Stichting Onderzoek Multinationale Ondernemingen
Centre for Research on Multinational Corporations

Sustainability in the Dutch Power Sector

Fact Sheet Series – 2009 Update

Joseph Wilde-Ramsing, Tim Steinweg, Maaike Kokke

October 2009

Colophon

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By: Joseph Wilde-Ramsing, Tim Steinweg, Maaike Kokke
Cover Design: Annelies Vlasblom
ISBN: 978-90-71284-39-7

Funding
This report was made possible with funding from
Greenpeace Nederland

Published by

Stichting Onderzoek Multinationale Ondernemingen
Centre for Research on Multinational Corporations

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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

1 Introduction

1.1 Aim and context of the fact sheet series

This 2009 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 2009 fact sheet series builds on SOMO's 2008 report "Sustainability in the Dutch Power Sector" (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. Three pairs of companies (GDF Suez / Electrabel, RWE / Essent, and Vattenfall / Nuon) are combined into three fact sheets instead of being investigated separately in six fact sheets (although the RWE / Essent and Vattenfall / Nuon combined company fact sheets do present information for both corporate entities). The 2009 series thus consists of seven company fact sheets on Delta, Dong, Eneco, E.ON, GDF Suez / Electrabel, RWE / Essent, and Vattenfall / Nuon, as well as four thematic fact sheets, for a total of 11 fact sheets. Three companies that were included in the 2008 report have not been included in the 2009 version: Greenchoice, Windunie and Oxxio. However, it should be noted that SOMO's 2008 report indicates that Greenchoice and Windunie score high in the sustainability criteria addressed here.

1.2 Report structure

After this brief introduction, Sections 2 – 8 comprise the seven company fact sheets for Delta, Dong, Eneco, E.ON, GDF Suez / Electrabel, RWE / Essent, and Vattenfall / Nuon. Each company fact sheet contains information on four measures of sustainability: the company's current fuel mix for installed electricity generation capacity in Europe, current fuel mix of electricity supplied in the Netherlands (or the Netherlands region), investments in new generating capacity in Europe, and initiatives to encourage consumers to become more sustainable in their energy use by conserving energy and reducing overall use (demand-side initiatives) in the Netherlands. The four thematic fact sheets found in sections 9– 12 focus on these same four areas and compare the seven companies' performance in each area.

1.3 Methods

The choice of companies to include in the fact sheet series is based on the overall size and market share of companies with electricity generation and/or supply operations in the Netherlands. This does not mean that the companies have to be based in the Netherlands, but simply that they are active on the Dutch market; in fact, most of the companies are not Netherlands-based. The seven companies chosen for the 2009 report (Delta, Dong, Eneco, E.ON, GDF Suez / Electrabel, RWE / Essent, and Vattenfall / Nuon) are thus the largest power companies active in the Dutch electricity sector. The three companies not included in the 2009 version but that were in the 2008 version (Greenchoice, Windunie and Oxxio) were not included in the 2009 version because of their small size and thus difficult comparability with the other companies.

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.

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. All 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 Methodological Annex in Section 13.

1.4 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.

2 Delta

2.1 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. and are an important player in the field of industrial and hazardous waste management, whereas also domestic waste is being handled in Zeeland and Belgium. From its base in Dutch province of 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 lager part of South and Western Europe. We have more divisions than currently stated, like

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

- Division Energy: Energy production, energy supply, energy supply to large business clients
- Division Comfort: Energy supply to households and small business clients
- Subsidiary Biovalue
- Subsidiary Solland and Sunergy

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

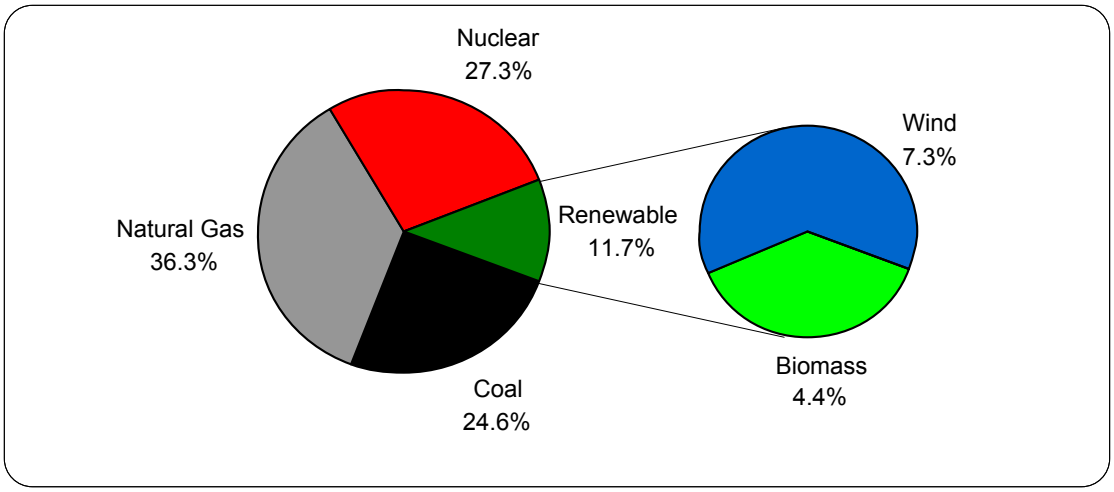
2.2 Installed capacity and electricity generation in Europe

Figure 1 reveals the fuel mix of Delta's electricity generation capacity in 2008. Delta's total generating capacity in the Netherlands is over 800 MW.[1]

In 2008 the generation capacity increased by 36.5 MW. The biomass plant BMC Moerdijk, that has a capacity of 36.5 MW was completed in September 2008.[2]

[1] Delta website, Thuis, Producten, Elektriciteit Zeeuws Groen Gas, Elektriciteit, Elektriciteitsproductie, no date, http://www.delta.nl/web/show/id=44088 (22-07-09).
[2] Delta Annual Report 2007, http://www.delta.nl/web/servlet/nl.gx.delta.client.http.GetFile?id=107957 (20-07-09).

Figure 1: Fuel mix of Delta's installed capacity in Europe, 2008



Based on: Delta[3]

Table 1 gives an the absolute figures of both the installed capacity and the generated electricity of Delta.

Table 1: Fuel mix of Delta's installed capacity in Europe, 2008

Fuel type	Capacity (MW)
Coal	202.5[4]
Natural gas	299.0[5]
Nuclear	225.0[6]
Biomass	36.5
Wind	60.0
Hydro	0.0
Other renewable	0.0
Total	**823.0**

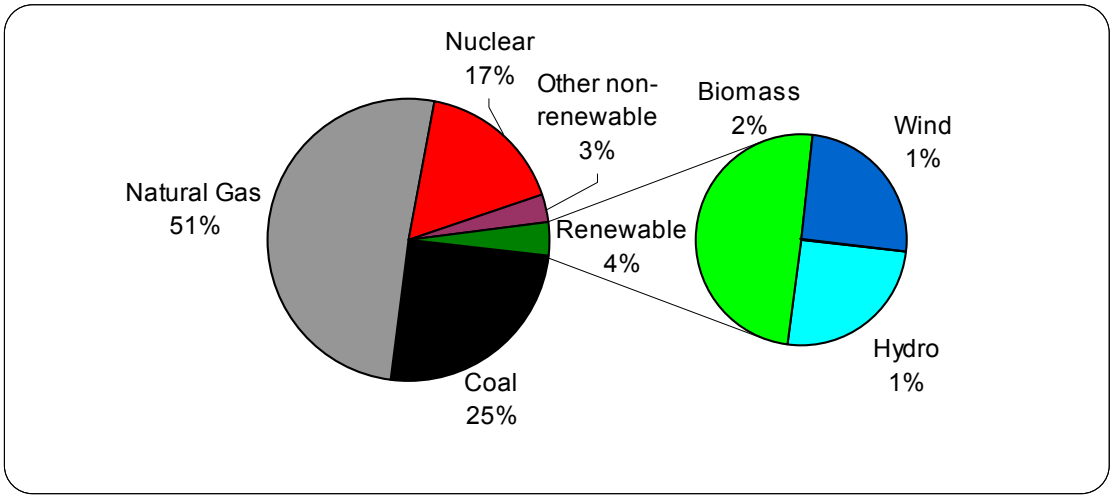
Based on: Delta[7]

[3] Delta website, Thuis, Producten, Elektriciteit Zeeuws Groen Gas, Elektriciteit, Elektriciteitsproductie, no date, http://www.delta.nl/web/show/id=44088 (22-07-09).
[4] Total capacity of coal plant Borssele is 405 MW. Delta has a 50% stake.
[5] The capacity of 299 MW is composed of 9 MW of the gas plant Borssele (total capacity is 18 MW, Delta has a 50% stake), 100 MW of CHP plants, and 190 MW of ELSTA Plant (Total capacity is 475 MW, 1/5 is used by Dow Benelux, the remaining electricity is divided between Essent and Delta. Source: AES Elsta bv website, "Informatie", no date, http://www.dekanaalzone.nl/pages/bedrijven/popups/index.php?id=1) (22-07-09).
[6] Total capacity of nuclear plant Borssele is 450 MW. Delta has a 50% stake.
[7] Delta website, Thuis, Producten, Elektriciteit Zeeuws Groen Gas, Elektriciteit, Elektriciteitsproductie, no date, http://www.delta.nl/web/show/id=44088 (22-07-09).

2.3 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.

Figure 2: Fuel mix of electricity supplied by Delta in the Netherlands, 2008



Based on: Delta[8]

Table 2: Emissions and waste resulting from electricity supplied by Delta in the Netherlands, 2008

Indicator	Amount
CO_2 (g/kWh)	428.7
Radioactive waste (µg/kWh)	500

Based on: Delta[9]

2.4 Investments in new generation capacity in Europe

Delta's aim is to increase its electricity generating capacity to 2,000 MW by 2015. The company is strongly in favour of bolstering Dutch nuclear generating capacity. In addition, Delta is developing renewable generating capacity in the form of biomass, wind, and solar power.

Table 3 reveals Delta's investments in new generation capacity that are currently underway.

[8] Delta, Stroometiket 2008, http://www.delta.nl/2879/1344/3287/stroometiket_2008 (22-07-09).
[9] Delta website, Stroometiket 2008, http://www.delta.nl/2879/1344/3287/stroometiket_2008 (14-08-09).

Table 3: Delta's investments in new generation capacity in Europe

Project name	Location	Fuel Type	Date in operation	Amount (million €)	Capacity (MW)	Status
Sloe Centrale	Vlissingen (NL)	Gas (CCGT)	2009	275[10]	435[11]	Under construction
Waste burning plant	Dublin (IE)	Biomass	2011	n/a	12.75[12]	Under construction[13]
Solar panel park	Willebroek (BE)	Solar	n/a	n/a[14]	3[15]	Under construction[16]

Based on: Delta[17]

Table 4 shows investment plans that Delta has announced or that have appeared in newspaper reports, but for which construction has not yet been initiated.

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

Project name	Location	Fuel Type	Date in operation	Amount (million €)	Capacity (MW)	Status
Indaver Gas-fired Power Station	Beveren (BE)	Gas	n/a	n/a	400	Awaiting permission[18]
Second nuclear power plant	Borssele (NL)	Nuclear	2018[19]	4,000-5,000	2,500[20]	Permit application phase[21]
Biovalue 2: Second biofuel plant	Zeeland (NL)	Biomass	n/a	n/a	n/a	Planning phase
Fermentation plant	Zeeland (NL)	Biomass	2010	n/a	2	n/a[22]
Wind farms	The Netherlands	Wind	2009-2013	n/a	n/a	Planning phase[23]

[10] Total investment is €550 million. Delta has a 50% stake (the other 50% is owned by EDF).
[11] Total capacity is 870 MW. Delta has a 50% stake (the other 50% is owned by EDF).
[12] Total capacity is 17 MW. Delta has a 75% stake.
[13] PZC, Deltadochter Indaver bouwt afvalverbrander in Dublin, 9 May 2008, http://www.pzc.nl/regio/zeeland/3098235/Deltadochter-Indaverbouwt-afvalverbrander-in-Dublin.ece (22-07-09).
[14] The investment is part of a project in which Delta and NPG Energy invest €40 million in renewable energy.
[15] The investment is part of a project in which Delta and NPG build a renewable capacity of 150 MW.
[16] Delta press release, Delta NV en NPG Energysamen in groene stroom productie, 12 June 2009, http://www.delta.nl/web/show/id=51704/contentid=5610 (21-07-09).
[17] Delta Annual Report 2008, p. 38, http://www.delta.nl/web/servlet/nl.gx.delta.client.http.GetFile?id=115740 (22-07-09).
[18] Delta Annual Report 2008, p. 38, http://www.delta.nl/web/servlet/nl.gx.delta.client.http.GetFile?id=115740, (20-07-09). A feasibility study has been carried out. The final decision to build the plant will be made after the permits and business case have been arranged. These are expected in 2010.
[19] The goal is to apply for the permit at the end of 2011. When granted, the construction permit can be filed in 2012. In that case, the construction will start in 2013. With a construction period of 5 years, the plant will be brought into use.
[20] Delta website, Over Delta, Ons profiel, Kernenergie, "Startnotitie tweede kerncentrale", http://www.delta.nl/web/show/id=115316 (20-07-09).
[21] Delta press release, DELTA start procedure voor vergunningaanvraag 2de kerncentrale, 25 June 2009, http://www.delta.nl/web/show/id=51704/contentid=5651 (20-07-09).
[22] Ministerie Economische Zaken, Sectorakkoord Energie 2008-2020, 28 October 2008, http://www.ez.nl/dsresource?objectid=160723&type=PDF (22-07-09).
[23] Delta Annual Report 2007, p. 33, http://www.delta.nl/web/servlet/nl.gx.delta.client.http.GetFile?id=107957 (20-07-09).

Replacement Kreekrak	Odijk (NL)	Wind	2012	n/a	29.5[24]	Planning phase[25]
Tidal power station	Brouwersdam (NL)	Hydro	n/a	200	n/a[26]	Feasibility study completed[27]
Cooperation Delta and NPG Energy	Benelux	Unspecified renewable	n/a	40	137[28]	Planning phase[29]

Based on: Delta[30]

2.5 Demand-side initiatives in the Netherlands

Delta's demand-side initiatives include:

- In cooperation with certified advisors, Delta handles requests for energy labels.
- Delta offers its clients an energy test that shows them how much energy they consume in comparison with the national average. Delta offers the test in a brief and an extensive version. Delta also offers its clients a test that shows them how "green" or "energy efficient" they behave in their daily life.
- On its website, Delta gives its clients information about the power consumption of home appliances. Delta publishes a number of energy use reduction tips and climate tips. It also publishes a free newsletter with information about sustainability and energy saving.
- On its website, Delta offers its clients free information on solar panels, solar boilers, and relevant subsidies. Delta sells solar panels and boilers and offers free advice (in a personal home visit) on payment and installation of the panels and boilers.
- Delta participates in the program 'Meer met Minder', a joint initiative by government, construction companies, and energy companies through which homeowners can evaluate how to lower their electricity costs.

[24] Replacement of Kreekrak (9.5 MW) by a wind farm of 39 MW.

[25] Ministerie Economische Zaken, Sectorakkoord Energie 2008-2020, 28 October 2008, http://www.ez.nl/dsresource?objectid=160723&type=PDF (22-07-09).

[26] The power station will produce 220 GWh (TU Delft, Getijdencentrale in Brouwersdam is technisch haalbaar, 3 December 2008, http://www.tudelft.nl/live/ServeBinary?id=f14ca197-7f0f-48d5-b6ee-f2035c446ccb&binary=/doc/Brouwersdam.pdf) or 600 million KWh (Intermediair, Stroom uit water door getijdencentrale, 18 July 2008, http://www.intermediair.nl/artikel/archief/63656/stroom-uit water-door-getijdencentrale.html) (22-07-09).

[27] Intermediair, Stroom uit water door getijdencentrale, 18 July 2008, http://www.intermediair.nl/artikel/archief/63656/stroom-uit water-door-getijdencentrale.html (22-07-09).

[28] Total capacity of the project is 150MW, consisting of small renewable projects with a capacity between 2 and 20 MW on industry terrains and next to buildings. Two investment are already under construction: A solar panel park in Willebroek of 3 MW, and a wind farm in Saint Vith of 10 MW.

[29] Delta press release, Delta NV en NPG Energysamen in groene stroom productie, 12 June 2009, http://www.delta.nl/web/show/id=51704/contentid=5610 (21-07-09).

[30] Delta Annual Report 2008, p. 38, http://www.delta.nl/web/servlet/nl.gx.delta.client.http.GetFile?id=115740 (22-07-09).

3 Dong Energy

3.1 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.[31] Currently, Dong Energy's business is based on procuring, producing, distributing, and trading in energy and energy-related products in Northern Europe.[32] Dong has operations in Denmark, the Netherlands, UK Sweden, Norway and Germany.[33]

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 focussing 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.

Dong Energy has approximately 5,500 employees and generated more than DKK 60 billion (€8.1billion) in revenue in 2008. Its activities in the Netherlands are currently only focused on energy supply, but the company has recently announced that it will construct a power plant in cooperation with Eneco.

3.2 Installed capacity and 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. For the thermal facilities, the company makes the distinction between "central power stations" and "small-scale power stations" and does mention that most of the thermal generation comes from coal.[34]

All of Dong Energy's thermal facilities are located in Denmark. Its wind parks are located in Denmark, the UK, and France, while the company's only hydro plant is located in Sweden.

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

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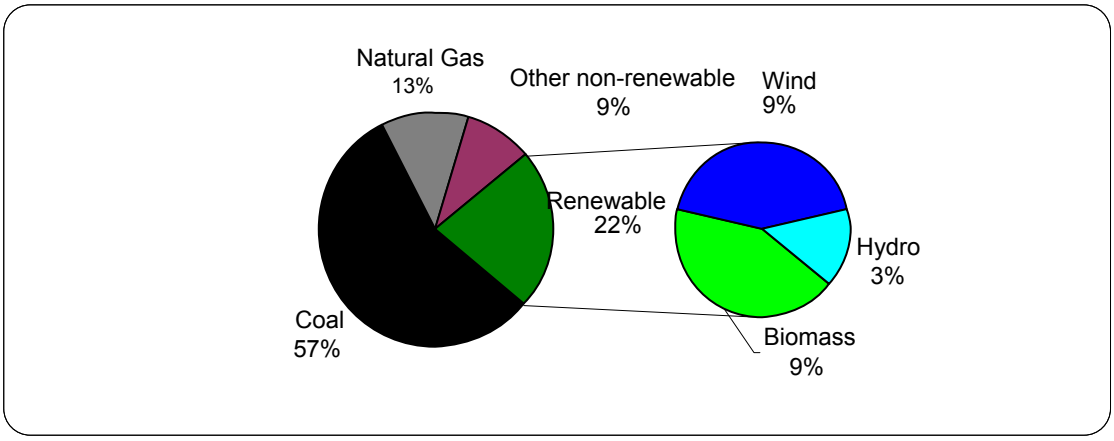
[31] Wikipedia website, "Dong Energy", last modified on 17-06-09, http://en.wikipedia.org/wiki/DONG_Energy (14-07-09).

[32] Dong Annual Report 2008, http://www.dongenergy.com/SiteCollectionDocuments/%C3%85rsrapporter/%C3%85rsrapport_050309_UK_FINAL.pdf (14-07-09).

[33] Dong Energy's response to a draft version of this profile, email received 29-07-09.

[34] Ibid.

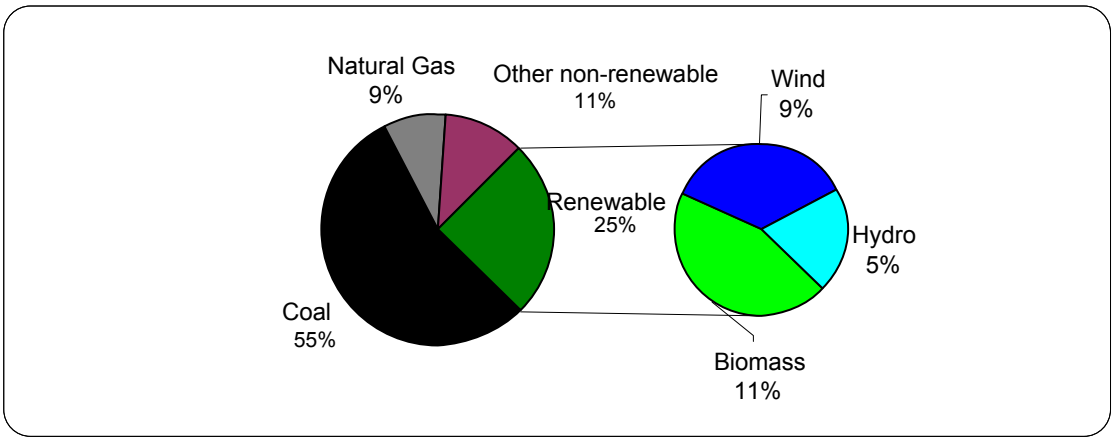
Figure 3: Fuel mix of Dong's installed capacity in Europe, 2008



Based on: Dong[35]

Figure 4 shows the fuel mix of the electricity that was generated by Dong Energy in Europe in 2008.

Figure 4: Fuel mix of electricity generated by Dong in Europe, 2008



Based on: Dong[36]

Table 5 shows the absolute figures of the fuel mix of Dong Energy's installed capacity (in MW) and generated electricity (in GWh) in 2008.

[35] Dong Energy website, "Capacity, availability factor and production efficiency", no date, http://griuk.dongenergy.com/index.dsp?page=238 (14-07-09).
[36] Dong Energy website, "Capacity, availability factor and production efficiency", no date, http://griuk.dongenergy.com/index.dsp?page=238 (14-07-09).

Table 5: Fuel mix of Dong's installed capacity and electricity generated in Europe, 2008

		Installed capacity (MW)	Electricity generated (GWh)
Non-renewable		5,019	13,901
	Coal	3,626	10,194
	Natural Gas	794	1,668
	Other non-renewable	599	2,039
Renewable		1,412	4,635
	Biomass	601	2,057
	Wind	606	1,650
	Hydro	205	928
Total		**6,431**	**18,536**

Based on: Dong[37]

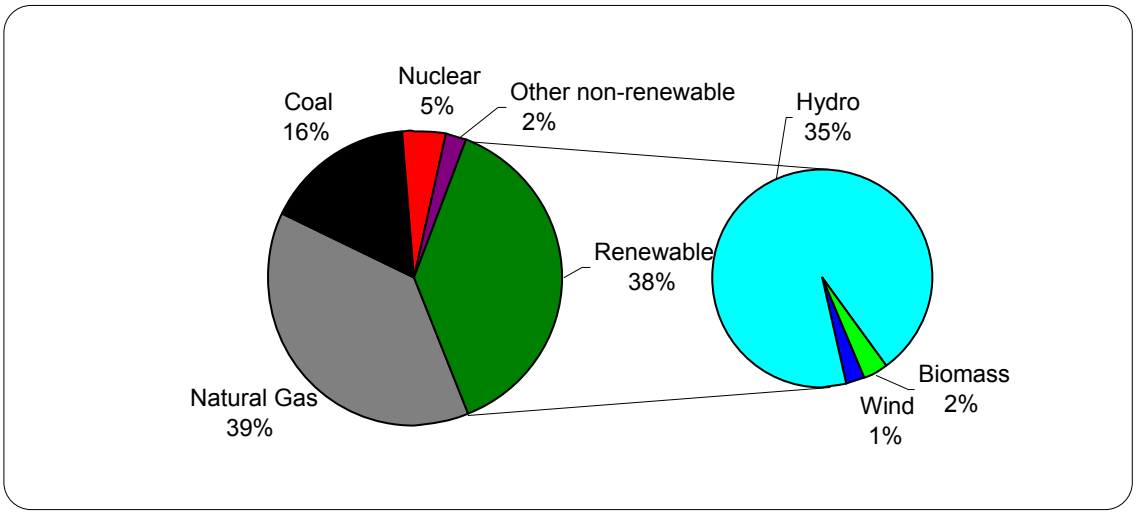
3.3 Electricity supplied in the Netherlands

Dong Energy is a relatively new player in the Dutch electricity supply market, having been active in the Netherlands only since 2005 providing electricity generated primarily from natural gas and hydropower. [38] Figure 5 shows the fuel mix of the electricity generated by Dong Energy in the Netherlands. Most of this energy is purchased through spot markets, but the company indicated that it intends to buy more energy directly from the Danish mother company in the future. This would primarily be energy generated from wind power.

[37] 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. For the sake of comparability, biomass is considered a renewable source here, and the total amounts of renewable and non-renewable generation and capacity are calculated accordingly. Dong Annual Report 2008, http://www.dongenergy.com/SiteCollectionDocuments/%C3%85rsrapporter/%C3%85rsrapport_050309_UK_FINAL.pdf (14-07-09); Dong Energy website, "Capacity, availability factor and production efficiency", no date, http://griuk.dongenergy.com/index.dsp?page=238 (14-07-09); Dong Energy's response to a draft version of this profile, email received 29-07-09.

[38] Dong Energy Nederland website, "Wie is Dong Energy", no date, http://www.dongenergy.nl/home/over_dong/wie_is_dong_energy.html (14-07-09).

Figure 5: Fuel mix of electricity supplied by Dong in the Netherlands, 2008



Based on: Dong[39]

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

Table 6: Emissions and waste resulting from electricity supplied by Dong in the Netherlands, 2008

Indicator	Amount
CO_2 (g/kWh)	304
Radioactive waste (µg/kWh)	160

Based on: Dong[40]

3.4 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, Denmark, Norway, Sweden, and Poland. Most of the investments are in new wind capacity, while there are also two new natural gas fuelled plants currently under construction. Additionally, Dong Energy is investing in expanding the biomass co-generation capacity of existing coal facilities at the Avedøre and Herning stations in Denmark.[41]

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

Table 7: Dong's investments in new generation capacity in Europe

[39] Dong Energy Nederland website, "Waar halen wij onze stroom vandaan?", no date, http://www.dongenergy.nl/home/thuis/producten_tarieven/basisstroom_puurstroom/stroometiket.html (14-07-09).
[40] Ibid.
[41] Dong Annual Report 2008, http://www.dongenergy.com/SiteCollectionDocuments/%C3%85rsrapporter/%C3%85rsrapport_050309_UK_FINAL.pdf (14-07-09), p.24

Project name	Location	Fuel type	Date in operation	Amount (million €)	Capacity (MW)	Project status
Horns Rev 2[42]	Denmark	Wind	2009	470	209	Partially in operation
Gunfleet Sands I[43]	UK	Wind	2009	n/a	108	Under construction
Gunfleet Sands II[44]	UK	Wind	2010	188	65	Under construction
Walney I[45]	UK	Wind	2011	651	183.6	Under construction
Walney II[46]	UK	Wind	2011	651	183.6	Under construction
Storrun[47]	Sweden	Wind	2009	40	30	Under construction
London Array, (Phase 1)[48]	UK	Wind	2012	1,100	315	'Pre construction'
Severn[49]	UK	Natural gas	2010	697	850	Project acquired
Mongstad[50]	Bergen	Natural gas	2009	201	260	Under

[42] The amount Dong invests is DKK2bn. Currency conversion rates of 08-07-09 used, www.xe.com; Dong Annual Report 2008, http://www.dongenergy.com/SiteCollectionDocuments/%C3%85rsrapporter/%C3%85rsrapport_050309_UK_FINAL.pdf (14-07-09) p.22; Dong, Press Release, "DONG Energy to proceed with Horns Rev 2", 01-05-07, http://www.dongenergy.com/EN/Investor/releases/Pages/omx%20feed%20list%20details.aspx?omxid=285398 (14-07-09).

[43] The amount Dong invests is DKK1.4bn. Currency conversion rates of 08-07-09 used, www.xe.com; Dong Annual Report 2008, p.23; Dong, Press Release, "DONG Energy invests in UK offshore wind farms", 03-12-07, http://www.dongenergy.com/EN/Investor/releases/Pages/omx%20feed%20list%20details.aspx?omxid=281989 (08-07-09).

[44] Ibid.

[45] The amount Dong invests in the Walney I and II is DKK9.7bn. For this table, it is assumed that the investment is split evenly among the two projects. Currency conversion rates of 08-07-09 used, www.xe.com; Dong Annual Report 2008, http://www.dongenergy.com/SiteCollectionDocuments/%C3%85rsrapporter/%C3%85rsrapport_050309_UK_FINAL.pdf (14-07-09), p.23; "Denmark: Dong Energy expected to make investments worth EUR 1bn in 2009", Esmerk, Børsen, April 23, 2009;

[46] Dong Annual Report 2008, p.23; Per Holmgaard, Senior Vice President, Presentation at the Scandinavian Renewable Energy Forum 2008, October 2008, http://www.dongenergy.com/SiteCollectionDocuments/NEW%20Corporate/PDF/Presentations/Scan-REF_October_2008.pdf (08-07-09).

[47] The amount Dong invests is DKK300m. Currency conversion rates of 08-07-09 used, www.xe.com; Dong Annual Report 2008, http://www.dongenergy.com/SiteCollectionDocuments/%C3%85rsrapporter/%C3%85rsrapport_050309_UK_FINAL.pdf (14-07-09), p.22; "DONG Energy acquires Sweden's Storrun Vindkraft for undisclosed sum", Forbes, 09-08-06, http://www.forbes.com/feeds/afx/2006/09/08/afx3002335.html (08-07-09).

[48] Dong owns 50% of the project. The figures given here for the amount invested and capacity are subsequently calculated as half of what has been announced. The second phase of the project will commence in 2011and is taken up in Table 8. Dong Annual Report 2008, http://www.dongenergy.com/SiteCollectionDocuments/%C3%85rsrapporter/%C3%85rsrapport_050309_UK_FINAL.pdf (14-07-09), p.23; S. Arnott, "Green light for the world's biggest offshore wind farm", The Independent, 13-05-09, http://www.independent.co.uk/news/business/news/green-light-for-the-worlds-biggest-offshore-wind-farm-1684056.html (14-07-09).

[49] The amount Dong invests is GBP 600m. Currency conversion rates of 08-07-09 used, www.xe.com; "DONG enters deal to buy 850-MW UK project from independent generator Welsh Power", Global Power Report, March 12, 2009.

	(NO)					construction
Karnice I[51]	Poland	Wind	2009	59	30	Under construction
Karcino[52]	Poland	Wind	2010	81	51	Project acquired

Compared to the investments already underway, Dong Energy's announced plans for investments depict a somewhat different strategy. Several coal plants are in the pipeline, with a projected total capacity of 4,600 MW when completed. In addition, the company has also announced a number of wind projects, as well as a new gas fuelled power plant in Rotterdam, which it would develop in cooperation with Eneco. 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 generation capacity in Europe

Project name	Location	Fuel Type	Date in operation	Amount (million €)	Capacity (MW)	Project status
Avedøre[53]	Copenhagen (DK)	Wind	2009-2010	25	12.5	Announced
Greifswald[54]	Germany	Coal	n/a	n/a	1,500	Awaiting permits
Emden[55]	Germany	Coal	n/a	n/a	1,600	Unclear
Hunterston[56]	Glasgow (UK)	Coal	n/a	2,326	1,600	Investment decision to be taken

[50] The amount Dong invests is GBP 1.5bn. Currency conversion rates of 08-07-09 used, www.xe.com; Dong Annual Report 2008, http://www.dongenergy.com/SiteCollectionDocuments/%C3%85rsrapporter/%C3%85rsrapport_050309_UK_FINAL.pdf (14-07-09), p.24; Dong website, Plant Description, "Mongstad Gas-fired CHP Plant", no date, http://www.dongenergy.com/SiteCollectionDocuments/NEW%20Corporate/PDF/Engineering/50.pdf (08-07-09).

[51] The amount Dong invests is DKK 443m. Currency conversion rates of 08-07-09 used, www.xe.com; Dong Annual Report 2008, http://www.dongenergy.com/SiteCollectionDocuments/%C3%85rsrapporter/%C3%85rsrapport_050309_UK_FINAL.pdf (14-07-09), p.23; Dong Energy, Press Release, "DONG Energy to invest in Polish wind farm", 24-06-08, http://www.dongenergy.com/EN/Investor/releases/Pages/omx%20feed%20list%20details.aspx?omxid=325954 (08-07-09).

[52] The amount Dong invests is DKK 600m. Currency conversion rates of 08-07-09 used, www.xe.com; Energy Current website, "DONG buys Karcino wind project", 20-03-09, http://www.energycurrent.com/index.php?id=2&storyid=16871 (14-07-09).

[53] The figure given here for the installed capacity is the average of the announced 10-15MW capacity. The amount Dong invests is DKK 185m. Currency conversion rates of 08-07-09 used, www.xe.com; Dong Annual Report 2008, http://www.dongenergy.com/SiteCollectionDocuments/%C3%85rsrapporter/%C3%85rsrapport_050309_UK_FINAL.pdf (14-07-09), p.22; Oilvoice website, "DONG Energy to Build New Windmills at Avedøre Holme", 19-11-08, http://www.oilvoice.com/n/DONG_Energy_to_Build_New_Windmills_at_Avedre_Holme/d42a5806.aspx (08-07-09).

[54] Dong Kraftwerke Greifswald website, no date, www.kraftwerkegreifswald.de (08-07-09).

[55] Dong Energy, Press release, "DONG Energy to balance energy supply security and climate change ", 02-12-08, http://www.dongenergy.com/EN/Media/Press%20releases/Pages/CisionDetails.aspx?cisionid=404443 (14-07-09).

London Array (Phase 2)[57]	UK	Wind	2014	n/a	185	Announced
West of Duddon Sands[58]	UK	Wind	2012	n/a	165	Approved
Enecogen[59]	Rotterdam (NL)	Natural gas (CCGT)	2012	336	435	Announced

3.5 Demand-side initiatives in the Netherlands

Dong Energy's demand-side initiatives in the Netherlands include[60]:

- Dong Energy offers an online "energy savings card" with which consumers can measure their energy use and save energy when necessary.
- Dong Energy offers a number of online energy saving tips.
- Dong Energy participates in the program 'Meer met Minder', a joint initiative by government, construction companies, and energy companies through which homeowners can evaluate how to lower their electricity costs.
- Dong Energy has engaged partnerships with several companies concerning Energy Saving initiatives and programs.
- Dong Energy offers the "Energy Monitor", with this online free application clients can - at any moment - monitor their usage of electricity or natural gas (depending on the product, and only for "hour metered" customers). The "Energy Monitor" also follows the current developments and price levels in the energy market and helps to choose the right moment of purchase.

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[56] This coal plant would be equipped to co-fire up to 15% biomass. The amount Dong invests is GBP 2bn. Currency conversion rates of 08-07-09 used, www.xe.com; Dong Energy, Press release, "DONG Energy to balance energy supply security and climate change ", 02-12-08, http://www.dongenergy.com/EN/Media/Press%20releases/Pages/CisionDetails.aspx?cisionid=404443 (14-07-09); "DONG, Peel consider 1,600-MW coal plant in Scotland by existing coal import terminal", Global Power Report, November 27, 2008; "United Kingdom: £2bn plan for clean fuel plant to power Scotland", TendersInfo, November 21, 2008.

[57] Dong http://www.dongenergy.com/SiteCollectionDocuments/%C3%85rsrapporter/%C3%85rsrapport_050309_UK_FINAL.pdf (14-07-09), p.23; S. Arnott, "Green light for the world's biggest offshore wind farm", The Independent, 13-05-09, http://www.independent.co.uk/news/business/news/green-light-for-the-worlds-biggest-offshore-wind-farm-1684056.html (14-07-09).

[58] Per Holmgaard, Senior Vice President, Presentation at the Scandinavian Renewable Energy Forum 2008, October 2008, http://www.dongenergy.com/SiteCollectionDocuments/NEW%20Corporate/PDF/Presentations/Scan-REF_October_2008.pdf (08-07-09), p.10.

[59] Dong has acquired a 50% stake in the project. The invested amount is 50% of the total investment of DKK 2.5B. Currency conversion rates of 29-07-09 used, www.xe.com. Dong Energy's response to a draft version of this profile, email received 29-07-09; "Dong Energy buys into Netherlands plant ", UPI Energy, May 4, 2009.

[60] Dong Energy Nederland website, Thuis, "Over energie", no date, http://www.dongenergy.nl/home/thuis/over_energie.html (14-07-09).

4 Eneco

4.1 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 the Dutch and Belgian markets, where it operates in the fields of production, trade, distribution, and supply of gas, electricity and heat. It is currently also developing new renewable capacity in France and the UK.

Eneco Holding holds three subsidiaries: Eneco B.V., Joulz, and Stedin. Eneco B.V. deals with the generation of electricity, distribution of heat, trading activities and heat, gas and electricity supply in the Netherlands and abroad.[62] Joulz is an energy infrastructure company that also constructs and maintains public lighting systems, among other things. Stedin is Eneco's gas and electricity grid company.

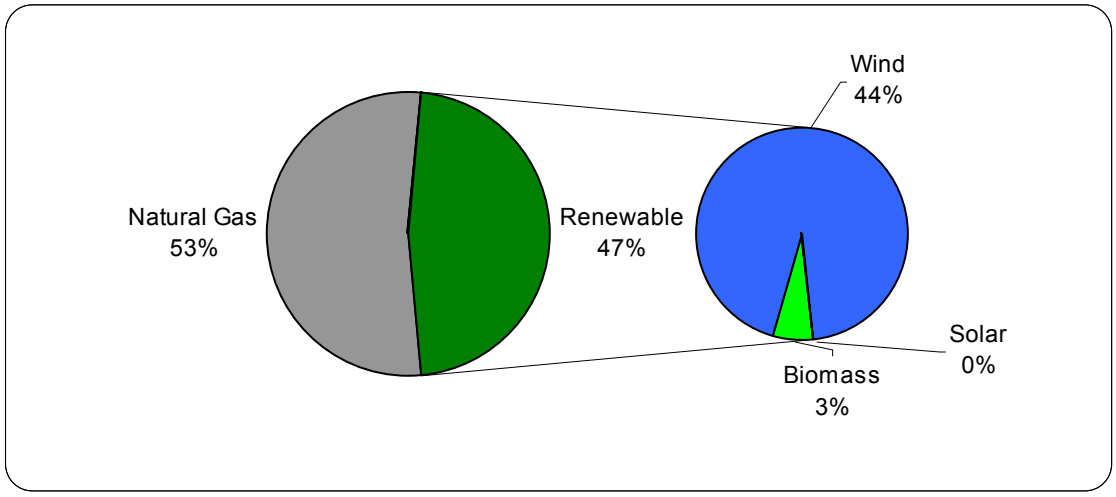
Along with Essent and Nuon, Eneco was traditionally one of the top three network operators in the Netherlands and is the only one that is still owned by Dutch municipalities. The company has 5,500 employees, and in 2008 had a turnover of almost € 5 billion.

4.2 Installed capacity and electricity generation in Europe

Contrary to previous years, Eneco no longer provides information about its installed capacity or electricity it generates in its annual report or on its website. The figures given here come from direct correspondence between Eneco and SOMO. Figure 6 shows the relative fuel mix of Eneco's installed capacity in 2008.

[61] Eneco website, Eneco, Organisatie, "Historie", no date, http://corporatenl.eneco.nl/Organisatie/historie/Pages/Default.aspx (15-07-09).
[62] Eneco website, Eneco, Organisatie, "Organigram", no date, http://corporatenl.eneco.nl/Organisatie/Pages/profiel_en_merkwaarden.aspx (15-07-09).

Figure 6: Fuel mix of Eneco's installed capacity in Europe, 2008[63]



Based on: Eneco[64]

Table 9 shows the absolute figures of Eneco's installed capacity in 2008. In May 2008, the company officially opened the windpark in the Anna Vosdijkpolder-Moggershilpolder, with an installed capacity of 15MW.[65] In June of the same year, the large off-shore windpark Amalia, near IJmuiden was opened, increasing the company's capacity with another 120MW of wind power.[66] The Pergen gas-fuelled combined heat and power plant also came into production, with a capacity attributable to Eneco of 250MW.[67]

Table 9: Fuel mix of Eneco's installed capacity and electricity generated in Europe, 2008

Fuel type	Installed capacity (MW)	Electricity generated (GWh)
Wind	900.0	1,500
Biomass	55.3	n/a
Solar	1.3	n/a
Natural gas (CHP)	1,100.0	8,000
Total	**2056.6**	**9,500**

Based on: Eneco[68]

[63] It should be noted that these figures are partially based on exclusive contracts Eneco has, and partially on generation capacity actually owned by the company.

[64] Eneco response to a draft version of this profile, email received 22-07-09.

[65] Eneco Press Release, "Opening windpark Anna Vosdijkpolder-Moggershilpolder", 09-05-08, http://corporatenl.eneco.nl/nieuws_en_media/Persberichten/Pages/OpeningwindparkAnnaVosdijkpolder-Moggershilpolder.aspx (15-07-09).

[66] Eneco Annual Report 2008, http://www.shareholder.com/visitors/DynamicDoc/document.cfm?DocumentID=2517&CompanyID=ENECO&PIN=757253952 (15-07-09), p.12.

[67] Eneco Annual Report 2008, http://www.shareholder.com/visitors/DynamicDoc/document.cfm?DocumentID=2517&CompanyID=ENECO&PIN=757253952 (15-07-09), p.28.

[68] Eneco response to a draft version of this profile, email received 22-07-09. No figures were given for the electricity generated from solar and biomass. However, since the installed capacity is so minor it is assumed that the figures for total electricity generated are not greatly affected by this omission.

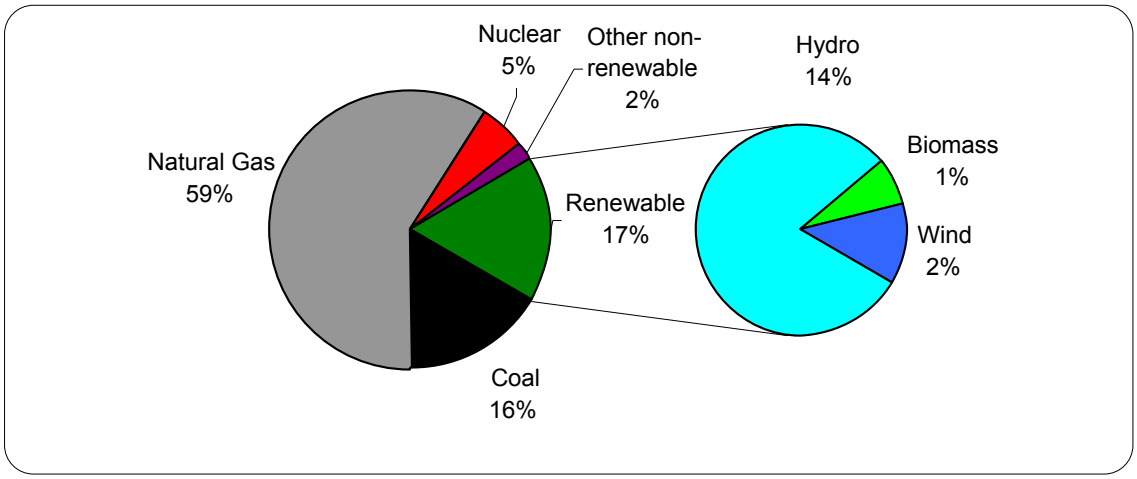
Eneco has developed a strategy that is also focused on a more decentralized form of electricity production. This strategy includes facilitating individual consumers to generate their own electricity through solar panels and CHP boilers. These are taken up as demand side initiatives in section 4.5.

It should also be noted that in June 2009 Eneco acquired portions of the Dutch sustainable energy company Econcern, including some of the company's wind and biomass facilities. Eneco has noted in a press release that "this takeover will result in a strengthening of Eneco's sustainability strategy", and has indicated to SOMO that it acquired a total of 61MW of existing wind capacity and "a few hundred MW of capacity to be developed".[69] Because this acquisition took place after the 2008 installed capacity fuel mix figures were published, the 61MW of Econcern wind capacity is included in section 4.4 below on Eneco's investments.

4.3 Electricity supplied in the Netherlands

As shown in Figure 7, the fuel mix of electricity supplied by Eneco is clearly less sustainable than that of its installed capacity. This is due to the fact that Eneco supplies much more electricity than it generates. The electricity that is not generated by the company itself is bought through its Trading business unit.

Figure 7: Fuel mix of electricity supplied by Eneco in the Netherlands, 2008



Based on: Eneco[70]

Table 10 presents the CO_2 emissions and radioactive waste production resulting from the generation of the electricity that Eneco supplies in the Netherlands.

[69] Eneco website, "Eneco neemt kern Econcern over", http://corporatenl.eneco.nl/nieuws_en_media/Persberichten/Pages/EneconeemtkernEconcernover.aspx (4-9-09); C. de Ruiter, Eneco spokesman, e-mail 10 September 2009.

[70] Eneco Annual Report 2008, http://www.shareholder.com/visitors/DynamicDoc/document.cfm?DocumentID=2517&CompanyID=ENECO&PIN=757253952 (15-07-09), p.27.

Table 10: Emissions and waste resulting from electricity supplied by Eneco, 2008

Indicator	Amount
CO_2 (g/kWh)	384
Radioactive waste (µg/kWh)	200

Based on: Eneco[71]

4.4 Investments in new generation capacity in Europe

Table 11 shows Eneco's investments in new capacity that are currently underway. It shows that the company is making some large investments in new gas-fuelled capacity, while it also aims to increase its wind capacity. A number of the projects mentioned here came into operation or were acquired in 2009, but were not yet taken up in the 2008 annual report.

Table 11: Eneco's investments in new generation capacity in Europe

Project name	Location	Fuel Type	Date in operation	Amount (million €)	Capacity (MW)	Project status
EnecoGEN[72]	Rotterdam Rijnmondgebied (NL)	Natural gas (CHP)	2011	750	435	Investments announced
Boterdorp[73]	Bergschenhoek (NL)	Gas (CHP)	2009	n/a	2	In operation
Tullow Wind Farm[74]	UK	Wind	2010	n/a	16	Project acquired
St. Antoinedijk[75]	Halderberge (NL)	Wind	2009	n/a	10	In operation
C-Power supply contract[76]	BE	Wind	2009	n/a	30	In operation
Econcern takeover	NL	Wind	2009	n/a	61	Project acquired
Tidal wave turbine[77]	Borssele (NL)	Hydro	2008	1 (jointly)	0.3	Under construction

[71] Ibid.

[72] Eneco has a 50% stake in the project. The figures on installed capacity are calculated on the basis that 50% of the capacity is attributable to Eneco; Eneco Press Release, "Enecogen gascentrale wordt realiteit", 26-05-09, http://corporatenl.eneco.nl/nieuws_en_media/Persberichten/Pages/Enecogengascentralewordtrealiteit.aspx (08-07-09); "Ruim baan voor groene stroom", Het Financieele Dagblad, 11 juli 2008.

[73] Eneco Press Release, "Warmte voor ruim 1000 woningen uit 1 centrale", 08-07-09, http://corporatenl.eneco.nl/nieuws_en_media/Persberichten/Pages/Warmtevoorruim1000woningenuit1centrale.aspx (09-07-09).

[74] Eneco Annual Report 2008, http://www.shareholder.com/visitors/DynamicDoc/document.cfm?DocumentID=2517&CompanyID=ENECO&PIN=757253952 (15-07-09), p.28.

[75] Eneco Press Release, "Eneco plaatst vijf windturbines in Halderberge", 07-10-08, http://corporatenl.eneco.nl/nieuws_en_media/Persberichten/Pages/EnecoplaatstvijfwindturbinesinHalderberge.aspx (08-07-09).

[76] Eneco Press Release, "C-Power gaat met Eneco in "zee"", 12-01-09, http://corporatenl.eneco.nl/nieuws_en_media/Persberichten/Pages/C-PowergaatmetEnecoin%E2%80%9Czee%E2%80%9D.aspx (08-07-09).

[77] "Getijdenturbine aan Total-steiger ", Provinciale Zeeuwse Courant, July 14, 2008; http://www.waterforum.net/index.asp?url=/template_a1.asp&que=paginanr=6798

Eneco has expressed its intent to increase the share of renewable energy it supplies by investing in new renewable capacity. The company aims to supply 20% renewable energy by 2012, and 70% by 2020.[78] Table 12 shows the investments Eneco has announced, but are not yet underway. A number of investment plans that were mentioned in the company's 2007 annual report, no longer feature in its 2008 annual report. There were also a number of investment plans mentioned in news report in 2008, after which no more recent information was found. It is unclear what the status of these plans are. These include the Blue Energy osmosis project on the Afsluitdijk, and the large windpark at the new Maasvlakte. A recent news item also reports that the company's application for a permit for a new off-shore windpark near Callantsoog has been denied.

Table 12: Eneco'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
24 biogas facilities[79]	Belgium (BE)	Biogas	n/a	n/a	64	Planning phase
Blue Energy	Afsluitdijk (NL)	Osmosis	n/a	n/a	200	Planning phase
Tweede Maasvlakte (NL)[80]	Maasvlakte (NL)	Wind	2013	100	n/a	Planning phase
North Sea Power[81]	Belgium	Wind	2011-2015	1,500	500	Awaiting permission
Q10 park[82]	North Sea (NL)	Wind	n/a	n/a	200	Awaiting permission
Callantsoog Noord[83]	Callantsoog (NL)	Wind	n/a	n/a	303	Permit denied

Eneco has also announced that it is bidding in the tender of the Crown Estate in the UK for the development of off-shore wind parks from 2015 on. However, no investment figures or estimated capacity has been announced yet.[84]

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[78] "Eneco: Groene ambities zwarte cijfers", FEM Business, 10 mei 2008.

[79] Eneco Annual Report 2008, http://www.shareholder.com/visitors/DynamicDoc/document.cfm?DocumentID=2517&CompanyID=ENECO&PIN=757253952 (15-07-09), p.32.

[80] "Groot windpark op nieuwe Maasvlakte", FEM Business, 10 mei 2008.

[81] Eneco Press Release, "C-Power gaat met Eneco in "zee"", 12-01-09, http://corporatenl.eneco.nl/nieuws_en_media/Persberichten/Pages/C-PowergaatmetEnecoin%E2%80%9Czee%E2%80%9D.aspx (08-07-09). The capacity is the average of the range of 400-600MW announced.

[82] Eneco Press Release, "Eneco dient aanvraag in voor snel te realiseren windpark Q10 in Noordzee", 13-11-08, http://corporatenl.eneco.nl/nieuws_en_media/Persberichten/Pages/EnecodientaanvraaginvoorsnelterealiserenwindparkQ10inNoordzee.aspx (08-07-09).

[83] Eneco Press Release, "Eneco vraagt vergunning voor bouw groot offshore windpark bij Callantsoog", 06-06-08, http://corporatenl.eneco.nl/nieuws_en_media/Persberichten/Pages/EnecovraagtvergunningvoorbouwgrootoffshorewindparkbijCallantsoog.aspx (15-07-09); Webregio website, "Geen turbines Eneco voor kust Callantsoog", 02-07-09, http://www.webregio.nl/noordkop/regionaalnieuws/artikel/219396/geen-turbines-eneco-voor-kust-callantsoog-callantsoog.aspx (15-07-09).

[84] Eneco Press Release, "Eneco maakt stappen met windenergie op zee", 13-03-09, http://corporatenl.eneco.nl/nieuws_en_media/Persberichten/Pages/Enecomaaktstappenmetwindenergieopzee.aspx (09-07-09).

4.5 Demand-side initiatives in the Netherlands

Eneco's demand-side initiatives include a number of individual generation products, as well as energy saving schemes:

- Eneco has developed a technology for micro combined heat and power (CHP) plants to be used by individual consumers to generate and use their own electricity.[85]
- Eneco has developed a technology for micro wind turbines to be used by individual consumers to generate and use their own electricity.[86]
- Eneco has developed a technology for micro solar panels to be used by individual consumers to generate and use their own electricity.[87]
- Eneco provides various services to stimulate consumption reduction by consumers. These include pre-paid meters, advice services, corporate CO_2 analyses, public awareness campaigns and various other schemes.[88]
- Eneco participates in the program 'Meer met Minder', a joint initiative by government, construction companies, and energy companies through which homeowners can evaluate how to lower their electricity costs.
- Eneco offers solar panels and boilers to its clients including advice, information about subsidies and installation.
- Eneco advises its clients about energy labels and provides official labels.
- Eneco compensates clients for energy that they produce themselves. Clients that have solar panels or boilers and produce more energy than they consume receive compensation for the energy that flows back into the electricity grid.[89]
- Eneco offers 'Ecogas', which gives consumers the possibility to compensate the CO_2 emissions of its gas consumption.

[85] Eneco website, Prive, Producten en Tarieven, Producten, "Elektriciteit en Ecostroom van Eneco", no date, http://prive.eneco.nl/producten_en_tarieven/producten/elektriciteit_algemeen.asp (14-07-09).
[86] Ibid.
[87] Ibid.
[88] Eneco website, Prive, "Besparen", no date, http://prive.eneco.nl/over_energie/over_energie_home.asp (14-07-09).
[89] Essent website, Thuis, Producten & Tarieven, "Teruglevering", no date, http://www.essent.nl/content/thuis/producten/elektriciteit/teruglevering/index.jsp (08-07-09).

5 E.ON

5.1 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.[90]

E.ON has six business units active in Europe. E.ON Energie, of which E.ON Benelux is a subsidiary, is active in generation and supply in the Central European market.[91] E.ON UK and E.ON Nordic have similar activities in their respective regions. Two new European business units were formed in 2008, both on a geographical basis: E.ON Spain, after the takeover of Viesgo and other Spanish power companies from Endesa in June 2008, and E.ON Italy, which controls the large generation portfolio previously owned by Endesa. 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., E.ON Energy Trading, and E.ON Ruhrgas.

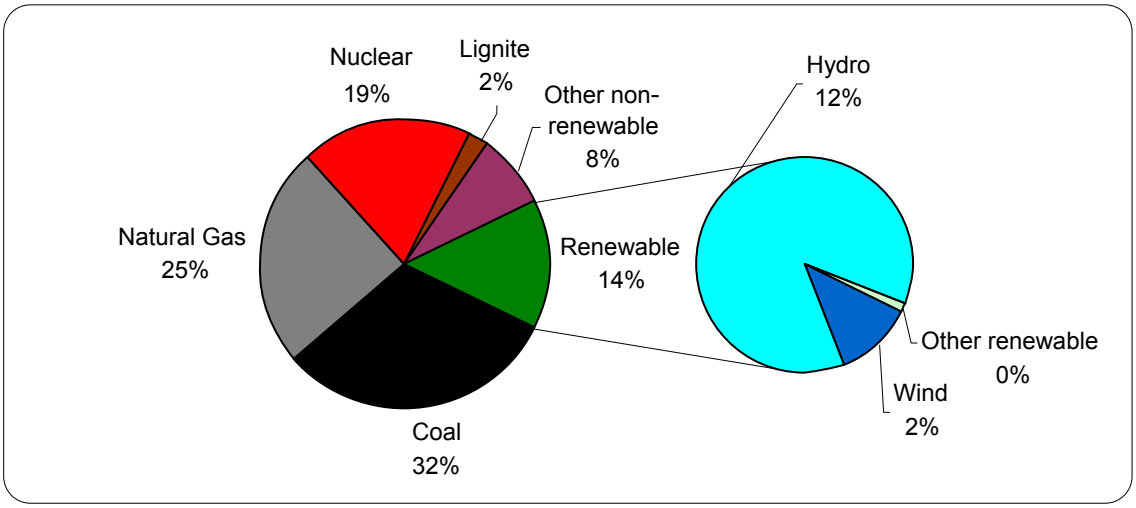
5.2 Installed capacity and electricity generation in Europe

Figure 8 reveals the fuel mix of E.ON's installed electricity generation capacity in Europe in 2008. E.ON has generation capacity in Bulgaria, the Czech Republic, Finland, France, Germany, Hungary, Italy, the Netherlands, Romania, Slovakia, Sweden, and the UK. E.ON's total generation capacity worldwide is approximately 74,366 MW. 12% of its generation capacity comes from renewable sources, primarily from large hydro-plants in Germany, Scandinavia, and Italy. In Europe, the generation capacity is 58,664 MW.

[90] It should be noted that E.On Benelux indicated its objections to the methodology used in this report. It felt that the focus on generation and supply in Europe and The Netherlands respectively, "fails to do justice to all of E.ON's worldwide efforts – including in the field of renewables"; E.ON Benelux response to a draft version of this report, email received 23-07-09.

[91] E.ON Annual Report 2008, p.42.

Figure 8: Fuel mix of E.ON's installed capacity in Europe, 2008



Based on: E.ON[92]

Table 13 lists the breakdown of E.ON's installed capacity per fuel type in Europe, for all business units that operate in Europe.

Table 13: Fuel mix of E.ON's installed capacity in Europe per business unit, in MW, 2008

	Central Europe	UK	Nordic	Italy	Spain	Climate & Renewables[93]	Total
Nuclear	8,548	0	2,593	0	0	0	11,141
Coal	10,180	4,910	0	1,904	1,433	0	18,427
Lignite	1,314	0	0	0	0	0	1,314
Natural gas	4,356	4,910	0	4,124	1,180	0	14,570
Other non-renewable	1,540	1,555	1,778	0	0	0	4,873
Hydro	2,811	0	2,758	1,007	669	0	7,245
Wind	0	0	0	0	0	1,005	1,005
Other renewable	0	0	0	0	0	89	89
Total	**28,749**	**11,375**	**7,129**	**7,035**	**3,282**	**1,094**	**58,664**

Based on: E.ON[94]

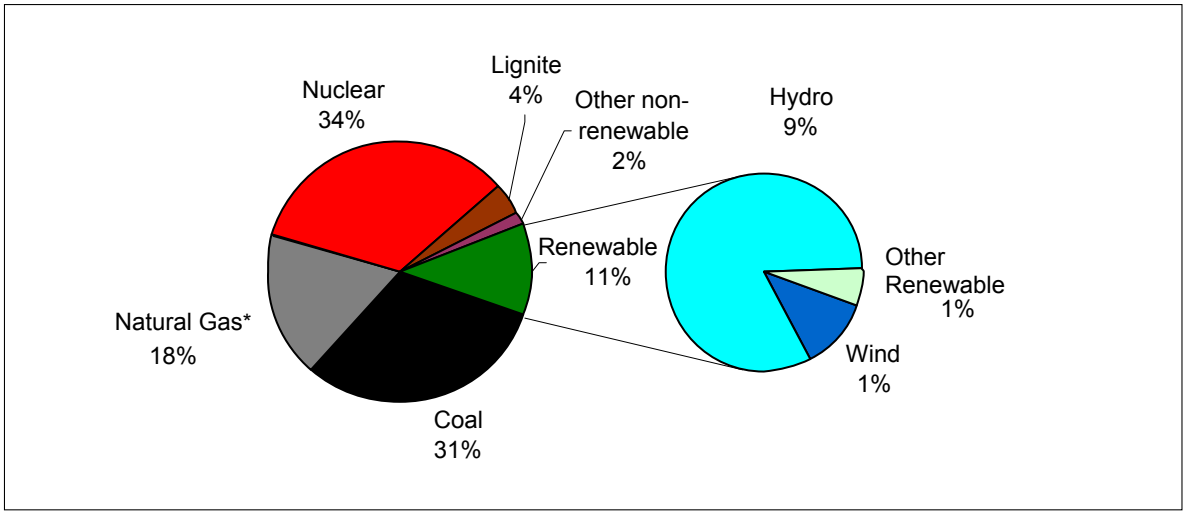
Figure 9 illustrates the fuel mix of electricity actually generated by E.ON in 2008. Interestingly, these figures differ significantly from the fuel mix of the company's installed capacity. Most notable is the fact relatively little electricity was generated from the natural gas and oil despite the company's installed capacity to do so, and that the relative share of electricity generated from nuclear energy is much larger than the relative share of capacity.

[92] E.ON Benelux response to a draft version of this report, email received 23-07-09 (referring to E.ON Strategy & Key Figures 2009 and E.ON Company Report 2008).

[93] The Climate & Renewables business unit operates in Europe and the United States. The figures given here are calculated by taking the total capacity figure (2,269MW) and deducting the US operations (1,175MW of wind power); E.ON website, Corporate, Group Structure, Climate & REnewables, "Generation Capacity", no date, http://www.eon.com/en/unternehmen/24559.jsp (28-07-09).

[94] E.ON Benelux response to a draft version of this report, email received 23-07-09 (referring to E.ON Strategy & Key Figures 2009 and E.ON Company Report 2008).

Figure 9: Fuel mix of electricity generated by E.ON in Europe, 2008



* Including fuel oil
Based on: E.ON[95]

Table 14: Fuel mix of electricity generated by E.ON in Europe per business unit, in GWh, 2008

	Central Europe	UK	Nordic	Italy	Spain	Climate & Renewables[96]	Total
Nuclear	62,062		15,100				77,162
Coal	45,388	19,799		2,850	1,599		69,636
Lignite	8,972						8,972
Natural gas (including oil)	9,503	19,972	1,400	7,752	1,755		40,382
Other non-renewable	3,346	619					3,965
Hydro	7,777		11,800	798	546		20,921
Wind						2,944	2,944
Other renewable	1,256					256	1,512
Total	**138,304**	**40,390**	**28,300**	**11,400**	**3,900**	**3,200**	**225,494**

Based on: E.ON[97]

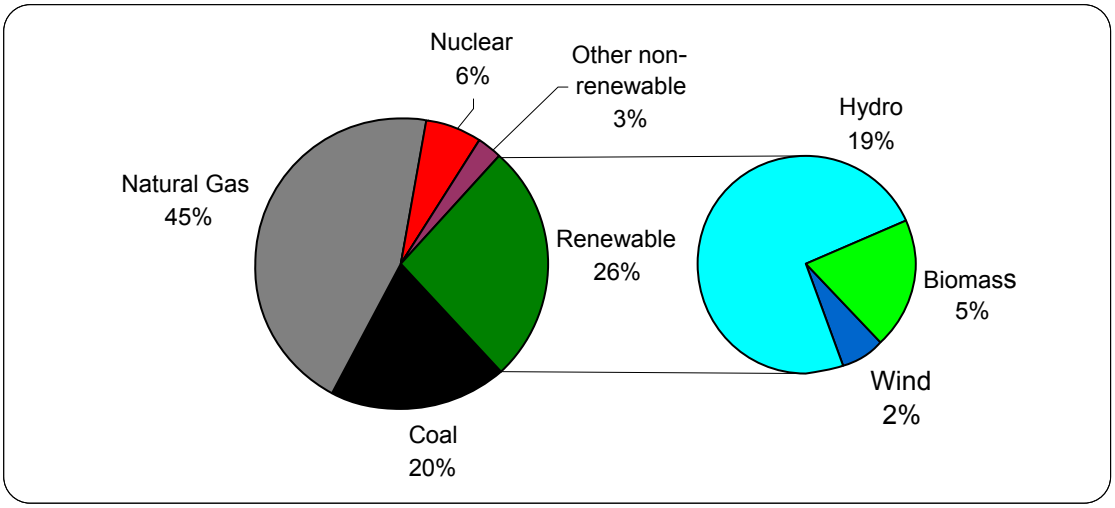
5.3 Electricity supplied in the Netherlands

Unlike the other companies in this fact sheet series, E.ON does not release any figures on electricity supplied only in the Netherlands. As a result, the figures for electricity supplied in this section are for E.ON Benelux, meaning that they represent the consolidated figures of electricity supplied throughout the Benelux region (i.e. Belgium, the Netherlands, and Luxemburg). It is likely, however, that the company's supply in the Netherlands is similar in fuel mix to its consolidated Benelux supply. Figure 10 shows the fuel mix of energy supplied by E.ON Benelux in the Netherlands, Belgium and Luxemburg. Table 15 presents the CO_2

[95] Ibid.
[96] It should be noted that no figures were available about the amount of electricity generated by the Climate & Renewables business unit in Europe. The figures given here also include the business unit's operations in North America.
[97] E.ON Benelux response to a draft version of this report, email received 23-07-09 (referring to E.ON Strategy & Key Figures 2009 and E.ON Company Report 2008).

emissions and radioactive waste resulting from the generation of the electricity that E.ON supplies in the Benelux region.

Figure 10: Fuel mix of electricity supplied by E.ON in Benelux, 2008



Based on: E.ON Benelux[98]

Table 15: Emissions and waste resulting from electricity supplied by E.ON in Benelux, 2008

Indicator	Amount
CO_2 (g/kWh)	362.5
Radioactive waste (µg/kWh)	187

Based on: E.ON Benelux[99]

5.4 Investments in new generation capacity in Europe

E.ON is expanding its generation capacity throughout Europe, mostly through the construction of new coal and natural gas plants and the updating of existing facilities. Three coal plants of similar size, and with a similar investment from E.ON, are currently under construction in Germany, Belgium, and the Netherlands. E.ON Energie is also investing in several natural gas plants in Germany and Hungary. Investments by other E.ON business units in Europe include three more natural gas plants in the UK, Spain, and Sweden, and a large off-shore wind park in the UK. A number of power plants that featured in last year's company profile have since come into operation, and are taken up in the calculations in Section 5.2.

In July 2009, GDF Suez announced a swap of production capacity with E.ON totalling approximately 1,700MW. Electrabel receives a share in the German coal plants in Farga

[98] E.ON Benelux website, Consumenten, Over Energie, "Stroometiket", http://www.eon-benelux.com/eonwww/publishing.nsf/AttachmentsByTitle/Stroometiket+2008/$FILE/Stroometiket+2008+-+Hoe+is+de+elektriciteit+van+EON+opgewekt.pdf (07-07-09).

[99] Ibid.

(350 MW) and Zolling (449 MW) and some smaller German biomass, hydro and oil plants.[100] Electrabel also receives a share in three German nuclear plants; Krümmel, Grundremmingen and Unterweser (700 MW). In exchange, Eon becomes the owner of the Belgian plants Vilvoorde (natural gas, 385 MW), and Langerlo (coal and biomass, 556 MW). Eon also receives a share in the Belgian nuclear plants Doel 1 (150 MW) Doel 2 (166 MW) and Tihange (184 MW). In addition, Eon receives 270 MW production capacity from 'classical' plants in the Netherlands.

Table 16 shows E.ON's investments in new capacity currently underway.[101]

Table 16: E.ON's investments in new generation capacity in Europe

Business unit	Location	Fuel Type	Date in operation	Amount (million €)	Capacity (MW)	Project status
E.ON Energie[102]	Datteln (DE)	Coal	2011	1,200	1,100	Under construction
E.ON Energie[103]	Rotterdam (NL)	Coal	2012	1,200	1,100	Under construction
E.ON Energie[104]	Antwerp (BE)	Coal	2014	1,500	1,100	Under construction
E.ON Energie[105]	Irsching 4 (DE)	Natural gas (CCGT)	2011	n/a	555	Under construction
E.ON Energie[106]	Irsching 5 (DE)	Natural gas (CCGT)	2009	450[107]	860	Under construction
E.ON Energie[108]	Gönyü (HU)	Natural gas (CCGT)	2010	400	430	Under construction
E.ON UK[109]	Isle of Grain (UK)	Natural gas (CCGT)	2010	580[110]	1,275	Under construction

[100] Flanders Investment & Trade, German concern Eon swaps capacity with number 1 player Electrabel, 18 December 2008, http://www.investinflanders.com/en/news_details/default.aspx?id=1b64dd58-f954-4173-9c03 87cad940206f&news=German+concern+E.ON+swaps+capacity+with+N%C2%B01+player+Electrabel&parent =af2ecb9b-ab1b42d4-acd9-7e377bcd80b8 (26-06-09).

[101] Not all figures for investment amounts and to-be installed capacity were found. E.ON indicated that "[E.ON] cannot provide more detailed information. This partly reflects the confidential nature of the operational data. At the same time, the project details could still be subject to change spurred by internal and external factors"; E.ON Benelux response to a draft version of this report, email received 23-07-09.

[102] E.ON Kraftwerke, „Datteln 4; Answers to your questions", no date, http://www.kraftwerk-datteln.com/pages/ekw_en/Datteln_Power_Plant/Media_Center/_documents/RZ_EKW28087_Datteln_engl.pdf (07-07-09).

[103] E.ON Press Release, "E.ON and Rotterdam Climate Initiative start joint development of CCS", 25-02-09, http://www.eon.com/en/presse/news-detail.jsp?id=9077&year=2009 (07-07-09).

[104] E.ON Kraftwerke, "A new state of the art coal fired power plant in Antwerp", Presentation to AHK debelux, 28 January 2009, http://www.debelux.org/fileadmin/user_upload/Aktuell/Praesentation_E_ON_fuer_debelux.pdf (07-07-09).

[105] E.ON Kraftwerke website, Innovation, Generation, New Power Plants, New Construction Projects, "Irsching is the Centre of European Combined Cycle Gas Turbine activities", no date, http://www.eon-kraftwerke.com/pages/ekw_en/Innovation/New_Power_Plants/New_Construction_Projects/_Kraftwerke_Irsching _4_und__5/index.htm (07-07-09).

[106] Ibid.

[107] Power-technology website, Projects, "Irsching Siemens Gas Turbine, Germany", no date, http://www.power-technology.com/projects/irsching/ (07-07-09).

[108] E.ON 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 (07-07-09).

E.ON Nordic[111]	Malmö (SE)	Natural gas (CCGT)	2009	300	440	Under Construction
E.ON Spain[112]	Bahia de Algeciras (ES)	Natural gas (CCGT)	2010	n/a	819	Under construction
E.ON Nordic[113]	Norrköpping (SE)	Waste	n/a	100[114]	n/a	Under construction
E.ON UK[115]	Blackburn Meadows (UK)	Biomass	2011	69[116]	25	'Pre-construction'
E.ON Nordic[117]	Kalmar (SE)	Biomass	2009	n/a	90[118]	Under construction
E.ON Climate & Renewables[119]	Thames estuary: London Array, (UK)	Wind	2013	2,200	1,000	'Pre-construction'
E.ON Climate & Renewables[120]	Robin Rigg (UK)	Wind	2009	400 (approx.)	180	Under Construction
E.ON Climate & Renewables[121]	Alpha Ventus (DE)	Wind	2009	66[122]	16[123]	Under construction
E.ON Climate & Renewables[124]	Rodsand 2 (DK)	Wind	2010	400	207	Under construction

Table 17 lists all announced investments that are not yet underway. These include more coal and natural gas plants, as well as E.ON's minority stake in Fennovoima, a company that is developing nuclear capacity in Finland.

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[109] E.ON UK website, Generation, Planning for the Future, Gas, "Grain CHP", no date, http://www.eon-uk.com/generation/grainCHP.aspx (07-07-09).
[110] Announced investment is given as GBP 500M. Conversion rates of 06-07-09 used, www.xe.com.
[111] E.ON Annual Report 2008, http://www.eon.com/en/investoren/19886.jsp (28-07-09), p.58.
[112] E.ON España website, Company, Generation, "Combined Cycle Plants", no date, http://www.eon-espana.com/cms/en/547.jsp (07-07-09).
[113] Ibid.
[114] E.ON, "Sustainable City Development", Presentation by Lars Frithiof, September 12, 2007 http://www.malmo.se/download/18.76b00688114b7562b52800024193/scd07_lars_frithiof.pdf (07-07-09).
[115] http://www.eon-uk.com/generation/1490.aspx
[116] Announced investment is given as GBP 60M. Conversion rates of 06-07-09 used, www.xe.com
[117] E.ON Annual Report 2008, http://www.eon.com/en/investoren/19886.jsp (28-07-09), p.57.
[118] CTS Engtec website, "Kalmar Energi Värme AB, Kalmar, Sweden, A new combined heat and power plant", no date, http://www.ctse.fi/references/process-industry/energy/82-kalmar-energi-vaerme-ab-kalmar-sweden-a-new-combined-heat-and-power-plant (07-07-09).
[119] http://www.eon.com/en/downloads/EON_Offshore_Factbook_June_2009_.pdf
[120] E.ON Climate & Renewables, "E.ON Offshore Wind Energy Factbook", June 2009 http://www.eon.com/en/downloads/EON_Offshore_Factbook_June_2009_.pdf (07-07-09).
[121] Ibid.
[122] Calculated on the basis of E.ON's 26.25% share of the total investments.
[123] Calculated on the basis of E.ON's 26.25% share of the installed capacity.
[124] E.ON Climate & Renewables, "E.ON Offshore Wind Energy Factbook", June 2009 http://www.eon.com/en/downloads/EON_Offshore_Factbook_June_2009_.pdf (07-07-09).

Table 17: E.ON's announced plans for investment in new generation capacity in Europe

Business unit	Location	Fuel Type	Date in operation	Amount (million €)	Capacity (MW)	Project status
E.ON Energie[125]	Stade (DE)	Coal	n/a	n/a	1,000	Awaiting permission
E.ON Energie[126]	Willem-shaven (DE)	Coal	2014	1,000	550	Final investment decision to be made in 2009
E.ON Energie[127]	Staudinger (DE)	Coal	2013	1,200[128]	1,100[129]	Planning phase
E.ON UK[130]	Kingsnorth (UK)	Coal	n/a	1,160[131]	1,600	Planning phase
E.ON Energie[132]	Lubmin (DE)	Natural Gas	n/a	n/a	600[133]	Final investment decision to be made in 2009
E.ON Energie[134]	Malzenice (SK)	Natural gas (CCGT)	2010	200	430	Construction will commence in 2010
E.ON UK[135]	Drakelow, Derbyshire (UK)	Natural gas (CCGT)	2017	n/a	1,220	Planning phase
E.ON Spain[136]	Solvay (ES)	Natural gas (CCGT)	2012	n/a	400	Planning phase

[125] E.ON Kraftwerke website, Innovation, Generation, New Power Plants, New Construction Projects, "New Coal-fired Power Station in Stade", no date, http://www.eon-kraftwerke.com/pages/ekw_en/Innovation/New_Power_Plants/New_Construction_Projects/_Steinkohlekraftwerk Stade/index.htm (07-07-09).

[126] E.ON Kraftwerke website, Innovation, Generation, New Power Plants, New Construction Projects, "The Project "Kraftwerk 50plus" in Wilhelmshaven", no date, http://www.eon-kraftwerke.com/pages/ekw_en/Innovation/New_Power_Plants/New_Construction_Projects/_Kraftwerk_Wilhelms haven/index.htm (07-07-09).

[127] E.ON Kraftwerke Staudinger website, "Allow Staudinger to Introduce Itself", no date, www.kraftwerk-staudinger.com (07-07-09).

[128] In joint venture with the municipality of Hannover; Bloomberg website, "E.ON Foe Sees `End of World' in Coal as Germany Shuns Reactors", 10-10-08, http://www.bloomberg.com/apps/news?pid=20601100&sid=aWt.P9MlfNS8&refer=germany (07-07-09).

[129] This is a replacement of olderblocks of the power plant with an unknown capacity.

[130] This investment will replace existing facilities at Kingsnorth. For more information, see http://www.eon-uk.com/generation/supercritical.aspx (07-07-09).

[131] Announced investment is given as GBP 1 billion. Conversion rates of 06-07-09 used, www.xe.com

[132] E.ON Kraftwerke website, Innovation, New Power Plants, New Construction Projects, "The new combined cycle power station in Lubmin", no date, http://www.eon-kraftwerke.com/pages/ekw_en/Innovation/New_Power_Plants/New_Construction_Projects/_Lubmin/index.htm (07-07-09).

[133] E.ON holds a 50% share of the 1,200 MW project.

[134] "E.ON to Build EUR 200 Million Plant in Slovakia", East Express, No.77, no date, http://amras.boerse-express.com:88/osteuropa/pdf/eastexpress812007.pdf (07-07-09).

[135] E.ON UK website, Generation, Planning for the Future, Gas, "Drakelow CCGT", no date, http://www.eon-uk.com/generation/drakelowccgt.aspx (07-07-09).

E.ON Nordic[137]	Fennovoima (FI)	Nuclear	2020	n/a	2,000[138]	Approval expected in 2010
E.ON Nordic[139]	Orebro	n/a	n/a	n/a	n/a	n/a
E.ON Nordic[140]	Stockholm	n/a	n/a	n/a	n/a	n/a
E.ON UK[141]	Portbury Dock, Bristol (UK)	Biomass	2014	347[142]	150	Planning phase
E.ON UK[143]	Butterwick Moor (UK)	Wind	n/a	7[144]	30	Planning phase
E.ON UK[145]	Humber Gateway (UK)	Wind	n/a	800[146]	300	Planning phase
E.ON UK[147]	Scarweather Sands (UK)	Wind	n/a	n/a	100	Announced
E.ON UK[148]	Aire and Calder (UK)	Wind	n/a	n/a	45	Planning phase
E.ON UK	Afton (UK)	Wind	n/a	n/a	74	Planning phase
E.ON UK	Auchencorth (UK)	Wind	n/a	n/a	45	Under appeal
E.ON UK	Blackstone edge (UK)	Wind	n/a	n/a	6.9	Planning phase
E.ON UK	Camster (UK)	Wind	n/a	n/a	50	Planning phase
E.ON UK	Chiplow (UK)	Wind	n/a	n/a	10	Planning phase
E.ON UK	Corriemoillie (UK)	Wind	n/a	n/a	45	Planning phase
E.ON UK	Dungavel (UK)	Wind	n/a	n/a	32.2	Planning phase
E.ON UK	Haswell Moor (UK)	Wind	n/a	n/a	12.5	Planning phase

[136] E.ON España website, Company, Generation, "Combined Cycle Plants", no date, http://www.eon-espana.com/cms/en/547.jsp (07-07-09).

[137] E.ON Annual Report 2008, http://www.eon.com/en/investoren/19886.jsp (28-07-09), p.57; Fennovoima Project website, no date, www.fennovoima.com (07-07-09).

[138] This is the average of the announced capacity of 1,500-2,500.

[139] E.ON Annual Report 2008, http://www.eon.com/en/investoren/19886.jsp (28-07-09), p.57.

[140] Ibid.

[141] E.ON UK website, Generation, Planning for the Future, Biomass, "Portbury Dock", no date, http://www.eon-uk.com/generation/1541.aspx (07-07-09).

[142] Announced investment in GBP 300M. Conversion rates of 06-07-09 used, www.xe.com.

[143] http://www.eon-uk.com/generation/butterwickmoor.aspx

[144] Announced investment is given as GBP 6M. Conversion rates of 06-07-09 used, www.xe.com

[145] All information for the on-shore wind parks comes from the E.ON UK website, but it is possible that these projects fall under the E.ON Climate & Renewables business unit.

[146] E.ON UK, Press Release, "E.ON submits planning application to build one of the UK's largest offshore wind farms off the Yorkshire coast, hopes for swift resolution to MoD objection", 07-04-08, http://www.eon-uk.com/downloads/Dc_-_Humber_Gateway_-_07_04_08.pdf (07-07-09). The announced investment is given as GBP 700 million. Exchange rates of 03-07-09 used, www.xe.com.

[147] E.ON UK website, Generation, "Scarweather Sands", no date, http://www.eon-uk.com/generation/scarweathersands.aspx (07-07-09).

[148] E.ON UK website, Generation, "Planning for the Future", no date, http://www.eon-uk.com/generation/planning.aspx (07-07-09). This reference valid for all E.ON UK entries in table below this note

E.ON UK	Kelmarsh (UK)	Wind	n/a	n/a	17.5	In development
E.ON UK	Lamonby (UK)	Wind	n/a	n/a	12.5	Planning phase
E.ON UK	Rosehall (UK)	Wind	n/a	n/a	22	Permits granted
E.ON UK	Great Eppleton Re-Power (UK)	Wind	n/a	n/a	12	Permits granted
E.ON UK	Tedder Hill (UK)	Wind	n/a	n/a	6.9	Planning phase
E.ON UK	Tweenbridge (UK)	Wind	n/a	n/a	66	'Public Enquiry'
E.ON UK	Cornwall (UK)	Tidal wave	n/a	n/a	5	Planning phase
E.ON Spain[149]	Murcia (ES)	Hydro	n/a	n/a	5	Planning phase

5.5 Demand-side initiatives in the Netherlands

As was the case in section 5.3 on electricity supplied, E.ON does not publish information on demand-side initiative solely in the Netherlands, but rather at the Benelux level. E.ON Benelux's demand-side initiatives in the Benelux include:

- E.ON Benelux owns Q-ENERGY, an energy advisory company that develops energy labels for homes. Costumers can request a calculation of the energy efficiency of their home, including the quality of their roof, floors, windows, etc.[150] Q-ENERGY also provides "energy performance advice", giving advice on investments for energy reductions.
- E.ON Benelux publishes a number of energy use reduction tips on its website.[151]
- E.ON Benelux participates in the program 'Meer met Minder', a joint initiative by government, construction companies, and energy companies through which homeowners can evaluate how to lower their electricity costs.

[149] E.ON España website, Company, Generation, Renewables, "Clean, inexhaustable and light energies", no date, http://www.eon-espana.com/cms/en/542.jsp (07-07-09).
[150] E.ON Benelux website, Over energie, "Energielabel", no date, <http://www.eon-benelux.com/eonwww/publishing.nsf/Content/Energielabel> (07-07-09).
[151] E.ON Benelux website, Over energie, "Handige besparingstips", no date, <http://www.eon-benelux.com/eonwww/publishing.nsf/Content/Handige_besparingstips> (07-07-09).

6 GDF Suez / Electrabel

6.1 Basic company information

GDF Suez was created in the merger between Suez and Gaz de France (GDF) that took place on 22 July 2008. The company is one of the leading energy providers in the world that is active across the entire energy value chain. GDF Suez holds major capacities in Europe, Latin America, Asia, the Middle East and North America. Its activities are divided into five operational business lines:[152]

- Energy France
- Energy Europe and International, consisting of:
  - Energy Benelux & Germany,
  - Energy Europe (the entire Europe including Russia, with the exception of France, Benelux and Germany),
  - Energy International (North America, Latin America, Asia and the Middle East).
- Global Gas & LNG
- Infrastructures
- Energy Services

In Europe, the Group is established in France, Benelux, Germany, United Kingdom, Norway, Switzerland, Russia, Poland, Romania, Hungary, Italy, Spain, Portugal, and Turkey.

Electrabel is part of GDF Suez, and is present in Belgium, France, Greece, Italy, Poland, Spain, Czech Republic, Germany, Hungary, Netherlands and Romania. Through its subsidiary Electrabel Nederland, Electrabel is currently the Netherlands' leading electricity producer, with a share of approximately 20% of the country's generating capacity. Its production is sold to industrial consumers and suppliers, and to the residential market under the Rendo Energy and Cogas Energy brands.[153]

6.2 Installed capacity and electricity generation in Europe

Figure 11 reveals the fuel mix of GDF Suez / Electrabel's electricity generation capacity in Europe in 2008. Worldwide, GDF Suez / Electrabel is the 10th largest producer of electricity and has the capacity to produce 68.4 GW of power.[154] 15 GW, or 22% of this generation capacity exists of renewable sources of energy for electricity generation. In Europe, the total generation capacity is 37.8 GW, 55% of GDF Suez / Electrabel's worldwide capacity.[155]

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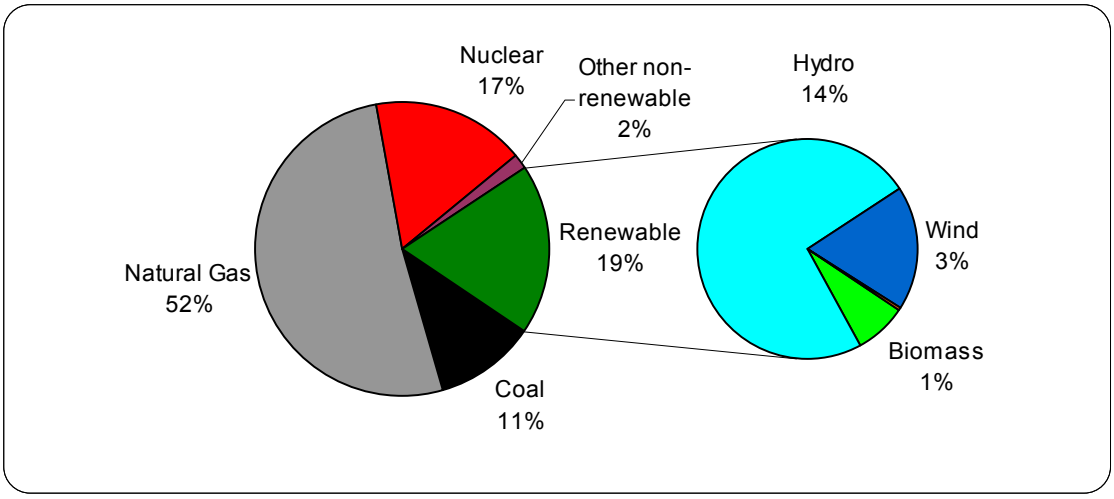
[152] GDF Suez website, Group, "Operational organization", http://www.gdfsuez.com/en/group/operational-organization/operational-organization/ (15-06-09).

[153] GDF Suez Reference Document 2008, p. 62, http://www.gdfsuez.com/document/?f=files/en/gdf-suez-ddr08-vus-interactif.pdf(25-06-09).

[154] GDF Suez Reference Document 2008, p. 41, http://www.gdfsuez.com/document/?f=files/en/gdf-suez-ddr08-vus-interactif.pdf(15-06-09).

[155] W. Wolters, Manager Strategy & Regulatory Affairs, Electrabel Nederland, e-mail 06 July 2009.

Figure 11: Fuel mix of GDF Suez / Electrabel's installed capacity in Europe, 2008



Based on: GDF Suez[156]

Table 18 gives the absolute figures of the installed capacity of GDF Suez / Electrabel.

Table 18: Fuel mix of GDF Suez / Electrabel's installed capacity in Europe, 2008

Fuel type	Capacity (MW)
Coal	4,161.7
Natural Gas	19,598.0
Nuclear	6,356.1
Other non-renewable	643.2
Biomass	529.7
Wind	1,286.4
Hydro	5,221.1
Other renewable	37.8
Total	**37,834.0**

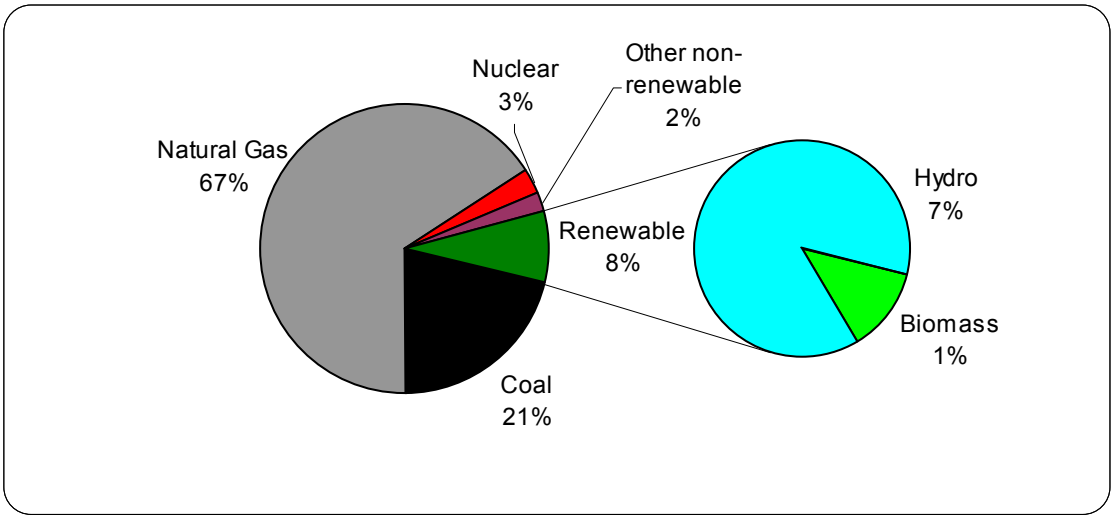
Based on: GDF Suez[157]

6.3 Electricity supplied in the Netherlands

In the Netherlands, production is sold to industrial consumers and suppliers under the name Electrabel. Until 2009, Electrabel sold energy on the residential market under the Rendo Energy and Cogas Energy brands. Since 1 February 2009, energy is sold to households solely under the name Electrabel. Figure 12 shows the fuel mix of energy supplied by Electrabel in the Netherlands.

[156] Ibid.
[157] Ibid.

Figure 12: Fuel mix of electricity supplied by Electrabel in the Netherlands, 2008



Based on: Electrabel[158]

Table 19 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 19: Emissions and waste resulting from electricity supplied by GDF Suez / Electrabel in the Netherlands, 2008

Indicator	Amount
CO_2 (g/kWh)	472
Radioactive waste (µg/kWh)	102

Based on: Electrabel[159]

6.4 Investments in new generation capacity in Europe

Table 20 indicates the projects GDF Suez is currently developing in Europe. GDF Suez has a electricity generation capacity of 68.4 GW worldwide. The Group's objective is to increase its industrial development through a major investment program of €30 billion for the period 2008-2010. In 2008, the net investment was € 11.8 billion, of which €1 billion was invested in renewable energy.[160] The goal is to reach a production capacity of 100 GW by 2013, of which more than 10 GW would be in France, mainly in renewable energy (hydraulic, wind, biomass and solar), nuclear power and natural gas plants.[161]

In addition to the investments explained in Table 20 and Table 21, GDF Suez is upgrading the Gelderland power plant in Nijmegen. This investment will increase the biomass co-fired capacity to 150 MW. However, the total capacity of the primarily coal-based power plant is

[158] Electrabel website, Thuis, Producten, "Stroometiket", GDF Suez Stroometiket 2008, http://www.electrabel.nl/Thuis/Producten/Stroometiket.aspx (15-06-09) & Website Groenestroomjagraag, Stroometiketten,"Electrabel", http://www.groenestroomjagraag.nl/stroometiket/electrabel (15-06-09).
[159] Ibid.
[160] GDF Suez Activities and Sustainable Development Report 2008, http://www.gdfsuez.com/document/?f=files/en/gdfsuezradd08-vus.pdf (23-06-09).
[161] GDF Suez Reference Document 2008, p. 50, http://www.gdfsuez.com/document/?f=files/en/gdf-suez-ddr08-vus-interactif.pdf(15-06-09).

602 MW and will remain unchanged. For this reason the investment is not included in the table below.

In July 2009, GDF Suez announced a swap of production capacity with E.ON totalling approximately 1,700MW. Electrabel receives a share in the German coal plants in Farga (350 MW) and Zolling (449 MW) and some smaller German biomass, hydro and oil plants.[162] Electrabel also receives a share in three German nuclear plants; Krümmel, Grundremmingen and Unterweser (700 MW). In exchange, E.ON becomes the owner of the Belgian plants Vilvoorde (natural gas, 385 MW), and Langerlo (coal and biomass, 556 MW). E.ON also receives a share in the Belgian nuclear plants Doel 1 (150 MW) Doel 2 (166 MW) and Tihange (184 MW). In addition, E.ON receives 270 MW production capacity from 'classical' plants in the Netherlands. Again, as these developments do not constitute investments in new capacity, these are not included in Table 20 below.

Table 20: GDF Suez / Electrabel's investments in new generation capacity in Europe

Project name	Location	Fuel Type	Date in operation	Amount (million €)	Capacity (MW)	Project Status
Power Plant Wilhelmshaven	Wilhelmshaven (DE)	Coal	2012	1,000	707[163]	Under construction[164]
Power Plant Maasvlakte	Rotterdam (NL)	Coal and Biomass	2013	1,200	800	Under construction[165]
Power Plant Romania	Constanta (RO)	Coal and Biomass	n/a	2,400	1,600	Suspended indefinitely because of financial crisis[166]
Cycofos	Fos-sur-Mer (FR)	Natural gas (CCGT)	n/a	n/a	484	Test phase
CombiGolfe	Fos-sur-Mer (FR)	Natural gas (CCGT)	2010	270	425	Under construction
Montoir	Montoir de Bretagne (FR)	Natural gas (CCGT)	2010	n/a	435	Under construction
Flevo	Lelystad (NL)	Natural gas (CCGT)	2010	n/a	872	Under construction
Amercoeur	Charleroi (BE)	Natural gas (CCGT)	2009	150	290[167]	Under construction[168]

[162] Flanders Investment & Trade, German concern Eon swaps capacity with number 1 player Electrabel, 18 December 2008, http://www.investinflanders.com/en/news_details/default.aspx?id=1b64dd58-f954-4173-9c0387cad940206f&news=German+concern+E.ON+swaps+capacity+with+N%C2%B01+player+Electrabel&parent=af2ecb9b-ab1b42d4-acd9-7e377bcd80b8 (26-06-09).

[163] GDF Suez Activities and Sustainable Development Report 2008, p.48, http://www.gdfsuez.com/document/?f=files/en/gdfsuezradd08-vus.pdf (23-06-09).

[164] Electrabel Press Release, Electrabel Suez Group power plant in Wilhelmshaven gets the go-ahead, 16 June 2008, http://hugin.info/133965/R/1229525/261034.pdf (16-06-09).

[165] Electrabel, Electrabel start bouw in Rotterdam, 22 June 2009, http://www.electrabel.nl/Nieuwsberichten/Electrabel-start-bouwcentrale-in-Rotterdam.aspx (24-06-09).

[166] Business Week, Electrabel SA to Suspend Two Investment Projects, 3 May 2009, http://investing.businessweek.com/research/stocks/private/snapshot.asp?privcapId=874639 (24-06-09).

[167] From 130 MW to 420 MW.

[168] Electrabel, "Electrabel invests €150 million in the Amercoeur (Belgium) power station", 14 November 2005, http://www.suezenergyna.com/press/documents/ElectrabelAmercoeur20051114.pdf (21-07-08).

Degussa	Antwerp (BE)	Natural gas (CHP)	Mid 2010	22.5[169]	21[170]	Under construction[171]
Lanxess	Zwijndrecht (BE)	Natural gas (CHP)	2009	60[172]	58	Under construction
Sidmar	Gent (BE)	Natural Gas (furnace and convection gas)	April 2010	n/a	305	Pre construction phase
Second EPR reactor, in partnership with EDF	Penly site, Normandy (FR)	Nuclear	2017 (construction starts in 2012)	n/a	675[173]	Pre construction phase[174]
Units 3 and 4 (Candu6 reactors)	Cernavoda (RO)	Nuclear	Unit 3: 2014 Unit 4: 2015	4,000[175]	1,500 [176]	Under construction[177]
Doel 4	Doel (BE)	Nuclear	n/a	n/a	30	Under construction
Doel 1	Doel (BE)	Nuclear	n/a	n/a	40	Under construction
Tihange 3	Tihange (BE)	Nuclear	n/a	n/a	30	Under construction
Deux Côtes project	Bay of Somme (FR)	Wind	n/a	n/a	705	Under development
Wind Farm Eemshaven	Groningen (NL)	Wind	April 2009	n/a	27	Operational[178]
Scotia Wind Craigengelt Limited Wind Park	South-west of Stirling (GB)	Wind	2010	n/a	24	Pre construction phase
Wind Farm Generg	Portugal (PT)	Wind	2011	n/a	240[179]	Under development
Trapani Salemi	Sicily (IT)	Wind	October 2009	n/a[180]	66[181]	Under construction[182]

[169] The power plant will be build in cooperation with E.ON. The two companies will jointly invest € 45 million.
[170] 50/50 joint venture for Electrabel and Eon. The total output capacity is 42 MW.
[171] Thomson Reuters, "Suez, E.ON to build Belgian power plant for Degussa", 11 September 2007, http://uk.reuters.com/article/oilRpt/idUKL1184194320070911 (21-07-08).
[172] The power plant will be build in cooperation with Lanxess Rubber. The two companies will jointly invest € 60 million.
[173] The total capacity is 2700 MW. GDF Suez has 33.33% share. GDF SUEZ and Total agreed on a partnership agreement with respective stakes of 75% and 25% to jointly own this stake.
[174] Reuters, GDF Suez and total team up for the EPR project in Penly, 4 May 2009, http://www.reuters.com/article/pressRelease/idUS163718+04-May-2009+BW20090504 (29-06-09).
[175] The amount of EUR 4 billion is financed by all project partners: Electrabel, Nuclearelectrica, ArcelorMittal Galati, CEZ, Enel, Iberdrola and RWE, under the name EnergoNuclear.
[176] Construction takes place along with other European partners; Nuclearelectrica, ArcelorMittal Galati, CEZ, Enel, Iberdrola and RWE, under the name EnergoNuclear.
[177] Banktrack, Dodgy deals, Cernavoda Nuclear Units 3 & 4 Romania, 8 June 2009, http://www.banktrack.org/show/dodgydeals/cernavoda_nuclear_units_3_4 (23-06-09).
[178] Eemshaven info, Windpark Eems geopend, 20 April 2009, http://www.eemshaven.info/nieuws.html (21-07-08)
[179] Owned by a group of companies.
[180] Electrabel took a 90 % shareholding in the company WindCo which is developing a 66 MW wind farm in Sicily.
[181] Energy Business Review, "vestas receives 66 MW wind turbine order for Windco's Sicily project", 20 June 2008, http://www.energy-business-review.com/article_news.asp?guid=0893CF54-6EFB-40CF-B7FC-252CB0EEFBBA (21-07-08).

Purchase Repower	Germany (DE)	Wind	Between 2009 and 2011	n/a	500[183]	Purchase (completed)[184]
Büllingen	Büllingen (BE)	Wind	n/a	14	12	Under construction[185]
Ford	Genk (BE)	Wind	n/a	7	4	Under construction[186]
Winds mills next to E40	Sint-Truiden (BE)	Wind	2010	110	40-50	Pre construction phase[187]
Solar panel projects in cooperation with Beaulieu, Delhaize, Sloen, Volvo	BE	Solar	n/a	n/a	3	Under construction
Photovoltaic solar project Generg	Portugal (PT)	Solar	n/a	n/a	16	Under construction

Based on: GDF Suez[188]

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

Table 21: GDF Suez / Electrabel'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[189]	n/a	800	Planning phase[190]
Power plant Stade	Stade (DE)	Coal	n/a[191]	n/a	800	Planning phase[192]

[182] Vestas, Vestas receives order for 66 MW in Italy, 18 June 2008, http://www.vestas.com/files//Filer/EN/Investor/Company_announcements/2008/080618-MFKUK-31.pdf (13-08-08)

[183] Please note that this is only a procurement contract for windturbines. These will have to be installed in projects that are still under development (E-mail W. Wolters, Manager Strategy & Regulatory Affairs, Electrabel Nederland, 6 July 2009).

[184] Electrabel koopt 250 winturbines (500 MW) van het Duitse repower, 29 February 2008, https://mm.mailing electrabel.nl/35/pages/website/newsitemarchive.asp?id=2474&zoekid=13980 (29-06-09).

[185] Envirodesk, "Electrabel investeert in windturbines te Büllingen", no date, http://www.laatjebouwen.com/nieuws/bed-prod/bed-prod-item.asp?nieuws_id=29 (21-07-08).

[186] Elecetrabel, Electrabel bouwt windturbines bij Belgische Ford fabriek, 13 May 2009, https://mm.mailing-electrabel.nl/35/pages/website/newsitemarchive.asp?id=4715&zoekid=14008 (29-06-09).

[187] Electrabel, Sint-Truiden: Investering EUR 8 mln in windmolempark Electrabel langs E40, 19 September 2008, https://mm.mailing-electrabel.nl/35/pages/website/newsitemarchive.asp?id=3415&zoekid=13976 (29-06-09).

[188] Electrabel Activities Report 2007, http://www.electrabel.com/assets/content/whoarewe/rac_2007_en_53CEDF261CAB4D3BA93D4199522919B0.pdf, GDF Suez Activities and Sustainable Development Report 2008, http://www.gdfsuez.com/document/?f=files/en/gdfsuezradd08-vus.pdf, GDF Suez Reference Document 2008, http://www.gdfsuez.com/document/?f=files/en/gdf-suez-ddr08-vus-interactif.pdf (24-06-09).

[189] 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).

[190] Tractabel Engineering, Voornaamste referenties, "Superkritische steenkoolcentrales Wilhelmshaven en Brunsbuttel", no date, http://nl.tractebel-engineering.com/power/references (24-06-09).

Repowering of Units 1 & 2 at Vado Ligure	Vado Ligure (IT)	Coal	n/a	n/a	630[193]	n/a[194]
Power Plant Poland	Gdansk (PO)	Coal and Biomass	n/a[195]	2,000	1,600[196]	Planning phase
Ploufragan Côtes-d'Armor	Bretagne (FR)	Natural gas (CCGT)	n/a	n/a	n/a	Planned, pending administrative approval
Repowering Dunamenti	Szazhalombatta (HU)	Natural gas (CCGT)	n/a	170	200[197]	Feasibility study[198]
One or more gas fired plants	Site to decide: Schwandorf/ Calbe/ Stassfurt (DE)	Natural gas (CCGT)	n/a	500	800 each[199]	Feasibility study[200]
Morata de Tajuña	Morata de Tajuña (ES)	Natural gas (CCGT)	n/a	500	1200	Planning phase, permissions granted[201]
Pontinia	Pontinia, Italy	Natural Gas (CCPP)	2008	0.22	376	Feasibility Study[202]
Borealis	Antwerp (BE)	Natural Gas (CHP)	2011	n/a	44[203]	Planning phase[204]
Third EPR reactor	France (FR)	Nuclear	n/a	n/a	n/a	Candidate[205]

[191] 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).
[192] Reuters, TABLE-New power station projects in Germany, 20 November 2008, http://in.reuters.com/article/oilRpt/idINLJ15058220081120 (24-06-09).
[193] Unit 1 is repowered into a 800 MW combined cycle power plant. Unit 2 is repowered into a 460 MW ultrasupercritical coal-fired unit. Ownership: 50% Tirreno Power, 50% Electrabel.
[194] Tractabel, References, Thermal Power, Repowering van eenheden 1&2 van Vado Ligure, http://nl.tractebelengineering.com/power/references/(service)/4 (30-06-09).
[195] Completion was planned for end 2012, but this announcement has been taken back (E-mail W. Wolters, Manager Strategy & Regulatory Affairs, Electrabel Nederland, 6 July 2009).
[196] Central Europe Energy Weekly, "Belgian energy company Electrabel plans to invest EUR 2.5 bln in Poland", 29 September 2007.
[197] Increase form 240 to 400 MW.
[198] Tractabel Engineering, Voornaamste referenties, "Tweede repowering van Dunamenti", no date, http://nl.tractebel-engineering.com/power/references (24-06-09).
[199] Electrabel, "Electrabel prüft bau von gaskraftwerken in Deutschland", 23 January 2008, http://hugin.info/133965/R/1184911/237016.pdf (21-07-08).
[200] Electrabel, Electrabel considers constructing natural gas power plants in Germany, http://www.electrabel.com/newsroom/pressreleases_new_en.aspx?id=2008012301 (24-06-09).
[201] Electrabel Spain website, Our offer, Generation, "Morata", no date, http://www.electrabel.es/content/corporate/aboutelectrabel/morata_en.asp (21-07-08).
[202] Tractabel, Pontinia (Latina) CCPP Feasibility Study, no date, http://www.tractebel-engineering.it/var/plain_site/storage/original/application/7b2a86788971f971597817fde08a915e.pdf (29-06 09).
[203] Partnership with Eon.
[204] Greenpeace, Gerealiseerde en geplande nieuwe capaciteit voor de productie van elektriciteit in Belgie¨(2003-2011), no date, http://www.greenpeace.org/raw/content/belgium/nl/press/reports/het-licht-zal-niet-uitgaan.pdf (29-06-09).

2 new nuclear power stations in the UK, in partnership with Iberdrola and SSE	United Kingdom	Nuclear	2020	n/a	n/a	Examining opportunities for potential sites[206]
Gaya project (R&D)	n/a	Biomass	Construction in 2009	n/a	n/a	Financing phase
Dour Extension	Dour-Quiévrain (BE)	Wind	n/a	n/a	4	Planning phase
La Roche	La Roche (BE)	Wind	n/a	n/a	12	Planning phase
Zeebrugge	Zeebrugge (BE)	Wind	n/a	n/a	4	Planning phase
Blue4Power I, zone I and II	North Sea (BE)	Wind	2012	n/a	n/a	Awaiting concession granting
Modave	Liège (BE)	Wind	2011	16	8-12	Planning phase[207]
Wind mills on land, in cooperation with Arcadis	The Netherlands (NL)	Wind	n/a	n/a	n/a	Planning phase[208]
Mol	Mol (BE)	Wind	n/a	n/a	n/a	Feasibility study completed, construction permit request[209]
Wind Farm Poland	North of Poland (PO)	Wind	2012	500	100	n/a[210]
Dour-Quiévrain	Dour-Quiévrain (BE)	Wind	n/a	n/a	4	Planning phase
Wind Farm Belgium	Site to decide (BE)	Wind	n/a	n/a	100	n/a
Bollène	Bollène (FR)	Wind	n/a	n/a	9	n/a
Wind Farm France	Site to decide (FR)	Wind	n/a	n/a	300	n/a
Wind Farm Italy	Site to decide (IT)	Wind	n/a	n/a	50	n/a
Belwind	Offshore	Wind	n/a	n/a	330	Interested in

[205] Bloomberg, EDF Beats GDF Suez to Build New Reactor in France (Update4), 30 January 2009, http://www.bloomberg.com/apps/news?pid=20601072&sid=a5v9iCKYd3OA&refer=energy (29-06-09).
[206] GDF Suez, GDF Suez, Iberdrola and SSE consortium reasserts its nuclear ambitions in the UK, 29 April 2009, http://www.gdfsuez.com/en/news/press-releases/press-releases/?communique_id=1028 (16-06-09).
[207] Electrabel, Electrabel investeert in windenergie in Modave, 26 January 2009, http://www.electrabel.com/newsroom/pressreleases_new.aspx?id=1284925 (29-06-09).
[208] Electrabel, Samenwerking met Arcadis voor bouw windmolens op land, 26 May 2009, http://www.electrabel.nl/Nieuwsberichten/Samenwerking-met-Arcadis-voor-bouw-windmolens-op-land.aspx (29-06-09).
[209] Electrabel, Electrabel plant windmolenpark in Mol, 16 January 2009, https://mm.mailingelectrabel.nl/35/pages/website/newsitemarchive.asp?id=4081&zoekid=9896 (29-06-09).
[210] Electrabel. Electrabel mikt op verdere groei in Polen, 25 September 2007, https://mm.mailingelectrabel.nl/35/pages/website/newsitemarchive.asp?id=1775&zoekid=13980 (29-06-09).

	Belgian coast (BE)					participation in project[211]
Photovoltaic France	Site to decide (FR)	Solar	n/a	n/a	220	n/a
Hydroelectric power station France	Site to decide (FR)	Hydro	n/a	n/a	50	n/a
Hydroelectric power station IT	n/a (IT)	Hydro	n/a	n/a	10[212]	n/a

Based on: GDF Suez[213]

6.5 Demand-side initiatives in the Netherlands

Demand-side initiatives undertaken by GDF Suez / Electrabel through its Dutch subsidiary Electrabel Nederland include:

- Electrabel Nederland offers a number of energy saving tips on its website, and provides links to other websites about energy saving. [214]
- Electrabel Nederland advises its clients on possibilities to lower the energy costs, among others by way of Energy Kronos, Energy Scan, Factuur Scan and Foto Scan. Electrabel Nederland charges costumers for this service.[215]
- Electrabel Nederland advises its clients on environmental permits and subsidies concerning energy. Electrabel Nederland charges costumers for this service.[216]
- Electrabel Nederland advises its clients about the installation of solar panels and wind mills.[217]
- Electrabel offers its clients the possibility to compensate CO2 emissions of their energy consumption.[218]
- Electrabel organises a debate on Energy Efficiency where business clients can get information on the newest technologies and possibilities in the field of sustainable energy.[219]

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[211] Electrabel**,** Electrabel België aast op deelname in Belwind, tweede offshore windmolenpark van België, 22 January 2009, https://mm.mailing-electrabel.nl/35/pages/website/newsitemarchive.asp?id=4105&zoekid=13994 (29-06-09).

[212] Ownership Tirreno Power (50% ElectrabelAcea).

[213] Electrabel Activities Report 2007, http://www.electrabel.com/assets/content/whoarewe/rac_2007_en_53CEDF261CAB4D3BA93D4199522919B0.pdf, GDF Suez Activities and Sustainable Development Report 2008, http://www.gdfsuez.com/document/?f=files/en/gdfsuezradd08-vus.pdf, GDF Suez Reference Document 2008, http://www.gdfsuez.com/document/?f=files/en/gdf-suez-ddr08-vus-interactif.pdf (24-06-09).

[214] Electrabel website, Thuis, Service, "energiebesparende tips", no date, http://www.electrabel.nl/Thuis/Service/Energie_besparen/Tips.aspx (29-06-09). For business clients, there are also 'Energiebesparende tips' and links available on the website of Electrabel.

[215] Electrabel website, Zakelijk, Midzakelijk, Advies,"Energie- en kostenbesparing", no date, http://www.electrabel.nl/Zakelijk/Midzakelijk/Advies/Energie-en-kostenbesparing.aspx (22-07-08).

[216] Electrabel website, Zakelijk, Midzakelijk, Advies,"Milieuvergunningen en subsidies", no date, http://www.electrabel.nl/Zakelijk/Midzakelijk/Advies/Milieuvergunningen-en-subsidies.aspx (22-07-08).

[217] Electrabel website, Zakelijk, Duurzaam, Duurzaam advies, "duurzame energie opwekken", http://www.electrabel.nl/Zakelijk/Duurzaam/Duurzaam-advies/Duurzame-energie-opwekken.aspx (29-06-09).

[218] Electrabel website, Zakelijk, Duurzaam, Duurzaam advies, "Compensatie CO2", http://www.electrabel.nl/Zakelijk/Duurzaam/Duurzaam-advies/Compensatie-CO2.aspx (29-06-09).

[219] Electrabel website, Zakelijk, Duurzaam, "Energy Efficiency Congres and Debat 2009", http://www.electrabel.nl/Zakelijk/Energy-Efficiency.aspx (29-06-09).

- Electrabel participates in the program ‘Meer met Minder’, a joint initiative by government, construction companies, and energy companies through which homeowners can evaluate how to lower their electricity costs.

7 RWE / Essent

7.1 Basic company information

Essent
Essent is a Dutch energy company that supplies electricity, gas, and heat to households and business clients. Essent was formed in 1999 through a merger between PNEM/Mega Groep and the Edon Groep. The company considers the Netherlands as its home market, but has also built up a considerable market position in Germany and is increasingly active in Belgium. Essent supplies energy to some 2.6 million clients and gas to around two million clients in the Netherlands. In terms of turnover, Essent is the market leader in the Dutch energy market. In addition, Essent is the biggest producer of green power and has the most green power clients in the Netherlands.

On January 1 2009, Essent divested from its grid distribution activities, in order to meet the new unbundling law. These activities were housed under the new company Enexis. As of July 1 2009, the divestment of Essent from Enexis was legally completed. Essent owns 50% of NV EPZ, which exploits the nuclear power plant at Borssele, as well as 51% of SWB AG in Germany.

RWE
RWE currently has no generation operations in the Netherlands, but it is examined here because it is likely to become a major player in the Dutch power sector in the near future due to planned investments in large electricity plants in the country, and because of the acquisition of the Dutch power company Essent. Furthermore RWE Energy, RWE's electricity and gas supplier, is active in the Dutch supply market.

RWE generates power through three business units: RWE Power, RWE npower and RWE Innogy. RWE Power encompasses RWE's continental European power generation activities (with the exception of energy from renewables), including lignite mining. In 2008, the company had access to an installed capacity of about 33 GW. RWE npower is responsible for power generation (with the exception of energy from renewables) as well as electricity and gas supply in the UK. The company has an installed capacity of roughly 10 GW and intends to continue growing. RWE Innogy has been in charge of nearly all renewable activities since February 2008. The division focuses on wind, hydropower, and biomass and has an installed capacity of 1.2 GW. In addition to its RWE Power, RWE npower and RWE Innogy subsidiaries, the RWE Group's other market units include RWE Dea (oil and gas production), RWE Energy (sales and grid), and RWE Supply & Trading (energy trading).[220]

Acquisition
On 23 June 2009, RWE received approval from the European Commission for the acquisition of Essent, and the takeover was completed on 1 October 2009. As part of RWE AG, Essent is no longer a shareholder in NV EPZ. BU Essent Milieu (a waste management operation) is also no longer part of Essent, but will operate under the name of Attero. Both

[220] RWE Annual Report 2008, http://www.rwe.nl/documents/Annual%20report%202008%20RWE%20AG.pdf (10-07-09).

Attero and Enexis (previously BU Essent Netwerk) remain under ownership of Essent's former public shareholders: a collection of Dutch provincial and municipal governments. Given the fact that NV EPZ was excluded from the takeover, the total acquisition costs for RWE were approximately €7.3 billion.[221] With this acquisition, RWE becomes the fourth largest energy supplier in Europe.[222] In order to provide readers an approximate picture of what the new combined RWE / Essent company will look like with regard to the sustainability criteria examined in this report, the two companies' figures have been combined in a number of instances below. It should be noted, however, that these combined-company approximations are SOMO's estimations and have not been verified by either RWE or Essent.

7.2 Installed capacity and electricity generation in Europe

Figure 13 reveals the fuel mix of Essent's electricity generation capacity in Europe for the year 2008. In total, Essent has a generation capacity of over 6,000 MW.[223] Two of the company's major projects were completed and began production in 2008: The Inesco Combined Heat and Power (CHP) plant that was built in Zwijndrecht near Antwerp and has a production capacity of 135 MW. Its operation is tailored to the needs of the chemical company INEOS Oxide.[224] And in May 2008, the first wind turbines of the Westereems Wind Park in Groningen were put into operation. The wind park, consisting of 52 wind turbines with a total power of 156 MW, was officially opened a year later, in May 2009. The park was realized as a replacement and expansion of the old Eemshaven and Eemsmond wind parks. These wind parks were comprised of 134 wind turbines with a total power of 44 MW.[225]

Figure 14 shows the fuel mix of RWE's electricity generation capacity in Europe for 2008. RWE owns electricity generation sites in Germany, the UK, Hungary, Spain and other European countries. RWE's total electricity generation capacity in Europe amounted to 45,196 MW in 2008 of which 1,515 MW is based on renewables.[226] Most of this generation capacity from renewables is operated through its business unit RWE Innogy. RWE's total electricity generation in 2008 amounts to 224.1 TWh, of which 2.4% is generated from renewable sources of energy.[227]

The fuel mix of RWE and Essent's combined electricity generation capacity in Europe is shown in Figure 15. Table 22 gives an overview of the absolute figures of both the installed capacity and the generated electricity of RWE and Essent.

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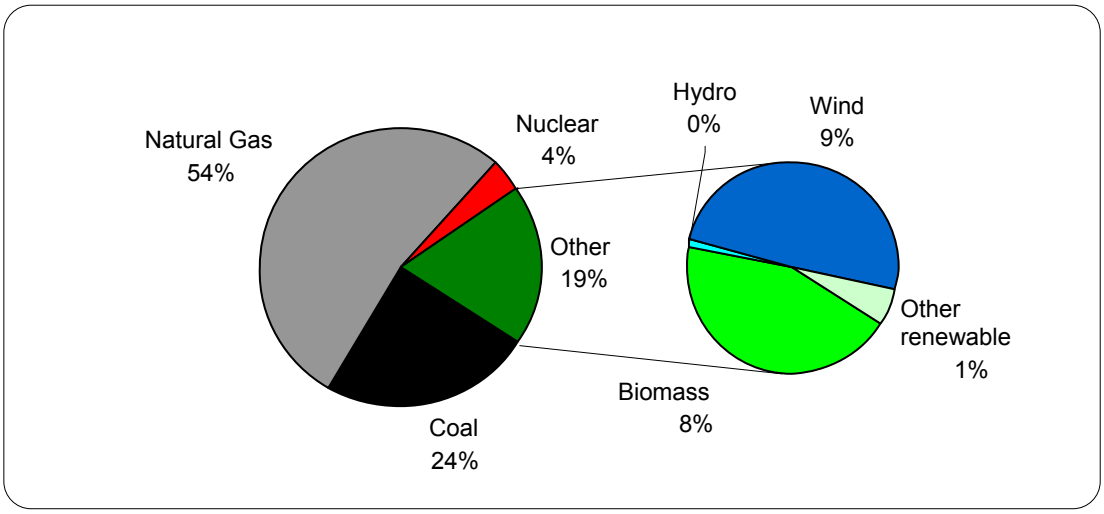
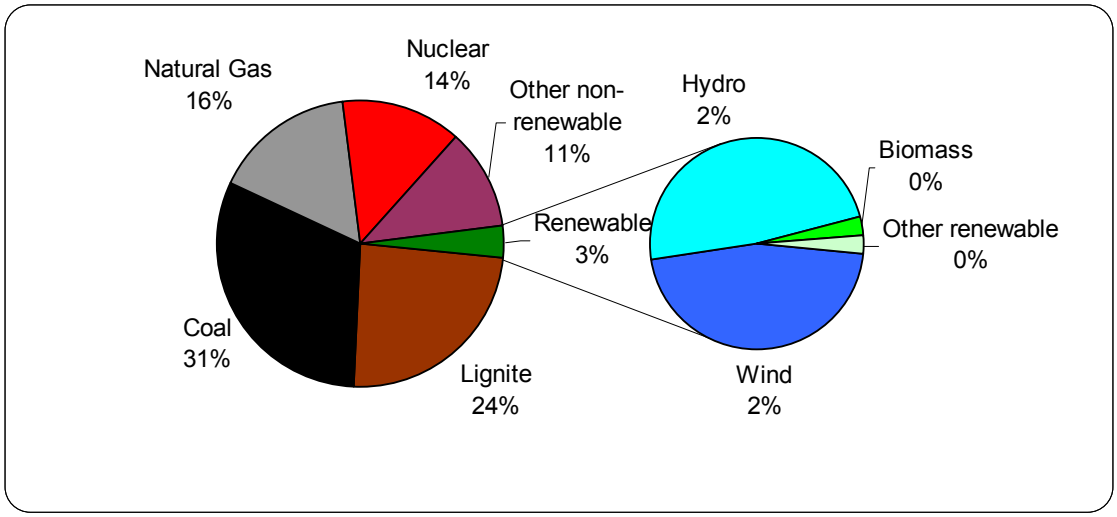
[221] Essent website, "Essent en RWE ronden transactie af", 30-09-2009, http://www.essent.nl/content/overessent/actueel/archief/persberichten/essent_en_rwe_ronden_transactie_af.jsp
[222] Essent website, "Dossier Essent-RWE", http://www.essent.nl/content/overessent/kennisbank/dossiers/essent_sluit_zich_aan_bij_rwe/index.jsp (1-7-09).
[223] Essent Annual Report 2008, p. 2, http://www.rwe.nl/documents/Annual%20report%202008%20RWE%20AG.pdf (26-06-09).
[224] Essent website, News, "Essent and INEOS Oxide inaugurate the Inesco CHP plant in Zwijndrecht", 7 May 2008, http://www.essent.eu/content/about_essent/news/archive/essent_and_ineos_oxide_inaugurate_the_inesco_chp_plant_in_zwijndrecht.jsp (07-07-09).
[225] Essent website, News, "Essent opens Westereems Wind Park", 14 May 2009, http://www.essent.eu/content/about_essent/news/archive/essent_opens_westereems_wind_park.jsp (07-07-09).
[226] RWE Annual Report, p. 62, http://www.rwe.nl/documents/Annual%20report%202008%20RWE%20AG.pdf (26-06-09).
[227] RWE Annual Report, p. 61, http://www.rwe.nl/documents/Annual%20report%202008%20RWE%20AG.pdf (08-07-09).

Figure 13: Fuel mix of Essent's installed electricity generation capacity in Europe, 2008



Based on: Essent[228]

Figure 14: Fuel mix of RWE's installed capacity in Europe, 2008

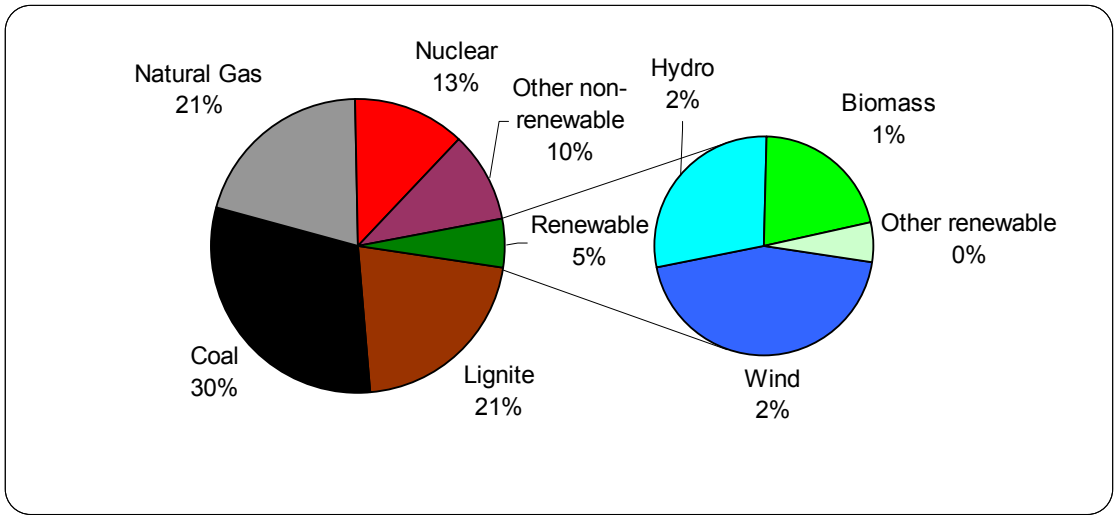


Based on: RWE[229]

[228] Generation capacity data for 2007, increased by the investments completed (partly) in 2008 (Inesco CHP plant 135 MW, Westereems Wind Park 112 MW <156 MW – 44 MW>).

[229] RWE Annual Report 2008, p. 62, http://www.rwe.nl/documents/Annual%20report%202008%20RWE%20AG.pdf (08-07-09) & RWE Factbook (May 2009), http://www.rwe.com/web/cms/mediablob/en/86206/data/37399/dl-factbook-new.pdf (26-06-09)

Figure 15: Fuel mix of RWE / Essent's combined installed capacity in Europe, 2008



SOMO aggregation based on data from Essent[230] and RWE[231]

Table 22: Fuel mix of RWE/Essent's installed capacity and electricity generated in Europe, 2008

Fuel type	Essent's installed capacity (MW)	RWE's installed capacity (MW)	RWE / Essent's combined installed capacity (MW)	Essent's electricity generated (GWh)	RWE's electricity generated (GWh)
Lignite	0	10,828	10,828	0	73,900
Coal	1,503.4	14,183	15,686.4	n/a	62,000
Natural Gas	3,311.3	7,223	10,534.3	n/a	31,200
Nuclear	242.5	6,295	6,537.5	n/a	49,300
Other non-renewable[232]	0	5,152	5,152	0	2,400
Biomass	504	61	565	1,718[233]	0
Wind	564[234]	632	1,196	843	1,300
Hydro	11.6[235]	751	762.6	30	3,400
Other renew.	70	71	141	465[236]	600
Total	**6,206.8**	**45,196**	**51,402.8**	**n/a**	**224,100**

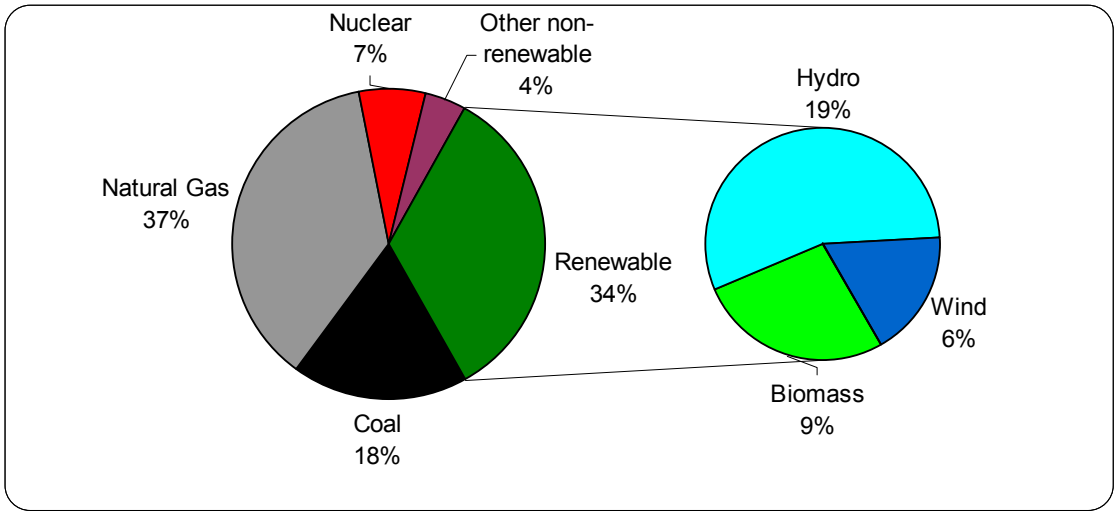
Based on: Essent[237] and RWE[238]

[230] Generation capacity data for 2007, increased by the investments completed (partly) in 2008 (Inesco CHP plant 135 MW, Westereems Wind Park 112 MW <156 MW – 44 MW>).
[231] RWE Annual Report 2008, p. 62, http://www.rwe.nl/documents/Annual%20report%202008%20RWE%20AG.pdf (08-07-09) & RWE Factbook (May 2009), http://www.rwe.com/web/cms/mediablob/en/86206/data/37399/dl-factbook-new.pdf (26-06-09)
[232] Other non-renewable is defined as 'Pumped storage, oil and other' by RWE. Pumped storage is electricity that originates from water that is pumped out of the opencast mines for lignite production.
[233] 42 GWh landfill gas and biogas, 164 GWH stand-alone clean biomass, 1,512 GWh fossil fuels replaced by clean biomass.
[234] Essent CSR Report, p. 21, http://www.essent.nl/content/Images/mvoverslag_2008_tcm301-60262.pdf (22-07-09)
[235] The hydroelectricity of Essent is produced at one small-scale hydroelectric power station located in the Vecht (0.1 MW), and one larger power station in the Maas (11.5 MW). Both stations are run-of-river facilities, and the Maas plant is equipped with both a fish ladder and a fish guidance system allowing for uninterrupted up and downstream migration of fish.
[236] 465 GWh waste incineration.

7.3 Electricity supplied in the Netherlands

Figure 16 reveals the fuel mix of electricity supplied by Essent in the Netherlands, Belgium and Germany.[239] As shown, thirty seven percent of the energy supplied comes from natural gas, 24% of which is from higher efficiency CHP plants. Figure 16 represents Essent's electricity supply to both industrial and residential customers, but Essent guarantees that the 'Groene Stroom' (Green Electricity) it supplies to residential customers is solely generated from biomass (57%), wind (34%), and hydro (10%). 80% of the 'Groene Stroom' that Essent supplies to residential customers in the Netherlands is generated by Essent itself, the other 20% is purchased abroad.[240]

Figure 16: Fuel mix of electricity supplied by Essent in the Netherlands, Belgium and Germany, 2008



Based on: Essent[241]

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[237] Essent no longer provides an overview of all its facilities as it did in its 2006 Annual report. The figures given here are based on the data gathered in 2007, complemented by the two new facilities that went into operation in 2008. These are the Inesco CHP plant (135 MW), and the additional capacity at the Westereems Wind Park (112 MW). These figures should be interpreted with caution, as they were not confimed by Essent, in contrast with other figures given in this research; Essent website, CSR, Renewable Energy, "Production", http://www.essent.eu/content/about_essent/csr/renewable_energy/production/index.jsp (08-07-09); CSR Report Essent 2006, p. 50 & CSR report Essent 2007, p. 26 t/m 29 & Annual Report Essent 2007, p. 55.
Installed capacity : data for 2007, increased by the investments completed (partly) in 2008 (Inesco CHP plant 135 MW, Westereems Wind Park 112 MW <156 MW – 44 MW>).

[238] RWE Annual Report 2008, http://www.rwe.nl/documents/Annual%20report%202008%20RWE%20AG.pdf (23-07-09).

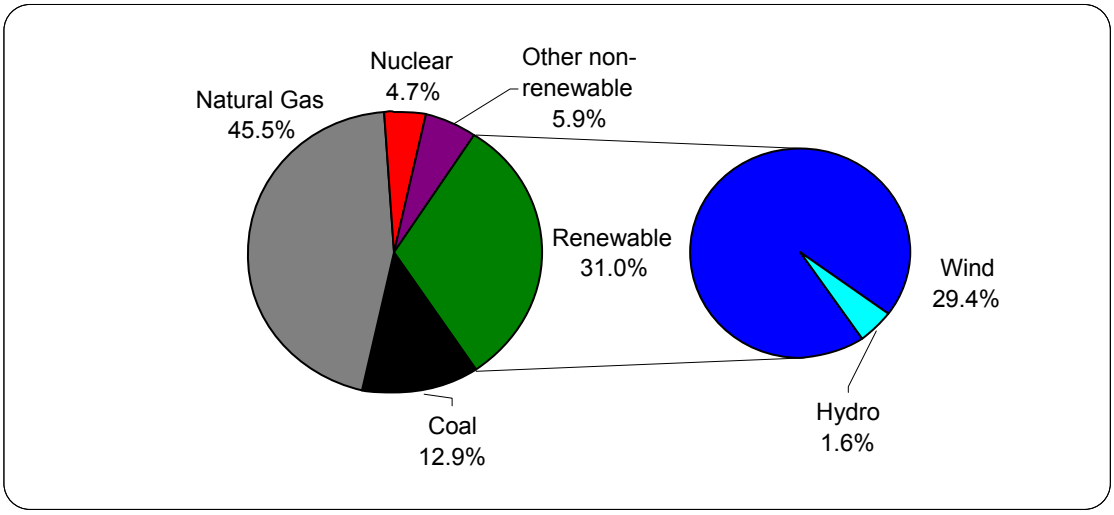
[239] Essent only provides complete (i.e. for both industrial and residential customers, not just residential) supply fuel mixes for all Essent NV units, including those in Belgium and Germany. The figures it provides for just the Netherlands (Essent Retail) only include residential and small business customers, not industrial customers. Since other companies have been evaluated on their complete supply figures and since Essent does supply 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, even though they do include operations in Belgium and Germany. Although Essent would not provide exact figures, it is assumed that the vast majority of the electricity supplied by Essent is in the Netherlands, with only a relatively small portion in BE and DE.

[240] Essent website, Actueel, "Essent: Geen misleiding bij verkoop Groene Stroom", 25 September 2008, http://www.essent.nl/content/overessent/actueel/nieuwsberichten/geen_misleiding_bij_verkoop_groene_stroom.jsp (07-07-09).

[241] Essent website, Thuis, Producten & Tarieven, Electriciteit, "Stroometiket", no date, http://www.essent.nl/content/Images/Download_het_Stroometiket_2008_tcm301-59847.pdf (08-07-09).

Figure 17 shows the fuel mix for the electricity supplied by RWE in the Netherlands in 2008. As the figure reveals, RWE's supply mix is more sustainable than the mix for the electricity it generates itself and relies heavily on wind power purchased from other electricity generators. RWE offers its clients a renewable energy product called Windkracht220 that consists of 100% wind energy.

Figure 17: Fuel mix of electricity supplied by RWE in the Netherlands, 2008



Based on: RWE[242]

Because Essent and RWE provide figures on different regional scales (RWE for all electricity supplied in the Netherlands; Essent for all electricity in the Netherlands, Belgium and Germany),[243] and because neither RWE nor Essent provides aggregate figures on the actual amount of electricity supplied in the Netherlands (in GWh), a comparison and combination of the figures to illustrate what the combined company's supply in the Netherlands will look like is difficult. However, the two companies' fuel mixes for electricity supply are relatively similar, and if we acknowledge the fact that the majority of Essent's electricity supply is in the Netherlands, and the fact that Essent supplies more electricity in the Netherlands than RWE and thus give slightly more weight to Essent's supply figures, the following approximation of the combined RWE / Essent electricity supply fuel mix can be made: Coal 16%, natural gas 40%, nuclear 6%, other non-renewable 5%, renewable 33%. It should be noted, however, that this compilation is speculative and has not been verified by either Essent or RWE.

Table 23 presents the CO_2 emissions and radioactive waste production resulting from the generation of the electricity that Essent supplies to its clients in the Netherlands, Belgium and Germany. In addition, it presents the CO_2 emissions and radioactive waste production resulting from the generation of the electricity that RWE supplies in the Netherlands.

[242] RWE website, Voor thuis, "Samenstelling Stroom", no date, http://www.rwe.nl/60 (08-07-09).
[243] See footnote 239.

Table 23: Emissions and waste resulting from electricity supplied by RWE / Essent, 2008

Indicator	Essent *	RWE**
CO_2 (g/kWh)	321	281.1
Radioactive waste (µg/kWh)	200	142

Based on: Essent[244] and RWE[245]; * supply in the Netherlands, Belgium and Germany; ** supply in the Netherlands

7.4 Investments in new generation capacity in Europe

Table 24 reveals Essent's and RWE's investments in generation capacity that are currently under construction. To safeguard and expand its position, Essent developed a project pipeline in 2008 with capital expenditure of up to €5.5 billion planned for the next five years. As a portion of this amount has already been allocated to projects that have been finalized or delayed, this figure is not fully up-to-date.[246] This money is used for enlarging the sustainable generating capacity, replacing and expanding conventional power stations, opportunities concerning liquefied natural gas (LNG) and gas storage.[247]

RWE plans to invest approximately €26 billion to expand, maintain and modernise energy infrastructure by 2012. These funds are basically earmarked for investment in state-of-the art power plants with lower carbon emissions, supra-regional and cross-border electricity grids, gas pipelines, and storage facilities as well as in gas and oil production. It should be noted that the three projects in Germany (in Neurath, Hamm, and Lingen) are mainly replacing older plants with lower efficiencies and higher CO_2 emissions.

Table 24: RWE / Essent's investments in new generation capacity in Europe

Company	Project name	Location	Fuel Type	Date in operation	Amount (million €)	Capacity (MW)	Project Status
RWE	BoA 2&3	Neurath (DE)	Lignite	2011	2,400	2,100	Under construction
RWE	Replanting Niederaußern	Niederauß ern (DE)	Lignite	2009	130	48[248]	Completion by 2009
RWE	Hard-coal power plant	Hamm (DE)	Coal	2012[249]	2,100	1,180[250]	Under construction
RWE	Hard coal twin unit	Eemshave n (NL)	Coal	2013	2,600	1,600[251]	Under [252] construction

[244] Essent website, Thuis, Producten & Tarieven, Electriciteit, "Stroometiket", no date, http://www.essent.nl/content/Images/Download_het_Stroometiket_2008_tcm301-59847.pdf (08-07-09).
[245] RWE website, Voor thuis, "Samenstelling Stroom", no date, http://www.rwe.nl/60 (08-07-09).
[246] Essent response to a draft version of this profile, email received July 21, 2009.
[247] Essent Press Release, Continued solid growth of revenue and profit, 28 February 2008, http://www.essent.eu/content/Images/press_release_2007_annual_results_tcm362-54744.pdf (07-07-09).
[248] Total capacity is 114 MW, of which 66 MW will be Green MW. Green MW are MW achieved by increasing efficiency without increasing fuel consumption.
[249] E-mail Burkhard Pahnke, Investor Relations, RWE AG (20-07-09).
[250] Total capacity is 1,530 MW. Rwe's capacity is 1,180 MW (E-mail Burkhard Pahnke, Investor Relations, RWE AG, 20-07-09).
[251] E-mail Burkhard Pahnke, Investor Relations, RWE AG (20-07-09).
[252] Dagblad van het Noorden, RWE bouwt Eemshaven-centrale 'met voet op rem', 23 June 09, http://www.dvhn.nl/nieuws/economie/eco_noorden/article4854648.ece/RWE_bouwt_Eemshaven-centrale_met_voet_op_rem (09-07-09).

RWE	Replanting Ibbenbüren	Ibbenbüren (DE)	Coal	November 2009	61	13[253]	Under construction
Essent	Moerdijk II	Moerdijk (NL)	Natural Gas (CCGT)	2011	500[254]	430	Under construction [255]
Essent	Claus station	Maasbracht (NL)	Natural Gas	2012	1,000[256]	640[257]	Under construction [258]
RWE	CCGT power plant Germany	Lingen (DE)	Gas (CCGT)	End 2009	500 [259]	876	Under construction
RWE	CCGT power plant UK	Staythorpe (UK)	Gas (CCGT)	2010	900	1,650	Under construction
RWE	CCGT plant	Pembroke (UK)	Gas (CCGT)	2012	1,200	2,000	Under construction
RWE	Replanting Didcot B	Oxfordshire (UK)	Gas (CCGT)	2009	75	80	Completion by 2009
RWE	Two new nuclear power generation units (3&4).	Cernavoda (RO)	Nuclear	2016[260]	366[261]	132[262]	Under construction [263]
Essent	Mittelkalorik	Bremen (DE)	Biomass	2009	112	14[264]	Under [265] construction
RWE	Biomass fired CHP plant	Siegen Wittgenstein (DE)	Biomass (CHP)	Autumn 2009[266]	30	8	Under construction

[253] Total capacity is 56 MW, of which 43 MW will be Green MW. Green MW are MW achieved by increasing efficiency without increasing fuel consumption.
[254] AGD, "Essent investeert 1.5 miljard euro in gas", 29 May2008, http://www.agd.nl/1053607/Nieuws/Artikel/Essent-investeert-1,5-miljard-euro-in-gas.htm (07-07-09).
[255] Essent Annual Report 2008, p. 16, http://www.essent.eu/content/Images/essent08_jaarverslag_tcm362-60071.pdf (07-07-09).
[256] AGD, "Essent investeert 1.5 miljard euro in gas", 29 May2008, http://www.agd.nl/1053607/Nieuws/Artikel/Essent-investeert-1,5-miljard-euro-in-gas.htm (07-07-09).
[257] Capacity increases from 1,280 MW to 1,920 MW.
[258] Essent Annual Report 2008, p. 16, http://www.essent.eu/content/Images/essent08_jaarverslag_tcm362-60071.pdf (07-07-09).
[259] RWE website, RWE Group, About RWE, Group structure, RWE Power, "Power plant new build", no date, http://www.rwe.com/web/cms/en/2984/rwe-power/power-plant-new-build (09-07-09).
[260] E-mail Burkhard Pahnke, Investor Relations, RWE AG (20-07-09).
[261] Total investment is € 4 billion. RWE has a 9.15% stake.
[262] Total capacity is 1440 MW. RWE has a 9.15% stake.
[263] World Nuclear News, Investors agree on Cernavoda 3 and 4 project company, 20 November 2008, http://www.world-nuclear news.org/NN-Investors_agree_on_Cernavoda_3_and_4_project_company-2011084.htm l (23-07-09).
[264] This is an investment of SWB AG, Essent has a 51% share in this company. The total capacity of the plant will be 27.5 MW.
[265] It should be noted that Essent has announced that it will divest from all its German activities. Therefore, these investments in Germany will not be owned by RWE once the takeover of Essent is completed. However, as Essent is still regarded as a separate company for this research, and these investments have been made by Essent, they are still taken up in these profiles. Essent Annual Report 2007, p. 63, http://www.essent.eu/content/Images/annual_report_2007_tcm362-54741.pdf (07-07-09).
[266] RWE press release, RWE Innogy lays foundation stone for biomass-fired CHP plant at Siegen-Wittgenstein, 24 June 2008, http://www.rwe.com/web/cms/en/106382/rwe/responsibility/data-dialogue/news/rwe-innogy-lays-foundation-stone-for-biomass fired-chp-plant-at-siegen-wittgenstein/ (13-07-09).

RWE	Biogas plant	Güterglück (DE)	Biomass	n/a	n/a	3	Under construction
RWE	Biogas plant EnviaM	Vockerode (DE)	Biomass	2009	n/a	0.3	Under construction
RWE	Biogas CHP Süwag	Weilburg (DE)	Biomass	2009	n/a	0.05	Under construction
RWE	Biogas plant Süwag	Zwingelhausen (DE)	Biomass	2009	n/a	1.1	Under construction
RWE	Biogas plant VSE	Saarland (DE)	Biomass	n/a	n/a	0.5	Under construction
Essent	Nordsee Ost offshore project	Helgoland (DE)	Wind	2012[267]	900	300 [268]	Pre construction phase (invitation for tenders)[269]
RWE	Danta de Energias S.A.	Spain (ES)	Wind	2009	n/a	70[270]	Acquisition majority interest[271]
RWE	Wind Park Rhyl Flats	Rhyl (UK)	Wind	4th quarter 2009[272]	300	90	Under construction
RWE	Windpark Greater Gabbard, in cooperation with SSE	Suffolk (UK)	Wind	2011	750[273]	254.5[274]	Under construction
RWE	Windpark Little Cheyne Court	Romney Marsh (UK)	Wind	2009	87[275]	60	Completion by 2009
RWE	Windpark Suwalki	Masuria (PL)	Wind	Summer 2009	50[276]	41	Under construction
RWE	Windpark Tychowo	Western Pomerania (PL)	Wind	Autumn 2009	50[277]	35	Under construction
RWE	RWE and Fri - El Green Power Joint	Cagliari, Sardinia (IT)	Wind	2009-2013	n/a	12.6[278]	Under construction [279]

[267] Essent, The future lies in at sea, no date, http://www.essent.de/content/Images/offshore_brochure_nordseeostengl_tcm38256221.pdf (08-07-09).
[268] Exact capacity depends on proposals in tender process.
[269] Essent CSR Report 2008, p.45, http://www.essent.nl/content/Images/mvo_verslag_2008_tcm301-60262.pdf (07-07-09) & Essent Annual Report 2008, p. 32, http://www.essent.eu/content/Images/essent08_jaarverslag_tcm362-60071.pdf (07-07-09).
[270] Expansion of shares from 44 to 93.7%
[271] RWE press release, RWE Innogy koopt meerderheidsbelang in Spaanse windkrachtexploitant, 11 May 2009, http://www.rwe.nl/934 (13-07-09).
[272] RWE npower website, Portfolio, Projects in construction, "Rhyl Flats", no date, http://www.npowerrenewables.com/rhylflats/index.asp (09-07-09).
[273] Total investment is € 1.5 billion. RWE has a 50% stake.
[274] Total capacity is 509 MW. RWE has a 50% stake.
[275] Investment for Litlle Cheyne Court windpark and Knabs Ridge windpark together is € 100 million. Investment for Knabs Court Windpark alone is € 13 million. Times Online website, RWE npower turns up the heat, 5 February 2007, http://business.timesonline.co.uk/tol/business/industry_sectors/utilities/article1329305.ece (10-07-09) & RWE npower pressrelease, Delivery of final four wind turbines to Knabs Ridge, 25 June 2008, http://www.npowerrenewables.com/pressreleases/onshorewind/080625_knabsridge.pdf (10-07-09).
[276] The Masuria and Western Pomerania projects have a combined investment of € 100 million
[277] Ibid.

	Venture						
RWE	Wind farm Thornton Bank	Thornton Bank (BE)	Wind	2013	n/a	80[280]	Pilot phase[281]
RWE	RWE Innogy	Northern France (FR)	Wind	n/a	n/a	8[282]	Under construction
RWE	Andasol 3	South of Spain (ES)	Solar	2011	n/a	6.4[283]	Under construction[284]
Essent	Weserkraftwerk	Bremen (DE)	Hydro	2010	1.9[285]	1.2[286]	Under construction[287]
RWE	Albbruck-Dogern run-of-the-river plant	The Rhine between Switzerland and Germany (CH / DE)	Hydro	2009	70[288]	24[289]	Under construction

Based on: Essent[290] and RWE[291]

Table 25 shows the cumulative figures for both Essent and RWE for each fuel type.

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[278] Total capacity is 24.65 MW. RWE has a 51% stake.
[279] FRI-EL Green Power website, "News", 2009 The first wind farm developed in JV with RWE Innogy is under construction, no date, http://www.fri-el.it/en/news.php (10-07-09).
[280] Total capacity 300 MW. RWE has a 26.72% stake.
[281] RWE press release, RWE Innogy taking a share in Belgian offshore wind farm Thornton Bank, 4 May 2009, http://www.rwe.com/web/cms/en/113648/rwe/press-news/press release/?%24=0i%2bBUZimOylDaWslihznkvu9D5QlkV16xHAfGCmyXbwfNWSCqVaY%2fQ%3d%3d (10-07-09).
[282] Three windparks in total. 20 MW is already in operation.
[283] Total capacity is 50 MW. RWE Innogy and RheinEnergie jointly hold 25.1% of the shares in this project via an investment holding company (RWE Innogy: 51%, RheinEnergie: 49%).
[284] RWE press release, Stadtwerke München and RWE Innogy realize a parabolic trough power plant in Spain in conjunction with MAN Ferrostaal, RheinEnergie and Solar Millennium, 10 July 2009, http://www.rwe.com/web/cms/en/113648/rwe/pressnews/press-release/?pmid=4003688 (13-07-09).
[285] The total costs for the project are EUR 40 million. SWB AG has a share of 24.5% in Weserkraftwerk Bremen. Essent has a 51% share in SWB AG.
[286] The total capacity of the project will be 10 MW. SWB AG has a share of 24.5% in Weserkraftwerk Bremen. Essent has a 51% share in SWB AG.
[287] Planet-Eenergy website, Projekte, Wasser, "Weserkraftwerk Bremen", http://www.planetenergy.de/projekte_wasser_weserkraftwerk.php (07-07-09). Essent Annual Report 2008, p. 46, http://www.essent.eu/content/Images/essent08_jaarverslag_tcm362-60071.pdf (07-07-09).
[288] RWE website, RWE at a glance, Responsibility, Energy & Climate, Dossier: Renewable energies Hydroelectric power, "Albbruck-Dogern run-of-the-river plant", no date, http://www.rwe.com/web/cms/en/87740/rwe/responsibility/energyclimate/dossier-renewable-energies/hydroelectric-power/albbruck-dogern-run-of-the-river-plant/ (10-07-09).
[289] Extension, total capacity up to 104 MW.
[290] Essent Annual Report 2008, http://www.essent.eu/content/Images/essent08_jaarverslag_tcm362-60071.pdf and Essent CSR Report 2008, http://www.essent.nl/content/Images/mvo_verslag_2008_tcm301-60262.pdf (07-07-09).
[291] RWE Annual Report 2008, http://www.rwe.nl/documents/Annual%20report%202008%20RWE%20AG.pdf (09-07-09), RWE Responsibility Status Report 2008, http://www.rwe.com/web/cms/mediablob/en/238548/data/39688/blob.pdf (09-07- 09) & RWE website, Responsibility, Energy & Climate, Security of supply, "Investment projects", no date, http://www.rwe.com/web/cms/mediablob/en/183110/data/37596/investment-projects-en.pdf (09-07-09).

Table 25: Overall figures for RWE / Essent's investments in new generation capacity in Europe

Fuel type	Capacity (MW)		Investment (million €)	
	RWE	Essent	RWE	Essent
Renewable	694	315	1,337*	1,014
Natural gas	4,606	1,070	2,675	1,500
Coal (including lignite)	4,941	0	7,291	0
Nuclear	132	0	366	0
Other	0	0	0	0
Total	**10,373**	**1,385**	**11,669**	**2,514**

* Incomplete information

Table 26 shows all the investment plans that Essent and RWE have announced or that have appeared in newspaper reports, but for which construction has not been initiated yet.

Essent especially plans to invest heavily in further expanding its wind capacity, onshore as well as offshore, in the Netherlands, Germany and Northwest Europe.[292] The company planned to construct a coal-fired power plant with biomass co-firing in Geertruidenberg, to be named Amer 10. However, the company decided to put the development of this unit on hold for the moment, due to a number of developments. For one, as a result of the anticipated scheme for allocating CO_2 emission rights, prospects are far from positive and there is uncertainty about the subsidy of biomass needed. In addition, the situation on the buyers-markets for both coal and biomass is uncertain. An additional 20MW CHP turbine for the Amer 9 plant that was previously announced will not be realised.[293]

RWE's investment plans include a large number of announced investments plans in new wind projects. However, RWE also has a number of large investments in coal plants planned.

Table 26: RWE / Essent's announced plans for investment in new generation capacity in Europe

Company	Project name	Location	Fuel Type	Date in operation	Amount (million €)	Capacity (MW)	Status
RWE	Lignite power plant with coal gasification and CO_2 capture	Hürth (DE)	Lignite (IGCC)	2014	800[294]	450	Planning phase
RWE	Hard coal power plant	Blyth (UK)	Coal	2014	>2,500	2,400	Planning phase
RWE	Hard coal power plant	Tilbury (UK)	Coal	2013	1,800	1,600	Planning phase

[292] Essent Annual Report 2008, p. 33, http://www.essent.eu/content/Images/essent08_jaarverslag_tcm362-60071.pdf (07-07-09).
[293] Essent response to a draft version of this profile, email received July 21, 2009
[294] Total cost is €2 billion. RWE invests €1 billion with €800 million for the power plant and €200 for the pipeline and CO2 storage operations.

RWE	Power plant, in cooperation with Martisa Iztok mining complex	Maritsa Iztok (BG)	Coal	2013	510[295]	331.5[296]	Planning phase[297]
RWE	Hard coal power plant, in cooperation with Kompania Weglowa	Wola (PL)	Coal	2015	1,100[298]	600[299]	Planning phase, investment decision taken end 2009
Essent	IGCC & CCS, in cooperation with Shell[300]	n/a	Coal and biomass	n/a	n/a	1,000	Feasibility study[301]
RWE	Turkey power plant	Denizli (TR)	Gas (CCGT)	2012	n/a	560[302]	Planning phase[303]
Essent	Gas Fired Power Station	Genk - Zuid (BE)	Natural Gas (CCGT)	n/a	n/a	400	Planning phase[304]
Essent	Nuclear Power Station	Netherlands (NL)	Nuclear	2018 – 2020	n/a	n/a	Feasibility study[305]
RWE	Nuclear power plant.	Belene (BG)	Nuclear	2014/2015[306]	1,500[307]	980[308]	Planning phase[309]
RWE	Joint Venture E.ON-RWE npower	Wylfa/Oldbury (UK)[310]	Nuclear	n/a	n/a	3,000[311]	Planning phase (land secured)[312]

[295] Total costs are € 1 billion. RWE has a 51% stake.
[296] Total capacity between 600 and 700 MW. RWE has a 51% stake.
[297] Seeurope website, "Bulgaria: Germany's RWE, Bulgaria Mining co May Build New Power Capacity", 30 May 2007, http://www.seeurope.net/?q=node/9252 (09-07-09).
[298] Total costs are € 1.5 billion. RWE has a 75% stake.
[299] Total capacity is 800 MW. RWE has a 75% stake.
[300] Study into the possibility of an integrated coal gasification plant combined with full CO2 capture and storage.
[301] Essent CSR Report 2008, p. 43, http://www.essent.nl/content/Images/mvo_verslag_2008_tcm301-60262.pdf (07-07-09).
[302] Total capacity is 800 MW. RWE owns 560 MW.
[303] E-mail Burkhard Pahnke, Investor Relations, RWE AG (20-07-09).
[304] Essent CSR Report 2008, p. 44, http://www.essent.nl/content/Images/mvo_verslag_2008_tcm301-60262.pdf (07-07-09).
[305] Study in cooperation with Delta, Essent Annual Report 2008, p. 32, http://www.essent.eu/content/Images/essent08_jaarverslag_tcm362-60071.pdf (07-07-09).
[306] E-mail Burkhard Pahnke, Investor Relations, RWE AG (20-07-09).
[307] Total costs are € 7 billion. RWE has offered to provide € 1.275 billion in equity and a loan of around € 280 million.
[308] Total capacity is 2,000 MW. RWE has a 49% stake and plans to share this stake with another partner.
[309] RWE website, RWE Group, Group structure, RWE Power, Power plant new-build, "Belene power plant project", no date, http://www.rwe.com/web/cms/en/2460/rwe-power/power-plant-new-build/belene-power-plant-project/ (09-07-09).
[310] 3 sites that are being sold off by the Nuclear Decommissioning Authority.
[311] Total capacity is 6,000 MW. RWE has a 50% stake.
[312] E-mail Burkhard Pahnke, Investor Relations, RWE AG (20-07-09).

RWE	RWE and Fri - El Green Power Joint Venture	Various sites (IT)	Biomass	n/a	n/a	>300[313]	Planning phase[314]
RWE	Wood residuals fired plant	Lincolnshire (UK) [315]	Biomass	2011	260	73[316]	Permission granted[317]
RWE	Biomass plant, in cooperation with the city of Troisdorf	Troisdorf (DE)	Biomass (CHP)	2009	30[318]	4[319]	Planning phase (construction will start In second half 2009)[320]
RWE	Biomass plant, in cooperation with NährEngel GmbH and Stadtwerken Goch GmbH	Goch (DE)	Biomass (CHP)	n/a	24[321]	5.6[322]	Planning phase (construction will start in autumn 2009)
RWE	Vegetable oil fired plant Süwag	Beselich (DE)	Biomass	2011	n/a	1	Planning phase
RWE	Joint venture with Daldrup & Söhne AG for construction geothermal power stations	Germany (DE)	Geothermal	n/a	n/a	n/a	Permission granted[323]
Essent	Expansion	Groningen	Wind	n/a	n/a	12	Planning

[313] Total capacity is more than 588 MW. RWE has a 51% stake (E-mail Burkhard Pahnke, Investor Relations, RWE AG 20-07-09).

[314] Redorbit website, RWE Innogy and Fri-El Green Power to form Italian JV, 28 May 2008, http://www.redorbit.com/news/business/1405492/rwe_innogy_and_friel_green_power_to_form_italian_jv/ (10-07-09).

[315] Zie: http://www.biofuelsdigest.com/blog2/2008/09/29/uks-helius-energy-sells-biomass-to-power-project-to-rwe-innogy-for-56million/

[316] E-mail Burkhard Pahnke, Investor Relations, RWE AG (20-07-09).

[317] New Energy Focus, RWE Innogy to take over £200m biomass project on Humberside, 26 September 2008, http://www.newenergyfocus.com/do/ecco.py/view_item?listid=1&listcatid=94&listitemid=1733 (13-07-09).

[318] Total investment € 60 million. RWE has a 51% stake (E-mail Burkhard Pahnke, Investor Re;ations, RWE AG, 20-07-09).

[319] Total capacity is 8 MW. RWE has a 51% stake (E-mail Burkhard Pahnke, Investor Relations, RWE AG, 20-07-09).

[320] Orbit website, RWE Innogy, Troikomm to build biomass-fired cogeneration plant, 14 November 2008, http://www.redorbit.com/news/business/1601203/rwe_innogy_troikomm_to_build_biomassfired_cogeneration_plant/ (13-07-09).

[321] Total investment € 30 million. RWE has a 80% stake.

[322] Total capacity 7 MW. RWE has a 80% stake.

[323] Renewable Energy World website, RWE Innogy Starts Geothermal Joint Venture with Daldrup & Sohne, 27 January 2009, http://www.renewableenergyworld.com/rea/news/article/2009/01/rwe-innogy-starts-geothermal-joint-venture-with-daldrup-sohne 54593 (13-07-09).

	Westereems Windpark	(NL)					phase[324]
Essent	New onshore and offshore wind farms	Europe	Wind	n/a	n/a	n/a	Preparation phase[325]
RWE	Wind parks Poland	Various sites (PL)	Wind	2010	n/a	200	Planning phase
RWE	Wind parks Poland	Northern Poland (PL)	Wind	n/a	n/a	150[326]	Awaiting permission (expected in 2011)
RWE	Wind parks pipe line	Various sites (PL)	Wind	n/a	n/a	730	Planning phase[327]
RWE	Windpark Middlemoor	Northumberland (UK)	Wind	n/a	n/a	75	Permission granted
RWE	Outer Tay Estuary wind park	Inch Cape (UK)	Wind	2015	n/a	905	Under development[328]
RWE	Windpark Gwynt y Môr	Gwynt y Môr (UK)	Wind	2012/ 2014	2,500	750	Permission granted[329]
RWE	Round 3	Various sites (UK)	Wind	n/a	n/a	5,000[330]	Application phase[331]
RWE	Windparks in Czech Republic	Various sites (CZ)	Wind	n/a	n/a	100	Planning phase(permission expected 2009-2011)
RWE	Windparks in Hungary	Aufwind Schmack (HU)	Wind	n/a	n/a	300	Awaiting permission
RWE	Offshore windpark Innogy North Sea 1	Juist (GE)	Wind	2014	2,800	960	Permission expected in 2009
RWE	Offshore windpark 'Tromp Binnen'	Callantsoog (NL)	Wind	2012/ 2013	n/a	300	Permission granted[332]

[324] Essent website, News, "Essent opens Westereems Wind Park", 14 May 2009, http://www.essent.eu/content/about_essent/news/archive/essent_opens_westereems_wind_park.jsp (07-07-09).
[325] AGD, "Essent investeert 1.5 miljard euro in gas", 29 May2008, http://www.agd.nl/1053607/Nieuws/Artikel/Essent-investeert-1,5-miljard-euro-in-gas.htm (07-07-09) & Essent Annual Report 2008, p. 16, http://www.essent.eu/content/Images/essent08_jaarverslag_tcm362-60071.pdf (07-07-09).
[326] Three projects in total.
[327] RWE Poland website, "RWE Polska", no date, http://www.rwe.pl/index.php?id=308&L=1 (23-07-09).
[328] RWE Npower press release, Npower renewables and SeaEnergy renewables preferred bidders in Scottish waters offshore tender, 16 Febraury 2009, http://www.npower-renewables.com/pressreleases/offshorewind/090216_inchcape.pdf (23-07-09).
[329] E-mail Burkhard Pahnke, Investor Relations, RWE AG (20-07-09).
[330] RWE applies for 5,000 MW as part of a consortium in round 3 UK.
[331] E-mail Burkhard Pahnke, Investor Relations, RWE AG (20-07-09).
[332] Rwe press release, RWE krijgt vergunning voor bouw van groot offshore windpark, 30 June 2009, http://www.rwe.nl/602 (10-07-09).

RWE	Offshore windpark 'Tromp'	Tromp (NL)	Wind	n/a	n/a	1,150	Awaiting permission
RWE	Offshore windpark 'De Ruyter'	North Sea (NL)	Wind	n/a	n/a	850	Awaiting permission
RWE	Joint Venture formed in Italy to develop wind energy projects	Various sites (IT)	Wind	n/a	n/a	3,895	Planning phase
RWE	RWE and Fri - El Green Power Joint Venture	South Italy (IT)	Wind	2009-2013	n/a	477[333]	Planning phase[334]
RWE	RWE Innogy	Triton Knoll (UK)	Wind	2015	n/a	1,200	Engineering and design study[335]
RWE	Windprojects of Babcock and Brown	Europe	Wind	n/a	3,500 – 4,000	n/a	Acquisitions (Unconfirmed) [336]
RWE	Danto de Energias S.A.	Castille-Leon (ES)	Wind	2011	n/a	40	Planning phase[337]
RWE	RWE Innogy	Various sites (UK)	Wind	n/a	n/a	2,300	Pipeline (Various stages) [338]
RWE	Extension pump storage power plant	Vianden (LU)	Hydro	2012	142	200	Permission granted
RWE	Romney Weir run-of-the-river plant	Windsor (UK)	Hydro	n/a	n/a	0.3	Permission granted
RWE	Altenstadt /	Altenstadt	Hydro	2010	n/a	1.3	Planning

[333] Total capacity is 960 MW. RWE has a 51% stake. A project of 24.65 MW is already under construction.
[334] Redorbit website, RWE Innogy and Fri-El Green Power to form Italian JV, 28 May 2008, http://www.redorbit.com/news/business/1405492/rwe_innogy_and_friel_green_power_to_form_italian_jv/ (10-07-09).
[335] PM World Today website, Design of Triton Knoll Offshore Wind Farm Project off UK Coast Kicks Off, February 2009, http://www.pmworldtoday.net/fascinating_projects/2009/feb/Design%20of%20Triton%20Knoll%20Offshore%20Wind%20Farm20Project%20off%20UK%20coast%20kicks%20off.htm (10-07-09).
[336] Finanznachrichten, RWE interested in acquiring parts of Babcock and Brown windparks, 20 May 2008, http://www.finanznachrichten.de/nachrichten-2008-05/10862653-rwe-interested-in-acquiring-parts-of-babcock-brown-windparks020.htm (10-07-09).
[337] Rwe press release, RWE Innogy koopt meerderheidsbelang in Spaanse windkrachtexploitant, 11 May 2009, http://www.rwe.nl/934 (23-05-09).
[338] B. Pahnke, Investor Relations, RWE AG, e-mail 20 July 2009.

	Illertissen run-of-the-river plant	Illertissen (DE)					phase
RWE	Willstätt run-of-the-river plant Süwag	Willstätt (DE)	Hydro	n/a	n/a	1	Planning phase
RWE	Bad Ems run-of-the-river plant Süwag	Bad Ems (DE)	Hydro	n/a	n/a	0.2	Planning phase
RWE	Wave energy project	Scotland (UK)	Hydro	2010	n/a	4	Planning phase
RWE	Wave energy project Anglesy	Anglesy (UK)	Hydro	2010/2011	n/a	10.5	Planning phase

Table 27 shows the cumulative figures of Essent's and RWE's investment plans per fuel type.

Table 27: Overall figures for RWE / Essent's announced plans for investment in new generation capacity in Europe

Fuel type	Capacity (MW)		Investment (million €)	
	RWE	Essent	RWE	Essent
Renewable	19,943*	12*	9,506*	n/a*
Natural gas	560	400	n/a*	n/a*
Coal (including lignite)	5,381.5	1,000	6,710	n/a*
Nuclear	3,980	n/a	1,500*	0
Other	0	0	0	0
Total	**28,884.5***	**1,412***	**17,716***	**n/a***

* Incomplete information

7.5 Demand-side initiatives in the Netherlands

RWE's demand site initiatives in the Netherlands include:

- RWE Nederland offers a number of saving tips for gas and electricity on its website[339]
- The company offers assessments of homes for energy labels and supplies energy labels. RWE charges costumers for both these services.[340]
- RWE Nederland offers personal energy saving advice, specified with regard to the house and the energy consumption of the client. RWE charges costumers for both these services.[341]

[339] RWE website, "Besparen op energie", http://www.rwe.nl/67/mijn_rwe/besparen_op_energie (13-07-09).
[340] RWE website, Mijn RWE, Besparen op energie, "Energielabel", http://www.rwe.nl/66/mijn_rwe/besparen_op_energie/energielabel (13-07-09).

[341] RWE website, Mijn RWE, Besparen op energie, "EPA maatwerkadvies",

- RWE Nederland participates in the program 'Meer met Minder', a joint initiative by government, construction companies, and energy companies through which homeowners can evaluate how to lower their electricity costs.

Essent's demand-side initiatives in the Netherlands include:

- Essent gives its clients advice and free tips on how to lower energy costs. It also offers its clients tools to gain insight into their energy consumption and to save energy in the long run. This is called the "BespaarPlan".[342]
- Essent offers its clients the possibility to use the "VerbruiksManager", which compares expected and actual energy consumption and gives advice accordingly. It also offers clients the possibility to calculate their energy consumption online with the help of personal data such as the size of the household and the amount of showers taken a week.[343] These services allow to become more aware of their energy consumption.
- Essent offers its clients a calculation programme and advice on how to save energy with low energy light bulbs.[344]
- Essent stimulates its clients to tackle unnecessary energy use by electrical appliances that consume energy while they are not in use. It offers a calculation programme that calculates the unnecessary energy consumption, also in terms of CO2 emissions, and offers advise on how to reduce it. The programme is called StopContact.[345]
- Essent offers solar panels and boilers to its clients including advice, information about subsidies and installation.[346]
- Essent offers high efficiency boilers. Clients can rent, lease, or buy them.[347]
- Essent compensates clients for energy that they produce themselves. Clients that have solar panels, a wind turbine, or a *high efficiency electricity*-generating (*HRe*) *boiler* and produce more energy than they consume receive compensation for the energy that flows back into the electricity grid.[348]
- Essent offers 'Groen voor Gas', which means that for two cents extra per cubic meter of gas, Essent compensates the CO_2 emissions of clients' gas consumption by investing in projects that reduce CO_2 emissions and meet the criteria of the Gold Standard Voluntary Emission Rights, an initiative of the WWF.[349]

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http://www.rwe.nl/64/mijn_rwe/besparen_op_energie/epa_maatwerkadvies (13-07-09).

[342] Essent website, Thuis, Zelf regelen, "Energie besparen", no date, http://www.essent.nl/content/thuis/zelf_regelen/energie_besparen_bespaarplan/index.jsp (07-07-09).

[343] Essent website, Thuis, Zelf Regelen, Energie Besparen, "Hulpmiddelen", no date, http://www.essent.nl/content/thuis/zelf_regelen/energie_besparen_bespaarplan/hulpmiddelen.jsp (08-07-09).

[344] Essent website, Thuis, Zelf Regelen, Energie Besparen, "Duurzaam Verlichten", no date, http://www.essent.nl/content/thuis/duurzaam_verlichten.jsp (08-07-09).

[345] Essent website, Thuis, Zelf Regelen, "StopContact", no date, http://www.essent.nl/pdfservice/ (08-07-09).

[346] Essent website, Thuis, Producten & Tarieven, CV en Warm Water, "Zonneboilers", no date, http://www.essent.nl/content/thuis/producten/CV_en_warm_water/zonneboilers/index.jsp & Essent website, Thuis, Producten & Tarieven, CV en Warm Water, "Zonnepanelen", http://www.essent.nl/content/thuis/producten/CV_en_warm_water/zonnepanelen/index.jsp (08-07-09).

[347] Essent website, Thuis, Producten & Tarieven, CV en Warm Water, "CV-Ketels", no date, http://www.essent.nl/content/thuis/producten/CV_en_warm_water/cv_ketel_kopen_huren_leasen/index.jsp (08-07-09).

[348] Essent website, Thuis, Producten & Tarieven, "Teruglevering", no date, http://www.essent.nl/content/thuis/producten/elektriciteit/teruglevering/index.jsp (08-07-09).

[349] Essent website, Thuis, Producten & Tarieven, Gas, Groen voor gas, "Wat is groen voor gas?", no date, http://www.essent.nl/content/thuis/producten/overzicht_gas/groen_gas/hoewerkthet.jsp (08-07-09).

- Essent advises its clients about energy labels and provides official labels.[350]
- Essent offers Groene Stroom to individual consumers. This is electricity solely generated by renewable sources.[351]
- Essent participates in the program 'Meer met Minder', a joint initiative by government, construction companies, and energy companies through which homeowners can evaluate how to lower their electricity costs.

[350] Essent website, Thuis, Producten & Tarieven, CV en Warm Water, "energielabel", no date, http://www.essent.nl/content/thuis/producten/CV_en_warm_water/energielabel_aanvragen/index.jsp (08-07-09).
[351] Essent response to a draft version of this profile, email received July 21, 2009

8 Vattenfall / Nuon

8.1 Basic company information

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). 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 Germany and Belgium, and has trading activities with, among others, the UK and Scandinavia. Nuon provides electricity, natural gas, cooling and heat to over three million customers in the Netherlands, Belgium and Germany. The company also markets and trades energy, and it offers energy-related services, such as equipment installation.

Vattenfall
Vattenfall is Europe's fifth largest generator of electricity and the largest producer of heat. The parent company, Vattenfall AB, is 100%-owned by the Swedish state. Vattenfall operates throughout the electricity value chain, including generation, transmission, distribution and sales operations. It also generates, distributes and sells heat, trades energy and mines for lignite.

As of 1 July 2009, Vattenfall organises its business activities through four Business Groups: Business Group Nordic, Business Group Central Europe, Business Group Benelux and Business Group Pan-Europe. In 2008 Vattenfall was organised in two business groups; Business Group Nordic and Business Group Central Europe. The Business Group Nordic generated a total of 90.7 TWh of electricity from an installed capacity of 18,621 MW.[352] The Business Group Central Europe generated 72.4 TWh from a total installed capacity of 15,951 MW.[353] The company primarily relies on fossil fuels, nuclear fuel and hydro power to generate electricity. Vattenfall's operations in 2008 were conducted in Sweden, Denmark, Finland, Germany, Poland and the UK.

Vattenfall has announced its intentions to become a carbon neutral company by 2050.[354] It aims to reach this goal through both reducing emissions from existing facilities, and investing in "increasing its generation of electricity with very low CO2 emissions".[355] Such generation would not only use renewable sourced as defined in this research, but also coal with CCS and nuclear power. For this reason, the company has seen criticism for "its mastery of spin on climate change, portraying itself as a climate champion while lobbying to continue

[352] Vattenfall, Annual Report 2008, http://www.vattenfall.com/www/vf_com/vf_com/369431inves/369463finan/481881annua/16136922008/index.jsp (20-07-09), p.60.
[353] Ibid, p.63
[354] Vattenfall press release, "Vattenfall's energy production carbon neutral by 2050", 30-09-08, http://www.vattenfall.com/www/vf_com/vf_com/370103press/558539press/index.jsp?pmid=94382 (20-07-09).
[355] Vattenfall response to a draft version of this fact sheet, email received 13-07-09.

business as usual, using coal, nuclear power, and pseudo-solutions such as agrofuels and carbon capture and storage (CCS)."[356]

Acquisition
In February 2009, Nuon announced that it received a take-over bid of € 8.5 billion from Sweden's Vattenfall.[357] Nuon's shareholders including the municipality of Amsterdam, and the provinces Gelderland, Noord-Holland and Friesland, have since agreed to the takeover. The bid has also been approved by the European Competition Authorities.[358] Vattenfall acquired 49% of the Nuon shares as of the first of July 2009, 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 six years under fixed terms. It has also been announced that Vattenfall will sell off Nuon's retail activities in Germany.[359] In order to provide readers an approximate picture of what the new combined Vattenfall / Nuon company will look like with regard to the sustainability criteria examined in this report, the two companies' figures have been combined in a number of instances below. It should be noted, however, that these combined-company (i.e. Vattenfall / Nuon) approximations are SOMO's estimations and have not been verified by either Vattenfall or Nuon.

8.2 Installed capacity and electricity generation in Europe

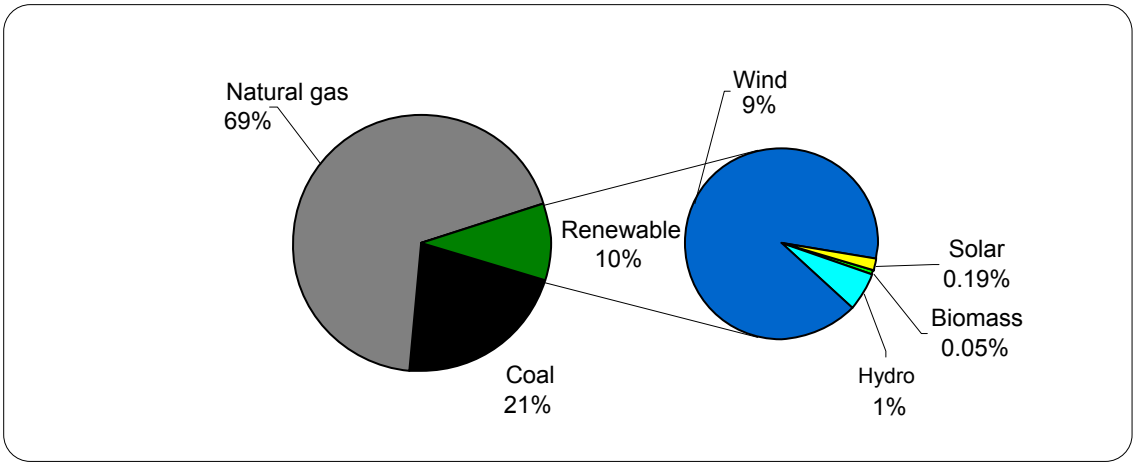
Nuon
While Nuon has several international operations, practically all of its electricity generation capacity is located in the Netherlands. In total, Nuon owns an installed capacity of 4,146 MW, of which 44MW is based outside of the Netherlands. Figure 18 gives the fuel mix of Nuon's installed capacity. One-third of the wind capacity comes from the large offshore wind farm near Egmond aan Zee. The company also owns three small-scale hydroelectric plants, one in Maurik and one in Alphen with a capacity of 10 MW and 14 MW, respectively, and a smaller plant at Roermond.[360] The biomass capacity is mainly accounted for by the biomass plant Lelystad, while in the Willem-Alexander plant in Buggenum biomass is co-fired in the coal gasifier.[361] In 2008, 24.8 MW of new wind capacity was realized.[362]

Figure 19 and Table 28 reveal the fuel mix of the electricity generated by Nuon. Under the category "Natural gas", Nuon makes the distinction between three different types of gas from which it produces electricity: 19.5% comes from blast furnace gases generated at the Corus

[356] Climate Greenwash website, "Climate Greenwash Awards 2009, no date, http://www.climategreenwash.org/ (20-07-09).
[357] Nuon website, press release, "Nuon en Vattenfall bundelen krachten en vormen toonaangevend Europees energiebedrijf", 23-02-09, http://www.nuon.com/nl/pers/persberichten/20090223/index.jsp (02-07-09).
[358] Nuon website, press release, "Groen licht van Europese mededingingsautoriteit voor Nuon en Vattenfall", 22-06-09, http://www.nuon.com/nl/pers/persberichten/20090622/index.jsp (02-07-09).
[359] Nuon website, press release, "Nuon and Vattenfall complete transaction", 01-07-09. http://www.nuon.com/press/press-releases/20090701/index.jsp (28-07-09).
[360] Nuon response to a draft version of this report, email received 22-07-09.
[361] Nuon website, Centrales "Willem-Alexander centrale te Buggenum, no date, http://www.nuon.com/nl/het-bedrijf/kernactiviteiten/opwekken-energie/centrales/buggenum.jsp (02-07-09).
[362] Nuon Annual Report, 2008, http://www.nuon.com/nl/investor-relations/publicaties-en-presentaties/2008.jsp (28-07-09), p.51.

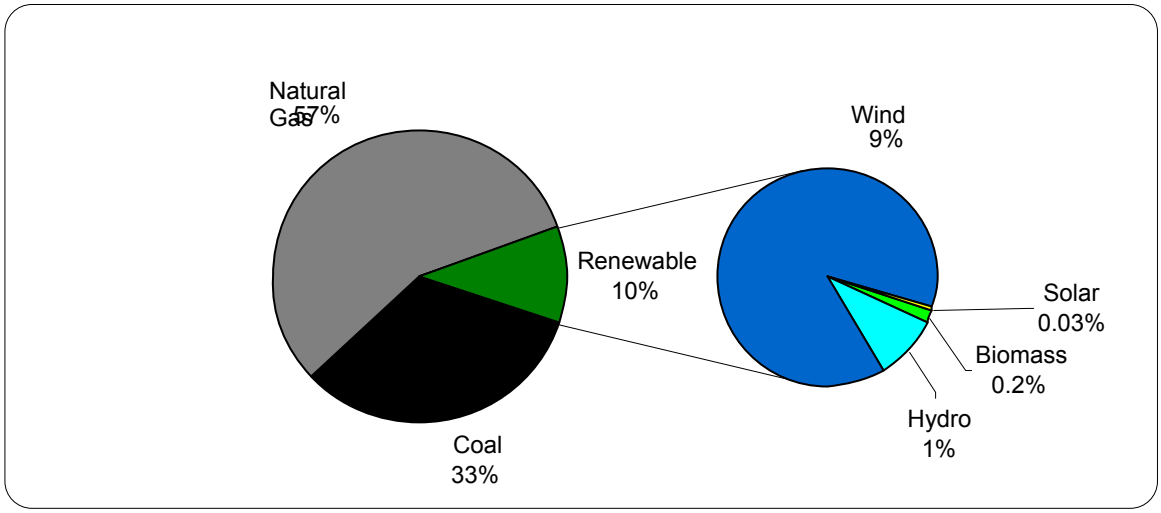
steel factory site, 27.5% from natural gas fired in combined heat and power (CHP) plants, and the remaining 10.4% comes from natural gas fired in conventional natural gas plants.[363]

Figure 18: Fuel mix of Nuon's installed capacity in Europe, 2008



Based on: Nuon[364]

Figure 19: Fuel mix of electricity generated by Nuon in Europe, 2008



Based on: Nuon[365]

[363] Nuon Annual Report, 2008, http://www.nuon.com/nl/investor-relations/publicaties-en-presentaties/2008.jsp (28-07-09), p.37.
[364] Nuon Corporate Social Responsibility Report, 2008, http://www.nuon.com/nl/mvo/verslaggeving/index.jsp, (28-07-09), p.53 & p69.
[365] Ibid.

Table 28: Fuel mix of Nuon's installed capacity and electricity generation in Europe, 2008

Fuel type		Capacity (MW)	Generation (TWh)
Non renewable		**3,752**	**14.4**
	Coal	883	5.2
	Natural gas	2,869	9.2
Renewable		**394**	**1.4**
	Wind	359	1.3
	Solar	8	0.004
	Hydro	26	0.08
	Biomass	2	0.03
Total		**4,146**	**15.8**

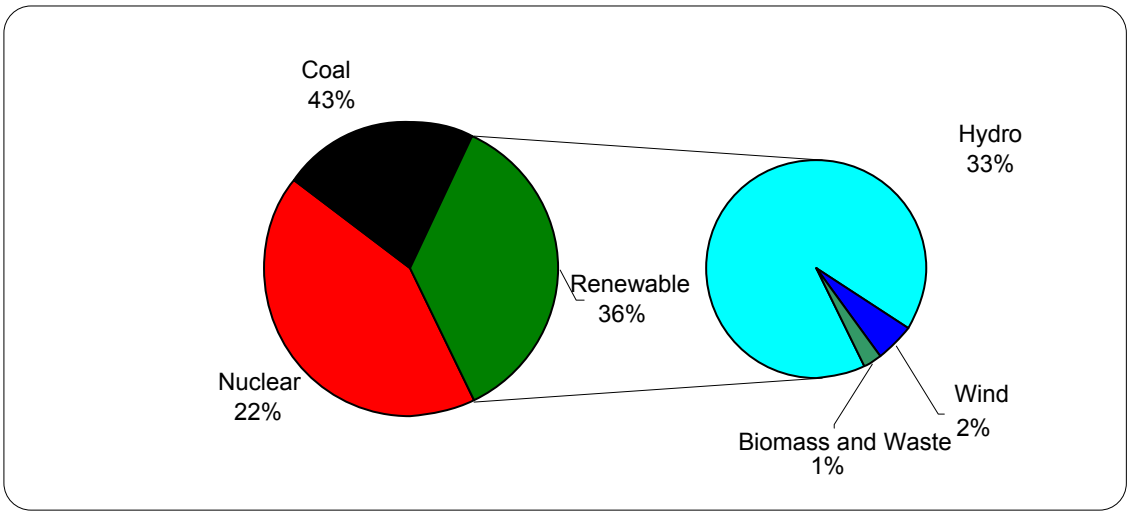
Based on: Nuon[366]

Vattenfall

Vattenfall gives a clear overview of the fuel mix it uses for the electricity it generates. The company provides fuel mix breakdowns for both actual electricity generated (in TWh) as well as for installed capacity (in MW). The former gives a more realistic picture of the company's actual contribution to renewable energies, while the latter provides for a more accurate comparison to the other companies in this fact sheet series.

Figure 20 shows the fuel mix of the company's installed capacity. Figure 21 gives the fuel mix of the electricity that was actually generated by Vattenfall in 2008.

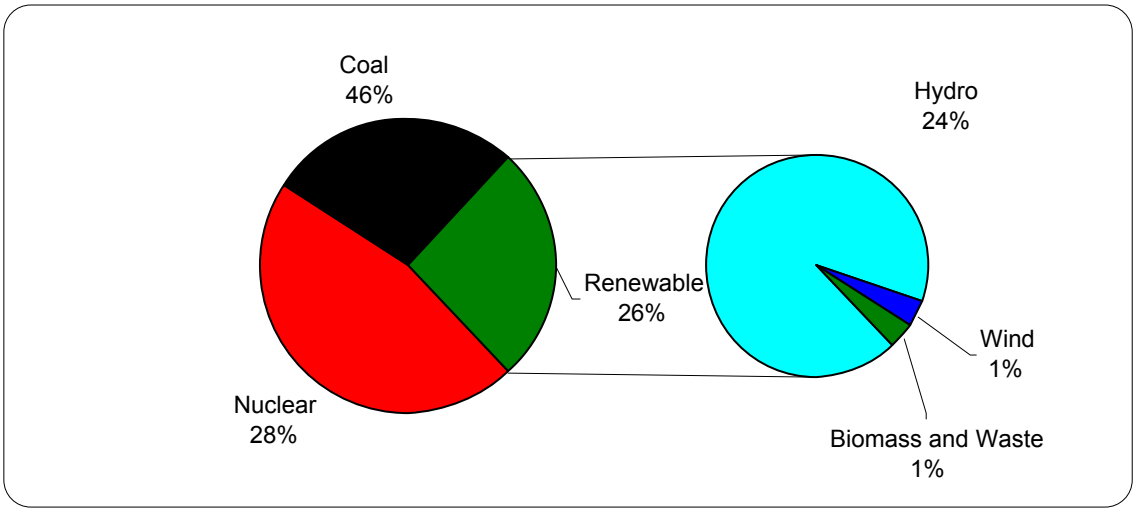
Figure 20: Fuel mix of Vattenfall's installed capacity in Europe, 2008



Based on: Vattenfall[367]

[366] Ibid.
[367] Vattenfall, Annual Report 2008, http://www.vattenfall.com/www/vf_com/vf_com/369431inves/369463finan/481881annua/16136922008/index.jsp (20-07-09), p.124. The annual report uses the category ' fossil fuel'. Corresponding figures are given for 'coal' on Vattenfall's website, thereby indicating that the two terms are used interchangeably.

Figure 21: Fuel mix of electricity generated by Vattenfall in Europe, 2008



Based on: Vattenfall[368]

Table 29 gives a more detailed overview of the generated electricity and installed capacity of Vattenfall's two business groups under which Vattenfall operated 2008 with generation activities.

Table 29: Fuel mix of Vattenfall's installed capacity and generated electricity in Europe, 2008

	Nordic Business Group		Central Europe Business Group	
	Capacity (MW)	**Generated (TWh)**	**Capacity (MW)**	**Generated (TWh)**
Hydro	8,362	36.5	2,894	3.0
Nuclear	6,788	46.2	771	0.0
Coal	2,603	6.1	12,141	69.0
Wind	568	1.5	43	0.1
Biomass	300	0.5	102	0.4
Total	**18,621**	**90.8**	**15,951**	**72.5**

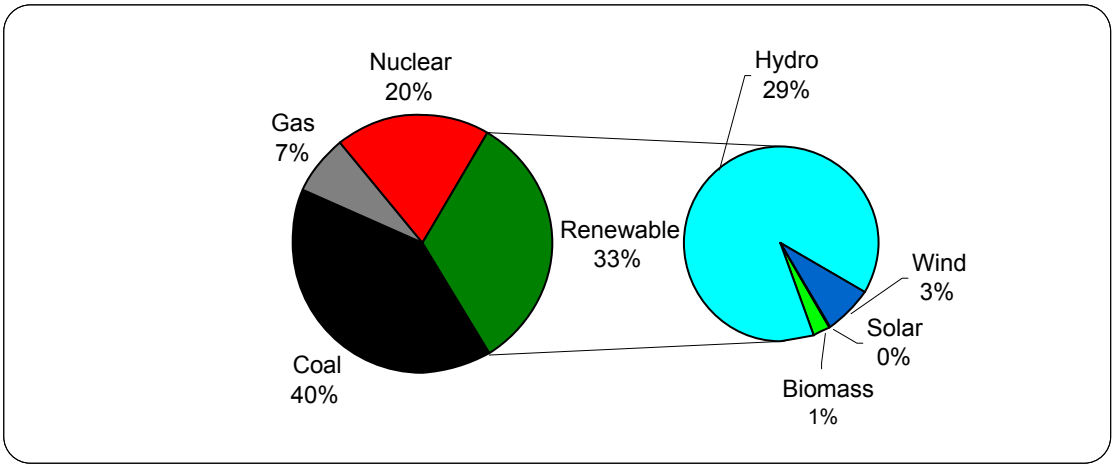
Based on: Vattenfall[369]

Nuon and Vattenfall combined

As Vattenfall is a much larger company that Nuon, with more than eight times as much capacity, the fuel mixes of the two companies combined closely resemble Vattenfall's fuel mixes. Figure 22 shows the fuel mix when the installed capacity of both companies are combined. Figure 23 shows the fuel mix of the electricity generated in 2008, while Table 30 shows the absolute figures.

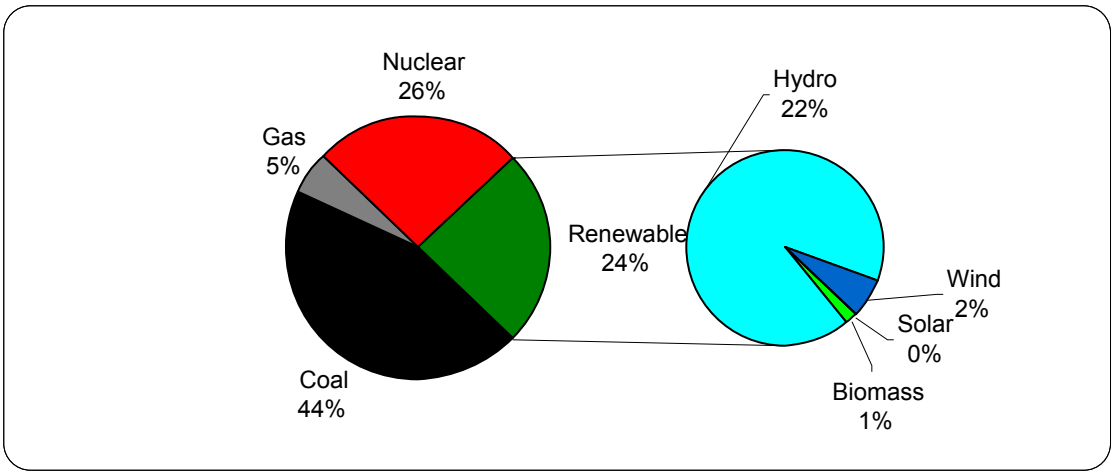
[368] Ibid.
[369] Ibid.

Figure 22: Fuel mix of Vattenfall / Nuon's combined installed capacity in Europe, 2008



SOMO aggregation based on data from Vattenfall and Nuon

Figure 23: Fuel mix of electricity generated by Vattenfall / Nuon in Europe, 2008



SOMO aggregation based on data from Vattenfall and Nuon

Table 30: Fuel mix of Vattenfall / Nuon's combined installed capacity and electricity generated in Europe, 2008

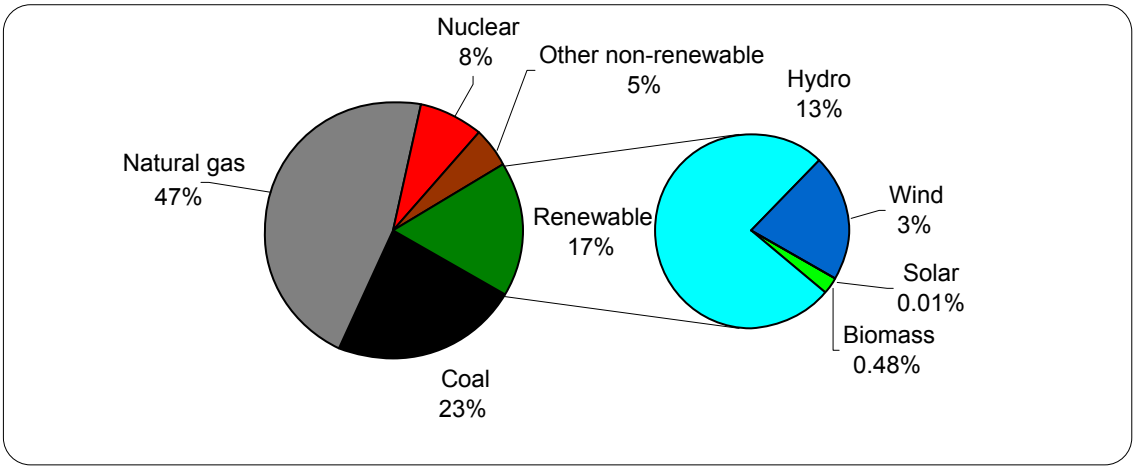
Fuel type		Capacity (MW)	Generation (TWh)
Non renewable		**26,055**	**135.7**
	Coal	15,627	80.3
	Natural gas	2,869	9.2
	Nuclear	7,559	46.2
Renewable		**12,664**	**43.4**
	Wind	970	2.9
	Solar	8	0.0
	Hydro	11,282	39.6
	Biomass	404	0.9
Total		**38,719**	**179.1**

SOMO aggregation based on data from Vattenfall and Nuon

8.3 Electricity supplied in the Netherlands

Figure 24 shows the fuel mix of electricity supplied by Nuon in the Netherlands, Belgium and Germany.[370] Vattenfall does not currently supply any electricity in the Netherlands, so Nuon's supply figures are be taken to be representative of the combined company Vattenfall / Nuon. As the figure reveals, Nuon's supply mix has a higher share of renewable power than the mix for the electricity it generates itself. No information was found regarding the type of hydro power (large scale or small scale) that is supplied. For its renewable product (Nuon NatuurStroom) the electricity is guaranteed from small-scale hydro in the Netherlands, in addition to wind and solar energy.[371]

Figure 24: Fuel mix of electricity supplied by Vattenfall / Nuon in the Netherlands, Germany and Belgium, 2008



Based on: Nuon[372]

Table 31 presents the CO_2 emissions and radioactive waste production resulting from the generation of the electricity that Nuon supplies in the Netherlands, Germany and Belgium.

Table 31: Emissions and waste resulting from electricity supplied by Vattenfall / Nuon in the Netherlands, Germany, and Belgium 2008

Indicator	Amount
CO_2 (g/kWh)	417.4
Radioactive waste (µg/kWh)	240

Based on: Nuon[373]

[370] Similar to Essent, Nuon does not publish information on its supply to all customers in the Netherlands. Instead, it publishes information on either supply to Dutch households and small businesses only (NV Nuon) or supply to all customers (including large industrial customers) in the Netherlands, Belgium and Germany (Nuon Groep). Since the company's supply outside of the Netherlands (i.e. in Belgium and Germany) is assumed to be only a small fraction of its supply in the Netherlands itself, the Nuon Groep figures are assumed to be relatively representative of the company's supply to all customers in the Netherlands and are thus used here.

[371] Nuon Corporate Social Responsibility Report, 2008, http://www.nuon.com/nl/mvo/verslaggeving/index.jsp, (28-07-09), p.48-51.

[372] Nuon Annual Report, 2008, http://www.nuon.com/nl/investor-relations/publicaties-en-presentaties/2008.jsp (28-07-09), p.52.

[373] Nuon Corporate Social Responsibility Report, 2008, http://www.nuon.com/nl/mvo/verslaggeving/index.jsp, (28-07-09), p 71.

8.4 Investments in new generation capacity in Europe

Table 32 reveals Vattenfall's and Nuon's investment in new production capacity that are currently underway.

In July 2006 Nuon announced the construction plans for Nuon Magnum, a 1200 MW coal and biomass gasification power plant. In September 2007 Nuon decided to realise Nuon Magnum in two phases, starting with the natural gas stream and postponing the investment decision on coal and biomass gasification. Within the next few years, Nuon will decide whether it will continue with the coal and biomass gasifiers, probably with CO_2 capture facilities In 2008, construction of the plant was suspended after the Council of State (Raad van State) withdrew permissions. Nuon expects to be able to restart construction in the second half of 2009.[374]

The company is also in the process of developing a wind farm near Antwerp, Belgium. Two wind turbines are already in operation, while an additional 38 are planned (total capacity of 90 MW).[375] Additionally, Nuon is expanding an existing windpark in Wales with 7.8 MW of new wind capacity.

Vattenfall is rapidly expanding its presence in a number of European countries through investments in new plants, improvements and expansions of existing plants, and the takeover of a number of existing electricity companies. The company has made a number of acquisitions in the UK that will expand its wind power capacity, but is also constructing a number of coal-fired plants in Germany and Poland.

Table 32: Vattenfall / Nuon's investments in new generation capacity in Europe

Company	Project name / unit	Location	Fuel Type	Date in operation	Amount (million €)	Capacity (MW)	Project status
Nuon	Nuon Magnum[376]	Eemshaven (NL)	Multi-fuel (coal, gas, biomass)	2011	1,800[377]	1,200	Construction suspended; awaiting permission[378]

[374] Nuon Press Release, "Herstart bouw Nuon Magnum gepland voor eind augustus ", 22-07-09, http://www.nuon.com/nl/pers/nieuwsfeiten/20090722/index.jsp (28-07-09).

[375] Nuon Belgium website, Duurzame Projecten, "De Antwerpse Haven", no date, http://213.193.144.196/nl/nuon/duurz_haven.html (28-07-09).

[376] In July 2007, Nuon announced the suspension of the planned coal and biomass turbines at the Magnum plant. Nuon's plans currently are that the Magnum plant will consist of 3 gas turbines with a total generation capacity of 1,200 MW. After the first building phase, these gas turbines will be fuelled with natural gas. In the second phase an additional gasification plant will be built, in which coal and biomass can be gasified to form a so-called syn-gas. This syn-gas can be co-fired on the gas turbines (together with natural gas). Thus, when Magnum actually becomes multi-fuel (after phase 2), the existing gas turbines will not change and the total capacity will remain 1,200 MW; Nuon says that it is not possible to say which part of the capacity is used for which fuel (G. Beijen, Nuon, e-mail 03-09-2008). Thus, since the fully completed facility is likely to be run primarily on coal, for the calculations in these fact sheets the entire 1,200 MW is considered to be coal.

[377] The initial costs € 1.5 billion, but these costs rose due to the delay caused by the suspension of the needed permits. "Nieuwe centrale Nuon 300 miljoen duurder", De Stentor/Sallands Dagblad, March 18, 2009.

[378] Nuon Annual Report, 2008, http://www.nuon.com/nl/investor-relations/publicaties-en-presentaties/2008.jsp (28-07-09), p.11.

Nuon	Wind farm Antwerpen	Antwerpen (BE)	Wind	2007 - unknown	100	78[379]	Various stages
Nuon	Pendine Wind Park[380]	UK	Wind	2010	n/a	7.8	Under construction
Vattenfall	Central Europe[381]	Hamburg (DE)	Coal	2012	2,620	1,640	Approval granted
Vattenfall	Central Europe[382]	Boxberg 2 (DE)	Lignite	2011	900	675	Under construction
Vattenfall	Central Europe[383]	Jänschwalde (DE)	Lignite improvement	2015	1,000	No new capacity	Feasibility study
Vattenfall	Denmark[384]	Midtfynsværket in Odense, Denmark	Biomass CHP	2009	90	35	Under construction
Vattenfall	Nordic[385]	Vanaja power plant in Finland	Biomass	2009	30	60	Under construction
Vattenfall	Nordic[386]	Abelvattnet	Hydro	n/a	9.3	4.6	Under construction
Vattenfall	Germany (Alpha Ventus)[387]	Borkum (DE)	Wind	2009	63	20	Under construction
Vattenfall	Thanet Offshore	UK	Wind	2010	912	300	Takeover of a company

[379] This entails an expansion from 12MW existing capacity to 90MW after construction has finished.

[380] Nuon renewables website, "Parc Cynog Wind Farm Extension ", no date, http://www.nuonrenewables.com/Old%20site/wwwroot/projects_ParcCExt.html (02-07-09).

[381] "Vattenfall Germany sticks to Hamburg coal power plant", Reuters, 21-04-09, http://in.reuters.com/article/oilRpt/idINLL8257920090421 (20-07-09); P. Seibel, "Hamburg Allows Vattenfall to Build Coal-Fired Plant", Planet Ark News, 01-10-08, http://www.planetark.com/dailynewsstory.cfm/newsid/50434/story.htm (20-07-09).

[382] H.J. Cramer, Head of Business Group Germany, Presentation, "Vattenfall Capital Markets Day 2007", 24-09-07, http://www.vattenfall.com/www/vf_com/vf_com/Gemeinsame_Inhalte/DOCUMENT/360168vatt/5966164xin/620058pres/620062cmd/8940542007/P0286722.pdf (20-07-09); Vattenfall response to a draft version of this fact sheet, email received 13-07-09.

[383] This entails the equipment of an existing plant with CCS technology. No new capacity will come from this investment. Vattenfall press release, "Vattenfall will build CCS demonstration plant in Jänschwalde", 23-05-08, http://www.vattenfall.com/www/vf_com/vf_com/370103press/401665archi/401806archi/index.jsp?pmid=91724 (20-07-09).

[384] Vattenfall Denmark, "Straw-fired CHP plant at Fyn Power Station, no date, http://www.vattenfall.dk/www/vf_dk/vf_dk/Gemeinsame_Inhalte/DOCUMENT/258660vatt/9137181xvo/914119vore/914322xvor/P0274189.pdf (20-07-09); Vattenfall response to a draft version of this fact sheet, email received 13-07-09.

[385] Vattenfall presentation, " Good Examples: Vattenfall's Environmental Performance", 23-12-08, http://www.vattenfall.com/www/vf_com/vf_com/Gemeinsame_Inhalte/DOCUMENT/360168vatt/386246envi/P0296009.pdf (20-07-09); Vattenfall response to a draft version of this fact sheet, email received 13-07-09.

[386] Vattenfall, Annual Report 2008, http://www.vattenfall.com/www/vf_com/vf_com/369431inves/369463finan/481881annua/16136922008/index.jsp (20-07-09), p.62; "Vattenfall to invest 100m kronor in new power plant", The Local, 05-07-07, http://www.thelocal.se/7805/20070705/ (20-07-09).

[387] The project is a joint venture between EWE, E.ON and Vattenfall. The total capacity of the project will be 60MW and the total investments are €180M. Vattenfall, "Bridging the future", Vattenfall's newsletter on the CO2-free power plant project, No. 8, September 2007 http://www.vattenfall.com/www/co2_en/co2_en/Gemeinsame_Inhalte/DOCUMENT/388963co2x/401837co2x/P0273432.pdf (20-07-09); Vattenfall response to a draft version of this fact sheet, email received 13-07-09.

	Wind Ltd[388]						with investment portfolios
Vattenfall	AMEC Wind Energy Ltd[389]	UK	Wind	n/a	160	573	Takeover of a company with investment portfolios
Vattenfall	Eclipse Energy UK Plc[390]	UK	Wind	2011	602	150	Takeover of a company with investment portfolios
Vattenfall	Nordic[391]	Denmark	Wind	2011	110	80	Under construction

Table 33 shows the cumulative figures of Nuon's and Vattenfall's investments per fuel types.

Table 33: Overall figures for Vattenfall / Nuon's investments in new generation capacity in Europe

Fuel type	Capacity (MW)		Investment (million €)	
	Vattenfall	**Nuon**	**Vattenfall**	**Nuon**
Renewable	1,223	86	1,976	100*
Natural gas	0	0[392]	0	0
Coal (including lignite and improvements)	2,315	1,200[393]	4,520	1,800
Nuclear	0	0	0	0
Other	0	0	0	0
Total	**3,538**	**1,286**	**6,496**	**1,900**

Based on: compilation from Table 32; * Incomplete information

Table 34 summarises the figures above and shows those announced plans for investments that are not yet underway.

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[388] Vattenfall spent €41M for the takeover of Thanet. The amount given here is the estimated amount needed for completion of the windpark. Vattenfall press release, "Vattenfall acquires Britain's largest offshore wind farm ", 10-11-08, http://www.vattenfall.com/www/vf_com/vf_com/370103press/401665archi/401806archi/index.jsp?pmid=95189 (20-07-09).

[389] Vattenfall press release, "Vattenfall acquires AMEC Wind Energy ltd ", 06-10-08, http://www.vattenfall.com/www/vf_com/vf_com/370103press/370135press/385357press/index.jsp?pmid=94467 (20-07-09).

[390] New Energy Focus website, Electricity News, "Vattenfall agrees £51.5m offer for Eclipse Energy ", 19-09-08, http://www.newenergyfocus.com/do/ecco.py/view_item?listid=1&listcatid=94&listitemid=1710 (20-07-09); Vattenfall response to a draft version of this fact sheet, email received 13-07-09.

[391] The project is called the Danish Repowering Programme, in which a number of older windparks are replaced by more modern and efficient facilities. Vattenfall Denmark website, "Nørrekær Enge – en stor dansk vindmøllepark", no date, http://www.vattenfall.dk/www/vf_dk/vf_dk/916035vores/916053vatte/916225vores/916675landv/1427818nxrre/index.jsp (20-07-09); Vattenfall response to a draft version of this fact sheet, email received 13-07-09.

[392] See footnote 376

[393] See footnote 376

Nuon decided not to invest further in the construction of the new gas-fired plant in Frankfurt am Main. A final investment decision will be taken at the end of 2009 for the construction of the CCGT plant near Charleroi, Belgium.[394] Nuon has also announced plans to develop another wind park in Belgium, under the name of Seal located at Noordehinder. No figures were found on the investment amount or the total capacity.[395] Additionally, the company is planning to invest in a number of gas plants in the Netherlands and wind projects in Belgium, the UK and The Netherlands.

Table 34: Vattenfall / Nuon's announced plans for investment in new generation capacity in Europe

Company	Project name / business unit	Location	Fuel Type	Date in operation	Amount (million €)	Capacity (MW)	Project status
Nuon	Hemweg 9[396]	Amsterdam (NL)	Gas (CCGT)	2012	n/a	500	Final investment decision to be taken
Nuon	Diemen 34[397]	Diemen (NL)	Gas (CCGT)	2012	n/a	500	Final investment decision to be taken
Nuon	Seneffe[398]	Charleroi (BE)	Gas (CCGT)	n/a	n/a	400	Final investment decision to be taken
Nuon	Nuon Magnum[399]	Eemshaven (NL)	Multi-fuel (coal, gas, biomass)	n/a	n/a	n/a	Awaiting final investment decision
Nuon	n/a	Wales (UK)	Wind	n/a	n/a	300	Optional contract
Nuon	De Zuidlob[400]	Zeewolde (NL)	Wind	2012	140[401]	108	Contracts signed with cooperation De Zuidlob

[394] Nuon website, About Nuon, The Company, Energy Generation, Power Stations, "Seneffe Power Plant", no date, http://www.nuon.com/company/core-business/energy-generation/power-stations/seneffe.jsp (02-07-09).
[395] Nuon Press Release, "Joint venture for largest offshore wind farm in Belgium", 01-07-08, http://www.nuon.com/press/press-releases/20080731/index.jsp (27-07-09).
[396] Nuon website, About Nuon, The Company, Energy Generation, Power Stations, "Hemweg 9 power plant", no date, http://www.nuon.com/company/core-business/energy-generation/power-stations/hemweg9.jsp (02-07-09).
[397] Nuon website, About Nuon, The Company, Energy Generation, Power Stations, "Diemen 34 power plant", no date, http://www.nuon.com/company/core-business/energy-generation/power-stations/diemen34.jsp (02-07-09).
[398] Nuon website, About Nuon, The Company, Energy Generation, Power Stations, "Seneffe Power Plant", no date, http://www.nuon.com/company/core-business/energy-generation/power-stations/seneffe.jsp (02-07-09); Nuon website, Press Release, "Nuon treft voorbereidingen voor bouw zuinige centrale in Seneffe", 29-09-08, http://www.nuon.com/nl/pers/persberichten/20080929/index.jsp (02-07-09).
[399] See footnote 376
[400] Nuon website, Press Release, "Nuon-dochter WEOM ontwikkelt voor 63 agrariërs een van de grootste windparken in Nederland", 21-10-08, http://www.nuon.com/nl/pers/persberichten/20081021/index.jsp (02-07-09).

Nuon	Beaufort[402]	Offshore Zuid Holland (NL)	Wind	n/a	n/a	340	Design permission granted
Vattenfall	Nordic	Nordjyllandsværket (DK)	Coal with CCS	2013	n/a	300	Delayed[403]
Vattenfall	Poland[404]	Pulawy (PL)	Coal	2018	n/a	700	Announced
Vattenfall	Poland[405]	Opalenie (PL)	Coal	2018	n/a	700	Announced
Vattenfall	Poland[406]	Poland	Coal	n/a	n/a	1,098	Interest announced in buying stake in existing plant.
Vattenfall	Central Europe[407]	Poland	Coal, gas and biomass	2020	465	520 (Coal) and 250 (Gas)	Announced as strategic objective
Vattenfall	U.K. [408]	UK	Nuclear	n/a	4,000	n/a	Feasibility study
Vattenfall	Nordic[409]	Uppsala (SE)	Waste	n/a	n/a	n/a	Announced, feasibility study
Vattenfall	Nordic[410]	Trolleboda	Wind	n/a	n/a	150	Pre-Planning phase

[401] These are the amounts invested by Nuon and the cooperation of farmers (Zuidlob). Nuon receives a 5% share in Zuidlob, but it is unclear how much Nuon itself is investing exactly. "Windpark Flevopolder kost EUR140 miljoen", Leeuwarder Courant, October 22, 2008.

[402] Ministeris van Verkeer en Waterstaat Press Release, "Huizinga verleent vier ontwerpvergunningen voor windparken op zee", 29-06-2009 http://www.verkeerenwaterstaat.nl/actueel/nieuws/huizingaverleentvierontwerpvergunningenvoorwindparkenopzee.aspx (28-07-09).

[403] Vattenfall initially indicated that if a positive result were obtained from geological surveys, an investment decision may be made in 2010, in which case, a 300 MW CCS demonstration plant could be in operation at Nordjyllandsværket by 2013 (Vattenfall response to a draft version of this fact sheet, email received 13-07-09). However, a more recent Vattenfall press release indicates that the project has been delayed (Vattenfall, 01-09-2009, http://www.vattenfall.dk/www/vf_dk/vf_dk/918477press/953281press/index.jsp?pmid=77722)

[404] The capacity given here is 50% of the total new capacity. "Pulawy and Vattenfall plan 1,400 MW power plant", Reuters, 23-12-08, http://www.reuters.com/article/rbssChemicalsAgricultural/idUSLN94320081223 (20-07-09).

[405] "New Power Plants", Polish News Bulletin, Gazeta Wyborcza 24-06-09, p. 25.; Vattenfall response to a draft version of this fact sheet, email received 13-07-09.

[406] This figure amounts to 46% of the 2,388MW plant in question. "Vattenfall express interest in buying stake in Poland's 2,338-MW PAK plant", Global Power Report, 30-10-08.

[407] Vattenfall has allocated money for the construction of a biomass power block at Elektrownia Pruszkow, the construction of a 520 MW congeneration power block at the heat and power plant Elektrocieplownia Siekierki, and the launch of a 250 MW gas-steam power block and a heat accumulator at Elektrocieplownia Zeran. "Poland: EUR 456mn will be invested by Vattenfall in Warsaw", Esmerk Poland News, Rzeczpospolita, 22-05-09;

[408] "UK: Swedish Vattenfall to invest in nuclear", Dagens Industri, 31-10-08.

[409] "Vattenfall to install new turbine in Uppsala", Energi & Miljö, 02-01-09.

[410] Vattenfall, Annual Report 2008, http://www.vattenfall.com/www/vf_com/vf_com/369431inves/369463finan/481881annua/16136922008/index.jsp (20-07-09), p.12; Vattenfall Denmark, "Trolleboda Wind Farm", no date, http://www.vattenfall.dk/www/vf_dk/vf_dk/Gemeinsame_Inhalte/DOCUMENT/258660vatt/9137181xvo/914119vore/914140vore/914294trol/P02.pdf (20-07-09); S.E. Thor, Presentation, "Vattenfall Windpower Expansion Plans", 26-05-09,

Vattenfall	Nordic[411]	Taggen	Wind	n/a	n/a	150	Pre-Planning phase
Vattenfall	Nordic[412]	Kriegers Flak	Wind	n/a	n/a	600	Pre-planning
Vattenfall	Nordic (Together with Sveaskog) [413]	Sweden and Denmark	Wind	2020	3,786	1,500	Location identification, feasibility study
Vattenfall	Collaboration with Scottish Power Renewa-bles[414]	UK	Wind	2020	n/a	3,000	Announced
Vattenfall	Nordic[415]	Stor-Roliden (SE)	Wind	2010	138	~90	Announced
Vattenfall	Nordic[416]	Ireland	Wave	n/a	0.5	250	Pilot project, pre planning

Table 35 summarises the figures above and shows the cumulative figures of Nuon's and Vattenfall's investment plans per fuel type.

Table 35: Overall figures for Vattenfall / Nuon's announced plans for investment in new generation capacity in Europe

Fuel type	Capacity (MW)		Investment (million €)	
	Vattenfall	Nuon	Vattenfall	Nuon
Renewable	5,740	748	3,925*	140*

http://www.natverketforvindbruk.se/Global/Affarsutveckling/Wind%20Power%20and%20Industry%202009/Presentationer/Block%202%20-%2026%20maj/S-E_Thor_Kalmar_v3.pdf (20-07-090.

[411] Vattenfall, Annual Report 2008, http://www.vattenfall.com/www/vf_com/vf_com/369431inves/369463finan/481881annua/16136922008/index.jsp (20-07-09), p.12; S.E. Thor, Presentation, "Vattenfall Windpower Expansion Plans", 26-05-09, http://www.natverketforvindbruk.se/Global/Affarsutveckling/Wind%20Power%20and%20Industry%202009/Presentationer/Block%202%20-%2026%20maj/S-E_Thor_Kalmar_v3.pdf (20-07-090.

[412] Ibid; SGS Group press release, "SGS to verify Vattenfall's Kriegers Flak Offshore Wind Farm (600 MW+) Project in Baltic Sea", 16-01-06, http://www.sgs.com/sgs_to_verify_vattenfall_s_kriegers_flak_offshore_wind_farm__600_mw___project_in_baltic sea?viewId=2412 (20-07-09).

[413] "Vattenfall, Sveaskog say form wind power venture", Reuters, 16-11-07, http://www.windenergynews.com/content/view/1067/45/ (20-07-09).

[414] Vattenfall, Annual Report 2008, http://www.vattenfall.com/www/vf_com/vf_com/369431inves/369463finan/481881annua/16136922008/index.jsp (20-07-09), p.14.

[415] "Vattenfall in 1.5-bil.-Kronor Swedish Wind Park Investment", World Markets Research Centre, Global Insight, 20-05-09; Vattenfall response to a draft version of this fact sheet, email received 13-07-09.

[416] The amount given is for the acquisition of the company. Vattenfall notes that it intends to further develop the technology and to build a demonstration project of 250MW in the future. Vattenfall press release, "Wave power cooperation between Vattenfall and Wavebob", 06-03-08, http://www.vattenfall.com/www/vf_com/vf_com/370103press/401665archi/401806archi/index.jsp?pmid=90043 (20-07-09); Vattenfall press release, "Vattenfall prepares for ocean energy farms in Ireland", 14-01-08, http://www.vattenfall.com/www/vf_com/vf_com/370103press/401665archi/401806archi/index.jsp?pmid=98731 (20-07-09). Vattenfall response to a draft version of this fact sheet, email received 13-07-09.

Natural gas	250	1,400	233*	0*
Coal (including lignite)	3,318	0	233*	0
Nuclear	0*	0	4,000	0
Other	0	0	0	0
Total	**9,308**	**2,148**	**8,390**	**140**

Based on: compilation from Table 34; * Incomplete information

In addition, Nuon is developing gas storage in Zuidwending, as well as expanding its existing gas storage in Epe (Germany). The latter is planned to be operational in 2011.[417] Nuon also started construction of pre-combustion CO_2 capture pilot facility in Buggenum. Additionally, Nuon purchased all shares of Burlington Resources Nederland Petroleum in 2008. Recently, this was expanded with the acquisition of minority interests in various gas fields in the British part of the North Sea. In total Nuon has a stake in 38 gas fields in the North Sea.[418]

In addition to information about actual projects that the company is investing in, Vattenfall's annual report gives detailed information about the allocation of funds per fuel types. The company is set to invest 28% of its total investments in renewable energy between 2009-2013. This is a reduction from 2007 and 2008 when 35.2% and 29.4% of total investments went to renewable energy sources, respectively.[419] Table 36 shows that the company has allocated the most money to be spent on future nuclear investments. It should be noted that the amounts for nuclear investments are for a much longer time span than the other announced investments, as the company has estimated its nuclear investments up to 2030. The amount that would be invested in nuclear capacity up to 2013 amounts to approximately €1.1 billion.[420]

Table 36: Vattenfall's allocated funds for investment in new generation capacity in 2009-2013 by fuel type

Fuel type	Allocated funds (million €)
Wind	3,475
Hydro	663
Biomass	626
Waste	308
CCS technology	1,027
Nuclear*	4,668

Source: Vattenfall[421]; * investment in nuclear refers to period 2009-2030

[417] Nuon Corporate Social Responsibility Report, 2008, http://www.nuon.com/nl/mvo/verslaggeving/index.jsp, (28-07-09), p.26-27.
[418] Nuon Press Release, "Nuon acquires stakes in British gas fields", 19-06-09, http://www.nuon.com/press/press-releases/20090619/index.jsp (28-07-09).
[419] It should be noted that this is a percentage of total investments only and does not provide an indication of total or aggregate investment in renewable/non-renewable sources of energy. "Sweden:Vattenfall's green investments drop despite climate target", Dagens Nyheter, Ekonomi, 09-06-09, p.2-3.
[420] Vattenfall response to a draft version of this fact sheet, email received 13-07-09.
[421] Vattenfall, Annual Report 2008, http://www.vattenfall.com/www/vf_com/vf_com/369431inves/369463finan/481881annua/16136922008/index.jsp (20-07-09).

8.5 Demand-side initiatives in the Netherlands

Vattenfall itself is currently not yet active on the Dutch electricity supply market, but offers demand-side products and services in the Netherlands through Nuon:

- Insulation products and advice to improve the energy efficiency of households.
- Customers can purchase high efficiency boilers, which require less energy to heat water.
- Boiler service contracts, to ensure proper maintenance and repair of boilers.
- Energy shops, offering products such as low energy light bulbs and water saving shower heads, which can be financed through the consumer's energy bill. Nuon also offers an online shop with the same products.
- Various energy reduction advice services, including the Step2Save programme.
- Nuon is certified to give out energy labels.
- Several online consumer energy waste and saving checks.
- Nuon participates in the program 'Meer met Minder', a joint initiative by government, construction companies, and energy companies through which homeowners can evaluate how to lower their electricity costs. [422]

[422] Nuon Website, Voor thuis, Energiebesparen, "Energie is mooi", no date, http://www.nuon.nl/energiebesparen/ (02-07-09).

9 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 2008. As noted in the company fact sheets above, in order to provide readers an approximate picture of what the new combined RWE / Essent and Vattenfall / Nuon companies will look like, the two companies' figures have been combined in a number of instances below. It should be noted, however, that these combined-company approximations are SOMO's estimations and have not been verified by the companies.

9.1 Installed capacity in Europe

Table 37 shows the installed generation capacity in Europe of each company in MW. E.ON is the largest company taken up in this research, with almost 60GW of installed capacity in Europe. Nuon and Vattenfall combined now have the most overall renewable installed capacity.

Table 37: Fuel mix of installed capacity in Europe by company, in MW, 2008

Fuel type	Delta	Dong	Eneco	E.ON	GDF Suez / Electrabel	RWE/ Essent	Vattenfall / Nuon
Renewable	97	1,412	956.6	8,339	7,075	2,665	12,664
Natural gas	299	794	1,100	14,570	19,598	10,534	2,869
Coal (including lignite)	203	3,626	0	19,741	4,162	26,514	15,627
Nuclear	225	0	0	11,141	6,356	6,538	7,559
Other[423]	0	599	0	4,873	643.2	5,152	0
Total	**823**	**6,431**	**2,057**	**58,664**	**37,834**	**51,403**	**38,719**

SOMO compilation based on company data

Table 38 reflects the fuel mix of the installed capacity of the companies based on the percentage that each fuel comprises of the total mix. Eneco has the highest percentage of sustainable installed capacity, while RWE / Essent has the least sustainable fuel mix. In Figure 25, these fuel mixes are illustrated in a bar chart. As a consequence of the takeover, Essent has now become part of the most unsustainable company taken up in this research. Whereas Essent by itself has a renewable fuel mix of 18.5%, RWE / Essent's combined figures amount to no more than 5.2%.

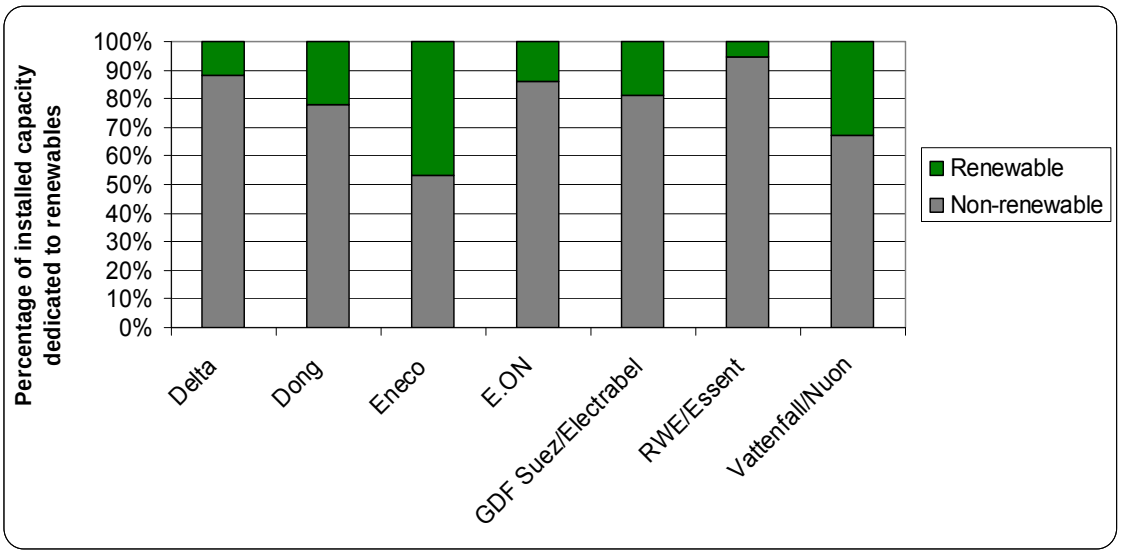
Table 38: Fuel mix of installed capacity in Europe by company, in MW, 2008

Fuel type (%)	Delta	Dong	Eneco	E.ON	GDF Suez/ Electrabel	RWE/ Essent	Vattenfall / Nuon
Renewable	11.7	22.0	46.5	14.2	18.7	5.2	33.0
Natural gas	36.3	12.3	53.5	24.8	51.8	20.5	7.0

[423] The category "Other" refers to non-renewable, generally fossil fuel sources of energy such as fuel oil and diesel.

Coal (including lignite)	24.6	56.4	0.0	33.7	11.0	51.6	40.0
Nuclear	27.3	0.0	0.0	19.0	16.8	12.7	20.0
Other	0.0	9.3	0.0	8.3	1.7	10.0	0.0
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Figure 25: Installed capacity in Europe dedicated to renewable electricity, by company, 2008



SOMO compilation based on company data

9.2 Electricity generated in Europe

Table 39 shows the electricity that was actually generated in 2008 from the companies' installed capacity listed above. It should be noted that some companies do not provide figures on their generation figures, so there are a number of gaps in the tables and figures in this section. Looking at the overall figures, it is not surprising that E.ON, the company with the most installed capacity, also generated the most electricity in 2008. The figures for Vattenfall and Nuon combined amount to almost 180TWh, which is significantly more than the Eneco and Dong, the two much smaller companies for whom data was available.

Looking at the overall renewable figures, we see that Vattenfall / Nuon generated the most electricity from renewable sources, followed by E.ON, RWE / Essent, Dong and Eneco. Please note that that the figures for RWE / Essent are not available due to the fact that RWE provides no information on electricity generated and Essent provides data only on electricity generated from renewable sources (8,356 GWh in 2008). No figures were available for Delta or GDF Suez / Electrabel.

Table 39: Fuel mix of electricity generated in Europe by company, in GWh, 2008

Fuel type	Delta	Dong	Eneco	E.ON	GDF Suez / Electrabel	RWE/ Essent	Vattenfall / Nuon
Renewable	n/a	4,635	1,500	25,377	n/a	n/a	43,300
Natural gas	n/a	1,668	8,000	40,382	n/a	n/a	9,200
Coal (including lignite)	n/a	10,194	0	78,608	n/a	n/a	80,300

Nuclear	n/a	0	0	77,162	n/a	n/a	46,200
Other	n/a	2,039	0	3,965	n/a	n/a	0
Total	**n/a**	**18,536**	**9,500**	**225,494**	**n/a**	**n/a**	**179,100**

* Incomplete information; SOMO compilation based on company data

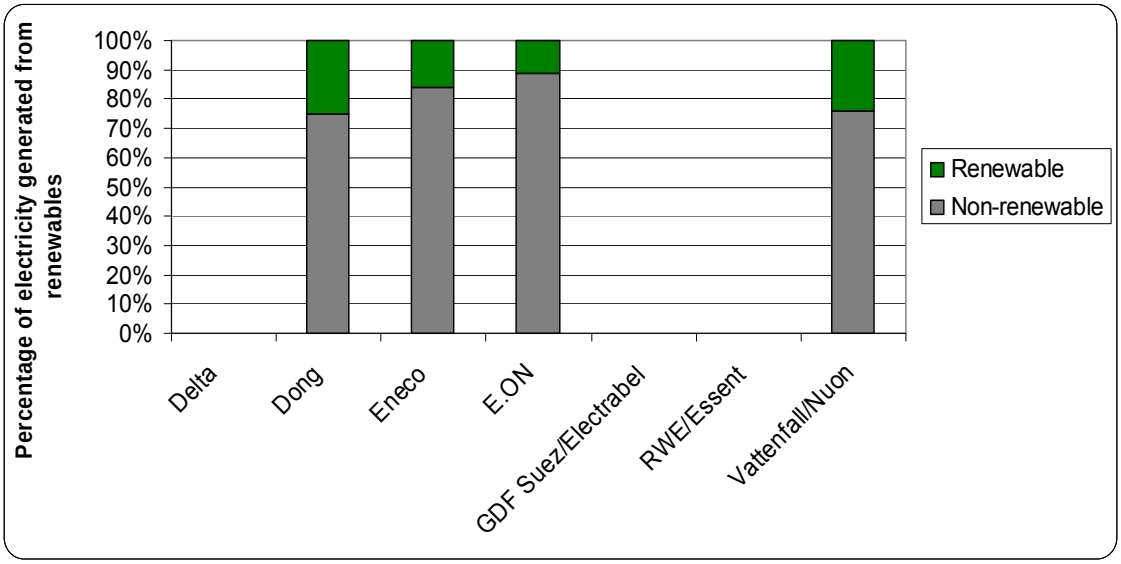
Table 40 reflects the fuel mix of the electricity generated by the companies. It shows that newcomer Dong Energy has the highest percentage of electricity generated from renewables (25%), closely followed by Vattenfall / Nuon (24%). Interestingly, Eneco only generated 15.8% of its electricity from renewable sources, which is a much lower percentage than would be expected from its installed capacity (46.5%). Relative figures could not be calculated for Delta and GDF Suez / Electrabel since no figures were available, or for RWE / Essent since only partial information could be gathered.

Table 40: Fuel mix of electricity generated in Europe by company, in percentage, 2008

Fuel type	Delta	Dong	Eneco	E.ON	GDF Suez/ Electrabel	RWE / Essent	Vattenfall / Nuon
Renewable	n/a	25.0	15.8	11.2	n/a	n/a	24.0
Natural gas	n/a	9.0	84.2	18.0	n/a	n/a	5.0
Coal (including lignite)	n/a	55.0	0.0	34.9	n/a	n/a	44.0
Nuclear	n/a	0.0	0.0	34.2	n/a	n/a	26.0
Other	n/a	11.0	0.0	1.8	n/a	n/a	0.0
Total	**n/a**	**100**	**100**	**100**	**n/a**	**n/a**	**100**

SOMO compilation based on company data

Figure 26: Electricity generated from renewables in Europe, by company, 2008



SOMO compilation based on company data

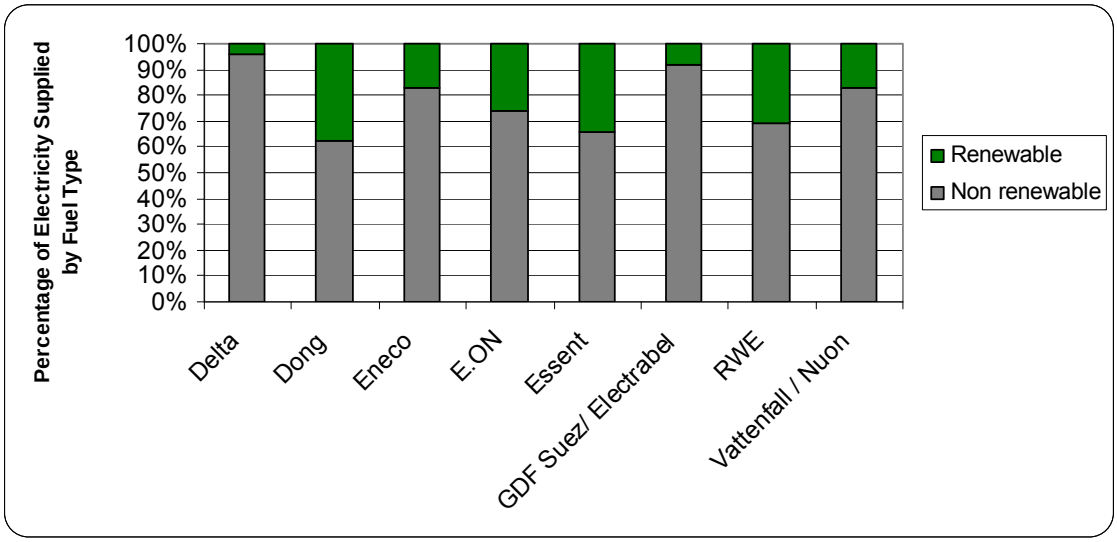
10 Fuel mix of electricity supplied in the Netherlands

This fact sheet compares the companies regarding the fuel mixes of the electricity they supply in the Netherlands, or in some cases also including neighbouring countries. The energy labels that each company is obliged to present are taken as the basis of these comparisons. Again, it should be noted that the RWE / Essent and Vattenfall / Nuon combined-company approximations are estimations made by SOMO that have not been verified by the companies.

10.1 Percentage of renewable energy in electricity supplied

Figure 27 illustrates the fuel mix of electricity supplied by the various companies, on the basis of their energy labels. Of all the companies, Dong supplies the most renewable energy, closely followed by Essent. Delta and Electrabel supply the least renewable energy. No figures could be given for Essent and RWE combined, as is done for other comparisons in this research, as only relative figures were available. It was therefore not possible to combine the two electricity labels, so the two companies are presented separately in the tables and figures in this section. Vattenfall is not yet active on the Dutch market, so the figures given for Vattenfall / Nuon are simply the figures from Nuon.

Figure 27: Renewable and non-renewable electricity supplied in the Netherlands, by company, 2008



SOMO compilation based on company data; *E.ON figures for electricity supplied in the Benelux region; **Essent and Nuon figures for electricity supplied in Netherlands, Belgium, Germany.

Table 41 provides a more detailed overview of the fuel sources used for the supply of electricity for each company.

Table 41: Fuel mix of electricity supplied in the Netherlands by company, in percent, 2008

Fuel type	Delta	Dong	Eneco	E.ON*	Essent**	GDF Suez/ Electrabel	RWE	Vattenfall / Nuon**
Renewable	4	38	17	26	34	8	31	17
Natural gas	51	39	59	45	37	67	45.5	47
Coal (including lignite)	25	16	16	20	18	21	12.9	23
Nuclear	17	5	5	6	7	3	4.7	8
Other	3	2	2	3	4	2	5.9	5
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

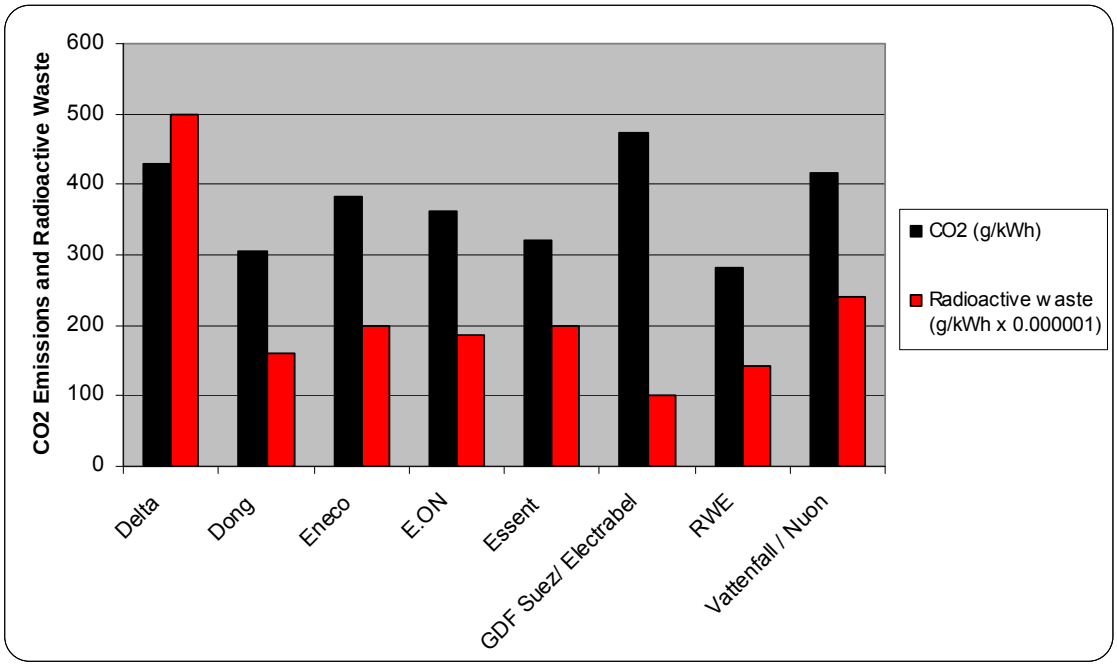
SOMO compilation based on company data; *E.ON figures for electricity supplied in the Benelux region; **Essent and Nuon figures for electricity supplied in Netherlands, Belgium, Germany.

As mentioned in section 7.3 above, because Essent and RWE provide figures on different regional scales and because neither RWE nor Essent provides aggregate figures on the actual amount of electricity supplied in the Netherlands (in GWh), a comparison and combination of the figures to illustrate what the combined company's supply in the Netherlands will look like is difficult. However, the two companies' fuel mixes for electricity supply are relatively similar, and if we acknowledge the fact that the majority of Essent's electricity supply is in the Netherlands, and the fact that Essent supplies more electricity in the Netherlands than RWE and thus give slightly more weight to Essent's supply figures, the following approximation of the combined RWE / Essent Netherlands electricity supply fuel mix can be made: Renewable 33%, non-renewable 67% (natural gas 40%, coal 16%, nuclear 6%, and other 5%). It should be noted, however, that this compilation is speculative and has not been verified by either Essent or RWE.

10.2 CO_2 emissions and radioactive waste

The CO_2 emissions and radioactive waste resulting from the electricity supplied by the companies, as shown in Figure 28, resemble the fuel mixes of their electricity supply. Dong's large share of renewable energy in its supply mix also results in low CO_2 emission figures. However, RWE has even lower CO_2 emission figures. This is due to the small share of coal in its fuel mix. The suppliers with the least sustainable supply mix, Delta and Electrabel, 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 the most radioactive waste. GDF Suez/Electrabel, a company that does own significant nuclear capacity, barely supplies energy from this source within The Netherlands.

Figure 28: CO_2 emissions and radioactive waste resulting from electricity supplied in the Netherlands, per company, 2008



SOMO compilation based on company data; *E.ON figures for electricity supplied in the Benelux region; **Essent and Nuon figures for electricity supplied in Netherlands, Belgium, Germany.

Table 42 shows the figures as given in the electricity labels of the CO2 emissions and production of radioactive waste for each company.

Table 42: CO_2 emissions and radioactive waste resulting from electricity supplied in the Netherlands, per company, 2008

	Delta	Dong	Eneco	E.ON*	Essent**	GDF Suez/ Electrabel	RWE	Vattenfall/ Nuon**
CO_2 emissions g/kWh	428.7	304.0	384.0	362.5	321.0	472.0	281.1	417.4
Nuclear waste g/kWh (x0.000001)	500	160	200	187	200	102	142	240

SOMO compilation based on company data; *E.ON figures for electricity supplied in the Benelux region; **Essent and Nuon figures for electricity supplied in Netherlands, Belgium, Germany.

11 Investments in new generation capacity in Europe

This thematic fact sheet examines the seven companies' current and announced investments in new electricity generation capacity in Europe and, based thereupon, provides a forecast of the companies' future fuel mixes. A distinction is made between 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).

11.1 Current investments in new generation capacity in Europe

This section analyses investment in electricity generation plants that are currently under construction in Europe. It does not include the announced plans for investment. Table 43 presents the financial amount (in million €) of the investments, broken down into investment in capacity for renewable, natural gas, coal, nuclear and other non-renewable generation. It should be noted that it was not possible to gather the financial information for all the investments currently underway. Therefore, some of the figures given in this table are incomplete. Table 44 lists the investments according to the maximum capacity to be installed (in MW), broken down in the same fashion.[424]

Looking at the investment figures in Table 43, RWE / Essent is by far the largest investor in new capacity, investing more than €14 billion, the vast majority going to fossil fuels (coal and natural gas). GDF Suez / Electrabel is investing massively in nuclear, while RWE / Essent also has more limited investments in nuclear. Dong Energy is spending the largest amount on new renewable capacity, closely followed by E.ON. As mentioned above, these figures should be interpreted with caution due to their incompleteness.

[424] Note that these tables include only investments for which information with regard to monetary amounts and MW is available. It is therefore possible that more investments are currently under construction than those that are given in Table 43 and Table 44.

Table 43: Investments (in million €) in new generation capacity in Europe, per company and fuel source

Fuel type	Delta	Dong	Eneco	E.ON	GDF Suez / Electrabel	RWE/ Essent	Vattenfall / Nuon
Renewable	n/a*	3,240	1*	3,135	131*	2,351*	2,067*
Natural gas	275	898	750*	1,730*	353*	4,175	0[425]
Coal (including lignite & coal improvements)	0	0	0	3,900	4,600	7,291	6,320
Nuclear	0	0	0	0	4,000*	366	0
Other	0	0	0	100	0	0	0
Total	**275***	**4,138**	**751***	**8,865***	**9,084***	**14,183***	**8,387***

* Incomplete information; SOMO calculation from company data [426]

Table 44 shows that each of the companies currently has renewable projects in the pipeline. GDF Suez/Electrabel, E.ON, Vattenfall / Nuon and Dong each will expand their renewable capacity by more than 1,000MW in the near future. RWE / Essent is the largest investor overall with investments in more than 11,000MW of new capacity currently underway.

Table 44: Investments in new generation capacity (in MW) in Europe, per company and fuel source

Fuel type	Delta	Dong	Eneco	E.ON	GDF Suez/ Electrabel	RWE / Essent	Vattenfall / Nuon
Renewable	26	1,175	117	1,518	1,642	1,009	1,309
Natural gas	435	1,110	437	4,379	2,890	5,676	0[427]
Coal (including lignite & coal improvements)	0	0	0	3,300	3,107	4,941	3,515
Nuclear	0	0	0	0	2,275	132	0
Other	0	0	0	n/a*	0	0	0
Total	**461**	**2,285**	**493**	**9,197***	**9,914**	**11,758**	**4,824**

* Incomplete information; SOMO calculation from company data [428]

11.2 Announced investment plans for new generation capacity in Europe

In addition to the plants that are currently being developed, companies have also announced plans for various investments to be made in the future. These 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. Due to this and other factors, not all financial details of these plans are known. Again, this results in incomplete information that should be interpreted with caution.

[425] See footnote 376

[426] This Table only examines investments in new electricity generation capacity. This means that investments in new technologies or efficiency measures in existing plants are not taken up. For calculating these figures, the full amount of the investment is taken up, including when these projects are in collaboration with other companies/parties. If companies have specified their share, only their own investment is used. In the case of E.ON, the investments by E.ON UK and E.ON Nordic are also included.

[427] See footnote 376

[428] When the capacity of a project is given as a range rather than as a single figure, the average of the range is used in the calculation.

Table 45 and Table 46 present the companies' announced plans for additional investment. Table 45 provides the information in monetary terms (million €), while Table 46 presents the figures in terms of maximum output capacity (MW).

Some of the figures that stand out include the new renewable capacity that RWE / Essent has announced to invest in the future. The company plans to develop almost 20,000MW of mostly wind generated power. At the same time, E.ON, the other German giant, gives a much more modest outlook for its investments in renewable energy. Dutch company Eneco is the only one that has not announced any non-renewable investments other than the ones currently underway.

Five of the companies in this research have announced plans to develop more than 3,000 MW of new coal capacity. Only Eneco, which focuses more on renewable investments and decentralized generation facilities, and Delta, focusing on additional nuclear capacity, do not have plans for new coal plants.

Table 45: Announced plans for investments (in million €) in new generation capacity in Europe, by company and fuel source

Fuel type	Delta	Dong	Eneco	E.ON	GDF Suez/ Electrabel	RWE / Essent	Vattenfall / Nuon
Renewable	240*	25*	1,600*	1,154*	516*	9,506*	4,065*
Natural gas	n/a*	336	0	200*	1,390*	n/a*	233*
Coal (including lignite)	0	2,326*	0	3,360*	2,000*	6,710*	233*
Nuclear	4,500	0	0	n/a*	0	1,500*	4,000
Other	0	0	0	0	0	0	0
Total	**4,740***	**2,687***	**1,600***	**4,714***	**3,906***	**17,716***	**8,531***

* Incomplete information; SOMO calculation from company data[429]

Table 46: Announced plans for investments in new generation capacity (in MW) in Europe, by company and fuel source

Fuel type	Delta	Dong	Eneco	E.ON	GDF Suez/ Electrabel	RWE / Essent	Vattenfall/ Nuon
Renewable	169*	363	1,267*	1,048	1,203*	19,955*	6,488
Natural gas	400	435	0	2,650	2,620	960	1,650
Coal (including lignite)	0	4,700	0	5,404	3,830	6,382	3,318
Nuclear	2,500	0	0	2,000	0	3,980	n/a*
Other	0	0	0	0	0	0	0
Total	**3,069***	**5,498**	**1,267***	**11,102**	**7,653***	**31,277***	**11,456***

* Incomplete information; SOMO calculation based on company data

On the basis of the data on the plants that are currently being constructed (Table 43 and Table 44), an estimation can be made for each company about the fuel mixes for electricity generation once these investments have been completed. Adding the additional capacity listed in Section 11.1 to the current fuel mixes of the companies, Eneco will still have the highest renewable fuel mix although its percentage drops slightly. Dong Energy will see its

[429] Only the known investment figures are taken up. This means that a number of projects that are in advanced stages of planning, but for which no financial details have been disclosed, are not taken up in this table.

relative fuel mix become more sustainable once all investments are completed. All the other companies will remain more or less the same.

When calculating the estimated fuel mix if all investments *and* announced plans (Table 45 and Table 46) were completed according to current projections, quite a different picture emerges. Most notably, RWE would all of a sudden become one of the most sustainable companies with a relative renewable fuel percentage of 25.3%. Eneco would see its renewables share climb above 50%. Only Delta would significantly lower its renewable share.

However, it should be noted that these announced investments are unlikely to all be realized in the same form as they have been announced. Therefore, only limited weight should be given to the projections summarised in Table 47.

Table 47: Current and prospected relative renewable generation capacity (in percent) per company

Percentage of capacity based on renewables	Delta	Dong	Eneco	E.ON	GDF Suez / Electrabel	RWE / Essent	Vattenfall/ Nuon
Current capacity (2008)	11.7	22.0	46.5	14.1	18.7	5.2	32.7
Current capacity (2008) + investments	8.8	29.7	41.1	14.4	18.3	5.8	32.1
Current capacity (2008) + investments + announced plans for investment	6.7	20.8	59.7	13.7	17.9	25.0	37.2

SOMO calculation based on company data

11.3 Investments per fuel type

This section presents the combined current investments and announced plans for investment per fuel type in order to give an indication of the current trends regarding fuel type, as well as serving as a further specification of the information provided above.[430] Table 48 reveals that most of the companies are building or are planning to build new capacity for power generation from renewable sources of some sort.

Table 48: Investment in sustainable generation capacity, by company and fuel source

Fuel source	Company	Value (€ million)	Capacity (MW)
Current			
Biomass			
	Delta	n/a	12.5
	E.ON	69*	115
	RWE / Essent	142*	27
	Vattenfall / Nuon	120	95
Wind			
	Dong Energy	3,240	1,175

[430] For the tables in this section, info on the monetary amounts (€) of investments planned are often not available, so these results should be interpreted with caution.

	Eneco	n/a	117
	E.ON	3,066	1,403
	GDF Suez / Electrabel	131*	1,623
	RWE / Essent	2,137*	951
	Vattenfall / Nuon	1,884*	1,209
Hydro			
	Eneco	1	0
	RWE / Essent	72	25
	Vattenfall / Nuon	9	5
Solar			
	Delta	n/a	3
	GDF Suez / Electrabel	n/a	16
	RWE / Essent	n/a	6
Planned			
Biomass			
	Delta	n/a	2*
	Eneco	n/a	64
	E.ON	347	150
	RWE / Essent	314*	384
Wind			
	Delta	n/a	29.5
	Eneco	1,600*	1,003
	Dong Energy	25*	363
	E.ON	807*	888
	GDF Suez / Electrabel	516*	923
	Vattenfall / Nuon	4,064*	6,238
	RWE / Essent	9,192*	19,394
Hydro			
	Delta	200	n/a
	E.ON	n/a	5
	GDF Suez / Electrabel	n/a	60
	RWE / Essent	142*	217
Solar			
	GDF Suez / Electrabel	n/a	220
Tidal / Wave			
	E.ON	n/a	5
	Vattenfall / Nuon	1	250
Osmosis			
	Eneco	n/a	200

*Incomplete information; SOMO calculation based on company data

Similarly, Table 49 indicates that all companies also have plans for new natural gas-based capacity. In particular, E.ON, GDF Suez/Electrabel, Vattenfall / Nuon and RWE / Essent are investing in significant additional gas capacity.

Table 49: Investment in natural gas-based generation capacity, by company

Investment	Company	Value (€ million)	Capacity (MW)
Current			
	Delta	275	435
	Dong Energy	898	1,110
	Eneco	750*	437
	E.ON	1,730*	4,379
	GDF Suez / Electrabel	353*	2,890
	RWE / Essent	4,175	5,676
Planned			
	Delta	n/a	400
	Dong Energy	336	435
	E.ON	200*	2,650
	GDF Suez / Electrabel	1,390*	2,620
	RWE / Essent	n/a	960
	Vattenfall / Nuon	n/a	1,400

* incomplete information; SOMO calculation based on company data

Table 50 lists the companies that are investing in, or have plans to invest in new coal facilities. All the larger companies are currently constructing new coal facilities, while all companies except Delta and Eneco have plans to do so.

Table 50: Investment in coal-based (including lignite and improvements) generation capacity, by company

Investment	Company	Value (€ million)	Capacity (MW)
Current			
	E.ON	3,900	3,300
	GDF Suez / Electrabel	4,600	3,107
	RWE / Essent	7,291	4,941
	Vattenfall / Nuon	6,320	3,515
Planned			
	Dong Energy	2,326*	4,700
	E.ON	3,360*	5,404
	GDF Suez / Electrabel	2,000*	3,830
	RWE / Essent	6,710	6,381.5
	Vattenfall / Nuon	233	3,318

* incomplete information; SOMO calculation based on company data

Table 51 lists the companies that are investing in, or have plans to invest in new nuclear facilities.

Table 51: Investment in nuclear generation capacity, by company

Investment	Company	Value (€ million)	Capacity (MW)
Current			
	GDF Suez / Electrabel	4,000*	2,275
	RWE / Essent	366	132
Planned			
	Delta	4,500	2,500
	E.ON	n/a	2,000
	RWE / Essent	1,500*	3,980
	Vattenfall / Nuon	4,000	n/a

* incomplete information; SOMO calculation based on company data

12 Demand-side initiatives in the Netherlands

Demand-side initiatives are efforts made by the energy companies to help consumers become more sustainable in their energy consumption, primarily by reducing their overall energy use. Initiatives on the supply side, such as the development of innovative renewable energy production methods, are not considered here.

Offering clients the possibility to purchase renewable electricity is an effort to make the energy consumption of clients more sustainable. However, renewable electricity supply is already covered in section 3 of the company factsheets in which the electricity supply of the companies in the Netherlands is shown. Therefore, this effort is not considered a demand-side initiative in this thematic factsheet.

Demand-side initiatives undertaken by power companies active in the Dutch market include:

- Energy Label advice: Personal advice about Energy Labels, principally Energy Performance Advice (EPA).
- Energy Label assignment: Granting of Energy Labels by officially acknowledged advisors.
- Energy reduction tips on website: General energy reduction tips shown on the website of the energy company.
- Personal energy advice: Energy advice that applies to the specific situation of the individual client, such as energy tests, personal assistance, etc.
- Participation in 'Meer Met Minder' Initiative: 'Meer Met Minder' is a joint initiative by the Dutch government, construction companies, and energy companies through which households can evaluate how to lower their electricity costs.
- Offering energy efficient products: The sale of energy efficient products like low-energy light bulbs or high efficiency boilers.
- Financial incentives for energy efficiency: Favourable conditions that take effect when clients buy energy efficient products, or when they cut back on power consumption.
- Awareness raising: Methods that help clients become more aware of their power consumption.
- Stimulating individual renewable energy production: Support and financial benefits for clients that produce their own energy by means of, for example, solar panels, solar boilers or wind turbines.
- Offering individual renewable energy products: The sale of products with which clients can generate their own energy, such as solar panels, solar boilers or wind turbines.
- Environmental subsidy advice: Providing advice to clients on available environmental subsidies related to energy.
- Compensation measures: Providing clients the possibility to compensate the CO2 emissions of their power consumption.

Table 52 provides an overview of the demand-side initiatives offered by the various power companies active in the Netherlands. Please note that it is possible that several demand-side initiatives of a company fall into one single category.

Table 52: Demand-side initiatives in the Netherlands by company, 2008

Demand-side initiative	Delta	Dong	Eneco	E.ON	GDF Suez/ Electrabel	RWE / Essent	Vattenfall / Nuon
Energy Label advice			X	X		X	X
Energy Label assignment	X		X	X		X	X
Energy reduction tips on website	X	X	X	X	X	X	X
Personal energy advice	X	X	X		X	X	X
Participation in 'Meer Met Minder' Initiative[431]	X	X	X	X	X	X	X
Offering energy efficient products			X			X	X
Financial incentives for energy efficiency						X	X
Awareness raising	X	X	X		X	X	X
Stimulating individual renewable energy production	X		X			X	X
Offering individual renewable energy products	X		X			X	X
Environmental subsidy advice	X		X		X	X	X
Compensation measures			X		X	X	X

Based on: company sources, news reports

The table indicates that Vattenfall / Nuon and RWE / Essent offer the most diverse range of demand-side initiatives in the Netherlands. Eneco and Delta also have a large variety of demand-side initiatives, of which Eneco clearly offers the most possibilities to clients (see endnotes). GDF Suez / Electrabel offers an average range of initiatives, in the form of advice, tips and measures to monitor energy consumption and to compensate CO_2 emissions. Within the category 'Awareness raising' in Table 52, Electrabel offers many different measures such as a scan of energy consumption and an energy efficiency debate.

Dong and E.ON offer the least variety of demand-side initiatives. E.ON offers Energy Label advice services and publishes energy reduction tips on their websites. Dong offers energy reduction tips, personal energy advice, and energy reduction tools.

All energy companies are a member of the "Meer Met Minder" initiative, contributing financially to the energy saving measures for its clients that are executed by the government-led initiative.

[431] Meer Met Minder website, Thuis, Wat kunt u doen?, "Energieleveranciers", no date, http://www.meermetminder.nl/energieleveranciers (14-08-09).

13 Methodological Annex

13.1 "Renewable" vs. "Non-renewable" fuels and sustainability considerations

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".[432] Table 53 provides an overview of the classification used by SOMO, with the reasoning for each fuel type in the corresponding descriptions below.

Table 53: 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)[433], 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

[432] J. Wilde-Ramsing, Quality Kilowatts: A normative-empirical approach to the challenge of defining and providing sustainable electricity in developing countries (Amsterdam and Oslo: SOMO and ProSus/SINTEF, June 2009) http://somo.nl/publications-nl/Publication_3170-nl/view (4 September 2009).

[433] 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).

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.[434]

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. 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 is extremely carbon-intensive. The mining and enriching of uranium ore into high quality fuel are industrial processes that require an enormous amount of energy and are therefore responsible for large CO_2 emissions. 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.[435] Furthermore, electricity generation from nuclear fuel produces various types of solid radioactive waste (high, medium, and low-level radioactivity[436]). Because of the lack of a technological solution for permanently treating nuclear waste to rid it

[434] V. Fthenakis and H.C. Kim, "Land use and electricity generation: A life-cycle analysis", *Renewable and Sustainable Energy Reviews*, 2008, in press.

[435] H. Shinondola-Mote, "Uranium Mining in Namibia: A Blessing or a Curse?" Labour Resource and Research Institute (LaRRI), Windhoek, Namibia, 2008, http://somo.nl/publications-nl/Publication_3004-nl/view, (5 June 2009).

[436] 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).

of dangerous radioactivity, generation of electricity from nuclear fuel represents a transfer of costs and environmental liability to future generations. 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. 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 a relatively carbon-neutral process. 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. Nevertheless, as recently-built Greenpeace pilot stand-alone biomass plant demonstrates, the technology to build an efficient, clean biomass-only plant does exist. 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[437]), loss of biodiversity due to changes in land use, decent labour standards on plantations and in processing chains, indigenous land rights issues, etc. The Dutch Cramer Commission[438] has developed sustainability criteria for biomass, but these are still being hotly debated in Europe and around the globe and are not necessarily used by all the power generation companies investigated in this report. 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

[437] 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.

[438] Cramer Commission, "Testing framework for sustainable biomass: Final report from the project group 'Sustainable production of biomass'". Energy Transition's Interdepartmental Programme Management (IPM), 2007, http://www.swnternovem.nl/mmfiles/Testing%20framework%20for%20sustainable%20biomass_tcm24-232796.pdf (1 May 2009).

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 sustainable, with a note to readers that this should be viewed cautiously for the abovementioned 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 a theoretical 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%[439], 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%.[440]
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 considers investment in CCS to be investment in a non-renewable fuel source (fossil fuels) and will classify it as investment in coal or natural gas depending the type of plant it is applied to.

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[439] Intergovernmental Panel on Climate Change, "IPCC special report on Carbon Dioxide Capture and Storage". Cambridge University Press, Cambridge and New York, 2005, <www.ipcc.ch> (5 July 2009).
[440] Ibid.

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.[441] 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.[442] As a result, the World Commission on Dams asserts that "Where other options offer better solutions, they should be favoured over large dams".[443]

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.[444] 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.[445]

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[441] International Hydropower Association, *Sustainability Guidelines*, 2004, http://www.hydropower.org/downloads/IHA%20Sustainability%20Guidelines_Feb04.pdf (9 June 2009).
[442] International Rivers, *Dirty Hydro: Dams and Greenhouse Gas Emissions*, 2008, http://internationalrivers.org/files/dirtyhydro_final_lorez.pdf (16 June 2009).
[443] World Commission on Dams, *Dams & Development: A New Framework for Decision-Making*, 2008, London and Sterling, VA: Earthscan Publications Ltd.
[444] International Hydropower Association, *Sustainability Guidelines*, 2004, http://www.hydropower.org/downloads/IHA%20Sustainability%20Guidelines_Feb04.pdf (9 June 2009).
[445] Eawag, *Annual Report 2007*, Swiss Federal Institute of Aquatic Science and Technology, Dübendorf, Switzerland, 2008, http://www.eawag.ch/services/publikationen/jahresbericht/eawag-jb_07e.pdf (10 May 2009).

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.

13.2 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 2008 or early 2009 or since the company's last reporting (generally, mid-2008) 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 (all of which are dated 2008), but the status of those investments in the "Investments in new generation capacity" tables in the investment section of each company fact sheet and the thematic fact sheet on investment is noted as "In operation since *xx date*".