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## Pay a visit to Stignæsværket

Stignæsværket is pleased to arrange visits for groups and schools for a tour of our power producing facilities.

If you would like to have more information about the visits, please contact Stignæsværket on telephone +45 99 55 05 00

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Denmark

## THE STIGNÆSVÆRKET POWER PLANT



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## DONG ENERGY STIGSNÆSVÆRKET

Stignæsværket is one of DONG Energy's ten central power stations. Stignæsværket is located at the Great Belt 10 km from Skælskør. The power station consists of two units commissioned in 1966 and 1970. Unit 1 was mothballed in 2008. In 1999, the lifetime of unit 2, which has a capacity of 265 MW electricity, was extended and the unit was equipped with a desulphurisation plant. Stignæsværket has approximately 100 employees.

Stignæsværket uses coal as fuel for the production of power. Fuel oil is used in connection with start-up and in special operating situations. The power station produces power for the Nordic power grid and steam for DONG Energy Oil Terminals.

### Power production

The power produced at Stignæsværket is sold on a daily basis at The Nordic Power Exchange, Nord Pool where the price is set by supply and demand. The power production is sold on market terms. If the power price is low due to a high domestic power production from wind turbines or high hydroelectric power production in Norway, Stignæsværket reduces its production.

The harbour at Stignæsværket is 18 m deep. This means that capesize ships loaded with up to 160,000 tonnes of

coal can call into the port. From the ships, the coal is transported to the coal yard, and from here the coal is conveyed to the coal silos. At full production, unit 2 burns up to 100 t/h of coal. The production plant consists of coal mills, boiler, steam turbine and generator.

From the coal silos the coal is led to the coal mills to be pulverised and blown into the boiler furnace through the burners. The boiler consists of a large number of pipes forming the walls in the boiler room. The pipes are filled with water, converting the water into high-pressure steam at the high temperature in the boiler. The steam is led to the turbine at a pressure of 190 bar and a temperature of 545 °C. The energy of the steam revolves the turbine shaft with 3,000 rpm. The turbine shaft is connected to the generator producing the power. Before the power is led to the high-voltage grid, it passes a generator converter transforming the power from 18 kV to 240 kV.

### Flue gas cleaning

Stignæsværket, unit 2, is equipped with low-NOx burners reducing the formation of nitric oxides when burning the coal. Leaving the boiler the flue gas is led through an electrostatic precipitator collecting more than 99 % of the fly ash in the flue gas. The fly ash is used in the cement and concrete industries or for road construction. Unit 2

produces approximately 9 t/h of fly ash at full production. From the electrostatic precipitator, the flue gas is led to the desulphurisation plant removing more than 98 % of the sulphuric oxide (SO<sub>2</sub>) from the flue gas. This is done in a chemical process where the flue gas is washed by a mixture of lime and water. Lime, water and sulphur form the mineral product gypsum used for the production of plasterboards and cement for the building industry. The power station has an annual production of approximately 40,000 tonnes of gypsum. The environmental plants annually reduce the impact on the environment by 4,000 tonnes of sulphuric dioxide and 800 tonnes of nitric oxides.

### The environment

All processes at Stignæsværket are subjected to regulatory control. Changes of existing plants as well as construction of new plants must be in accordance with the applicable Danish laws and the guidelines issued by the municipality of Slagelse. The supervisory authority, being Miljøcenter Roskilde, must approve and lay down rules and conditions for layout and operation of the plants at Stignæsværket. The emissions and other environmental impact caused by Stignæsværket are further subjected to the requirements laid down in ISO14001 according to which the power station is certified.

### Working environment

The working environment affecting the staff working at Stignæsværket is also certified according to the requirements laid down in OHSAS18001. All employees must be aware that working at a power station may involve risks if the safety requirements are reduced. Therefore, serious efforts are made to make Stignæsværket a safe

and secure workplace with as few accidents as possible. Every year, all employees – also suppliers and guests – must receive training in safety, and the power station has its own plant protection unit, including trained firemen, first-aiders and staff trained for height rescue.

### Coal terminal

During recent years, DONG Energy's power stations have received coal from overseas ships loaded with up to 160,000 tonnes. Only the harbours at Enstedværket at Aabenraa and Stignæsværket have the necessary depths for ships of that size to moor. Therefore, these two harbours can be used as port of transit for shipping of coal to other power stations.

To improve the environment and the production at the coal yard, Stignæsværket's coal harbour will be modernised in 2008/2009. DONG Energy has decided to replace the two coal cranes by new grabs with a capacity of 20 tonnes of coal each. A capesize ship loaded with up to 150,000 tonnes can be unloaded in three to four days. A new coal conveyor system with a larger capacity than the existing and an overhead conveyor, stacking the coal, will also be installed. This means that 4,000 t/h of coal can be moved and that the use of dozers will be reduced.

### Mineral products

Fly ash and the desulphurisation product gypsum from the power production, so-called mineral products, are used for industrial purposes. Fly ash is used in the production of cement and concrete, and gypsum is used for the production of plasterboards for the building industry.



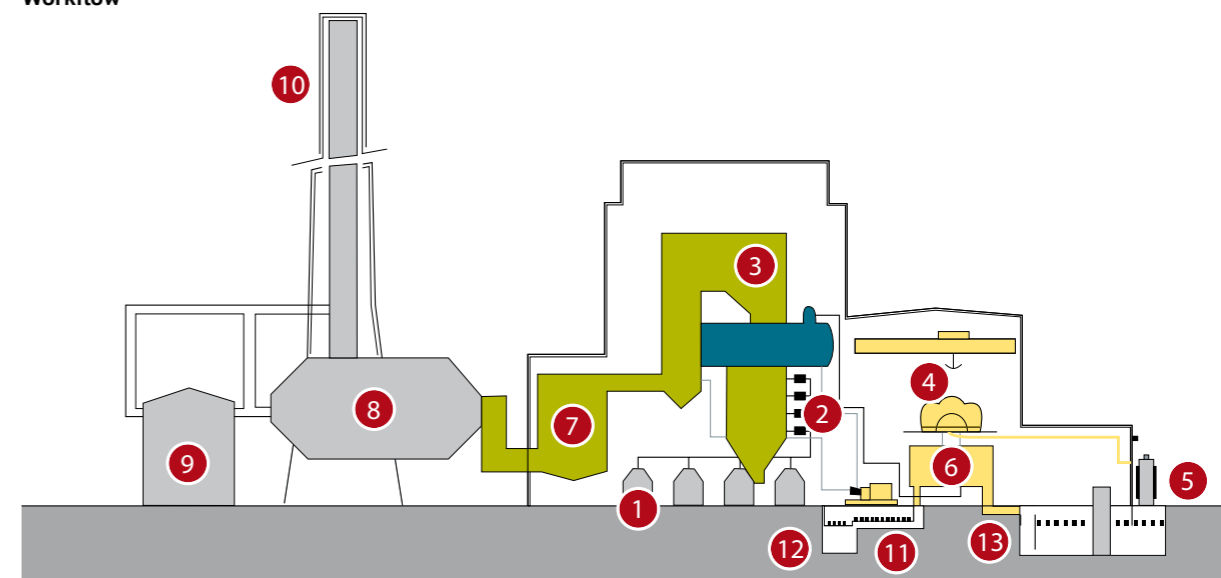


## Technical key data

Unit 2	
Commissioning year	1970
Rehabilitated	1999
Boiler type	Benson
Steam production	236 kg/s
Normal operating pressure at superheater outlet	190 bar
Normal steam temperature at superheater outlet	545 °C
Flue gas temperature at full load	135 °C

Fuel	Coal and heavy fuel oil
Gross output at full load	285 MW
Number of low-pressure exhausts	4
Number of feedwater steps	7
Net output at full load	266 MW
Heat consumption at full load, net	9,08 GJ/MWh
Generator voltage	18 kV
Connected high-voltage grid	132 kV

## Workflow



- |                          |                               |                           |                             |
|--------------------------|-------------------------------|---------------------------|-----------------------------|
| 1. 4 coal mills          | 5. Generator transformer      | 9. Desulphurisation plant | 13. Main cooling water pump |
| 2. 24 burners            | 6. Condenser                  | 10. Stack                 |                             |
| 3. Boiler                | 7. Air preheater              | 11. 3 feedwater pumps     |                             |
| 4. Turbine and generator | 8. Electrostatic precipitator | 12. Outlet duct           |                             |

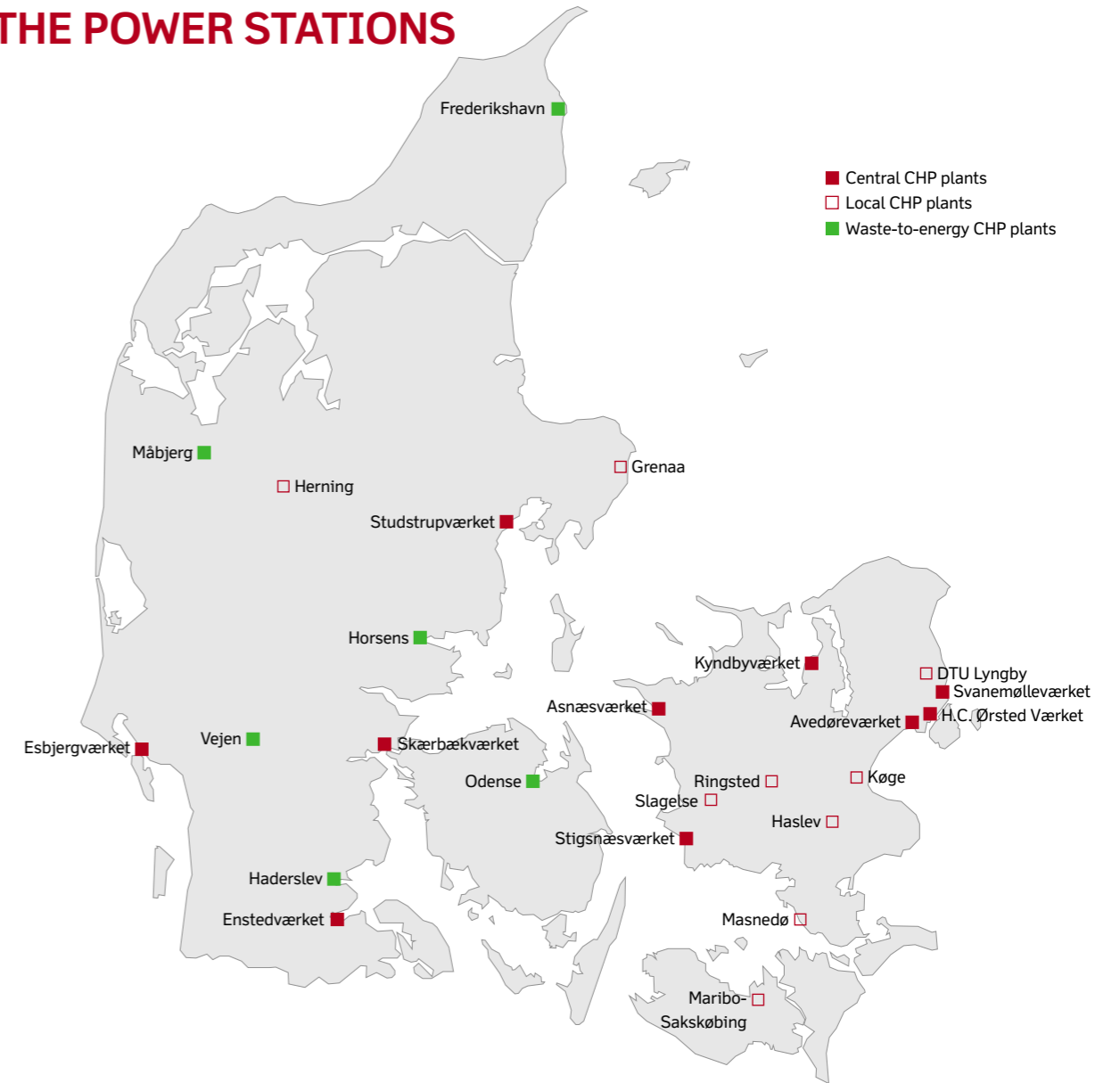
# STIGSNÆSVÆRKET SEEN FROM ABOVE

1. Harbour
2. Coal store
3. Desulphurisation plant
4. Coal cranes
5. Unit 2
6. Unit 1
7. Central store
8. Oil pier
9. Turbine hall
10. Transformer station
11. Port of unloading
12. Workshop and administration building
13. Site hut town
14. Camping ground





## THE POWER STATIONS





## DENMARK'S NEW ENERGY COMPANY

DONG Energy is Denmark's new energy company established in 2006.

DONG Energy is active in all phases of the energy supply chain – from offshore oil rigs in the North Sea, power stations producing heat and power, and wind farms, until we market the energy and transport it all the way to our customers' doorsteps in Denmark and abroad.

This ensures a highly reliable supply of energy and gives us the necessary expertise to develop our company for the future.

DONG Energy has many years of experience. For more than a hundred years we have been supplying power to the Danish consumers and developed the special Danish tradition of combining the production of heat and power.

Since the beginning of the 1980s, we have also supplied oil and natural gas to the Danish consumers.

Innovation is a natural part of how we work. For more than 25 years we have been involved in the extraction of oil and natural reserves in the North Sea, and our power stations are among the most efficient and eco-friendly in the world.

We are also at the cutting edge in the development of renewable energy, not least in the establishment of offshore wind farms.

DONG Energy has increased its international activities significantly and is now an international energy company focusing on the North European energy markets. On the liberalised market the customers are free to choose their energy suppliers, and DONG Energy competes every day against other energy companies to be the customers' preferred supplier.

Yet still being a small player on international scale, DONG Energy is rapidly developing its activities in all parts of energy supply to be well positioned for future competition on the energy market.