ENERGY
ENVIRONMENT
ECONOMY

ARUN – SUMATRA INDONESIA

TACKLING INDONESIA'S PEAKS – THE FLEXIBLE WAY

With a population of nearly 250 million and an economy that has grown at an average of 5.6 per cent a year over the last decade, Indonesia is hungry for power. To improve electrification and meet a demand that is expected to grow at 9-10 per cent per annum in the coming years, much of the new capacity that is being added is in the form of large baseload coal fired plant. However, building an optimum generating system that can also meet peak electricity demand is a challenge.

The government's decision to turn to gas to address the issue presented an opportunity for Wärtsilä to demonstrate the benefits of its flexible power generation solution.

Aceh Special District in northern Sumatra is one area that needs to strengthen its electricity system to ensure reliable electricity supply to consumers. Grid stability has to be improved and more capacity is required to serve a demand peak that occurs once a day for about five hours.

When state utility PLN decided to build the new Arun gas fired plant to address its needs, it could have opted for open cycle gas turbines to do the job. However, after a careful lifecycle analysis, it decided to build a plant based on combustion engines supplied by Wärtsilä. With an output of 184 MW, generated by 19 Wärtsilä 20V34SG engines running on liquefied natural gas (LNG), when it begins operation it will be the country's largest gas fired combustion engine plant.

One major advantage of this solution compared to a gas turbine plant is the high degree of flexibility it offers. To provide grid stabilisation, the power plant has to be capable of fast start-up. Arun will be able to reach full load in around 10-15 minutes. Further, because engines can be switched on or off according to load requirements, the remaining engines can run at full power and therefore the plant can maintain maximum efficiency over a much wider load range. By comparison, a gas turbine due to its much larger size would have to operate at part load and thus be much less efficient.

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THE CHALLENGE	WÄRTSILÄ'S SOLUTION	BENEFIT
Meet a heavily fluctuating peak demand for short periods	Wärtsilä 34SG combustion engines capable of daily starts/stops without any impact on maintenance	Lower lifecycle costs
Very large operating window required	Multiple engine solution with higher efficiency than open cycle GT plants	Can follow load without reducing overall plant efficiency
Grid stability and reliability issues	Internal combustion engines with excellent ramp rates and able to reach full load in 10 minutes	Grid support
Currently baseload plants must be used also for peaking	Smart Power Generation plants used for peaking & grid stability	More efficient use of baseload plants
Fast growing demand soon renders current capacity insufficient	Attractive delivery time, financial and development services	Customer can deliver power faster and start earning on electricity sales earlier

Peaking operation also has a negative impact on lifecycle costs of gas turbines. An engine-based plant has another benefit in that it can be started up and shutdown without impacting maintenance schedules.

The plant's 19 engines will be split across four blocks of engines (5 + 5 + 5 + 4) housed in two adjacent powerhouses. Radiators for each block are located on the roof and the entire plant will be controlled from a single control room.

As the plant will be used purely for peaking as a grid stabilising plant, it is expected to operate for between 2000 and 3000 hours a year.

Using the Arun plant purely for this purpose has overall system benefits. It will allow optimisation of the total power system by enabling PLN's large baseload plants to run at full power, where they are most efficient, all year round. For PLN the savings will be dramatic.

The Arun power plant will serve to strengthen the Aceh Special District electricity system, ensuring reliable electricity supply to consumers during peak loads.

In its effort to satisfy burgeoning power demand, Indonesia is pulling out all the stops in getting the new plant up and running as soon as possible. Arun is therefore being built on a fast-track basis – around 18 months from contract signing to full commissioning.

Notably, it is the first project where PLN requested the contractor and the equipment manufacturer to arrange financing through export credit. Wärtsilä worked closely with Finnvera and Standard Chartered Bank to secure the loan agreement at attractive interest rates. Wärtsilä's support in arranging financing has also helped to expedite the project.

When it fires up in 2015, Arun will not only help satisfy Indonesia's enormous appetite for power, it will also serve as a reference for a more flexible way of tackling peak demand and providing grid stability throughout the region.

MAIN DATA

Customer	PT Wijaya Karya Persero Tbk (PT Wika) (Utility)
Type	Wärtsilä 34 gas power plant
Operating mode	Peak load/stand-by & emergency
Gensets	19 x Wärtsilä 20V34SG
Total output	184 MW
Fuel	LNG (Liquefied natural gas)
Scope	EEQ (Engineering & Equipment)
Delivered	2015

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