



**Pressurized water** is added to the intake air after the turbocharger.

enters the combustion space as steam. This lowers combustion temperature and reduces the formation of NO<sub>x</sub> by as much as 30%, which would help cut emissions to 7-8 g/kWh over the whole of the Wallenius fleet.

"Choosing Wärtsilä as our co-operation partner was an easy and natural decision. Over the years we've been very pleased with Wärtsilä's products, the quality of after-sales services provided and everyday operations," says Per Croner, President of Wallenius Lines.

Reducing the NO<sub>x</sub> emissions generated by auxiliary engines is important, as these engines are only run in port. This means that emissions take place close to urban areas and their populations. "In general, the NO<sub>x</sub> emissions from auxiliary engines are small, almost negligible, when compared to the emissions caused by main engines or an entire fleet. However, we take all emissions seriously and are constantly looking for new ways and technologies to reduce them," says Croner.

### WETPAC H IS THE BEST, BUT NOT THE ONLY SOLUTION

The WetPac Humidification System was a natural choice for the Wallenius fleet as the auxiliary engines were supplied by Wärtsilä in the beginning. "We're better able to optimize engine performance when there's a one-to-one match between engine and humidification system. We know our products from the inside out, which makes troubleshooting and consultation quick and efficient," says Matti Vaarasto, Head of Ancillary Systems, Wärtsilä.

When the two companies initiated discussions reducing NO<sub>x</sub> emissions from auxiliary engines, more than just one solution was on the table, notes Göran Hellén, Head of Emission & Control, Wärtsilä. "Naturally it all begins with the engine design – the goal is to optimize the product so that environmental impacts are as insignificant as possible. After

## WALLENIUS FIGHTS NO<sub>x</sub> EMISSIONS WITH WÄRTSILÄ WETPAC

Co-operation between Wallenius Marine and Wärtsilä goes back to the 1980s when the first of many engines were supplied. The two companies are now focusing on the reduction of NO<sub>x</sub> emissions in auxiliary engines. The target is to achieve a 25% decrease in emission levels by 2008.

**A**ccording to an agreement between Wallenius and Wärtsilä, the WetPac Humidification System is to be installed on 17 vessels in the Wallenius Marine fleet. Work on the forty auxiliary engines concerned is expected to be completed by 2008.

**REDUCING NO<sub>x</sub> EMISSIONS WHEN IN PORT**  
Co-operation with Wärtsilä is part of Wallenius'

strategy of focusing on upstream solutions which aim to prevent the formation of harmful emissions. The principle of the WetPac Humidification System is to reduce NO<sub>x</sub> formation by conveying pressurized water into the combustion process, adding it to the intake air after the turbocharger. The high temperature of the compressed air means that the water evaporates immediately and

### [ AN UPSTREAM SOLUTION TO PREVENT THE FORMATION OF HARMFUL EMISSIONS ]

**1.** The WetPac Humidification System reduces NO<sub>x</sub> formation by adding water to the intake air after the turbocharger, lowering combustion temperatures.

**2.** Reducing the NO<sub>x</sub> emissions generated by auxiliary engines is important. As the engines are only run in port, emissions can affect urban populations.

**3.** Preliminary reports on tests in a pilot vessel that were completed at the end of 2006 indicate that using the Wetpac H system cut NO<sub>x</sub> emissions by 40%.

**“Preliminary reports show that NO<sub>x</sub> emissions have fallen by 40%.”**

that, it's a question of which solution is most suitable for the engine in question," he says.

SCR (Selective Catalytic Reduction) catalysator systems, for example, can cut NO<sub>x</sub> emissions by as much as 90%, but these also have their limitations. "Installed straight after the turbocharger, the SCR system takes up a lot of room. So the best - and in practice only - stage to install this solution is during the shipbuilding process. The SCR process also requires addition of a special urea-water mixture into the flue or exhaust gas stream. This would mean that the vessel concerned has to carry the mixture with it - the infrastructure at ports does not support this type of refuelling."

Other choices are the WetPac DWI (Direct Water Injection) and WetPac WFE (Water-in-Fuel Emulsion) systems. "Both utilize water as the coolant in the combustion process. The reduction in NO<sub>x</sub> emissions when these solutions are employed is around 40%, but factors such as the engine loading affect the final figure. For Wallenius, WetPac H was the best fit," says Hellén.

### GOOD RESULTS FROM PILOT INSTALLATIONS

As the WetPac installations are currently underway, final results regarding NO<sub>x</sub> reduction are not yet available. "The estimated reduction will be in the neighbourhood of 30%," says Vaarasto. Test installations, however, indicate that good news is on the way. "Testing on our pilot vessel was completed at the end of 2006 and preliminary reports show that NO<sub>x</sub> emissions have fallen by 40%," says Croner.

The testing stage presented its own challenges thanks to the limited number of running hours on the auxiliary engines. The ship carrying the pilot project made only a few stops at European ports, so follow-up of system

performance was not so easy. "At this stage we asked Wärtsilä to pick up speed, and that's what happened," says Croner, who regards the schedule for installations in the next few months to be a challenging one.

### FUEL CELLS AS A POWER SOURCE?

"We are, however, very happy so far and I'm sure that Wärtsilä will be able to complete the project successfully. Also, we're in this for the long haul - there are a number of areas we'll be working on together with Wärtsilä. Their experience in engine room and ship design is a valuable asset, and we already have some R&D projects underway."

According to Croner, Wärtsilä's vision of being a lifecycle power solution provider fits Wallenius' needs perfectly. Wallenius is working on five major areas that will improve the company's environmental performance: lowering the fuel consumption of its vessels; using low-sulphur oil; reducing NO<sub>x</sub> emissions; using non-toxic paints as hull coatings; and treating ballast water.

Wallenius is also closely monitoring developments in non-fossil fuels, and alternative energy sources such as solar and water power are under scrutiny. One future application involves fuel cells.

"This is one of our most important projects at the moment. Testing of Wärtsilä-supplied fuel cells will take place later this year, and we're very excited about this. Even though this will take time, we might be able to use fuel cells as power sources on our vessels in the future," says Croner.