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**Did you know that...**

**The Esso refinery is cooperating with local energy companies and other interested parties in an effort to make use of low-temperature waste heat for district heating in the Tønsberg area and at Slagen Energipark**



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The volume of waste heat disappearing to the air in connection with the final cooling of products before they are stored in tanks, is equivalent to the energy generated by the Alta power plant! The temperature of this waste heat is too low to be utilized in the refining process.

Since 1997 Esso has made considerable efforts to establish Slagen Energipark in the vicinity of the refinery so that industry can exploit this energy, and so that the heat can be utilized for district heating in the Tønsberg area.

These are important contributions to the efforts to exploit untapped energy resources, thereby reducing Norway's future CO<sub>2</sub> emissions.

**ExxonMobil**

ExxonMobil  
Postboks 60  
4064 Stavanger  
Tlf. 51 60 60 60

Design: Svein Thorkildsen

**ExxonMobil**



**Environmental solutions at work**



**W** **Did you know that...**  
**ExxonMobil spends 1.2 billion NOK annually on research within health, environment and safety**



This brochure presents some of the aspects of ExxonMobil's research and development within energy and the environment.

*Photo: The Esso refinery at Slagentangen*

**W** **Did you know that...**  
**ExxonMobil has joined forces with General Motors and Toyota with the aim of developing the environmentally friendly car of tomorrow**

ExxonMobil is engaged in active co-operation with car manufacturers in the development of new technology that will reduce emissions and fuel consumption.



One probable key to this future generation of cars is the fuel cell, which generates electricity through an electrochemical reaction between hydrogen and oxygen. Hydrogen is supplied either from a separate container in the car, or from a conventional fuel containing hydrogen (e.g. gasoline). The car is driven by an electric motor.

GM and Toyota aim at utilizing gasoline as the hydrogen source for the first generation of fuel cell cars. This opens up the possibility of utilizing the world-wide distribution network for gasoline that is already in place. This will also make it possible to achieve a faster introduction of fuel cell technology.

The long-term goal is to manufacture cars that can operate on hydrogen provided from renewable energy sources. The only emission from such cars will be water vapour.

**W** **Did you know that...**  
**ExxonMobil is developing and testing, on a continuous basis, fuels that emit smaller volumes of hazardous substances.**

Extensive efforts are being made to reduce emissions of particles and other polluting substances in exhaust.

**Did you know that...**

**W** ExxonMobil is in the forefront among oil companies when it comes to reducing energy consumption at its own refineries and chemical plants

The majority of ExxonMobil's refineries and chemical plants use a combination of gas and steam turbines that give very high energy efficiency when generating electricity for process facilities (co-generation).

ExxonMobil now covers 70% of the power consumption at its plants through this type of technology, and plans to install further facilities of this kind.

The energy efficiency of ExxonMobil's refineries and process plants has increased by 37% over the last 25 years. This corresponds to a CO<sub>2</sub> reduction of approx. 55 million tons, which is more than Norway's total, annual emissions of CO<sub>2</sub>.

In recent years an extensive system for energy control has been established at ExxonMobil plants all over the world. The possibility of obtaining a further 15% cut in energy consumption is being evaluated. - This corresponds to 14 million tons of reduced CO<sub>2</sub> emissions, or approx. 35 % of Norway's total, annual emissions of CO<sub>2</sub>.



**Did you know that...**

**W** Discharges of oil in the purified effluent water at the Esso Slagentangen refinery are no greater than the discharges from an ordinary outboard motor

Since start-up in 1961, discharges of oil-carrying effluent water to the Oslofjord have been reduced from 140 kg/day to 3 kg/day.

The biological purification stage also removes nitrogen from effluent water.

**Did you know that...**

**W** The Esso refinery at Slagentangen has reduced its emissions of sulphur (SO<sub>2</sub>) by almost 90% during the last 20 years. New technology to reduce these emissions even further is being installed.

In 1984 the refinery installed a sulphur recovery plant. Emissions have been cut from 4500 tons per year to around 600 tons per year today.

New technology is being developed to purify waste gases and treat acid water. This may cut emissions by a further 40%.





**Did you know that...**  
**W** The refinery has always pioneered the manufacture of products fulfilling the strictest environmental requirements

The refinery is already capable of producing "sulphur-free" gasoline to be used by the environmentally based motor technology of the future.

In 1998 the refinery was able to produce gasoline with a 1% benzene content. The statutory requirement for this was introduced in 2000.

Ever since 1993 the refinery has had the technology to produce diesel containing 0.05% sulphur. This statutory requirement wasn't introduced until 1996. Today an "environmentally friendly diesel" containing 0.005% sulphur is being produced. Investments are planned which will make it possible to produce "sulphur-free" diesel (i.e. sulphur content lower than 0.001%) for the diesel engines of the future which are being developed now. These engines have very low emissions.

*Photo: From the process unit at the refinery*



**Did you know that...**  
**W** Emissions to the air of CO<sub>2</sub> from the Esso refinery are low compared to energy consumption.

The refinery's furnaces are gas-fired. The hydrogen content of the firing gas is close to 50%. Hydrogen combustion produces only water vapour in the waste gas, hence lower CO<sub>2</sub> emissions will be achieved.

Efficient utilization of heat exchange reduces the consumption of energy in the process plant by almost 50%. International comparisons show that the Esso Slagentangen refinery is one of the refineries in the world with the most efficient energy utilization.

Since 1997 the refinery has adopted internal measures to save energy corresponding to 12 million watts. This constitutes 20,000 tons of CO<sub>2</sub> per year.