

# Kiisa ERPP I & II

## CASE STUDY



## “Paint it black”? Not in Estonia

Even in one of the smallest countries in the EU, managing a grid is no easy thing. This is the task of Wärtsilä customer Elering, the Estonian transmission system operator (TSO), who is responsible of managing the Estonian electrical grid and operating it in a safe way. A constant, real-time balance between supply and demand is an absolute must to keep the grid running and the power reaching customers without the frequency unbalancing. A TSO can, however, only control one side of the equation. While the energy supply has to carefully be managed by the TSO, in order to minute by minute meet the amount the country is consuming, power consumption fully depends on the end consumers and cannot be controlled. What happens if too many customers coincidentally decide to start using electricity at the same time or one of the main power plants suffers an unexpected malfunction? A blackout.

“For Elering, the specific technology was not so relevant. We had end results that needed to be met and Wärtsilä’s engines simply offered an unrivaled solution.”

Ilo Toom,  
Project Manager for Kiisa at Elering

Of course, the only darkness that Estonians are proud of is that of the middle stripe in their national flag. So in an effort to be prepared for any eventualities that may take place, Elering decided in 2010 to build new reserve capacity, which could provide emergency supply for the country in case a blackout occurred. Kiisa, the location for the power reserve, is some kilometers away from Estonia's main consumption node and capital city, Tallinn. The plant has a capacity equaling one sixth of Estonia's peak power consumption, providing a comfortable cushion for years to come. Even if the biggest generating unit in Estonia unexpectedly went offline, the Kiisa plant would immediately fill in the void and quickly restore the system to a normal state while repairs are carried out.

The choice of Wärtsilä as the supplier for the back-up solution needed in Estonia was by no means accidental. Even when another three competitors submitted tenders based on gas turbine technology, Wärtsilä was the front runner in the race, by virtue of being the only one who could meet the need for the power plant to ramp up to full output in a very short time. Not only must that emergency power plant be able to start in a scenario where all power has completely been lost, it must also reach 100% load in less than 10 minutes. This means that the power will come back before you have found your flashlight and lit the candles. An emergency reserve of 100 MW also needs to be kept available and provided to the main consumers of the Estonian capital area upon request. Right next to the most important electrical substation in the whole country, there is no room for hesitation.

The two units that form the Elering Kiisa power plant – which is fully automated and requires no on-site personnel – are also flexible and able to adapt to an uncertain future in the fuel markets. The generating sets are based on state-of-the-art Wärtsilä 20V34DF engines that primarily operate on natural gas but

are comfortable with switching to light fuel oil as a back-up. The two dynamic grid stability plants at Kiisa operate on average for 200 hours per year, and are capable of compensating for any failure in the system within a matter of minutes.

Furthermore, a clever solution allows the plant to keep its standby consumption below 200 kW. Using the plant's own equipment, a heat pump keeps the equipment warm and ready to take load immediately, while minimizing the energy needed to do so.

Successfully using proven, reliable technology for a new purpose. That's also innovation.

**CUSTOMER**

Elering (Utility/TSO)

**TYPE**

Wärtsilä 34DF multi-fuel power plant

**OPERATING MODE**

Peak load/stand-by & emergency

**GENSETS** 27 x Wärtsilä 20V34DF

**TOTAL OUTPUT** 250 MW

**FUEL** Natural gas & LFO

**SCOPE** EPC

(Engineering, procurement & construction)

**DELIVERY** 2013 & 2014



CHALLENGE	WÄRTSILÄ'S SOLUTION	BENEFIT
Extremely fast ramp-up time to comply with grid requirements	Internal combustion engines with the best ramp-up capability in the market (>100%/min)	True stability for the grid, ability to fill in immediately in case of failure
Ability to restart the whole national grid in case of a total blackout	Blackout capability: no need for electricity to start-up	Safety and stability, the Kiisa plant can cover the loss of the biggest generation unit of the country
Extreme ambient conditions – 80°C variance between summer and winter temperatures	Internal combustion engines insensitive to extreme conditions	All-year round reliability
Minimising the need for on-site operating personnel	Fully automated operation, no on-site personnel needed	Cost decrease, personnel focused on key tasks and minimised price for reserve power