Stichting Onderzoek Multinationale Ondernemingen
Centre for Research on Multinational Corporations

Sustainability in the Power Sector

2010 Update - The Netherlands

Tim Steinweg, Albert ten Kate & Kristóf Rácz

November 2010

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Amsterdam, November 2010

Colophon

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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 The Netherlands, and covers the following companies, all active on the Dutch market;

- Delta
- Dong Energy
- E.ON
- Eneco
- GDF Suez/Electrabel
- RWE
- Vattenfall/Nuon

Report structure

After this brief introduction, Chapters 1-8 comprise the ten company fact sheets. Each company fact sheet contains information on four measures of sustainability: the company's current fuel mix for installed capacity and electricity generation in Europe, current fuel mix of electricity supplied in the Netherlands (or Belgium), investments in new generating capacity in Europe, and the socio-economic impacts of the company, with a specific focus on issues present in their supply chains (eg. The sourcing of coal, uranium or biomass). The four thematic fact sheets found in Chapters 9-12 focus on these same four areas and compare the eight companies' performance in each area.

Methods and scope

The selection of companies to include in the fact sheet series is based on a number of considerations. The companies that are covered in the Dutch version of this report are selected because they either have installed capacity in The Netherlands, or are investing in new capacity. They are also all active in the Dutch supply market. The scope of the information varies slightly per section. For all generation capacity and investments, use is made of European figures, excluding Russia but including Turkey. For the supply figures, use is made of figures for The Netherlands.

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

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

Information about SOMO

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

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

1 DELTA

Basic company information

Delta NV is a Dutch multi-utility company that supplies a wide range of products and services: electricity, gas and water, water treatment, solar cells, waste management, radio and television signals, internet, and digital telephony over cable. It is an electricity producer in the Netherlands and manages and maintains the networks for electricity, gas, water, and cable. The company operates across the entire electricity supply chain, from generation and fuel purchasing to industrial end-user sales. Delta's core activity is providing electricity, gas, water, cable, and internet services to domestic customers. The company also services the corporate market with energy, water (including industrial water) and waste management. The company is an important player in the field of industrial and hazardous waste management, whereas domestic waste is also being handled in the Dutch province of Zeeland and in Belgium. From its base in Zeeland, the company's activities extend to the markets across the Netherlands and other parts of the Benelux region. The company's industrial and hazardous waste management services cover the larger part of South and Western Europe.

Delta's energy activities are carried out through the following divisions:

- Energy: Energy production, energy supply, energy supply to large business clients
- Comfort: Energy supply to households and small business clients
- Biofuels; production of biodiesel
- Solland and Sunergy; two solar power subsidiaries

Other divisions include Infra, Delta Networks (DNWB, will be renamed in 2010), Waste Management Services and a participation in the water company Evides.

Although Delta has been contacted several times during the research for this paper, SOMO didn't get any reaction from the company. This is the reason that the data presented here have not been verified by Delta.

Installed capacity in Europe

Figure 1 reveals the fuel mix of Delta's electricity generation capacity in 2009. Delta's total generating capacity in the Netherlands is just below 1200 MW.

In 2009 the generation capacity increased with almost 30%. The increase is largely due to the newly built gas powered Sloe power plant in Vlissingen (NL), which was operational in the second half of 2009. Also in 2009 Delta opened its new solar panel park in Willebroek (BE). Regarding natural gas, all of Delta's gas powered plants are equipped with combined cycle gas turbines (CCGT).

Figure 1: Fuel mix of Delta's installed capacity in Europe, 2009

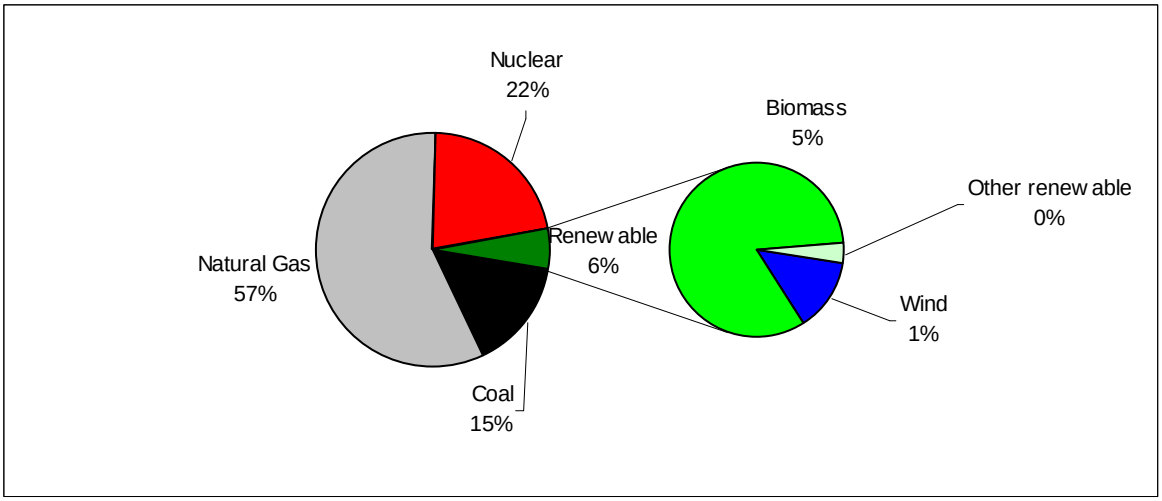


Table 1 gives the absolute figures of Delta's installed capacity in MW's. Figures are based on Delta's list of plants on its site and the share Delta has in these plants.[1]

Table 1: Fuel mix of Delta's installed capacity in Europe, 2009

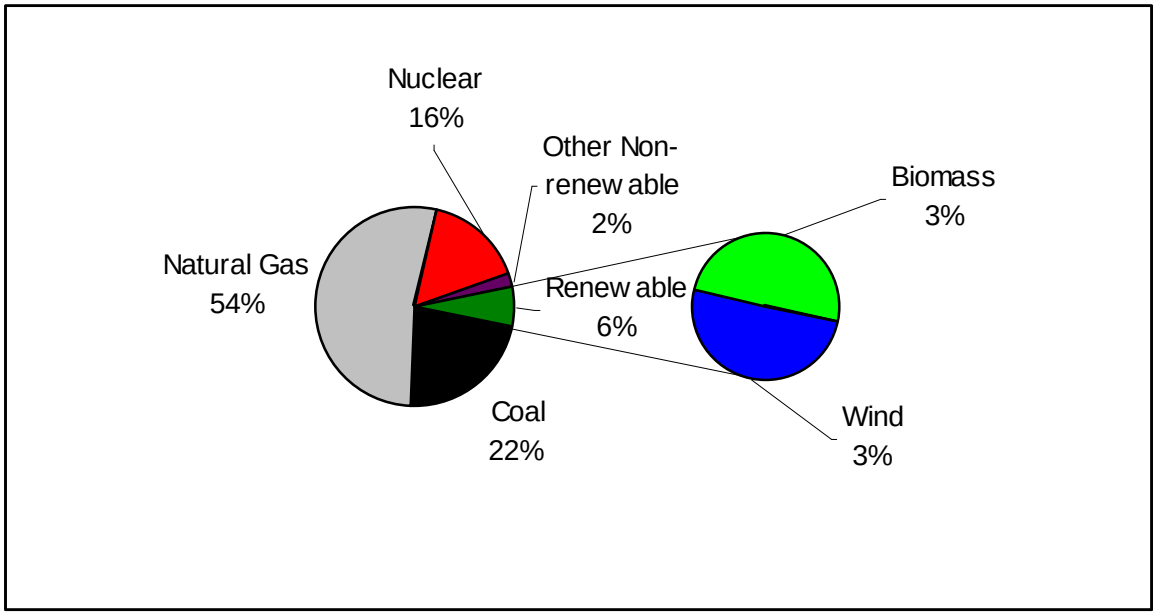
Fuel type	2009 Installed Capacity (MW)
Coal	176.8[2]
Natural Gas (CCGT)	687[3]
Oil	0
Nuclear	256[4]
Other Non-renewable	0
Wind	8.5[5]
Hydro	0
Large scale (>10MW)	0
Small scale (<10MW)	0
Biomass	54.45[6]
Stand alone	18.25[7]
Co-fired	36.2[8]
Other renewable	2.6[9]
Total	1,185.35

Delta does not provide any figures about the generated electricity in 2009.

Electricity supplied in the Netherlands

Figure 2 shows the fuel mix of electricity supplied by Delta in the Netherlands, and Table 2 presents the CO_2 emissions and radioactive waste production resulting from the generation of the electricity that Delta supplies in the Netherlands. As explained in the methodology chapter, the figures might be influenced by the purchase and trade of green certificates, and do not necessarily reflect the fuel mix received by consumers.

Figure 2: Fuel mix of electricity supplied by Delta in the Netherlands, 2009



Based on: DELTA stroometiket 2009[10]

Table 2 indicates the emissions and radioactive waste resulting from Delta's electricity supply in the Netherlands.

Table 2: Emissions and waste resulting from Delta's electricity supply, 2009

Indicator	Amount
CO_2 (g/kWh)	390
Radioactive waste (µg/kWh)	490

Based on: DELTA stroometiket 2009[11]

Investments in new generation capacity in Europe

Delta's aim is to be CO_2-neutral in its production by 2050. To be able to do this, the company wants to invest in the enlargement of the Borssele nuclear power plant, which when ready, would double Delta's total installed capacity. As this would require a huge investment on Delta's part, it is questionable whether Delta will be able to remain independent in the future. Independence on the Dutch energy market is one of Delta's formulated goals for the future.[12]

Delta is investing in two wind farms in the Benelux region and is building a biomass powered plant in Ireland. For more detail see Table 3.

Table 3: Delta's investments in new production capacity

Project name	Location	Fuel Type	Date in operation	Amount (million €)	Output Capacity (MW)	Project Status
Enlargement wind farm Kreekraksluis[13]	Kreekrak (NL)	Wind	2012[14]	108.5[15]	75[16]	under construction[17]
Enlargement wind farm St Vith	St Vith (BE)	Wind	n/a	n/a	n/a[18]	under construction[19]
Waste burning plant	Meath (IE)	Biomass	2011	n/a	15[20]	under construction[21]

Table 4 shows the company's investment plans that have been announced, but are not yet underway. Delta's biggest investment plan financially and capacity wise is the enlargement of the Borssele nuclear power plant, for which the company is still looking for an investment partner.

Table 4: Delta's announced plans for investment in new capacity

Project name	Location	Fuel Type	Date in operation	Amount (million €)	Output Capacity (MW)	Status
Enlargement Sloecentrale	Vlissingen (NL)	Gas (CCGT)	n/a	n/a	225[22]	Planning phase[23]
Borssele II	Borssele (NL)	Nuclear	2018[24]	750[25]	2500[26]	Permit application phase[27]
Tidal power station	Brouwersdam (NL)	Hydro	n/a	n/a[28]	55[29]	Planning phase[30]

Responsible sourcing

Delta has a section 'sustainability' on its website, with the formulated goal to be producing CO_2 neutral by 2050.[31] In its annual report Delta has a chapter on CSR. Here the company expresses its aim to besides producing CO_2-neutral, also to apply this policy in its own company.[32]

Sources of fuels and electricity trading

Delta has no public information on the amounts of coal, biomass and uranium used in its production processes. Regarding the sourcing of its fuels, Delta uses, amongst others, uranium from Australia, Canada and Kazakhstan.[33] No public information was found regarding the sources of biomass and coal. Also Delta's policy on energy trading is unknown.

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1 Delta website, over Delta, Stakeholder, Wat doet en waar vindt u Delta, Deelnemingen Delta, http://www.delta.nl/over_DELTA/stakeholders/wat_doet_en_waar_vindt_u_DELTA/deelnemingen_DELTA/ (10/06/2010)

2 The total capacity of the coal powered Borssele plant is 426 MW, Delta has a 50% share, from this share 83% is powered by coal and 17% by biomass. EPZ website, Kolencentrale, http://www.epz.nl/content.asp?kid=10000036 and http://www.epz.nl/content.asp?kid=10031712&fid=-1&bid=10032132 (10/06/2010)

3 The capacity of 687 MW is composed of 435 MW from the gas powered CCGT Sloecentrale (total capacity is 870 MW, Delta has a 50% share) and 252 MW from the AES ELSTA plant (CCGT) (total capacity is 630 MW, 1/5 is used by DOW Benelux, the remaining electricity is divided between Essent and Delta). Sources: Sloecentrale website, Het project, http://www.sloecentrale.nl/nl/ AES ELSTA bv website, Informatie,

http://www.dekanaalzone.nl/pages/bedrijven/popups/index.php?id=1; AES Corporation website, Global Presence, Europe, Netherlands, http://www.aes.com/aes/index?page=country&cat=NL (10/06/2010)

4 The total capacity of the nuclear part of plant Borssele is 512 MW. Delta has a 50% share. EPZ website, Kerncentrale, http://www.epz.nl/content.asp?kid=10000037 (10/06/2010)

5 The capacity of 8.5 MW is composed of 6 MW from the Borssele plant and 2.5 MW from Windpark Distridam. Total capacity is double for the two, but Delta has a 50% share in both projects. Source: EPZ website, Windpark, http://www.epz.nl/content.asp?kid=10000038 and Windpark Distridam website, http://www.raedthuys.nl/projectoverzicht-windenergie/windpark-distridam.html (10/06/2010)

6 The capacity of 54,45 MW is composed of 18,25 MW (stand alone) from the BMC Moerdijk plant and 36,2 MW (co-fired) from the Borssele plant. (10/06/2010)

7 The total capacity of the BMC Moerdijk biomass plant is 36,5 MW, Delta has a 50% share. BMC Moerdijk website, http://www.bmcmoerdijk.nl/index2.php?pid=2 (10/06/2010)

8 The total capacity of the coal powered Borssele plant is 426 MW, Delta has a 50% share, from this share 83% is powered by coal and 17% by biomass. EPZ website, Kolencentrale, http://www.epz.nl/content.asp?kid=10000036 and http://www.epz.nl/content.asp?kid=10031712&fid=-1&bid=10032132 (10/06/2010).

9 The solar panel park in Willebroek (B). Delta Annual Report 2009, p. 8.

10 Delta website, Stroometiket 2009, http://www.delta.nl/Media/pdf/thuis/stroometiket_2009 (10/06/2010)

11 Ibid.

12 Delta website, Over Delta, Kernenergie, http://www.delta.nl/over_DELTA/kernenergie/ (23/06/2010)

13 Windpark Kreekraksluis bv is owned by Delta, however Eneco also has a share in the project. Windpark Kreekraksluis website, Project, Initiatiefnemers, http://www.windparkkreekraksluis.nl/generator.php?id=11 (10/06/2010)

14 Windpark Kreekraksluis website, Project, http://www.windparkkreekraksluis.nl/generator.php?id=9 (10/06/2010)

15 Ibid. The invested amount is estimated between 87M euro and 130M euro.

16 Reported capacity is 60-90 MW, for which the average of 75 MW is used for calculation. Windpark Kreekraksluis website, Veel gestelde vragen, http://www.windparkkreekraksluis.nl/faq.php?id=13 (10/06/2010) Current capacity is 13 MW. The Wind Power website, Wind Farms, Europe, http://www.thewindpower.net/wind-farm-6161.php (14/06/2010).

17 Delta Annual Report 2009, p. 20.

18 Current capacity of wind farm St Vith is 0.5 MW. The Wind Power website, Wind Farms, Europe, http://www.thewindpower.net/wind-farm-10.php (14/06/2010)

19 Delta Annual Report 2009, p. 19.

20 Total capacity is 20 MW, Delta has a 75% share.

21 The plant is being built by Indaver, which is member of Delta. Indaver CSR report 2009, p. 36.

22 Current capacity is 870 MW (two turbines), the planned expansion would mean the construction of a new 450 MW turbine. Delta and EDF have both a 50% share. J. Kutterink, “Elektriciteitsfabriek in Vlissingen-Oost vandaag geopend - Delta wil centrale uitbreiden”, PZC, 12 February 2010

23 Ibid.

24 D. Bosscher, “Kernenergie, ja! (of we willen of niet)”, Vrij Nederland, 7 November 2009, p. 34.

25 The total costs for the new nuclear plant in Borssele will be around EUR 4-5 bn, Delta is planning to invest between 500M – 1bn and is looking for investment partners. J. Kutterink, “Tweede kerncentrale kan met (buitenlandse) partner worden gebouwd”, PZC, 2 April 2010.

26 D. Bosscher, “Kernenergie, ja! (of we willen of niet)”, Vrij Nederland, 7 November 2009, p. 34. At this point, Delta is still the sole investor in the new nuclear plant. The company has indicated that it is looking for investment partners, but none have been announced up to date. Therefore, the entire capacity of the new plant is taken up in this profile.

27 “Kernenergie staat overal weer op de agenda”, Dagblad De Pers, 11 November 2009, p. 10.

28 Costs for the tidal power station not known yet, Delta will probably have a share in the project of the province Zeeland. L. van Heel, “Duikers straks naar de Grevelingen voor het grootste afgezonken wrak”, AD Rivierenland, 19 January 2010, p. 25.

29 Reported capacity is 50-60 MW, for which the average of 55 MW is used for calculation.

30 Website Provincie Zeeland, Milieu en natuur, Duurzaam ondernemen, Projecten, Duurzame Energie, Getijdencentrale, http://provincie.zeeland.nl/milieu_natuur/duurzaam_ondernemen/projecten/duurzame_energie/getijdencentrale (18/06/2010)

31 Delta website, Over Delta, Duurzaam, http://www.delta.nl/over_DELTA/duurzaam/ (16/06/2010)

32 Delta Annual Report 2009, p. 14.

33 “Visie op brandstofmix in Nederland” Delta brochure, Delta website, Over Delta, Duurzaam, Fossiele brandstoffen, http://www.delta.nl/over_DELTA/duurzaam/fossiele_brandstoffen/ (18/08/2010)

2 Dong Energy

Basic company information

Dong Energy is an energy company that is majority owned by the Danish state. It was originally founded to manage the country's energy resources in the North Sea, and the company has been active in the electricity sector since the early 2000s. Currently, Dong Energy's business is based on procuring, producing, distributing, and trading in energy and energy-related products in Northern Europe. Dong Energy has operations in Denmark, the Netherlands, the UK, Sweden, Norway and Germany.[34]

Dong Energy's activities are structured in four business units: Exploration & Production explores for and produces gas and oil in the North Sea, primarily in the areas around Denmark, the UK, the Faroer Islands, Greenland, and Norway; Generation is the unit in which all the company's generation activities are located, primarily focusing on wind power and coal; Energy Markets is responsible for the company's energy trading activities and the selling of energy to wholesale consumers; and Sales & Distribution sells gas, energy, and services to consumers in Denmark, Sweden, Germany, and the Netherlands.[35]

Dong Energy has approximately 6,000 employees and generated just under DKK 60 billion (EUR 6.6billion) in revenue in 2009.[36] Its activities in the Netherlands are currently only focused on energy supply, but the company has bought 50% of Enecogen, a natural gas-fired power station in Rotterdam, which will be operational in 2011.[37]

Installed capacity for electricity generation in Europe

Dong Energy provides detailed information about its generation facilities on its website and gives a breakdown of the various types of renewable fuel sources it uses. 83% of Dong Energy's power production in 2009 came from thermal power plants of which the majority are fossil fuelled. The remainder came from hydro power and on- and offshore wind farms.[38] For the thermal facilities, the company makes the distinction between "central power stations" (where 80% of the company's electricity is generated[39]) and "small-scale power stations". Dong also mentions that their primary fuel source is coal, representing 70% of all fuels used.[40] Regarding natural gas, all of Dong Energy's gas powered plants are combined heat and power (CHP) plants.

All of Dong Energy's thermal facilities are located in Denmark. Its wind parks are located in Denmark, the UK, Poland, Norway Sweden and France, while the company's only hydro plant (in which Dong has the rights to generate electricity) is located in Sweden.[41]

Figure 3 shows the fuel mix of Dong Energy's installed capacity in Europe.

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

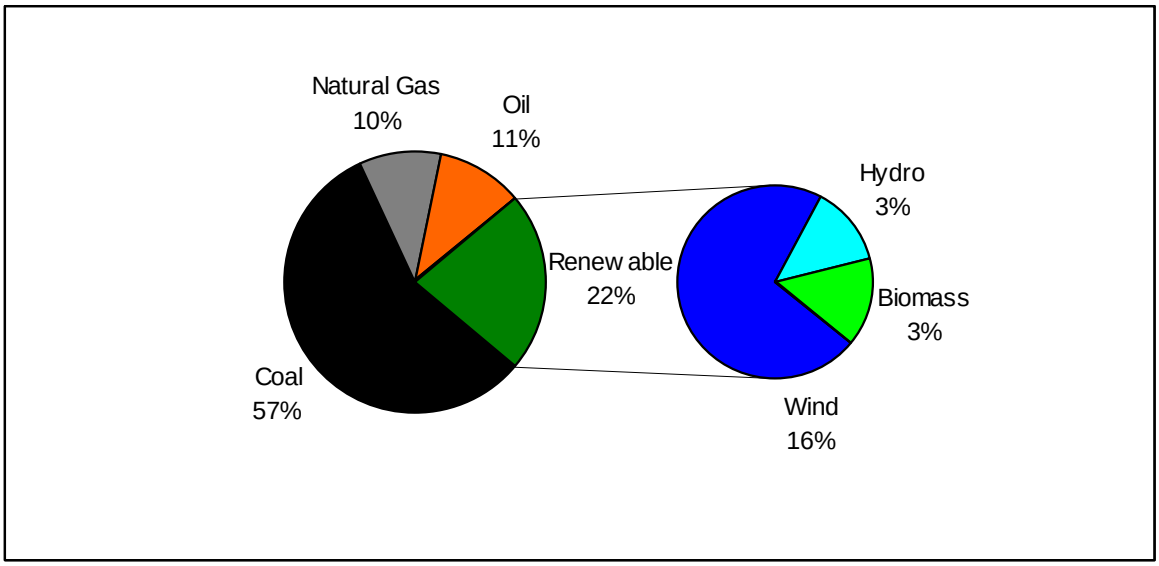
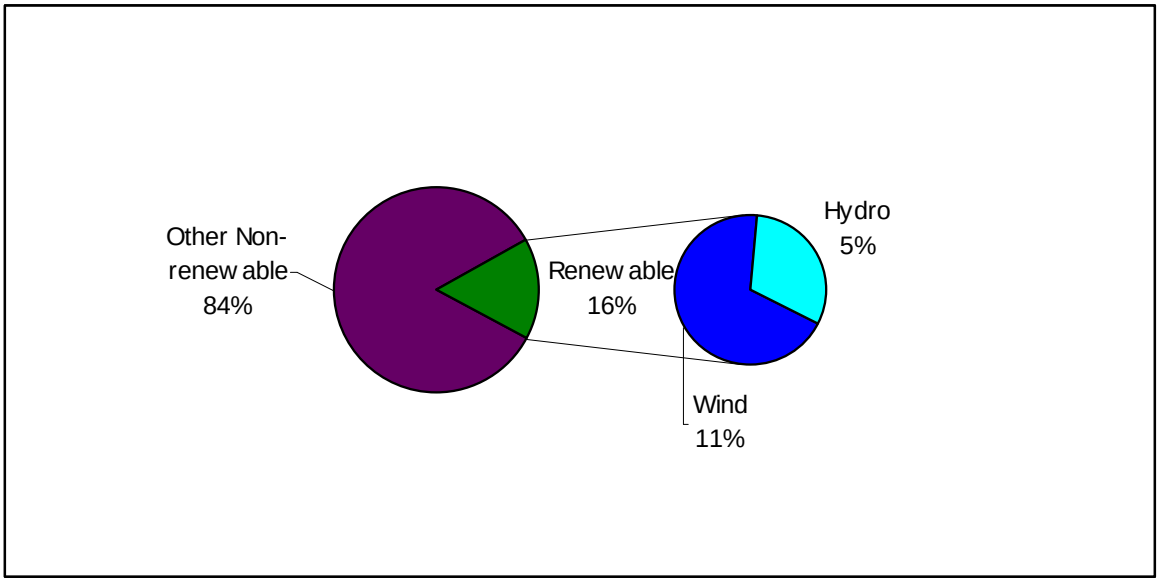


Figure 4 shows the fuel mix of the electricity that was generated by Dong Energy in Europe in 2009. It has to be noted that the figures for coal, natural gas and oil are included in the category 'other non-renewable'. A surprising fact is that the company has 3% installed capacity in biomass plants, but did not generate any electricity from these plants in the year 2009.

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



Regarding the electricity generated, Dong Energy does not publish any information for its non-renewable fuel types. The only distinction the company makes is 'thermal generation' (not renewable) with 15,264 GWh and 'renewable generation' with 2,810 GWh, totalling up to 18,074 GWh electricity generated in 2009.[42] Within 'renewable generation' a distinction is made between electricity generated in wind farms and in hydro plants[43], for these numbers see Table 5.

Table 5 shows the absolute figures of the fuel mix of Dong Energy's installed capacity (in MW) and generated electricity (in GWh) in 2009. For the non-renewable electricity generated, the figures for coal, natural gas (CHP) and oil are included in the figure for 'other non-renewable'.

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

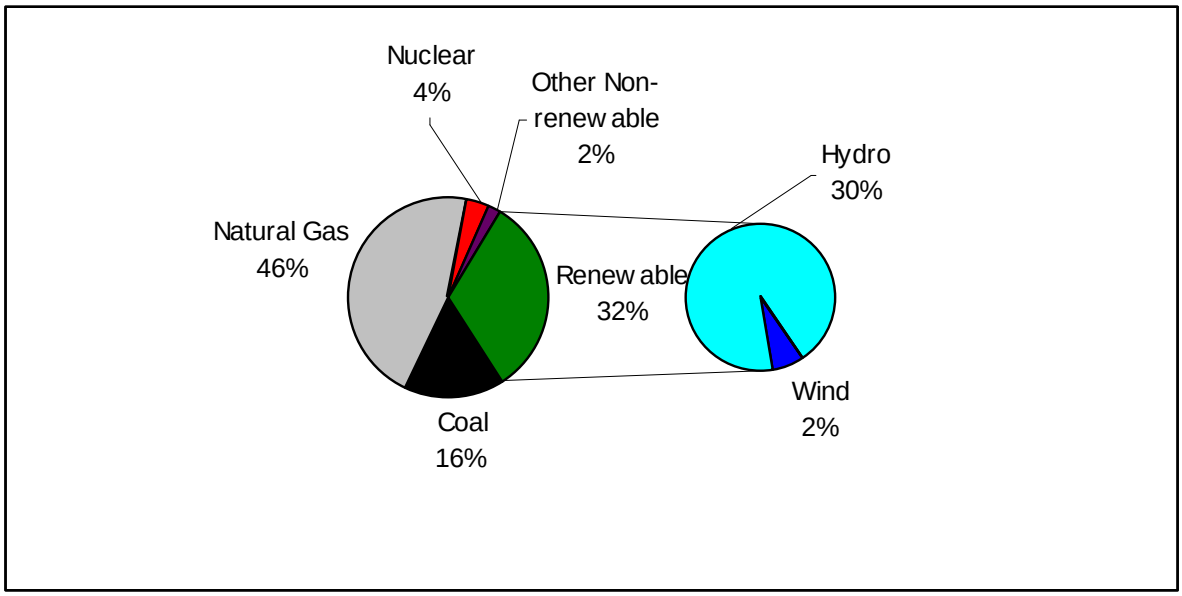
Fuel type		Installed Capacity (MW)	Electricity generated (GWh)
Coal		3,987[44]	n/a[45]
Natural Gas (CHP)		723[46]	n/a[47]
Oil		752[48]	n/a[49]
Nuclear		0	0
Other non-renewable		-	15,264[50]
Wind		1,104[51]	1,929[52]
Hydro		205[53]	881[54]
	Large scale (>10MW)	205[55]	881
	Small scale (<10MW)	0	0
Biomass		232	0
	Stand alone	154[56]	0
	Co-fired	78[57]	0
Other renewable		0	0
Total		**7,003**	**18,074[58]**

Electricity supplied in the Netherlands

Dong Energy is a relatively new player in the Dutch electricity supply market, having been active in the Netherlands only since 2005 when the company purchased Intergas Levering. Since 2007 the company operates under the name of the Danish mother company, Dong Energy.[59]

Figure 5 shows the fuel mix of the electricity generated by Dong Energy in the Netherlands: the two main sources of electricity generation are natural gas and hydropower. As explained in the methodology chapter, the figures might be influenced by the purchase and trade of green certificates, and do not necessarily reflect the fuel mix received by consumers.

Figure 5: Fuel mix of electricity supplied by Dong Energy in the Netherlands, 2009



Based on: Dong stroometiket 2009[60]

Table 6 indicates the emissions and radioactive waste resulting from Dong Energy's electricity supply in the Netherlands.

Table 6: Emissions and waste resulting from Dong's electricity supply, 2009

Indicator	Amount
CO_2 (g/kWh)	315.7
Radioactive waste (µg/kWh)	122

Based on: Dong stroometiket 2009[61]

Investments in new generation capacity in Europe

Dong Energy's focus on northern Europe is reflected in the company's investments in new generation capacity. Dong's current investments all take place in the UK, Norway, the Netherlands and Poland. Most of the investments are in new wind capacity, while there are also three new natural gas fuelled plants currently under construction.

Table 7 shows the company's investments in new capacity currently underway.

Table 7: Dong's announced investments in new production capacity

Project name	Location	Fuel Type	Date in operation	Amount (million €)	Output Capacity (MW)	Project Status
Severn[62]	Wales (UK)	Natural gas (CCGT)	End of 2010	671[63]	824[64]	Under construction
Enecogen	Rotterdam (NL)	Natural gas (CCGT)	End of 2011	336[65]	435[66]	Under construction
Mongstad[67]	Mongstad (N)	Natural gas (CHP)	2010[68]	371[69]	260	Under construction[70]
Karcino	Poland	Wind	Q2 2010	81[71]	51	Construction complete[72]
Walney	Walney Island (UK)	Wind	2011	900[73]	275[74]	Under construction
London Array	UK	Wind	2012	1,134[76]	315[77]	Onshore

Phase I[75]						construction started[78]
Nygårdsfjellet 2	Narvik (N)	Wind	2011[79]	27[80]	17[81]	Under construction
Mehuken 2	Vågsøy (N)	Wind	2010	20[82]	6[83]	Under construction
Gunfleet Sands 1	UK	Wind	2010[84]	350[85]	108[86]	Construction complete[87]
Gunfleet Sands 2	UK	Wind	2010[88]	150[89]	64[90]	Construction complete[91]

Dong is planning to suspend the operations of two coal-fired power station units in the second quarter of 2010. The two units, at Studstrup Power Station near Århus and Asnæs Power Station near Kalundborg, have a total capacity of 980 MW. Overall, this means that Dong Energy's coal-based power station capacity in Denmark will be reduced by around 25%.[92] Besides the planned closure of the two coal-powered stations mentioned, Dong decided in 2009 to cease building new coal-fired power stations. This also applies to the project exploring the opportunities of building a 1,620-MW coal-powered station at Greifswald in Germany. Whether Dong Energy will withdraw the application for the power station, or sell the project rights is not clear.[93] Besides the Greifswald project, the company also dropped out of the planned construction of two 1.600 MW coal plants: one near Hunterston in Scotland (with a total budget of EUR 3.7 bn (GBP 3 bn)) and the other near Emden in Germany. The reasons for the decision are the falling revenues due to the economic and financial crisis.[94]

As for wind energy, Dong Energy is currently constructing wind farms with a total capacity of just under 1,000 MW and has announced the development of projects with another 1400 MW total capacity. This means that the company is on its way towards its target of a total wind turbine capacity of 3,000 MW by 2020.[95] Dong Energy has signed an agreement with Siemens for the supply of 1,800 MW of wind turbines, for a total investment of between €2 billion and €3 billion. The turbines will be used for the Anholt, Walney, London Array and Lincs projects, among others.[96]

Under the heading 85/15, Dong Energy has set itself the target to reduce CO_2 emissions to the effect that by 2040 85% of the company's energy production will derive from CO_2-free sources of energy.[97] Dong Energy's other goal with wind power is to become one of the top three suppliers of wind power in the world by 2012.[98]

Table 8 shows the company's investment plans that have been announced, but are not yet underway.

Table 8: Dong's announced plans for investment in new capacity

Project name	Location	Fuel Type	Date in operation	Amount (million €)[99]	Output Capacity (MW)	Status
Lincs	Lincolnshire (UK)	Wind	2012[100]	224[101]	67.5[102]	Planning phase
Burbo Bank extension	Liverpool Bay (UK)	Wind	2016[103]	n/a	234[104]	Early planning[105]
Westermost Rough	Yorkshire (UK)	Wind	2014	n/a	245[106]	Application submitted
Anholt	Anholt island (D)	Wind	2013[107]	134[108]	400[109]	Permits granted
West of Duddon Sands	Irish Sea (UK)	Wind	2012[110]	n/a	167[111]	Consented[112]

Wigtown Bay	Irish Sea (UK)	Wind	2017	n/a	280[113]	Early planning[114]
Humber Renewables[115]	Hull (UK)	Biomass	2016[116]	n/a	300[117]	Announced
Borkum Riffgrund 1&2	Germany	Wind	2015[118]	43[119]	277[120]	Consent authorised
London Array, phase II[121]	UK	Wind	2014	666[122]	185[123]	Announced

Responsible sourcing

Dong Energy publishes a CSR report, a *Quality, Health, Safety and Environmental (QHSE) report* (for its division Exploration & Production) and Responsibility targets[124] on a yearly basis and has a 'Responsibility' section on its website. In addition, the company has a code of conduct for suppliers. This code of conduct is not publicly accessible, although it is available upon request. The document specifies the obligations for its suppliers regarding labour rights, like fair working hours, non-discrimination and child labour as well as corruption measures and environmental standards. Dong Energy's code of conduct forms a part of the contract with suppliers also including suppliers of raw materials.[125] The company mentions on its website that it does inspection visits and third party audits at selected suppliers.[126]

Dong Energy is reporting according to the Global Reporting Initiative's (GRI) sustainability reporting guidelines (GRI3) and uses third party verification for these indicators.[127]

Sources of fuels[128]

Biomass

Approximately all of the biomass used is produced in Europe. The types of biomass which are utilized by Dong Energy include wood chips, wood pallets and straw.

Coal

Table 9 gives an overview of the origin of coal used by Dong Energy in production.

Table 9: The origin of coal used in production by Dong Energy in 2009 (in %)

Country of origin	Percentage
South Africa	16
USA	11
Norway	4
Australia	4
Poland	1
Russia	37
Colombia	27
TOTAL	**100**

Electricity trading

Dong Energy buys as well as sells most of its own electricity on the Nord Pool power exchange. As the transactions happen on an exchange, the counterpart is not known. The fuel mix of the electricity bought on the market is determined by the Danish transmission system operator Energinet.dk.[129]

The total electricity generated in 2009 amounted to 18,074 GWh. The power sales to end customers was 10,723 GWh, of which 8,529 GWh was generated by Dong Energy itself, the rest was bought on Nord Pool.[130]

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[34] Dong website, About us, History, http://www.dongenergy.com/EN/About%20us/history/Pages/history.aspx (28/06/2010)
[35] Dong website, About us, Dong Energy in brief, Backgrounder, http://www.dongenergy.com/en/about%20us/dong%20energy%20in%20brief/pages/background.aspx (28/06/2010)
[36] Dong annual report 2009, p. 2.
[37] Dong annual report 2009, p. 43.
[38] Dong website, Business activities, Generation, Electricity generation, http://www.dongenergy.com/en/business%20activities/generation/electricity%20generation/pages/electricity%20generation.aspx (28/06/2010)
[39] Dong website, Business activities, Generation, Electricity generation, Thermal generation, http://www.dongenergy.com/en/business%20activities/generation/electricity%20generation/thermal%20generation/pages/thermal%20generation.aspx (24/06/2010).
[40] Dong website, Business activities, Generation, Electricity generation, Thermal generation, Fuel, http://www.dongenergy.com/en/business%20activities/generation/electricity%20generation/thermal%20generation/pages/fuel.aspx (24/06/2010).
[41] Dong also has hydro facilities in Norway, but the company only has a financial stake in these and these will be sold in 2010. Dong website, Business activities, Generation, Electricity generation, Hydro, http://www.dongenergy.com/en/business%20activities/generation/electricity%20generation/pages/hydro.aspx (24/06/2010); "Dong Energy divests hydro assets in Norway for EUR 268.9m", ADP News Renewable Energy Track, June 25, 2010.
[42] Dong annual report 2009, p. 5.
[43] It should be noted that Dong applies a different definition of 'renewable energy'. It does not consider biomass a renewable fuel, and therefore only lists its wind and hydro facilities for its renewable generation capacity.
[44] The 3987 MW capacity is composed of Dong's several coal-fired central power stations. However, it has to be noted that the Studsturp power station with a total capacity of 700 MW, which is fuelled by oil, coal and biomass is also included this amount. Dong website, Business activities, Generation, Studsturp power station, http://www.dongenergy.com/EN/business%20activities/generation/electricity%20generation/Primary%20power%20stations/Pages/Studstrup%20Power%20Station.aspx (24/06/2010).
[45] Figures are included in the generation figures of "other non-renewable".
[46] The 723 MW capacity is composed of Dong's several CHP gas-fired central power stations and small-scale plants. However, it has to be noted that the both the Skaerbaek station with 392 MW and the Svanemolle station with 81 MW, which are fuelled by gas and oil are included in this amount. Dong website, Business activities, Generation, Skaerbaer power station and Svanemolle power station, http://www.dongenergy.com/en/business%20activities/generation/electricity%20generation/primary%20power%20stations/pages/skaerbaek%20power%20station.aspx and http://www.dongenergy.com/en/business%20activities/generation/electricity%20generation/primary%20power%20stations/pages/svanemolle%20power%20station.aspx (24/06/2010).
[47] Figures are included in the generation figures of "other non-renewable".
[48] The 752 MW capacity is composed of 740 MW from the Kyndby station and 12 MW from the Herning CHP plant. .However, it has to be noted that the Studstrup Power Station, the Skærbæk Power Station and the Svanemølle Power Station also co-fire with oil, but these capacity figures are taken up in the figures for coal and gas, respectively. This is due to the fact that no information was found on the ratio's of co-firing for these plants. Dong website, Business activities, Generation, Kyndby power station and Herning CHP plant, http://www.dongenergy.com/en/business%20activities/generation/electricity%20generation/primary%20power%20stations/pages/kyndby%20power%20station.aspx and http://www.dongenergy.com/en/business%20activities/generation/electricity%20generation/small_scale_chp_plants/pages/herning%20chp%20plant.aspx (24/06/2010).
[49] Figures are included in the generation figures of "other non-renewable".
[50] The 15,264 Gwh electricity generated includes the figures for coal, natural gas and oil, as Dong does not report separately on these figures. Dong annual report 2009, p. 5.
[51] Dong annual report 2009, p. 44. The total wind capacity of 1,104 MW is the sum of Dong's onshore and offshore wind farms. Dong Energy's response to a draft version of this profile, email received 06/08/2010.
[52] Dong annual report 2009, p. 44.
[53] Dong annual report 2009, p. 45.
[54] Dong annual report 2009, p. 44.
[55] Dong only has large scale hydro plants, in June 2010 the company divested their shares in Salten Kraftsamband hydro power station (NOR) and only have a minority stake in Indalsälven (SWE) left. Dong Energy's response to a draft version of this profile, email received 06/08/2010.
[56] The 154 MW capacity is composed of Dong's several small scale plants and waste-to-energy plants. Dong website, Business activities, Generation, Electricity Generation, Small-scale CHP plants and Waste-to-energy plants http://www.dongenergy.com/en/business%20activities/generation/electricity%20generation/small_scale_chp_plants/pages/small-scale%20chp%20plants.aspx and

http://www.dongenergy.com/en/business%20activities/generation/electricity%20generation/waste_to_energy_plants/pages/wastetoenergy%20plants.aspx (24/06/2010).

[57] The 78 MW capacity is composed of 67 MW from the Herning CHP plant (total capacity is 95 MW, of which 70% biomass, 17% gas and 13% oil) and 11 MW from the Greena CHP plant (total capacity is 18 MW, of which 60% biomass and 40% coal). However, it has to be noted that both the Ensted Power Station and the Studstrup Power Station co-fire with biomass, but these capacity figures are taken up in the figures for coal. This is due to the fact that no information was found on the ratio's of co-firing for these plants. Dong website, Business activities, Generation, Herning CHP plant and Greena CHP plant, http://www.dongenergy.com/en/business%20activities/generation/electricity%20generation/small_scale_chp_plants/pages/herning%20chp%20plant.aspx and http://www.dongenergy.com/en/business%20activities/generation/electricity%20generation/small_scale_chp_plants/pages/grenaa%20chp%20plant.aspx (24/06/2010).

[58] Dong annual report 2009, p. 40.

[59] Dong Energy Nederland website, Alles over Dong Energy, Wie is Dong Energy, http://www.dongenergy.nl/over-dong-energy/alles-over-dong-energy/Pages/wie-is-dong-energy.aspx (24/06/2010).

[60] Dong website, Gas en stroom, Stroometiket, http://www.dongenergy.nl/web/gas-en-stroom/Pages/stroometiket-dong-energy.aspx (21/06/2010)

[61] Ibid.

[62] Dong annual report 2009, p. 43.

[63] Platts Power in Europe, "PIE's new plant tracker" May 3, 2010, p. 9.

[64] Dong website, Severn Power Station, About Severn, http://www.dongenergy.com/severnpower/About_Severn/Pages/About_Severn.aspx (29/06/2010)

[65] The amount Dong invests in the project is DKK 2.5 bn. Currency conversion rates of 29/06/2010 used, www.xe.com; Platts Power in Europe, "PIE's new plant tracker" May 3, 2010, p. 9.

[66] Total capacity of the Enecogen plant will be 870 MW, which is a 50-50 joint venture between Dong and Eneco. Dong annual report 2009, p. 43.

[67] Mongstad is a combined heat and power plant (CHP), which is part of the Mongstad Energy Project, supplying power to Statoil's nearby refinery. Dong annual report 2009, p. 43; Dong website, Business Activities, Generation, Electricity Generation, Central Power stations, Mongstad Power Station, http://www.dongenergy.com/en/business%20activities/generation/electricity%20generation/primary%20power%20stations/pages/mongstad%20power%20station.aspx (21/06/2010)

[68] Ibid.

[69] Platts Power in Europe, "PIE's new plant tracker" May 3, 2010, p. 9.

[70] Dong annual report 2009, p. 43.

[71] The amount Dong invests is DKK 600 million. Currency conversion rates of 21/06/2010 used, www.xe.com; Ecoseed website, http://www.ecoseed.org/en/general-green-news/green-politics/green-policies/americas/index.php?option=com_content&view=article&id=1077&Itemid=207 (21/06/2010)

[72] Dong annual report 2009, p. 44.

[73] Total costs for the Walney offshore wind farm is EUR 1.2 bn. Dong has a 47.9% share. Currency conversion rates of 21/06/2010 used, www.xe.com; Dong website, Walney, News, "DONG Energy sells minority stake in Walney Offshore Wind Farm" December 23, 2009, http://www.dongenergy.com/Walney/News/data/Pages/DONGEnergysellsminoritystakeinWalneyOffshoreWindFarm.aspx (21/06/2010)

[74] Total capacity of the Walney offshore wind farm is 367 MW, Dong sold 25.1% of the project in December 2009. Dong annual report, p. 44.

[75] Construction is scheduled in two phases, phase one is expected to be operational in 2012 with a total capacity of 630MW, the rest is to be completed in 2014. Power-technology website, Industry Projects, "London Array Offshore Wind Farm, United Kingdom" http://www.power-technology.com/projects/london-array/ (21/06/2010)

[76] Total costs for the two phases will be GBP 3 bn (EUR 3.6 bn), Currency conversion rates of 21/06/2010 used, www.xe.com; Dong has a 50%share. The EUR 1134 mln investment is calculated according to the ratio's of installed capacity between phase I and phase II: 315 MW – 185 MW. Ibid

[77] Total capacity after the construction of the two phases will be 1000 MW, Dong has a 50% share. Ibid. Final investment decision has only been taken on phase I. For this, total capacity is 630 MW. DONG Energy's share is 315 MW due to 50 percent ownership. Dong Energy's response to a draft version of this profile, email received 06/08/2010.

[78] For phase one, offshore construction is scheduled to start early 2011. London Array website, The project, Provisional construction programme, http://www.londonarray.com/about/provisional-construction-programme/ (21/06/2010)

[79] Recharge website, "Siemens bags $170m turbine order for Norwegian wind farm" http://www.rechargenews.com/energy/wind/article202338.ece (21/06/2010)

[80] Total costs for the project are DKK 300 mln, Currency conversion rates of 28/06/2010 used, www.xe.com; Dong has a 67% share. Dong website, Investor, Company announcements, "DONG Energy Builds Wind Farm in Northern Norway", August 7, 2009, http://www.dongenergy.com/EN/Investor/releases/Pages/omx%20feed%20list%20details.aspx?omxid=404674 (28/06/2010)

[81] Total capacity is 25.3 MW, Dong has a 67% share. Dong annual report 2009, p. 44.

[82] Dong Energy's response to a draft version of this profile, email received 06/08/2010.

[83] Total capacity is 18.4 MW, Dong has a 33% share. Dong website, Generation, Renewable energy, Mehuken, http://www.dongenergy.no/en_/generation/renewable_energy/pages/mehuken.aspx (28/06/2010)

[84] Dong website, Gunfleet Sands, About Gunfleet Sands, http://www.dongenergy.com/Gunfleetsands/GunfleetSands/AboutGFS/Pages/default.aspx (28/06/2010)
[85] Dong Energy's response to a draft version of this profile, email received 06/08/2010.
[86] Dong website, Gunfleet Sands, About Gunfleet Sands, http://www.dongenergy.com/Gunfleetsands/GunfleetSands/AboutGFS/Pages/default.aspx (28/06/2010)
[87] Both Gunfleet Sands projects became operational in March 2010. Dong website, Gunfleet Sands, About Gunfleet Sands, Press Releases, "DONG Energy supplying green energy to the British", June 15, 2010 http://www.dongenergy.com/Gunfleetsands/GunfleetSands/News_and_events/data/Pages/DONGEnergysupplyinggreenenergytotheBritish.aspx (28/06/2010)
[88] Ibid.
[89] Dong Energy's response to a draft version of this profile, email received 06/08/2010.
[90] Dong website, Gunfleet Sands, About Gunfleet Sands, Press Releases, "DONG Energy supplying green energy to the British", June 15, 2010 http://www.dongenergy.com/Gunfleetsands/GunfleetSands/News_and_events/data/Pages/DONGEnergysupplyinggreenenergytotheBritish.aspx (28/06/2010)
[91] Ibid.
[92] Dong annual report 2009, p. 42.
[93] Dong annual report 2009, p. 43; "Dong struggles with Greifswald exit", Platts Power in Europe, May 17, 2010, News No. 576.
[94] T. Webb, "£3bn coal plant will prove if carbon capture can succeed", The Guardian, March 13, 2010, p. 42; T. Bieshuizen, "Kolencentrale bij Emden afgeblazen", Dagblad van het Noorden, October 14, 2009, p. 11.
[95] Dong annual report 2009, p. 45.
[96] Dong website, Investor, Company announcements, "DONG Energy and Siemens enter into a new supply agreement regarding offshore wind turbines", December 12, 2009, http://www.dongenergy.com/EN/Investor/releases/Pages/omx%20feed%20list%20details.aspx?omxid=454279 (28/06/2010)
[97] Dong annual report 2009, p. 42.
[98] Dong website, Investor, Company announcements, "DONG Energy and Siemens enter into a new supply agreement regarding offshore wind turbines", December 12, 2009, http://www.dongenergy.com/EN/Investor/releases/Pages/omx%20feed%20list%20details.aspx?omxid=454279 (28/06/2010)
[99] In this column, for the investments indicated as "n/a", Dong Energy couldn't provide data on the investments taken, as no final investment decision has been taken on these projects. Email received 06/08/2010.
[100] RTT News website, "Centrica To Sell 50% Stake In Lincs Wind Farm To Dong Energy For GBP 50 Mln Cash", December 23, 2009, http://www.rttnews.com/ArticleView.aspx?Id=1164993&SMap=1 (21/06/2010)
[101] Total costs are GBP 750 mln, Dong has a 25% share. Currency conversion rates of 21/06/2010 used, www.xe.com; Ibid, Dong annual report 2009, p. 44.
[102] Total capacity is 270 MW, Dong has a 25% share.
[103] 4 C Offshore website, Wind farms, Burbo Bank extension, http://www.4coffshore.com/windfarms/burbo-bank-extension-united-kingdom-uk59.html (24/06/2010)
[104] Current capacity is 90 MW. Dong website, Burbo, http://www.dongenergy.com/Burbo/Pages/index.aspx (24/06/2010); Ibid.
[105] Ibid.
[106] Dong website, Westermost Rough, News, ES Submission, http://www.dongenergy.com/WestermostRough/News/Pages/ES_submission.aspx (28/06/2010)
[107] The wind farm will supply its first power by the end of 2012, the whole project will be ready by the end of 2013. Dong press release, "DONG Energy to build Anholt offshore wind farm", June 22, 2010, http://www.dongenergy.com/EN/Investor/releases/Pages/omx%20feed%20list%20details.aspx?omxid=491888 (24/06/2010)
[108] The costs for the project are estimated at DKK 10 bn. Currency conversion rates of 24/06/2010 used, www.xe.com; Ibid.
[109] Ibid.
[110] Construction is to begin in 2012, date of operation is unclear. 4 C Offshore website, Wind farms, West Duddon, http://www.4coffshore.com/windfarms/windfarms.aspx?windfarmId=UK33 (28/06/2010)
[111] Total capacity will be 500 MW, Dong has a 33.3% share. Dong website, Wind energy, UK projects, 4 October 2009, http://www.dongenergy.co.uk/Wind_energy/UK_projects/Pages/UK_projects.aspx (28/06/2010)
[112] Ibid.
[113] Ibid.
[114] 4 C Offshore website, Wind farms, Wigtown Bay, http://www.4coffshore.com/windfarms/wigtown-bay-united-kingdom-uk49.html (28/06/2010)
[115] Dong website, Humber Renewables, The project, http://www.dongenergy.com/humberside/About_Humberside/Pages/Humber%20Renewables.aspx (29/06/2010)
[116] This is Hull & East Riding website, News, "East Hull bio-mass plant could create jobs" February 19, 2010, http://www.thisishullandeastriding.co.uk/news/green-energy-key-future-employment/article-1849009-detail/article.html (28/06/2010)
[117] Market wire website, February 24, 2010, "Dong Energy Plans 300-Megawatt Biomass Plant for Hull Port" http://www.marketwire.com/press-release/Dong-Energy-Plans-300-Megawatt-Biomass-Plant-Hull-Port-Industrial-Info-News-Alert-1122110.htm (28/06/2010)

[118] Construction of the offshore wind farm expected to start in 2012. 4 C offshore website, Windfarms, Borkum Riffgrund, http://www.4coffshore.com/windfarms/borkum-riffgrund-germany-de04.html (29/06/2010)
[119] The costs for the project are estimated at DKK 320 mln. Currency conversion rates of 29/06/2010 used, www.xe.com; Dong press release, "DONG Energy acquires full ownership of offshore wind turbine projects Borkum Riffgrund 1 and 2", December 17, 2009, http://www.dongenergy.com/EN/Investor/releases/Pages/omx%20feed%20list%20details.aspx?omxid=452838 (29/06/2010)
[120] 4 C offshore website, Windfarms, Borkum Riffgrund, http://www.4coffshore.com/windfarms/borkum-riffgrund-germany-de04.html (29/06/2010)
[121] Construction is scheduled in two phases, phase one is expected to be operational in 2012 with a total capacity of 630MW, the rest is to be completed in 2014. Power-technology website, Industry Projects, "London Array Offshore Wind Farm, United Kingdom" http://www.power-technology.com/projects/london-array/ (21/06/2010)
[122] Total costs for the two phases will be GBP 3 bn (EUR 3.6 bn), Currency conversion rates of 21/06/2010 used, www.xe.com; Dong has a 50%share. The EUR 666 mln investment is calculated according to the ratio's of installed capacity between phase I and phase II: 315 MW – 185 MW. Ibid
[123] Total capacity after the construction of the two phases will be 1000 MW, Dong has a 50% share. Ibid. Final investment decision has only been taken on phase I. For phase II the total planned capacity is 370 MW, Dong's share is 185 MW due to 50% ownership.
[124] For the responsibility targets see: Dong website, Responsibility, Reporting, Responsibility goals 2009, http://www.dongenergy.com/en/responsibility_/reporting/pages/responsibility_goals_2009.aspx (29/06/2010)
[125] Code of conduct for suppliers received upon request via email on 06/08/2010.
[126] Dong website, Responsibility, Code of conduct, http://www.dongenergy.com/en/responsibility_/society/pages/code_of_conduct.aspx (29/06/2010), Dong Energy's response to a draft version of this profile, email received 06/08/2010.
[127] Dong website, Responsibility, Reports, GRI overview, http://www.dongenergy.com/en/responsibility/reports/pages/gri_overview.aspx (10/08/2010)
[128] Information is based on Dong Energy's response to a draft version of this profile. Email received 06/08/2010.
[129] Ibid.
[130] Dong annual report 2009, p. 49.

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.

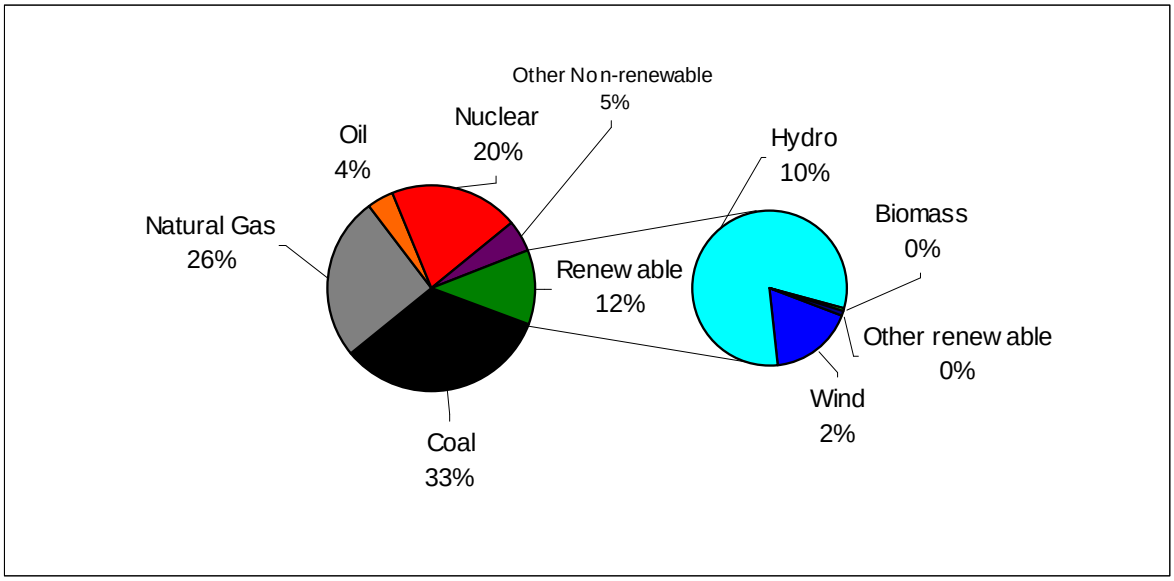
E.ON has six business units active in Europe.[131] E.ON Central Europe, of which E.ON Benelux is a subsidiary, is active in generation and supply in the Central European market. E.ON UK, E.ON Nordic, E.ON Italy and E.ON Spain have similar activities in their respective regions. E.ON Climate and Renewables, 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 6 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.[132] 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.[133] At the same time, E.ON has sold off or swapped a number of assets in Germany in 2009, totalling 5,000 MW.

Figure 6: Fuel mix of E.ON's installed capacity in Europe, 2009



Based on: E.ON Strategy and Key Figures

Table 10 shows the absolute figures for E.ON's installed capacity in Europe per fuel type.

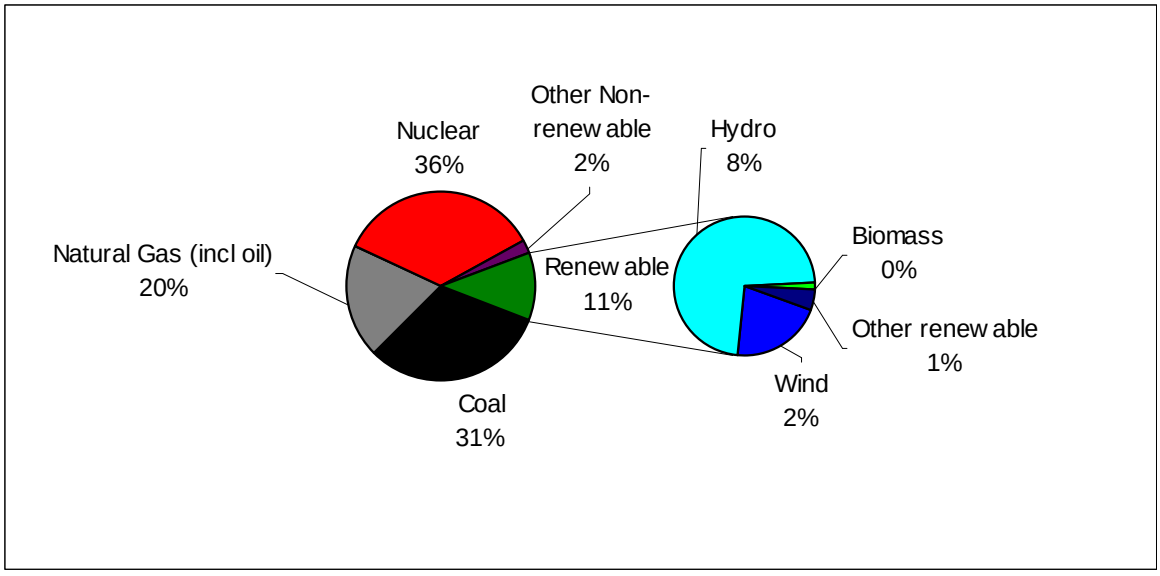
Table 10: E.ON's installed capacity in Europe (MW) per division and per fuel type, 2009

Fuel type	Central Europe[134]	UK[135]	Nordic[136]	Italy[137]	Spain[138]	Climate & Renewables[139]	Total
Coal[140]	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[141]	69	0	0	0	0	1	**70**
Total	**28,407**	**10,330**	**6,842**	**6,047**	**3,353**	**1,236**	**56,214**

Figure 7 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.[142] This is due to the exclusion of the figures from Russia and the USA. The figures for the electricity generated by oil are included in the figures for natural gas.

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



Based on: E.ON Strategy and Key Figures

Table 11 shows the absolute figures for E.ON's generated electricity in Europe per fuel type.

Table 11: E.ON's generated electricity (GWh) in Europe per division and per fuel type, 2009

Fuel type	Central Europe[143]	UK[144]	Nordic[145]	Italy[146]	Spain	Climate & Renewables[147]	Total
Coal[148]	46,930	12,700	0	4,290	n/a	0	**63,920**
Natural Gas	10,297[149]	20,100	0	9,900	n/a	0	**40,297**
Oil	-	-	-	-	n/a	-	**n/a**
Nuclear	63,313	0	8,500	0	n/a	0	**71,813**
Other Non-renewable	1,869[150]	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**

Electricity supplied in The Netherlands

Figure 8 shows the fuel mix of the electricity that E.ON supplies in the Benelux. E.ON does not provide supply figures broken down for just The Netherlands. The 23% renewable electricity is mostly accounted for by hydro power. As explained in the methodology chapter, the figures might be influenced by the purchase and trade of green certificates, and do not necessarily reflect the fuel mix received by consumers.

Figure 8: Fuel mix of E.ON's supplied electricity in the Benelux, 2009

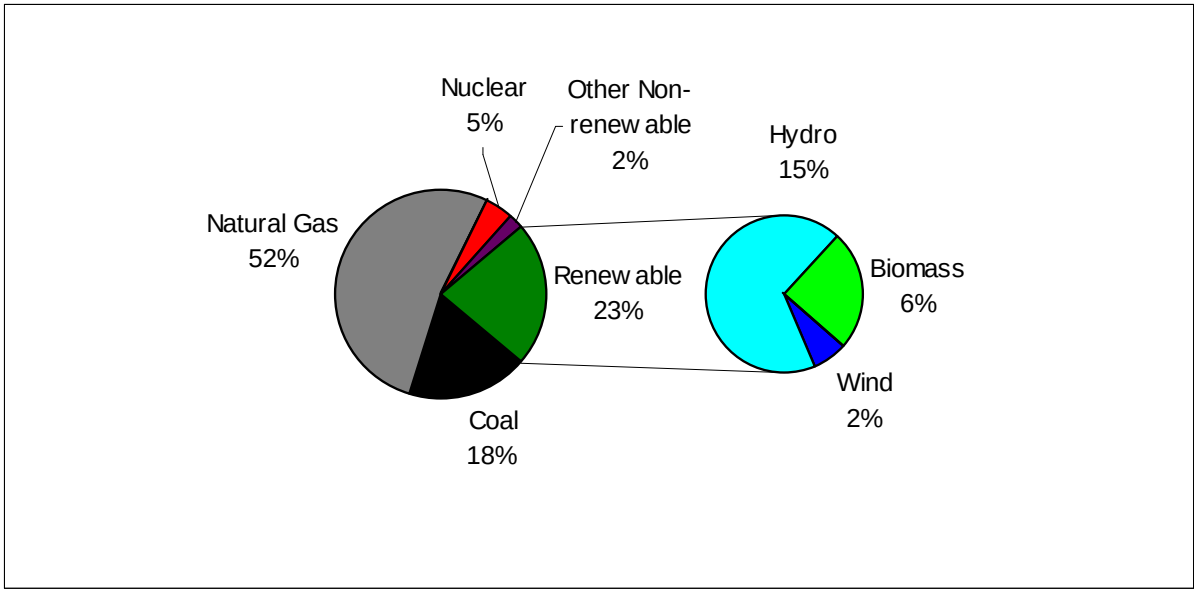


Table 12 shows the CO_2 emissions and radioactive waste production related to this supply.

Table 12: CO_2 emissions and radioactive waste production for E.ON's supplied electricity, 2009

Indicator	Amount
CO_2 (g/kWh)	358.8
Radioactive waste (µg/kWh)	140

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.[151] 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.[152] 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.[153]

Table 13 shows E.ON's investments in new production capacity that are currently underway.

Table 13: E.ON's investments in new production capacity

Project name	Location	Fuel Type	Date in operation	Amount (million €)	Output Capacity (MW)	Project Status
Datteln[154]	Germany	Coal	2012	1,200	1,100	Limited construction
Maasvlakte[155]	Netherlands	Coal	2012	1,200	1,100	Under construction
Malzenica[156]	Slovakia	Natural gas (CCGT)	2010	500	430	Under construction
Gönyü[157]	Hungary	Natural gas (CCGT)	2011	400	430	Under construction
Irshing (unit 4) [158]	Germany	Natural gas (CCGT)	2011	250	540	Under construction
Isle of Grain[159]	Kent (UK)	Natural gas (CHP)	2010	564	1,275	Partially in operation
Emile Huchet, Saint Avold[160]	Lorraine (FR)	Natural gas (CCGT)	2010	470	860	Testing phase
Bahia de Algeciras[161]	Spain	Natural gas (CCGT)	2010	350	-	Testing phase
Robin Rigg[162]	UK	Wind	2010	366	180	In operation
London Array Phase 1[163]	London (UK)	Wind	2012	660	189	Under construction
Rødsand[164]	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[165]	Spain	Other Renewable (Solar)	2011	225	50	Under construction

Table 8 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.[166] 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.[167]

No figures for the investment amount or output capacity are given, and this project is therefore not included in the table below.

Table 14: 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[168]	Germany	Coal	2013	1,200	1,100	Planned
	Antwerp (BE)[169]	Coal	2015	1,500	1,100	Planned
High Marnham[170]	UK	Natural gas (CCGT)	2016	n/a	1,600	Plans announced
Drakelow[171]	UK	Natural gas (CCGT)	2017	564	2,640	Plans announced/ delayed
Lubmin[172]	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[173]	Spain	Natural gas (CCGT)	2013	n/a	400	Plans announced
Upgrade of unit O2[174]	Oskarshamn (SE)	Nuclear	2011	n/a	500	Delayed
Fennovoima[175]	Finland	Nuclear	2020	n/a	612	License granted
Horizon Nuclear Power[176]	Wylfa (Anglesey, Wales, UK)	Nuclear	2020	4,200	1,650	planning application scheduled for 2012
Horizon Nuclear Power[177]	Oldbury (Gloucestershire, England, UK)	Nuclear	2025	4,200	1,650	Planning application once construction at Wylfa is underway
Royal Portbury Dock[178]	North Sumerset (UK)	Biomass	2013	789	150	Plans announced
Loctock[179]	Northwich (UK)	Waste	n/a	n/a	60	Plans announced
Orkney[180]	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[181]	UK	Wind	n/a	789	300	Plans announced
Lancashire-Cumbria[182]	UK	Wind	n/a	n/a	20	Plans announced
Sussex[183]	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.'[184] As part of E.ON's CSR approach, the company has published its Responsible Procurement Principles.[185] 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.[186]

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.[187] 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.[188] 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.[189]

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

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[131] E.ON, Strategy and Key Figures, 2010, p.2.
[132] E.ON, Strategy and Key Figures, 2010, p.41.
[133] E.ON, Strategy and Key Figures, 2010, p.22.
[134] E.ON, Strategy and Key Figures, 2010, p.29 & p.32.
[135] 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.
[136] 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.

[137] 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.
[138] E.ON, Strategy and Key Figures, 2010, p.152. All the natural gas capacity in Spain comes from CCGT facilities.
[139] 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.
[140] E.ON reports separately for its lignite and hard coal capacity. This table has combined these figures for reasons of comparability.
[141] 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.
[142] E.ON website, Responsibility, Performance Report 2009, "Sustainable Energy Mix", no date, http://www.eon.com/en/responsibility/35071.jsp (16-07-10).
[143] E.ON, Strategy and Key Figures, 2010, p.33.
[144] E.ON, Strategy and Key Figures, 2010, p.85.
[145] E.ON, Strategy and Key Figures, 2010, p.105.
[146] 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.
[147] 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.
[148] E.ON reports separately for its lignite and hard coal capacity. This table has combined these figures for reasons of comparability.
[149] 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.
[150] This includes 1,688 GWh generated from waste incineration.
[151] E.ON, Strategy and Key Figures, 2010, p.5.
[152] E.ON, Strategy and Key Figures, 2010, p.22.
[153] 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).
[154] 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 warden", 24-06-10, http://nachrichten.rp-online.de/wirtschaft/kraftwerk-datteln-darf-weitergebaut-werden-1.79630 (15-07-10).
[155] E.ON, Strategy and Key Figures, 2010, p.22; Platts Power in Europe, "PIE's new plant tracker", 03-05-10.
[156] 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).
[157] E.ON, Strategy and Key Figures, 2010, p.22; E.ON Kraftwerke GmbH, Press Release, "Gönyű: 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).
[158] 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.
[159] 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)
[160] Platts Power in Europe, "PIE's new plant tracker", 03-05-10
[161] 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.
[162] 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)
[163] 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.
[164] 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).
[165] 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.
[166] E.ON, Strategy and Key Figures, 2010, p.5.
[167] 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).
[168] E.ON, Strategy and Key Figures, 2010, p.22; Platts Power in Europe, "PIE's new plant tracker", 03-05-10.
[169] E.ON, Strategy and Key Figures, 2010, p.22; Platts Power in Europe, "PIE's new plant tracker", 03-05-10.
[170] Platts Power in Europe, "PIE's new plant tracker", 03-05-10.

[171] 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)

[172] Platts Power in Europe, "PIE's new plant tracker", 03-05-10; E.ON has a 50% share of the 1,200 MW project.

[173] Platts Power in Europe, "PIE's new plant tracker", 03-05-10.

[174] 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/NewsPage1036.aspx (16-07-10).

[175] 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.

[176] 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)

[177] 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_programme.pdf> (14 July 2010)

[178] 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)

[179] Platts Power in Europe, "PIE's new plant tracker", 03-05-10.

[180] 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).

[181] 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)

[182] 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).

[183] 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).

[184] E.ON CR Report, 2009, p.3.

[185] E.ON Responsible Procurement Policy, 20-03-07, http://www.eon.com/en/downloads/1107_EON_Procurement_Policy.pdf (16-07-10).

[186] E.ON website, Responsibility, Performance Report 2009, " Responsible Procurement", no date, http://www.eon.com/en/responsibility/29272.jsp (16-07-10).

[187] 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).

[188] E.ON website, Responsibility, Performance Report 2009, " Responsible Procurement", no date, http://www.eon.com/en/responsibility/29272.jsp (16-07-10).

[189] 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 Eneco

Basic company information

Eneco Holding N.V. is a non-listed public limited liability company with its official seat in Rotterdam. Eneco was founded in its current form in 1995, when a number of older energy companies merged.[61]The company has a focus on North West Europe (Dutch, Belgian, French, German and UK markets), where it operates in the fields of production, trade, distribution, and supply of gas, electricity and heat.

Eneco has undergone a number of organisational changes over the last year. On the one hand, Eneco was splitting off its infrastructure and distribution companies Joulz and Stedin, as part of unbundling the generation and distribution activities. However, these developments have been put on hold in June 2010, after the Court of Justice in The Hague decided that the unbundling requirements set by the Dutch government were in violation of European law. On the other hand, Eneco has acquired a number of subsidiaries of Econcern, which filed for bankrupcy in 2009. These include Ecostream (solar activities), Evelop (wind generation) and Ecofys (consultancy).

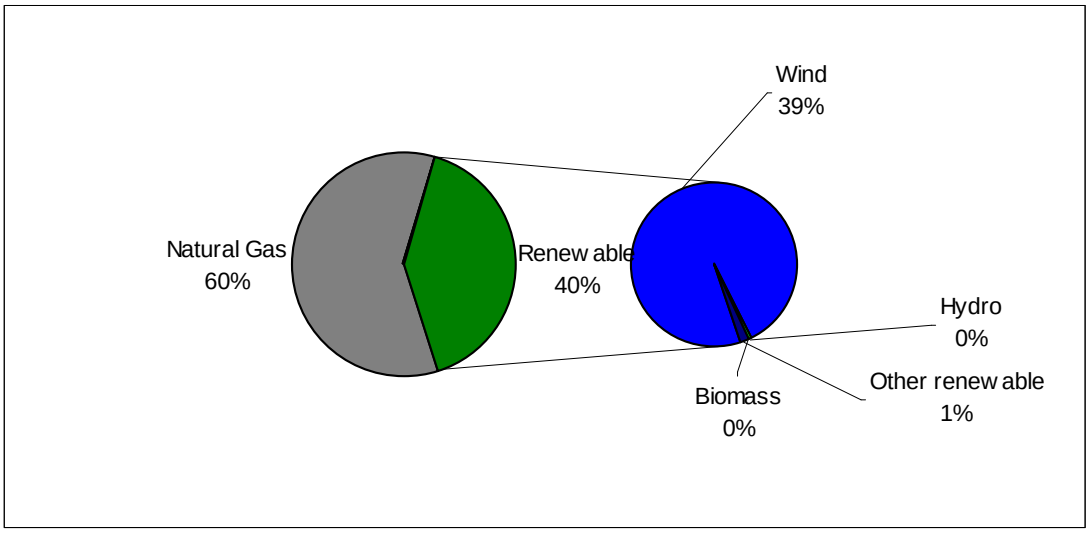
These developments have led to a change in business structure as of January 1st, 2010. Eneco now operates within eight business units[190]; Eneco Supply; Eneco Installation Companies; Eneco Energy Trade; Eneco Heat & Cold; Eneco Wind; Eneco Solar, Bio & Hydro; Strategic Assets and Ecofys. In order to maintain the independence needed for proper consultancy work, Ecofys is not integrated into the Eneco structure, but is kept independent and has its own board of directors.

Along with Essent and Nuon, Eneco was traditionally one of the top three network operators in the Netherlands and is the only one that is still owned by Dutch municipalities. The company has 6,600 employees, and in 2009 had a turnover of €5.2 billion.

Installed capacity for electricity generation in Europe

Figure 9 shows Eneco's installed capacity per fuel type. In the last year, the company gained additional wind capacity because of the takeover of Evelop as well as several projects becoming operational.[191]

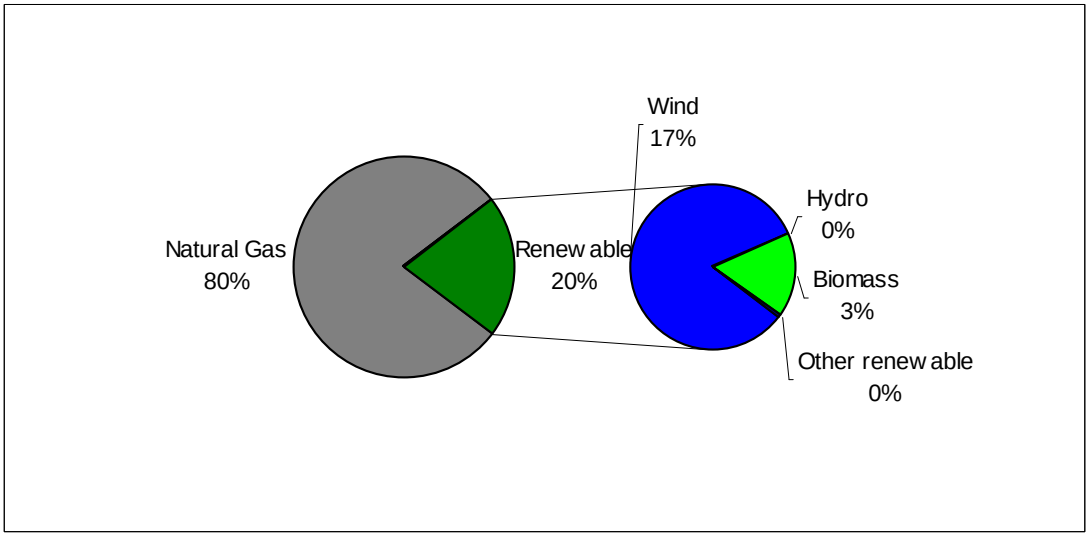
Figure 9: Fuel mix of Eneco's installed capacity in Europe, 2009



Based on: Eneco

Figure 10 shows the fuel mix of the generated electricity, and shows that the share of natural gas is larger than in the capacity fuel mix. This might be explained by lower gas prices in 2009.

Figure 10: Fuel mix of Eneco's generated electricity in Europe, 2009



Based on: Eneco

In its annual report, Eneco does not provide an overview of the capacity per fuel type. The figures provided in Table 15 are based on information received from the company directly.[192] Eneco has a total of 805 MW renewable capacity.[193]

Table 15: Eneco's installed capacity and generated electricity in Europe per fuel type, 2009

Fuel type	2009 Installed Capacity (MW)	2009 Generated electricity (GWh)
Natural Gas (CHP)	1,245	7,530
Wind	742	1,626
Hydro		
Small scale (<10MW)	0.1	0.8
Biomass		
Stand alone	45	328
Other renewable	18	4
Total	**2,050**	**9,488**

Electricity supplied in The Netherlands

In total, Eneco supplied 25.311 GWh of electricity in 2009.[194] Figure 11 shows the fuel mix of the electricity supplied by Eneco. Compared to previous year, both the share of renewable and natural gas have gone up slightly, while the supply is less dependent on coal and nuclear energy.

Figure 11: Fuel mix of Eneco's supplied electricity in the Netherlands, 2009

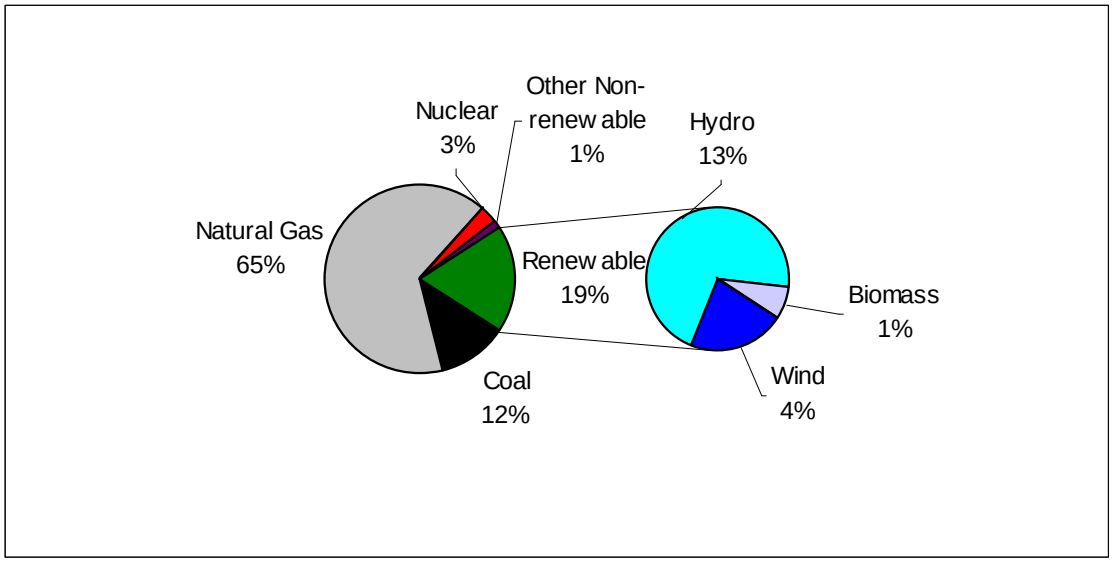


Table 16 shows the CO2 emissions and radioactive waste as reported in Eneco's stroometiket.

Table 16: CO2 emissions and radioactive waste production for Eneco's supplied electricity, 2009

Indicator	Amount
CO_2 (g/kWh)	340
Radioactive waste (µg/kWh)	100

Source: Eneco[195]

Announced investments in new generation capacity in Europe

Table 17: Eneco's current investments in new production capacity that are currently underway. A number of wind and natural gas facilities that were included in last years overview have since gone into operation, and are included in the section above. Construction has started on a number of onshore and offshore wind farms in The Netherlands, Belgium and the UK.

Table 17: Eneco's current investments in new production capacity

Project name	Location	Fuel Type	Date in operation	Amount (million €)	Output Capacity (MW)	Project Status
Enecogen[196]	Rotterdam (NL)	Natural gas	End of 2011	350	435	Under construction
Tullo	UK	Wind	2010	21	17.5	Under construction
Luna wind farm[197]	Heerhugowaard[198]	Wind	2010	10	6.9	Under construction
Fuji[199]	Tilburg (NL)	Wind	2011	14	10	Contracting
Martina Cornelia[200]		Wind	2011	n/a	15	Contracting
Acrres[201]	Lelystad (NL)	Wind	2011	n/a	7.5	Contracting
EBP extension[202]	EBP extension (B)	Wind	2010 / 2011	9	6	Under Construction
Perwez (B)[203]	Perwez (B)[204]	Wind	2010	9	7.5	Under Construction
Marbais[205]	Marbais (B)	Wind	2010	9	6	Under Construction
Arendonk (B) [206]	Arendonk (B),	Wind	n/a	n/a	17.5	Under construction
Eeklo[207]	Eeklo (B)	Wind	2011 / 2012	6	4	Permits granted
Puurs[208]	Puurs (B)	Wind	2011 / 2012	6	4	Permits granted
Gouvy (B)[209]	Gouvy B)[210]	Wind	2011	17	6.9	Grid connection paid, last stage of development

Table 18 shows the announced plans for new production capacity. Eneco is planning several larger offshore wind projects, including a 900MW wind farm in the UK and a 360MW park in Belgium. Additionally, plans for new projects include some gas and biomass facilities.

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

Project name	Location	Fuel Type	Date in operation	Amount (€)	Output Capacity (MW)	Status
-	Beringen[211]	Gas	n/a	800	900	Awaiting permits
-	Beringen	Biomass	n/a	n/a	12.5	Awaiting permits
-	Rotterdam[212]	Biomass	2015	n/a	20	Plans announced
-	North of Netherlands[213]	Biomass	2012	n/a	50	Plans announced
-	unknown	Biomass	n/a	n/a	25	Plans announced

Q4 (incl. FLOW partnership	North Sea	Wind	2015	n/a	97.5	Permits granted (awaiting subsidies)
North Sea Power (50%)[214]	Knokke (BE)	Wind	n/a	n/a	360	Concession acquired (awaiting subsidies)
Q-10[215]		Wind	2015	n/a	165	Permits granted (awaiting subsidies)
Scheveningen-Buiten[216]	North sea	Wind	2015	n/a	212	Permits granted
Isle of Wight	Offshore Isle of Wight (UK)	Wind	2016	n/a	900	Rights awarded
Lochluichart Estate[217]	Schotland	Wind	2013	80	51	Plans announced

Responsible sourcing

Eneco's business model is one of sustainable and decentralized electricity generation. The company recognizes the need for sustainability throughout the production chain, and in its Corporate Brochure states the following: 'Eneco's power lies in its involvement in all the links of the chain: from production and trading to supply. That is why we have and maintain an overview of all the relevant issues and are not dependent on other companies. That way we can actually make sustainability the focal point of all our actions. It also allows us to initiate integrated sustainability projects in cooperation with others.'[218]

Raw materials

Eneco sources all the biomass it uses in its plants from Belgium, where it purchases agricultural waste. In a response to a draft version of this report, Eneco indicated that it intends to use waste from a Vietnamese furniture plants as raw materials for new to-be-built biomass plants. In its Annual Report, Eneco states that it applies sustainability criteria for the biomass it purchases. More specifically, it states that:

> 'In connection with its vertical integration strategy, it is important that Eneco gains access to sustainable residual waste flows. Eneco Energy Trade is responsible for the purchase of biomass for those Eneco plants that depend on these third party waste flows. In order to gain experience in this field, Eneco Energy Trade at present acts as the intermediary between biomass suppliers and customers. Since there is insufficient supply of residual materials in Europe, Eneco is investigating the presence of residual flows on other continents. Eneco applies strict sustainability criteria with regard to biomass. The core elements of the policy are the restriction that biomass flows from other continents may only be used for generating electricity if that is a logical option and the fact that Eneco only uses wood and pure plant oil. Eneco collaborates with the Max Havelaar Foundation and ICCO to ensure that the biomass flow is in accordance with the Fair Trade principles and ICCO standards.'[219]

Eneco also indicates that the criteria it sets for biomass purchases goes beyond the NTA 8080 norms, the biomass sustainability certification scheme. These criteria are verified by a Sustainability Officer, who operates on a Corporate level and in cooperation with the NEN (Dutch Normalisation Institute) and the Control Union verification body.

Eneco does not publish any policies regarding the sourcing of coal or uranium for electricity generation. However, this can be explained by the simple fact that Eneco does not generate any electricity using these fuel sources.

Electricity trading

Eneco generates 47% of all the electricity it supplies to customers. No further details were provided concerning the counterparties or fuel mix of the traded electricity.

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[219] Eneco, Annual Report, p.34.

5 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.[220] The main shareholder of GDF Suez is the French government, with 35.9% of the shares as of 31 December 2009.[221] 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.[222]

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.[223] 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.[224] 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 12 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 12 and 13 and table 19 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 12: Fuel mix of GDF Suez's installed capacity in Europe, end of 2008[225]

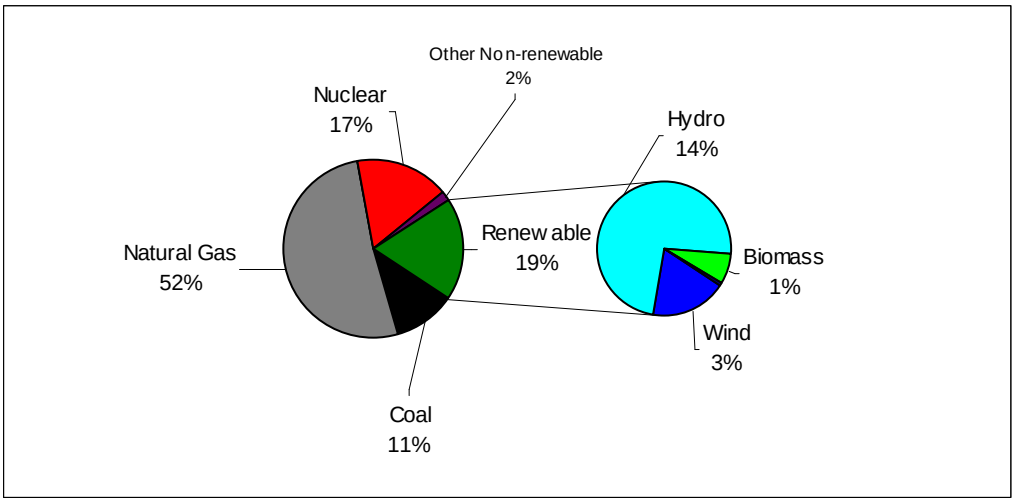


Figure 13 reveals the fuel mix of GDF Suez's electricity generation worldwide in 2009.

Figure 13: Fuel mix of GDF Suez's electricity generation worldwide in 2009[226]

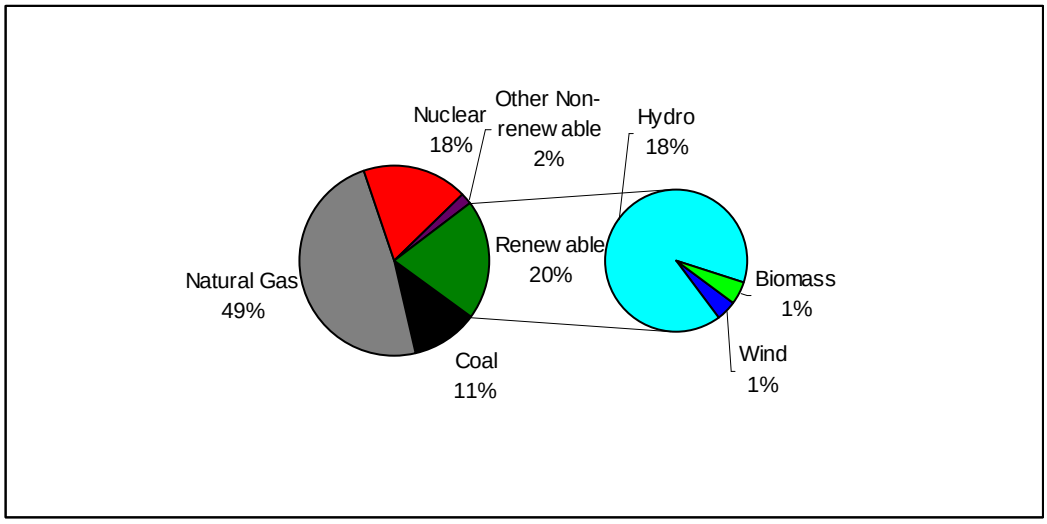


Table 19 shows the absolute figures of the installed capacity of GDF Suez in Europe at the end of 2008 and its worldwide capacity and actual generation in 2009.

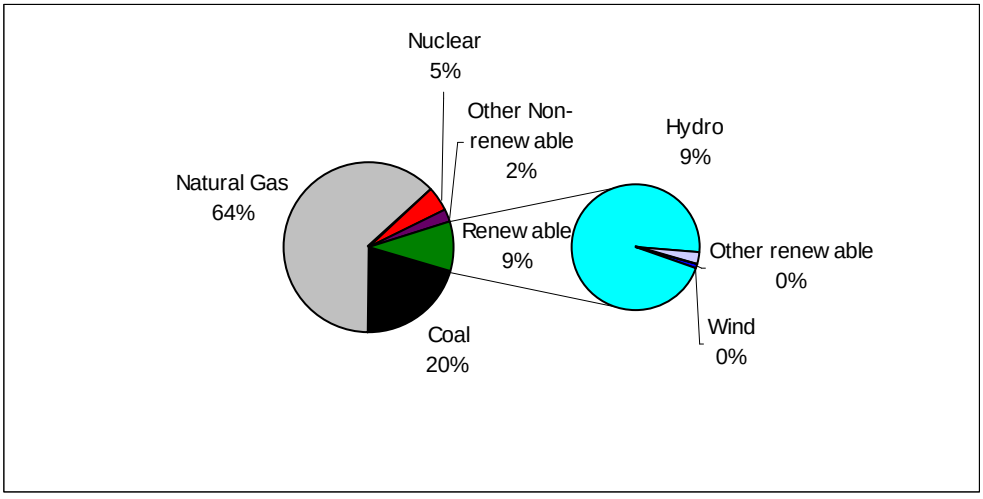
Table 19: GDF Suez's fuel mix of installed capacity in Europe at the end of 2008, and GDF Suez's worldwide capacity and actual generation in 2009

Fuel type	European capacity as of 31 December 2008 (MW)[227]	Worldwide capacity as of 31 December 2009 (MW)[228]	Worldwide generation in 2009 (GWh)[229]
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**

Electricity supplied in the Netherlands

In the Netherlands, GDF Suez is a major electricity generator through its subsidiary Electrabel Nederland, with a share of approximately 20-25% in the country's generating capacity. Its production is mainly sold via the wholesale market to industrial consumers and suppliers.[230] Electrabel in the Netherlands has seven power plants with a total installed capacity of 4,068 MW.[231]

Figure 14: Fuel mix of Electrabel's supplied electricity in The Netherlands, 2009



Based on: Electrabel[232]

Table 20 presents the CO_2 emissions and radioactive waste production resulting from the generation of the electricity that GDF Suez / Electrabel supplies in the Netherlands.

Table 20: Emissions and waste resulting from electricity supplied by GDF Suez / Electrabel in the Netherlands, 2009[233]

Indicator	Amount
CO_2 (g/kWh)	422
Radioactive waste (µg/kWh)	144

Investments in new generation capacity in Europe

Table 21 indicates the projects GDF Suez is currently developing in Europe.

In addition to the investments explained in the tables 3 and 4, as of first half of 2010 Electrabel's conventional power plant in Gelderland (590 MW coal) will allow to use up to 25% biomass in co-combustion with coal. The construction has started in January 2009 and the facility has started operating in March 2010. The total capacity of the primarily coal-based power plant will remain unchanged.[234] 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.[235] 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.[236] This transformation involves an investment of €125 million.[237] The new plant will be in operation in 2011.[238]

Table 21: 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[239]	under construction[240]
Power Plant Wilhelmshaven	Wilhelmshaven (DE)	coal	2012	568[241]	422[242]	under construction
Flevo	Lelystad (NL)	gas (CCGT)	2010	n/a	870[243]	under construction
SPEM	Montoir de Bretagne (FR)	gas (CCGT)	2010	n/a	435[244]	already built
CombiGolfe	Fos-sur-Mer (FR)	gas (CCGT)	mid 2010	270	424[245]	already built
Degussa	Antwerp (BE)	gas-fired CHP	mid 2010	21	22	under construction[246]
Heron II	Viotia (GR)	gas (CCGT)	2010	n/a	225	under construction[247]
Repowering Dunamenti	Szazhalombatta (HU)	gas (CCGT)	2011	149[248]	138[249]	under construction
acquired by Nuon	Almere (NL)[250]	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[251]
Doel 1, upgrade capacity	Doel 1, Belgium	nuclear	n/a	n/a	40.5	under construction[252]
France, Italy and Belgium	France, Italy and Belgium	biomass & biogas	n/a	n/a	23	under construction[253]
Several projects	France	wind	2010/2011	n/a	273[254]	under construction
Generg wind farms	Portugal (PT)	wind	n/a	n/a	102	under development[255]
Wind parks	Belgium	wind	n/a	n/a	24	under

						construction[256]
Scotia Wind Craigengelt	South-west of Stirling, Scotland (UK)	wind	2010	n/a	20	under construction[257]
Wind farm	Jarogniew – Moltowo (Poland)	wind	early 2011[258]	n/a	20	under construction[259]
AceaElectrabel Produzione Group (AEP)	Italy	wind	n/a	n/a	35	under construction[260]
Other renewables	Italy	other renewables	n/a	n/a	9	under construction[261]
Curbans	Alpes de Haute Provence (France)	solar	August 2011	n/a	33	under construction[262]
More solar projects	France	solar	n/a	n/a	11[263]	construction permits obtained
Generg Photovoltaic solar	Portugal	solar	n/a	n/a	5	under construction[264]

Table 22 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.[265]

Table 22: 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[266]
Unit at Vado Ligure	Vado Ligure (IT)	coal	n/a	n/a	161	awaiting permission[267]
Power plant	Police near Szczecin (PO)	coal	n/a	2,147	1,432	concept design[268]
Power plant	Lublin (PO)	coal (biomass co-fired)	n/a	536	358	concept design[269]
Power Plant Romania	Constanta (RO)	coal and biomass	n/a	2,400	1,600	suspended indefinitely[270]
Power station	Polaniec (south-east Poland)	biomass	end of 2012	240[271]	190	building contract signed[272]
Power plant	Polaniec (south-east Poland)	gas	n/a	666	833	concept design[273]
Electrabel Polaniec S.A.	Near Wloclawek (PO)	gas	n/a	610	900	construction start within two years[274]
GDF Suez Energy Romania and Termoelectrica	Borzesti, Bacau county, (RO)	gas	n/a	400	400	feasibility study finalised[275]
Morata de	Morata de	gas	n/a	500	1,200	halted by

Tajuña	Tajuña (ES)	(CCGT)				supreme court[276]
CombiGolfe, second 400 MW tranche	Fos-sur-Mer (FR)	gas (CCGT)	n/a	n/a	400[277]	engineering study underway
Ploufragan	Brittany (FR)	gas	n/a	n/a	200	administrative approvals pending[278]
AceaElectrabel Produzione	Pontinia (Italy)	gas (CCGT)	n/a	n/a	162	waiting for permission[279]
Horizon Energy/ AceaElectrabel	Molise (Italy)	gas (CCGT)	n/a	n/a	81	waiting for permission[280]
gas fired plant	Schwandorf (DE)	Gas (CCGT)	n/a	n/a	800	project stopped?[281]
One or two gas fired plants	Calbe and Stassfurt in Saxony-Anhalt state (DE)	gas (CCGT)	n/a	n/a	800	feasibility study[282]
Second EPR reactor (25% stake)	Penly site, Normandy (FR)	nuclear	2017	n/a	412[283]	public debate set up in 2010
Third EPR reactor	Rhone Valley (FR)	nuclear	n/a	n/a	1,100	candidate[284]
One or more nuclear reactors, together with Iberdrola and SSE	United Kingdom	nuclear	2020-2025[285]	n/a	1,350[286]	pre-development stage[287]
Renewal concessions by government, total 5,300 MW	France	hydro	2015	n/a	1,600	operatorships expected to be awarded between 2013 and 2015[288]
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[289]
Compagnie du Vent and Shell WindEnergy, Libron	Offshore, France	wind	2014	71	29	pre-development stage[290]
Compagnie du Vent, several small projects in France	Onshore, France	wind	2011/2013	396	281	pre-development stage[291]
Blue4Power I, zone I and II	North Sea (BE)	wind	2012	n/a	n/a	early 2010: request concession granting rejected[292]
Winds mills next to highway E40	Belgium	wind	2011	70	40	construction permits obtained[293]
Four wind turbines along a canal	Zomergem (Belgium)	wind	n/a	n/a	12	environmental permit requested[294]

Wind farm Poland	North of Poland (PO)	wind	n/a	n/a	n/a	several projects in development [295]
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[296]
Tirreno Power photovoltaic Italy	Campania a Sessa Aurunca (It)	solar	n/a	n/a	6.9	preliminary plan completed[297]
Solar projects ground-level	France	solar	n/a	n/a	206[298]	in study

Responsible sourcing

In its Activities and Sustainable Development report 2009, GDF Suez makes no reference to supply chain responsibility.[299] The company does have an Ethics charter, which includes requirements for suppliers. Among other adherence to the OECD Guidelines for Multinational enterprises is required.[300]

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.[301] It was the first time Synatom invested in mining projects. The projects are at the stage of preparation.[302]

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.[303]

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.[304] GDF Suez has its own certification scheme for biomass. The minimum criteria used focus on: energy balance or CO_2 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.[305]

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[222] Electrabel Nederland website, “Onze dienstverlening”, no date, <http://www.electrabel.nl/Over-Electrabel/Wie-zijn-we/Wat-doen-we.aspx> (2 July 2010)
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[223] E-mail by Robert Imler, corporate communication GDF SUEZ Energy Benelux & Germany on 30 August 2010.
[224] These capacities are on “share data basis”. The “share data” include the total capacities of the fully consolidated companies and the capacities of proportionally consolidated and equity method consolidated companies in proportion to the share held. GDF Suez Reference Document 2009, April 2010, p. 10, <http://www.gdfsuez.com/en/finance/investors/publications/publications/> (24 June 2010)

[225] Figures as of 31 December 2008, e-mail by W. Wolters, Manager Strategy & Regulatory Affairs, Electrabel Nederland, 06 July 2009.
[226] On "share data basis". The "share data" include the total capacities of the fully consolidated companies and the capacities of proportionally consolidated and equity method consolidated companies in proportion to the share held. GDF Suez Reference Document 2009, April 2010, p. 11, <http://www.gdfsuez.com/en/finance/investors/publications/publications/> (24 June 2010)
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[228] On "share data basis". The "share data" include the total capacities of the fully consolidated companies and the capacities of proportionally consolidated and equity method consolidated companies in proportion to the share held. GDF Suez Reference Document 2009, April 2010, p. 11, <http://www.gdfsuez.com/en/finance/investors/publications/publications/> (24 June 2010)
[229] On "share data basis". The "share data" include the total capacities of the fully consolidated companies and the capacities of proportionally consolidated and equity method consolidated companies in proportion to the share held. GDF Suez Reference Document 2009, April 2010, p. 11, <http://www.gdfsuez.com/en/finance/investors/publications/publications/> (24 June 2010)
[230] GDF Suez Reference Document 2009, April 2010, p. 37, <http://www.gdfsuez.com/en/finance/investors/publications/publications/> (24 June 2010)
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[231] Electrabel, "Verslag Activiteiten en Duurzame Ontwikkeling 2009", June 2010, page 56, <http://www.electrabel.be/assets/content/corporate/rac_29_nl_710059DE0B944E2585E950DB46E05A3F.pdf> (31 August 2010)
[232] Electrabel website, "Stroometiket", <http://www.electrabel.nl/Thuis/Producten/Groene_energie/Stroometiket.aspx> (24 June 2010)
[233] Electrabel website, "Stroometiket", <http://www.electrabel.nl/Thuis/Producten/Groene_energie/Stroometiket.aspx> (24 June 2010)
[234] GDF Suez Reference Document 2009, April 2010, p. 37, <http://www.gdfsuez.com/en/finance/investors/publications/publications/> (17 June 2010)
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[240] GDF SUEZ, press release "GDF SUEZ begins construction of 800 MW biomass and coal power station in the Netherlands" , 22 June 2010, <http://www.gdfsuez.com/en/finance/press-releases/press-releases/?communique_id=1061>, (18 June 2010)
[241] Total investment over 1 billion. Stake GDF Suez is 56.82%.
[242] Total capacity 742 MW. End 2008 GDF Suez has a 33.1% stake in WSW Energie & Wasser. WSW has a 15% stake in the Wilhelmshaven power plant. BKW FMB Energie AG (33%) has a 15% stake in the Wilhelmshaven power plant. This puts the stake of GDF Suez at 56.82%. GDF Suez Reference Document 2009, April 2010, p. 37 and 107, <http://www.gdfsuez.com/en/finance/investors/publications/publications/> (17 June 2010)
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[243] GDF Suez Reference Document 2009, April 2010, p. 37 and 107, p. 26, <http://www.gdfsuez.com/en/finance/investors/publications/publications/> (17 June 2010)
[244] GDF Suez Reference Document 2009, April 2010, p. 37 and 107, p. 26, <http://www.gdfsuez.com/en/finance/investors/publications/publications/> (17 June 2010)
[245] GDF Suez Reference Document 2009, April 2010, p. 37 and 107, p. 26, <http://www.gdfsuez.com/en/finance/investors/publications/publications/> (17 June 2010)
[246] Added capacity 22 MW. Total investment €45 million. 50/50 joint venture between E.ON and Electrabel. Platts Power In Europe, "PiE's new power plant project tracker - April 2010", 3 May2010.
E.ON website, <http://www.eon-energy-projects.com/pages/eep_en/References/References/CHP_Plant_Evonik_Degussa_Antwerpen/index.htm> (29 June 2010)
[247] Total capacity 450MW. 50/50 joint venture between GDF SUEZ and GEK TERNA.
GDF Suez Reference Document 2009, April 2010, p. 39, <http://www.gdfsuez.com/en/finance/investors/publications/publications/> (17 June 2010)
GDF Suez, press release "GEK TERNA AND GDF SUEZ complete the partnership in the Greek power generation market", 3 June 2009, <http://www.gdfsuez.com/en/finance/press-releases/press-releases/?communique_id=1053> (18 June 2010)

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[249] The capacity of the unit will be raised from 215 MWe currently to over 400 MWe. CMI, press release "Dunamenti Erőmű Power Plant (Hungary): corner stone laying ceremony in the presence of CMI", 4 June 2009, <http://www.cmigroupe.com/vpage.php?id=420> (18 June 2010)
Electrabel owns a 74.82% interest in Dunamenti. GDF Suez Reference Document 2009, April 2010, p. 402, <http://www.gdfsuez.com/en/finance/investors/publications/publications/> (18 June 2010).

[250] 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).

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[252] Electrabel, "Verslag Activiteiten en Duurzame Ontwikkeling 2009", June 2010, page 56, <http://www.electrabel.be/assets/content/corporate/rac_29_nl_710059DE0B944E2585E950DB46E05A3F.pdf> (31 August 2010)

[253] GDF Suez, presentation "2009 Annual Results", 4 March 2010, p. 103, <www.gdfsuez.com/document/?f=files/fr/slides-vf.pdf> (18 June 2010)

[254] This includes the Hauts Pays (78 MW in Haute-Marne, developed by Erelia) and Germinon (75 MW in the Marne, developed by Eole Generation) facilities, which are among the largest wind farms in France. GDF Suez Reference Document 2009, April 2010, p. 26, <http://www.gdfsuez.com/en/finance/investors/publications/publications/> (17 June 2010)
Erelia + LHL (100%, 102 MW), Great (100%, 10 MW), Eole Generation (100%, 97 MW), Maia Eolis (49%, 50 MW), La Compagnie du Vent (56%, 41 MW), CN'Air (49,9%, 34 MW). Total capacity 334 MW, GDF Suez share 273 MW. GDF Suez, presentation "2009 Annual Results", 4 March 2010, p. 128 and 130, <www.gdfsuez.com/document/?f=files/fr/slides-vf.pdf> (18 June 2010).

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[256] Electrabel, "Verslag Activiteiten en Duurzame Ontwikkeling 2009", June 2010, page 56, <http://www.electrabel.be/assets/content/corporate/rac_29_nl_710059DE0B944E2585E950DB46E05A3F.pdf> (31 August 2010)

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GDF Suez, press release "GDF SUEZ First UK Wind Farm", 31 March 2010 <http://www.gdfsuezuk.com/public/page.php?iddossier=735&idarticle=2988> (18 June 2010)

[258] ADPnews, "GDF Suez to launch 20.5 MW wind farm in Poland in early 2011" 18 June 2010, <http://adpnews.info/?APP_ACTION=BYSERVICE&sid=11> (20 June 2010)

[259] GDF SUEZ's first Polish wind farm (20 MW) is now under construction in Jarogniew – Moltowo and several other wind-power projects are in development. GDF Suez, press release "GDF SUEZ to build world's largest Biomass Power Unit in Poland strengthening its leading position in Europe", 7 April 2010, <http://www.gdfsuez.com/en/finance/press-releases/press-releases/?communique_id=1218> (18 June 2010)

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[262] Construction and operation of the future facility will be carried out by a specially-created project company made up of GDF SUEZ and two financial partners: EuroFideme 2 (Natixis Environnement & Infrastructure) and SEIEF (Dexia). GDF Suez, press release "GDF SUEZ builds France's largest photovoltaic solar power facility", 10 February 2010, <http://www.gdfsuez.com/en/finance/press-releases/press-releases/?communique_id=1181> (18 June 2010)

[263] Total 44 MW minus Curbans (33 MW) listed apart. GDF Suez Reference Document 2009, April 2010, p. 27, <http://www.gdfsuez.com/en/finance/investors/publications/publications/> (17 June 2010)

[264] GDF Suez holds a 42.5% stake in Generg. Total capacity under construction is 12 MWp of photovoltaic solar projects. GDF Suez Reference Document 2009, April 2010, p. 39,<http://www.gdfsuez.com/en/finance/investors/publications/publications/> (17 June 2010)

[265] Die Klima-Allianz, press release, "Weiteres Kohlekraftwerk in Deutschland verhindert", 2 February 2010, <http://www.die-klima-allianz.de/wp-content/uploads/PM_Weiteres-Kohlekraftwerk-in-Deutschland-

verhindert_20100202.pdf> (18 June 2010)
GDF Suez Reference Document 2009, April 2010, p. 173,
<http://www.gdfsuez.com/en/finance/investors/publications/publications/> (17 June 2010)

[266] GDF Suez, <http://nl.engineering-gdfsuez.com/power/references/ (18 June 2010)
Reuters, "FACTBOX Controversial German coal-fired power plant projects", 17 March 2010,
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Completion was planned for 2012, but this announcement has been taken back (E-mail W. Wolters, Manager Strategy & Regulatory Affairs, Electrabel Nederland, 6 July 2009).

[267] Total capacity 460MW. GDF Suez has a 35% stake in Tirreno Power.
Tirenno Power, "azionisti", <http://www.tirrenopower.com/finance/azionisti.aspx> (18 June 2010).
TIRRENO POWER S.P.A., "BILANCIO D'ESERCIZIO AL 31 DICEMBRE 2009",
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[268] Total investment 8,592 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)

[269] Total investment 4,296 million Zloty. Exchange rate: 0.24987 (average 01/01/2010-19/06/2010,
<http://nl.exchange-rates.org/history/EUR/PLN/T> GDF Suez has a stake of 50%. Total capacity 716 MW.
BRE Bank Securities, "Update power engineering", 12 March 2010,
<http://i.wp.pl/a/dibre/aspolek/energy_120310.pdf> (18 June 2010)
On 11 June 2010 PGE Polska Grupa Energetyczna SA and GDF SUEZ Energia Polska SA signed a preliminary agreement providing for the parties' cooperation on the development of a coal-fired power plant and their equal 50-50 participation in the planned undertaking. Polska Grupa Energetyczna SA, "PGE Signs Agreement with GDF Suez Energia Polska", 16 June 2010,
<http://www.pgesa.pl/en/PGE/PressCenter/PressInformation/Pages/PGESignsAgreementwithGDFSuezEnergiaPolska.aspx> (18 June 2010)

[270] "We have allocated a significant budget for the development of the Borzesti, Cernavoda and the wind energy projects," GDF SUEZ representatives said without, however, mentioning the actual amount. In addition to these projects, the company also planned other investments, such as the construction of two energy production units, one in Constanta and the other one in Galati, large-scale projects that required total funds of up to 2.5 billion euros. "At present such projects are not a priority for GDF SUEZ in Romania, as we chose to focus our resources on more advanced projects," group's representatives pointed out.
Website permanent representation Romania to the European Union, "Romanian economic highlights", 21 December 2009, <http://ue.mae.ro/pdf/2009.12.21_highlights51.pdf> (20 June 2010)

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<http://www.news2biz.com/images/publicationimages/SENER-Energy%20and%20Environment-173-a321.pdf> (18 June 2010)

[272] The "Green Unit" will burn wood and agri-fuels. It will be located at the site of GDF SUEZ's 1800 MW co-fired power station (coal/biomass). GDF Suez, press release "GDF SUEZ to build world's largest Biomass Power Unit in Poland strengthening its leading position in Europe", 7 April 2010, <http://www.gdfsuez.com/en/finance/press-releases/press-releases/?communique_id=1218> (18 June 2010)

[273] Total investment 2,666 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)

[274] GDF Suez subsidiary Electrabel Polaniec S.A. begins construction of a 900 MW gas-fired power plant near Wloclawek. Poland's gas giant PGNiG will hold a minority stake in the €500 million investment.
Emerisk, "Emerge 365: Poland Q1 10", <http://www.emerisk.com/country/poland> (18 June 2010)
Total investment 2,880 million Zloty, exchange rate 0.24987, would be 720 million. (exchange rate 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)

[275] The Diplomat, "Hold-up for new energy projects", April 2010, <http://www.thediplomat.ro/articol.php?id=1026> (17 June 2010)
The Diplomat, "Outdated power plants face the heat", June 2010,
<http://www.thediplomat.ro/articol.php?id=1209> (17 June 2010)

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<http://www.legaltoday.com/practica-juridica/publico/medio_ambiente/el-supremo-confirma-que-la-central-de-morata-no-es-un-bien-de-utilidad-publica> (19 June 2010)
Electrabel Spain, "Morata", no date,
<http://www.electrabel.es/content/corporate/aboutelectrabel/morata_en.asp> (18 June 2010)

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<http://www.gdfsuez.com/en/finance/investors/publications/publications/> (17 June 2010)

[278] Platts Power In Europe, "PiE's new power plant project tracker - April 2010", 3 May2010

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"GDF Suez has a 40.59% interest in Acea-Electrabel". GDF Suez Reference Document 2009, April 2010, p. 395,
<http://www.gdfsuez.com/en/finance/investors/publications/publications/> (29 June 2010).

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"GDF Suez has a 40.59% interest in Acea-Electrabel". GDF Suez Reference Document 2009, April 2010, p. 395, <http://www.gdfsuez.com/en/finance/investors/publications/publications/> (29 June 2010).

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Finanznachrichten, information from Reuters, 19 April 2010, <http://www.finanznachrichten.de/nachrichten-2010-04/16658063-german-power-gas-sales-rose-in-q1-energy-group-020.htm> (18 June 2010)

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World Nuclear Association, "Nuclear Power in France", June 2010, <http://www.world-nuclear.org/info/inf40.html> (17 June 2010)
GDF Suez, press release "GDF SUEZ and Total team up for the EPR project in Penly", 4 May 2009, <http://www.gdfsuez.com/en/finance/press-releases/press-releases/?communique_id=1034> (18 June 2010)

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TendersInfo, "France : GDF Plans Nuclear Plant for Rhone Valley, an Industrial Info News Alert", 27 February 2010.

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[286] In February 2009, GDF SUEZ (37.5%), Iberdrola (37.5%) and Scottish and Southern Energy (25%) entered a partnership to jointly participate in the development of new nuclear power stations in the UK. The consortium intends to prepare detailed plans for developing a new nuclear power station with a capacity up to 3.6 GW. GDF SUEZ, press release "Iberdrola and Scottish and Southern Energy to acquire site from Nuclear Decommissioning Authority", 28 October 2009, <http://www.gdfsuez.com/en/finance/press-releases/press-releases/?communique_id=1134> (18 June 2010)

[287] In October 2009, a consortium of GDF SUEZ SA, Iberdrola SA and Scottish and Southern Energy Plc ("SSE") has been successful in securing an option to purchase land for the development of a new nuclear power station at Sellafield 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)
GDF SUEZ, press release "Iberdrola and Scottish and Southern Energy to acquire site from Nuclear Decommissioning Authority", 28 October 2009, <http://www.gdfsuez.com/en/finance/press-releases/press-releases/?communique_id=1134> (18 June 2010)

[288] "GDF Suez wants to boost its French hydropower capacity by the equivalent of the size of a new generation nuclear reactor by 2015." Source: TendersInfo, "France : GDF Suez eyes more French hydropower capacity-report", 7 May 2010.

[289] Projet des Deux Côtes of La Compagnie du Vent, off the coast of the Somme and Seine-Maritime districts, foresees 141 turbines outputting a total 705 MW. As of 31 December 2009 GDF Suez has a 56.84% stake in La Compagnie du Vent. GDF Suez Reference Document 2009, April 2010, p. 27 and 460, <http://www.gdfsuez.com/en/finance/investors/publications/publications/> (17 June 2010).
"2 billion (USD 2.6bn) project" Source: ADP News Renewable Energy Track, "GDF Suez opens public consultation on offshore wind farm", 3 May 2010.

[290] Compagnie du Vent and Shell Windenergy 50/50. As of 31 December 2009 GDF Suez has a 56.84% stake in La Compagnie du Vent. Total capacity 102 MW, total costs 250 million euro. Source: Compagnie du Vent, <http://compagnieduvent.com/parcsprojlibron.html> (25 August 2010)

[291] As of 31 December 2009 GDF Suez has a 56.84% stake in La Compagnie du Vent. Listed are all future projects named on the website of La Compagnie du Vent, excluded otherwise mentioned projects and projects under construction as of 31 December 2009. Source: Compagnie du Vent, < http://compagnieduvent.com/parcsproj01.html > (25 August 2010)

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[293] Total investment €125 million for 29 turbines (each 2 or 3 MW) along the highway E40. Consortium: Electrabel (56%), Infrabel (10%), municipality of Sint-Truiden (23%) and municipality of Landen (11%).
Electrabel, "Parc éolien le long de l'E40, réunion d'information", 30 September 2008, <http://www.electrabel.com/assets/content/news/Reunion_d_information_398_FA700D3C884343108ED6BF3C6103E2D4.pdf> (17 June 2010)
Nieuwsblad, "Gingelom krijgt zeven windmolens", 17 October 2009, <http://www.nieuwsblad.be/article/detail.aspx?articleid=592GPGU3> (17 June 2010)
Express.be, "Windmolenpark E40 Brussel-Luik definitief goedgekeurd", 7 February 2009, <http://www.express.be/sectors/nl/energy/windmolenpark-e40-brussel-luik-definitief-goedgekeurd/102932.htm>

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Province Vlaams-Brabant, “Vergunning voor 17 windturbines”, 19 January 2010, <http://www.vlaamsbrabant.be/wonen-milieu/milieu-en-natuur/vergunningen/milieuvergunningen/nieuws-17-windturbines.jsp> (17 June 2010)

294 Het Nieuwsblad, “Electrabel wil vier windmolens langs Schipdonkkanaal”, 5 June 2010, <http://www.nieuwsblad.be/article/detail.aspx?articleid=3L2R4LEQ> (18 June 2010)

295 The Group’s first 20 MW wind farm is now under construction in Jarogniew – Moltowo and several other wind-power projects are in development. GDF Suez, press release “GDF SUEZ to build world's largest Biomass Power Unit in Poland strengthening its leading position in Europe”, 7 April 2010, <http://www.gdfsuez.com/en/finance/press-releases/press-releases/?communique_id=1218> (18 June 2010)

296 “We have allocated a significant budget for the development of the Borzesti, Cernavoda and the wind energy projects,” GDF SUEZ representatives said without, however, mentioning the actual amount. In addition to these projects, the company also planned other investments, such as the construction of two energy production units, one in Constanta and the other one in Galati, large-scale projects that required total funds of up to 2.5 billion euros. “At present such projects are not a priority for GDF SUEZ in Romania, as we chose to focus our resources on more advanced projects,” group’s representatives pointed out.
Website permanent representation Romania to the European Union, “Romanian economic highlights”, 21 December 2009, <http://ue.mae.ro/pdf/2009.12.21_highlights51.pdf> (20 June 2010)

297 GDF Suez has a 35% stake in Tirreno Power. TIRRENO POWER S.P.A., “BILANCIO D’ESERCIZIO AL 31 DICEMBRE 2009”, p. 11 <http://www.tirrenopower.com/resources/bilanci/73B77F89-8682-4A50-B085-2FCD0FDA334F.pdf> (18 June 2010)

298 Largest project is Curbans (33 MW in the Alpes de Haute Provence) where site construction began in February 2010. GDF Suez Reference Document 2009, April 2010, p. 27, <http://www.gdfsuez.com/en/finance/investors/publications/publications/> (17 June 2010)

299 GDF Suez, “2009 Activities and Sustainable Development report”, May 2010, <www.gdfsuez.com/document/?f=files/en/gdf-suez-radd-09-vus.pdf> (24 June 2010)

300 GDF Suez. “ethics and compliance”, http://www.gdfsuez.com/en/group/ethics-and-compliance/ethics-and-compliance/ (31 August 2010)

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Powertech Uranium Corp., “Strategic Partnership with Synatom”, <http://www.powertechuranium.com/s/SynatomPartnership.asp> (24 June 2010)

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305 Laborelec, presentation Yves Ryckmans “Sustainable biomass for green power”, <http://www.laborelec.com/pages_files/BM_Sustainable%20biomass%20for%20green%20power-Bestof.pdf> (25 August 2010)

6 Vattenfall/Nuon

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

Basic company information

Vattenfall

Vattenfall is Europe's fifth largest generator of electricity and largest producer of heat. Consolidated sales in 2009 amounted to €19.8 billion. Vattenfall's main products are electricity, heat and gas. In electricity, Vattenfall works in all parts of the value chain: generation, transmission, distribution and sales. In heat, Vattenfall is active in production, distribution and sales. Vattenfall is also engaged in production and sales of gas, energy trading, and lignite mining. Vattenfall has approximately 40,000 employees and is 100%-owned by the Swedish state.[306]

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.[307]

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

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

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

Nuon

N.V. Nuon Energy is a non-listed public limited liability company incorporated in 1998 with its registered office in Amsterdam. On 1 July 2008 Nuon was split into a distribution company (Alliander) and a production and supply company (N.V. Nuon Energy) to prepare for the implementation of the Dutch Independent Network Operations Act (Won), which came into effect one year later. Nuon has operations in the field of generation, trade and supply. In addition to being one of the largest energy suppliers in the Netherlands, the company has interests in energy generation and supply in Belgium, and has trading activities with, among others, the UK and Scandinavia. Nuon provides electricity, natural gas, cooling and heat to approximately 2.6 million customers in the Netherlands and Belgium.[308] The company also

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

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

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

Purchase and integration

On 1 July 2009, Vattenfall acquired 49% of the Nuon shares, for an amount of €4,833 million, giving the company operational control over Nuon. Vattenfall will acquire the remaining 51% of shares in the coming five years under fixed terms. As one of the conditions of the European Competition Authorities, Vattenfall sold off Nuon's activities in Germany. In March 2010, it was announced that Enervie (formerly Sewag) acquired all of Nuon's German operations. [309]

Installed capacity for electricity generation in Europe

Vattenfall (including Nuon)

Figure 15 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.[310] The generation capacity of Nuon is 100% incorporated in the capacity figures of Vattenfall as of 31 December 2009.

Figure 15: Fuel mix of Vattenfall's installed capacity in Europe, 2009

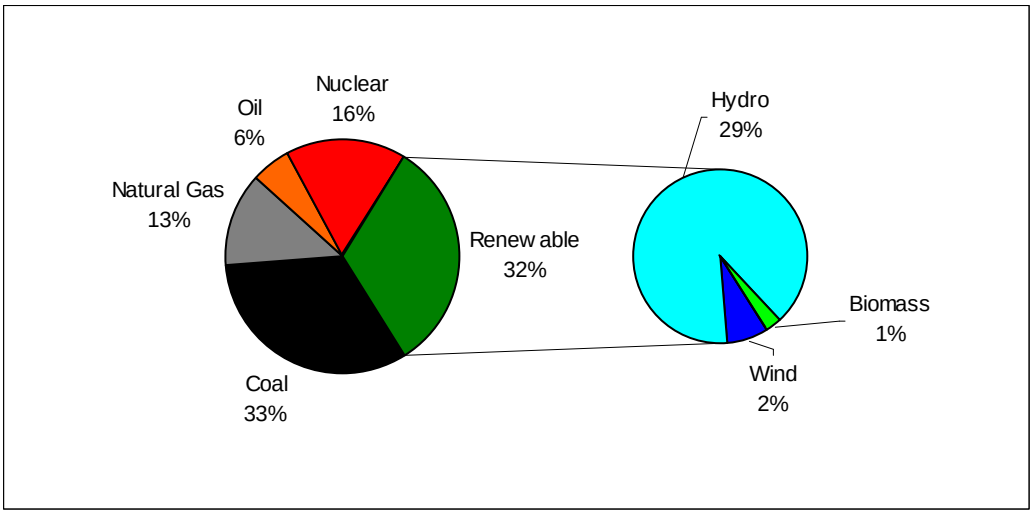


Table 23 shows the absolute figures for Vattenfall's installed capacity in Europe per fuel type.

Table 23: Vattenfall's installed capacity in Europe (MW) per division and per fuel type, 2009[311]

Fuel type	Business Group Pan Europe	Business Group Nordic	Business Group Central Europe	Business Group Benelux	Total
Coal[312]	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 16 shows the fuel mix of the actual generated electricity in Europe by Vattenfall in 2009.

Figure 16: Fuel mix of Vattenfall's generated electricity in Europe, 2009

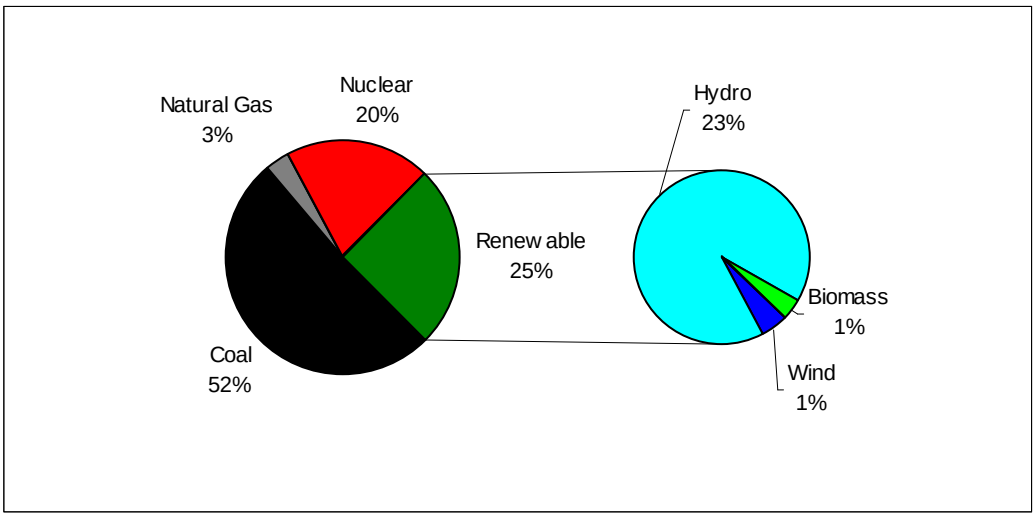


Table 24 shows the absolute figures for Vattenfall's generated electricity in Europe per fuel type. As in 2008, the installed capacity for fuel type oil was not used for actual generation of electricity in 2009. Contrary to the installed capacity, the generated electricity by Nuon is not fully incorporated 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.[313] 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).[314]

Table 24: Vattenfall's generated electricity (TWh) in Europe per division and per fuel type, 2009[315]

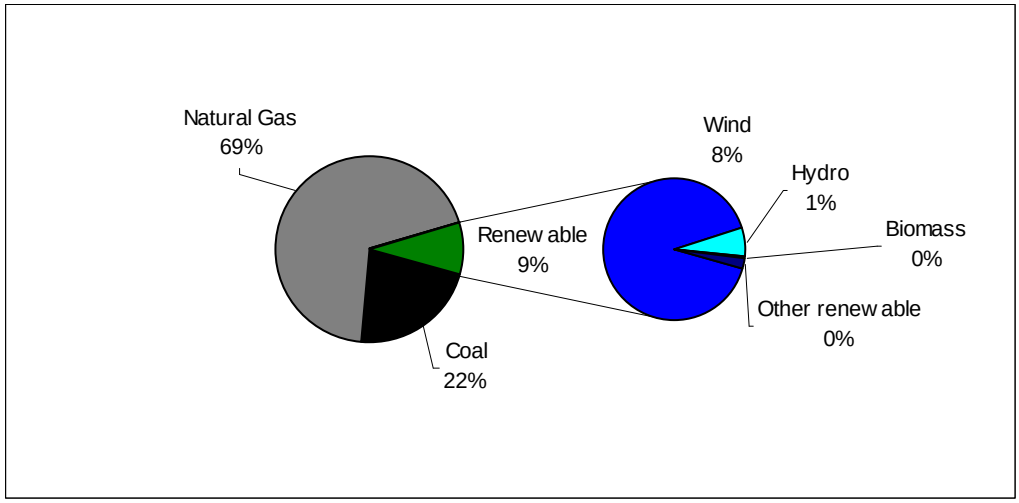
Fuel type	Business Group Pan Europe	Business Group Nordic	Business Group Central Europe	Business Group Benelux	Total
Coal[316]	0	6.7	61.9	2.6	**71.2**
Natural Gas	0	0.6	3.5	0.6	**4.7**
Oil	0	0	0	0	**0**
Nuclear	28.3	0	0	0	**28.3**
Wind	1.7	0	0	0	**1.7**
Hydro	0	29.1	2.5	0	**31.6**
Biomass	0	0.3	1.1	0	**1.4**
Total	**30.0**	**36.7**	**69.0**	**3.2**	**138.9**

Nuon

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

Figure shows the fuel mix of Nuon's installed capacity. For the large part, this fuel mix has remained the same compared to the previous year. A number of small wind projects became operational in 2009.[317] Nuon still has the large majority of its installed capacity in The Netherlands, and most of the 9% renewable capacity is accounted for by offshore and onshore wind projects.

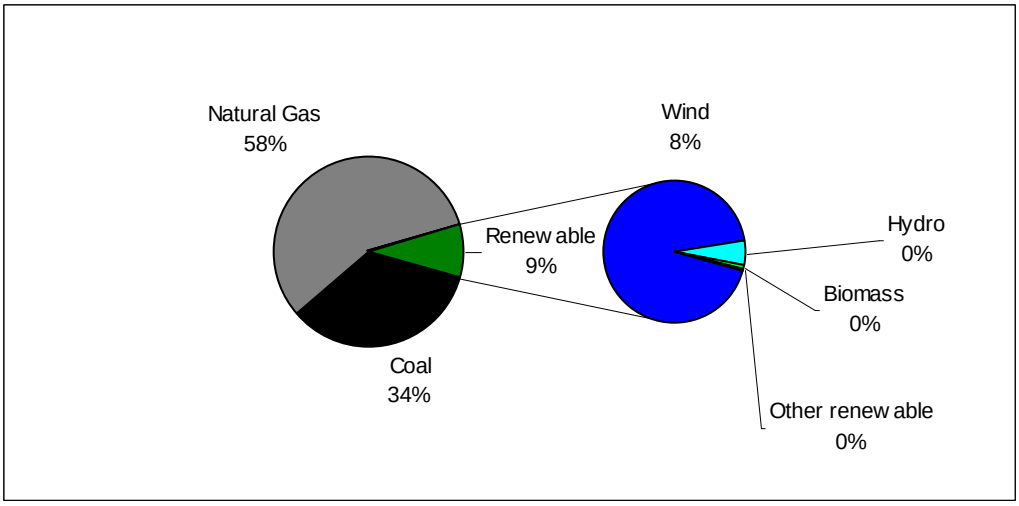
Figure 17: Fuel mix of Nuon's installed capacity in Europe, 2009



Based on: Nuon[318]

Nuon provides detailed figures on the generated electricity in 2009. Figure 18 shows the fuel mix, and shows slightly higher coal figures and slightly lower natural gas figures than its installed capacity. The renewable share is similar to the figures for the installed capacity.

Figure 18: Fuel mix of Nuon's generated electricity in Europe, 2009



Based on Nuon[319]

Table 25 shows the absolute figures for Nuon's installed capacity and electricity generation. Under the category "Natural gas", Nuon makes the distinction between three different types of gas from which it produces electricity: 12.6% of the generated electricity comes from blast furnace gases generated at the Corus, 28.5% from combined heat and power (CHP) plants, and 15.8% from conventional natural gas plants.

Table 25: Fuel mix of Nuon's installed capacity and electricity generation in Europe, 2009[320]

Fuel type	Installed capacity (MW)[321]	Generated electricity (GWh)[322]
Coal	883[323]	5,262
Natural Gas	2,767[324]	8,758
CHP		4,387
Regular		2,427
Blast Furnace		1,944
Oil		
Nuclear		
Other Non-renewable		
Wind	334[325]	1,275
Hydro	24	72
Large scale (>10MW)		0
Small scale (<10MW)	[24[326]]	[72]
Biomass	2	16
Stand alone	[2[327]]	
Co-fired		
Other renewable	8[328]	4
Total	**4,018**	**15,387**

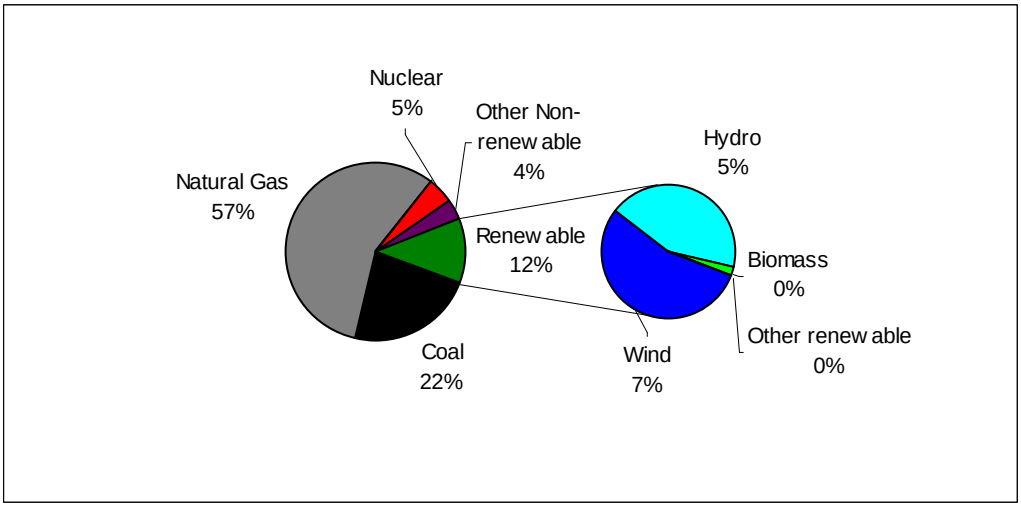
Electricity supplied in The Netherlands

The figures for the electricity supplied are gathered from Nuon. Vattenfall does not have any supply activities in the Benelux other than Nuon.

As Figure 19 reveals, Nuon's supply mix has a higher share of renewable power than the mix for the electricity it generates itself. These figures are similar to previous years. The 12% renewable electricity represents a total of 2,126 GWh.[329] As explained in the methodology

chapter, the figures might be influenced by the purchase and trade of green certificates, and do not necessarily reflect the fuel mix received by consumers.

Figure 19: Fuel mix of Nuon's supplied electricity in The Netherlands and Belgium



Based on Nuon[330]

Table 26 shows the CO2 emissions and radioactive waste production related to the supplied electricity.

Table 26: CO2 emissions and radioactive waste production for Nuon's supplied electricity, 2009

Indicator	Amount
CO_2 (g/kWh)	396.6
Radioactive waste (µg/kWh)	190

Announced investments in new generation capacity in Europe

Vattenfall

Vattenfall's investment plan for the period 2010–2014 is worth €19.4 billion[331], 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.[332] 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.[333]

In addition to the investments explained in table 4 and 5, 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.[334] The total capacity of the plants will remain unchanged. For this reason the investment is not included in the tables below.

Nuon

Table 27 shows Vattenfall/Nuon's investments in new production capacity that are currently underway. It includes Nuon's 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.[335] It also exchanged some wind assets in a swap with Electrawinds and Aspiravi.[336] 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 27: Vattenfall/Nuon'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[337]	under construction[338]
Vattenfall	new unit Boxberg	Germany	lignite	late 2010	1,000	675	under construction[339]
Vattenfall	combined heat and power unit, Siekierki	Warsaw, Poland	coal/ biomass	2014	800	480	almost tendered[340]
Vattenfall	boost generation capacity	Forsmark and Ringhals plants, Sweden	nuclear	2011/ 2014	1,250[341]	450[342]	under construction
Vattenfall	Abelvattnet	Sweden	hydro	2010	10	4.6	under construction[343]
Vattenfall	Ormonde wind farm, offshore	in the Irish Sea, 10km off Barrow-In-Furness, England, UK	wind	2011/ 2012	545	150	under construction[344]
Vattenfall	Thanet wind farm, offshore	off the south-east coast of Kent, England, UK	wind	2010	945	300	under construction[345]

Vattenfall	Stor-Rotliden, wind power project, onshore	municipality of Åsele in northern Sweden	wind	2011	135	78	under construction [346]
Vattenfall	Alpha Ventus	45 km off the coast of the island of Borkum, Germany	wind	April 2010	66	16	in operation[347]
Vattenfall	Repower older turbines	Denmark	wind	n/a	n/a	35	under construction [348]
Vattenfall	Edinbane, onshore wind power project	the Isle of Skye, Scotland, UK	wind	2010	61	41.4	under construction [349]
Nuon		Almere (NL)[350]	Natural gas (CHP)	2010	n/a	120	Plant acquired from GDF Suez/Electrabel
Nuon	Nuon Magnum (Phase I)[351]	Eemshaven (NL)	Natural gas (part of a multi-fuel installation)	2012	1,800	1,200[352]	Construction resumed
Nuon	Hemweg 9[353]	Amsterdam (NL)	Natural gas (CCGT)	2012	n/a	435	Under construction
Nuon	Oom Kees[354]	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 28 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.[355] 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.[356] 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 28. Nuon is also constructing a 299 MW wind park in Wales, called Pen Y Cymoedd, which is also not taken up in the table for reasons of scope and consistency. [357]

Table 28: Vattenfall/Nuon'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	un-decided [358]	2016-2018	650-900	700	planning phase[359]
Vattenfall	Elektrownia Kozienice	South east Poland	coal	2015	288	187	planning phase[360]
Vattenfall	Elektrownia Kozienice	South east Poland	coal	n/a	288	187	considered [361]

Vattenfall	Elektrownia Gniew – Opalenie	Opalenie, Poland	coal	n/a	2,560	1,660	planning phase[362]
Vattenfall	Jänschwalde	Near Brandenburg, Germany	coal/CCS	2015	n/a	250[363]	planning phase[364]
Vattenfall	EC Pruszków	Poland	coal/ biomass	n/a	740	480	planning phase[365]
Vattenfall	EC Zerań	Warsaw, Poland	coal/ biomass	n/a	740	480	planning phase[366]
Vattenfall	Heizkraftwerk Lichterfelde	Berlin, Germany	gas (CCGT)	2014/ 2015	n/a	300	planning phase[367]
Vattenfall	Heizkraftwerk Klingenberg	Berlin, Germany	gas (CCGT)	2016/ 2019	n/a	300	planning phase[368]
Vattenfall	Enea	Poland	biogas	2020	n/a	28	planning phase[369]
Vattenfall	CHP plant Haferweg	Hamburg Altona, Germany	biomass	n/a	n/a	5	Approval received in January 2010[370]
Vattenfall	district heating plant Märkisches	Märkisches, Germany	biomass	n/a	n/a	5	Approval received in March 2010[371]
Vattenfall	Biomass CHP plant Klingenberg	Klingenberg, Germany	biomass	n/a	n/a	40	Planning phase[372]
Vattenfall	Aegir	Shetland Islands, UK	wave power	2014	n/a	10	planning consent needed[373]
Vattenfall	Tonn Energy	Ireland	wave power	2020	180	125	in study[374]
Vattenfall	Dan Tysk	70 km northwest of Sylt, Germany	wind	n/a	n/a	400	Construc-tion starts 2011.[375]
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.[376]
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	Construc-tion expected to commence after 2015.[377]
Vattenfall	Kriegers Flak II	Baltic Sea, 30 km south of Trelleborg, Sweden	wind	n/a	n/a	640	no investment decision yet.[378]
Vattenfall	Taggen	Offshore Sweden	wind	n/a	n/a	150	possible construction start 2012[379]
Vattenfall	Trolleboda	Offshore Sweden	wind	n/a	n/a	150	not economi-cally viable according to company[380]

Vattenfall	Aultmore, onshore	Aultmore Forest, Banffshire, Scotland, UK	wind	n/a	n/a	n/a	awaiting permission [381]
Vattenfall	Clashindarroch, onshore	near Huntly in Aberdeen-shire, Scotland, UK	wind	n/a	n/a	50	awaiting permission [382]
Vattenfall	Kyle, onshore	east of Dalmellington, Scotland, UK	wind	n/a	n/a	n/a	in study[383]
Vattenfall	Logiealmond, onshore	Perthshire, Scotland, UK	wind	n/a	n/a	n/a	awaiting permission [384]
Vattenfall	Minch Moor, onshore	near Peebles, Scotland, UK	wind	n/a	n/a	n/a	awaiting permission [385]
Vattenfall	Ray, onshore	near Kirkwhelping-ton. England, UK	wind	n/a	n/a	n/a	awaiting permission [386]
Vattenfall	Whitton, onshore	east of Jedburgh, Scotland, UK	wind	n/a	n/a	15	awaiting permission [387]
Vattenfall	Enea	Poland	wind	2020	n/a	75	planning phase[388]
Nuon		Velsen[389]	natural gas	n/a	100	200	Proposed
Nuon		Diemen (NL) [390]	natural gas (CHP)	2012	n/a	500	Proposed
Nuon		Seneffe[391] (BE)	natural gas (CCGT)	n/a	n/a	450	Proposed
Nuon	Beaufort[392]	Noordzee	wind	2015	950	300	Awaiting subsidies
Nuon	De Zuidlob[393]	Zeewolde	wind	2012	n/a	108	Proposed
Nuon		Duiven (NL)[394]	wind	n/a	n/a	12	Awaiting permits
Nuon		Büren (NL) [395]	wind	n/a	n/a	8	Awaiting permits
Nuon	Nuon Magnum (Phase II)[396]	Eemshaven (NL)	coal and biomass	n/a	n/a	800	Proposed
Nuon	Nuon Magnum (Phase II)[397]	Eemshaven (NL)	natural gas	n/a	n/a	-800	Proposed

Responsible sourcing

Vattenfall/Nuon's approach to sustainability can be described as aiming to find a balance between electricity reliability, cost and sustainability.[398] 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'.[399] 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.[400]

Vattenfall owns and operates lignite mines close to its lignite-fired power plants in the Lausitz region, in eastern Germany.[401] 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.[402]

Nuon explicitly states that it does not provide figures for the quantities of raw materials it purchases, because this information would be 'competition-sensitive'.[403] 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.[404]

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'.[405]

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.'[406] 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.[407] 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 bares 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.'[408]

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

No information was found regarding Vattenfall's trading activities.

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306 Vattenfall, "annual report 2009", p.2 and 3, <http://www.vattenfall.com/en/file/2-20100524-110100.pdf> (16 July 2010)
307 Vattenfall website, "Market operations", updated 21 June 2010, <http://www.vattenfall.com/en/market-operations.htm> (16 July 2010).
308 Nuon, Annual Report 2009, p.4.
309 Energeia website, "Nuon Duitsland definitief in handen van Enervie na Europees groen licht", 19-03-10, http://www.energeia.nl/news.php?ID=42683 (08-07-10).
310 Vattenfall, "annual report 2009", p.94, <http://www.vattenfall.com/en/file/2-20100524-110100.pdf> (16 July 2010)
311 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)
312 Vattenfall reports separately for its lignite and hard coal capacity. This table has combined these figures for reasons of comparability.
313 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)
314 Vattenfall, "annual report 2009", p.22 and 133, <http://www.vattenfall.com/en/file/2-20100524-110100.pdf> (16 July 2010)
315 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)
316 Vattenfall reports separately for its lignite and hard coal capacity. This table has combined these figures for reasons of comparability.
317 Nuon, Annual Report 2009, p.22.
318 Nuon Corporate Social Responsibility Report 2009, p78.
319 Nuon Corporate Social Responsibility Report 2009, p.19.
320 The figures given in this table are based on Nuon's CSR report, which provides the most detailed figures for capacity and generation.
321 Some of these figures are based on SOMO's own calculations. In its CSR report, Nuon indicates that reporting on "total installed capacity by fuel source is not always possible due to combined fuel applications in the installations" (Nuon CSR report, p.78). These figures should therefore be interpreted with caution.
322 Nuon's comments to a draft version of this report, email received 06-08-10.
323 This is the combined capacity of the Buggenum (253 MW) and Hemweg (630 MW) coal plants.
324 This is calculated by taking the total grey capacity (3,650 MW) minus the coal capacity (883 MW).
325 Nuon Corporate Social Responsibility Report 2009, p.50.
326 Idem.

[327] Idem.
[328] Idem.
[329] Nuon Corporate Social Responsibility Report 2009, p.32.
[330] Nuon Corporate Social Responsibility Report 2009, p.36.
[331] SEK 201 billion. Exchange rate SEK 10.35 = € 1
[332] SEK 100 billion. Exchange rate SEK 10.35 = € 1
[333] Vattenfall, "annual report 2009", p.10, <http://www.vattenfall.com/en/file/2-20100524-110100.pdf> (16 July 2010)
[334] 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)
[335] 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).
[336] 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).
[337] Total capacity of 1,640 MW of electric power and up to 650 MWth for district heating.
[338] 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_Kraftwerke/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)
[339] 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)
[340] 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)
[341] 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
[342] 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)
[343] 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.
[344] Total investment £ ~450 million. Exchange rate as 01-07-2010: £1 = € 1.21148 (http://www.exchange-rates.org/history/EUR/GBP/T). Rated power150 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)
[345] 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)
[346] Total investment SEK ~1,400 million. Exchange rate SEK 10.35= € 1. Rated power78 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)

[347] 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)

[348] 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)

[349] 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 of 01-07-2010: £1 = € 1.21148 (http://www.exchange-rates.org/history/EUR/GBP/T)

[350] 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).

[351] 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).

[352] 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.

[353] Platts Power in Europe, "PIE's new plant tracker", 03-05-10.

[354] 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).

[355] 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).

[356] Platts Power in Europe, "PIE's new plant tracker", 03-05-10.

[357] Platts Power in Europe, "PIE's new plant tracker", 03-05-10.

[358] 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 CO_2 emission rights for the years 2013-2020.

[359] 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)
Environmental impact assessment and a feasibility study should be completed by mid-2012 Dow Jones Newswires, "Vattenfall, Polish Pulawy Ink Power Plant Cooperation Deal", 23 April 2010, <http://www.foxbusiness.com/story/markets/commodities/vattenfall-polish-pulawy-ink-power-plant-cooperation-deal/> (19 July 2010)

[360] 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_channel=4> (19 July 2010)
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.
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)

[361] 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.

[362] 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)

[363] Corresponds to 650 Mwth.

[364] 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)

[365] 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)
Elsam (Dong energy), "Elsamprojekt Polska", <http://www.elsamprojekt.com.pl/biomasa_eng.html), 19 July 2010.

[366] 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)

[367] 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)

[368] 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)

[369] 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.

[370] thermal capacity of 17 megawatts and an electrical output of five megawatts. Vattenfall Germany, <http://www.vattenfall.de/de/zukunft-der-biomasse.htm> (25 August 2010)

[371] thermal capacity of 18 megawatts and an electrical output of five megawatts. Vattenfall Germany, <http://www.vattenfall.de/de/zukunft-der-biomasse.htm> (25 August 2010)

[372] Twice a electricity capacity of 20 megawatts and a total heating capacity of 150 megawatts. Vattenfall Germany, <http://www.vattenfall.de/de/zukunft-der-biomasse.htm> (25 August 2010)

[373] Aegir Wave Power Ltd is a 51%/49% joint venture between Vattenfall and Pelamis Wave Power. Total capacity first phase is 20 MW. The first phase will be installed by 2014 if planning consent is gained.
Pelamis Wave Power and Vattenfall, press release “Partnership Aegir to develop Shetland’s first wave power project”, 15 December 2009, <http://www.pelamiswave.com/media/091215_aegir_launch_national.pdf> (16 July 2010)

[374] Tonn Energy is a joint venture of Vattenfall (51%) with Wavebob (49%). In 2020 the company hopes to achieve 250 MW wave energy generation in Ireland. The investment is estimated at €360 million. Tonn Energy, “Consultation Response, Treatment of Small, Renewable and Low Carbon Generators outside the Group Processing Approach” April 2009, <http://www.cer.ie/GetAttachment.aspx?id=cfb7bef1-6e7c-4b47-acf4-fb83ecc68970> (16 July 2010)
Short term investment in 5 - 10 MW. Vattenfall, “R&D in Vattenfall”, April 2010, <http://www.vattenfall.com/en/file/2-20100511-091204.pdf> (16 July 2010)

[375] Vattenfall, press release “Vattenfall bündelt Windgeschäft in Deutschland und Polen”, 16 June 2009, <http://www.vattenfall.de/www/vf/vf_de/225583xberx/232127press/232157press/232187archi/258228press/index.jsp?pmid=166010&WT.ac=search_success> (16 July 2010) . Vattenfall, “Offshore-Windkraftprojekte von Vattenfall”, no date, <http://www.vattenfall.de/www/vf/vf_de/225583xberx/228647erneu/2014373neu-w/2014942offsh/2016036weite/index.jsp> (16 July 2010)

[376] ScottishPower Renewables (50%) and Vattenfall (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 Vattenfall Award Gardline Hydro Multi Million Pound Contract”, 17 June 2010, <http://www.scottishpower.com/PressReleases_2038.htm> (21June 2010)
ScottishPower, press release “Iberdrola Renovables Creates Global Offshore Wind Division In Glasgow To Promote Projects Up To 10,000 MW”, 2 March 2010, <http://www.scottishpower.com/PressReleases_2015.htm> (21June 2010)

[377] ScottishPower Renewables (50%) and Vattenfall (50%) are the developers of the East Anglia Array offshore windfarm zone. The proposed first project will consist of approximately 240 turbines and will have the capacity to generate up to 1.2 GW of electricity. The East Anglia Array, located in the North Sea off the coast of Norfolk, will have a capacity of up to 7.2 GW and is projected to commence construction in 2015.
ScottishPower, press release “ScottishPower Renewables And Vattenfall Award Gardline Hydro Multi Million Pound Contract”, 17 June 2010, <http://www.scottishpower.com/PressReleases_2038.htm> (21June 2010)
ScottishPower, press release “Iberdrola Renovables Creates Global Offshore Wind Division In Glasgow To Promote Projects Up To 10,000 MW”, 2 March 2010, <http://www.scottishpower.com/PressReleases_2015.htm> (21June 2010)

[378] If the wind farm meets the demands that Vattenfall makes on its projects and if the Vattenfall Board decides to build the wind farm at Kriegers flak, it is scheduled to be completed in stages during the period between 2014 and 2017. Vattenfall, brochure, “Kriegers Flak wind farm”, January 2010, <http://www.vattenfall.com/en/file/2-20100118-125828.pdf> (16 July 2010)

[379] Total capacity 300 MW. Vattenfall stake 50%. Taggen windpark website, <http://www.taggenvindpark.se/2-4.aspx> (16 July 2010)

[380] Vattenfall website, “Trolleboda vindkraftpark”, updates 14 July 2010, <http://www.vattenfall.se/sv/trolleboda-vindkraftpark.htm> (16 July 2010)
Vattenfall, “Vattenfall Windpower Expansion Plans, presentation Sven-Erik Thor”, 26 May 2009, <http://www.natverketforvindbruk.se/Global/Affarsutveckling/Wind%20Power%20and%20Industry%202009/Presentationer/Block%202%20-%2026%20maj/S-E_Thor_Kalmar_v3.pdf> (16 July 2010)

[381] compact group of 13 turbines. Vattenfall website, “Aultmore”, updated 19 March 2010, <http://www.vattenfall.co.uk/en/aultmore.htm> (16 July 2010).
[382] A revised proposal was submitted on in May 2009 to Aberdeenshire Council for a wind farm of 18 wind turbines of up to 2.75 MW. Vattenfall website, “Clashindarroch”, updated 19 March 2010, <http://www.vattenfall.co.uk/en/clashindarroch.htm> (16 July 2010).
[383] Scottish Ministers turned down a scheme on Friday 24 October 2008. Vattenfall website, “Kyle”, updated 19 March 2010, <http://www.vattenfall.co.uk/en/kyle.htm> (16 July 2010).
[384] 14 wind turbine proposal. Vattenfall website, “Logiealmond”, updated 19 March 2010, <http://www.vattenfall.co.uk/en/logiealmond.htm> (16 July 2010).
[385] Project comprises 12 turbines. Vattenfall website, “Minch Moor”, updated 19 March 2010, <http://www.vattenfall.co.uk/en/minch-moor.htm> (16 July 2010).
[386] Project comprises 16 turbines. Vattenfall website, “Ray”, updated 19 March 2010, <http://www.vattenfall.co.uk/en/ray.htm> (16 July 2010).
[387] Project comprises 6 turbines of 2 or 3 MW. Vattenfall website, “Whitton”, updated 19 March 2010, <http://www.vattenfall.co.uk/en/whitton.htm> (16 July 2010).
[388] 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.
[389] Platts Power in Europe, “PIE’s new plant tracker”, 03-05-10.
[390] Platts Power in Europe, “PIE’s new plant tracker”, 03-05-10 and <http://www.energeia.nl/news.php?ID=36944>
[391] Platts Power in Europe, “PIE’s new plant tracker”, 03-05-10.
[392] Nuon, Annual Report 2009, p.3. and J. Olthoff, Head of Technology, Vattenfall, “Offshore Windenergy from a Dutch perspective”, presentation, 28-01-10, http://www.hollandgateway.nl/downloads/0000/0012/Offshore_Windenergy_from_a_Dutch_perspective_-_Jaap_Olthoff.pdf (08-07-10).
[393] Platts Power in Europe, “PIE’s new plant tracker”, 03-05-10.
[394] Nuon Corporate Social Responsibility Report 2009, p.49.
[395] Idem.
[396] Figures based on input provided by Nuon as a response to a draft version of this profile. The calculation for the output capacity is based on a 66% coal and biomass and a 33% natural gas division of the total capacity of 1,200 MW. Email Pinar Ates, Manager regulatory affairs Nuon received 30-08-2010.
[397] A negative figure is presented here to avoid double counting. Phase II of the Magnum project will not add additional capacity, but will replace the fuel type of part of the plant from natural gas to coal and biomass.
[398] Nuon Corporate Social Responsibility Report 2009, p.II.
[399] Vattenfall website, Our company, Operations, Suppliers, Code of conduct for suppliers, updated 21 June 2010, <http://www.vattenfall.com/en/code-of-conduct-for-suppliers.htm> (19 July 2010)
[400] Vattenfall website, Our company, Operations, Power plants, Coal, Coal at Vattenfall, updated 21 June 2010, <http://www.vattenfall.com/en/coal-at-vattenfall.htm> (19 July 2010)
[401] Vattenfall website, Our company, Operations, Power plants, Coal, Coal at Vattenfall, updated 21 June 2010, <http://www.vattenfall.com/en/coal-at-vattenfall.htm> (19 July 2010)
[402] Vattenfall Europe Mining & Generation, Dipl.-Ing. Siegfried Körber, presentation “Braunkohlenförderung Nochten / Reichwalde – Garant für langfristige Versorgungssicherheit”, 14 May 2009, <http://www.debriv.de/tools/download.php?filedata=1243369256.pdf&filename=Pr%E4sentation%20K%F6rber.pdf&mimetype=application/pdf> (26 August 2010)
Vattenfall Europe Mining & Generation, presentation Herr Prof. Dr. Dähnert, “Das Lausitzer Braunkohlerevier – auf dem Weg zur innovativen Energieregion Lausitz / Spreewald” 23 April 2009, <http://www.ct-ifm.de/Bilder/projekte/Vortrag_Energie_Zukunft.pdf> (26 August 2010)
Umweltgruppe Cottbus e.V., <http://www.lausitzer-braunkohle.de/> (26 August 2010)
[403] Nuon Corporate Social Responsibility Report 2009, p.80.
[404] Meeting between Nuon and SOMO, 13-08-10.
[405] A. Rising, “Vattenfall opinion paper on sustainability aspects of bioenergy”, 6 April 2009, <http://www.vattenfall.com/en/file/opinion-paper-on-sustainabili_8459801.pdf> (19 July 2010)
[406] Nuon Corporate Social Responsibility Report 2009, p.45-6.
[407] Vattenfall website, “Uranium from mine to nuclear power plant”, updated 21 June 2010, <http://www.vattenfall.com/en/uranium-from-mine-to-nuclear-.htm> (16 July 2010)
[408] Answer given to the questionnaire sent by SOMO, email received 06-08-10.

7 RWE/Essent

Basic company information

RWE is present in all areas of the electricity and gas value chain. Europe is its market. In addition to Germany, its strategic focus is on the UK, the Benelux region, Central and South Eastern Europe as well as Turkey. The company is the number one power producer in Germany. In terms of sales of electricity, RWE is number two in Germany and the Netherlands, and number three in the UK. The European market position of the RWE Group in terms of sales is number three for electricity and number six for gas. In 2009 the revenue of the RWE Group amounted to €47.7 billion.[409]

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/Essent 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.[410]

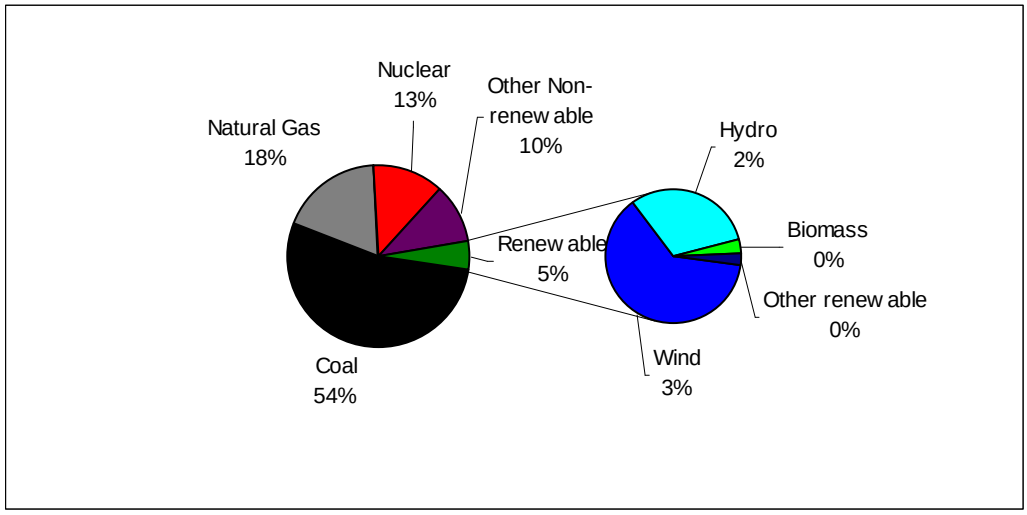
The RWE Group is streamlined according to functional and geographical companies:

- 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 Power 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.[411]

Installed capacity for electricity generation in Europe

Figure 20 reveals the fuel mix of RWE's electricity generation capacity in Europe for the year 2009. The installed capacity was 49.6 GW.[412] 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.[413] 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 20: 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.[414] Figure 21 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 21: Fuel mix of RWE's electricity generation in Europe, 2009

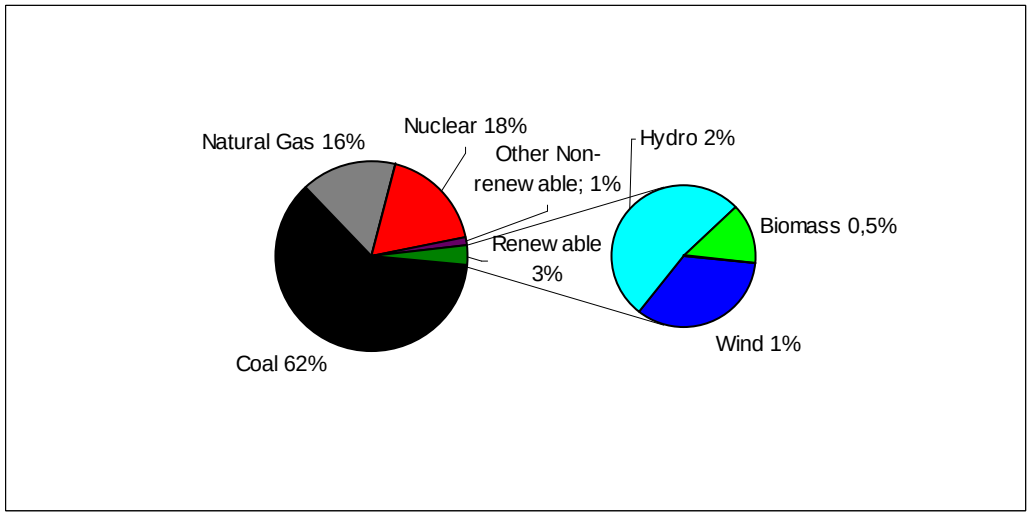


Table 29 gives the absolute figures of both the installed capacity and RWE's generated electricity.

Table 29: Fuel mix of RWE's electricity generated and installed capacity in Europe, 2009[415]

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[416]	6,500
Wind	1,574[417]	2,200[418]
Hydro	793	3,400
Biomass	98[419]	900
Other renewable	67	-
Total	**49,582**	**187,200**

Electricity supplied in The Netherlands

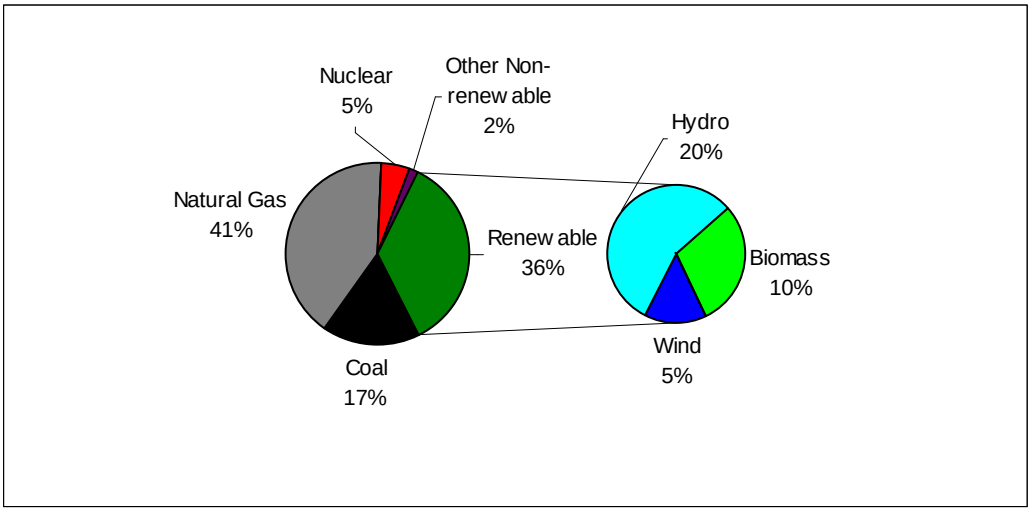
RWE Group, by means of Essent NV, is the number three in the Netherlands as to power generation.[420] In terms of electricity sales, RWE is the number two in the Netherlands. In 2009, RWE supplied 3.5 TWh of electricity to private and commercial customers in the Netherlands and Belgium and 2.0 TWh to industrial and corporate customers in the Netherlands and Belgium.[421] The supply of electricity by Essent Belgium in Belgium amounted to 1.5 Twh in 2009. The total supply of RWE/Essent may however have been slightly bigger, because some small suppliers within RWE/Essent are not part of this calculation (Essent Energy Trading and RWE Key Account)[422] In the Netherlands and in 2009, RWE's electricity supply business had a market share of 28.4% for households, 26% for small and medium enterprises (SMEs) and 19% with regard to large business customers.[423] Essent Belgium had a market share of 2.1% within electricity supplies in Belgium.[424]

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

Figure 22 reveals the fuel mix of electricity supplied by Essent in the Netherlands, Belgium and Germany during 2009.[425] The figure represents Essent's electricity supply to all clients. Essent guarantees that the 'Groene Stroom' (Green Electricity) it supplies to residential customers is generated from biomass (67%), wind (32%), and hydro (1%).[426] Essent estimates this mix might change in 2010.[427] Essent has stated: 'Figure 3 mentions the fuel mix of the Essent NV (*Essent NV Mix*), prior to takeover by RWE. As such this mix includes electricity sales of our former activities in Germany (swb AG and Kom-Strom). As both these activities were disposed in 2009 and swb AG predominantly uses coal, the *Essent NV Mix*

does not give a good representation of the fuel mix of Essent under new ownership by RWE and of the fuel mix of electricity supplied in the Netherlands.'[428]

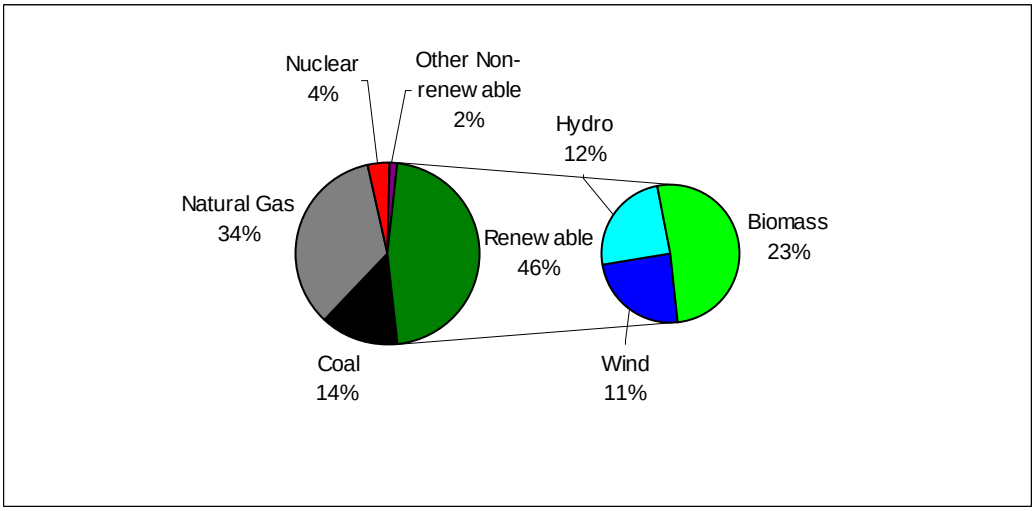
Figure 22: Essent NV fuel mix of electricity supplied by Essent in the Netherlands, Belgium and Germany, 2009



Based on: Essent[429]

Essent has suggested using the *Essent Retail Mix* as the best mix representing the fuel mix of electricity supplied to B2C (households) and SME customers in the Netherlands.[430] This mix does however not include industrial customers. Figure 23 shows the *Essent Retail Mix* for 2009.

Figure 23: Essent retail fuel mix of electricity supplied in the Netherlands, 2009



Based on: Essent[431]

Table 30 presents the CO_2 emissions and radioactive waste production resulting from the electricity supply by Essent in 2009.

Table 30: Emissions and waste resulting from Essent's electricity supply in 2009 (Essent NV mix and Essent Retail mix)[432]

Indicator	Essent NV mix (2009)	Essent Retail mix (2009)
CO_2 (g/kWh)	303	251
Radioactive waste (µg/kWh)	140	110

The fuel mixes of electricity supplied by Essent during 2009 do not include supplies by RWE Energy Nederland NV. RWE Energy Nederland NV is a very small player in the Dutch market, compared to Essent. Therefore the fuel mix for the electricity supplied by RWE Energy Nederland NV in the Netherlands in 2009 is not included into this fact sheet. RWE Energy Nederland NV offers its clients a renewable energy product called Windkracht220 that consists of 100% wind energy.[433]

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.[434] Essent's onshore wind project at Westereems has gone into full operation in 2009, and has been included in the installed capacity section.[435] Table 31 indicates the projects of the RWE group that are currently under construction in Europe.

Table 31: 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/bio mass	2013/2014	2,200[436]	1,560[437]	under construction
Hamm	Westfalen, Germany	coal	2012	1,550	930	under construction[438]
Neurath	Grevenbroich, Germany	Coal (lignite)	2011	2,500[439]	700[440]	under construction
GKM 9	Grosskraftwerk Mannheim, Germany	coal	2013	480[441]	364[442]	under construction
Moerdijk II	Moerdijk, Netherlands	gas (CCGT)	end of 2011	500[443]	430[444]	under construction
Claus unit C	Maasbracht, Netherlands	gas	2012	1,000[445]	1,275[446]	under construction
CCGT power plant	Lingen, Emsland, Germany	gas (CCGT)	April 2010[447]	500[448]	876	under construction
4 new 58 MW units	Lingen, Emsland, Germany	gas	2011	200	122	under construction[449]
Staythorpe power station	Nottinghamshire, England, UK	gas (CCGT)	Late 2010	900	1,650	under construction[450]
Pembroke power plant	Pembroke, Wales, UK	gas (CCGT)	2012	1,100	2,000	under construction[451]
Denizli	Western Turkey.	gas (CCGT)	2012	350	542	under construction[452]
Reactors 3 + 4	Cernavoda, Romania	nuclear	Unit 3: 2016	366	132	under construction

			Unit 4: n/a			[453]
Selset	Scotland, UK	hydro	2010	2.8[454]	0.7	under construction [455]
Black Rock	Nearby Evanton, Scotland, UK	hydro	2010	n/a	3.5	under construction [456]
Ruivares	Ruivares, Portugal	hydro	2011	n/a	3.6	under construction [457]
Siadar	Isle of Lewis, Scotland, UK	tidal scheme	n/a	n/a	4	under construction [458]
Stallingborough Alpha	Lincolnshire, England, UK	biomass	2013	n/a	65	under construction [459]
BMHKW Goch	Goch, Germany	biomass	2011	n/a	5	under construction [460]
BMHKW Wittgenstein	Wittgenstein, Germany	biomass	2010	n/a	5	under construction [461]
Tullis Russel	Markinch, Scotland, UK	biomass	2012	200[462]	50	under construction [463]
Südlohn	Münsterland region, Germany	biogas	2010	n/a	4.1	under construction [464]
Nordsee Ost offshore wind farm	30 kilometres north-west of Helgoland, Germany	wind	2013	1,000	295	Investment decision made[465]
Greater Gabbard offshore wind farm, together with SSE	25km off the east coast of England.	wind	2011	750[466]	250	under construction [467]
Thornton Bank	Offshore, next to Oostende, Belgium	wind	2013	254	80	under construction [468]
Tychowo	West Pomerania, Poland	wind	2010	50[469]	34.5	under construction [470]
San Basilio	Onshore, Sardinia, Italy	wind	2010	n/a	12.6[471]	under construction [472]
Ururi	Onshore, region Molise, Italy	wind	2010	n/a	13[473]	under construction [474]
Danto de Energias S.A.	Castille-Leon, Spain	wind	2011	n/a	40	under construction [475]
Guilhado	Onshore, North Portugal	wind	2010	n/a	2	under construction [476]
Causeymire extension	Onshore, Scotland, UK	wind	~2011	n/a	7	under construction [477]
Novar extension	Onshore, Novar Estate, Scotland, UK	wind	2011	n/a	32	under construction [478]
Kildrummy	Onshore, 6 km west of Lumsden, Scotland, UK	wind	2010	n/a	10	under construction [479]
An Suidhe	Onshore, 5 miles west of Inverary,	wind	2011	n/a	19.2	under construction

	Scotland, UK					[480]
Lochelbank	Onshore, Ochil hills nearby Perth, Scotland, UK	wind	2010	n/a	9.6	under construction [481]
Middleton Farm	Onshore, 5.5 km Northwest of Newton Mearns, Scotland, UK	wind	2012	n/a	15	under construction [482]
Middlemore	Onshore, near Alnwick, England, UK	wind	2011	n/a	54	under construction [483]
Bradwell	Onshore, Bradwell, England, UK	wind	2014	n/a	30	under construction [484]
Hellrigg	Onshore, Hellrigg, England, UK	wind	2011	n/a	9	under construction [485]
Kiln Pit Hill	Onshore, Kiln Pit Hill, England, UK	wind	2011	n/a	13.8	under construction [486]
Goole	Onshore, Goole, England, UK	wind	2011	n/a	37	under construction [487]
Lindhurst	Onshore, next A614, England, UK	wind	2010	n/a	9	under construction [488]
Bard Offshore 1	Offshore, 90 km from Borkum, North Sea, Germany	wind	n/a	n/a	6	under construction [489]
Andasol 3	Granada, South Spain	solar	2011	n/a	6.4	under construction [490]

Table 32 lists RWE's investments that are either still awaiting permission or have merely been announced as plans.

Table 32: 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[491]
Arneburg	Arneburg, Germany	coal	2015	n/a	1,600	planning phase[492]
Lignite power plant with coal gasification and CO_2 capture	Hürth, Germany	lignite (IGCC)	later than 2015	800[493]	450	planning phase[494]
RWE Elektrownia Czeczott	Silesia region, Poland	coal	n/a	1,125	600	operation date was 2015, now suspended[495]
Willington	Derbyshire, England, UK	gas (CCGT)	n/a	n/a	2,000	planning application submitted[496]
Gas Fired Power Station	Genk – Zuid, Belgium	gas (CCGT)	2014	n/a	400	planning phase[497]
Tilbury	Tilbury. Essex, England, UK	gas (CCGT)	n/a	n/a	2,000	feasibility study to be started[498]
Horizon Nuclear Power	Wylfa, Anglesey, Wales, UK)	nuclear	2020	4,200	1,650	planning application scheduled for

						2012[499]
Horizon Nuclear Power	Oldbury, Gloucestershire, England, UK	nuclear	2025	4,200	1,650	planning application once construction at Wylfa is underway[500]
The rivers Danube, Morava and Drina	Serbia and Bosnia-Herzegovina	hydro	n/a	n/a	1,500[501]	Memorandum of Understanding signed In November 2009[502]
Cia Aig	near Fort William, in the Scottish Highlands, UK	hydro	2012/ 2013	n/a	3	building permission received[503]
Braan	Trochry, Perthshire, Scotland, UK	hydro	n/a	n/a	3.5	planning phase[504]
Maldie Burn Hydro Project	Kylestrome, Scotland, UK	hydro	n/a	n/a	4.5	planning phase[505]
Extra 200 MW generating unit	Vianden, Luxembourg	hydro	2013/4	n/a	80	Permission granted[506]
Anglesey Skerries Tidal Stream Array	off the coast of Anglesey, north Wales, UK	tidal stream	n/a	n/a	10.5	planning phase[507]
Triton Knoll Offshore Wind Farm	off the east coast of England, UK	wind	2020	n/a	1,200	in study[508]
Gwynt y Môr	Liverpool Bay, Wales, UK	wind	2014	1,200	346	planning phase[509]
Atlantic Array project	off the coast South Wales and North Devon, Wales, UK	wind	n/a	5,000[510]	1,500	Zone Development Agreement signed[511]
Dogger Bank Zone	off the Yorkshire coast, England, UK	wind	n/a	n/a	2,750	investment decision anticipated around late 2014[512]
Innogy Nordsee 1 offshore wind farm	40 km north of Juist, North Sea, Germany	wind	~2015	2,800[513]	960	in development[514]
Tromp	75km off the coast Callantsoog, Netherlands	wind	~2015	1,000	300	in development[515]
Several projects	Poland	wind	2015	500	300	RWE target[516]
De Ruijter Oost	Netherlands	wind	n/a	n/a	256	planning phase[517]
Allt Duine	Onshore, Scotland, UK	wind	n/a	n/a	more than 50	planning phase[518]
Brechfa Forest	Carmarthenshire, Wales, UK	wind	n/a	n/a	up to 107	planning phase[519]
Carnedd Wen Wind Farm	north western region Powys, Wales, UK	wind	n/a	n/a	161	planning phase[520]
Clocaenog Forest Wind Farm	North Wales, UK	wind	n/a	n/a	up to 85	planning phase[521]
East Heslerton	North Yorkshire, England, UK	wind	n/a	n/a	n/a	planning phase[522]
Mynydd y Gwair Wind Farm	Near Pantyffynnon, Wales, UK	wind	n/a	n/a	38 - 57	planning phase[523]
Rowantree	Scotland, UK	wind	n/a	n/a	60 - 90	planning

Wind Farm						phase[524]
Nun Wood Wind Farm Proposal	Near Northampton, England, UK	wind	n/a	n/a	32 - 36	planning phase[525]
Stroupster Wind Farm	Wick, Caithness, Scotland, UK	wind	n/a	n/a	24 - 35	planning phase[526]
Batsworthy Cross Wind Farm	Devon County, England, UK	wind	n/a	n/a	13.5 - 22.5	planning phase[527]
Burn of Whilk Wind Farm	11km south west of Wick in Caithness, Scotland, UK	wind	n/a	n/a	up to 27	planning phase[528]
Cotton Farm Wind Farm	Huntington, England, UK	wind	n/a	n/a	18 - 24	planning phase[529]
Fforch Nest Wind Farm	Wales, UK	wind	n/a	n/a	25	planning phase[530]
Kirkharle Wind Farm	Northumberland, England, UK	wind	n/a	n/a	18 - 24	planning phase[531]
Raera Forest Wind Farm	Argyle & Bute, Scotland, UK	wind	n/a	n/a	up to 25	planning phase[532]
Saxby Wold Wind Farm Proposal	Lincolnshire, England, UK	wind	n/a	n/a	up to 21	planning phase[533]
Hampole	near Doncaster, England, UK	wind	n/a	n/a	10 - 15	planning phase[534]
Earls Hall	Clacton on Sea, England, UK	wind	n/a	n/a	10 – 11.5	planning phase[535]
Langham Wind Farm	Skegness, England, UK	wind	n/a	n/a	9 - 15	planning phase[536]
Stobhill Wind Farm	County Durham, England, UK	wind	n/a	n/a	up to 7	planning phase[537]

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.[538] 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.[539] 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%).[540]
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%).[541] The Amercentrale consumed 1.7 million tonnes of coal in 2008 originating from South Africa (44%), Columbia (35%), Indonesia (20%), and the USA (1%).[542]

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.[543] Essent states that it purchases coal either from international mining companies, or on the global spot market.[544]

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.[545]

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.[546] 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."[547] 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.[548] In 2009, Essent used only wood as a biomass.[549]

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.[550] In 2009 73% of the biomass used by Essent fell under the certification scheme.[551]

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.[552]

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[409] RWE, "Annual Report 2009", <http://www.rwe.com/web/cms/en/110822/rwe/investor-relations/financial-reports/> (15 July 2010)
[410] E-mails by Eduard J.F. Wijnoldij Daniëls, CSR Consultant, Essent N.V. on 9, 10 and 17 August 2010.
[411] RWE, "Annual Report 2009", pages 37, 55, 56, <http://www.rwe.com/web/cms/en/110822/rwe/investor-relations/financial-reports/> (13 August 2010)
RWE, "Corporate Social Responsibility Report 2009", pages 10, 30, 48, 58, <http://www.rwe.com/web/cms/mediablob/en/409784/data/408954/66411/rwe/responsibility/key-data/cr-reports/blob.pdf> (13 August 2010)
[412] RWE website, "annual report 2009, excel tables", <http://www.rwe.com/web/cms/en/110822/rwe/investor-relations/financial-reports/> (13 July 2010).

[413] SOMO, “Sustainability in the Dutch Power Sector; Fact Sheet Series – 2009 update”, October 2009, http://somo.nl/publications-nl/Publication_3247-nl/ (19-07-10)..
[414] RWE website, “annual report 2009, excel tables”, <http://www.rwe.com/web/cms/en/110822/rwe/investor-relations/financial-reports/> (13 July 2010).
[415] RWE website, “annual report 2009, excel tables”, <http://www.rwe.com/web/cms/en/110822/rwe/investor-relations/financial-reports/> (13 July 2010).
[416] RWE, “Annual Report 2009”, page 58, <http://www.rwe.com/web/cms/en/110822/rwe/investor-relations/financial-reports/> (15 July 2010)
[417] E-mail by Eduard J.F. Wijnoldij Daniëls, CSR Consultant, Essent N.V. on 9 August 2010.
[418] E-mail by Eduard J.F. Wijnoldij Daniëls, CSR Consultant, Essent N.V. on 9 August 2010.
[419] Given the fact that only primary energy sources are mentioned the biomass co-firing option of Essent’s converted coal-fired power station is not included in the section ‘renewables’, but in the section “coal”. As of 31 December 2009, Essent's biomass co-firing capacity amounted to 295 MW. Sources:
Essent Capital Market Day, presentation “Facts & Figures”, 2 June 2010, page 26, <http://www.rwe.com/web/cms/mediablob/en/424264/data/417630/67518/rwe/investor-relations/events-presentations/essent-capital-market-day/Facts-Figures-Essent-Capital-Market-Day-PDF-file-.pdf> (13 August 2010)
E-mail by Eduard J.F. Wijnoldij Daniëls, CSR Consultant, Essent N.V. on 9 August 2010.
[420] Essent Capital Market Day, presentation “Facts & Figures”, 2 June 2010, <http://www.rwe.com/web/cms/mediablob/en/424264/data/417630/67518/rwe/investor-relations/events-presentations/essent-capital-market-day/Facts-Figures-Essent-Capital-Market-Day-PDF-file-.pdf> (13 August 2010)
[421] RWE website, “annual report 2009, excel tables”, <http://www.rwe.com/web/cms/en/110822/rwe/investor-relations/financial-reports/> (13 July 2010).
[422] CREG, VREG, CWAPE, BRUGEL, “De ontwikkeling van de elektriciteits- en aardgasmarkten in België, Jaar 2009”, 27 April 2010, <http://www.vreg.be/vreg/documenten/persmededelingen/PERS-2010-2.pdf> (13 August 2010)
[423] Essent Capital Market Day, presentation “Facts & Figures”, 2 June 2010, <http://www.rwe.com/web/cms/mediablob/en/424264/data/417630/67518/rwe/investor-relations/events-presentations/essent-capital-market-day/Facts-Figures-Essent-Capital-Market-Day-PDF-file-.pdf> (13 August 2010)
[424] CREG, VREG, CWAPE, BRUGEL, “De ontwikkeling van de elektriciteits- en aardgasmarkten in België, Jaar 2009”, 27 April 2010, <http://www.vreg.be/vreg/documenten/persmededelingen/PERS-2010-2.pdf> (13 August 2010)
[425] Essent website, “Stroometiket 2009”, <http://www.essent.nl/content/Images/59847_10094%20Stroometiket%20cons.pdf> (13 July 2010). Essent only provides complete (i.e. for both industrial and residential customers, not just residential) supply fuel mixes for all Essent NV units, including those in Belgium and Germany. The figures it provides for just the Netherlands only include residential customers (Essent Retail). Since Essent also supplies electricity to industrial customers in the Netherlands, the Essent NV figures are assumed to provide a more accurate picture of Essent’s total operations in the Netherlands.
[426] Essent website, “Stroometiket 2009”, <http://www.essent.nl/content/Images/59847_10094%20Stroometiket%20cons.pdf> (13 July 2010)
[427] E-mail by Eduard J.F. Wijnoldij Daniëls, CSR Consultant, Essent N.V. on 9 August 2010.
[428] E-mail by Eduard J.F. Wijnoldij Daniëls, CSR Consultant, Essent N.V. on 17 August 2010.
[429] Essent website, “Stroometiket 2009”, <http://www.essent.nl/content/Images/59847_10094%20Stroometiket%20cons.pdf> (13 July 2010)
[430] E-mail by Eduard J.F. Wijnoldij Daniëls, CSR Consultant, Essent N.V. on 17 August 2010.
[431] Essent website, “Stroometiket 2009”, <http://www.essent.nl/content/Images/59847_10094%20Stroometiket%20cons.pdf> (13 July 2010)
[432] Essent website, “Stroometiket 2009”, <http://www.essent.nl/content/Images/59847_10094%20Stroometiket%20cons.pdf> (13 July 2010)
[433] RWE website, “Samenstelling elektriciteit”, April 2010, <http://www.rwe.nl/documents/RWE_Stroometiket_2010.pdf> (13 July 2010)
[434] RWE, “Fact Book Renewable Energy”, June 2010, <http://www.rwe.com/web/cms/mediablob/en/108824/data/214382/69621/rwe/investor-relations/events-presentations/factbook/renewable-energy/factbook-renewable-energy-new.pdf> (15 July 2010)
[435] Westereems project website, <http://www.westereems.nl> (13 August 2010)
[436] Dagblad van het Noorden, “Bouwput Eemshaven”, 15 april 2010, <http://www.dvhn.nl/nieuws/economie/eco_noorden/article5998473.ece> (13 July 2010)
[437] RWE, “Facts & Figures | Update December 2009”, p. 17, 18 December 2010, <http://www.rwe.com/web/cms/mediablob/en/108808/data/114404/58812/rwe/investor-relations/events-presentations/factbook/Facts-Figures-2009.pdf> (13 July 2010)
[438] Construction of Westfalen D and E units, each 800 MW. After completion, Units A and B with a capacity of 160 MW each, will go off stream. RWE has agreed a 25-year cooperation scheme with 23 municipal partners from North Rhine-Westphalia, Hesse, Lower Saxony and Rhineland-Palatinate: the municipal utilities have a share of about 23% in the construction and operation. They are investing over € 450 million and will have a 350-MW share in the output of the new units. RWE power, leaflet “The new Westfalen power plant”, http://www.rwe.com/web/cms/mediablob/en/331232/data/12450/53991/rwe-power-ag/power-plant-new-

build/new-hard-coal-fired-units/Energy-for-the-future-The-new-Westfalen-power-plant.pdf> (15 July 2010)
Dec 09: construction delayed since September by faulty boiler steelworks supplied by Alstom and manufactured in China. First 800 MW block was expected to come online in mid-2011, the second due in early 2012 - these dates now probably not possible, RWE says. Platts Power in Europe, "Pie's new plant tracker", 3 May 2010.

439 RWE, "FACTS & FIGURES 2010 (Updated August 2010), page 26, <http://www.rwe.com/web/cms/mediablob/de/108808/data/114404/71877/rwe/investor-relations/events-praesentationen/fakten-kompakt/Facts-Figures-2010.pdf> (31 August 2010)

440 Two power plant units will each have a gross capacity of 1,100 megawatt. Sixteen 150-MW units in the Rhenish lignite mining area will gradually be shut down by late 2012. Six 150-MW units will then merely be used as stand-by reserve for the BoA units in Neurath. RWE, "The BoA 2&3 project"", <http://www.rwe.com/web/cms/mediablob/en/2546/data/12030/66013/rwe-power-ag/power-plant-new-build/boa-2-3/links-downloads/Neurath-down.pdf>(15 July 2010)
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[524] RWE npower renewables, “Rowantree Wind Farm”, <http://www.rwe.com/web/cms/en/282198/rwe-npower-renewables/sites/projects-in-development/wind/rowantree/the-proposal/> (14 July 2010)
[525] RWE npower renewables, “Nun Wood Wind Farm Proposal”, <http://www.rwe.com/web/cms/en/305628/rwe-npower-renewables/sites/projects-in-development/wind/nun-wood/the-proposal/> (14 July 2010)
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[527] RWE npower renewables, “Batsworthy Cross Wind Farm”, <http://www.rwe.com/web/cms/en/282574/rwe-npower-renewables/sites/projects-in-development/wind/batsworthy-cross/the-proposal/> (14 July 2010)
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[529] RWE npower renewables, “Cotton Farm Wind Farm”, <http://www.rwe.com/web/cms/en/294386/rwe-npower-renewables/sites/projects-in-development/wind/cotton-farm/> (14 July 2010)
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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.

Installed capacity in Europe

Table 33 shows the installed generation capacity in Europe of each company in MW. E.ON is the largest electricity company active in The Netherlands. However, Vattenfall has the most renewable capacity, with more than 12 GW of mostly hydro capacity.

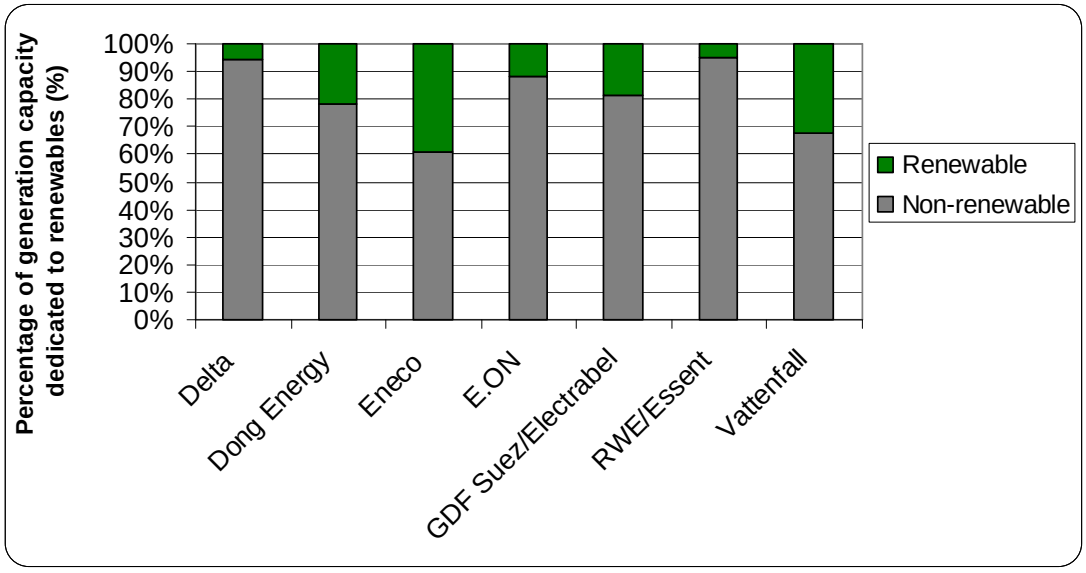
Table 33: Fuel mix of installed capacity in Europe by company, in MW, 2009

Fuel type	Delta	Dong Energy	Eneco	E.ON	GDF Suez / Electrabel[553]	RWE / Essent	Vattenfall / Nuon
Coal	177	3,987	0	18,478	4,162	26,465	12,198
Natural Gas	687	723	1,245	14,467	19,598	9,144	4,880
Oil	0	752	0	2,395	0	0	2,068
Nuclear	256	0	0	11,325	6,356	6,295	6,146
Other Non-renewable	0	0	0	2,819	643	5,146	0
Wind	9	1,104	742	1,146	1,286	1,574	859
Hydro	0	205	0	5,450	5,221	793	10,869
Large scale	0	205	0	n/a	n/a	n/a	n/a
Small scale	0	0	0	n/a	n/a	n/a	n/a
Biomass	54	232	45	64	530	98	366
Stand alone	18	154	45	n/a	n/a	n/a	n/a
Co-fired	36	78	0	n/a	n/a	n/a	n/a
Other renewable	3	0	18	70	38	67	0
Total renewable	***66***	***1,541***	***805***	***6,730***	***7,075***	***2,532***	***12,094***
Total	**1,185**	**7,003**	**2,050**	**56,214**	**37,834**	**49,582**	**37,386**

SOMO compilation based on company data

Figure 24 reflects the fuel mix of the installed capacity of the companies based on the percentage that each fuel comprises of the total mix. Eneco and Vattenfall have the highest share of renewable capacity, while RWE/Essent has the lowest. A remarkable fact is that the percentage of Delta's renewable capacity more than halved in comparison with last year.[554]

Figure 24: Installed capacity in Europe dedicated to renewable energy, by company, 2009



SOMO compilation based on company data

Electricity generated in Europe

Table 34 shows the electricity that was actually generated in 2009 from the companies' installed capacity listed above. It should be noted that some companies do not provide figures on their generation figures, so there are a number of gaps in the tables and figures in this section. As Nuon's figures for 2009 were not wholly incorporated into Vattenfall's generated electricity, Nuon's figures are presented separately here. No figures were available at all for Delta.

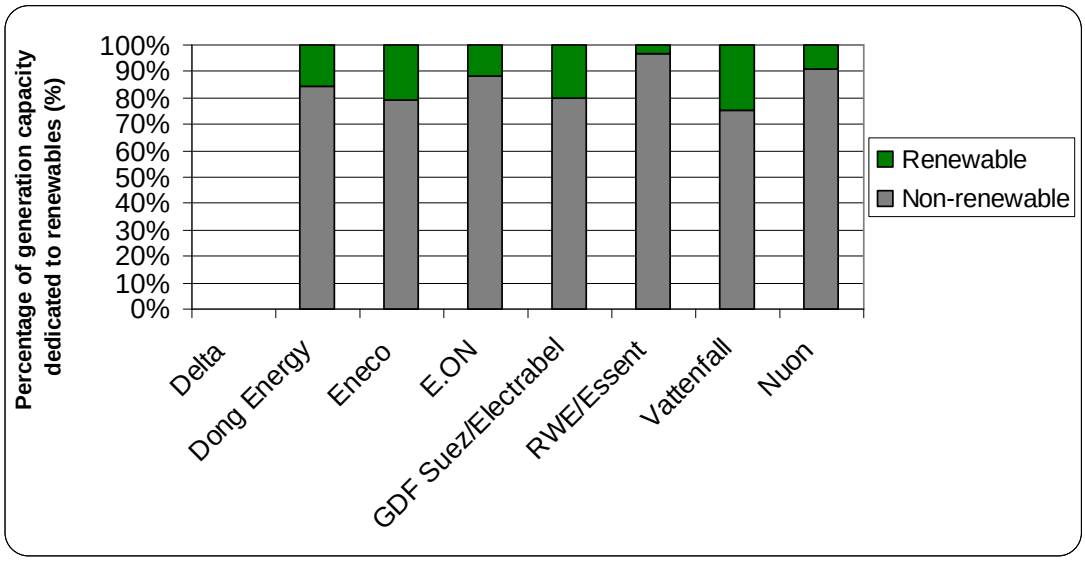
Table 34: Fuel mix of electricity generated in Europe by company, in GWh, 2009

Fuel type	Delta	Dong Energy	Eneco	E.ON	GDF Suez/ Electrabel	RWE	Vattenfall	Nuon
Coal	n/a	n/a	0	63,920	27,800	115,000	71,200	5,262
Natural Gas	n/a	n/a	7,530	40,297	124,000	29,700	4,700	8,758
Oil	n/a	n/a	0	n/a	0	0	0	0
Nuclear	n/a	0	0	71,813	45,600	33,900	28,300	0
Other Non-renewable	n/a	15,264	0	4,434	5,100	2,100	0	0
Wind	n/a	1,929	1,626	4,859	2,500	2,200	1,700	1,275
Hydro	n/a	881	0.8	17,150	45,600	3,400	31,600	72
Large scale (>10MW)	n/a	[881]	-	-	-	-	-	-
Small scale (<10MW)	n/a	-	[0.8]	-	-	-	-	[72]
Biomass	n/a	0	328	270	2,500	900	1,400	16
Stand alone	n/a	-	[328]	-	-	-	-	-
Co-fired	n/a	-	-	-	-	-	-	-
Other renewable	n/a	0	4	1,128	0	0	0	4
Total renewable	***n/a***	***2810***	***1959***	***23,407***	***50,600***	***6,500***	***34,700***	***1,367***
Total	**n/a**	**18,074**	**9,488.8**	**203,871**	**253,100**	**187,200**	**138,900**	**15,387**

SOMO compilation based on company data

Figure 25 reflects the fuel mix of the electricity generated by the companies. Vattenfall has the largest share of electricity generated from renewable sources, while RWE has the lowest.

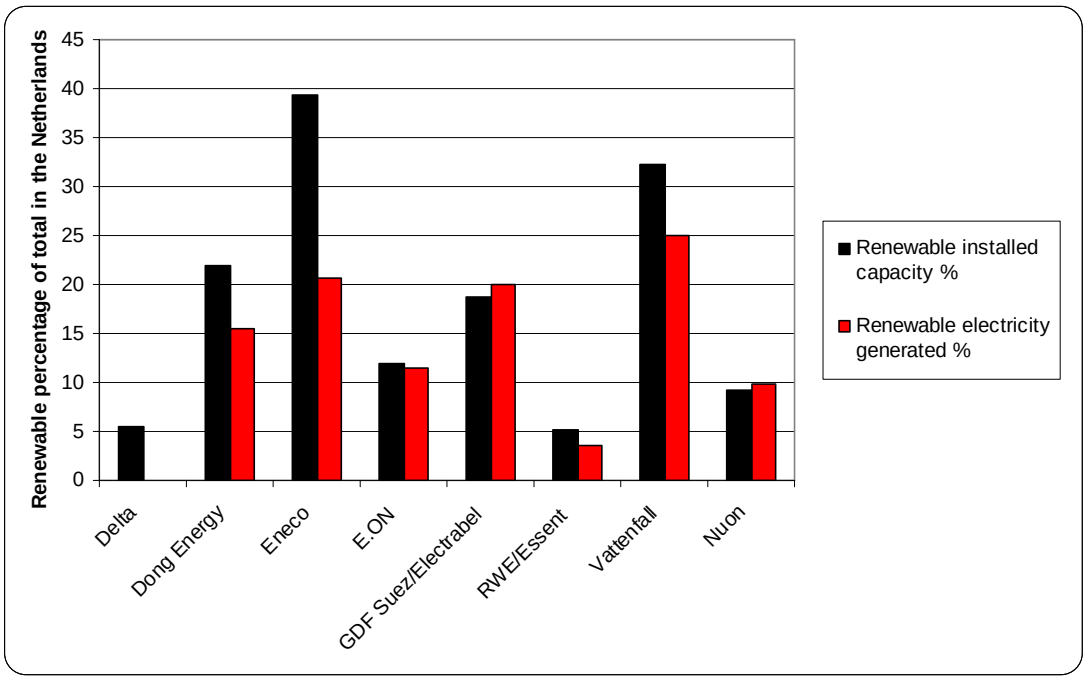
Figure 25: Electricity generated from renewables in Europe, by company, 2009



SOMO compilation based on company data

An interesting picture emerges when we compare the renewable share of each of the companies' installed capacity, with their generated electricity. Figure 26 gives a bar chart of these relative figures. We see that Eneco has a much smaller share of renewable energy generated than what could be achieved with their renewable capacity.

Figure 26: Renewable installed capacity and electricity generated as percentage of the total, by company, 2009



[553] Figures for 2009 were not available, so 2008 figures were used.
[554] In 2008 Delta had a percentage of 11,7% of renewable installed capacity. J. Wilde-Ramsing, T. Steinweg & M. Kokke, Sustainability in the Dutch Power Sector – 2009 Update, SOMO publication, October 2009, p. 79.

9 Fuel mix of electricity supplied in the Netherlands

This fact sheet compares the companies regarding the fuel mixes of the electricity they supply in the Netherlands and, or in some cases also including neighbouring countries. The CO2 emissions and the radioactive waste resulting from this supply are also compared. The energy labels that each company is obliged to present are taken as the basis of these comparisons.

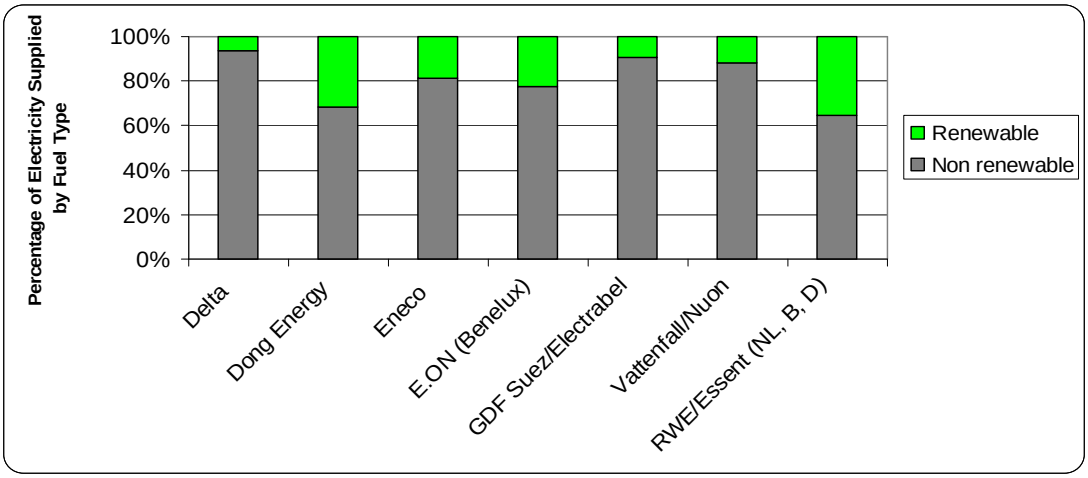
For better comparability, two lists of figures are presented. First, the Dutch market as a whole is viewed at, meaning the retail market together with the market for business customers. This gives the most complete overview of the type of electricity supplied by each of the companies. It should be noted that due to differences in scope and underlying calculations, these figures might be somewhat less comparable. The second set of comparisons is based on the fuel mix. These figures all have the same scope and, for the most part, the same calculation methods and are therefore more comparable. However, these figures do not provide a complete overview, as the large businesses and industries are not taken up.

Percentage of renewable energy in electricity supplied

Whole Dutch market

Figure 27 illustrates the fuel mix of electricity supplied by the various companies, on the basis of their energy labels. Of all the companies, RWE/Essent supplies the most renewable energy, closely followed by Dong Energy. Delta and GDF Suez/Electrabel supply the least renewable energy. RWE/Essent's figures are based on Essent NV, the company supplying electricity to Dutch, Belgian and German consumers and businesses. Regarding E.ON, the only available numbers were those for the whole Benelux region, so these are presented in the figure.

Figure 27: Renewable and non-renewable electricity supplied in the Netherlands, by company, 2009



SOMO compilation based on company data

Table 35 provides a numerical overview of the percentages given in Figure 27.

Table 35: Fuel mix of electricity supplied in the Netherlands by company, in percent, 2009

Company	Non renewable	Renewable	Total
Delta	93.6	6.4	100
Dong Energy	68.1	31.9	100
Eneco	81.2	18.7	100
E.ON (Benelux)	77.5	22.5	100
GDF Suez / Electrabel	90.7	9.4	100
Vattenfall / Nuon	88	12	100
RWE / Essent (NL, B, D)	64.5	35.5	100

SOMO compilation based on company data

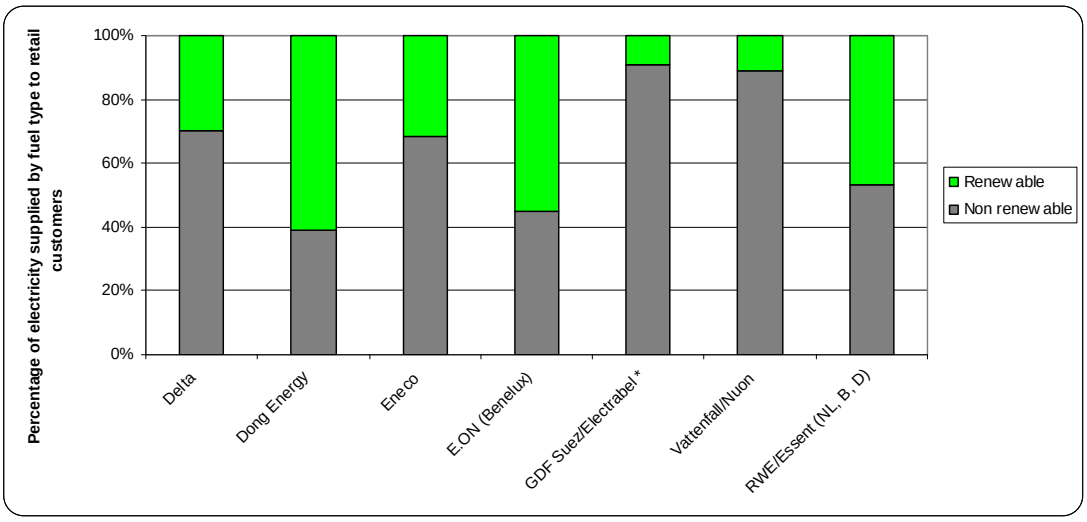
Dutch retail market

Figure 28 shows the ratio between renewable and non renewable electricity supplied on the Dutch retail market. These figures are also based on the energy labels which the companies have to report on. The figures slightly differ from the ones reported about the whole Dutch electricity market: Dong Energy has the highest percentage of renewable electricity supply to retail customers, followed by E.ON. The lowest percentages are found at the supply figures of GDF Suez/Electrabel and Nuon.

The figures for E.ON represent the Benelux region and the numbers for RWE/Essent also include the Belgian and German retail markets. It has to be noted that the supply figures for retail customers in the Netherlands for GDF Suez/Electrabel were not available, so the for the comparison the figures from Figure 27 and Table 35 were used (numbers for the whole Dutch market, retail and business together).

Except for Vattenfall / Nuon, all companies show a higher percentage of renewable supply to their retail customers than to their retail and business customers together. The most striking difference is found for Delta, which has about 6% renewable supply to the market as a whole as opposed to the almost 30% of renewable supply to its retail customers. Also Dong Energy and E.ON show considerable differences in their renewable supply to the whole market and the retail branch: 32% whole to 61% retail and 23% whole to 55% retail, respectively.

Figure 28: Renewable and non-renewable electricity supplied to retail customers in the Netherlands, by company, 2009



* Figures for retail and the business market together

Table 36 provides a numerical overview of the percentages given in 28.

Table 36: Fuel mix of electricity supplied to retail customers in the Netherlands by company, in percent, 2009

Company	Non renewable	Renewable	Total
Delta	70.1	29.9	100
Dong Energy	38.9	61	100
Eneco	68.5	31.5	100
E.ON (Benelux)	45.1	55.2	100
GDF Suez / Electrabel *	90.7	9.4	100
Vattenfall / Nuon	88.8	11.2	100
RWE / Essent (NL, B, D)	53.4	46.6	100

* Figures for retail and the business market together

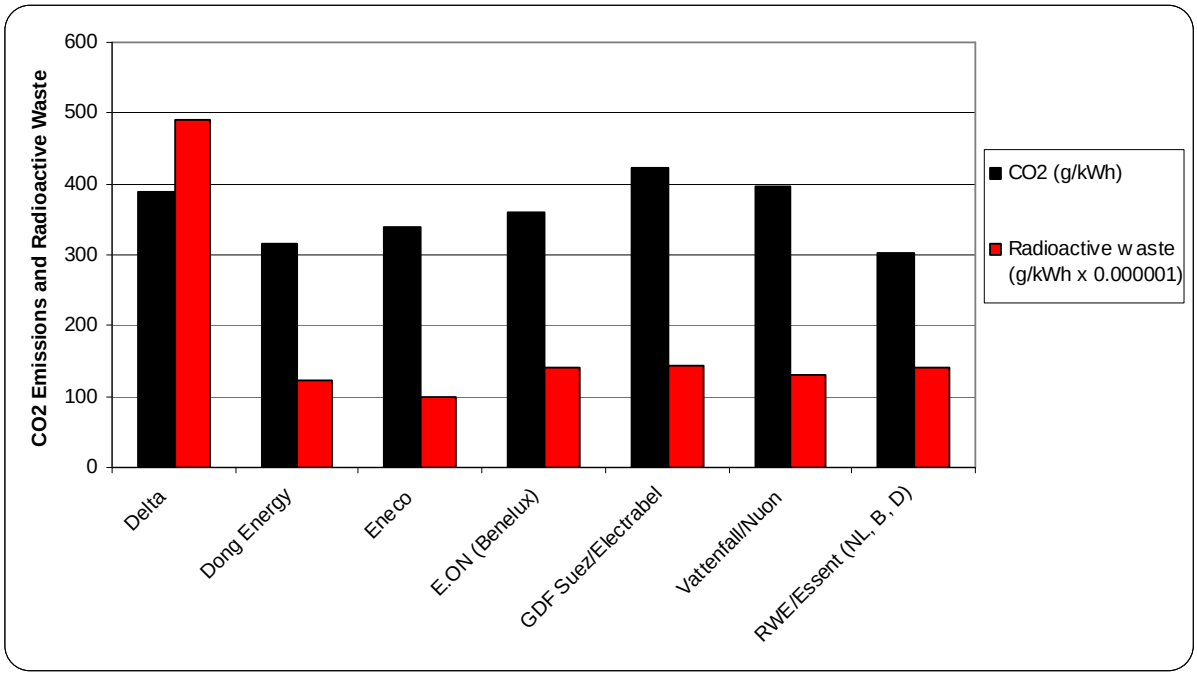
CO_2 emissions and radioactive waste

Whole Dutch market

The CO_2 emissions and radioactive waste resulting from the electricity supplied by the companies, as shown in Figure 29, resemble the fuel mixes of their electricity supply. The lowest emissions are produced by RWE, which is a direct consequence of their relatively large share of renewable energy. The suppliers with the least sustainable supply mix, GDF Suez/Electrabel, Vattenfall/Nuon and Delta, are also the largest emitters of greenhouse gas. Radioactive waste production correlates with the presence of nuclear energy in each company's fuel mix for electricity supply. Delta, a company with a large share of nuclear energy in its supply mix, generates by far the most radioactive waste. E.ON, a company that does own significant nuclear capacity, barely supplies energy from this source within The Netherlands.

The figures for RWE represent the numbers for the Dutch, Belgian and German markets. Regarding E.ON, the only available numbers were those for the whole Benelux region, so these are presented in the figure.

Figure 29: CO2 emissions and radioactive waste resulting from electricity supplied in the Netherlands, by company, 2009



SOMO compilation based on company data

Table 37 shows the figures as given in the electricity labels of the CO2 emissions and production of radioactive waste for each company.

Table 37: CO2 emissions and radioactive waste resulting from electricity supply in the Netherlands, per company, in g/kWh, 2009

	Delta	Dong Energy	Eneco	E.ON (Benelux)	GDF Suez/Electrabel	Vattenfall/ Nuon	RWE/Essent (NL, B, D)
CO2 emissions	390	315.7	340	358.8	422	396.6	303
Nuclear waste*	490	122	100	140	144	130	140

SOMO compilation based on company data; * Nuclear waste figures in g/kWh x0.000001

Dutch retail market

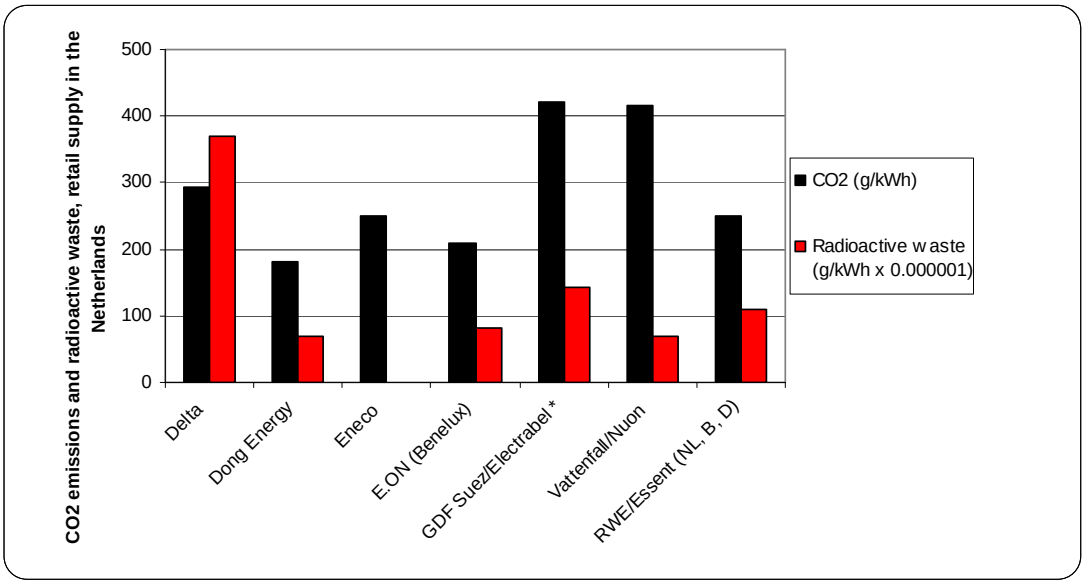
Figure 30 shows the amounts of CO2 emissions and radioactive waste resulting from the supply to retail customers on the Dutch electricity market. The lowest emitter is Dong Energy, followed by E.ON. The companies with the highest emissions are GDF Suez / Electrabel and Vattenfall / Nuon. For radioactive waste, Dong Energy and Vattenfall / Nuon have the lowest pollution figures and again Delta shows the highest concentration of nuclear waste. Eneco does not generate any nuclear waste from its electricity supplied to retail costumers, as it excludes this type of electricity from its fuel mix.

The figures for E.ON represent the Benelux region and the numbers for RWE / Essent also include the Belgian and German retail markets. It has to be noted that the figures for

emissions and nuclear waste for retail customers in the Netherlands for GDF Suez / Electrabel were not available, so for this company the figures from Figure 29 and Table 37 were used (numbers for the whole Dutch market, retail and business together).

In general, the emission and nuclear waste numbers for the retail market are lower than for the Dutch market as a whole, which is a direct consequence of the fact that the share of renewable energy supply is higher in the retail sector, as described above. Vattenfall/Nuon is the only exception in this respect. In this comparison Dong Energy and E.ON are the companies sticking out, with considerable differences in their emission and nuclear waste figures: they are both about 40 percent lower for the retail market than for the Dutch market as a whole. Here it should be mentioned as well that Vattenfall / Nuon's nuclear waste figures are approximately the half on the retail market when compared to the Dutch market as a whole.

Figure 30: CO_2 emissions and radioactive waste resulting from electricity supply to retail customers in the Netherlands, by company, 2009



* Figures for retail and the business market together

Table 38 shows the figures as given in the electricity labels of the CO_2 emissions and production of radioactive waste for the Dutch retail market for each company.

Table 38: CO_2 emissions and radioactive waste resulting from electricity supply to retail customers in the Netherlands, per company, in g/kWh, 2009

	Delta	Dong Energy	Eneco	E.ON (Benelux)	GDF Suez/ Electrabel *	Vattenfall/ Nuon	RWE/Essent (NL, B, D)
CO2 emissions	292.4	180.4	249	208.9	422	415.8	251
Nuclear waste**	370	70	0	81	144	70	110

* Figures for retail and the business market together; ** Nuclear waste figures in g/kWh x0.000001

10 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. 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. For GDF Suez the European capacity as of 31 December 2008 is indicated, because the capacity figures for 2009 were not available.[555]

Table 39 shows the current investments (in MW) compared to the electricity generation capacity in Europe as of 31 December 2009. Looking at the figures, RWE/Essent is by far the largest investor in new capacity.

Table 39: Current investments compared to electricity generation capacity, in Europe, as of 31 December 2009, per company, in MW.

company	capacity	current investments	% investments of capacity
Delta	1,185	90	8%
Dong Energy	7,003	2,355	34%
E.ON	56,214	6,468	12%
Eneco	2,050	544	27%
GDF Suez/Electrabel	37,834	3,879	10%
RWE/Essent	49,582	11,707	24%
Vattenfall/Nuon	37,386	5,627	15%

Table 40 shows the renewables percentage in the electricity generation capacity as of 31 December 2009 versus the renewables percentage in the current investments of the companies. Again, some of the figures given in this table are incomplete and should be interpreted with caution for the same reasons as described above for Table 39. However, from the table it can be analysed that there are great differences in the relative renewables

capacity of the companies (ranging from 5% for RWE to 39% for Eneco). Further on, at present only RWE/Essent, Dong Energy and Delta 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 40: 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	%
Delta	1,185	66	6%	90	90	100%
Dong Energy	7,003	1,541	22%	2,355	836	35%
E.ON	56,214	6,730	12%	6,468	733	11%
Eneco	2,050	805	39%	544	109	20%
GDF Suez/Electrabel	37,834	7,075	19%	3,879	555	14%
RWE/Essent	49,582	2,532	5%	11,707	1,126	10%
Vattenfall/Nuon	37,386	12,094	32%	5,627	627	11%

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 41 distinguishes the renewables share in the capacity after the current investments have been realised and the renewables share in the announced plans for investments. RWE/Essent has announced most investments in new renewable capacity (in MW). Vattenfall/Nuon, Dong Energy and Eneco also stand out positively towards renewable energy, compared to the fuel mix of their capacity after the current investments.

Table 41: 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	%
Delta	1,275	156	12%	2,780	55	2%
Dong Energy	9,358	2,377	25%	2,156	2,156	100%
E.ON	62,682	7,463	12%	14,481	1,719	12%
Eneco	2,594	914	35%	2,793	1,893	68%
GDF Suez/Electrabel	41,713	7,630	18%	15,815	2,826	18%
RWE/Essent	57,631	3,658	6%	22,720	10,170	45%
Vattenfall / Nuon	43,013	12,721	30%	11,415	5,721	50%

Table 42 shows the relative renewable generation capacity whenever the current investments and the announced plans for investments are to be completed. It should again be noted that only limited weight should be given to the projections summarised in this table. According to the table, the relative renewable generation capacity of RWE/Essent, Dong Energy and Eneco increases significantly.

Table 42: 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
Delta	6%	12%	5%
Dong Energy	22%	25%	39%
E.ON	12%	12%	12%
Eneco	39%	35%	52%
GDF Suez/Electrabel	19%	18%	18%
RWE/Essent	5%	6%	17%
Vattenfall / Nuon	32%	30%	34%

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 43 shows the current investments per fuel type of each company. In the category 'other renewables' the figures for biomass are also included. Of all fuel types, investments in natural gas power plants are dominant, followed by coal, wind and nuclear. RWE/Essent and Vattenfall/Nuon invest most in coal.

Table 43: 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
Delta	75	0	15	0	0	0	0	90
Dong Energy	836	0	0	1,519	0	0	0	2,355
E.ON	683	0	50	3,535	2,200	0	0	6,468
Eneco	109	0	0	435	0	0	0	544
GDF Suez/ Electrabel	474	0	81	1,994	1,158	173	0	3,880
RWE/Essent	979	8	140	6,895	3,554	132	0	11,708
Vattenfall/ Nuon	622	5	0	1,755	2,795	450	0	5,627
Total	**3,778**	**13**	**286**	**16,133**	**9,707**	**755**	**0**	**30,672**
%	12%	0%	1%	53%	32%	2%	0%	100%

Table 44 shows an overview of the monetary amounts invested in current investments per fuel type.

Table 44: Investments in new generation capacity in Europe, per fuel source (million €)

Fuel type	DELTA	Dong Energy	E.ON	Eneco	GDF Suez/ Electrabel	RWE/Essent	Vattenfall/Nuon
Renewable	108.5*	2,662	1,651*	101*	-*	2,257*	1,762*
Gas	-	1,378	2,534	350	440*	4,550	1,800*
Coal	-	-	2,400	-	1,768	6,730	4,400
Nuclear	-	-	-	-	366*	366	1,250
Oil	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-
Total	**108.5**	**4,040**	**6,585**	**451**	**2,574**	**13,903**	**9,212**

* Incomplete information

Table 45 shows the announced plans for investments per fuel type of each company. In the category 'other renewables' the figures for biomass are also included. 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 45: 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
Delta	0	55	0	225	0	2,500	0	2,780
Dong Energy	1,856	0	300	0	0	0	0	2,156
E.ON	1,519	0	200	6,090	2,200	4,412	60	14,481
Eneco	1,786	0	108	900	0	0	0	2,793
GDF Suez	813	1,610	403	5,776	4,351	2,862	0	15,815
RWE/ Essent	8,402	1,663	105	4,400	4,850	3,300	0	22,720
Vattenfall/ Nuon	5,508	0	213	950	4,044	0	700	11,415
Total	**19,884**	**3,328**	**1,329**	**18,341**	**15,445**	**13,074**	**760**	**72,160**
%	28%	5%	2%	25%	21%	18%	1%	100%

* Incomplete information; SOMO calculation from company data[556]

Table 46 shows the monetary amounts for the announced investment plans per company and per fuel type.

Table 46: Additional investment plans for new generation capacity in Europe, by company and fuel source (million €)

Fuel type	DELTA	Dong Energy	Eneco	E.ON	GDF Suez/ Electrabel	Vattenfall/Nuon	RWE/Essent
Renewable	-	1,067	80*	1,578*	1,914*	950*	10,500*
Gas	-	-	800	704*	2,176*	100*	-*
Coal	-	-	-	2,700	5,083*	-	1,925*
Nuclear	750	-	-	8,400*	-*	-	8,400
Oil	-	-	-	-	-	-	-
Other	-	-	-	-*	-	775	-
Total	**750**	**1,067**	**880**	**13,382**	**0**	**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 by companies active in The Netherlands.

Table 47: Current investments in nuclear capacity

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

Table 48: Announced plans for investments in nuclear generation

Company	Country	Project	Date in operation	Amount (€million)	Capacity (MW)	Project status
E.ON (50%), RWE/Essent (50%)	England, UK	Horizon Nuclear Power, Oldbury (Gloucestershire)	2025	8,400	3,300	Planning application once construction at Wylfa is underway
E.ON (50%), RWE/Essent (50%)	Wales, UK	Horizon Nuclear Power, Wylfa (Anglesey)	2020	8,400	3,300	planning application scheduled for 2012
GDF Suez/ Electrabel (37.5%), Iberdrola (37.5)	England, UK	Sellafield, Iberdrola/GDF Suez/SSE	2020-2025	n/a	2,700	pre-development stage
E.ON	Finland	Fennovoima	2020	n/a	612	License granted
GDF Suez/ Electrabel	France	Rhone Valley, third EPR reactor	n/a	n/a	1,100	Candidate
EdF (50%), GDF Suez	France	Penly site, Normandy,	n/a	n/a	1,237	Public debate set up in 2010

(25%)		second EPR reactor				
Delta	Netherlands	Borssele II	2018	750	2,500	Permit application phase
E.ON	Sweden	Oskarshamn, upgrade of unit O2	2011	n/a	500	Delayed

11 Responsible sourcing

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

The information on the efforts per company is provided in the company fact sheets in Chapters 1-7. A description of the methodology can be found in Annex 1.

Table 49 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 or specific mines they source from.

Table 49: Measures for responsible sourcing of the companies

Indicator	Delta	Dong Energy	E.ON	Eneco	GDFSuez /Electrabel	Nuon	RWE/Essent	Vattenfall
CSR policy	X	X	X	X	X	X	X	X
Supplier Code of conduct that applies to raw materials	-	X	X	X	(X)	X	X	X
Transparency on origin coal	-	X	X	N/A	-	-	X	-
Transparency on origin biomass	-	(X)	-	X	(X)	X	(X)	-
Transparency on origin uranium	X	N/A	X	N/A	(X)	N/A	-	X
Applies sourcing criteria	-	X	X	X	(X)	(X)	X	X
Conducts audits	-	X	X	X	-	(X)	-	X

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

CSR Policies

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. No information was found regarding supplier codes of conduct for Delta. It should be noted that Delta did not review their company profile. It is therefore possible that this company has internal policies that are not published online.

Transparency on origin of coal

While a number of companies indicated that information about the origin of coal is considered confidential, mostly for commercial reasons, a few other companies did provide insight on where they source their coal from. These are Dong Energy, E.ON and RWE/Essent. Table 50 shows the where these companies source their coal from.

Table 50: Source of coal for Dong Energy, E.ON and RWE/Essent, in %

	Dong Energy	E.ON	RWE/Essent
Germany		5	22
UK		8	10
Norway	4	1	
Spain		2	
Poland	1	1	
Russia	37	17	37
South Africa	16	10	9
USA	11	42	
Colombia	27	9	15
Australia	4	1	
Indonesia		1	
Other			7

Transparency on the origin of biomass

Two of the eight companies provided complete information about the origin of their biomass. These are Eneco and Nuon. Eneco sources all its biomass from agricultural waste in Belgium. The company also indicated its plans to source from a furniture factory in Vietnam in the future. Nuon sources all of its biomass from wood waste in The Netherlands and Germany.

Dong Energy provided some information by stating that all its biomass originates from within Europe, while RWE/Essent indicated its plans to build a factory producing biomass pellets in the future, to be used as fuel for electricity.

Transparency on the origin of uranium

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

Sourcing criteria

Dong Energy, E.ON, Eneco, RWE/Essent, GDF Suez/Electrabel 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.[557]

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

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

Audits

Dong Energy, E.ON, Eneco and Vattenfall all 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, all these companies did indicate that they made use of third parties (or multiple stakeholders) to conduct the audits.

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

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[555] As explained in the fact sheets.
[556] 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.
[557] It should be noted that the UN Global Compact has been criticized for its non-committal nature. For more information, see www.globalcompactcritics.org.

12 Methodological Annex

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

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

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

Changes from previous years

- Responsible sourcing

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

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

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

production of coal[558], biomass[559] and uranium[560]. 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 were 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.[561]

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 SOx 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'.[562] Table 51

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

Table 51: SOMO classification of 'renewable' and 'non-renewable' fuel types

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

- Fossil fuels

Fossil fuels (e.g. coal, lignite, natural gas, diesel, fuel oil, gas oil) are non-renewable sources of energy. Electricity generation technologies based on the combustion of fossil fuels consume finite natural resources and thus transfer costs to future generations. Fossil fuel combustion for electricity generation is also one of the largest sources of human-induced emissions of greenhouse gasses (GHGs) such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_20), which, according to the United Nations Intergovernmental Panel on Climate Change (IPCC)[563], are causing the Earth's atmosphere to warm, altering climates in irreversible ways. Due to its continued heavy reliance on fossil fuels, the electricity industry is the world's largest emitter of GHGs, and individual electricity generation companies are among the world's largest single emitters of GHGs.

In addition to GHG emissions, the combustion of fossil fuels to produce electricity can also result in the emission of a range of different types of air pollutants such as sulphur dioxide (SO_2), mono-nitrogen oxides (NO_X, i.e. NO and NO_2), 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.[564]

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

Nuclear power

Nuclear power is generated from uranium, which, like fossil fuels, is not a renewable resource. Electricity generation from nuclear fuel produces various types of solid radioactive waste (high, medium, and low-level radioactivity[565]). Because of the lack of a technological solution for permanently treating nuclear waste to rid it of dangerous radioactivity, generation of electricity from nuclear fuel represents a transfer of costs and environmental liability to future generations. In addition, despite improvements in nuclear technology, the possibility of human error in using nuclear technology still brings with it the risk of catastrophic impacts on human health and the environment if a reactor melts down, as well as the risk the proliferation of nuclear technology that could be used to produce nuclear weapons. Furthermore, although proponents of nuclear power emphasise that the generation of electricity from nuclear fuel produces no CO_2 emissions, what they often fail to recognize (or admit) is that the nuclear fuel production chain does emit CO_2 (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.[566] For these reasons, SOMO considers nuclear power to be non-renewable.

Biomass

Biomass, organic material from living or recently living organisms such as plants and trees, can be combusted to produce electricity. Biomass absorbs CO_2 from the atmosphere during its lifetime, then releases this CO_2 back into the atmosphere when it is combusted or dies and decomposes, thereby making the use of biomass for electricity less carbon-intensive . Because plants and trees, which are the primary sources of biomass, are generally assumed to be a renewable resource, biomass is also generally considered to be a renewable source of fuel for electricity generation. For these reasons, SOMO will consider investment in and construction of biomass-only power plants to be renewable. However, it should be noted that some biomass-only plants (such as many of those in operation in the Netherlands) have low efficiency levels and have limited flue gas treatment capabilities to reduce the emission of airborne pollutants such as SO_2 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 CO_2 balance. Some of the factors that determine if biomass for electricity is truly sustainable include the carbon balance for the entire value chain and lifecycle of the biomass (e.g. transport, emissions due to land use change[567]), loss of biodiversity due to changes in land use, decent labour standards on plantations and in processing chains, land/food rights of people confronted with land use shifts., etc. If electricity generation from biomass is to truly be sustainable, the entire supply chain of biomass production must also conform to sustainable development standards.

Co-firing of biomass in existing coal and natural gas-fired power plants is becoming increasingly popular among electricity generation companies seeking to reduce their CO_2 emissions. Co-firing entails combusting biomass along with a fossil fuel, and current technologies allow for co-firing of up to 50% of a coal power plant's capacity with biomass.

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

- Carbon capture and storage

Carbon capture and storage (CCS) is one approach to mitigating the global warming effects of fossil fuel-based electricity generation by capturing CO_2 as it is emitted at its point source before it enters the atmosphere and storing it underground in (presumably) stable geological formations or underwater. It is seen by some as a short-term solution to avoid the worst impacts of global warming while allowing us to continue our use of fossil fuels. Although some scientists theorise that CCS could reduce the CO_2 emissions to the atmosphere of a fossil fuel-based power plant by approximately 80-90%[568], 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%.[569]
2. Investment in CCS does nothing to further the development of truly renewable and sustainable energy technologies or energy efficiency that are needed for "real" sustainability.
3. Currently, CCS technology has not been completely proven safe. Deep ocean storage could contribute to ocean acidification, long-term predictions about the security of underground storage are difficult to make, and there are no guarantees that "stored" CO_2 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.[570] As a result, large hydroelectric dams present an acute threat to biodiversity given that they often require the flooding of large areas of land. Companies that build large dams sometimes compensate for the loss of biodiversity in the flooded area by purchasing, protecting or creating replacement habitats. However, the replacement habitats may not have the same biodiversity value. Electricity infrastructure that alters natural habitats can alter the migration and breeding habits of animals. Furthermore, although the actual process of electricity generation from water does not emit CO_2, hydroelectricity can be a significant source of GHG emissions, especially when it involves large reservoirs in tropical climates. CO_2 is released by decomposing vegetation and soils trapped under water when the reservoir was first filled. It should be noted that reservoirs also absorb atmospheric CO_2 through photosynthesis by plankton and aquatic plants and that this uptake can occasionally exceed CO_2 emissions. However, recent studies suggest that reservoirs also release other GHGs, such as methane (CH_4) and nitrous oxide (N_2O), which are much more potent than CO_2.[571] As a result, the World Commission on Dams asserts that “Where other options offer better solutions, they should be favoured over large dams”.[572]

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.[573] 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.[574]

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

Wind and solar

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

sustainability criteria should also be applied to these technologies and their entire supply and production chains. For example, wind farms can have an undesirable impact on the visual landscape and may impact the migration patterns of flocks of migratory birds. The production of photovoltaic solar panels emits CO_2 and involves the use of hazardous chemicals that can be dangerous for human health and the environment. That said, because of their limitless supply and relatively low levels of emissions, SOMO considers wind and solar to be the most sustainable mainstream electricity generation technologies on the market, but emphasises that, as with biomass, if electricity generation from solar and wind is to truly be sustainable, the entire supply chain of solar panels and windmills must also conform to sustainable development standards.

Investments vs. investment plans

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

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

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

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[560] 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)

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[563] 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).
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[565] 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).
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[567] 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.
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[572] World Commission on Dams, *Dams & Development: A New Framework for Decision-Making*, 2008, London and Sterling, VA: Earthscan Publications Ltd.
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Questionnaire for SOMO's research on sustainability in the electricity sector

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

The first part deals with the source of the raw materials that are used as fuel in power plants. Recent years have seen an increase in public attention on the greater supply chain of electricity, and several reports have been published dealing with sustainability issues around the mining and production of coal[575], biomass[576] and uranium[577].

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

5. Does your company have a Corporate Social Responsibility policy and does it report annually on its performance? Please direct us to the relevant documents.

6. Does your company have a Supplier Code of Conduct or does it otherwise recognize its Supply Chain Responsibility. Does you Supply Chain Responsibility policy also apply to the suppliers of raw materials?

7. Does your company set specific sustainability criteria when sourcing its raw materials, such as biomass, coal and uranium? Please specify.

8. How does your company monitor compliance with these sustainability criteria or Supplier Code of Conduct? Please specifiy.

9. 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

10. 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?

11. 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		

[575] 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).
[576] 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).
[577] LaRRI, "Uranium mining in Namibia; The mystery behind 'low level radiation", February 2009, http://somo.nl/publications-nl/Publication_3061-nl (28-06-10).