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Norway: Kleven Maritime

22 January 2013 | Observatory: [EMCC](#)

About

Case study name:

[The greening of industries in the EU](#)

Country:

Norway

Organisation Size:

100-499

Sectors:

Shipbuilding

Kleven Maritime AS is a Norwegian-owned shipbuilding company – a pioneer in building liquefied natural gas-driven vessels that drastically reduce emissions of CO₂ and NO_x compared with conventional diesel-driven vessels. The case study illustrates the interplay between the shipbuilding company and the other companies in the supply chain of environmental shipping, customers, NGOs, industry organisations and public authorities. It further exemplifies how creative entrepreneurship and extensive collaboration between relevant actors can positively affect attitudes, policies, regulations, the number of green jobs in the sector and the opportunities of the shipbuilding company's employees to develop their green skills.

Introduction

In 2007 the Norwegian shipbuilding sector accounted for 1.1% of national GDP and employed 36,700 people. About 80% of the world's trade volume goes by sea, and ship-traffic produces 3.3% of the manmade CO₂ emissions in the world. The wider global maritime industry is responsible for a significant amount of the global CO₂ emissions and fuel for ships is subjected to CO₂ surcharges.

[Kleven Maritime AS](#) is a shipbuilding company with its activities located on the west coast of Norway. With 460 employees and an annual turnover of approximately €423 million in 2010, the company is today the largest Norwegian-owned shipyard. The family-owned company has roots back to 1915 and 1944, but ownership has shifted. Since 2001 the company has been fully owned by the Kleven family.

In addition to having its own recycling measures that stretch beyond legal requirements Kleven built the world's first supply ship driven by liquefied natural gas (LNG), *Viking Energy*, in 2003 and the world's first LNG-driven coastguard vessel, *KV Barentshav*, in 2008. The majority of ships built today operate on diesel. However, the LNG-powered vessels reduce CO₂ emissions by 20% and NO_x (oxides of nitrogen) emissions by 89% compared with conventional vessels. This way Kleven's pioneering green business practices contribute directly to climate change mitigation.

Drivers and motivations

The motivation of Kleven to start building LNG-driven vessels stems from the shipping and ship-developing company [Eidesvik](#). Kleven works as a subcontractor for this company. Eidesvik wanted to find ways to reduce financial risk due to the rising cost of oil in 1999. Simultaneously Eidesvik's CEO at the time saw the development of the ship as a chance to improve the shipping industry's damaged environmental reputation. By pioneering the development of ships using environmental technology Eidesvik could also potentially seize business opportunities.

Eidesvik's project department started developing the ship, in collaboration with supplier of new gas-engine technology [Wärtsilä](#), before they had a contract on it. Eidesvik contacted Kleven which accepted the offer to build the ship. Kleven saw the offer as a good business opportunity, as well as a chance to be at the forefront of the environmental development in their sector. Climate policies contributed to finding a customer for the ship. The Norwegian [Ministry of Petroleum and Energy](#) gave the buyer, oil-company [Statoil](#), chance to credit the NO_x-emission reductions the gas-driven ship would give them to their activities on land – this way directly contributing to Statoil's decision to choose the gas solution. The ship was delivered from Kleven in 2003 with dual-fuel engines, so that it could operate on both oil and LNG.

Kleven's main motivations for maintaining and updating their competency in building LNG ships are winning contracts in a sector where competition is tough and there is a general interest in environmental solutions.

Green business practices

Kleven's building of LNG ships contributes indirectly to climate change mitigation in that they reduce emissions of CO₂ by 20% compared with conventional vessels. There are few differences between a conventional diesel-driven ship and an LNG-driven ship. The tank technology is different and the LNG ship is bigger, because the tank demands more space. An LNG ship is also more expensive, though the public **NOX-fund** covers most of the extra expenses involved in building the ship. Since its establishment in 2008, the public NO_x-fund, which finances the measures that give the largest reductions in NO_x-emissions in the Norwegian shipping sector, has made it possible for Eidesvik to cover extra expenses involved in developing environmental ship technology. Simultaneously the fund makes it possible for Kleven to keep building gas-driven ships.

Eidesvik's initiative to develop the world's first LNG-driven supply ship, and give Kleven the contract to build it, emerged after Eidesvik's technical staff had read an article on gas-driven ships from the Norwegian Shipowners' Association. Simultaneously the staff got to hear about a gas-driven ferry being set to sea in a neighbouring county.

At the time of the development of *Viking Energy*, knowledge of LNG technology was limited in the Norwegian Maritime Directorate. Eidesvik had to consult it on the subject and the directorate formed the regulations on gas-driven supply ships at the same time as Kleven was building the ship. The technical staff of Eidesvik and engine developer Wärtsilä held shorter courses for Kleven's employees who were involved in the supervision (technical staff) of the gas engines, before the building process started (see below).

Eidesvik's collaboration with environmental NGO **Bellona** has helped increase the scope of Kleven's green business practices. This collaboration started when Bellona saw that the first gas ships developed by Eidesvik gave substantial reductions in emissions of CO₂ and NO_x. Bellona has helped Eidesvik become more visible to the government, the Norwegian Research Council and other public funding agencies. Together with the NO_x-fund, Eidesvik's collaboration with Bellona and the resulting financial support has been crucial for Kleven's opportunity to win contracts on LNG ships.

In addition to the building of LNG ships Kleven has also implemented other direct energy saving measures. Kleven has invested in collection points for the sorting and recycling of waste material, equipment to clean waste oil, and welding robots that reduce the employees' exposure to gases while preventing the overuse of gas and electricity. The waste oil treatment was initiated by local authorities, while the other measures were initiated by Kleven's management.

Anticipation and management of the impact of green change on quantity and quality of jobs

Impact on quantity of jobs

Since Kleven won the first contract, on *Viking Energy*, it has won more contracts on gas-driven ships. This means that a higher number of employees are working in green jobs at any time. Kleven has hired new employees in recent years, due to a rise in the number of orders. Approximately 20% of the staff have been working in green jobs over the past last three years; 3 out of 10 ships in their current order book are gas-driven.

Due to the implementation of collection points for sorting and recycling of material Kleven has hired one new employee who is responsible for the collection and sorting of waste. When Kleven started using welding robots the jobs of the welders were transformed. Some of the welders now work as robot-operators. Kleven's green business practices have not had any negative effect on the levels of employment.

Kleven's CEO expects the number of green jobs to rise with increasingly strict regulations from the international maritime organisations and the government, because this will lead to a jump in demand for environmentally friendly ships.

Kleven's trade union representatives have been involved in all of the company's green business initiatives, in that three of them sit on Kleven's board. The number of union representatives on the board is dependent on the total number of employees in the company. As a consequence of more employees and more orders, for both diesel-driven and LNG-driven vessels, the number of union representatives in the board increased from two to three in 2011. Before the contract on *Viking Energy* was signed the union representatives saw that the building of LNG ships could increase Kleven's competitiveness and profitability, and thus contribute to create more jobs. They also regarded the other environmental measures in the company as beneficial for the economy of the company and the working environment. Therefore there has been broad agreement on all of Kleven's green initiatives.

Impact on quality of jobs

Skills development

Kleven's engineers and manual workers involved in the building of LNG ships acquired prior knowledge on general differences between diesel- and gas-tanks through occupation-specific mandatory education. In order to be able to build ships with LNG-gas technology Kleven's employees who are involved in the supervision of the gas engines have gone through shorter additional training. These engineers from the technical staff have had to learn about the specifications of an LNG-gas engine. The courses have been initiated and held by employees from engine-developer Wärtsilä and contractor Eidesvik.

Kleven's engineers have an ongoing dialogue and discussion with the manual workers who are responsible for connecting the LNG engines with the propeller shaft of the ship. This way knowledge is shared between the technical and the manual staff. The workers also attend in-house courses run by Kleven's most experienced staff on working with LNG engines. This type of training is a continuous process in the company. Only the manual workers who are to connect the LNG engines with the propeller shaft of the ship get the necessary in-house-training. At present Kleven has four manual workers who are capable of performing this task. According to the union leader representing the manual staff, Kleven will give the necessary training to more manual workers when demand requires it.

In recent years LNG ship technology has become even more environmentally advanced than before (for example, newer ships now have modern systems for sorting of waste on board). These developments mean that Kleven's technical staff are dependent on more information on the technical specifications of the ships. This information is mainly collected through courses held by employees from Kleven's business partners: engine developers and the companies that have developed the ships.

The more experienced engineers, who have been through all the mentioned courses, mentor their less experienced colleagues whenever the latter have questions concerning new technical specifications. Through continuous dialogue updated knowledge on specifications is transferred from the engineers, who plan the building process, to the operators who build the ship.

Kleven's investments in collection points for sorting and recycling of waste material and equipment to clean waste oil has not led to any increase in required job-specific skills. The former welders were instructed on the operation of the welding robots through short courses held by the supplier.

The CEO of Kleven believes that the sum of the company's environmental measures create positive environmental attitudes among his employees. These types of attitudes are reflected in some of Kleven's employees, who express pride in being part of the supply chain of environmental shipping in conversation with acquaintances from competing shipyards outside of this supply chain.

The CEO of Kleven does not believe that the company will have any problems responding to green skills needs in the future. The actual need for green skills depends on the development of regulations, legislation and the price of oil and gas. With more strict regulations, reasonable gas prices and the NO_x-fund covering most of the extra expenses, shipbuilding companies in the supply chain of environmental shipping will have a promising future.

Other dimensions of job quality

There are no differences in the financial conditions, career and employment security and working hours of the workers in green jobs and the workers in the remaining jobs. Regarding health and well-being, the working conditions are similar for the employees. In addition to the investment in welding robots Kleven has invested in indoor painting facilities and good ventilation solutions. These measures make the employees less exposed to dust from paint and gases.

Anticipation and management of green change

Kleven has not used any specific formal approaches to anticipate the green change as regulations and the shipbuilding company's contractors indirectly decide which vessels Kleven is to build. Eidesvik, on the other hand, had to consult the Norwegian Maritime Directorate to get regulations on gas-driven supply ships in place before Kleven could deliver *Viking Energy* in 2003 (see section above on green business practices). Since the building process of an LNG ship is similar to that of a diesel-driven ship Kleven already had most of the know-how required prior to winning the contract on *Viking Energy*. The remaining demanded competency was, as already mentioned, acquired through courses on gas-engine technology and in-house training, and through collaboration between Kleven's engineers and manual operators.

Kleven collaborates closely with the trade unions in the company, their business partners and industry organisations to anticipate and manage their green business practices. Through the board the union representatives participate in all decisions regarding the scope of these practices and consider their possible impact on the quantity and quality of jobs before giving their consent. Kleven's business partners hold frequent courses to transfer knowledge on LNG-ship technology to Kleven's technical staff, as Kleven keeps winning contracts and the ships become more environmentally advanced. Industry organisations provide the company with relevant information on developments in the sector. The shipbuilding company also follows developments in the market and in regulations and is working towards getting an environmental ISO certificate to document its green business practices (it has not yet been decided which ISO certificate Kleven will apply for).

Close collaboration between the shipbuilding company, the gas-engine developer and Eidesvik's project department has been of great benefit for the successful implementation of Kleven's green business practices. This collaboration has enabled Kleven to concentrate mainly on what they do best: building ships. The main challenges in the process have been faced by Eidesvik, the developer of the ship. As already mentioned, Eidesvik had to contribute to get regulations in place and collaborate with an environmental NGO to convince public funding agencies to give them financial support.

The public authority's role in developing green skills and green jobs within the sector is mainly to support green initiatives financially, facilitate the NO_x-fund and develop laws and regulations that function as incentives for customers to choose environmental shipping solutions. Kleven's CEO believes that restrictions on the use of older and less environmentally sound vessels will be beneficial for growth in the demand for gas-driven ships.

Conclusions and recommendations

The case study suggests the following conclusions and recommendations:

- The development of the world's first LNG-driven supply ship was facilitated by creative entrepreneurship in the context of rising oil prices in the late 1990s. Lobbying with national authorities led to the development of regulations and climate policies and found the ship a customer. Kleven was able to deliver the ship in 2003.
- Together with Norway's public NO_x-fund, the contractor's collaboration with an environmental NGO and the resulting public financial support has been crucial for Kleven's opportunity to keep winning contracts on LNG ships.
- Kleven's green business practices have contributed to creating more jobs. Skilled employees with prior occupation-specific education have developed their green skills through courses held by business partners, and through collaboration between Kleven's technical staff and manual workers. Kleven's environmental measures have in sum created positive environmental attitudes among the company's employees, as well as a healthier work environment.
- The shipbuilding company and the ship developers depend on good collaboration with each other, with customers, trade unions and industry organisations to secure and develop their roles in the supply chain of environmental shipping. Further, they depend on public funding, more strict regulations, reasonable pricing of gas and good environmental profiling if their green business practices are to increase in scope. This will also increase the number of green jobs and possibly strengthen the role of education and training institutions, as the ships become more environmentally advanced. In summary, the case study demonstrates that further environmental development in the sector is dependent on several actors playing active parts.

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