



Sustainability in the Power Sector

2010 Update - Europe

Tim Steinweg, Albert ten Kate & Kristóf Rác

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2010 update: Europe

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

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Abbreviations and terminology

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

Introduction

Aim and context of the fact sheet series

This 2010 series of power company 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), 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, Nuon/Vattenfall 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 Europe, and covers the following companies, all among the largest electricity companies in Europe;

- EdF
- Enel
- E.ON
- GDF Suez/Electrabel
- Iberdrola
- RWE
- 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, investments in new generating capacity in Europe, and the approach to responsible sourcing of the company, with a specific focus on issues present in their supply chains (eg. the sourcing of coal, uranium or biomass). The three thematic fact sheets found in Chapters 9-11 focus on these same three 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 European version of this report are

selected because they are among the largest electricity companies in Europe, when looking at their installed capacity. For all generation capacity and investments, use is made of European figures, excluding Russia but including Turkey.

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.¹ The main shareholder of EdF is the French State, with a 84.5% stake as of 31 December 2009.²

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%.³

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.⁴ So, the findings in this fact sheet should be interpreted with caution. SPE has responded to both a draft fact sheet and questionnaire.⁵

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.⁶ 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.⁷

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

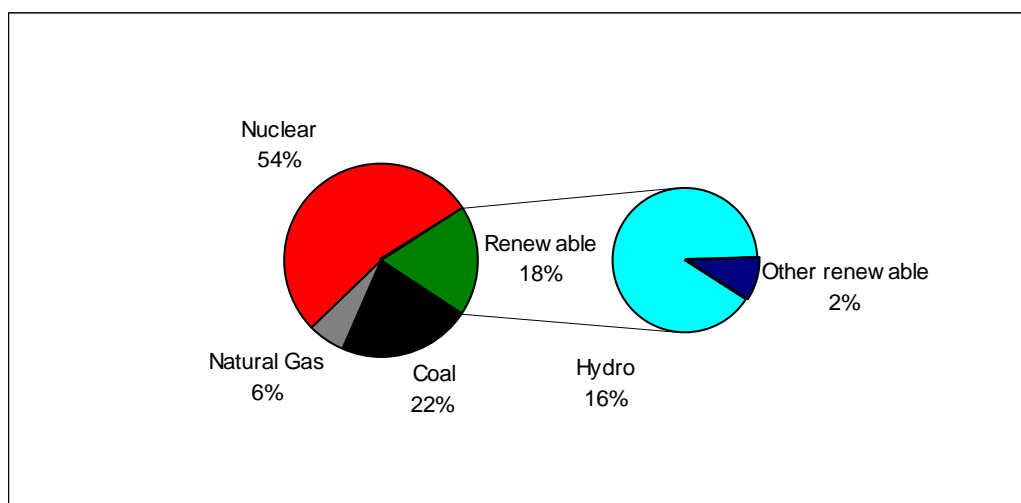


Figure 2: Fuel mix of EdF's electricity generation worldwide, 2009

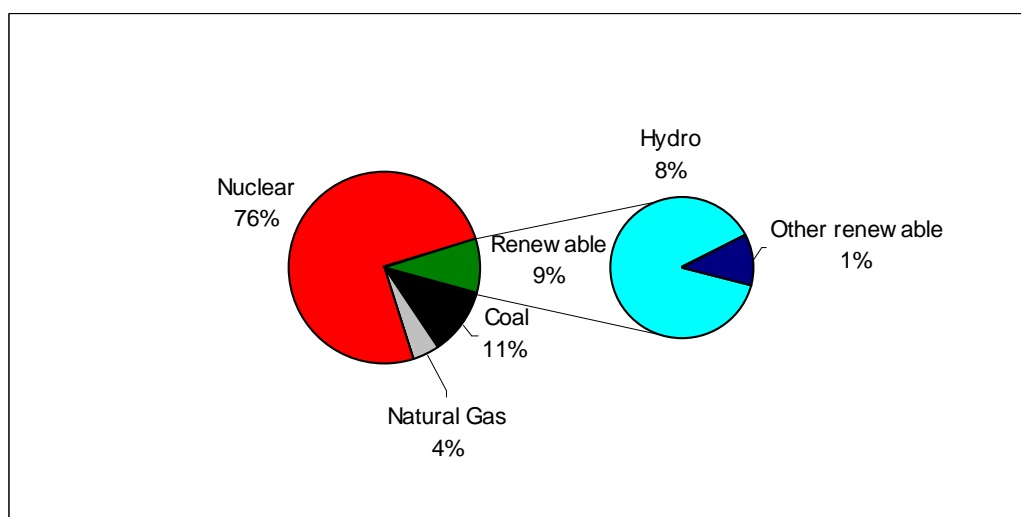


Table 1 gives the absolute figures of both the installed capacity and EdF's electricity generated.

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

Fuel type	Generated (TWh) ⁸	Capacity (GWe) ⁹
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

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.¹⁰

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 ¹¹	420 ¹²	under construction
EnBW: GKM 9	Grosskraftwerk Mannheim (DE)	coal	2013	177 ¹³	134 ¹⁴	under construction
EnBW: Rostock power station	Rostock (DE)	coal	2010	148 ¹⁵	118 ¹⁶	acquisition January 2010
EdF: two combined-cycle gas turbines	Martigues (FR)	gas (CCGT)	2011/2012	n/a	930 ¹⁷	under construction
EdF: combustion turbines	Montereau (FR)	gas	end of 2010	n/a	374 ¹⁸	under construction
EdF: combined-cycle gas turbine	Blénod (FR)	gas (CCGT)	2011/2012	n/a	440	under construction ¹⁹
Alpiq: gas-fired combined cycle	Bayet (FR)	gas (CCGT)	start 2011	78	107	under construction ²⁰
Alpiq: gas-fired combined cycle	San Severo, Italy	gas (CCGT)	end of 2010	n/a	63	under construction ²¹
Edison/Hellenic Petroleum	Thisvi (GR)	gas (CCGT)	n/a	n/a	103 ²²	under construction
EdF Energy: West Burton	Nottinghamshire (UK)	gas (CCGT)	mid 2011	n/a	1,049 ²³	under construction
SPE peak unit Angleur	Liège, Belgium	gas	2011	27	65	under construction ²⁴
Acquisition more shares SPE	SPE, Belgium	mainly gas	2010	n/a	248	June 2010 ²⁵
EdF: European Pressurized Reactor (EPR)	Flamanville (FR)	nuclear	2013	3,500 ²⁶	1,400 ²⁷	under construction
EdF: Rizzanese River dam	Corsica (FR)	hydro	2012	150	55 ²⁸	under construction
EdF/EnBW: fifth turbine	Iffezheim (DE)	hydro	2012	72 ²⁹	28 ³⁰	under construction
EnBW	Rheinfelden (DE)	hydro	2010	175 ³¹	34 ³²	under construction
EnBW	Esslingen am Neckar, new plants	hydro	n/a	n/a	n/a	under construction ³³
EnBW/Borusan	Turkey	hydro	late 2010	18	12	under construction ³⁴

EnBW: 7 onshore wind farms	Onshore (DE)	wind	mid 2010	n/a	24 ³⁵	acquisition in Dec 2009
EnBW: Baltic 1	Baltic 1 (DE)	wind	end of 2010	55 ³⁶	23 ³⁷	under construction ³⁸
EdF Énergies Nouvelles	Europe	wind	n/a	n/a	183 ³⁹	under construction
SPE Wind parks	Belgium	wind	2011	10	12	under construction ⁴⁰
EdF Énergies Nouvelles	Europe	solar	n/a	n/a	47 ⁴¹	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 ⁴²
EnBW: gas power station	Karlsruhe (DE)	gas	n/a	n/a	n/a	in study ⁴³
Edison	Italy	gas (CCGT)	n/a	n/a	392 ⁴⁴	in study
Nest-Energie (99.6%-owned by EdF).	Evergem, East Flanders, Belgium.	gas (CCGT)	2015	750	920 ⁴⁵	to be developed; subject to EC decision ⁴⁶
Dils-Energie (99.6%-owned by EdF).	Dilsen-Stokkem Belgium.	gas (CCGT)	2012	750	920 ⁴⁷	to be developed; subject to EC decision ⁴⁸
SPE	Navagne (Belgium)	gas (CCGT)	2012	280	439	In study/to be developed ⁴⁹
EdF: EPR	Penly site, Normandy (FR)	nuclear	n/a	n/a	825 ⁵⁰	public debate set up in 2010
EdF: uprate capacity 20 units 1,300 MW	France	nuclear	gradually from 2017	n/a	1300	study ⁵¹
EdF: EPR	Poland	nuclear	before the end of 2020	n/a	n/a	feasibility study ⁵²
EdF: EPR	Italy	nuclear	2020	n/a	800	license in 2011 ⁵³
EdF: three EPRs	Italy	nuclear	n/a	n/a	n/a	feasibility study ⁵⁴
EdF Energy: EPR	UK	nuclear	end of 2017	n/a	1,600	investment decision by EdF in 2011 ⁵⁵
EdF: three EPRs	UK	nuclear	after 2017	n/a	n/a	pre-development ⁵⁶
EdF: small hydro	France	hydro	2010-2014	n/a	54 ⁵⁷	In study/to be developed
Alpiq: two more hydro turbines	Switzerland	hydro	n/a	n/a	42 ⁵⁸	in discussion

EdF/EnBW: additional group	Gambenheim (FR)	hydro	n/a	n/a	20 ⁵⁹	construction to start in 2010
EdF Energy: offshore wind farms	Teesside, Fair Field and Royal Oak (UK)	wind	n/a	n/a	49 ⁶⁰	planning phase
EnBW	Baltic 2 (DE)	wind	2013	386 ⁶¹	133 ⁶²	supply contract June 2010
EnBW	North Sea (He dreih and Hochsee) (DE)	wind	n/a	922 ⁶³	397	to be developed ⁶⁴
SPE	Belgium	wind	2011-2015	n/a	est. 51	In study/to be developed ⁶⁵
EdF Énergies Nouvelles	Toul-Rosieres (FR)	solar	2012	n/a	143	to be developed ⁶⁶

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.⁶⁷ The same applies for its Activity and Sustainable Development Report 2009.⁶⁸ 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.⁶⁹

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.⁷⁰

In its Activity and Sustainable Development Report 2009 EdF declares it has used 24 million tonnes of coal in 2009.⁷¹

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

² 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> (15 June 2010)

³ 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> (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> (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> (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> (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> (14 June 2010)
- ¹⁰ 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> (14 June 2010)
- ¹¹ 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> (14 June 2010)
- ¹² 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> (14 June 2010)
- ¹³ 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/> (16 June 2010)
Website GKM, "Unsere Aktionäre", <<http://www.gkm.de/unternehmen/struktur/>> (16 June 2010)
- ¹⁴ 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/> (16 June 2010)
Website GKM, "Unsere Aktionäre", <<http://www.gkm.de/unternehmen/struktur/>> (16 June 2010)
- ¹⁵ 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> (14 June 2010)
- ¹⁶ 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> (14 June 2010)
- ¹⁷ 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> (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.
- ¹⁸ 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> (14 June 2010)
- ¹⁹ 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> (14 June 2010)
- ²⁰ 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> (16 June 2010)
Alpiq, <<http://www.alpiq.com/news-stories/stories/stories.jsp?story=tcm:95-56487>>, (16 June 2010)
- ²¹ 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)
- ²² 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> (14 June 2010)
- ²³ 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> (14 June 2010)
EdF Energy website, About us, "West Burton Combined Cycle Gas Turbine Station", <<http://www.EdFenergy.com/about-us/energy-generation/power-generation/west-burton-combined-cycle-gas-turbine.shtml>> (16 June 2010)
- ²⁴ 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,

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- 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> (23 June 2010)
- 25 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/Communiqués/EdF/2010/cp_20100601_va.pdf> (11 June 2010)
- 26 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. Enels 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.
- 27 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> (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> (14 June 2010)
- 28 EdF group 2009 Document de Référence, April 2010, p. 76, <http://www.EdF.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2010/ddd/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> (16 June 2010)
- 29 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> (14 June 2010)
- 30 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/ddd/EdF_DDR2009_va.pdf> (14 June 2010)
- 31 Total investment is € 380 million. EdF has a 46.07% stake in EnBW.
- 32 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/ddd/EdF_DDR2009_va.pdf> (14 June 2010)
- 33 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> (14 June 2010)
- 34 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> (17 June 2010)
- 35 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/ddd/EdF_DDR2009_va.pdf> (15 June 2010)
- 36 Total investment was €3 billion. Divided by ratio of capacity (Baltic 1 has 4% of total capacity of projects Baltic 1, Kriegers Flat, He Dreiht 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/pressemittelungen/2010/05/PM_20100506_baltic1_mw01/index.jsp> (17 June 2010)
- 37 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/ddd/EdF_DDR2009_va.pdf> (14 June 2010)
- 38 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)
- 39 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/communique/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.
- 40 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> (23 June 2010)
- 41 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/communique/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.
- 42 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> (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> (18 June 2010)
- 43 dF 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> (15 June 2010)
- 44 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> (17 June 2010)
- 45 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> (23 June 2010)
- 46 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.
- 47 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> (23 June 2010)
- 48 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.
- 49 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§ion=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> (23 June 2010)
- 50 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> (15 June 2010)
- 51 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> (15 June 2010) One Terawatt-hour is equal to approximately 114 megawatts for a period of one year.
- 52 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>
(15 June 2010)
- ⁵³ 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.
- ⁵⁴ 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> (16 June 2010)
- ⁵⁵ 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> (15 June 2010)
- ⁵⁶ 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> (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.
- ⁵⁷ 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> (15 June 2010)
- ⁵⁸ 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> (16 June 2010)
- ⁵⁹ The Gamsbheim 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> (15 June 2010)
- ⁶⁰ 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.
- ⁶¹ 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.
- ⁶² 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, <<http://www.siemens.com/press/en/pressrelease/index.php?content=energy>> (16 June 2010) Project is previously called Kriegers Flak.
- ⁶³ 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.
- ⁶⁴ 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> (16 June 2010)
- ⁶⁵ 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> (23 June 2010)
- ⁶⁶ Agence France Presse, "France builds world's biggest photovoltaic solar plant", 2 March 2010.
- ⁶⁷ 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_06_1009_va.pdf> (23 June 2010)

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- ⁶⁸ EdF Group Activity and Sustainable Development Report 2009,
<http://www.EdF.com/html/RA2009/uk/pdf/EdF_RA09_full_va.pdf> (23 June 2010)
- ⁶⁹ World Nuclear Association, "Nuclear Power in France", June 2010, <<http://www.world-nuclear.org/info/inf40.html>> (14 June 2010)
- ⁷⁰ 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>
(23 June 2010)
- ⁷¹ EdF Group Activity and Sustainable Development Report 2009, p. 98
<http://www.EdF.com/html/RA2009/uk/pdf/EdF_RA09_full_va.pdf> (23 June 2010)

2 Enel

Basic company information

Enel is an Italian multinational firm which is the largest power company in Italy, Spain, Slovakia and a number of major Latin American countries and is Europe's second-largest listed utility by installed capacity. It is an integrated player which produces, distributes and sells electricity and gas. After the acquisition of the Spanish utility Endesa, Enel is now present in 23 countries with over 96,000 MW and serves 60.8 million power and gas customers.⁷² Enel operates power plants for hydroelectric, thermoelectric, nuclear, geothermal, wind and photovoltaic power generation.

Four of Enel's divisions are involved in the generation of electricity. The Generation and Energy Management Division is responsible for the generation and sale of electricity in Italy and the trading on domestic and international markets. The Iberia and Latin America Division focuses on developing Enel's presence and coordinating its operations in the electricity and gas markets of Spain, Portugal and Latin America. The mission of the International Division is to support Enel's strategies for international growth, as well as to manage and integrate the foreign businesses not included in the Iberia and Latin America Division. The Renewable Energy Division has the mission of developing and managing operations for the generation of electricity from renewable resources worldwide. Table gives an overview of where these divisions are active. In December 2008 Enel established Enel Green Power, the Group's company dedicated to developing and managing worldwide energy generation from renewable sources, operating around 5,700 MW in plants relying on hydro, wind, geothermal, solar and biomass sources in Europe and the Americas.⁷³ This subsidiary falls under the Renewable Energy Division.

Table 4: Enel's divisions and area's of activity

Division	Area
Generation and Energy Management	Italy
Iberia and Latin America	Spain, Portugal, Latin America, Ireland
International Division	France, Belgium, Central and South-Eastern Europe, Russia
Renewable Energy Division (incl. Enel Green Power)	Italy, Europe, Americas

In 2009, Enel generated just over EUR 64 billion in revenue and a net income of EUR 5.4 billion. The company has about 81,000 employees.⁷⁴

Enel has made use of the opportunity to review the fact sheet and to fill out the questionnaire sent to the company by SOMO.

Installed capacity for electricity generation in Europe

In its annual report Enel provides information on its installed capacity and electricity generated broken down by business divisions. For the sake of comparability in this paper the data from the '2009 Results / 2010-2014 Plans' presentation is used, in which the figures are reported according to the regions where the company operates. These figures are shown in Table 5.

It has to be noted that Enel doesn't make a distinction between oil and natural gas in categorizing its power plants. The differentiation Enel makes is on the one hand CCGT gas plants and on the other hand gas plants with Open Cycle Gas Turbines (OCGT) and ST oil plants. As in this paper the distinction is made between oil and natural gas, the figures of 27,341 MW and 37,391 GWh installed capacity and electricity generated respectively, for natural gas, are composed of the CCGT, OCGT and ST figures in Europe. Of the total amount of 27,341 MW Enel has 7,986 MW of installed CCGT capacity and of the 37,391 GWh Enel generated 22,651 GWh electricity in these CCGT plants in 2009.⁷⁵

In the category of 'Other renewable' Enel's geothermal, wind and the category specified by Enel as 'other' are included.⁷⁶

Electricity generation from biomass only represents a small part of Enel's European activities, with 42 MW of installed capacity in Spain.⁷⁷ The company is currently in the process of converting several of its Italian plants to be able to co-fire with biomass in the future.⁷⁸

Also solar power represents a small fraction of Enel's total capacity with a current total of 17 MW in Europe,⁷⁹ It has to be noted though that Enel is constructing twice as much this year and the expectation is to have 51 MW of total installed solar capacity by the end of 2010. For details see Table 5.

Figure 3 shows the fuel mix of Enel's generation capacity in Europe.

Figure 3: Fuel mix of Enel's installed capacity in Europe, 2009

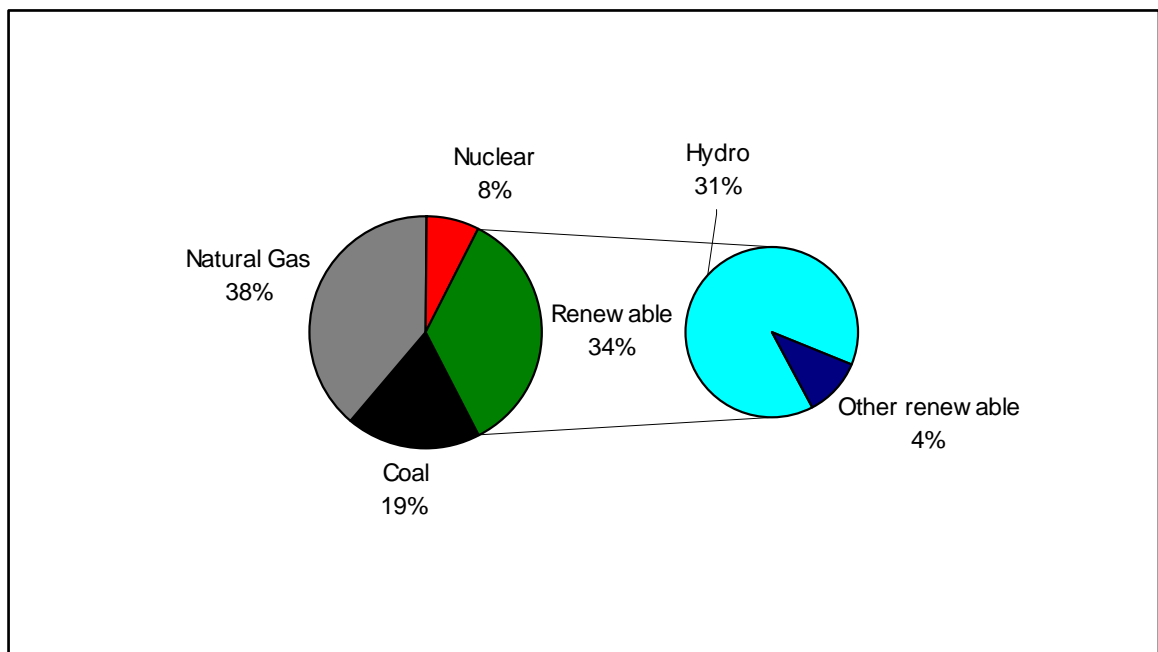


Figure 4 shows the fuel mix of the electricity that was generated by Enel in Europe in 2009.

Figure 4: Fuel mix of electricity generated by Enel in Europe, 2009

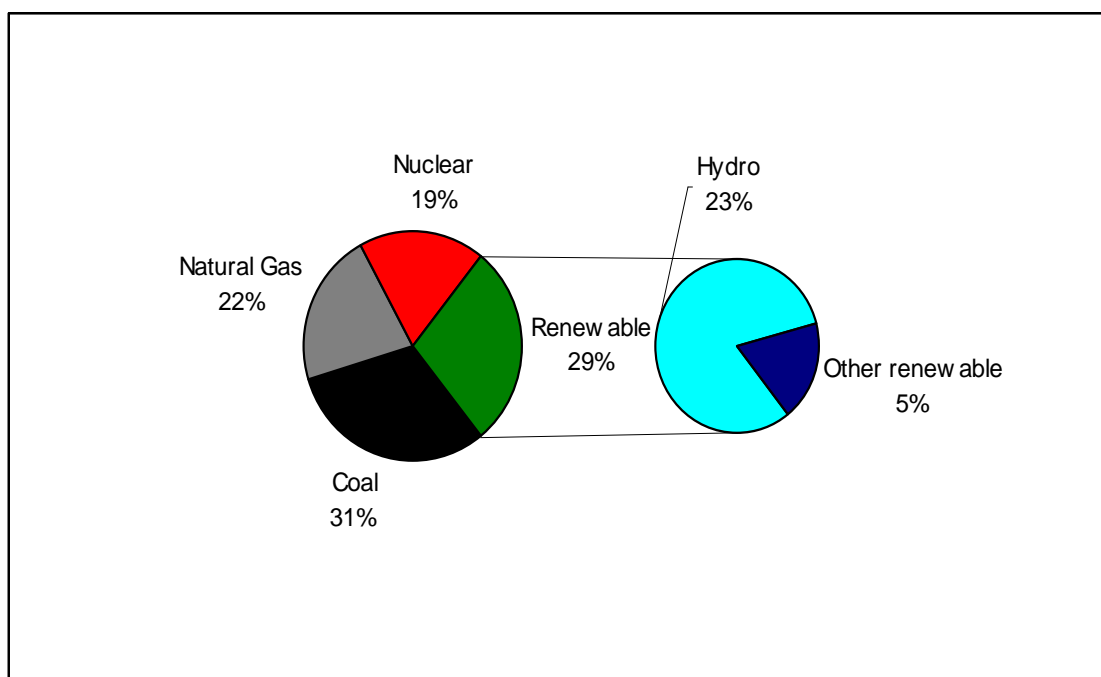


Table 5 shows the fuel mix of Enel's installed capacity (in MW) and generated electricity (in GWh) in 2009.

Table 5: Fuel mix of Enel's installed capacity and electricity generated in Europe, 2009

Fuel type	Installed Capacity (MW)	Electricity generated (GWh)
Coal	13,273 ⁸⁰	51,806 ⁸¹
Natural Gas	27,341 ⁸²	37,391 ⁸³
Oil	_ ⁸⁴	_ ⁸⁵
Nuclear	5,284 ⁸⁶	31,909 ⁸⁷
Other Non-renewable	0	0
Wind	_ ⁸⁸	_ ⁸⁹
Hydro	21,459 ⁹⁰	39,856 ⁹¹
Large scale (>10MW)	n/a	n/a
Small scale (<10MW)	n/a	n/a
Biomass	n/a	n/a
Stand alone	n/a	n/a
Co-fired	n/a	n/a
Other renewable	2,613 ⁹²	8,865 ⁹³
Total	69,970	169,827

Investments in new generation capacity in Europe

Enel has several new investments in the pipeline, of which the majority in coal and gas (CCGT). As for the long term plans, the company's main focus lies on nuclear energy, with a total planned capacity of 3,400 MW.

Enel is involved in the conversion of several oil powered plants into coal-fired plants with some biomass co-firing. The plans are set up for the conversion of the plant in Porto Tolle (3x660 MW of capacity, planned date of completion is 2014, costs are estimated at EUR 2.5 billion⁹⁴), the plant in Civitavecchia (3x660 MW of capacity, planned date of completion is 2010)⁹⁵ and the Rossano Calabro plant in Calabria (1,260 MW of capacity, costs are estimated at EUR 1.2 billion).⁹⁶ The oil-firing unit of the Sermide-Ostiglia power plant in Italy is scheduled to be converted to methane-gas firing by 2012 (costs are approximately EUR 150 million).⁹⁷

Table shows the company's investments in new capacity currently underway.

Table 6: Enel's announced investments in new production capacity

Project name	Location	Fuel type	Date in operation	Amount (€ million)	Output Capacity (MW)	Project Status
Mochovce III, IV	Slovakia	Nuclear ⁹⁸	2013	2.700 ⁹⁹	820 ¹⁰⁰	Under construction
Torrevaldaliga Nord	Civitavecchia (I)	Coal	End of 2010	n/a	1900	Under construction ¹⁰¹
Algeciras	Algeciras (S)	Gas (CCGT)	n/a	n/a	800	Construction complete ¹⁰²
Marcinelle	Wallonia (B)	Gas (CCGT)	2011	290 ¹⁰³	400	Under construction ¹⁰⁴
Fusina	Fusina (I)	Hydrogen ¹⁰⁵	2010	n/a	16 ¹⁰⁶	Construction complete ¹⁰⁷
Reactors 3 + 4	Cernavoda, Romania	Nuclear	Unit 3: 2016 Unit 4: 2017	366	132	Under construction. ¹⁰⁸
Archimede Project	Priolo Gargallo (I)	Solar	May 2010	n/a	5	Construction complete ¹⁰⁹
Shalba	Shalba (Bulgaria)	Wind	2010	n/a	21	Construction complete ¹¹⁰
Enlargement Sa Turrina Manna	Sassari (I)	Wind	2010	n/a	60	Construction complete ¹¹¹
Strambino	Strambino (I)	Solar	End of 2010	n/a	2	Under construction ¹¹²
Taranto	Taranto (I)	Solar	2010	n/a	2	Under construction ¹¹³
Nola	Nola (I)	Solar	2010	n/a	25	Under construction ¹¹⁴
Maida, Cortale and San Floro	Calabria (I)	Wind	2010	n/a	64	Construction complete ¹¹⁵
Dobrogea	Dobrogea (Romania)	Wind	n/a	350	200	Under construction ¹¹⁶
Flamanville III	France	Nuclear ¹¹⁷	2012 ¹¹⁸	500 ¹¹⁹	200 ¹²⁰	Under construction

In Italy Enel signed an agreement with the Italian Ministry of Environment to increase the installed capacity of renewable plants from its 2008 level of 2,597 MW (excluding major hydroelectric plants) by an additional 4,100 MW by 2020. Enel has also agreed to increase the use of biomass and fuels from waste to generate electricity in its power station from 137.5 thousand metric tons in 2008 to 300 thousand metric tons a year in 2013.¹²¹

According to the company's Sustainability report, in Spain Enel's key goals are 'to promote the development of a CCS (Carbon Capture & Storage) project; to reach 3,600 MW of installed capacity in its combined-cycle plants by 2012; to install new peaking capacity (400 MW of consumption for pumping) which is to be increased by 30% by 2012; to install gas turbines; and to develop the technology of hydrogen to be used as a fuel in thermal power plants.'¹²²

Table 7 shows the company's investment plans that have been announced, but are not yet underway.

Table 7: Enel's announced plans for investment in new capacity

Project name	Location	Fuel type	Date in operation	Amount (€ million)	Output Capacity (MW)	Status
Catania	Catania (I)	Solar	n/a	320 ¹²³	160 ¹²⁴	Agreement signed
Various solar plants	Mediterranean area	Solar	2016	n/a	500	Agreement signed ¹²⁵
Several wind farms	Calabria (I)	Wind	n/a	n/a	200 ¹²⁶	Development stage
Porto Tolle	Porto Tolle (I)	Coal (CCS) ¹²⁷	n/a	n/a	250	In preparation
Four EPR power plants	Italy	Nuclear	n/a	8.000 ¹²⁸	3200	Agreement signed ¹²⁹
Portoscuso	Sardinia (I)	Wind	n/a	n/a	100	Preparations started ¹³⁰
Rethymnon	Crete (GR)	Wind	n/a	n/a	5	License acquired ¹³¹
Livadia	Livadia, Viotia (GR)	Natural Gas (CCGT)	End of 2011	n/a	332 ¹³²	Plan approved
Canary Islands	Canary Islands (ES)	Wind	n/a	n/a	16 ¹³³	License awarded
Expansion Nuova Radicondoli	Italy	Geothermal	December 2010	n/a	20	Authorisation received ¹³⁴
Braila	Braila, Romania	Coal	n/a	n/a	266	Project on hold ¹³⁵
Energy complex	Porto Romano, Albania	Coal	n/a	n/a	800	Planning phase ¹³⁶

Responsible sourcing

Enel publishes a CSR report on a yearly basis and has a "Sustainability" section on its website. Since 2002, the company has a code of ethics published on its website, which deals with the criteria of conduct with shareholders, employees, customers, suppliers and the community.¹³⁷ Enel is reporting according to the Global Reporting Initiative's (GRI) sustainability reporting guidelines (GRI3).¹³⁸

The code of ethics 'is binding for the actions of all employees, and all affiliated and allied companies, as well as the Group's main suppliers'.¹³⁹ Enel has a 'general information' clause in 'all contracts' that make the adoption of Enel's Code of Ethics explicit. The implementation

of this code goes through an internal control committee, training and audits. The social report on ethical and social responsibilities is submitted to an external auditor. In addition to the Code of Ethics, Enel 'obliges contractors to apply the National Collective Bargaining Agreement to its workers, and in general to comply with regulations regarding on-the-job health, safety, and hygiene, as well as wage, pension, and insurance obligations'.¹⁴⁰ The code of ethics states that contracts with suppliers from countries 'at risk' must include clauses on human rights and labour rights issues, like child and forced labour, the freedom to associate and safety and environmental protection.¹⁴¹ To ensure that these conditions are met Enel states that it can make use of the possibility of holding inspections at offices and production sites of suppliers from these specified countries.¹⁴²

Regarding non-core suppliers (stationary, packaging, PC's, etc), Enel publishes a few guidelines on its website on standards, re-utilization and recycling.¹⁴³

The company does ethical auditing: it publishes the numbers of the violations of its Code of Ethics, but fails to mention how these audits are conducted and in what way suppliers breached these codes.¹⁴⁴

Sources of fuels and electricity trading

Enel does not report on the quantities of coal, biomass or uranium used in production. The sustainability report does mention that the consumption of fossil fuels in the overall Group went up from about 33.1 million tonnes of oil-equivalent (toe) in 2008 to about 37.4 million toe in 2009.¹⁴⁵ Enel does not have any publicly available policy on the purchase of coal, biomass or uranium.

In response to a draft version of this profile, the company stated that it could not give any data on the sourcing of its fuels or on its electricity trading activities on the spot and wholesale markets due to the sensitive nature of this type of information. Enel did mention that it extracts coal from the mines owned by Endesa, that it participates in gas extraction activities in Russia and Indonesia and that it owns a 10% share in Indonesia's eighth-largest coal producing company PT Bayan Resources.¹⁴⁶ On its website the company states that Enel France owns 5% of the French EPEX (European Power Exchange).¹⁴⁷ In terms of transparency, it has to be noted that except the sensitive information on sourcing and energy trading, Enel was active and willing to provide the necessary information needed for this paper.

⁷² Enel press release, "ENEL, EDF AND ANSALDO ENERGIA (FINMECCANICA) SIGN AN IMPORTANT MEMORANDUM FOR THE DEVELOPMENT OF NUCLEAR POWER IN ITALY", 9 April 2010, http://www.enel.com/en-GB/media/press_releases/release.aspx?iddoc=1630349 (13/07/2010)

⁷³ Enel company profile, March 2010, http://www.enel.com/en-GB/doc/group/profile/100701_Company_profile.pdf (15/07/2010)

⁷⁴ Enel sustainability report, p. 229.

⁷⁵ The figures exclude 123 MW of installed capacity and 768 GWh of net production in Morocco.

⁷⁶ Excluding the 42 MW of installed biomass capacity in Spain.

⁷⁷ This capacity is included in the category "other renewable", as Enel doesn't have a separate category for biomass in its reporting.

⁷⁸ Enel website, Group, Production, Biomasses, <http://www.enel.com/en-GB/group/production/biomasses/> (15/07/2010)

⁷⁹ The 17 MW is composed of 4 MW in Italy and 13 MW in Spain. Figures as of 30/06/2010. Enel's response to a draft version of this profile, email received 09/08/2010.

⁸⁰ The total installed capacity for coal is composed of the figures for "Italy", "Iberia", "Centre", and "SEE", as presented in the "2009 Results / 2010-2014 Plans" presentation. London, March 18, 2010. Enel website, Investor, Presentations, 2009 Results 2010-2014 Plans, p. 48, http://www.enel.com/en-GB/investor/annual_presentations/presentazione.aspx?id=2010_01 (10/08/2010)

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- ⁸¹ The total electricity generated for coal is composed of the figures for "Italy", "Iberia", "Centrel", and "SEE", as presented in the "2009 Results / 2010-2014 Plans" presentation. London, March 18, 2010. Enel website, Investor, Presentations, 2009 Results 2010-2014 Plans, p. 48, http://www.enel.com/en-GB/investor/annual_presentations/presentazione.aspx?id=2010_01 (10/08/2010)
- ⁸² The total installed capacity for natural gas is composed of the figures for "Italy", "Iberia", "Centrel", and "SEE", excluding the 123 MW of installed capacity in Morocco, as presented in the "2009 Results / 2010-2014 Plans" presentation. London, March 18, 2010. Enel website, Investor, Presentations, 2009 Results 2010-2014 Plans, p. 48, http://www.enel.com/en-GB/investor/annual_presentations/presentazione.aspx?id=2010_01 (10/08/2010)
- ⁸³ The total electricity generated for natural gas is composed of the figures for "Italy", "Iberia", "Centrel", and "SEE", excluding the 768 GWh of net production in Morocco, as presented in the "2009 Results / 2010-2014 Plans" presentation. London, March 18, 2010. Enel website, Investor, Presentations, 2009 Results 2010-2014 Plans, p. 48, http://www.enel.com/en-GB/investor/annual_presentations/presentazione.aspx?id=2010_01 (10/08/2010)
- ⁸⁴ The figures for the oil powered plants are included in the figures for natural gas.
- ⁸⁵ Ibid.
- ⁸⁶ The total installed capacity for nuclear is composed of the figures for "Italy", "Iberia", "Centrel", and "SEE", as presented in the "2009 Results / 2010-2014 Plans" presentation. London, March 18, 2010. Enel website, Investor, Presentations, 2009 Results 2010-2014 Plans, p. 48, http://www.enel.com/en-GB/investor/annual_presentations/presentazione.aspx?id=2010_01 (10/08/2010)
- ⁸⁷ The total electricity generated for nuclear is composed of the figures for "Italy", "Iberia", "Centrel", and "SEE", as presented in the "2009 Results / 2010-2014 Plans" presentation. London, March 18, 2010. Enel website, Investor, Presentations, 2009 Results 2010-2014 Plans, p. 48, http://www.enel.com/en-GB/investor/annual_presentations/presentazione.aspx?id=2010_01 (10/08/2010)
- ⁸⁸ The figures for wind energy are included in the figures for "other renewable".
- ⁸⁹ Ibid.
- ⁹⁰ The total installed capacity for the hydro powered plants is composed of the figures for "Italy", "Iberia", "Centrel", and "SEE", as presented in the "2009 Results / 2010-2014 Plans" presentation. London, March 18, 2010. Enel website, Investor, Presentations, 2009 Results 2010-2014 Plans, p. 48, http://www.enel.com/en-GB/investor/annual_presentations/presentazione.aspx?id=2010_01 (10/08/2010)
- ⁹¹ The total generated electricity for the hydro powered plants is composed of the figures for "Italy", "Iberia", "Centrel", and "SEE", as presented in the "2009 Results / 2010-2014 Plans" presentation. London, March 18, 2010. Enel website, Investor, Presentations, 2009 Results 2010-2014 Plans, p. 48, http://www.enel.com/en-GB/investor/annual_presentations/presentazione.aspx?id=2010_01 (10/08/2010)
- ⁹² The total installed capacity for "other renewable" is composed of the figures for "Italy", "Iberia", "Centrel", and "SEE", as presented in the "2009 Results / 2010-2014 Plans" presentation. London, March 18, 2010. Enel website, Investor, Presentations, 2009 Results 2010-2014 Plans, p. 48, http://www.enel.com/en-GB/investor/annual_presentations/presentazione.aspx?id=2010_01 (10/08/2010)
- ⁹³ The total electricity generated for "other renewable" is composed of the figures for "Italy", "Iberia", "Centrel", and "SEE", as presented in the "2009 Results / 2010-2014 Plans" presentation. London, March 18, 2010. Enel website, Investor, Presentations, 2009 Results 2010-2014 Plans, p. 48, http://www.enel.com/en-GB/investor/annual_presentations/presentazione.aspx?id=2010_01 (10/08/2010)
- ⁹⁴ Platts Power in Europe, "Porto Tolle approval imminent", June 28, 2010.
- ⁹⁵ Platts Power in Europe, "PIE's new plant tracker" May 3, 2010, p. 9.
- ⁹⁶ Platts Power In Europe, "Enel plans Rossano conversion", May 17, 2010.
- ⁹⁷ Platts Power In Europe, "Enel to upgrade Sermide-Ostiglia", May 3, 2010.
- ⁹⁸ Enel website, Group, Production, Nuclear Power, http://www.enel.com/en-GB/group/production/nuclear_power/ (12/07/2010)
- ⁹⁹ The costs for this project are likely to increase, as it is already EUR 1 bn higher than the estimates from 2008 (EUR 1.7 bn) Email Giuseppe Onufrio, Greenpeace Italy, received 24/08/2010 and email Jan Beranek, Greenpeace, received 26/08/2010.
- ¹⁰⁰ Enel annual report 2009, p. 14.
- ¹⁰¹ Enel annual report 2009, p. 12
- ¹⁰² Enel annual report 2009, p. 12
- ¹⁰³ Red orbit website, News, Business, "Enel Acquires Majority Stake in Marcinelle Energie From Dufenco", 1 July 2008, http://www.redorbit.com/news/business/1457803/enel_acquires_majority_stake_in_marcinelle_energie_from_duferco/index.html (13/07/2010)
- ¹⁰⁴ Enel annual report 2009, p. 12.
- ¹⁰⁵ The demonstration plant in Fusina is being powered using pure hydrogen (from the Marghera petrochemical complex) or various mixes of hydrogen and methane. AR, p. 146.
- ¹⁰⁶ Enel annual report 2009, p. 12.
- ¹⁰⁷ Enel sustainability report, p. 107.
- ¹⁰⁸ Total capacity 1,440 MW. As of 31 December 2009 Enel 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/>> (17/06/2010) "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%). [...] Each would provide that proportion of the financing and take the same share of the power generated. [...] 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>> (17/06/2010)
- "another two nuclear units of at least 700 MW at Cernavoda Nuclear Power Plant over 2009-2015". Website permanent representation Romania to the European Union, "Romanian economic highlights", 21 January 2010, <http://ue.mae.ro/pdf/2010.01.04_highlights01.pdf> (20/06/2010). In response to a draft version of this profile, Enel stated that it does not invest in the Cernavoda plant, but that is merely part of the consortium building the reactors. According to the above mentioned sources, each constructor would receive the same share of electricity generated as with the financing of the construction. Based on these sources SOMO decided to keep the investment in Table .
- 109 Enel annual report 2009, p. 147
- 110 Enel press release, "ENEL GREEN POWER DOUBLES ITS WIND CAPACITY IN BULGARIA", 10 May, 2010, http://www.enel.com/en-GB/media/press_releases/release.aspx?iddoc=1631066 (14/07/2010)
- 111 With the 60 MW enlargement, the total capacity of the wind farm is now 84 MW. Enel press release, "SARDINIA, HOME TO ITALY'S LARGEST WIND FARM FROM ENEL GREEN POWER", 9 February 2010, http://www.enel.com/en-GB/media/press_releases/release.aspx?iddoc=1629652 (14/07/2010)
- 112 The total capacity of the plant is 3 MW, Enel has a 60% share. Enel press release, "ENEL GREEN POWER AND FINPIEMONTE PARTECIPAZIONI SIGN AGREEMENT FOR DEVELOPMENT OF PHOTOVOLTAIC AND OTHER RENEWABLE ENERGY RESOURCES IN PIEDMONT", 27 January 2010, http://www.enel.com/en-GB/media/press_releases/release.aspx?iddoc=1629498 (14/07/2010)
- 113 The total capacity of the plant is 4 MW, Enel has a 51% share. Enel press release, "ENEL GREEN POWER AND GROUP MARCEGAGLIA JOIN FORCES TO DEVELOP PHOTOVOLTAIC GENERATION", http://www.enel.com/en-GB/media/press_releases/release.aspx?iddoc=1629484 (14/07/2010)
- 114 Enel press release, 10 December 2009, "ENEL GREEN POWER TO BUILD ONE OF THE WORLD'S LARGEST PHOTOVOLTAIC INSTALLATIONS ON THE ROOF OF CIS -INTERPORTO CAMPANO", http://www.enel.com/en-GB/media/press_releases/release.aspx?iddoc=1627819 (17/04/2010)
- 115 Enel press release, "64 MW OF WIND CAPACITY FOR ENEL GREEN POWER IN CALABRIA", 9 November, 2009, http://www.enel.com/en-GB/media/press_releases/release.aspx?iddoc=1625475 (14/07/2010)
- 116 Ziarul Financiar, "Enel starts construction of wind park in Dobrogea", February 4, 2010.
- 117 Enel website, Group, Production, Nuclear Power, http://www.enel.com/en-GB/group/production/nuclear_power/ (12/07/2010)
- 118 Enel website, Group, Worldwide, France, <http://www.enel.com/en-GB/group/worldwide/france/> (25/08/2010)
- 119 The total estimated costs are EUR 4 bn, Enel has a 12.5% share. S. Thomas, Enel: Business prospects and risks in nuclear energy, PSIRU Business School, University of Greenwich (London: April 2009), p. 12. The costs for this project are likely to increase, as it is already EUR 700 mln higher than the estimates from 2007 (EUR 3.3 bn) Email Jan Beranek, Greenpeace, received 26/08/2010.
- 120 Total capacity of the reactor (owned by EDF) is 1600 MW, Enel has a 12.5% stake. CSR report 2009, p. 174.
- 121 Enel annual report 2009, p. 33.
- 122 Enel sustainability report 2009, p. 148.
- 123 Enel annual report 2009, p. 276.
- 124 Capacity to be increased to 480 MW in the years after construction is complete. AR, p. 15.
- 125 Enel annual report 2009, p. 15.
- 126 Total installed capacity of the wind farms is 400 MW, Enel has a 50% share. AR., p. 36.
- 127 CO2 capture and sequestration (CCS) is a technology for generating electricity without emitting CO2 from coal. CCS technology has not yet reached commercial maturity, therefore Enel is planning to construct a demonstration plant in Porto Tolle. Enel annual report 2009, p. 145.
- 128 The estimated costs for the four EPR's is EUR 4 bn each. The project is a joint venture between Enel and EdF. Email Giuseppe Onufrio, Greenpeace Italy, received 24/08/2010
- 129 Enel signed an agreement with EDF for the construction of four Evolutionary Pressurised Reactor (EPR, third-generation) power plants (each of 1,600 MW). Enel sustainability report 2009, p. 147.
- 130 Work on the construction is scheduled to begin in 2010. Enel press release, "SARDINIA, HOME TO ITALY'S LARGEST WIND FARM FROM ENEL GREEN POWER" 9 February 2010, http://www.enel.com/en-GB/media/press_releases/release.aspx?iddoc=1629652 (14/07/2010)
- 131 Enel press release, "ENEL GREEN POWER SIGNS AGREEMENT FOR THE ACQUISITION OF ADDITIONAL RENEWABLES OPERATIONS IN GREECE", 23 October, 2009, http://www.enel.com/en-GB/media/press_releases/release.aspx?iddoc=1624416 (15/07/2010)
- 132 Total capacity is 443 MW. The plant is being constructed by Enelco, which is a 75%-25% joint venture between Enel and Prometheus Gas. Platts Power in Europe, "PIE's new plant tracker" May 3, 2010, p. 9.
- 133 The capacity of the 11 wind farms to be built is 116.6 MW. Three are to be built by Enel Union Fenosa Renovables (Eufer), a 50-50 joint venture of the Spanish Union Fenosa and Enel. International Oil Daily, "Spain Goes for Wind", August 13, 2009.
- 134 Platts Power In Europe, "Enel expands geothermal plant", August 24, 2009, p. 71.
- 135 The project is a cooperation between E.ON, Enel and the Romanian Termoelectrica, the total capacity of the plant is 800 MW. "Enel officials have confirmed that their power plant project for Braila has been on hold for a year, due to a misunderstanding over the participation in the joint-venture with Termoelectrica", The Diplomat Bucharest website, April 2010, <http://www.thediplomat.ro/articol.php?id=1026> (25/08/2010)
- 136 Enel website, Group, Worldwide, Albania, <http://www.enel.com/en-GB/group/worldwide/albania/> (25/08/2010)
- 137 For the code of ethics, see: http://www.enel.com/en-GB/doc/sustainability/ENEL_Codice_Etico_19_maggio.pdf

- ¹³⁸ Enel sustainability report 2009, p. 4.
¹³⁹ Enel sustainability report 2009, p. 239.
¹⁴⁰ T. Kerckhoffs and J. Wilde-Ramsing, "European Works Councils and Corporate Social Responsibility in the European Energy Sector", SOMO publication, June 2010, p. 32.
¹⁴¹ For "at risk" countries Enel refers to the ILO website. Enel sustainability report 2009, pp. 243-244.
¹⁴² Enel code of ethics, p. 52, http://www.enel.com/en-GB/doc/sustainability/Enel_Code_of_Ethics.pdf (11/08/2010)
¹⁴³ Enel website, Sustainability, Stakeholders, Suppliers, <http://www.enel.com/en-GB/sustainability/stakeholders/suppliers/> (15/07/2010)
¹⁴⁴ Enel sustainability report 2009, p. 247.
¹⁴⁵ Enel sustainability report 2009, p. 114.
¹⁴⁶ Enel's response to a draft version of this profile, email received 09/08/2010.
¹⁴⁷ Enel website, Group, Worldwide, France, <http://www.enel.com/en-GB/group/worldwide/france/> (25/08/2010)

3 E.ON

Basic company information

E.ON is one of the two largest power companies in Germany. It is active throughout Europe, in Russia and the United States. Through E.ON Benelux, the company is active in the generation and supply markets of the Netherlands. The focus of this profile is on E.ON's activities in mainland Europe, the UK and Scandinavia.

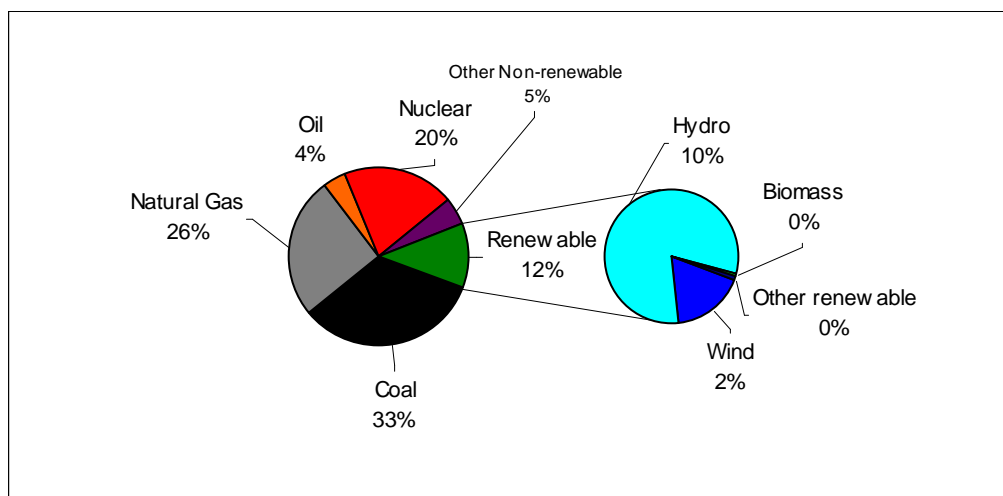
E.ON has six business units active in Europe.¹⁴⁸ E.ON Central Europe, of which E.ON Benelux is a subsidiary, is active in generation and supply in the Central European market. E.ON UK, E.ON Nordic, E.ON Italy and E.ON Spain have similar activities in their respective regions. E.ON Climate and Renewables, established in May 2007, is the business unit dealing with the company's activities in renewable energy sources worldwide. Other business units of E.ON include E.ON Russia, E.ON U.S. Midwest, E.ON Energy Trading, and E.ON Pan European Gas.

In 2009, E.ON had a turnover of more than € 80 billion and a total of 88,227 employees.

Installed capacity for electricity generation in Europe

Figure 5 shows the fuel mix of E.ON's installed capacity in Europe. Compared to last year, the relative share of renewable capacity went down by 2%. In absolute figures, the installed capacity in Europe totalled 56,214 MW. In The Netherlands, the installed capacity was 1,898 MW and in Belgium 941 MW.¹⁴⁹ A number of new facilities came into operation in the first half of 2010, including facilities in France and Germany with a combined new capacity of 1,776 MW.¹⁵⁰ At the same time, E.ON has sold off or swapped a number of assets in Germany in 2009, totalling 5,000 MW.

Figure 5: Fuel mix of E.ON's installed capacity in Europe, 2009



Based on: E.ON Strategy and Key Figures

Table 8 shows the absolute figures for E.ON's installed capacity in Europe per fuel type.

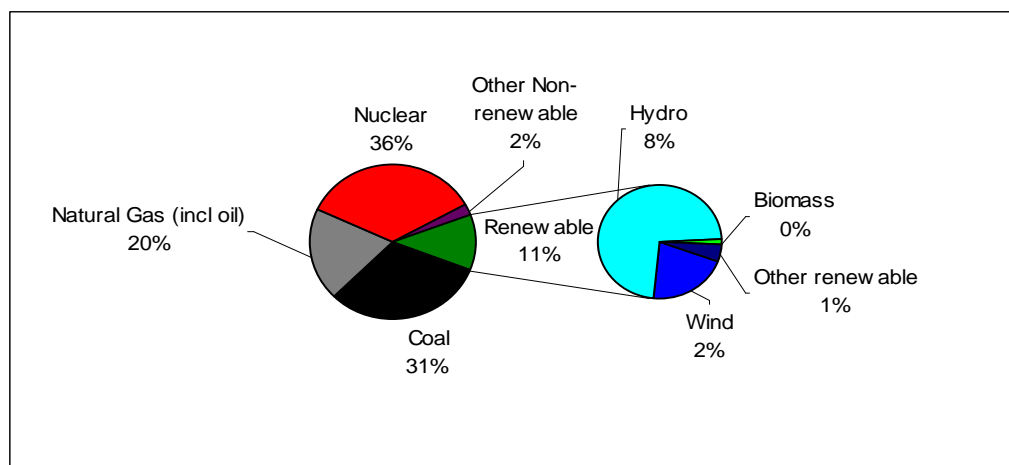
Table 8: E.ON's installed capacity in Europe (MW) per division and per fuel type, 2009

Fuel type	Central Europe ¹⁵¹	UK ¹⁵²	Nordic ¹⁵³	Italy ¹⁵⁴	Spain ¹⁵⁵	Climate & Renewables ¹⁵⁶	Total
Coal ¹⁵⁷	11,155	4,910	0	980	1,433	0	18,478
Natural Gas	4,852	3,865	0	4,537	1,213	0	14,467
Oil	1,095	1,300	0	0	0	0	2,395
Nuclear	8,555		2,770	0	0	0	11,325
Other Non-renewable	260	255	2,304	0	0	0	2,819
Wind	0	0	0	0	0	1,146	1,146
Hydro	2,420	0	1,768	530	707	25	5,450
Large scale (>10MW)	-	-	-	-	-	-	
Small scale (<10MW)	-	-	-	-	-	[25]	
Biomass	0	0	0	0	0	64	64
Stand alone	-	-	-	-	-	[64]	
Co-fired	-	-	-	-	-	-	
Other renewable ¹⁵⁸	69	0	0	0	0	1	70
Total	28,407	10,330	6,842	6,047	3,353	1,236	56,214

Figure 6 shows the fuel mix of the actual generated electricity in Europe by E.ON in 2009. The figures do not include the generation in Spain, for which the company did not publish any information. The figures differ slightly from the global energy mix, as provided on E.ON's website.¹⁵⁹ This is due to the exclusion of the figures from Russia and the USA.

The only significant difference with the installed capacity in Europe is the larger share of nuclear electricity generated and the lower share of natural gas and oil, both of which can be contributed to the Central Europe business unit.

Figure 6: Fuel mix of E.ON's generated electricity in Europe, 2009



Based on: E.ON Strategy and Key Figures

Table 9 shows the absolute figures for E.ON's generated electricity in Europe per fuel type.

Table 9: E.ON's generated electricity (GWh) in Europe per division and per fuel type, 2009

Fuel type	Central Europe ¹⁶⁰	UK ¹⁶¹	Nordic ¹⁶²	Italy ¹⁶³	Spain	Climate & Renewables ¹⁶⁴	Total
Coal ¹⁶⁵	46,930	12,700	0	4,290	n/a	0	63,920
Natural Gas	10,297 ¹⁶⁶	20,100	0	9,900	n/a	0	40,297
Oil	-	-	-	-	n/a	-	-
Nuclear	63,313	0	8,500	0	n/a	0	71,813
Other Non-renewable	1,869 ¹⁶⁷	0	2,400	165	n/a	0	4,434
Wind	0	0			n/a	4,859	4,859
Hydro	6,872	0	8,100	2,145	n/a	33	17,150
Large scale (>10MW)	-	-	-	-	n/a	-	-
Small scale (<10MW)	-	-	-	-	n/a	-	-
Biomass		0	0	0	n/a	270	270
Stand alone	-	-	-	-	n/a	-	-
Co-fired	-	-	-	-	n/a	-	-
Other renewable	1,128	0	0	0	n/a	0	1,128
Total	130,389	32,800	19,000	16,500	n/a	5,161	203,871

Announced investments in new generation capacity in Europe

E.ON is heavily investing in new capacity in the coming years, aiming to invest € 10 billion in 2010, € 8 billion in 2011 and € 6 billion in 2012.¹⁶⁸ These figures include construction plans as well as asset swaps and purchases. In 2009, E.ON has divested about 5,000MW of capacity in Germany, selling its assets or swapping them for capacity in France and Belgium.¹⁶⁹ E.ON has also cancelled the construction of a number of coal plants, including the Wilhelmshaven and Kiel projects, and the Scarweather Sands offshore wind project.¹⁷⁰

Table 10 shows E.ON's investments in new production capacity that are currently underway.

Table 10: E.ON's investments in new production capacity

Project name	Location	Fuel type	Date in operation	Amount (million €)	Output Capacity (MW)	Project Status
Datteln ¹⁷¹	Germany	Coal	2012	1,200	1,100	Limited construction
Maasvlakte ¹⁷²	Netherlands	Coal	2012	1,200	1,100	Under construction
Malzenica ¹⁷³	Slovakia	Natural gas (CCGT)	2010	500	430	Under construction
Gönyü ¹⁷⁴	Hungary	Natural gas (CCGT)	2011	400	430	Under construction
Irshing (unit 4) ¹⁷⁵	Germany	Natural gas (CCGT)	2011	250	540	Under construction
Isle of Grain ¹⁷⁶	Kent (UK)	Natural gas (CHP)	2010	564	1,275	Partially in operation

Emile Huchet, Saint Avold ¹⁷⁷	Lorraine (FR)	Natural gas (CCGT)	2010	470	860	Testing phase
Bahia de Algeciras ¹⁷⁸	Spain	Natural gas (CCGT)	2010	350	-	Testing phase
Robin Rigg ¹⁷⁹	UK	Wind	2010	366	180	In operation
London Array Phase 1 ¹⁸⁰	London (UK)	Wind	2012	660	189	Under construction
Rødsand ¹⁸¹	Denmark	Wind	2010	400	207	Partially in operation
Wielkopolska and Barzowice I	Poland	Wind	n/a	n/a	68.7	Under construction
La Victoria and Matabuey	Spain	Wind	n/a	n/a	38.4	Under construction
JV with Abengoa Solar ¹⁸²	Spain	Other Renewable (Solar)	2011	225	50	Under construction

Table 11 shows E.ON's announced plans for future investments in new production capacity. E.ON announces in its annual report that it is planning to build 3,800 MW of new CCGT capacity.¹⁸³ This figure is not allocated to specific projects, and is not taken up in the table below to avoid double counting. E.ON Nordic has also announced plans to build 40 new wind turbines, in cooperation with Svaeskog, which will be in operation in 2012 or 2013.¹⁸⁴ No figures for the investment amount or output capacity are given, and this project is therefore not included in the table below.

Table 11: E.ON's announced plans for investment in new capacity

Project name	Location	Fuel type	Date in operation	Amount (million €)	Output Capacity (MW)	Status
Staudinger ¹⁸⁵	Germany	Coal	2013	1,200	1,100	Planned
	Antwerp (BE) ¹⁸⁶	Coal	2015	1,500	1,100	Planned
High Marnham ¹⁸⁷	UK	Natural gas (CCGT)	2016	n/a	1,600	Plans announced
Drakelow ¹⁸⁸	UK	Natural gas (CCGT)	2017	564	2,640	Plans announced/delayed
Lubmin ¹⁸⁹	Germany	Natural gas (CCGT)	2013	140	600	Plans announced
Hornaing	Nord-Pas-de-Calais (FR)	Natural gas (CCGT)	2012	n/a	430	Plans announced
Lucy	Bourgogne (FR)	Natural gas (CCGT)	2010	n/a	420	Plans announced
Solvay ¹⁹⁰	Spain	Natural gas (CCGT)	2013	n/a	400	Plans announced

Upgrade of unit O2 ¹⁹¹	Oskarshamn (SE)	Nuclear	2011	n/a	500	Delayed
Fennovoima ¹⁹²	Finland	Nuclear	2020	n/a	612	License granted
Horizon Nuclear Power ¹⁹³	Wylfa (Anglesey, Wales, UK)	Nuclear	2020	4,200	1,650	planning application scheduled for 2012
Horizon Nuclear Power ¹⁹⁴	Oldbury (Gloucestershire, England, UK)	Nuclear	2025	4,200	1,650	Planning application once construction at Wylfa is underway
Royal Portbury Dock ¹⁹⁵	North Somerset (UK)	Biomass	2013	789	150	Plans announced
Loctock ¹⁹⁶	Northwich (UK)	Waste	n/a	n/a	60	Plans announced
Orkney ¹⁹⁷	UK	Other renewable (Wave power)	n/a	n/a	50	Plans announced
Billingborough	Lincolnshire (UK)	Wind	n/a	n/a	51	Plans announced
Humber Gateway ¹⁹⁸	UK	Wind	n/a	789	300	Plans announced
Lancashire-Cumbria ¹⁹⁹	UK	Wind	n/a	n/a	20	Plans announced
Sussex ²⁰⁰	UK	Wind	n/a	n/a	630	Plans announced
Kelmarsh	UK	Wind	n/a	n/a	17.5	Plans announced
Carnedd Wen	Powys, Wales (UK)	Wind	n/a	n/a	500	Plans announced

Responsible sourcing

E.ON's approach to sustainability can be described as aiming to find a balance between electricity reliability, cost and sustainability. In its Corporate Responsibility report, it states: 'Reliable, sustainable and affordable energy is the backbone of positive change in the world societally, socially and culturally. Yet at the same time, we must also give even stronger consideration to the interests of future generations.'²⁰¹ As part of E.ON's CSR approach, the company has published its Responsible Procurement Principles.²⁰² Here, it outlines the minimum requirements that all suppliers of the company have to adhere to. E.ON explicitly states that this policy also applies to suppliers of raw materials, such as biomass, coal and uranium.²⁰³

Sourcing of raw materials

E.ON publishes figures on its purchasing of coal as a raw material in 2009. In total, 42.9 million metric tonnes of coal were procured, of which 18.2 originated from the USA, 7.4 from Russia, 4.3 from South Africa and 4.0 from Colombia. In the beginning of 2010, the company conducted audits at coal mines in Colombia and South Africa. For these audits, independent auditors were used, and E.ON has actively engaged in information sharing with civil society.

For the sourcing of biomass, the company has a specific policy that determines the criteria for the biomass that the company uses. The policy states that biomass used for electricity should not have a negative effect on the use of land for food production, and it also states that the company prefers to source its biomass in the vicinity of the biomass plants.²⁰⁴ However, it does not provide figures on the origin of the biomass it procures.

E.ON also provides information regarding the origin of the uranium it uses; it procures most of the uranium from Canada, Kazakhstan and Uzbekistan, while other sources include Namibia, Canada, Niger, Ukraine and the USA.²⁰⁵ E.ON performed a corporate responsibility audit on its uranium sourcing in 2009. No further information was found regarding the specifics of this audit.

Electricity trading

E.ON provide detailed figures on the amounts of electricity purchased from outside sources, in relation to its own generation as well as total sales of electricity. In 2009, E.ON procured more than 60% of all the electricity it sold to its customers.²⁰⁶

No information was provided on E.ON's counterparts for the traded electricity, nor about the fuel sources of the traded electricity.

¹⁴⁸ E.ON, Strategy and Key Figures, 2010, p.2.

¹⁴⁹ E.ON, Strategy and Key Figures, 2010, p.41.

¹⁵⁰ E.ON, Strategy and Key Figures, 2010, p.22.

¹⁵¹ E.ON, Strategy and Key Figures, 2010, p.29 & p.32.

¹⁵² E.ON, Strategy and Key Figures, 2010, p.85 & p.87. E.ON categorizes its CHP capacity as 'other'. The 359 MW of CHP schemes are added up to the natural gas capacity.

¹⁵³ E.ON, Strategy and Key Figures, 2010, p.101 & p.103. E.ON categorizes its natural gas and oil capacity as 'other'. This table uses the same categorization. It should be noted that in other profiles these fuel types are categorized separately.

¹⁵⁴ E.ON, Strategy and Key Figures, 2010, p.148. Of the 4,537 MW of natural gas capacity in Italy, 4,367 MW comes from CCGT plants.

¹⁵⁵ E.ON, Strategy and Key Figures, 2010, p.152. All the natural gas capacity in Spain comes from CCGT facilities.

¹⁵⁶ E.ON, Strategy and Key Figures, 2010, p.169. The figures given in this table exclude the 1,720 MW of wind capacity that E.ON has in North America.

¹⁵⁷ E.ON reports separately for its lignite and hard coal capacity. This table has combined these figures for reasons of comparability.

¹⁵⁸ E.ON Central Europe categorizes wind, biomass et al. under 'other'. This table uses the same categorization. It should be noted that in other profiles these fuel types are categorized separately.

¹⁵⁹ E.ON website, Responsibility, Performance Report 2009, "Sustainable Energy Mix", no date, <http://www.eon.com/en/responsibility/35071.jsp> (16-07-10).

¹⁶⁰ E.ON, Strategy and Key Figures, 2010, p.33.

¹⁶¹ E.ON, Strategy and Key Figures, 2010, p.85.

¹⁶² E.ON, Strategy and Key Figures, 2010, p.105.

¹⁶³ E.ON, Strategy and Key Figures, 2010, p.147. Calculated on the basis of the total production figure of 16.5 billion kWh and the relative figures given on p.147.

¹⁶⁴ E.ON, Strategy and Key Figures, 2010, p.169. The wind figures in this column do include North America, as these figures are not broken down regionally by E.ON.

¹⁶⁵ E.ON reports separately for its lignite and hard coal capacity. This table has combined these figures for reasons of comparability.

¹⁶⁶ This figure is calculated by adding the 'oil/gas' and the 'combined heat and power' figures on p.33 of E.ON, Strategy and Key Figures, 2010. Due to E.ON's reporting structure, no figures can be given for 'oil' in this table. This includes 1,688 GWh generated from waste incineration.

¹⁶⁷ E.ON, Strategy and Key Figures, 2010, p.5.

¹⁶⁹ E.ON, Strategy and Key Figures, 2010, p.22.

¹⁷⁰ Platts Power in Europe, "PIE's new plant tracker", 03-05-10.; E.ON UK website, Press Releases, "DONG Energy and E.ON decide against developing Scarweather Sands Offshore Wind Farm", 03-12-09, <http://pressreleases.eon-uk.com/blogs/eonukpressreleases/archive/2009/12/03/1473.aspx> (15-07-10).

¹⁷¹ E.ON, Strategy and Key Figures, 2010, p.22; Platts Power in Europe, "PIE's new plant tracker", 03-05-10; RP Online website, Aktuelles, Wirtschaft, "Kraftwerk Datteln darf weitergebaut werden", 24-06-10, <http://nachrichten.rp-online.de/wirtschaft/kraftwerk-datteln-darf-weitergebaut-werden-1.79630> (15-07-10).

- 172 E.ON, Strategy and Key Figures, 2010, p.22; Platts Power in Europe, "PIE's new plant tracker", 03-05-10.
- 173 E.ON, Strategy and Key Figures, 2010, p.22; Reuters website, "E.ON starts construction of Slovak power plant", 06-10-09, <http://www.reuters.com/article/idUSL635565720091006> (15-07-10).
- 174 E.ON, Strategy and Key Figures, 2010, p.22; E.ON Kraftwerke GmbH, Press Release, "Gönyü: E.ON signed power plant contract with Siemens", 14-12-07, http://www.eon-eromuvek.com/pages/ekw_en/Press/Press_release/documents/sajtokozl_1213_eng.pdf (15-07-10).
- 175 E.ON, Strategy and Key Figures, 2010, p.22; Platts Power in Europe, "PIE's new plant tracker", 03-05-10. E.ON and Siemens are investing a total of € 500M.
- 176 E.ON, Strategy and Key Figures, 2010, p.87; E.ON UK website, Press Releases, "First fire of gas turbine at new Kent power station", 04-06-10, <http://pressreleases.eon-uk.com/blogs/eonukpressreleases/archive/2010/06/04/1555.aspx> (15-07-10); Exchange rate 1 January 2010 1 GBP =1.1271 EUR. (<http://www.exchangerates.org.uk/GBP-EUR-exchange-rate-history.html>)
- 177 Platts Power in Europe, "PIE's new plant tracker", 03-05-10
- 178 E.ON, Strategy and Key Figures, 2010, p.152; Platts Power in Europe, "PIE's new plant tracker", 03-05-10. The additional capacity for this investment has already been taken up in E.ON's reported installed capacity. Therefore, the 820 MW is kept out of this table to avoid a double count.
- 179 E.ON, Strategy and Key Figures, 2010, p.155; Platts Power in Europe, "PIE's new plant tracker", 03-05-10. the project is still categorized as an investment, as its capacity has not been included in the consolidated figures mentioned in E.ON's annual report. Exchange rate 1 January 2010 1 GBP =1.1271 EUR. (<http://www.exchangerates.org.uk/GBP-EUR-exchange-rate-history.html>)
- 180 E.ON UK website, Press Releases, "London Array signs contracts worth almost 2bn euros for work on world's largest offshore wind farm", 14-12-09, <http://pressreleases.eon-uk.com/blogs/eonukpressreleases/archive/2009/12/14/1474.aspx> (15-07-10); E.ON, Strategy and Key Figures, 2010, p.155.
- 181 E.ON, Strategy and Key Figures, 2010, p.155; E.ON Climate & Renewables, "E.ON Offshore Wind Energy Factbook", April 2010, http://www.eon.com/en/downloads/EON_Offshore_Factbook_April_2010_EN.pdf (15-07-10).
- 182 E.ON, Strategy and Key Figures, 2010, p.156; Abengoa Solar website, About Us, General News News Archive, 2009, "Abengoa Solar and E.ON Climate & Renewables team up to build two 50MW Concentrating Solar Power plants in Spain", 25-11-09, http://www.abengoasolar.com/corp/web/en/about_us/general/news/archive/2009/solar_20091125.html (16-07-10). The figure provided in this table represents 50% of the joint venture investment.
- 183 E.ON, Strategy and Key Figures, 2010, p.5.
- 184 E.ON Nordic website, Press Release, "E.ON och Sveaskog samarbetar kring ny vindkraft i Sverige", 10-06-10, <http://www.eon-nordic.se/templates/Eon2PressPage.aspx?id=70026&epslanguage=SV> (16-07-10).
- 185 E.ON, Strategy and Key Figures, 2010, p.22; Platts Power in Europe, "PIE's new plant tracker", 03-05-10.
- 186 E.ON, Strategy and Key Figures, 2010, p.22; Platts Power in Europe, "PIE's new plant tracker", 03-05-10.
- 187 Platts Power in Europe, "PIE's new plant tracker", 03-05-10.
- 188 E.ON UK website, Generation, Planning for the future, "Drakelow CCGT", no date, <http://www.eon-uk.com/generation/1781.aspx> (16-07-10); Platts Power in Europe, "PIE's new plant tracker", 03-05-10; R. Mason, "SSE and E.ON delay gas plants on low demand", The Telegraph, 19-05-10, <http://www.telegraph.co.uk/finance/newsbysector/energy/oilandgas/7741675/SSE-and-E.ON-delay-gas-plants-on-low-demand.html> (16-07-10); Exchange rate 1 January 2010 1 GBP =1.1271 EUR. (<http://www.exchangerates.org.uk/GBP-EUR-exchange-rate-history.html>)
- 189 Platts Power in Europe, "PIE's new plant tracker", 03-05-10; E.ON has a 50% share of the 1,200 MW project.
- 190 Platts Power in Europe, "PIE's new plant tracker", 03-05-10.
- 191 OKG website, Press Release, "Press Release: Government approval for power uprate at Oskarshamn 2 ", 29-04-10, http://www.okg.se/templates/NewsPage_1013.aspx (16-07-10); OKG website, Press Release, "Press Release: Last Stage of Oskarshamn 2 Modernization To Be Postponed", 02-07-10, http://www.okg.se/templates/NewsPage_1036.aspx (16-07-10).
- 192 E.ON Nordic website, Press Release, "E.ON får bygga ett nytt kärnkraftverk i Finland", 01-07-10, <http://www.eon.se/templates/Eon2PressPage.aspx?id=70204&epslanguage=SV> (16-07-10); E.ON owns 34% of the project, which will have a total capacity of 1,800 MW.
- 193 Horizon Nuclear Power is a 50/50 joint venture between E.ON UK and RWE npower. It plans to build new nuclear power stations in Wylfa and Oldbury. The total programme is likely to involve more than £15bn of investment. The company anticipates that a possible new nuclear power station at Oldbury could comprise of either two 1,650 MW Areva EPR reactors or up to three 1,100 MW Westinghouse AP1000 reactors; Exchange rate 1 January 2010 1 GBP =1.1271 EUR. (<http://www.exchangerates.org.uk/GBP-EUR-exchange-rate-history.html>); Horizon Nuclear Power, <http://www.horizonnuclearpower.com/faq_wylfa.php> (14 July 2010); Horizon Nuclear Power, press release "Horizon Nuclear Power on track to deliver first generation by 2020", 30 March 2010, http://www.horizonnuclearpower.com/downloads/Horizon_Nuclear_Power_announces_development_programme.pdf> (14 July 2010)
- 194 Horizon Nuclear Power is a 50/50 joint venture between E.ON UK and RWE npower. It plans to build new nuclear power stations in Wylfa and Oldbury. The total programme is likely to involve more than £15bn of investment. The company anticipates that a possible new nuclear power station at Oldbury could comprise of either two 1,650 MW Areva EPR reactors or up to three 1,100 MW Westinghouse AP1000 reactors; Exchange rate 1 January 2010 1 GBP =1.1271 EUR. (<http://www.exchangerates.org.uk/GBP-EUR-exchange-rate-history.html>); Horizon Nuclear Power, <http://www.horizonnuclearpower.com/faq_oldbury.php> (14 July 2010);

- Horizon Nuclear Power, press release "Horizon Nuclear Power on track to deliver first generation by 2020", 30 March 2010, http://www.horizonnuclearpower.com/downloads/Horizon_Nuclear_Power_announces_development_programm_e.pdf> (14 July 2010)
- ¹⁹⁵ E.ON UK website, Press Releases, "E.ON submits planning application for one of the UK's largest biomass-fired power plants ", 28-08-09, <http://pressreleases.eon-uk.com/blogs/eonukpressreleases/archive/2009/08/28/1436.aspx> (16-07-10); Platts Power in Europe, "PIE's new plant tracker", 03-05-10; Exchange rate 1 January 2010 1 GBP =1.1271 EUR. (<http://www.exchangerates.org.uk/GBP-EUR-exchange-rate-history.html>)
- ¹⁹⁶ Platts Power in Europe, "PIE's new plant tracker", 03-05-10.
- ¹⁹⁷ E.ON UK website, Press Releases, "E.ON delighted by Orkney wave power win", 16-03-10, <http://pressreleases.eon-uk.com/blogs/eonukpressreleases/archive/2010/03/16/1505.aspx> (16-07-10).
- ¹⁹⁸ E.ON UK website, Press Releases, "E.ON's Humber Gateway offshore wind farm moves one step closer ", 29-10-09, <http://pressreleases.eon-uk.com/blogs/eonukpressreleases/archive/2009/10/29/1458.aspx> (16-07-10); Exchange rate 1 January 2010 1 GBP =1.1271 EUR. (<http://www.exchangerates.org.uk/GBP-EUR-exchange-rate-history.html>)
- ¹⁹⁹ E.ON UK website, Press Releases, "E.ON submits scoping statement for proposed new Lancashire-Cumbria borders wind farm", 04-11-09, <http://pressreleases.eon-uk.com/blogs/eonukpressreleases/archive/2009/11/04/1461.aspx> (16-07-10).
- ²⁰⁰ E.ON UK website, Press Releases, "E.ON welcomes award of South Coast Round 3 offshore wind farm zone ", 08-01-10, <http://pressreleases.eon-uk.com/blogs/eonukpressreleases/archive/2010/01/08/1481.aspx> (16-07-10).
- ²⁰¹ E.ON CR Report, 2009, p.3.
- ²⁰² E.ON Responsible Procurement Policy, 20-03-07, http://www.eon.com/en/downloads/1107_EON_Procurement_Policy.pdf (16-07-10).
- ²⁰³ E.ON website, Responsibility, Performance Report 2009, " Responsible Procurement", no date, <http://www.eon.com/en/responsibility/29272.jsp> (16-07-10).
- ²⁰⁴ E.ON website, Responsibility, Performance Report 2009, " Responsibility in the Supply Chain", no date, <http://www.eon.com/en/responsibility/29274.jsp> (16-07-10).
- ²⁰⁵ E.ON website, Responsibility, Performance Report 2009, " Responsible Procurement", no date, <http://www.eon.com/en/responsibility/29272.jsp> (16-07-10).
- ²⁰⁶ E.ON Financial Report 2009, Part II/II, http://www.eon.com/en/downloads/EON_Financial_Report_2009_.pdf (10-08-10), p.14.

4 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.²⁰⁷ The main shareholder of GDF Suez is the French government, with 35.9% of the shares as of 31 December 2009.²⁰⁸ 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.²⁰⁹

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.²¹⁰ 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.²¹¹ 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 7 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 7 and 8 and table 12 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 7: Fuel mix of GDF Suez's installed capacity in Europe, end of 2008²¹²

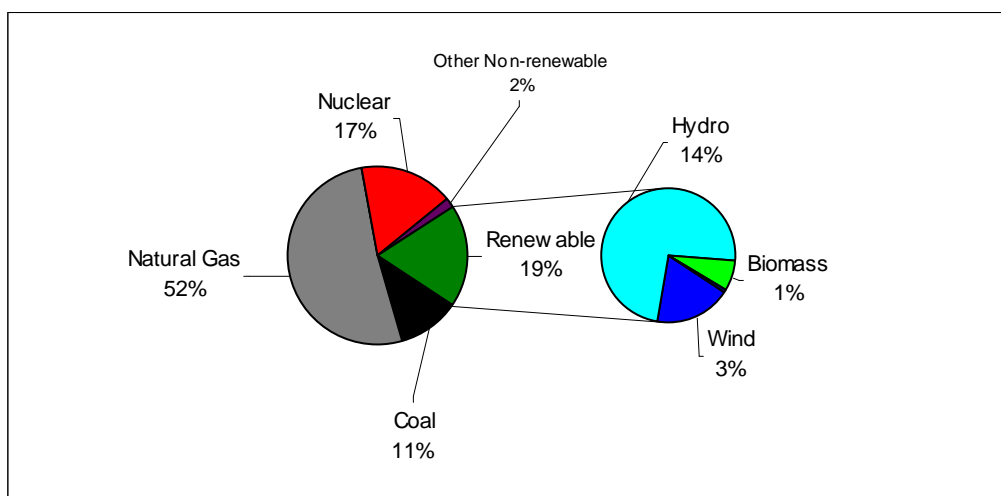


Figure 8 reveals the fuel mix of GDF Suez's electricity generation worldwide in 2009.

Figure 8: Fuel mix of GDF Suez's electricity generation worldwide in 2009²¹³

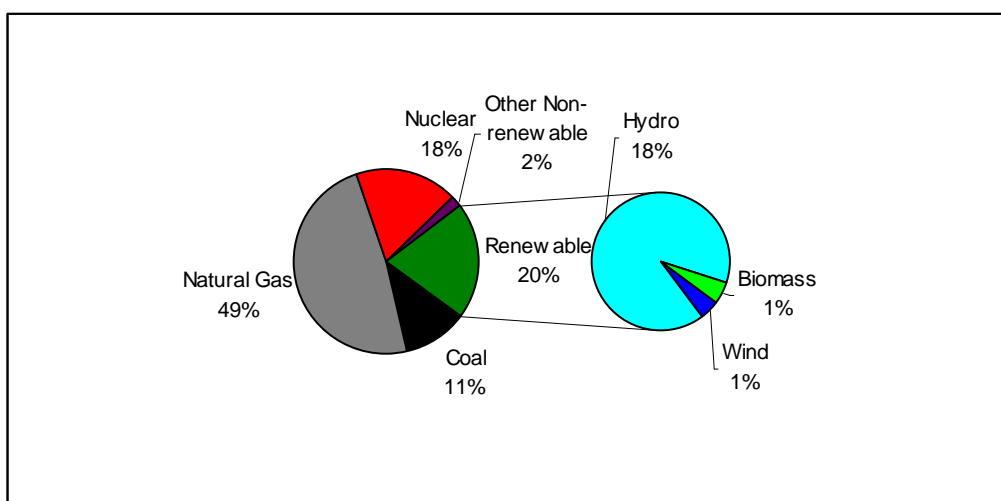


Table 12 shows the absolute figures of the installed capacity of GDF Suez in Europe at the end of 2008 and its worldwide capacity and actual generation in 2009.

Table 12: 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) ²¹⁴	Worldwide capacity as of 31 December 2009 (MW) ²¹⁵	Worldwide generation in 2009 (GWh) ²¹⁶
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
Total	37,834	60,500	253,100

Investments in new generation capacity in Europe

Table 13 indicates the projects GDF Suez is currently developing in Europe.

In addition to the investments explained in the tables 13 and 14, 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.²¹⁷ 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.²¹⁸ 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.²¹⁹ This transformation involves an investment of €125 million.²²⁰ The new plant will be in operation in 2011.²²¹

Table 13: 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	736 ²²²	under construction ²²³
Power Plant Wilhelmshaven	Wilhelmshaven (DE)	coal	2012	568 ²²⁴	422 ²²⁵	under construction
Flevo	Lelystad (NL)	gas (CCGT)	2010	n/a	870 ²²⁶	under construction
SPEM	Montoir de Bretagne (FR)	gas (CCGT)	2010	n/a	435 ²²⁷	already built
CombiGolfe	Fos-sur-Mer (FR)	gas (CCGT)	mid 2010	270	424 ²²⁸	already built
Degussa	Antwerp (BE)	gas-fired CHP	mid 2010	21	22	under construction ²²⁹
Heron II	Viotia (GR)	gas (CCGT)	2010	n/a	225	under construction ²³⁰
Repowering Dunamenti	Szazhalombatta (HU)	gas (CCGT)	2011	149 ²³¹	138 ²³²	under construction
Acquired by Nuon	Almere (NL) ²³³	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 ²³⁴
Doel 1, upgrade capacity	Doel 1, Belgium	nuclear	n/a	n/a	40.5	under construction ²³⁵
France, Italy and Belgium	France, Italy and Belgium	biomass & biogas	n/a	n/a	23	under construction ²³⁶
Several projects	France	wind	2010/2011	n/a	273 ²³⁷	under construction
Generg wind farms	Portugal (PT)	wind	n/a	n/a	102	under development ²³⁸

Wind parks	Belgium	wind	n/a	n/a	24	under construction 239
Scotia Wind Craigenfelt	South-west of Stirling, Scotland (UK)	wind	2010	n/a	20	under construction 240
Wind farm	Jarogniew – Moltowo (Poland)	wind	early 2011 ²⁴¹	n/a	20	under construction 242
AceaElectrabel Produzione Group (AEP)	Italy	wind	n/a	n/a	35	under construction 243
Other renewables	Italy	other renewables	n/a	n/a	9	under construction 244
Curbars	Alpes de Haute Provence (France)	solar	August 2011	n/a	33	under construction 245
More solar projects	France	solar	n/a	n/a	11 ²⁴⁶	construction permits obtained
Generg Photovoltaic solar	Portugal	solar	n/a	n/a	5	under construction 247

Table 14 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 2010.²⁴⁸

Table 14: 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 ²⁴⁹
Unit at Vado Ligure	Vado Ligure (IT)	coal	n/a	n/a	161	awaiting permission ²⁵⁰
Power plant	Police near Szczecin (PO)	coal	n/a	2,147	1,432	concept design ²⁵¹
Power plant	Lublin (PO)	coal (biomass co-fired)	n/a	536	358	concept design ²⁵²
Power Plant Romania	Constanta (RO)	coal and biomass	n/a	2,400	1,600	suspended indefinitely ²⁵³
Power station	Polaniec (south-east Poland)	biomass	end of 2012	240 ²⁵⁴	190	building contract signed ²⁵⁵
Power plant	Polaniec (south-east Poland)	gas	n/a	666	833	concept design ²⁵⁶
Electrabel Polaniec S.A.	Near Wloclawek (PO)	gas	n/a	500-720	900	construction start within two years ²⁵⁷
GDF Suez	Borzesti,	gas	n/a	400	400	feasibility study

Energy Romania and Termoelectrica	Bacau county, (RO)					finalised ²⁵⁸
Morata de Tajuña	Morata de Tajuña (ES)	gas (CCGT)	n/a	500	1,200	halted by supreme court ²⁵⁹
CombiGolfe, second 400 MW tranche	Fos-sur-Mer (FR)	gas (CCGT)	n/a	n/a	400 ²⁶⁰	engineering study underway
Ploufragan	Brittany (FR)	gas	n/a	n/a	200	administrative approvals pending ²⁶¹
AceaElectrabel Produzione	Pontinia (Italy)	gas (CCGT)	n/a	n/a	162	waiting for permission ²⁶²
Horizon Energy/AceaElectrabel	Molise (Italy)	gas (CCGT)	n/a	n/a	81	waiting for permission ²⁶³
gas fired plant	Schwandorf (DE)	gas (CCGT)	n/a	n/a	800	project stopped ²⁶⁴
One or two gas fired plants	Calbe and Stassfurt in Saxony-Anhalt state (DE)	gas (CCGT)	n/a	n/a	800	feasibility study ²⁶⁵
Second EPR reactor (25% stake)	Penly site, Normandy (FR)	nuclear	2017	n/a	412 ²⁶⁶	public debate set up in 2010
Third EPR reactor	Rhone Valley (FR)	nuclear	n/a	n/a	1,100	candidate ²⁶⁷
One or more nuclear reactors, together with Iberdrola and SSE	United Kingdom	nuclear	2020-2025 ²⁶⁸	n/a	1,350 ²⁶⁹	pre-development stage ²⁷⁰
Renewal concessions by government, total 5,300 MW	France	hydro	2015	n/a	1,600	operatorships expected to be awarded between 2013 and 2015 ²⁷¹
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 ²⁷²
Compagnie du Vent and Shell WindEnergy, Libron	Offshore, France	wind	2014	71	29	pre-development stage ²⁷³
Compagnie du Vent, several small projects in France	Onshore, France	wind	2011/2013	396	281	pre-development stage ²⁷⁴
Blue4Power I, zone I and II	North Sea (BE)	wind	2012	n/a	n/a	early 2010: request concession

						granting rejected ²⁷⁵
Winds mills next to highway E40	Belgium	wind	2011	70	40	construction permits obtained ²⁷⁶
Four wind turbines along a canal	Zomergem (Belgium)	wind	n/a	n/a	12	environmental permit requested ²⁷⁷
Wind farm Poland	North of Poland (PO)	wind	n/a	n/a	n/a	several projects in development ²⁷⁸
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 ²⁷⁹
Tirreno Power photovoltaic Italy	Campania a Sessa Aurunca (It)	solar	n/a	n/a	6.9	preliminary plan completed ²⁸⁰
Solar projects ground-level	France	solar	n/a	n/a	206 ²⁸¹	in study

Responsible sourcing

In its Activities and Sustainable Development report 2009, GDF Suez makes no reference to supply chain responsibility.²⁸² The company does have an Ethics charter, which includes requirements for suppliers. Among other adherence to the OECD Guidelines for Multinational enterprises is required.²⁸³

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.²⁸⁴ It was the first time Synatom invested in mining projects. The projects are at the stage of preparation.²⁸⁵

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.²⁸⁶

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.²⁸⁷ GDF Suez has its own certification scheme for biomass. The minimum criteria used focus on: energy balance or CO₂ 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.²⁸⁸

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5 Iberdrola

Basic company information

Iberdrola is the number one energy company in Spain and the world's top wind power producer.²⁸⁹ Its revenue in 2009 was €24.6 billion, of which 41% was generated in Spain and 31% in the United Kingdom (the company acquired ScottishPower in 2007). The revenue generated in Europe amounted to 73.4% of the total revenue in 2009, the remainder being achieved in the USA and South America.²⁹⁰

Iberdrola's main activity comprises the generation, distribution and marketing of electricity. To a lesser extent, the company also distributes gas. Iberdrola Renovables, an 80%-owned subsidiary of Iberdrola, conducts the wind power business of the company. Iberdrola Ingeniería y Construcción is one of the leading energy engineering companies in the world in the areas of generation, networks, and renewable and nuclear energy. Most of its portfolio comprises projects for clients outside of the Iberdrola group.²⁹¹

Iberdrola has made use of the opportunity to review the fact sheet and answer to the questionnaire sent by SOMO.

Installed capacity and electricity generation in Europe

Figure 9 reveals the fuel mix of Iberdrola's electricity generation capacity in Europe for the year 2009. The installed capacity in Europe amounted to 33.6 GW, of which 77% in Spain and 20% in the United Kingdom.²⁹² Its capacity in the USA and Latin America comprised 10.1 GW at the end of 2009, putting its worldwide capacity at 43.7 GW at the end of 2009.

Figure 9: Fuel mix of Iberdrola's installed electricity generation capacity in Europe, 2009

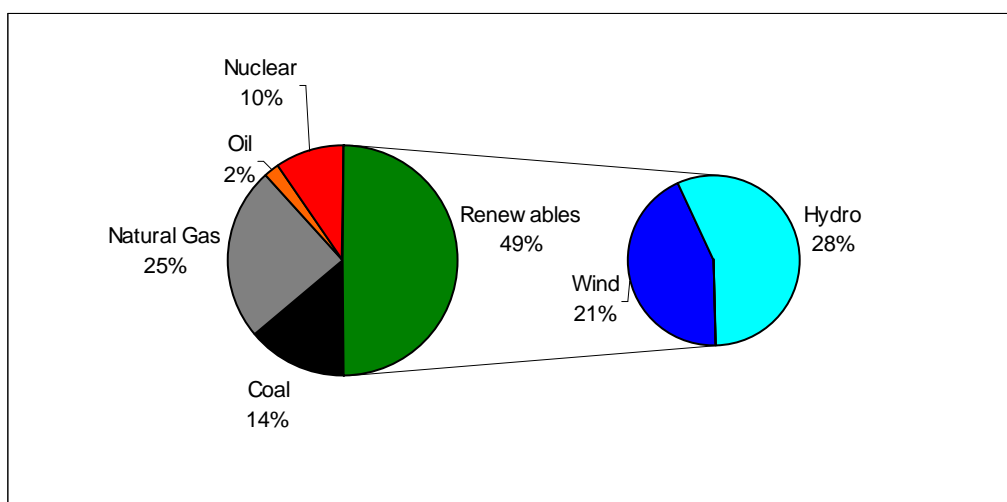


Table 15 shows the absolute figures for Iberdrola's installed capacity per region and per fuel type.

Table 15: Iberdrola's installed capacity (MW) in Europe per fuel type, 2009²⁹³

Fuel type	Spain	United Kingdom	Other	Europe
Coal	1,253	3,436	0	4,689
Gas (CCGT and co-generation)	6,274	2,017	0	8,291
Oil	710	0	0	710
Nuclear	3,344	0	0	3,344
Hydro	8,847	563	0	9,410
Other renewables	5,276	802	1,083	7,161
Total	25,704	6,818	1,083	33,605

Figure 10 shows the fuel mix for electricity actually generated in Europe by Iberdrola in 2009. The company's generated electricity in Europe amounted to 93.4 TWh in 2009, of which 70% in Spain and 28% in the United Kingdom. Electricity production from renewable sources comprised 26% of Iberdrola's generated electricity in Europe.²⁹⁴

Figure 10: Fuel mix of Iberdrola's electricity generation in Europe, 2009

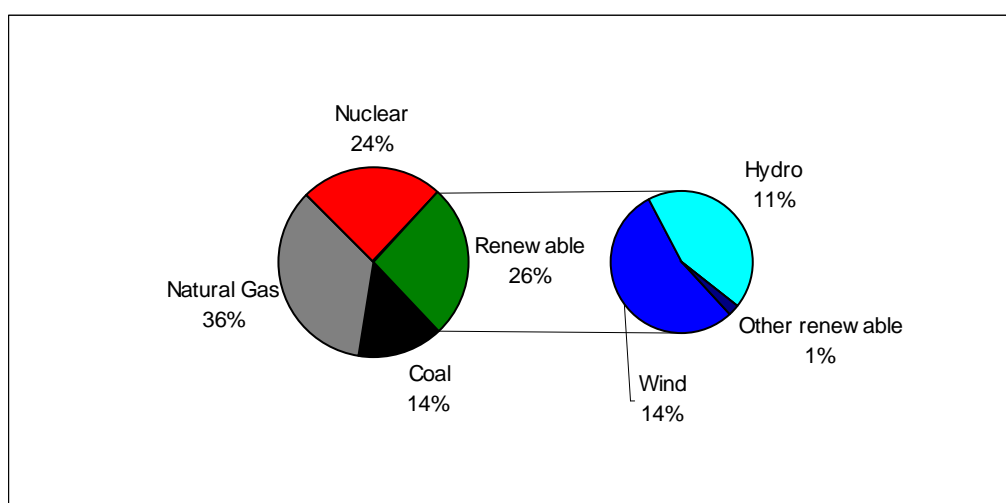


Table 16 shows the absolute figures for Iberdrola's generated electricity per region and per fuel type. In the USA and Latin America Iberdrola generated 49.400 GWh of electricity in 2009, putting worldwide generation at 142,800 GWh.

Table 16: Iberdrola's generated electricity (GWh) per region and per fuel type, 2009²⁹⁵

Fuel type	Spain	United Kingdom	Other	Europe
Coal	2,059	11,178	0	13,237
Gas (CCGT and co-generation)	20,552	12,444	0	32,996
Oil	34	0	0	34
Nuclear	22,830	0	0	22,830
Hydro	9,633	878	0	10,511
Wind ²⁹⁶	9,628	1,764	1,787	13,179
Other renewables	580 ²⁹⁷	0	0	580
Total	65,316	26,264	1,787	93,367

Announced investments in new generation capacity in Europe

Iberdrola projects investments of €18 billion in the period 2010-2012. The United States will receive 39% of the total, the United Kingdom 25%, Spain 24% and Latin America and other areas 12%. Investments in renewable energy (fundamentally wind power) will comprise €9 billion, of which €6.3 billion is for improving and expanding networks and €2.7 billion is for electricity generation and energy distribution.²⁹⁸

Table 17 indicates the projects Iberdrola is currently developing in Europe. The table is slightly incomplete, as the total capacity of wind power projects under construction by Iberdrola in Spain and the United Kingdom as of 31 December 2009 could not be traced.

Table 17: Iberdrola's announced investments in new European production capacity

Project name	Location	Fuel type	Date in operation	Amount (million €)	Output Capacity (MW)	Project status
Reactors 3 + 4	Cernavoda, Romania	nuclear	Unit 3: 2016 Unit 4: n/a	248	89	under construction ²⁹⁹
La Muela II	Spain	hydro	2012	350 ³⁰⁰	850	under construction ³⁰¹
San Esteban II	Spain	hydro	2012	n/a	175	under construction ³⁰²
San Pedro II	Spain	hydro	2012	n/a	24	under construction ³⁰³
Mihai Viteazu wind farm.	region of Dobruja, Romania	wind	2011	n/a	64	under construction ³⁰⁴
Three wind farms	Hungary and Poland	wind	2010	n/a	59	under construction ³⁰⁵
Lüganuse wind farm	120 km east of Tallinn, close to the Baltic Sea, Estonia	wind	n/a	n/a	78	under construction ³⁰⁶
five wind farms	France	wind	2010	n/a	37	under construction ³⁰⁷
Arecleoch windfarm	near Barrhill in South Ayrshire, Scotland, UK	wind	n/a	n/a	96	under construction ³⁰⁸

Table 18 lists Iberdrola's investments that are either still awaiting permission or have merely been announced as plans. Iberdrola has not verified this table. The company responded: "Due to changes in regulatory systems IBERDROLA is reconsidering some of its investments; accordingly, at this moment we can not supply the information you are requesting."³⁰⁹

In addition to the investments explained in table 4, ScottishPower plans to replace its coal-fired 1,200 MW plant in Cnockenzie (Scotland) by a CCGT-plant.³¹⁰ The total capacity of the power plant will remain unchanged. For this reason this investment is not included in the table below.

Table 18: Iberdrola's announced plans for investment in new capacity in Europe

Project name	Location	Fuel type	Date in operation	Amount (€)	Output Capacity (MW)	Project status
ScottishPower	Damhead Creek 2, Scotland	gas (CCGT)	n/a	n/a	1,000	applied to government for consent to project ³¹¹
Iberdrola	Portugal	gas (CCGT)	n/a	n/a	n/a	license granted, but project delayed ³¹²
One or two new units of Kozloduy plant	Kozloduy, Bulgaria	nuclear	n/a	n/a	n/a	feasibility study ready, project suspended ³¹³
1 or 2 reactors, together with GDF Suez and SSE	Sellafield, England, UK	nuclear	2020-2025 ³¹⁴	n/a	1,350 ³¹⁵	pre-development stage ³¹⁶
Alto Tâmega	Portugal	hydro	2018	1,700	1,200	in development ³¹⁷
wave and tidal power projects	Pentland Firth, Scotland, UK	wave/ tidal power	from 2015 onwards	n/a	116	to be developed ³¹⁸
first project East Anglia offshore windfarm zone	14km off the coast of Norfolk and Suffolk, England, UK	wind	n/a	n/a	480	construction expected to commence in 2015 ³¹⁹
other projects East Anglia offshore windfarm zone	14km off the coast Norfolk/Suffolk, England, UK	wind	n/a	n/a	2,400	construction expected to commence after 2015 ³²⁰
West of Duddon Sands	East Irish Sea, England, UK	wind	n/a	n/a	132	construction expected to commence in 2012 ³²¹
Argyll Array	west of Argyll and the island of Tiree, Scotland, UK	wind	2018 or later	n/a	920	application for permits in 2012 ³²²
extensions at Whitelee Windfarm	onshore, near Glasgow, Scotland, UK	wind	2012	n/a	217	construction starts 2010 ³²³
Harestanes windfarm	near Moffat and Ae, Scotland, UK	wind	n/a	n/a	216	permission received for most of the project ³²⁴
Dobruja project, 50 wind farms	Dobruja (Dobrogea) region,	wind	2011-2017	2,080	1,200	in study. ³²⁵

	Romania					
Ventotec Ost 2 wind farm	German zone of the Baltic Sea (DE)	wind	2014	n/a	320	to be developed ³²⁶
El Andevelo	southern Huelva province, Spain	wind	2010	256	195	acquisition ³²⁷
Several projects	Spain	wind	2011 onwards	n/a	992	pre-registry for government support ³²⁸
Several projects	Spain	solar	2013	n/a	50	pre-registry for government support ³²⁹

Responsible sourcing

Iberdrola has a range of CSR-policies³³⁰ and a code of conduct that also functions as its code of ethics.³³¹ The company produces a sustainability report annually and has committed itself to the United Nations' Global Compact and the OECD guidelines for multinational enterprises.

The company lists the promotion of corporate social responsibility measures within the supply chain as one of its objectives. It includes environmental and human rights commitment clauses in supplier contracts. It also makes known the percentage of suppliers with certified quality management systems (83%), certified environmental management systems (52%), and risk prevention systems (33%).³³² In 2009, 464 notices were sent to suppliers urging them to seek certification in the following areas: quality area 70 notices; environmental area 151 notices; occupational risk prevention area 243 notices. The suppliers all responded that they are at the stage of implementing or securing certification or have already obtained certification.³³³

The company has no specific code of conduct for suppliers but incorporates social responsibility clauses under the purchase conditions.³³⁴ However, these purchase conditions do not apply to raw materials, as Iberdrola acquires raw materials through special contracts with their suppliers. Iberdrola states it is progressively adding terms of social responsibility in these contracts. Today, the company does not systematically monitor compliance with those clauses; they are applied if the breach is detected by other ways.³³⁵

In its Sustainability Report 2009 Iberdrola declares it has used 5.4 million tonnes of coal in 2009 and as little as 0.08 million tonnes of biomass and weight-derived fuels.³³⁶ The company does not publicly report about the suppliers and origin of the coal (country/mine level) and problems with environment, human rights and labour rights during mining. This also applies to its procurement of uranium and biomass. The company also doesn't report where it plans to source raw materials in the future. Iberdrola explained as follows why these figures are not reported: 'The information about sustainability reporting that Iberdrola collects is based primarily on recommendations from the Global Reporting Initiative, and consequently, the information you have requested is not available at the group level.'³³⁷

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- 290 Iberdrola, “Consolidated Financial Statements 2009”, February 2010, p. 70,
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- 292 Iberdrola, brochure “Results 2009”, http://www.iberdrola.es/webibd/qc/prod/en/doc/folleto_09.pdf> (13 August 2010)
 It is assumed that Iberdrola’s category “Rest of the world” (anything except for Spain, UK, USA and Latin America) comprises European capacity and generation only. The category “Other (Europe)” in the table therefore comprises Iberdrola’s category “Rest of the world”.
- 293 Iberdrola, brochure “Results 2009”, http://www.iberdrola.es/webibd/qc/prod/en/doc/folleto_09.pdf> (13 August 2010)
 It is assumed that Iberdrola’s category “Rest of the world” (anything except for Spain, UK, USA and Latin America) comprises European capacity and generation only. The category “Other (Europe)” in the table therefore comprises Iberdrola’s category “Rest of the world”.
- 294 Iberdrola, brochure “Results 2009”, http://www.iberdrola.es/webibd/qc/prod/en/doc/folleto_09.pdf> (13 August 2010)
 It is assumed that Iberdrola’s category “Rest of the world” (anything except for Spain, UK, USA and Latin America) comprises European capacity and generation only. The category “Other (Europe)” in the table therefore comprises Iberdrola’s category “Rest of the world”.
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 It is assumed that Iberdrola’s category “Rest of the world” (anything except for Spain, UK, USA and Latin America) comprises European capacity and generation only. The category “Other (Europe)” in the table therefore comprises Iberdrola’s category “Rest of the world”.
- 296 Iberdrola Renovables, “Consolidated Accounts 2009”, p. 110,
http://www.iberdrolainforme2008.com/UK/media/pdf/cuentas_consolidadas_2009_en.pdf> (9 July 2010)
- 297 The other renewable energy generated in Spain comprised 560 GWh by mini-hydroelectric plants and 21 GWh by other technologies. Source: Iberdrola Renovables, “Consolidated Accounts 2009”, p. 110,
http://www.iberdrolainforme2008.com/UK/media/pdf/cuentas_consolidadas_2009_en.pdf> (9 July 2010)
- 298 Iberdrola, press release “Iberdrola projects investments of €18 billion between 2010 and 2012 to cement foundations for growth”, 24 February 2010,
http://www.iberdrola.es/webibd/corporativa/iberdrola?IDPAG=ENMODULOPRENSA&URLPAG=/qc/prod/en/co municacion/notasprensa/100324_NP_01_RuedaPrensaJGA10.html> (9 July 2010)
- 299 Total capacity 1,440 MW. As of 31 December 2009 Iberdrola still has a 6.2% 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 ErgoNuclear, 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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- 301 Iberdrola, “Investor day, Spanish liberalised business”, 24 February 2010,
http://www.iberdrola.es/webibd/qc/prod/en/doc/DialInversor1S10_3.pdf> (9 July 2010)
- 302 Iberdrola, “Investor day, Spanish liberalised business”, 24 February 2010,
http://www.iberdrola.es/webibd/qc/prod/en/doc/DialInversor1S10_3.pdf> (9 July 2010)
- 303 Iberdrola, “Investor day, Spanish liberalised business”, 24 February 2010,
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- 304 Iberdrola has a 80% stake in Iberdrola Renovables. Total capacity 80 MW.
 Iberdrola Renovables is implementing all its projects in Romania with the company Eolica Dobrogea (owned by the Swiss engineering group NEK and the Romanian companies C-Tech and Rokura). ScottishPower, press release “Iberdrola Renovables Acquires the Rights to Develop 1,500 Megawatts of Wind Power in Romania”, 19 April 2010, http://www.scottishpower.com/PressReleases_2027.htm> (21 June 2010)
- 305 In 2010 the EBRD has acquired a 25 per cent stake in Renovables Polska Sp. z.o.o. (IBR Polska) and Iberdrola Renovables Magyarorszag Kft (IBR Magyar). Iberdrola has a 80% stake in the remaining 75%. Total capacity of the investments is 98MW.

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- ³⁰⁶ Total capacity 150 MW. Iberdrola Renewables has a 65% stake, EBRD 25%, and OU Adepto, a local developer, 10%. Iberdrola has a 80% stake in Iberdrola Renovables. European Bank for Reconstruction and Development (EBRD), "Constructing a windfarm in Estonia", 19 April 2010, <http://www.ebrd.org/pages/project/case/estonia_windfarm.shtml> (9 July 2010)
- Iberdrola has an 80% stake in Iberdrola Renovables. Total capacity 150 MW. ScottishPower, press release "Iberdrola Renovables Acquires the Rights to Develop 1,500 Megawatts of Wind Power in Romania", 19 April 2010, <http://www.scottishpower.com/PressReleases_2027.htm> (21 June 2010)
- ³⁰⁷ Iberdrola has an 80% stake in Iberdrola Renovables, total capacity 46 MW. Specifically, Iberdrola Renovables has completed the 8 MW Nurlu wind farm in the region of Picardie, the 12 MW Grande Place, the 10 MW Pleugriffet plants in Brittany, the 10 MW Traves plant in Poitou-Charentes and the 6 MW Montloubay II wind farm. Targeted News Service, "Iberdrola Renovables Starts Up Five Wind Farms In France", 21 January 2010.
- ³⁰⁸ Iberdrola has an 80% stake in Iberdrola Renovables, total capacity 120 MW. Iberdrola, "Iberdrola Renovables UK-based subsidiary starts work on Arecleoch - one of the largest windfarms in Scotland", 18 September 2009, <http://www.iberdrola.es/webibd/corporativa/iberdrola?IDPAG=ENMODULOPRENSA&URLPAG=gc/prod/en/co municacion/notasprensa/090918 NP_02 IR_Arecleoh.html> (9 July 2010)
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ScottishPower, <<http://www.cockenziepowerstation.com/>> (9 July 2010)
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- ³¹² Platts Power in Europe, "Recession prompts CCGT slowdown", 19 April 2010.
- ³¹³ The capacities of the new reactors could vary between 700 and 1,500 MW. Iberdrola has expressed interest in being included as an investor and has prepared a feasibility study. Energetika.net, "Kozloduy NPP positive for more reactors", 23 February 2010, <<http://www.energetika.net/eu/novice/energy-policy/kozloduy-npp-positive-for-more-reactors>> (7 July 2010)
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Dnevnik, "Bulgaria: Iberdrola undertakes study for new reactor at Kozloduy NPP", 15 February 2010.
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- ³¹⁶ In October 2009, a consortium of GDF SUEZ SA, Iberdrola SA and Scottish and Southern Energy Plc ("SSE") has secured an option to purchase land for the development of a new nuclear power station at Sellafeld on the Cumbrian Coast from the Nuclear Decommissioning Authority ("NDA"). Project is currently in pre-development stage. GDF Suez Reference Document 2009, April 2010, p. 39, <<http://www.gdfsuez.com/en/finance/investors/publications/publications/>> (17 June 2010)
- ³¹⁷ Iberdrola website, <http://www.iberdrola.es/webibd/gc/prod/en/comunicacion/img/ge_hi_infografia1.pdf> (9 July 2010)
- Iberdrola website, press release "Iberdrola to collaborate with five Portuguese universities on the Alto Tâmega project", 4 June 2009, <http://www.iberdrola.es/webibd/corporativa/iberdrola?IDPAG=ENMODULOPRENSA&URLPAG=gc/prod/en/co municacion/notasprensa/090604 NP_universidadesTamega.html> (9 July 2010)
- ³¹⁸ The company will develop a 50 MW wave power project at Marwick Head, and a 95 MW tidal power project at Ness of Duncansby. Iberdrola has an 80% stake in Iberdrola Renovables. ScottishPower, press release "ScottishPower Renewables Purchase Pelamis Wave Power Device", 29 March 2010, <http://www.scottishpower.com/PressReleases_2021.htm> (21 June 2010)
- ³¹⁹ ScottishPower Renewables (50%) and Iberdrola (50%) are the developers of the East Anglia Array offshore windfarm zone. Iberdrola has a 80% stake in Iberdrola Renovables, which has a 100% stake in ScottishPower Renewables. 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 Iberdrola Award Gardline Hydro Multi Million Pound Contract", 17 June 2010, <http://www.scottishpower.com/PressReleases_2038.htm> (21 June 2010)
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- ³²⁰ ScottishPower Renewables (50%) and Iberdrola (50%) are the developers of the East Anglia Array offshore windfarm zone. Iberdrola has a 80% stake in Iberdrola Renovables, which has a 100% stake in ScottishPower Renewables. 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 Iberdrola Award Gardline Hydro Multi Million Pound Contract”, 17 June 2010, <http://www.scottishpower.com/PressReleases_2038.htm> (21 June 2010)
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- 321 The West of Duddon Sands offshore Wind Farm will be located 13 km West of Isle of Walney in the East Irish Sea. Project partners are DONG Energy (33,3%), ScottishPower Renewables (33,3%) and Eurus (33,3%). Dong website, “UK Projects”, <http://www.dongenergy.co.uk/wind_energy/uk_projects/pages/uk_projects.aspx> (9 July 2010)
- Total capacity 500 MW; construction will begin in 2012. ENP Newswire, “Iberdrola Renovables will invest €9 billion to boost growth in 2010-2012”, 9 June 2010. Iberdrola has a 80% stake in Iberdrola Renovables, which has a 100% stake in ScottishPower Renewables.
- 322 Project website “Argyll Array”, <<http://www.argyllarray.com/about-fags.asp#Q59>> (9 July 2010) Total expected capacity 500 to 1,800 MW. Iberdrola has a 80% stake in Iberdrola Renovables, which has a 100% stake in ScottishPower Renewables.
- ScottishPower, press release “ScottishPower Renewables Awarded Offshore Wind Site – Argyll Array”, 16 February 2009, <http://www.scottishpower.com/PressReleases_1832.htm> (7 July 2010)
- 323 The completion of both extensions will see the wind farm hosting a total of 215 turbines, adding a further 75 turbines, increasing overall capacity up to 593 MW. Before extensions: 140 turbines, capable of producing up to 322 MW of electricity. Iberdrola has a 80% stake in Iberdrola Renovables, which has a 100% stake in ScottishPower Renewables.
- ScottishPower, press release “Europe’s Largest Onshore Windfarm Set To Grow Again - A Further 39 Turbines At Whitelee”, 11 December 2009, <http://www.scottishpower.com/PressReleases_1974.htm> (21 June 2010)
- NewEnergyFocus, “Minister opens £2 million visitor centre at Whitelee windfarm”, 22 September 2009, <http://www.newenergyfocus.com/do/ecco/view_item?listid=1&listcatid=131&listitemid=3021> (21 June 2010)
- 324 Consent for Harestanes windfarm was received in late 2007, with the permission to build a 213 MW, 71-turbine site. In 2010 ScottishPower Renewables proposed an extension of up to 19 turbines with a total site generating capacity of up to 57 megawatts (MW). Iberdrola has a 80% stake in Iberdrola Renovables, which has a 100% stake in ScottishPower Renewables. Website ScottishPower Renewables, “Harestanes Windfarm Extension”, <<http://www.harestaneswindfarmextension.com/>> (9 July 2010)
- 325 Iberdrola Renovables is implementing all its projects in Romania with the company Eolica Dobrogea (owned by the Swiss engineering group NEK and the Romanian companies C-Tech and Rokura). Eolica Dobrogea is in charge of engineering and development work. The work is contracted to Iberdrola Renovables, which will also construct and operate the wind farms. Construction is planned between 2011 and 2017. Total capacity 1,500 MW; Iberdrola has a 80% stake in Iberdrola Renovables. Total value of investment will be \$3.26bn by 2015. Exchange rate dollar/euro as of 01-07-2010 is 0.79880 (<http://www.exchange-rates.org/history.aspx?iso_code=EUR&base_iso_code=USD&mode=T>). This puts the total investment at €2.6 billion.
- Sources:
- Foreign Direct Investment (fDI), “Regions: Europe - Latest investments”, 1 August 2009.
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- Eolica Dobrogea (Schweiz) AG, press release 19 April 2010, <http://www.edch.ch/press/pdf/press_release_EDCH_19042010.pdf> (9 July 2010)
- 326 Iberdrola Renovables has bought 100% of the rights from a German joint venture comprising Deutsche Erneuerbare Energien GmbH (Deutsche Bank Group) and Ventotec GmbH (GHF-Group). The wind farm will consist of 80 wind turbines of 5 megawatts (MW) each. Iberdrola has a 80% stake in Iberdrola Renovables.
- ScottishPower, press release “Iberdrola Renovables Acquires Rights To Build The 400 MW Ventotec OST 2 Offshore Wind Farm In Germany”, 22 March 2010, <http://www.scottishpower.com/PressReleases_2020.htm> (21 June 2010)
- 327 Acquired from Gamesa Corp. El Andevalo, considered Spain’s largest wind farm complex, is made up of the 50 MW Majal Alto, the 40 MW El Centenaur, the 40 MW La Tallisca, the 38 MW La Retuerta, the 30 MW El Saucito, the 28 MW Valdefuentes and the 18 MW Las Cabezas units. The total capacity is 244 MW. The price of the transaction was €320 million. Iberdrola has a 80% stake in Iberdrola Renovables. Global Power Report, “Iberdrola Renovables”, 18 February 2010. Iberdrola Renovables, “Consolidated Accounts 2009”, p. 96, <http://www.iberdrolainforme2008.com/UK/media/pdf/cuentas_consolidadas_2009_en.pdf> (9 July 2010)
- 328 The Spanish government has set a system of stages for the start-up of wind farms. Iberdrola Renovables received a response to the applications for inclusion of projects in the pre-allocation register, with the following MW of wind power assigned to it for each of the three phases: 732 MW (may come on stream at any time); 264 MW (to be brought into service in 2011 or 2012); 244 MW (needs to come on stream in 2012). Total pre-registered capacity 1,240 MW. Iberdrola has a 80% stake in Iberdrola Renovables.
- Iberdrola Renovables, “Consolidated Accounts 2009”, p. 41, <http://www.iberdrolainforme2008.com/UK/media/pdf/cuentas_consolidadas_2009_en.pdf> (9 July 2010)
- 329 ADP News Renewable Energy Track, “Spain okays pre-registration of 9,050 MW renewable energy projects”, 17 December 2009.
- 330 Iberdrola, “Social Responsibility Policies”, <<http://www.iberdrola.es/webibd/corporativa/iberdrola?IDPAG=ENWEBACCOPOLRES>> (13 August 2010)

- ³³¹ Iberdrola, "code of professional conduct of the Iberdrola group", 20 October 2009, <<http://www.iberdrola.es/webibd/gc/prod/en/doc/codigoiberdrola.pdf>> (13 August 2010)
- ³³² Iberdrola, "Sustainability Report 2009", February 2010, p. 9 and 14, <http://www.iberdrola.es/webibd/gc/prod/en/doc/IA_InformeSostenibilidad09.pdf> (1 July 2010)
- ³³³ Iberdrola, "Sustainability Report 2009", February 2010, p. 9, 14, 120, <http://www.iberdrola.es/webibd/gc/prod/en/doc/IA_InformeSostenibilidad09.pdf> (1 July 2010)
- ³³⁴ Iberdrola, "Purchasing Conditions", <<http://www.iberdrola.es/webibd/corporativa/iberdrola?cambioldioma=ESWEBPROVEEBASCOND>> (13 August 2010)
- ³³⁵ E-mail by Juan Félix Oleaga Olabarria (Iberdrola, Dirección de Comunicación, Responsabilidad Social y Reputación) on 5 August 2010.
- ³³⁶ Iberdrola, "Sustainability Report 2009", February 2010, p. 72, <http://www.iberdrola.es/webibd/gc/prod/en/doc/IA_InformeSostenibilidad09.pdf> (1 July 2010)
- ³³⁷ E-mail by Juan Félix Oleaga Olabarria (Iberdrola, Dirección de Comunicación, Responsabilidad Social y Reputación) on 5 August 2010.

6 RWE

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.³³⁸

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.³³⁹

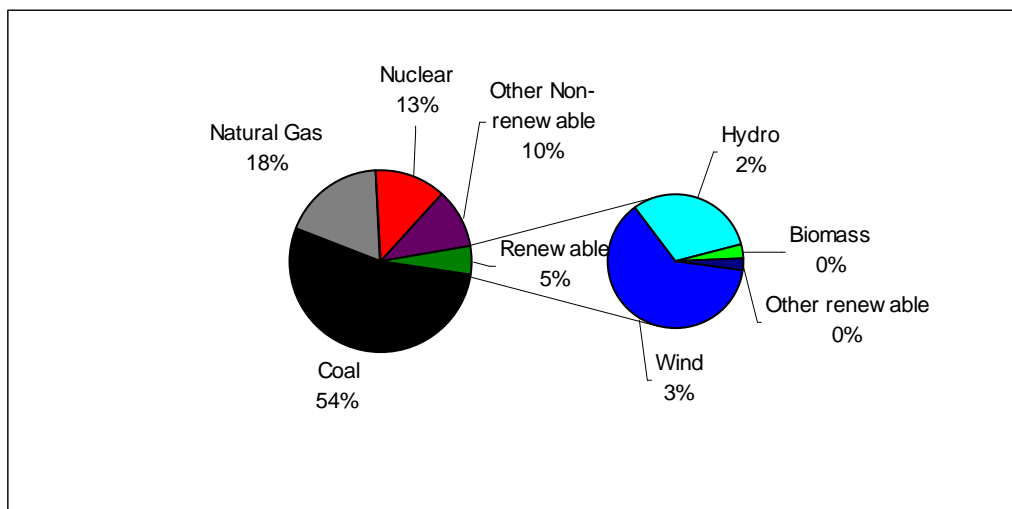
The RWE Group is streamlined according to functional and geographical companies:

- 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.³⁴⁰

Installed capacity for electricity generation in Europe

Figure 11 reveals the fuel mix of RWE's electricity generation capacity in Europe for the year 2009. The installed capacity was 49.6 GW.³⁴¹ 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.³⁴² 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 11: 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.³⁴³ Figure 12 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 12: Fuel mix of RWE's electricity generation in Europe, 2009

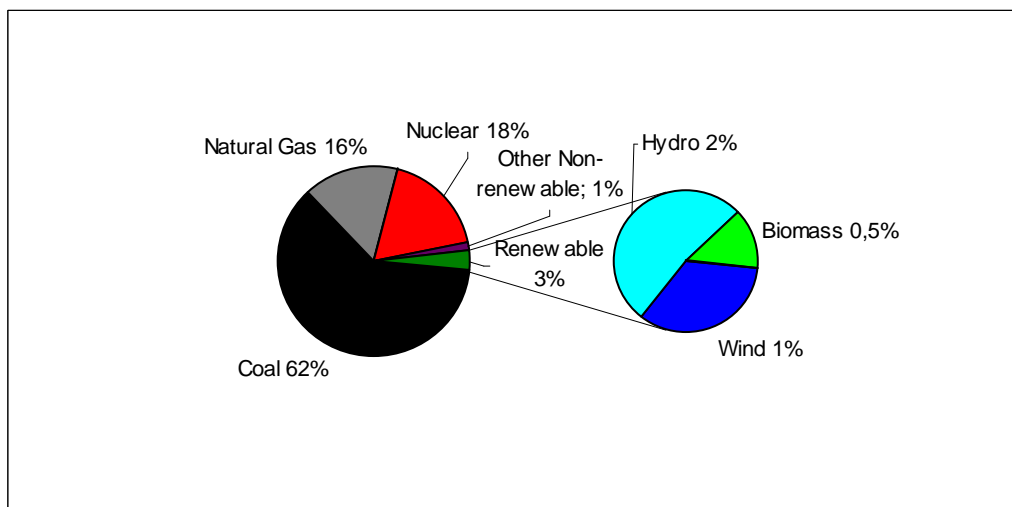


Table 19 gives the absolute figures of both the installed capacity and RWE's generated electricity.

Table 19: Fuel mix of RWE's electricity generated and installed capacity in Europe, 2009³⁴⁴

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	2,532 ³⁴⁵		6,500	
Wind	1,574 ³⁴⁶		2,200 ³⁴⁷	
Hydro	793		3,400	
Biomass	98 ³⁴⁸		900	
Other renewable	67		-	
Total	49,582		187,200	

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.³⁴⁹ Essent's onshore wind project at Westereems has gone into full operation in 2009, and has been included in the installed capacity section.³⁵⁰ Table 20 indicates the projects of the RWE group that are currently under construction in Europe.

Table 20: 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	2,200 ³⁵¹	1,560 ³⁵²	under construction
Hamm	Westfalen, Germany	coal	2012	1,550	930	under construction ³⁵³
Neurath	Grevenbroich, Germany	lignite	2011	2,500 ³⁵⁴	700 ³⁵⁵	under construction
GKM 9	Grosskraftwerk Mannheim, Germany	coal	2013	480 ³⁵⁶	364 ³⁵⁷	under construction
Moerdijk II	Moerdijk, Netherlands	gas (CCGT)	end of 2011	500 ³⁵⁸	430 ³⁵⁹	under construction
Claus unit C	Maasbracht, Netherlands	gas	2012	1,000 ³⁶⁰	1,275 ³⁶¹	under construction
CCGT power plant	Lingen, Emsland, Germany	gas (CCGT)	April 2010 ³⁶²	500 ³⁶³	876	under construction
4 new 58 MW units	Lingen, Emsland, Germany	gas	2011	200	122	under construction ³⁶⁴

Staythorpe power station	Nottinghamshire, England, UK	gas (CCGT)	late 2010	900	1,650	under construction 365
Pembroke power plant	Pembroke, Wales, UK	gas (CCGT)	2012	1,100	2,000	under construction 366
Denizli	Western Turkey.	gas (CCGT)	2012	350	542	under construction 367
Reactors 3 + 4	Cernavoda, Romania	nuclear	Unit 3: 2016 Unit 4: n/a	366	132	under construction 368
Selset	Scotland, UK	hydro	2010	2.8 ³⁶⁹	0.7	under construction 370
Black Rock	Nearby Evanton, Scotland, UK	hydro	2010	n/a	3.5	under construction 371
Ruivares	Ruivares, Portugal	hydro	2011	n/a	3.6	under construction 372
Siadar	Isle of Lewis, Scotland, UK	tidal scheme	n/a	n/a	4	under construction 373
Stallingborough Alpha	Lincolnshire, England, UK	biomass	2013	n/a	65	under construction 374
BMHKW Goch	Goch, Germany	biomass	2011	n/a	5	under construction 375
BMHKW Wittgenstein	Wittgenstein, Germany	biomass	2010	n/a	5	under construction 376
Tullis Russel	Markinch, Scotland, UK	biomass	2012	200 ³⁷⁷	50	under construction 378
Südlohn	Münsterland region, Germany	biogas	2010	n/a	4.1	under construction 379
Nordsee Ost offshore wind farm	30 kilometres north-west of Helgoland, Germany	wind	2013	1,000	295	Investment decision made ³⁸⁰
Greater Gabbard offshore wind farm, together with SSE	25km off the east coast of England.	wind	2011	750 ³⁸¹	250	under construction 382
Thornton Bank	Offshore, next to Oostende, Belgium	wind	2013	254	80	under construction 383
Tychowo	West Pomerania, Poland	wind	2010	50 ³⁸⁴	34.5	under construction 385
San Basilio	Onshore, Sardinia, Italy	wind	2010	n/a	12.6 ³⁸⁶	under construction 387
Ururi	Onshore,	wind	2010	n/a	13 ³⁸⁸	under

	region Molise, Italy					construction 389
Danto de Energias S.A.	Castille-Leon, Spain	wind	2011	n/a	40	under construction 390
Guilhado	Onshore, North Portugal	wind	2010	n/a	2	under construction 391
Causeymire extension	Onshore, Scotland, UK	wind	~2011	n/a	7	under construction 392
Novar extension	Onshore, Novar Estate, Scotland, UK	wind	2011	n/a	32	under construction 393
Kildrummy	Onshore, 6 km west of Lumsden, Scotland, UK	wind	2010	n/a	10	under construction 394
An Suidhe	Onshore, 5 miles west of Inverary, Scotland, UK	wind	2011	n/a	19.2	under construction 395
Lochelbank	Onshore, Ochil hills nearby Perth, Scotland, UK	wind	2010	n/a	9.6	under construction 396
Middleton Farm	Onshore, 5.5 km Northwest of Newton Mearns, Scotland, UK	wind	2012	n/a	15	under construction 397
Middlemore	Onshore, near Alnwick, England, UK	wind	2011	n/a	54	under construction 398
Bradwell	Onshore, Bradwell, England, UK	wind	2014	n/a	30	under construction 399
Hellrigg	Onshore, Hellrigg, England, UK	wind	2011	n/a	9	under construction 400
Kiln Pit Hill	Onshore, Kiln Pit Hill, England, UK	wind	2011	n/a	13.8	under construction 401
Goole	Onshore, Goole, England, UK	wind	2011	n/a	37	under construction 402
Lindhurst	Onshore, next A614, England, UK	wind	2010	n/a	9	under construction 403
Bard Offshore 1	Offshore, 90 km from Borkum, North Sea, Germany	wind	n/a	n/a	6	under construction 404
Andasol 3	Granada, South Spain	solar	2011	n/a	6.4	under construction 405

Table 21 lists RWE's investments that are either still awaiting permission or have merely been announced as plans.

Table 21: 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 ⁴⁰⁶
Arneburg	Arneburg, Germany	coal	2015	n/a	1,600	planning phase ⁴⁰⁷
Lignite power plant with coal gasification and CO ₂ capture	Hürth, Germany	lignite (IGCC)	later than 2015	800 ⁴⁰⁸	450	planning phase ⁴⁰⁹
RWE Elektrownia Czczott	Silesia region, Poland	coal	n/a	1,125	600	Operation date was 2015, now suspended ⁴¹⁰
Willington	Derbyshire, England, UK	gas (CCGT)	n/a	n/a	2,000	planning application submitted ⁴¹¹
Gas Fired Power Station	Genk – Zuid, Belgium	gas (CCGT)	2014	n/a	400	planning phase ⁴¹²
Tilbury	Tilbury. Essex, England, UK	gas (CCGT)	n/a	n/a	2,000	feasibility study to be started ⁴¹³
Horizon Nuclear Power	Wylfa, Anglesey, Wales, UK)	nuclear	2020	4,200	1,650	planning application scheduled for 2012 ⁴¹⁴
Horizon Nuclear Power	Oldbury, Gloucestershire, England, UK	nuclear	2025	4,200	1,650	planning application once construction at Wylfa is underway ⁴¹⁵
The rivers Danube, Morava and Drina	Serbia and Bosnia-Herzegovina	hydro	n/a	n/a	1,500 ⁴¹⁶	Memorandum of Understanding signed In November 2009 ⁴¹⁷
Cia Aig	near Fort William, in the Scottish Highlands, UK	hydro	2012/2013	n/a	3	building permission received ⁴¹⁸
Braan	Trochry, Perthshire, Scotland, UK	hydro	n/a	n/a	3.5	planning phase ⁴¹⁹
Maldie Burn Hydro Project	Kylestrome, Scotland, UK	hydro	n/a	n/a	4.5	planning phase ⁴²⁰
Extra 200 MW generating unit	Vianden, Luxembourg	hydro	2013/4	n/a	80	Permission granted ⁴²¹
Anglesey	off the coast of	tidal	n/a	n/a	10.5	planning

Skerries Tidal Stream Array	Anglesey, north Wales, UK	stream				phase ⁴²²
Triton Knoll Offshore Wind Farm	off the east coast of England, UK	wind	2020	n/a	1,200	in study ⁴²³
Gwynt y Môr	Liverpool Bay, Wales, UK	wind	2014	1,200	346	planning phase ⁴²⁴
Atlantic Array project	off the coast South Wales and North Devon, Wales, UK	wind	n/a	5,000 ⁴²⁵	1,500	Zone Development Agreement signed ⁴²⁶
Dogger Bank Zone	off the Yorkshire coast, England, UK	wind	n/a	n/a	2,750	investment decision anticipated around late 2014 ⁴²⁷
Innogy Nordsee 1 offshore wind farm	40 km north of Juist, North Sea, Germany	wind	~2015	2,800 ⁴²⁸	960	in development ⁴²⁹
Tromp	75km off the coast Callantsoog, Netherlands	wind	~2015	1,000	300	in development ⁴³⁰
Several projects	Poland	wind	2015	500	300	RWE target ⁴³¹
De Ruijter Oost	Netherlands	wind	n/a	n/a	256	planning phase ⁴³²
Allt Duine	onshore, Scotland, UK	wind	n/a	n/a	more than 50	planning phase ⁴³³
Brechfa Forest	Carmarthenshire, Wales, UK	wind	n/a	n/a	up to 107	planning phase ⁴³⁴
Carnedd Wen Wind Farm	north western region Powys, Wales, UK	wind	n/a	n/a	161	planning phase ⁴³⁵
Clocaenog Forest Wind Farm	North Wales, UK	wind	n/a	n/a	up to 85	planning phase ⁴³⁶
East Heselton	North Yorkshire, England, UK	wind	n/a	n/a	n/a	planning phase ⁴³⁷
Mynydd y Gwair Wind Farm	Near Pantyffynnon, Wales, UK	wind	n/a	n/a	38 - 57	planning phase ⁴³⁸
Rowantree Wind Farm	Scotland, UK	wind	n/a	n/a	60 - 90	planning phase ⁴³⁹
Nun Wood Wind Farm Proposal	Near Northampton, England, UK	wind	n/a	n/a	32 - 36	planning phase ⁴⁴⁰
Stroupster Wind Farm	Wick, Caithness, Scotland, UK	wind	n/a	n/a	24 - 35	planning phase ⁴⁴¹
Batsworthy Cross Wind Farm	Devon County, England, UK	wind	n/a	n/a	13.5 - 22.5	planning phase ⁴⁴²
Burn of Whilk	11km south	wind	n/a	n/a	up to 27	planning

Wind Farm	west of Wick in Caithness, Scotland, UK					phase ⁴⁴³
Cotton Farm Wind Farm	Huntington, England, UK	wind	n/a	n/a	18 - 24	planning phase ⁴⁴⁴
Fforch Nest Wind Farm	Wales, UK	wind	n/a	n/a	25	planning phase ⁴⁴⁵
Kirkharle Wind Farm	Northumberland, England, UK	wind	n/a	n/a	18 - 24	planning phase ⁴⁴⁶
Raera Forest Wind Farm	Argyle & Bute, Scotland, UK	wind	n/a	n/a	up to 25	planning phase ⁴⁴⁷
Saxby Wold Wind Farm Proposal	Lincolnshire, England, UK	wind	n/a	n/a	up to 21	planning phase ⁴⁴⁸
Hampole	near Doncaster, England, UK	wind	n/a	n/a	10 - 15	planning phase ⁴⁴⁹
Earls Hall	Clacton on Sea, England, UK	wind	n/a	n/a	10 – 11.5	planning phase ⁴⁵⁰
Langham Wind Farm	Skegness, England, UK	wind	n/a	n/a	9 - 15	planning phase ⁴⁵¹
Stobhill Wind Farm	County Durham, England, UK	wind	n/a	n/a	up to 7	planning phase ⁴⁵²

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.⁴⁵³ 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.⁴⁵⁴ 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%).⁴⁵⁵

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%).⁴⁵⁶ The Amercentrale consumed 1.7 million tonnes of coal in 2008 originating from South Africa (44%), Columbia (35%), Indonesia (20%), and the USA (1%).⁴⁵⁷

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.⁴⁵⁸ Essent states that it purchases coal either from international mining companies, or on the global spot market.⁴⁵⁹

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 2009.⁴⁶⁰

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.⁴⁶¹ 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.'⁴⁶² 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 2009.⁴⁶³ In 2009, Essent used only wood as a biomass.⁴⁶⁴

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.⁴⁶⁵ In 2009 73% of the biomass used by Essent fell under the certification scheme.⁴⁶⁶

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.⁴⁶⁷

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7 Vattenfall

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.⁴⁶⁸

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.⁴⁶⁹

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. This company profile also includes the investments of Nuon, the Dutch company that was purchased by Vattenfall in 2009. These investments were included in the company profile that was sent to Nuon, and have been reviewed.

Installed capacity for electricity generation in Europe

Figure 13 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.⁴⁷⁰ The generation capacity of Nuon is 100% incorporated in the capacity figures of Vattenfall as of 31 December 2009.

Figure 13: Fuel mix of Vattenfall's installed capacity in Europe, 2009

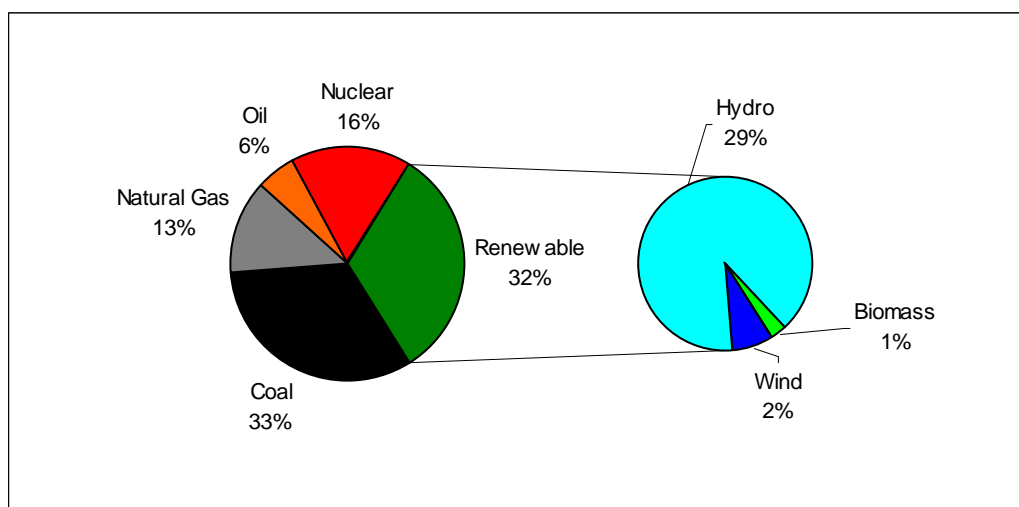


Table 22 shows the absolute figures for Vattenfall's installed capacity in Europe per fuel type.

Table 22: Vattenfall's installed capacity in Europe (MW) per division and per fuel type, 2009⁴⁷¹

Fuel type	Business Group Pan Europe	Business Group Nordic	Business Group Central Europe	Business Group Benelux	Total
Coal ⁴⁷²	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
Total	7,005	11,401	15,262	3,718	37,386

Figure 14 shows the fuel mix of the actual generated electricity in Europe by Vattenfall in 2009.

Figure 14: Fuel mix of Vattenfall's generated electricity in Europe, 2009

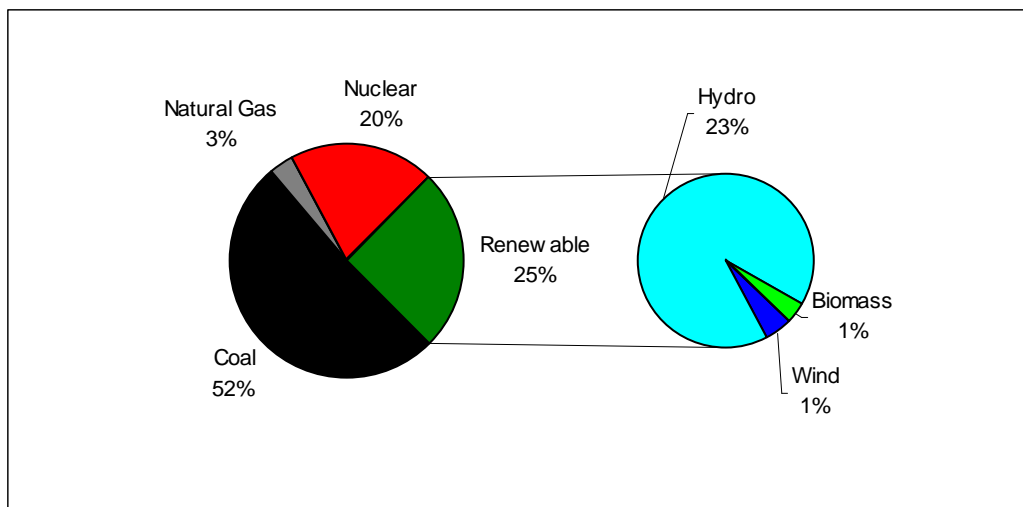


Table 23 shows the absolute figures for Vattenfall's generated electricity in Europe per fuel type.

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 2009.⁴⁷³ 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).⁴⁷⁴

Table 23: Vattenfall's generated electricity (TWh) in Europe per division and per fuel type, 2009⁴⁷⁵

Fuel type	Business Group Pan Europe	Business Group Nordic	Business Group Central Europe	Business Group Benelux	Total
Coal ⁴⁷⁶	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
Total	30.0	36.7	69.0	3.2	138.9

Announced investments in new generation capacity in Europe

Vattenfall's investment plan for the period 2010–2014 is worth €19.4 billion⁴⁷⁷, 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.⁴⁷⁸ 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.⁴⁷⁹

In addition to the investments explained in table 24 and 25, 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.⁴⁸⁰ The total capacity of the plants will remain unchanged. For this reason the investment is not included in the tables below.

Table 24 also includes Nuon's current investments in new installed capacity. It includes the takeover 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.⁴⁸¹ It also exchanged some wind assets in a swap with Electrawinds and Aspiravi.⁴⁸² 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 24: 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	1,640 ⁴⁸³	under construction ⁴⁸⁴
Vattenfall	new unit Boxberg	Germany	lignite	late 2010	1,000	675	under construction ⁴⁸⁵
Vattenfall	combined heat and power unit, Siekierki	Warsaw, Poland	coal/biomass	2014	800	480	almost tendered ⁴⁸⁶
Vattenfall	boost generation capacity	Forsmark and Ringhals plants, Sweden	nuclear	2011/2014	1,250 ⁴⁸⁷	450 ⁴⁸⁸	under construction

Vattenfall	Abelvattnet	Sweden	hydro	2010	10	4.6	under construction ⁴⁸⁹
Vattenfall	Ormonde wind farm, offshore	in the Irish Sea, 10km off Barrow-In-Furness, England, UK	wind	2011/2012	545	150	under construction ⁴⁹⁰
Vattenfall	Thanet wind farm, offshore	off the south-east coast of Kent, England, UK	wind	2010	945	300	under construction ⁴⁹¹
Vattenfall	Stor-Rotliden, wind power project, onshore	Municipality of Åsele in northern Sweden	wind	2011	135	78	under construction ⁴⁹²
Vattenfall	Alpha Ventus	45 km off the coast of the island of Borkum, Germany	wind	April 2010	66	16	in operation ⁴⁹³
Vattenfall	Repower older turbines	Denmark	wind	n/a	n/a	35	under construction ⁴⁹⁴
Vattenfall	Edinbane, onshore wind power project	the Isle of Skye, Scotland, UK	wind	2010	61	41.4	under construction ⁴⁹⁵
Nuon		Almere (NL) ⁴⁹⁶	Natural gas (CHP)	2010	n/a	120	plant acquired from GDF Suez/ Electrabel
Nuon	Nuon Magnum (Phase I) ⁴⁹⁷	Eemshaven (NL)	Natural gas (part of a multi-fuel installation)	2012	1,800	1,200 ⁴⁹⁸	construction resumed
Nuon	Hemweg 9 ⁴⁹⁹	Amsterdam (NL)	Natural gas (CCGT)	2012	n/a	435	under construction
Nuon	Oom Kees ⁵⁰⁰	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 25 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.⁵⁰¹ 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.⁵⁰² 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 25. Nuon is 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.⁵⁰³

Table 25: 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 ⁵⁰⁴	2016-2018	650-900	700	planning phase ⁵⁰⁵
Vattenfall	Elektrownia Kozienice	South east Poland	coal	2015	288	187	planning phase ⁵⁰⁶
Vattenfall	Elektrownia Kozienice	South east Poland	coal	n/a	288	187	considered ⁵⁰⁷
Vattenfall	Elektrownia Gniew – Opalenie	Opalenie, Poland	coal	n/a	2,560	1,660	planning phase ⁵⁰⁸
Vattenfall	Jänschwalde	Near Brandenburg, Germany	coal/CCS	2015	n/a	250 ⁵⁰⁹	planning phase ⁵¹⁰
Vattenfall	EC Pruszków	Poland	coal/biomass	n/a	740	480	planning phase ⁵¹¹
Vattenfall	EC Zerań	Warsaw, Poland	coal/biomass	n/a	740	480	planning phase ⁵¹²
Vattenfall	Heizkraftwerk Lichterfelde	Berlin, Germany	gas (CCGT)	2014/2015	n/a	300	planning phase ⁵¹³
Vattenfall	Heizkraftwerk Klingenberg	Berlin, Germany	gas (CCGT)	2016/2019	n/a	300	planning phase ⁵¹⁴
Vattenfall	Enea	Poland	biogas	2020	n/a	28	planning phase ⁵¹⁵
Vattenfall	CHP plant Haferweg	Hamburg Altona, Germany	biomass	n/a	n/a	5	approval received in January 2010 ⁵¹⁶
Vattenfall	district heating plant Märkisches	Märkisches, Germany	biomass	n/a	n/a	5	approval received in March 2010 ⁵¹⁷
Vattenfall	Biomass CHP plant Klingenberg	Klingenberg, Germany	Biomass	n/a	n/a	40	planning phase ⁵¹⁸
Vattenfall	Aegir	Shetland Islands, UK	wave power	2014	n/a	10	planning consent needed ⁵¹⁹
Vattenfall	Tonn Energy	Ireland	wave power	2020	180	125	in study ⁵²⁰

Vattenfall	Dan Tysk	70 km northwest of Sylt, Germany	wind	n/a	n/a	400	construction starts 2011. ⁵²¹
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. ⁵²²
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. ⁵²³
Vattenfall	Kriegers Flak II	Baltic Sea, 30 km south of Trelleborg, Sweden	wind	n/a	n/a	640	no investment decision yet. ⁵²⁴
Vattenfall	Taggen	Offshore Sweden	wind	n/a	n/a	150	possible construction start 2012 ⁵²⁵
Vattenfall	Trolleboda	Offshore Sweden	wind	n/a	n/a	150	not economically viable according to company ⁵²⁶
Vattenfall	Aultmore, onshore	Aultmore Forest, Banffshire, Scotland, UK	wind	n/a	n/a	n/a	awaiting permission ⁵²⁷
Vattenfall	Clashindarroch, onshore	near Huntly in Aberdeenshire, Scotland, UK	wind	n/a	n/a	50	awaiting permission ⁵²⁸
Vattenfall	Kyle, onshore	east of Dalmellington, Scotland, UK	wind	n/a	n/a	n/a	in study ⁵²⁹
Vattenfall	Logiealmond, onshore	Perthshire, Scotland, UK	wind	n/a	n/a	n/a	awaiting permission ⁵³⁰
Vattenfall	Minch Moor, onshore	near Peebles, Scotland, UK	wind	n/a	n/a	n/a	awaiting permission ⁵³¹
Vattenfall	Ray, onshore	near Kirkwhelpi-	wind	n/a	n/a	n/a	awaiting permission

		ngton. England, UK					⁵³²
Vattenfall	Whitton, onshore	east of Jedburgh, Scotland, UK	wind	n/a	n/a	15	awaiting permission ⁵³³
Vattenfall	Enea	Poland	wind	2020	n/a	75	planning phase ⁵³⁴
Nuon		Velsen ⁵³⁵	natural gas	n/a	100	200	proposed
Nuon		Diemen (NL) ⁵³⁶	natural gas (CHP)	2012	n/a	500	proposed
Nuon		Seneffe ⁵³⁷ (BE)	natural gas (CCGT)	n/a	n/a	450	proposed
Nuon	Beaufort ⁵³⁸	Noordzee	wind	2015	950	300	awaiting subsidies
Nuon	De Zuidlob ⁵³⁹	Zeewolde	wind	2012	n/a	108	proposed
Nuon		Duiven (NL) ⁵⁴⁰	wind	n/a	n/a	12	awaiting permits
Nuon		Büren (NL) ⁵⁴¹	wind	n/a	n/a	8	awaiting permits
Nuon	Nuon Magnum (Phase II) ⁵⁴²	Eems- haven (NL)	coal and biomass	n/a	n/a	800	proposed
Nuon	Nuon Magnum (Phase II) ⁵⁴³	Eems- haven (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.⁵⁴⁴ 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."⁵⁴⁵ 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.⁵⁴⁶

Vattenfall owns and operates lignite mines close to its lignite-fired power plants in the Lausitz region, in eastern Germany.⁵⁴⁷ 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.⁵⁴⁸

Nuon explicitly states that it does not provide figures for the quantities of raw materials it purchases, because this information would be 'competition-sensitive'.⁵⁴⁹ 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.⁵⁵⁰

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.'⁵⁵¹

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.'⁵⁵² 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.⁵⁵³ 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.'⁵⁵⁴

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.

- ⁴⁶⁸ Vattenfall, "annual report 2009", p.2 and 3, <<http://www.vattenfall.com/en/file/2-20100524-110100.pdf>> (16 July 2010)
- ⁴⁶⁹ Vattenfall website, "Market operations", updated 21 June 2010, <<http://www.vattenfall.com/en/market-operations.htm>> (16 July 2010).
- ⁴⁷⁰ Vattenfall, "annual report 2009", p.94, <<http://www.vattenfall.com/en/file/2-20100524-110100.pdf>> (16 July 2010)
- ⁴⁷¹ 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)
- ⁴⁷² Vattenfall reports separately for its lignite and hard coal capacity. This table has combined these figures for reasons of comparability.
- ⁴⁷³ 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)
- ⁴⁷⁴ Vattenfall, "annual report 2009", p.22 and 133, <<http://www.vattenfall.com/en/file/2-20100524-110100.pdf>> (16 July 2010)
- ⁴⁷⁵ 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)
- ⁴⁷⁶ Vattenfall reports separately for its lignite and hard coal capacity. This table has combined these figures for reasons of comparability.
- ⁴⁷⁷ SEK 201 billion. Exchange rate SEK 10.35 = € 1
- ⁴⁷⁸ SEK 100 billion. Exchange rate SEK 10.35 = € 1
- ⁴⁷⁹ Vattenfall, "annual report 2009", p.10, <<http://www.vattenfall.com/en/file/2-20100524-110100.pdf>> (16 July 2010)
- ⁴⁸⁰ The total capacity of the three plants (Amagerværket in Copenhagen, Fynsværket in Odense, Nordjyllandsværket in Aalborg) is 1,757 MW. Total investment Biomax in excess of 5 billion DKK. Exchange rate as of 1 January 2010: 1 DKK = €7.44155 (<http://nl.exchange-rates.org/HistoricalRates/E/EUR/1-1-2010>)
Vattenfall, "Clean coal from a Vattenfall perspective", presentation Torbjörn Wahlborg, Senior Executive Vice President Head of Business Group Nordic", 14 April 2010, p. 6 and 17, <<http://www.nog.se/files/Vattenfall.pdf>> (16 July 2010)
Vattenfall, Press release "Large quantities of biomass replacing coal", 9 February 2009, <<http://www.vattenfall.com/en/news-archive.htm?newsid=BFA3E81D6D6C475E983ABDAABE37A732>> (16 July 2010)
- ⁴⁸¹ Nuon website, Over Nuon, Pers, Persberichten, "Nuon vernieuwt productiecapaciteit op Hemweg locatie", 16-04-10, <http://www.nuon.com/nl/pers/persberichten/20100416/index.jsp> (08-07-10).
- ⁴⁸² Nuon website, Over Nuon, Pers, Nieuwsfeiten, "Nuon verwerft windpark in Wallonië", 19-03-10, <http://www.nuon.com/nl/pers/nieuwsfeiten/20100319/index.jsp> (08-07-10).
- ⁴⁸³ Total capacity of 1,640 MW of electric power and up to 650 MWth for district heating.
- ⁴⁸⁴ Vattenfall website, "Das Steinkohlekraftwerk Moorburg, Investition in die Energieversorgung", no date, <http://www.vattenfall.de/www/vf/vf_de/225583xberx/225613dasxu/225933bergb/226503kerng/226173kraft/1472202neux-/index.jsp> (16 July 2010)
Vattenfall website, "Fernwärme: umweltschonend und komfortabel", September 2009, <http://www.vattenfall.de/www/vf/vf_de/Gemeinsame_Inhalte/DOCUMENT/154192vatt/Bergbau_und_Kraftwerk_e/1592024moo/P02179847.pdf> (16 July 2010)
Bild, "Bau des Kraftwerks Moorburg geht voran", 19 October 2009, <<http://www.bild.de/BILD/regional/hamburg/dpa/2009/10/19/bau-des-kraftwerks-moorburg-geht-voran.html>> (16 July 2010)
- ⁴⁸⁵ Vattenfall, "annual report 2009", p.63, <<http://www.vattenfall.com/en/file/2-20100524-110100.pdf>> (16 July 2010)
DN.SE, "Vattenfall investerar i ekovärsting", 21 June 2010, <<http://www.dn.se/ekonomi/vattenfall-investerar-i-ekovarsting-1.1125523>> (16 July 2010)

- ⁴⁸⁶ Gazeta Wyborcza, "Poland: Vattenfall to complete € 800 mn power plant tender in Q2/Q3", 19 January 2010. Polish market online, "New power stations on the horizon", 11 August 2008, <<http://www.polishmarket.com.pl/document/17833>> (19 July 2010)
- ⁴⁸⁷ The investment includes measures to improve safety and extend the plants' useful life. Around SEK 13 Billion is included in the current investment plan for 2010–2014 with regard to the Forsmark and Ringhals nuclear power plants. Vattenfall, "annual report 2009", p.59, <<http://www.vattenfall.com/en/file/2-20100524-110100.pdf>> (16 July 2010). Exchange rate SEK 10.35= € 1
- ⁴⁸⁸ Uprate Forsmark 1 will be 120 MW in mid-2011. Uprate Forsmark 2 will also be 120 MW. Unit 3 will get a new SEK 900 million generator in 2014, which will contribute to a 190 MW uprate. Total uprate will be 430 MW. These uprates were approved by the government in February 2010 following recommendation from the Swedish Radiation Safety Authority (SSM). Forsmark is owned by Vattenfall 66%, Mellansvensk Kraftgrupp 25.5%, and E.ON Sverige 8.5%. Ringhals is owned by Vattenfall 70.4% and E.ON Sverige 29.6%. Exchange of high-pressure turbines and steam generators at Ringhals in 2011 and other work is expected to yield a further 240 MWe. Ringhals is owned by Vattenfall 70.4% and E.ON Sverige 29.6%. World Nuclear Association, "Nuclear Power in Sweden", updated 13 July 2010, <<http://www.world-nuclear.org/info/inf42.html>> (16 July 2010)
- ⁴⁸⁹ Vattenfall website, "Abelvattnet - ett nytt vattenkraftverk", updated 14 July 2010, <<http://www.vattenfall.se/sv/abelvattnets-vattenkraftverk.htm>> (16 July 2010) The total investment is SEK 100 billion. Exchange rate SEK 10.35= € 1.
- ⁴⁹⁰ Total investment £ ~450 million. Exchange rate as 01-07-2010: £1 = € 1.21148 (<http://www.exchange-rates.org/history/EUR/GBP/T>). Rated power 150 MW (30 x 5 MW). Vattenfall, "Vattenfall Capital Markets Day 2009, presentation by: Helene Biström, Senior Executive Vice President, Head of Business Group Pan Europe, 23 September 2009, p.17, <http://www.vattenfall.com/en/file/helene-bistrom-business-group_8459943.pdf> (16 July 2010) Vattenfall website, "Ormonde", updated 14 June 2010, <<http://www.vattenfall.co.uk/en/ormonde.htm>> (16 July 2010)
- ⁴⁹¹ Vattenfall website, "Thanet Offshore Wind Farm", updated 13 July 2010, <<http://www.vattenfall.co.uk/en/thanet-offshore-wind-farm.htm>> (16 July 2010). The total investment for completing the wind farm is in the order of around £780 million. Exchange rate as 01-07-2010: £1 = € 1.21148 (<http://www.exchange-rates.org/history/EUR/GBP/T>)
- ⁴⁹² Total investment SEK ~1,400 million. Exchange rate SEK 10.35= € 1. Rated power 78 MW (29x2 MW & 11x1.8 MW) Vattenfall, "Vattenfall Capital Markets Day 2009, presentation by: Helene Biström, Senior Executive Vice President, Head of Business Group Pan Europe, 23 September 2009, p.16, <http://www.vattenfall.com/en/file/helene-bistrom-business-group_8459943.pdf> (16 July 2010) Vattenfall, "annual report 2009", p.17, <<http://www.vattenfall.com/en/file/2-20100524-110100.pdf>> (16 July 2010)
- ⁴⁹³ Alpha Ventus is a development and demonstration plant in which Vattenfall has a 26.25% interest. Vattenfall, "annual report 2009", p.69, <<http://www.vattenfall.com/en/file/2-20100524-110100.pdf>> (16 July 2010) Total capacity is 60 MW. The sums invested by EWE, E.ON and Vattenfall for this pioneer project amount to €250 million. Alpha Ventus, press release "Germany's First Offshore Wind Farm is Formally Commissioned, 27 April 2010, <<http://www.alpha-ventus.de/index.php?id=80>> (16 July 2010)
- ⁴⁹⁴ New turbines with a combined capacity of approximately 75 MW will repower older turbines with total installed capacity of 40 MW. Vattenfall, "annual report 2009", p.59, <<http://www.vattenfall.com/en/file/2-20100524-110100.pdf>> (16 July 2010)
- ⁴⁹⁵ Vattenfall website, "Edinbane", updated 15 July 2010, <<http://www.vattenfall.co.uk/en/edinbane.htm>> (16 July 2010) The total investment for completing the wind farm is in excess of £50 million. Exchange rate as 01-07-2010: £1 = € 1.21148 (<http://www.exchange-rates.org/history/EUR/GBP/T>)
- ⁴⁹⁶ 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).
- ⁴⁹⁷ Platts Power in Europe, "PIE's new plant tracker", 03-05-10 and Nuon website, Over Nuon, Pers, Nieuwsfeiten, "Eerste paal elektriciteitscentrale Nuon Magnum", 10-12-09, <http://www.nuon.com/nl/pers/nieuwsfeiten/20091210/index.jsp> (08-07-10).
- ⁴⁹⁸ The figure of 1,200 MW total capacity for the Magnum plant was provided by Nuon. Email Pinar Ates, Manager regulatory affairs Nuon received 30-08-2010.
- ⁴⁹⁹ Platts Power in Europe, "PIE's new plant tracker", 03-05-10.
- ⁵⁰⁰ Nuon website, Over Nuon, Pers, Nieuwsfeiten, "Bouw windpark Oom Kees in Wieringermeer gestart", 08-06-10, <http://www.nuon.com/nl/pers/nieuwsfeiten/20100608/index.jsp> (08-07-10).
- ⁵⁰¹ Nuon website, Over Nuon, Pers, Nieuwsfeiten, "Nuon ontwikkelt gasgestookte centrale bij Frankfurt niet verder", 12-08-09, <http://www.nuon.com/nl/pers/nieuwsfeiten/20090812/index.jsp> (08-07-10).
- ⁵⁰² Platts Power in Europe, "PIE's new plant tracker", 03-05-10.
- ⁵⁰³ Platts Power in Europe, "PIE's new plant tracker", 03-05-10.
- ⁵⁰⁴ The technology and fuel used in the station has not been defined yet; it will depend on the strategy of both companies and the decision should be made in the current year. Initially, the plant was to be run by hard coal from the Bogdanka mine, but the new strategy of Vattenfall calls for limiting investments in power blocs run by coal. The investments will also depend on the decision concerning CO₂ emission rights for the years 2013-2020.
- ⁵⁰⁵ Total capacity 1,400 MW, Vattenfall stake 50%. The cost of the investment is estimated at somewhere between ZL5 and ZL7 billion. To be put in use between 2016 and 2018. Polish News Bulletin, "ZA Pulawy and Vattenfall to Build Power Station", 26 April 2010. Exchange rate as of 23 April 2010: 1 € = 3.88063 Zloty (<http://nl.exchange-rates.org/history/PLN/EUR/T>)

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- 506 Elektrownia "Kozienice" S.A., "ELEKTROWNIA "KOZIENICE" II Sp. z o.o. - The new power unit with the output up to 1000 MW", 11 August 2010, <http://www.elko.com.pl/elkoweb/site2/site.php?module=info&cmd=detail&id=20&code_channel=contact5&id_c_hannel=4> (19 July 2010)
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- Vattenfall holds a 18.67% stake in the Polish power firm Enea.
- BRE Bank Securities, "Update power engineering", 12 March 2010, <http://i.wp.pl/a/dibre/aspolek/energy_120310.pdf> (18 June 2010). Total investment 6,000 million Zloty. Exchange rate as of 12 March 2010: € 1 = 3.885 Zloty (<http://nl.exchange-rates.org/history/PLN/EUR/T>)
- 507 The company plans to build a 1,000-MW hard coal-fired plant at its 2,880-MW Elektrownia Kozienice station in southeast Poland by 2015, and is considering a second 1,000-MW block at the plant. Global Power Report, "Polish government seeks investors for stakes in PAK, Enea generators", 4 February 2010. Vattenfall holds a 18.67% stake in the Polish power firm Enea.
- 508 BRE Bank Securities, "Update power engineering", 12 March 2010, <http://i.wp.pl/a/dibre/aspolek/energy_120310.pdf> (18 June 2010). Total investment 9,960 million Zloty. Exchange rate as of 12 March 2010: € 1 = 3.885 Zloty (<http://nl.exchange-rates.org/history/PLN/EUR/T>)
- 509 Corresponds to 650 Mwth.
- 510 Vattenfall website, "Demonstration plant in Jänschwalde", updated 5 March 2010, <<http://www.vattenfall.com/en/ccs/janschwalde.htm>> (19 July 2010)
- Vattenfall's planned project to build a Carbon Capture and Storage (CCS) demonstration plant at Jänschwalde in Brandenburg, Germany, was awarded up to EUR 180 million in funding from the European Commission. Vattenfall, "annual report 2009", p.63, <<http://www.vattenfall.com/en/file/2-20100524-110100.pdf>> (16 July 2010)
- 511 BRE Bank Securities, "Update power engineering", 12 March 2010, <http://i.wp.pl/a/dibre/aspolek/energy_120310.pdf> (18 June 2010) Total investment 2,880 million Zloty. Exchange rate as of 12 March 2010: € 1 = 3.885 Zloty (<http://nl.exchange-rates.org/history/PLN/EUR/T>)
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- 512 BRE Bank Securities, "Update power engineering", 12 March 2010, <http://i.wp.pl/a/dibre/aspolek/energy_120310.pdf> (18 June 2010) Total investment 2,880 million Zloty. Exchange rate as of 12 March 2010: € 1 = 3.885 Zloty (<http://nl.exchange-rates.org/history/PLN/EUR/T>)
- Vattenfall website, "Co-combustion in Poland", updated 21 June 2010, <<http://www.vattenfall.com/en/co-combustion-poland.htm>> (19 July 2010)
- 513 The plan is a gas and steam turbine (CCGT) plant with a total capacity of 230 megawatts (MW) of thermal and 300 MW of electric power. The new building will replace the existing power plant on the site in Lichterfelde. Vattenfall website, "Das Heizkraftwerk Lichterfelde", no date, <<http://www.vattenfall.de/de/lichterfelde/daten-und-fakten-lichterfelde.htm>> (16 July 2010)
- 514 The plan is a gas and steam turbine (CCGT) plant with a total capacity of 230 megawatts (MW) of thermal and 300 MW of electric power. The two additional biomass plants will have a thermal capacity of approximately 150 MW. In 2016, the new CCGT-plant will be connected to the grid. The old HKW Klingenberg will be switched off. The commissioning of the two biomass plants is scheduled for 2017 and 2019. Vattenfall website, "Das Heizkraftwerk Klingenberg", no date, <<http://www.vattenfall.de/de/klingenberg/das-neubauprojekt-klingenberg.htm>> (16 July 2010)
- 515 Enea said it plans to build between 350 MW and 450 MW of wind capacity and around 150 MW of biogas by 2020. Global Power Report, "Polish government seeks investors for stakes in PAK, Enea generators", 4 February 2010.
- Vattenfall holds a 18.67% stake in the Polish power firm Enea.
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8 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 we have to add that France, the UK, Germany and Italy accounted for more than 90% of EdF's capacity and actual electricity generation in 2009.

Installed capacity in Europe

Table 26 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, closely followed by Enel.

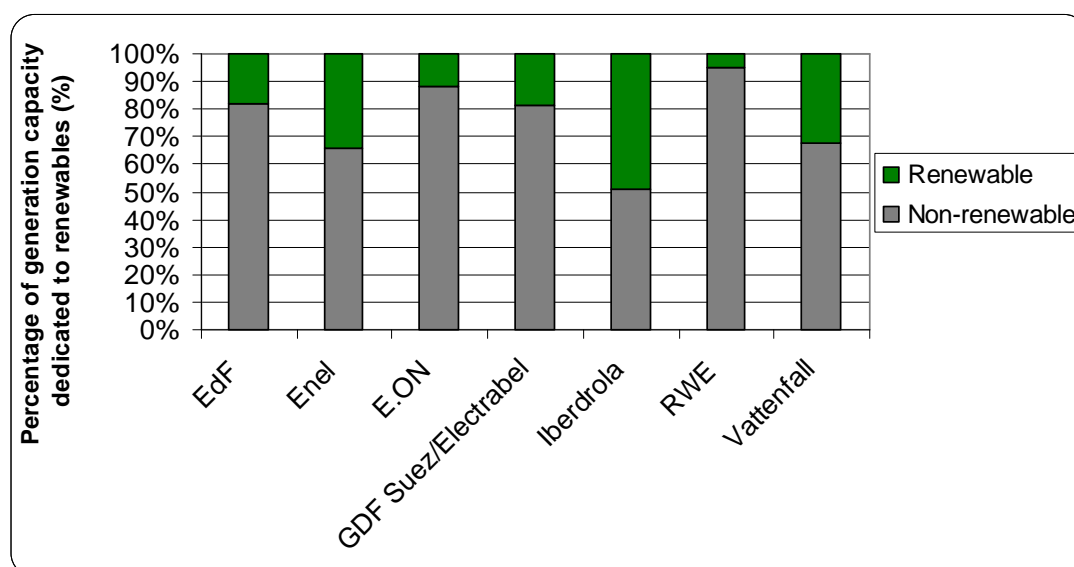
Table 26: Fuel mix of installed capacity in Europe by company, in MW, 2009

Fuel type	EdF	Enel	E.ON	GDF Suez / Electrabel ⁵⁵⁵	Iberdrola	RWE	Vattenfall
Coal	31,200	13,273	18,478	4,162	4,689	26,465	12,198
Natural Gas	8,500	27,341	14,467	19,598	8,291	9,144	4,880
Oil	0	0	2,395	0	710	0	2,068
Nuclear	75,000	5,284	11,325	6,356	3,344	6,295	6,146
Other Non-renewable	0	0	2,819	643	0	5,146	0
Wind	0	0	1,146	1,286	7,161	1,574	859
Hydro	22,900	21,459	5,450	5,221	9,410	793	10,869
Large scale	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Small scale	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Biomass	0	0	64	530	0	98	366
Stand alone	0	0	n/a	n/a	0	n/a	n/a
Co-fired	0	0	n/a	n/a	0	n/a	n/a
Other renewable	2,500	2,613	70	38	0	67	0
Total renewable	25,400	24,072	6,730	7,075	16,571	2,532	12,094
Total	140,100	69,970	56,214	37,834	33,605	49,582	37,386

SOMO compilation based on company data

Figure 15 reflects the fuel mix of the installed capacity of the companies based on the percentage that each fuel comprises of the total mix. Iberdrola has the highest percentage of sustainable installed capacity, with almost half of its production capacity being renewable, while RWE has the least sustainable fuel 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 27 shows the electricity that was actually generated in 2009 from the companies' installed capacity listed above. Looking at the overall figures, it is not surprising that EdF, the company with the most installed capacity, also generated the most electricity overall and the most electricity from renewable resources in particular in 2009.

Table 27: Fuel mix of electricity generated in Europe by company, in GWh, 2009

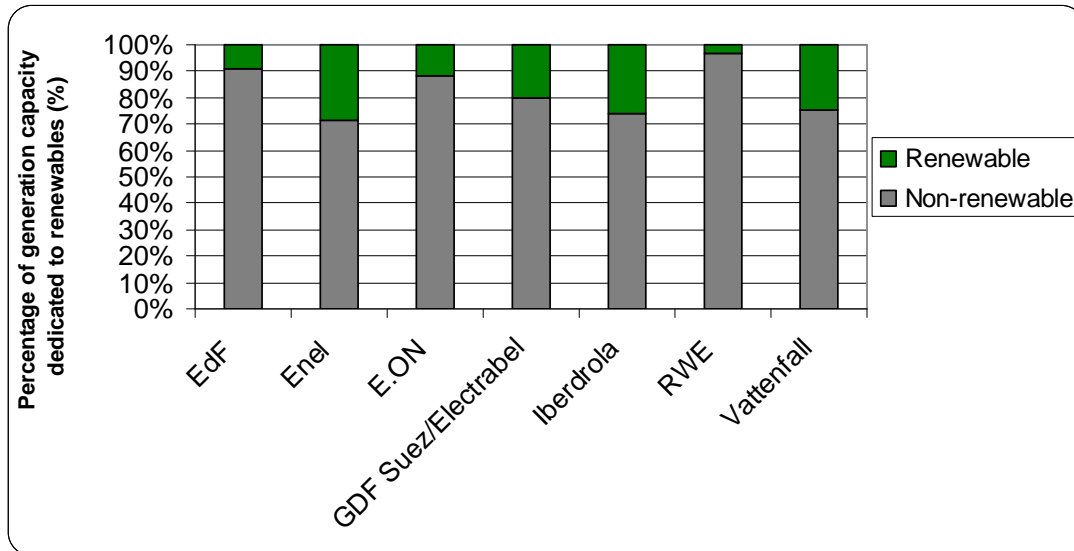
Fuel type	EdF	Enel	E.ON	GDF Suez / Electrabel	Iberdrola	RWE	Vattenfall / Nuon
Coal	69,000	51,806	63,920	27,800	13,237	115,000	71,200
Natural Gas	26,800	37,391	40,297	124,000	32,996	29,700	4,700
Oil	0	0	0	0	34	0	0
Nuclear	466,100	31,909	71,813	45,600	22,830	33,900	28,300
Other Non-renewable	0	0	4,434	5,100	0	2,100	0
Wind	0	0	4,859	2,500	13,179	2,200	1,700
Hydro	49,900	39,856	17,150	45,600	10,511	3,400	31,600
Large scale	-	-	-	-	-	-	-
Small scale	-	-	-	-	-	-	-
Biomass	0	0	270	2,500	0	900	1,400
Stand alone	-	-	-	-	-	-	-
Co-fired	-	-	-	-	-	-	-
Other renewable	6,700	8,865	1,128	0	580	0	0
Total renewable	56,600	48,721	23,407	50,600	24,270	6,500	34,700
Total	618,500	169,827	203,871	253,100	93,367	187,200	138,900

SOMO compilation based on company data

Figure 16 reflects the fuel mix of the electricity generated by the companies. It shows that Enel has the highest percentage of electricity generated from renewables. Interestingly,

Iberdrola, the company with the highest percentage of renewable installed capacity, did not generate the most renewable energy percentage-wise. RWE is the company with the lowest percentage of electricity generated in Europe in 2009.

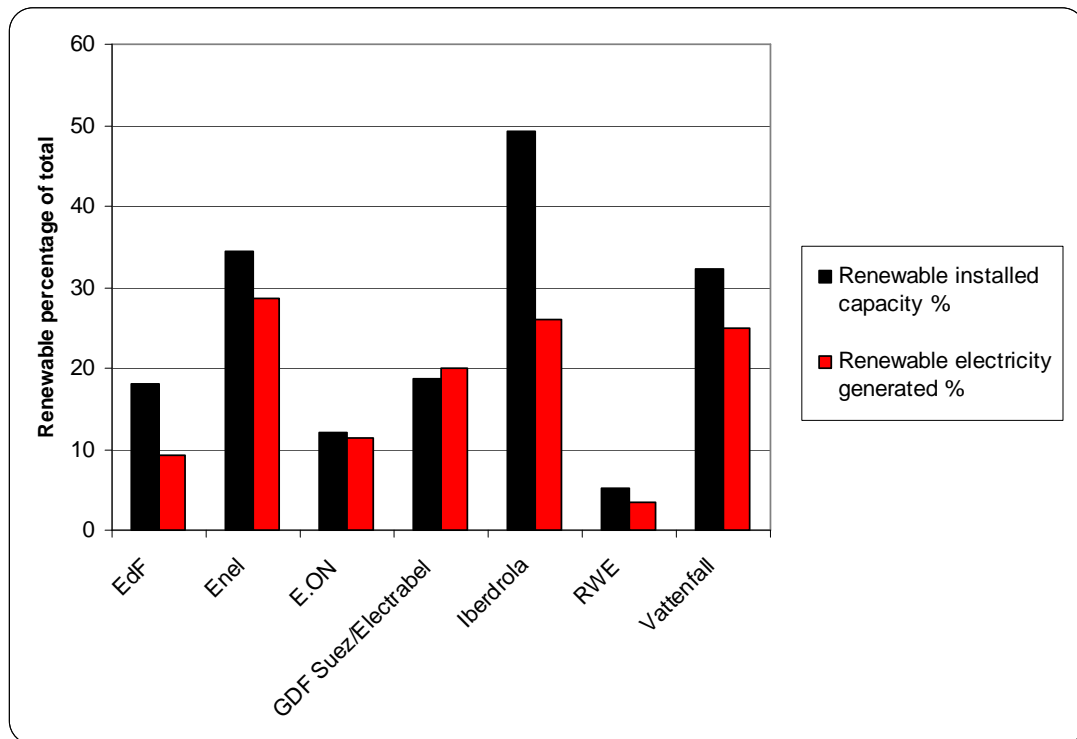
Figure 16: Electricity generated from renewables in Europe, by company, 2009



SOMO compilation based on company data

If we want to compare the percentages of renewable installed capacity and electricity generated per company, we would get a chart like the one in Figure 17. Interestingly, both Iberdrola and EdF have only half the relative renewable share in generated electricity as could be expected from their installed capacity. This means that these companies do not make full use of their renewable potential.

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



⁵⁵⁵ European figures for 2009 were not available, so 2008 figures were used.

9 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. The same applies to Iberdrola for its wind projects under construction in Spain and the UK.⁵⁵⁶ 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 the European capacity as of 31 December 2008 was used.⁵⁵⁷

Table 28 shows the current investments (in MW) compared to the electricity generation capacity in Europe as of 31 December 2009. Looking at the figures, RWE is by far the largest investor in new capacity.

Table 28: Current investments compared to electricity generation capacity, in Europe, as of 31 December 2009, per company, in MW.

Company	Current capacity	Current investments	% Investments of capacity
EdF	140,100	5,869	4%
Enel	69,970	4,647	7%
E.ON	56,214	6,468	12%
GDF Suez/Electrabel	37,834	3,879	10%
Iberdrola	33,605	1,472	4%
RWE	49,582	11,707	24%
Vattenfall	37,386	5,627	15%

Table 29 shows the renewable percentage in the installed capacity as of 31 December 2009 versus the renewable 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. However, from the table it can be analysed that there are great differences in the relative renewable capacity of the companies (ranging from 5% for RWE to 49% for Iberdrola). Further on, at present only RWE and Iberdrola 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 29: 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%
Enel	69,970	24,072	34%	4,647	379	8%
E.ON	56,214	6,730	12%	6,468	733	11%
GDF Suez/Electrabel	37,834	7,075	19%	3,879	555	14%
Iberdrola	33,605	16,571	49%	1,472	1,383*	94%
RWE	49,582	2,532	5%	11,707	1,126	10%
Vattenfall	37,386	12,094	32%	5,627	627	11%

* incomplete information

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

Table 30: 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%
Enel	74,617	24,451	33%	5,849	1,001	17%
E.ON	62,682	7,463	12%	14,481	1,719	12%
RWE	57,631	3,658	6%	22,720	10,170	45%
GDF Suez	41,713	7,630	18%	15,815	2,826	18%
Vattenfall / Nuon	43,013	12,721	30%	11,415	5,721	50%
Iberdrola	35,077	17,954	51%	10,788	8,438	78%

Table 31 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 here. According to the table, only the relative renewable generation capacity of RWE and Iberdrola increases significantly.

Table 31: 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%
Enel	34%	33%	32%
E.ON	12%	12%	12%
RWE	5%	6%	17%
GDF Suez	19%	18%	18%
Vattenfall / Nuon	32%	30%	34%
Iberdrola	49%	51%	58%

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 32 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 and Vattenfall invest most in coal.

Table 32: Current investments (MW) in new generation capacity in Europe, by company and fuel type

Company	Wind	Hydro	Other renewables (including biomass)	Natural gas	Coal	Nuclear	Other non-renewables	Total
EdF	254*	138	47	3,275	672	1,464	19	5,869
Enel	345	0	34	1,200	1,900	1,152	16	4,647
E.ON	683	0	50	3,535	2,200	0	0	6,468
RWE	979	8	140	6,895	3,554	132	0	11,708
GDF Suez	474	0	81	1,994	1,158	172	0	3,879
Vattenfall / Nuon	622	5	0	1,755	2,795	450	0	5,627
Iberdrola	334*	1,049	0	0	0	89	0	1,472
Total	3,691	1,200	352	18,654	12,279	3,459	35	39,670
%	9%	3%	1%	47%	31%	9%	0%	100%

* Incomplete information

Table 33 shows the monetary investments per fuel type for each of the companies.

Table 33: Investments in new generation capacity in Europe, per fuel source (million €)

Fuel type	EdF	Enel	E.ON	GDF Suez/ Electrabel	Iberdrola	Vattenfall	RWE
Renewable	567*	350*	1,651*	0*	350*	1,762*	2,257*
Gas	105*	290*	2,534	440*	0	1,800*	4,550
Coal	786	-	2,400	1,768	0	4,400	6,730
Nuclear	3,500	3,566	-	366*	248	1,250	366
Oil	-	-	-	n/a	0	-	-
Other	-	-*	-	n/a	0	-	-
Total	4,286	4,206	6,585	2,574	598	9,212	13,903

* Incomplete information

Table 34 shows the announced plans for investments per fuel type of each company. Investments in wind energy are most popular, followed by nuclear, natural gas and coal. 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 34: Announced plans for investments (MW) in new generation capacity in Europe, by company and fuel type*

Company	Wind	Hydro	Other renewables (including biomass)	Natural gas	Coal	Nuclear	Other non-renewables	Total
EdF	630	116	143	2,671	538	6,625	0	10,723

Enel	321	0	680	332	1,316	3,200	0	5,849
E.ON	1,519	0	200	6,090	2,200	4,412	60	14,481
RWE	8,402	1,663	105	4,400	4,850	3,300	0	22,720
GDF Suez	813*	1,610	403	5,776	4,351	2,862	0	15,815
Vattenfall / Nuon	5,508	0	213	950	4,044	0	700	11,415
Iberdrola	7,072	1,200	166	1,000	0	1,350	0	10,788
Total	24,264	4,589	1,910	21,219	17,299	21,749	760	91,791
%	26%	5%	2%	23%	19%	24%	1%	100%

* Incomplete information; SOMO calculation from company data⁵⁵⁸

Table 35 shows the monetary investment amounts per fuel type for each of the companies.

Table 35: Additional investment plans for new generation capacity in Europe, by company and fuel source (million €)

Fuel type	EdF	Enel	E.ON	GDF Suez/ Electrabel	Iberdrola	Vattenfall	RWE
Renewable	1,308*	320*	1,578*	1,914*	4,036*	950*	10,500*
Gas	1,780*	-	704*	2,176*	-	100*	-*
Coal	1,137	-	2,700	5,083*	-	-	1,925*
Nuclear	-*	8,000	8,400*	-*	-	-	8,400
Oil	-	-	-	-	-	-	-
Other	-	-	-*	-	-	775	-
Total	4,225	8,320	13,382	9,173	4,036	1,825	20,825

* Incomplete information

Investments in nuclear generation

This section presents the combined current investments and announced plans for investments in nuclear generation.

Table 36: Current investments in nuclear generation

Company	Country	Project	Date in operation	Amount (€ million)	Capacity (MW)
EdF (87.5%), Enel (12.5%)	France	European Pressurized Reactor (EPR) Flamanville	2013	4,000	1,600
Enel	Slovakia	Mochovce III, IV	2013	2,700	820
RWE, Enel, GDF Suez (each 9.15%), Iberdrola (6.2%)	Romania	Reactors 3 + 4 Cernavoda	Unit 3: 2016 Unit 4: 2017	1,346	485
Vattenfall	Sweden	boost generation capacity Forsmark and Ringhals plants	2011/2014	1,250	450
GDF Suez	Belgium	Doel 1, upgrade capacity	n/a	n/a	40.5

Table 37: Announced plans for investments in nuclear generation

Company	Country	Project	Date in operation	Amount (€ million)	Capacity (MW)	Project status
E.ON (50%), RWE (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 (50%)	Wales, UK	Horizon Nuclear Power, Wylfa (Anglesey)	2020	8,400	3,300	planning application scheduled for 2012
GDF Suez (37.5%), Iberdrola (37.5)	England, UK	Sellafield, Iberdrola/GDF Suez/SSE	2020-2025	n/a	2,700	pre-development stage
EdF (80%)	England, UK	EPR, joint venture (EdF 80%, Centrica 20%)	end of 2017	n/a	1,280	investment decision by EdF in 2011
EdF (80%)	England, UK	three EPRs, joint venture (EdF 80%, Centrica 20%)	after 2017	n/a	n/a	pre-development stage
Iberdrola	Bulgaria	One or two new units of Kozloduy plant	n/a	n/a	n/a	feasibility study ready, project suspended
E.ON	Finland	Fennovoima	2020	n/a	612	license granted
GDF Suez	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
EdF	France	uprate capacity 20 units	gradually from 2017	n/a	1,300	study
EdF (50%) Enel (50%)	Italy	three EPRs	n/a	n/a	4,800	feasibility study
EdF (50%) Enel (50%)	Italy	EPR	2020	n/a	1,600	license in 2011
EdF	Poland	EPR	before the end of 2020	n/a	n/a	feasibility study
E.ON	Sweden	Oskarshamn, upgrade of unit O2	2011	n/a	500	delayed

⁵⁵⁶ As explained in the fact sheets on EdF and Iberdrola.

⁵⁵⁷ As explained in the fact sheets.

⁵⁵⁸ 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.

10 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 are provided in the company fact sheets in Chapters 1-6. A description of the methodology can be found in Annex 1.

Table 38 provides a schematic overview on each of these points for all the companies covered in this report. It should be noted that with regards 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 38: Measures for responsible sourcing of the companies

Indicator	E.ON	EdF	Enel	GDF Suez/ Electrabel	Iberdrola	RWE	Vattenfall
CSR policy	X	X	X	X	X	X	X
Supplier Code of conduct that applies to raw materials	X	-	X	(X)	(X)	X	X
Transparency on origin coal	X	-	(X)	-	-	X	-
Transparency on origin biomass	-	-	-	(X)	-	(X)	-
Transparency on origin uranium	X	-	-	(X)	-	-	X
Applies sourcing criteria	X	-	(X)	(X)	-	X	X
Conducts audits	X	-	-	-	-	-	X

Based on: company sources, news reports

(...) = partially

CSR Policies

Practically all companies have some sort of CSR policy. 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. Iberdrola incorporates CSR in purchase conditions, but indicated that

this is not the case for the purchase of raw materials, as these are purchased through special contracts with suppliers. No information was found regarding supplier codes of conduct for EdF. It should be noted that this company did not review their company profile. It is therefore possible that the 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. These are E.ON and RWE. Table 39 shows the where these companies source their coal from.

Enel provided some information on its coal sourcing activities, without specifically indicating each country where it sources from.

Table 39: Source of coal for E.ON and RWE, in %

	E.ON	RWE
Germany	5	22
UK	8	10
Norway	1	-
Spain	2	-
Poland	1	-
Russia	17	37
South Africa	10	9
USA	42	-
Colombia	9	15
Australia	1	-
Indonesia	1	-
Other	-	7

Transparency on the origin of biomass

Only GDF Suez/Electrabel and RWE gave some information about the origin of their biomass. RWE indicated its plans to build a factory producing biomass pellets in the future, to be used as fuel for electricity, while GDF Suez indicates the types of biomass it uses, without specifics of the countries of origin.

Transparency on the origin of uranium

E.ON and Vattenfall reported on the origin of the uranium it uses in its nuclear facilities. E.ON procures its uranium from Canada, Kazakhstan, Uzbekistan, Namibia, Niger, Ukraine and the USA. Vattenfall purchases it from Australia, Namibia and Russia.

EdF, Enel, GDF Suez/Electrabel, Iberdrola and RWE all did not provide information about the origin of its uranium, while all do have nuclear capacity.

Sourcing criteria

E.ON, RWE and Vattenfall 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.⁵⁵⁹

Enel provided some information about sustainability agreements it had made with one specific supplier of coal in Indonesia, while Nuon, as part of Vattenfall, 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

E.ON and Vattenfall conduct audits at mines and plantations of the raw materials they purchase. While the specific details and approaches of these audits might differ from one company to the other, both these companies did indicate that they made use of third parties (or multiple stakeholders) to conduct the audits.

Nuon, as part of Vattenfall, indicated that it was conducting audits at places of origin but does not provide public information in order to not disrupt future common approaches.

⁵⁵⁹ It should be noted that the UN Global Compact has been criticized for its non-committal nature. For more information, see www.globalcompactcritics.org.

11 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 coal⁵⁶⁰, biomass⁵⁶¹ and uranium⁵⁶². 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 7 of the 8 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.⁵⁶³

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_x 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’.⁵⁶⁴ Table 40

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

Table 40: 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 (CO₂), methane (CH₄), and nitrous oxide (N₂O), which, according to the United Nations Intergovernmental Panel on Climate Change (IPCC)⁵⁶⁵, 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 (SO₂), mono-nitrogen oxides (NO_x, i.e. NO and NO₂), 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.⁵⁶⁶

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 radioactivity⁵⁶⁷). 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 CO₂ emissions, what they often fail to recognize (or admit) is that the nuclear fuel production chain does emit CO₂ (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.⁵⁶⁸ 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 CO₂ from the atmosphere during its lifetime, then releases this CO₂ 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 SO₂ and NO_x.

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 CO₂ 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 change⁵⁶⁹), 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 CO₂ 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 CO₂ 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 CO₂ emissions to the atmosphere of a fossil fuel-based power plant by approximately 80-90%⁵⁷⁰, 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%.⁵⁷¹
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" CO₂ 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.⁵⁷² 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 CO₂, hydroelectricity can be a significant source of GHG emissions, especially when it involves large reservoirs in tropical climates. CO₂ 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 CO₂ through photosynthesis by plankton and aquatic plants and that this uptake can occasionally exceed CO₂ emissions. However, recent studies suggest that reservoirs also release other GHGs, such as methane (CH₄) and nitrous oxide (N₂O), which are much more potent than CO₂.⁵⁷³ As a result, the World Commission on Dams asserts that "Where other options offer better solutions, they should be favoured over large dams".⁵⁷⁴

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.⁵⁷⁵ 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.⁵⁷⁶

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 CO₂ 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.

⁵⁶⁰ Greenpeace Nederland, "De Wereld achter de Kolenstroom", March 2008, <http://www.greenpeace.org/raw/content/nederland-old/reports/de-wereld-achter-kolenstroom.pdf> (28-06-10); Danwatch, "The Curse of Coal", May 2010, http://www.danwatch.dk/index.php?option=com_content&view=article&id=239&lang=en (19-07-10).

⁵⁶¹ 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).

⁵⁶² LaRRI, "Uranium mining in Namibia; The mystery behind 'low level radiation'", February 2009, http://somo.nl/publications-nl/Publication_3061-nl (28-06-10). Greenpeace International, "Left in the dust, AREVA's radioactive legacy in the desert towns of Niger", April 2010, http://www.greenpeace.org/international/Global/international/publications/nuclear/2010/AREVA_Niger_report.pdf (28-06-2010)

⁵⁶³ NOS Radio 1, "Consumentenbond: Term Groene Stroom is misleidend", radio interview, 23-09-08, <http://www.radio1.nl/contents/1575-consumentenbond-term-groene-stroom-is-misleidend> (17-08-10).

- ⁵⁶⁴ J. Wilde-Ramsing, *Quality Kilowatts: A normative-empirical approach to the challenge of defining and providing sustainable electricity in developing countries* (Amsterdam and Oslo: SOMO and ProSus/SINTEF, June 2009) http://somo.nl/publications-nl/Publication_3170-nl/view (4 September 2009).
- ⁵⁶⁵ Intergovernmental Panel on Climate Change (IPCC), "Climate Change 2007: Synthesis Report", (Valencia, Spain, November 2007), <<http://www.ipcc.ch/ipccreports/ar4-syr.htm>> (26 May 09).
- ⁵⁶⁶ V. Fthenakis and H.C. Kim, "Land use and electricity generation: A life-cycle analysis", *Renewable and Sustainable Energy Reviews*, 2008, in press.
- ⁵⁶⁷ For more information on the classification of radioactive waste and definitions of the various levels of radioactivity, see United Nations International Atomic Energy Agency, "Classification of Radioactive Waste: A Safety Guide", 1994, Vienna, http://www-pub.iaea.org/MTCD/publications/PDF/Pub950e_web.pdf, (7 April 2007).
- ⁵⁶⁸ H. Shinondola-Mote, "Uranium Mining in Namibia: A Blessing or a Curse?" Labour Resource and Research Institute (LaRRI), Windhoek, Namibia, 2008, http://somo.nl/publications-nl/Publication_3004-nl/view, (5 June 2009).
- ⁵⁶⁹ See, for example, B. Wicke et al. 2008. "Different palm oil production systems for energy purposes and their greenhouse gas implications", *Biomass and Bioenergy* 32(12): 1322-1337.
- ⁵⁷⁰ Intergovernmental Panel on Climate Change, "IPCC special report on Carbon Dioxide Capture and Storage". Cambridge University Press, Cambridge and New York, 2005, <www.ipcc.ch> (5 July 2009).
- ⁵⁷¹ Ibid.
- ⁵⁷² International Hydropower Association, *Sustainability Guidelines*, 2004, http://www.hydropower.org/downloads/IHA%20Sustainability%20Guidelines_Feb04.pdf (9 June 2009).
- ⁵⁷³ International Rivers, *Dirty Hydro: Dams and Greenhouse Gas Emissions*, 2008, http://internationalrivers.org/files/dirtyhydro_final_lorez.pdf (16 June 2009).
- ⁵⁷⁴ World Commission on Dams, *Dams & Development: A New Framework for Decision-Making*, 2008, London and Sterling, VA: Earthscan Publications Ltd.
- ⁵⁷⁵ International Hydropower Association, *Sustainability Guidelines*, 2004, http://www.hydropower.org/downloads/IHA%20Sustainability%20Guidelines_Feb04.pdf (9 June 2009).
- ⁵⁷⁶ Eawag, *Annual Report 2007*, Swiss Federal Institute of Aquatic Science and Technology, Dübendorf, Switzerland, 2008, http://www.eawag.ch/services/publikationen/jahresbericht/eawag-jb_07e.pdf (10 May 2009).

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 coal⁵⁷⁷, biomass⁵⁷⁸ and uranium⁵⁷⁹.

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, jatropha, 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		
Total		

⁵⁷⁷ 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).

⁵⁷⁸ 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).

⁵⁷⁹ LaRRI, "Uranium mining in Namibia; The mystery behind 'low level radiation'", February 2009, http://somo.nl/publications-nl/Publication_3061-nl (28-06-10).