

ENERGY
ENVIRONMENT
ECONOMY

IPP3, JORDAN



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Mr Young Jin Bae, Chief Executive Officer of Amman Asia Electric Power Company

A STEP TOWARDS SELF-SUFFICIENCY

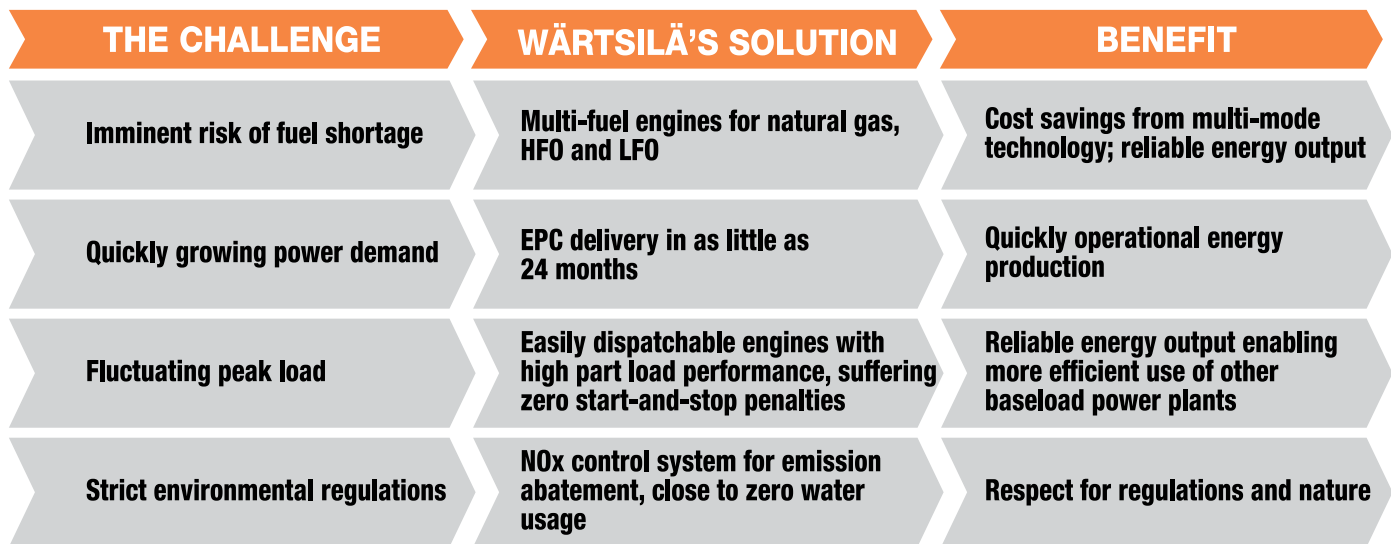
Right next to a tinderbox lies the Hashemite Kingdom of Jordan, an upper-income economy ranked with an advanced status by the European Union since 2010. With its quickly growing young population and increasing GDP, Jordan's rising electricity needs are racing against futile fuel supplies. Historically seen as an energy-poor country, the kingdom continuously imports 97% of its fuel from abroad.

Jordan's energy dependence has led the country to suffer collateral damage in recent years of political instability in the Middle East. Having imported cheap oil from Iraq since the 1980's, Jordan was subject to a first severe energy crisis in 2003 with the then-starting invasions to the neighbouring country. Its second crisis came with the Arab spring of 2011, when the source for 80% of its power generation, Egyptian natural gas, was cut off with attacks on the Arab Gas Pipeline. Despite resuming shipments from Egypt, energy problems still prevail due to increased natural gas prices, expensive alternative fuels and ongoing uncertainties in the Arab world corner.

Struggling against circumstances, Jordan has now set a tough goal for itself: achieving energy self-sufficiency by year 2020. This is to be reached through exploration of extensive local reserves of oil shale, nuclear investments, a new LNG terminal in the city of Aqaba, a dual natural gas/oil pipeline running from Iraq – and Smart Power Generation powered by Wärtsilä engines. Through the means of fuel flexibility, energy efficiency and operational flexibility; a Wärtsilä-led joint venture has been commissioned to usher the Jordanian national grid into a sustainable, reliable and affordable future.

In spring 2012 Amman Asia Electric Power Company (AAEPC), a consortium owned by Korea Electric Power Corporation of South Korea (KEPCO), Mitsubishi Corporation and Wärtsilä, was





chosen by the National Electric Power Company of Jordan (NEPCO) to build a grid-stabilising independent power plant to reduce the dependency on Egyptian gas from year 2014 onwards. AAEP awarded Wärtsilä, together with South Korean Lotte Engineering & Construction, to build a 600 MW turnkey multi-fuel combustion engine power plant – the world's largest and the first of its kind in the Middle East. The plant, IPP3 as it is called, has 38 Wärtsilä 50DF engines with a total capacity of 573 MW even in the extreme ambient conditions of Jordan (and 632 MW in ISO conditions). 22 engines provide baseload for the country's national grid with a 60 % capacity factor, while the rest, 16 engines, serve peak load with an expected 40 % capacity factor.

Built at Al Manakher, a green field site at an altitude of 814 metres above sea level, 30 kilometres outside the Jordanian capital Amman, the revolutionary IPP3 plant maximises the national grid's fuel flexibility by being able to run on natural gas, heavy fuel oil and light fuel oil. The plant is an excellent catcher of load peaks due to its high part-load performance and its ability to dispatch with zero penalties, enabling existing turbine plants to operate their baseload at higher efficiency. As a baseload plant the IPP3 benefits from being fitted with a NOx (nitrogen oxides) control system for abating emissions, meeting strict Environmental Health and Safety guidelines set forth by the International Finance Corporation (IFC WB EHS). Besides NOx regulations, the IPP3 follows international requirements for SOx (sulphur oxides) and PM (particular matter)

From collateral damage to self-sufficiency – with 573 MW of Wärtsilä power Jordan plans to enter a sustainable, reliable and affordable energy future.

and will have a close-to-zero usage of water once gas is employed as fuel, minimizing its environmental footprint.

What is special about the IPP3 is not only its landmark features in technology and size, but also the process behind its commissioning. The Jordanian plant serves as a great example of outstanding collaboration and compromise: the cooperation between Wärtsilä and affiliates has allowed for a competitive EPC price for the plant, an efficient bidding process and a shorter gestation period from start to finish. The first 16 peak load-bearing engines were operational in as little as 16 months, while the entire plant was up-and-running in no more than 24 months of Limited Notice to Proceed (LNTP). All parties of the project already agree that it has been a success:

“We trust Wärtsilä to professionally and competently lead the EPC consortium for the successful completion of this major and important project”, said Mr Young Jin Bae, Chief Executive Officer of customer AAEP in October 2012. “The commencement of the construction phase signifies the on time delivery of the state-of-the-art power plant which when operational will produce affordable, efficient and reliable power to meet the needs of Jordan's national grid”,

stated Wärtsilä's Project Consortium Manager Yngve Dahl during the plant's ground breaking ceremony in April 2013.

Thanks to great collaboration, advanced technology and a belief in a smart Jordanian power system, the IPP3 plant will spearhead the kingdom into a more sustainable future where energy resources are reliable and affordable and national growth can flourish.



MAIN DATA

Customer	IPP
Type.....	Wärtsilä 50DF multi-fuel power plant
Operating mode	Flexible baseload & peak load
Gensets	38 x Wärtsilä 18V50DF
Total output	573 MW
Fuel.....	Natural gas, HFO & LFO
Scope	EPC in a Consortium
Delivered	2014