Transparency on origin uranium	-	(X)	-	N/A	N/A	X
Applies sourcing criteria	-	(X)	X	X	(X)	X
Conducts audits	-	-	-	(X)	(X)	X

Based on: company sources, news reports; (...) = partially

### CSR Policies

Practically all companies have some sort of CSR policy. The only exception is SPE, who indicated that their CSR policy is under development. There are of course differences in the quality of the policy, the reporting and the scope, but this research has not compared the companies on those factors.

### Supplier code of conduct that applies to raw materials

The majority of the companies also have either specific codes of conduct for their suppliers, or have indicated that their internal policies also apply to their suppliers. For most of the companies, such codes of conduct also apply to the suppliers of raw materials such as coal, biomass and uranium. No information was found regarding supplier codes of conduct for

EdF and SPE. It should be noted that EdF did not review their company profile. It is therefore possible that this company has internal policies that are not published online.

### Transparency on origin of coal

While a number of companies indicated that information about the origin of coal is considered confidential, mostly for commercial reasons, a few other companies did provide insight on where they source their coal from. Of the companies active in Belgium, only RWE provided transparency on the countries of origin. Table 35 shows the where RWE sources their coal from.

**Table 35: Source of coal for RWE/Essent, in percent**

	RWE/Essent
Germany	22
UK	10
Norway	-
Spain	-
Poland	-
Russia	37
South Africa	9
USA	-
Colombia	15
Australia	-
Indonesia	-
Other	7

### Transparency on the origin of biomass

Two of the five companies provided complete information about the origin of their biomass. These are Nuon and SPE. Nuon sources all of its biomass from wood waste in The Netherlands and Germany, while SPE sources its biomass from Malaysia.

### Transparency on the origin of uranium

Vattenfall reported on the origin of the uranium it uses in its nuclear facilities. Vattenfall purchases it from Australia, Namibia and Russia. GDF Suez/Electrabel provided information of a uranium mining project in the United States, where it is involved in through a subsidiary.

### Sourcing criteria

RWE/Essent, SPE, GDF Suez/Electrabel and Vattenfall/Nuon all use some form of sustainability criteria when they source their raw materials. Most of these companies use the criteria incorporated in their own internal CSR policies, or in their Supplier Codes of Conduct, or refer to international norms such as the UN Global Compact.<sup>435</sup>

Nuon indicated that it was working on sustainability criteria in the context of a sector-wide initiative, without providing further details.

No information about sustainability criteria were found for EdF, but it should again be noted that this company did not review their profile and might have criteria that are not made public.

### Audits

Vattenfall conducts audits at mines and plantations of the raw materials they purchase. While the specific details and approaches of these audits are not looked into in detail, this

company did indicate that they made use of third parties (or multiple stakeholders) to conduct the audits.

Nuon indicated that it was conducting audits at places of origin but does not provide public information in order to not disrupt future common approaches, while SPE's biomass purchases are certified through the Roundtable for Sustainable Palm Oil (RSPO).

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<sup>433</sup> As explained in the fact sheets.

<sup>434</sup> Only the known investment figures (MW) are taken up. This means that a number of projects that are in some stage of planning, but for which no details have been disclosed, are not taken up in this table.

<sup>435</sup> It should be noted that the UN Global Compact has been criticized for its non-committal nature. For more information, see [www.globalcompactcritics.org](http://www.globalcompactcritics.org).

## 10 Methodological Annex

2010 is the fourth consecutive year that SOMO has published its report on sustainability in the electricity sector. For a large part, the aim of the research has been the same throughout the years; to provide a comparative overview of the sustainability of the fuel mixes used to generate and supply electricity, and to make projections of future fuel mixes on the basis of current and announced investments in new generation capacity. The 2009 update of the report included a detailed description of the methodology for the research, and described SOMO's position on a number of current debates that underpinned some of the methodological choices.

Throughout the years, relevant public debates about sustainability in the electricity sector have developed and shifted. SOMO has made a number of changes in its methodological approach of this year's research, in an attempt to better place these public debates in the framework of this research.

This chapter describes the methodological approach taken for this research, and the first section elaborates on the methodological changes compared to the research of previous years. The next section describes the underlying considerations for SOMO's choices on what to consider 'renewable' and 'non-renewable' fuels. The final section describes the approach to the investments in new generation capacity. These last two sections are similar to the methodological annex in last year's report.

### Changes from previous years

#### □ Responsible sourcing

This year is the first time SOMO has included a section on 'responsible sourcing'. This section replaces the 'Demand-side initiatives' that was included in previous reports. The information that is included in this report relates mostly to the sustainability issues that are known to exist in the supply chains of the companies covered in this report. SOMO has structurally collected information on, and conducted an analysis of the following questions;

- Does the company have a CSR policy?
- Does the company have a supplier policy or code of conduct?
- Does this supplier policy or code of conduct apply to suppliers of raw materials, such as coal, biomass and uranium?
- Does the company provide information regarding the origin of raw materials, such as coal, biomass and uranium?
- Does the company apply environmental, social and human rights criteria when sourcing raw materials, such as coal, biomass and uranium?
- Are the suppliers of these raw materials audited on the basis of such criteria?

By including the responsible sourcing of energy companies, SOMO is touching upon a number of current sustainability issues that the electricity sector is faced with. Recent years have seen an increase in public attention on the greater supply chain of electricity, and several reports have been published dealing with sustainability issues around the mining and

production of coal<sup>436</sup>, biomass<sup>437</sup> and uranium<sup>438</sup>. These issues include, among several others, the human rights abuses related to coal mining in Colombia, inadequate environmental and health and safety considerations at uranium mines in Namibia and Niger, and the destruction of rainforests to make way for palm oil plantations in Indonesia. Several electricity companies have been faced with public criticism regarding their roles in such issues, and have taken different measures in response of such criticism. By including this component, SOMO is allowing for a comparison between electricity companies on how they are addressing sustainability issues in their supply chain.

#### □ Questionnaire

For the first time, SOMO has made use of a questionnaire to collect additional information regarding a number of specific issues. The entire questionnaire can be found in Annex 2. It was sent to each of the companies alongside a draft version of the company profile. Companies were given three weeks to answer the questionnaire, and in total seven of the eight companies provided SOMO with an answer.

The questionnaire included questions on the following topics;

- The source of fuels; Companies were asked to provide information on the total amounts of coal, biomass and uranium used, and the country of origin for these raw materials.
- The sustainability criteria for sourcing fuels; Companies were asked to provide details of their codes of conduct, and the environmental, social and human rights criteria that were applied and audited at the supplier of coal, biomass and uranium.
- Electricity trading; Companies were asked to provide details about their electricity trading activities, including the share of traded electricity compared to electricity it had produced itself, and the details of the companies that electricity was traded with.
- Specific uncertainties in the company profile. The draft company profiles were sent in conjunction with the questionnaire. In cases where there were uncertainties about information included in these company profiles, concrete questions were included in the questionnaire.

#### □ Fuel mix of supplied electricity

Similar to previous years, SOMO compares the electricity company on the basis of the fuel mix that it supplies to end users. The data used for this comparison is based on the so-called 'stroometiketten' that all companies supplying the Dutch market are obliged to publish. This year, SOMO indicates in each of the profiles that 'the figures might be influenced by the purchase and trade of green certificates, and do not necessarily reflect the fuel mix received by consumers'. By stating this, SOMO explicitly recognizes that the fuel mixes reported by the companies do not necessarily reflect the fuel mixes of the electricity that consumers actually receive.

This is due to the fact that the fuel mix as reported by companies is based on Certificates of Origin. Certificates of Origin serve as the guarantee that electricity that is sold as being 'green', is actually linked to renewable production. Companies producing electricity from wind, hydro, solar and biomass receive one Certificate of Origin per MWh of produced

electricity. They can sell these certificates on international markets, independent from the generated electricity for which the certificate was granted. In effect, other companies can purchase Certificates of Origin and use these to attach a 'green' label to the electricity it supplies to consumers, regardless of the actual fuel type used.

A number of flaws in this system have led to criticism from various groups who claimed that it amounted to a misleading of consumers. The Dutch consumer organisation Consumentenbond argues that an electricity company can easily increase its share of green electricity, without having to invest in new renewable capacity, as Certificates of Origin can be purchased very cheaply.<sup>439</sup>

The system is also prone to 'double counting' of green electricity, as there are no guarantees that electricity supplied without the Certificate of Origin can still be presented as 'green' (eg. The electricity from Norwegian hydro plants for which the Certificate of Origin has been sold on). Therefore, it is argued that consumers purchasing green electricity do not necessarily contribute to the development of more renewable production capacity. These factors have lead news reports to call green electricity a 'scam', and the Consumentenbond to publicly criticize the system, calling it nothing more than a matter of 'image'.

While SOMO recognizes these concerns with the system of Certificates of Origin, it still bases its comparisons on the figures in the 'stroometiketten', as these are the only supply figures that are publicly available. SOMO believes that due to these facts, the figures should be interpreted with caution.

#### □ Biomass

Last year's methodology chapter included a description of SOMO's position regarding co-firing of biomass in coal plants. As the biomass co-firing capacity of such a plant can also be used to fire coal, and often is in practice, it can not be considered as renewable capacity. New investments in coal plants with biomass co-firing capacities were therefore considered to be full investments in non-renewable capacity. For the large part, this position remains unchanged, and this year's methodology regarding the categorization of biomass capacity and new investments is similar to previous years. However, there are a few points worth mentioning here;

First of all, SOMO has collected all the available information regarding the electricity that was actually generated, in addition to the installed capacity figures. The figures for generated electricity per fuel type provide a clear image of how much electricity was actually generated using biomass, and how much of the co-firing capacity was put to use. By using these figures in combination with the installed capacity figures, one can identify a company's strategies regarding the actual use of renewable co-firing capacity.

Secondly, SOMO has attempted to gather figures regarding the amounts (in kg) of biomass used by each of the companies. For companies that have co-firing capacity, this also gives another clue regarding the actual use of biomass in such plants. Obviously, the amount of electricity generated with biomass is also dependent on the efficiency of biomass plants. Therefore, the amounts of biomass in kilograms cannot be used to calculate how much co-firing capacity has been used in practice. It does, however, provide another clue on how much a company makes use of biomass facilities.



Finally, it should be noted that SOMO recognizes that stand alone biomass plants might be less efficient than co-firing facilities and that it is possible that they emit more SO<sub>x</sub> and other gases due to a lack of flue gas treatment. In this context, it is important to point out that the distinction made by SOMO is based on whether the fuel type is 'renewable' or 'non-renewable', as explained in the next section. SOMO does not categorize on 'sustainable' or 'non-sustainable', or on the basis of the amounts of greenhouse gases emitted. With this methodological approach, biomass is considered a renewable fuel type, as also explained in the next section, whereas coal is not. New investments in co-firing facilities of new coal plants cannot be categorized as renewable, because that capacity might still be used for coal.

#### □ Natural gas

In comparison to previous years, this year's report has tried to make more clear and structural distinctions between different types of natural gas fired capacity. As explained in the next section, there is a lot of variety in terms of efficiency and emissions between traditional natural gas plants, combined cycle gas turbines (CCGTs) and combined heat and power (CHP) plants. In fact, electricity companies can receive green certificates for the latter, on the basis of the amount of heat that is produced. Where the information was known, the type of natural gas capacity is indicated. As not all companies provide a clear breakdown, the different types are still grouped in one 'natural gas' category, which as a fossil fuel is considered non-renewable.

#### □ Hydro power

This year's research has also tried to systematically collect more detailed information about the types of hydro capacity used. As explained in the next section, a clear distinction can be made between large-scale hydro (>10 MW) and small-scale hydro (<10 MW). When available, these more specified figures are provided in the company profiles. It should be noted that not all companies make this distinction, while others use different definitions. For example, some companies consider plants with less than 50MW capacity to be small scale.

### **'Renewable' vs. 'Non-renewable' fuels and sustainability considerations**

This section describes in more detail the theoretical underpinning of the 'renewable' and 'non-renewable' categories used by SOMO.

In the breakdowns of companies' fuel mixes for electricity generation and supply and in the thematic fact sheets on companies' investment in various electricity generation technologies, SOMO makes a distinction between fuels and technologies that are considered 'renewable' and those that are 'non-renewable'. In the public perception, corporate communications, and even in scientific literature, the boundaries between these terms and what should be classified as "renewable" is not always clear. For purposes of manageability and facilitating comparison, but with the acknowledgement that it could be viewed as a simplification of a very complex issue, this study makes a distinction between renewable and non-renewable fuel sources; however, as outlined below, some fuels and technologies that are considered as renewable are not necessarily sustainable. In the interests of transparency and clarity, SOMO's rationale for making the renewable/non-renewable distinction is outlined below for a range of different fuels and technologies. These considerations rely heavily on a recent study by Wilde-Ramsing that aimed to 'define sustainable electricity provision'.<sup>440</sup> Table 37

provides an overview of the classification used by SOMO, with the reasoning for each fuel type in the corresponding descriptions below.

**Table 37: SOMO classification of ‘renewable’ and ‘non-renewable’ fuel types**

Renewable	Non-renewable
Hydro (i.e. water)	Coal (including lignite and plants outfitted with CCS)
Wind	Natural gas
Solar	“Other” fossil fuels (e.g. diesel, fuel oil)
Biomass (except new investment in coal and gas plants with biomass co-firing capacity)	Nuclear

▣ Fossil fuels

Fossil fuels (e.g. coal, lignite, natural gas, diesel, fuel oil, gas oil) are non-renewable sources of energy. Electricity generation technologies based on the combustion of fossil fuels consume finite natural resources and thus transfer costs to future generations. Fossil fuel combustion for electricity generation is also one of the largest sources of human-induced emissions of greenhouse gasses (GHGs) such as carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O), which, according to the United Nations Intergovernmental Panel on Climate Change (IPCC)<sup>441</sup>, are causing the Earth’s atmosphere to warm, altering climates in irreversible ways. Due to its continued heavy reliance on fossil fuels, the electricity industry is the world’s largest emitter of GHGs, and individual electricity generation companies are among the world’s largest single emitters of GHGs.

In addition to GHG emissions, the combustion of fossil fuels to produce electricity can also result in the emission of a range of different types of air pollutants such as sulphur dioxide (SO<sub>2</sub>), mono-nitrogen oxides (NO<sub>x</sub>, i.e. NO and NO<sub>2</sub>), mercury (Hg), particulates such as ash and dust, carbon monoxide (CO), and volatile organic compounds (VOC). The release of these waste products into the air can have a negative impact on health on human, animal, and ecosystem health. It should be noted that flue gas treatment has improved substantially over the past several decades resulting in reduced air pollutant emissions, but that significant air pollution is still a reality of fossil fuel combustion.

Furthermore, the extraction of fossil fuels from the Earth for use in electricity generation can have significant negative impacts on people and planet. For example, coal mining destroys the soil of the land it is mined on, permanently transforms the landscape, and removes ground vegetation. Coal mining also produces pollutants and effluents that can cause deterioration of water, soil and air quality.<sup>442</sup>

Although the long-term aim should remain on replacing all fossil fuels with renewable sources of electricity, improving the efficiency of fossil fuel-based electricity generation can reduce electricity companies’ overall resource consumption and emissions. Efficiency of energy conversion in electricity generation is measured by comparing the gross energy going into the plant to the net energy leaving the plant. Improving efficiency is largely dependent on the choice of technology for power plants. For example, combined cycle gas turbines (CCGT) that use natural gas as a fuel and combine heat and power (CHP) generation can reach much higher energy conversion efficiency levels than traditional single-cycle natural gas turbines.

## □ Nuclear power

Nuclear power is generated from uranium, which, like fossil fuels, is not a renewable resource. Electricity generation from nuclear fuel produces various types of solid radioactive waste (high, medium, and low-level radioactivity<sup>443</sup>). Because of the lack of a technological solution for permanently treating nuclear waste to rid it of dangerous radioactivity, generation of electricity from nuclear fuel represents a transfer of costs and environmental liability to future generations. In addition, despite improvements in nuclear technology, the possibility of human error in using nuclear technology still brings with it the risk of catastrophic impacts on human health and the environment if a reactor melts down, as well as the risk the proliferation of nuclear technology that could be used to produce nuclear weapons. Furthermore, although proponents of nuclear power emphasise that the generation of electricity from nuclear fuel produces no CO<sub>2</sub> emissions, what they often fail to recognize (or admit) is that the nuclear fuel production chain does emit CO<sub>2</sub> (as well as the supply chains of other electricity generation technologies) caused by the mining of uranium and the industrial processes needed to enrich uranium into useable fuel. In addition, uranium mining is taking place increasingly in African countries such as Niger, Namibia, and Malawi where health and environmental protection is at best weakly-enforced and at worst non-existent, and where the negative impact of exposure to low level radiation among uranium mining workers and communities has been documented.<sup>444</sup> For these reasons, SOMO considers nuclear power to be non-renewable.

## □ Biomass

Biomass, organic material from living or recently living organisms such as plants and trees, can be combusted to produce electricity. Biomass absorbs CO<sub>2</sub> from the atmosphere during its lifetime, then releases this CO<sub>2</sub> back into the atmosphere when it is combusted or dies and decomposes, thereby making the use of biomass for electricity less carbon-intensive. Because plants and trees, which are the primary sources of biomass, are generally assumed to be a renewable resource, biomass is also generally considered to be a renewable source of fuel for electricity generation. For these reasons, SOMO will consider investment in and construction of biomass-only power plants to be renewable. However, it should be noted that some biomass-only plants (such as many of those in operation in the Netherlands) have low efficiency levels and have limited flue gas treatment capabilities to reduce the emission of airborne pollutants such as SO<sub>2</sub> and NO<sub>x</sub>.

Furthermore, the use of biomass to generate electricity in general raises further questions. For example, the planting and harvesting of biomass (often in developing countries) to be used for electricity generation can have environmental and social impacts that reduce or nullify the positive CO<sub>2</sub> balance. Some of the factors that determine if biomass for electricity is truly sustainable include the carbon balance for the entire value chain and lifecycle of the biomass (e.g. transport, emissions due to land use change<sup>445</sup>), loss of biodiversity due to changes in land use, decent labour standards on plantations and in processing chains, land/food rights of people confronted with land use shifts, etc. If electricity generation from biomass is to truly be sustainable, the entire supply chain of biomass production must also conform to sustainable development standards.

Co-firing of biomass in existing coal and natural gas-fired power plants is becoming increasingly popular among electricity generation companies seeking to reduce their CO<sub>2</sub> emissions. Co-firing entails combusting biomass along with a fossil fuel, and current technologies allow for co-firing of up to 50% of a coal power plant's capacity with biomass.

However, while the potential for co-firing a large amount of biomass in these types of power plants is high, companies do not necessarily have to co-fire that much biomass as the plants are still able to run at full capacity on 100% fossil fuels. In fact, many power plants with a high theoretical capacity for co-firing biomass in practice actually only co-fire a very small percentage of biomass (generally around 10-20%, but sometimes as low as 1-2%), continuing instead with large-scale combustion of fossil fuels. Furthermore, the potential to co-fire biomass can be used by electricity generators to justify constructing new fossil fuel plants or continuing to operate existing plants when, as mentioned above, the amount of biomass actually co-fired remains relatively low, with the end result being that an energy system becomes even more dependent on coal. For these reasons, SOMO will classify any new investment in co-fired power plants under the categories 'coal' or 'natural gas' (depending on its primary fuel), although the co-firing potential will be noted in the company fact sheet investment tables as 'Coal and biomass' or 'Gas and biomass'; for the calculations in the thematic fact sheets the full investment amount and capacity of the plant will be classified as investment in either coal or natural gas (depending on the type of plant at which co-firing is taking place). The fuel mixes of electricity generated and supplied give a better indication of how much biomass-based electricity is actually being generated and supplied, so these figures will include biomass as 'renewable', with a note to readers that this should be viewed cautiously for the above mentioned sustainability reasons (i.e. lack of standardised sustainability criteria and verification, and contribution to continued use of fossil fuel (coal or gas) plants).

#### ▣ Carbon capture and storage

Carbon capture and storage (CCS) is one approach to mitigating the global warming effects of fossil fuel-based electricity generation by capturing CO<sub>2</sub> as it is emitted at its point source before it enters the atmosphere and storing it underground in (presumably) stable geological formations or underwater. It is seen by some as a short-term solution to avoid the worst impacts of global warming while allowing us to continue our use of fossil fuels. Although some scientists theorise that CCS could reduce the CO<sub>2</sub> emissions to the atmosphere of a fossil fuel-based power plant by approximately 80-90%<sup>446</sup>, investment in this technology will be classified as non-renewable because its primary application will be in facilities that use non-renewable fossil fuels (especially coal) to generate electricity. Furthermore, SOMO considers investment in this technology to be unsustainable for a number of reasons:

1. Even with the best currently available technologies, CCS consumes a huge amount of extra energy and would increase the fuel needs of a coal-fired power plant by 25-40%.<sup>447</sup>
2. Investment in CCS does nothing to further the development of truly renewable and sustainable energy technologies or energy efficiency that are needed for "real" sustainability.
3. Currently, CCS technology has not been completely proven safe. Deep ocean storage could contribute to ocean acidification, long-term predictions about the security of underground storage are difficult to make, and there are no guarantees that "stored" CO<sub>2</sub> could not leak out back into the atmosphere. The use of CCS is thus inconsistent with the internationally recognised precautionary principle.

For these reasons, SOMO will classify investments in new capacity that are accompanied by CCS technology as investments in coal or natural gas depending the type of plant it is applied to.

## □ Hydropower

Hydropower is perhaps the most prominent case of a technology that can be considered renewable but not necessarily sustainable. Although water is a renewable source of energy, large-scale (>10MW) hydro is generally not considered sustainable because of the significant negative environmental and social impacts of large dams and reservoirs. Large hydro facilities using dams and reservoirs have a large terrestrial footprint which often requires displacement of human populations. Large hydroelectricity plants can also impact water-related sustainability issues such as water quality (temperature changes, reduced oxygenation, increased potential for algal bloom), sediment transport and erosion, changes to river hydrology and downstream flows, passage of fish species, and pest species (flora and fauna) in reservoirs.<sup>448</sup> As a result, large hydroelectric dams present an acute threat to biodiversity given that they often require the flooding of large areas of land. Companies that build large dams sometimes compensate for the loss of biodiversity in the flooded area by purchasing, protecting or creating replacement habitats. However, the replacement habitats may not have the same biodiversity value. Electricity infrastructure that alters natural habitats can alter the migration and breeding habits of animals. Furthermore, although the actual process of electricity generation from water does not emit CO<sub>2</sub>, hydroelectricity can be a significant source of GHG emissions, especially when it involves large reservoirs in tropical climates. CO<sub>2</sub> is released by decomposing vegetation and soils trapped under water when the reservoir was first filled. It should be noted that reservoirs also absorb atmospheric CO<sub>2</sub> through photosynthesis by plankton and aquatic plants and that this uptake can occasionally exceed CO<sub>2</sub> emissions. However, recent studies suggest that reservoirs also release other GHGs, such as methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O), which are much more potent than CO<sub>2</sub>.<sup>449</sup> As a result, the World Commission on Dams asserts that 'Where other options offer better solutions, they should be favoured over large dams'.<sup>450</sup>

Small scale run-of-the-river and mini-hydro projects generally have less impact on aquatic ecosystems and resources than larger projects requiring dams and reservoirs. Small-scale hydro, while also not necessarily free of negative impacts on biodiversity, is generally considered more sustainable. The International Hydropower Association emphasises that small scale (<10MW) run-of-the-river and mini-hydro (<1MW) projects generally have less impact on aquatic ecosystems and resources than larger projects requiring dams and reservoirs.<sup>451</sup> However, while it has generally been assumed that small-scale run-of-river projects (which usually have only very small reservoirs) do not cause significant GHG emissions, a 2008 study by the Swiss Federal Institute of Aquatic Science and Technology revealed that a run-of-river facility was emitting significant amounts of methane. Switzerland is a temperate climate; methane emissions from run-of-river reservoirs in the tropics are likely to be even higher.<sup>452</sup>

SOMO considers hydro to be a renewable source of electricity, but emphasises that even for small-scale hydro to be considered sustainable it must be undertaken in combination with a proper needs assessment, stakeholder consultations, and a thorough evaluation of risks and alternatives. Readers are urged to view hydroelectric facilities, particularly those with more than 10MW of capacity, with a critical eye.

## □ Wind and solar

Wind and solar energy are renewable sources of electricity due to their limitless and constantly renewing supply. However, it should be noted that some of the above-mentioned

sustainability criteria should also be applied to these technologies and their entire supply and production chains. For example, wind farms can have an undesirable impact on the visual landscape and may impact the migration patterns of flocks of migratory birds. The production of photovoltaic solar panels emits CO<sub>2</sub> and involves the use of hazardous chemicals that can be dangerous for human health and the environment. That said, because of their limitless supply and relatively low levels of emissions, SOMO considers wind and solar to be the most sustainable mainstream electricity generation technologies on the market, but emphasises that, as with biomass, if electricity generation from solar and wind is to truly be sustainable, the entire supply chain of solar panels and windmills must also conform to sustainable development standards.

## Investments vs. investment plans

In each company fact sheet and in the thematic fact sheet on investments, a distinction is made between companies' current investments in new capacity and companies' announced plans for investment in new capacity in Europe. This distinction is based on those investments in projects that are already under construction (and for which the investments are definite), and announced plans for investments in projects that are in various stages of planning (and which could still be cancelled or modified by the company).

An additional note should be made about the companies' investments that have become operational in late 2009 or early 2010 or since the company's last reporting upon which the figures for fuel mixes of installed capacity and electricity generated are based. Such investments are *not* included in the installed capacity and electricity generated figures, if they are also not reported by the company itself. Instead they are included in the investment tables and its status is noted as "In operation".

Finally, it should be noted that several companies have publicly stated how much money they plan to invest in future capacity, without specifying the projects for which this money is reserved. With these figures, there is a high risk of 'double counting', as some of the projects for which this money is reserved have been announced, while others have not. It is often not specifically mentioned whether these projects are part of the overall announced investment budget or not. For this reason, overall investment figures that are not assigned to particular investment projects are not taken up in the tables for investment plans, and are not taken up in the thematic fact sheets. However, they are mentioned throughout the text of the company fact sheets.

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<sup>437</sup> E.g. Friends of the Earth UK, "Losing Ground; The human rights impacts of oil palm plantation expansion in Indonesia", February 2008, <http://www.foe.co.uk/resource/reports/losingground.pdf> (28-06-10).

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## Questionnaire for SOMO's research on sustainability in the electricity sector

This year, SOMO is including a questionnaire as part of its research project into the sustainability of European electricity companies. SOMO is hoping to gather additional information by this means, which would allow for a more comprehensive comparison between the different companies covered in SOMO's report. The questions in this questionnaire touch upon current sustainability issues that are relevant for companies that generate, trade and supply electricity. This questionnaire is structured in four parts;

The first part deals with the source of the raw materials that are used as fuel in power plants. Recent years have seen an increase in public attention on the greater supply chain of electricity, and several reports have been published dealing with sustainability issues around the mining and production of coal<sup>453</sup>, biomass<sup>454</sup> and uranium<sup>455</sup>.

The second part deals with the Supply Chain Responsibility of electricity companies, with a specific focus on sustainability criteria applied to the sourcing of the raw materials used as fuel for electricity. More specifically, SOMO is asking electricity companies whether and how they include social, economic and environmental considerations when purchasing fuels such as coal, biomass and uranium.

The third part of the questionnaire deals with the trading of electricity on the spot or wholesale market. SOMO recognizes that this is an important part of the business model of several of the companies it covers, and hopes to gain better insight into this part of the supply chain and to what extent sustainability plays an (integral) part in the daily trading activities. It is important to note that both SOMO and Greenpeace (the commissioner of this research) recognize the commercial sensitivity of some of the information they are asking. If a responding company desires so, SOMO and Greenpeace are willing to keep this information confidential.

The final part of the questionnaire contains specific questions that arise from the desk research of SOMO and refer to the draft company fact sheet that is sent by email.

### Source of fuels

1. Fill out the table below regarding the use of **biomass** by your company in 2009.

Type of material (palmoil, soy, rapeseed, jatropa, wood waste, etc.)	Country of origin	Absolute use in power plants (in tonnes)	% of total biomass use by your company
			Total: 100%

2. Fill out the table below regarding the use of **coal** by your company in 2009.

Country of origin	Absolute use in power plants (in tonnes)	% of total coal use by your company
		Total: 100%

3. Fill out the table below regarding the use of **uranium** by your company in 2009.

Country of origin	Absolute use in power plants (in tonnes)	% of total uranium use by your company
		Total: 100%

4. In case you are investing in new coal, biomass or nuclear capacity, can you indicate where you plan to source the raw materials from?

### Sustainability criteria for sourcing

- Does your company have a Corporate Social Responsibility policy and does it report annually on its performance? Please direct us to the relevant documents.
- Does your company have a Supplier Code of Conduct or does it otherwise recognize its Supply Chain Responsibility. Does your Supply Chain Responsibility policy also apply to the suppliers of raw materials?
- Does your company set specific sustainability criteria when sourcing its raw materials, such as biomass, coal and uranium? Please specify.
- How does your company monitor compliance with these sustainability criteria or Supplier Code of Conduct? Please specify.
- In case you are investing in new coal, biomass or nuclear capacity, will you apply sustainability criteria when sourcing the raw materials for these new power plants?

### Electricity trading on the wholesale market

- What percentage of the electricity your company supplies to consumers is generated by your company? What percentage is purchased on the wholesale or spot markets?
- Specify the three most important companies that you buy electricity from on the wholesale or spot markets.

Name of the supplier	GWh purchased in 2009	% of purchased electricity	% of electricity supplied to consumers

12. Specify the fuel mix of the electricity purchased on wholesale or spot markets.

Fuel type	Name of the largest supplier	% of purchased electricity
Coal		
Natural Gas		
Oil		
Nuclear		
Other Non-renewable		
Wind		
Hydro		
Large scale (>10MW)		
Small scale (<10MW)		
Biomass		
Stand alone		
Co-fired		
Other renewable		
<b>Total</b>		

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<sup>453</sup> Greenpeace Nederland, "De Wereld achter de Kolenstroom", 2009, <http://www.greenpeace.org/raw/content/nederland-old/reports/de-wereld-achter-kolenstroom.pdf> (28-06-10).  
<sup>454</sup> E.g. Friends of the Earth UK, "Losing Ground; The human rights impacts of oil palm plantation expansion in Indonesia", February 2008, <http://www.foe.co.uk/resource/reports/losingground.pdf> (28-06-10).  
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