CHAPTER 4: Emergency response systems of individual IEA countries

The ability of the International Energy Agency (IEA) to co-ordinate a swift and effective international response to an oil supply disruption stems from the strategic efforts of member countries to maintain a state of preparedness at the national level. Energy security is more than just oil, as the role of natural gas continues to increase in the energy balances of IEA countries. The most recently completed cycle of Emergency Response Reviews (ERRs) reflected this change by assessing, for the first time, the member countries’ exposure to gas disruptions and their ability to respond to such crises. This chapter provides general profiles of the oil and natural gas infrastructure and emergency response mechanisms for 29 IEA member countries.

Each country profile is set out in the following sequence:

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Oil demand
Imports/exports and import dependency
Oil company operations

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Ports and pipelines
Storage capacity

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Monitoring and non-compliance
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Gas demand
Gas import dependency
Gas company operations

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Storage

*Emergency policy*
Emergency response measures
Norway

Key data

Table 4.20.1  Key oil data

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<tbody>
<tr>
<td>Production (kb/d)</td>
<td>1 717.6</td>
<td>3 330.8</td>
<td>2 960.7</td>
<td>2 137.0</td>
<td>2 039.3</td>
<td>1 913.7</td>
<td>1 751.5</td>
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<td>Demand (kb/d)</td>
<td>199.4</td>
<td>211.4</td>
<td>216.7</td>
<td>220.8</td>
<td>224.3</td>
<td>218.0</td>
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<td>Motor gasoline</td>
<td>41.4</td>
<td>37.4</td>
<td>36.6</td>
<td>27.8</td>
<td>25.2</td>
<td>23.0</td>
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<td>Gas/diesel oil</td>
<td>65.6</td>
<td>79.3</td>
<td>84.4</td>
<td>99.6</td>
<td>96.8</td>
<td>98.2</td>
<td>-</td>
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<tr>
<td>Residual fuel oil</td>
<td>12.5</td>
<td>10.4</td>
<td>10.0</td>
<td>7.1</td>
<td>5.8</td>
<td>4.7</td>
<td>-</td>
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<tr>
<td>Others</td>
<td>79.8</td>
<td>84.3</td>
<td>85.7</td>
<td>86.3</td>
<td>96.4</td>
<td>92.1</td>
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<td>Net imports (kb/d)</td>
<td>-1 518.2</td>
<td>-3 119.4</td>
<td>-2 744.0</td>
<td>-1 916.2</td>
<td>-1 815.0</td>
<td>-1 695.7</td>
<td>-1 498.9</td>
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<td>Import dependency (%)</td>
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<td>-1 475.6</td>
<td>-1 266.2</td>
<td>-868.0</td>
<td>-809.3</td>
<td>-777.7</td>
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<td>Refining capacity (kb/d)</td>
<td>295.0</td>
<td>358.0</td>
<td>310.0</td>
<td>316.2</td>
<td>316.2</td>
<td>316.2</td>
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<tr>
<td>Oil in TPES** (%)</td>
<td>36</td>
<td>32</td>
<td>35</td>
<td>40</td>
<td>37</td>
<td>37</td>
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* Forecast.
** TPES data for 2012 are estimates.

Table 4.20.2  Key natural gas data

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<td>Production (mcm/y)</td>
<td>27 642</td>
<td>53 293</td>
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<td>114 748</td>
<td>117 348</td>
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<td>Demand (mcm/y)</td>
<td>2 262</td>
<td>4 109</td>
<td>5 186</td>
<td>6 141</td>
<td>5 891</td>
<td>6 156</td>
<td>5 939</td>
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<td>Transformation</td>
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<td>64</td>
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<td>Industry</td>
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<td>818</td>
<td>790</td>
<td>874</td>
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<td>-</td>
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<td>Residential</td>
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<td>0</td>
<td>6</td>
<td>5</td>
<td>4</td>
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<td>-</td>
</tr>
<tr>
<td>Others</td>
<td>2 262</td>
<td>3 395</td>
<td>4 298</td>
<td>4 415</td>
<td>4 267</td>
<td>0</td>
<td>-</td>
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<tr>
<td>Net imports (mcm/y)</td>
<td>-25 380</td>
<td>-49 184</td>
<td>-81 760</td>
<td>-103 507</td>
<td>-99 806</td>
<td>-108 592</td>
<td>-111 409</td>
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<tr>
<td>Import dependency (%)</td>
<td>-1 122</td>
<td>-1 197</td>
<td>-1 577</td>
<td>-1 686</td>
<td>-1 694</td>
<td>-1 764</td>
<td>-1 876</td>
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<tr>
<td>Natural gas in TPES (%)</td>
<td>9</td>
<td>15</td>
<td>15</td>
<td>20</td>
<td>18</td>
<td>17</td>
<td>-</td>
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</tbody>
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* 2012 data are estimates.
** Forecast.

Note: This section on the emergency response systems of individual member countries was written by the IEA. All countries provided valuable information and comments. All opinions, errors and omissions are solely the responsibility of the IEA.
Figure 4.20.1  Total primary energy source (TPES) trend, 1973-2012
Map 4.20.1  Oil infrastructure of Norway

This map is without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.
Map 4.20.2  Gas infrastructure of Norway

This map is without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.
Country overview

Norway joined the International Energy Agency (IEA) in 1975, with an agreement allowing the government to decide whether and how (on a case-by-case basis) to join an IEA emergency sharing system, including emergency stockdraw response measures. As Norway is a net exporter of oil, it is not bound by the IEA 90-day stockholding commitment.

Crude oil and natural gas resources on the Norwegian Continental Shelf (NCS) have been the main driver of the growth of oil and gas production in Norway. Since 2002, however, oil production has been declining; in the absence of significant new discoveries, the peak of oil production may already have been reached.

In 2012, Norway produced 1.91 million barrels per day (mb/d). Norway’s crude is both light and sweet, and over three-quarters of its production is exported, with over 90% headed to OECD Europe member countries.

Total Norwegian oil demand in 2012 stood at 218 kb/d. Norway’s total oil demand has been declining gradually since 2006, with the transportation sector accounting for over half of this demand.

Norway has two refineries: The Mongstad facility (200 kb/d) close to Bergen, and the Esso plant (110 kb/d) at Slagen south of Oslo. Their annual capacity totals about 310 kb/d. Approximately 30% of the output from these refineries (90 kb/d) is consumed by the domestic market, while the rest is exported.

Until 2006, Norway held a certain amount of governmental stocks for oil emergencies. These stocks were sold off in 2007 when new legislation was introduced that obliged the industry to hold emergency stocks of 20 days of their sales/imports in the domestic market. Release of company-held stocks is the preferred action in an IEA collective action responding to an oil supply disruption.

Norway is a significant gas producer. In 2012 its production stood at 114.7 bcm and is forecast to remain so for the coming decades. The Norwegian government has estimated “remaining gas resources” at 4.0 trillion cubic metres (tcm), of which 69% are discovered and 31% are undiscovered resources.

By contrast, Norway is a marginal consumer, exporting almost its entire production. Norway’s total gas consumption stood at approximately 6.1 bcm per year in 2012.

Oil

Market features and key issues

Domestic oil production

Norway is a major oil producer, and is one of only three net exporters (along with Canada and Denmark) among the IEA member countries. The bulk of domestic crude oil is produced from offshore platforms operating on the NCS. From the platforms, the crude oil is transported to onshore oil terminals either by pipeline or by loading onto oil tankers for transportation to oil refineries. The Mongstad refinery is linked by pipeline to some of the offshore production.
Norway produced 1.91 mb/d in 2012. Its crude is both light and sweet, and over three-quarters of its production is exported, with over 90% headed to OECD Europe countries. These volumes make Norway the seventh-largest world oil producer. In 2012, Norway’s net exports of oil (including products) stood at 1.7 mb/d.

Since 2002, NCS oil production has been decreasing. Should no new resources be exploited, it is expected to have peaked.

In order to meet the challenges related to mature fields, the Norwegian authorities have undertaken several policy changes. The two most important ones are opening the NCS to a wider range of companies and making all exploration areas around mature fields available through annual licensing rounds. There are now two separate systems for licensing on the NCS: one for awarding new licences in frontier areas and one for more mature areas.

**Oil demand**

Total Norwegian oil demand in 2012 stood at 218 kb/d. Norway’s total oil demand has been declining gradually since 2006 and overall demand is expected to continue along this gradual downward trend in the upcoming years, mainly because of a progressive decline in gasoline demand.

![Figure 4.20.2 Oil demand by product, 1998-2012](image)

The transportation sector accounted for over half of this demand, with motor gasoline, gas/diesel oil, and jet kerosene being the main transportation fuels. Any future oil demand growth will be the result of increases in the use of these fuels.
Imports/exports and import dependency
In 2012 Norway’s production stood at 1.91 mb/d; 90% of this amount was exported. With its two refineries producing some 328 kb/d of products in a domestic demand market of only 218 kb/d (2012 figures), Norway is also a net exporter of refined products, including both gas/diesel oil and gasoline.

Oil company operations
Nearly 60 oil companies are currently engaged in the upstream sector of the Norwegian petroleum industry. More than one-third of these are appointed operators of one or more production licences. Statoil alone accounts for almost 70% of all activities on the NCS. With the maturing of the NCS fields, there has been a renewed focus on attracting competent new players to the upstream sector. At the end of 2012, the state had participating interests in 158 production licences and 15 partnerships relating to pipelines and onshore installations.

The downstream market is highly concentrated in the hands of a few companies, with the four biggest players – Shell, Statoil Fuel & Retail, Esso and Uno-X – controlling 97% of the combined gasoline and diesel retail market, and the top three alone (Statoil Fuel & Retail, Shell and Esso) accounting for 86% of the market. Statoil has the single biggest market share, with close to 34% of combined motor fuel sales.

Oil supply infrastructure

Refining
Norway has two refineries: The Mongstad facility (200 kb/d) close to Bergen, and the Esso plant (110 kb/d) at Slagen south of Oslo. Their annual capacity totals approximately 310 kb/d.

Approximately 30% of the output from these two refineries (90 kb/d) is consumed by the domestic market, while the rest is exported. The remaining domestic consumption of oil products, amounting to some 140 kb/d, is produced at foreign refineries.
Ports and pipelines

Norway has established an extensive network of sub-sea oil pipelines to link offshore oil fields with onshore terminals. Statoil (previously Norsk Hydro) operates the Oseberg Transport System (765 kb/d) to connect the Oseberg field with the Sture receiving terminal. Statoil also operates another pipeline (265 kb/d) called Grane, linking its Grane field to Sture. The storage capacity of the Sture terminal is 6.3 mb of crude oil.

Statoil also manages the twin pipelines system called Troll I and II (565 kb/d), connecting the Mongstad terminal to offshore oil fields. The terminal can store 9.4 mb of crude oil. Most of the crude is exported from Mongstad by tankers, but the refinery retains a certain amount for its own use.

The Norpipe Oil AS pipeline is operated by ConocoPhillips Skandinavia AS. This oil pipeline (810 kb/d) is about 354 km long, starting at the Ekofisk Centre and crossing the UK Continental Shelf to come ashore at Teeside in the United Kingdom. A tie-in point for UK fields is located about 50 km downstream from Ekofisk.

Norway has numerous ports throughout the country. The main port for the country’s oil industry is near Bergen/Stavanger on the west coast, which is linked by pipeline to offshore production, and is connected to the country’s main refinery at Mongstad. The region around the capital, Oslo, on the east coast also has notable port activity. The country’s other refinery, Slagen, is located at Toensberg, about 100 km south of Oslo.

Storage capacity

Norway has 26 main storage facilities, spread over 17 localities, as well as about 50 distribution storage facilities. If the sub-storage and inland depots are included, altogether Norway has about 400 storage facilities, all owned by Norwegian fuel trading companies.

In addition to the Slagen and Mongstad refineries, which together can store around 15.7 mb of crude oil, Norwegian oil marketing companies have several types of storage facilities, including large storage terminals, distribution storage (supplied by tankers from the refineries or main storages sites) and coastal storage or sub-storage sites for delivering bunker oil to ships (supplied by ship and operated by independent dealers).
The companies also have larger storage facilities situated on service bases for offshore activity which are operated by the service companies themselves. Additionally, inland depots for small-scale distribution (“peddlers”) deliver heating oil and auto diesel to households and agriculture. The products from main storage sites, distribution storage and peddler depots are delivered by trucks. For deliveries to large customers, small tankers or barges are also used.

Several companies have entered into agreements on stockdraw in each other’s storage facilities. The agreements reduce distribution costs and are economical for the companies.

**Decision-making structure**

In an emergency, the formal decision arising from an IEA collective action will be made by the Minister of Foreign Affairs after consultations with the Minister of Petroleum and Energy (MPE). The other cabinet members will be informed in an appropriate way. Depending upon the actual situation, a decision on Norwegian participation might be made within 24 hours after receipt of a proposal for an IEA collective action.

Following the decision to participate in an IEA collective action, the MPE decides on the measures to be taken in an emergency. Under the new compulsory stocks regime, companies are required to release their stocks in an effective manner and immediately.

The stockdraw process (release of industry stocks) will formally be headed by the MPE who will use the Oil Emergency Board (OEB) to administer the process; the OEB is made up of high-ranking representatives from Norwegian oil companies and chaired by the MPE. The operational stock release is undertaken by Statoil ASA or Esso Norway (the two refining companies). The administration indicates that, on request, Statoil ASA’s or Esso Norway’s stockholding commitments of petroleum products can be lowered progressively, in line with the stockdraw rate and the sales process; the sales process is organised as a tender process.

**Stocks**

**Stockholding structure**

Despite being a net exporter, Norway held government stocks until 2006, based on laws established in 1956 (the Act of Supply and Contingency Measures, subsequently amended in 1975).

In August 2006, Norway introduced new legislation with the Act of Petroleum Product Storing for Emergency Purposes, which imposed an obligation on companies to hold stocks of products equivalent to 20 days of their sales/imports in the domestic market, and also an obligation to implement stockdraw upon the government’s request, should a situation of supply deficit occur. The Act was provided with supplementary regulations, instituted in September 2006. As a consequence of this new legislation, the government stocks were sold in 2007.

The new regulations give the government control of company stocks during peacetime in the event of a supply disruption. The new stocks legislation covers only petroleum products; however, in wartime the government can take control of all crude oil stocks as well as industry-held product stocks.
Crude or products
According to the Royal Decree of 1 September 2006 (Regulation relating Petroleum Product Storing for Emergency Purposes), the products that make up the compulsory stockholding obligation embrace the three existing EU categories, namely gasoline (Cat.1), middle distillates (Cat.2) and heavy fuels (Cat.3). At least 40% of the stored products must be made up of each of these three categories (para. 6 of the Royal Decree), and “up to 40% of the total stockholding commitment may consist of crude oil, condensate or semi-finished products”.

Location and availability
The new compulsory stocks are commingled with commercial stocks. Although there are no restrictions on location of stocks outside Norway, no stocks are currently held abroad. Norway has no bilateral stockholding arrangements with other countries.

Monitoring and non-compliance
As stipulated in the Royal Decree (para. 10), “Compulsory stockholders or anyone storing petroleum products on behalf of the compulsory stockholder are bound to provide the ministry with information about imports, sales and stocks, etc. on a specific scheme. The report must be submitted four times a year (i.e. before 15th January, 15th April, 15th July and 15th October”).

The new legislation includes provision for fines of up to EUR 1.25 million (NOK 10 million) per infringement of the obligation.

Financing and fees
There is no financial support to cover the cost of company stock obligations; companies are allowed to pass on any additional costs through consumer prices.

Other measures
Demand restraint
The transport sector makes up the majority of oil consumption in Norway, representing 51% in 2011. Thus the likely, most effective demand restraint measures would be targeted at the use of transport fuels.

In accordance with the Act on Supply and Contingency Measures, the MPE established a set of regulations for a comprehensive demand restraint programme for oil products in 1983 (revised in 1999). The programme consists of three phases: saving campaigns (based on persuasion), restrictions (light and heavy-handed as well) and rationing by cards.

Norway considers that, in today’s oil market, traditional demand restraint measures (such as restrictions on deliveries) are less reliable as measures in an IEA emergency response, and the Norwegian policy is to implement stockdraw measures. This is mainly because of the lengthy preparation time and uncertain effects of demand restraint. However, the legal arrangements from 1983 that allow for the implementation of the demand restraint system have not been formally abolished and are currently dormant.

Rationing by cards has always been regarded as a last resort in Norway and would only be implemented if the government believed that the actual crisis would last for at least six months and domestic consumption had to be cut by 20% or more. Before implementation, a preparation phase of about three months would be required in
order to make the necessary technical arrangements and extensive preparations for implementation and control of the effects of rationing. Other more light-handed demand restraint measures, such as saving campaigns and restrictions, would already have been put into effect during the preparation phase.

Norwegian authorities consider the oil rationing system to be a sub-optimal measure for mastering peacetime oil supply crises, notably because of the long timeframe needed to prepare for the implementation and the building up of a huge apparatus on both the local and regional level.

Other
Norway has no potential for increasing indigenous production in an emergency.

Fuel switching from oil is very limited and is not an issue on which Norway has focused. Norway’s contribution to the IEA’s fuel-switching potential would thus be minimal. Of note, no legal powers exist to implement fuel switching.

Gas

Market features and key issues

Gas production and reserves
Norway is a significant gas producer – production stood at 114.7 billion cubic metres (bcm) in 2012 – and is forecast to remain so for the coming decades. All Norway’s supplies are thus sourced directly from domestic production on the NCS.

The Norwegian administration has estimated “remaining gas resources” at 4.0 tcm, of which 69% are discovered and 31% are undiscovered resources.

In 2012, the Norwegian administration indicated that total “marketed” gas production was 114.7 bcm, of which 108.6 bcm was exported to Europe by pipeline and 4.7 bcm produced and exported from the Snøhvit liquefied natural gas (LNG) plant in the Barents Sea. The IEA estimates total indigenous production (including gas used for upstream oil and gas production) for 2012 at 114.7 bcm.

The Norwegian administration expects production to range from 105 bcm to 130 bcm over the period from 2010 to 2020, depending on exploration results and when new projects come on stream.

The Snøhvit LNG project was constructed to exploit the resources of three gas fields in the Barents Sea – Snøhvit, Albatross and Askeladd (240 m to 345 m deep) – which lie about 140 km northwest of Hammerfest in Norway. The LNG export terminal was completed in August 2007; its annual export capacity is 5.75 bcm.

Gas demand
Norway is a major producer and exporter of gas, but not a large consumer. Indeed, domestic use of gas amounts to a very small percentage of the country’s gas production. In 2012 total gas consumption stood at approximately 6.1 bcm.

Gas use for power is very small, standing at 229 million cubic metres (mcm) in 2012 – accounting for 1.7% of total power input. The biggest consuming sector of natural gas is industry, particularly as natural gas is used as a raw material in chemical production and in small-scale LNG plants. Consumption is minimal in all other sectors.
Gas exports
Norway consistently exports almost 95% of its gas production (108.6 bcm in 2012, out of 114.7 bcm produced). Exports have traditionally been to Europe by direct pipeline (to the United Kingdom, France, Belgium and Germany). Since the Snøhvit LNG terminal started exports in 2007, Norway’s exports have become further diversified.

Figure 4.20.5  Natural gas consumption by sector, 1973-2011

Gas company operations
In Norway, there are two main natural gas distributors, Gasnor AS and Lyse Gass AS. Gasnor operates in the southwestern part of Norway, and Lyse Gass operates in the Stavanger area. Lyse Gass AS has reported the delivery of 61 mcm (599 gigawatt hours) of gas in 2012. Gasnor has reported delivery of 222.9 mcm in 2012.

Gas supply infrastructure

Ports and pipelines
There is no integrated national downstream natural gas infrastructure or natural gas market covering Norway in a comprehensive manner. Norway also has no public or strategic storage of natural gas or LNG.

The pipelines built in Norway cover very limited geographical areas:

- Gasnor has approximately 100 km of pipelines in the southwestern part of Norway, in the Haugesund-Karmøy region
- Lyse Gass AS has approximately 450 km of distribution pipelines and distributes natural gas to a very limited geographical area in the southwestern part of Norway, in the Stavanger area.

Small-scale LNG-distribution has become a Norwegian alternative to gas transmission and distribution networks. In 2007, there were around 30 LNG reception terminals in operation in Norway. No household customers are served from these small-scale LNG reception terminals.
Gassco is the operator of the integrated gas transport system from the NCS to other European countries. The creation of Gassco forms part of an extensive reorganisation of the Norwegian oil and gas sector since 2001. Before that date, gas transport was provided by a number of companies. The Norwegian administration has also indicated that Gassco serves as the operator for the gas receiving terminals in Dunkerque, France, Zeebrugge, Belgium and Emden and Dornum in Germany.

Emergency policy

The Norwegian Water Resources and Energy Directorate is the national independent regulatory authority for the downstream natural gas market, and Norway has implemented the relevant EU directives.

According to the Norwegian administration, security of supply is not an issue in the poorly developed Norwegian downstream gas market. Indeed, natural gas customers in Norway will always be connected to the electricity grid, thereby supplying them with energy for various needs.

Unlike in many other IEA member countries, natural gas is not a key source of power generation. In fact, hydro alone consistently accounts for over 96% of electricity production.

However, during the winter of 2002-03, Norway experienced a drought followed by a cold wave, severely depleting its hydro reserves and making electricity rates rise fourfold in a matter of weeks. In response, Norway’s first commercial onshore gas-fired power plant was built by Naturkraft at Kårstø. Interestingly, the 420 MW plant claims to have the lowest greenhouse gas emissions of any fossil fuel power plant in Europe, at a cost of around EUR 253 million (NOK 2 billion).

The Kårstø plant uses gas resources from the NCS and started electricity production in the winter of 2007. The project can theoretically deliver up to around 3% of Norway’s total electricity production (equivalent to around 175,000 households). The plant can use up to 600 mcm of natural gas per year, or approximately 0.5% of Norway’s annual gas exports. However, owing to commercial considerations linked to gas and power prices, the production of power from Kårstø has been small over the past few years.

Five gas turbines also provide power to Statoil’s LNG plant from gas sourced from the Snøhvit field.