DHURUMA ELECTRICITY CO: PP11 PROJECT

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COOLING WIND IN THE DESERT

Dhuruma Electricity Company is quietly and efficiently completing a large world-class power generating station in record time. It's an interesting test case for the independent power plant model in Saudi Arabia

Spare a thought for the inhabitants of Riyadh. For four months of the year, the average temperature is more than 40 degrees Celsius, and that is uncomfortable even if you are used to it. Saudi Arabia's capital is in the middle of the Arabian Peninsula, and a long way from the sea, so its five million inhabitants would swelter horribly if they had to. The traditional way of keeping cool is to spray a lot of water about: effective but a waste of a scarce resource.

The main reason that demand for electricity is increasing by up to 12 per cent year-on-year is that everyone is demanding air conditioning in every part of the built environment, whether it's at home, in the shops or in the office. The Kingdom's high level of GDP allows it to cover the cost of the technology: the limiting factor is Saudi's ability to generate enough electricity to meet this growing demand.

1.7 GW

PP11's generating capacity

Again, the wealth is there and so is the fuel to power them, but power plants are complex and take time to build and commission. The country's national electricity company, Saudi Electricity Company (SEC), has been steadily increasing capacity but has found it hard to keep up with the fast rising demand by merely building and operating its own plants, which is why it is encouraging the construction of Independent Power Plants (IPPs) under the build, own, operate and transfer (BOOT) model.

Dhuruma Electricity Company (DEC) is a company set up with the purpose of building and operating at least one such plant, PP11 (the new plants are numbered in sequence), 120 kilometres from the capital and near to the town of Durma. Contracting to buy electricity from an independent operator is one way in which SEC can increase its capacity flexibly; but more importantly, the building and commissioning of the plant is fast-tracked. SEC owns 50 per cent of DEC: the other half is owned by a number of independent shareholders including the lead project developer International Power (owned 70 per cent by GDF SUEZ), Sojitz of Japan and the local Saudi business backer, the Aljomaih Group.

PP11 will use gas to generate 1.7 GW of power and yet it is just one of four new stations that Saudi Arabia needs to build each year if it is to supply the growing needs of its people and its industries. When you consider that work didn't start seriously until after Ramadan in 2010—mid-September that year—and it is contracted to deliver its initial power to the national grid by May 2012 well in time for the peak summer demand from Riyadh, the term 'fast-track' takes on a new meaning.

That is probably why Jim Cooper, an English engineer who has built large power plants around the world, was appointed to lead DEC through this critical period. Though the lead contractor, Korea's Hyundai Heavy Industries, is responsible for the

Inside one gallery of Block 2 air cooled condenser

engineering, procurement and construction (EPC) contract, this is a project that needs watching at every stage and, as head of the ownership company, Cooper will have to live with the result. He is accordingly taking a positive role in seeing that the engineering and finances of the $2 billion plant are carefully monitored.

Because PP11 is in the middle of the desert, the large quantity of water it will need for operation presents a huge challenge. The solution is to use recycled domestic waste water from the city of Riyadh, which will be brought to the site through a 95 kilometre underground pipeline. Gas, on the other hand, is plentiful. As Cooper explains: “Gas used to be looked on as a waste product and was flared off, but now it is being captured and used for electricity production.”

A large gas pipeline runs about a kilometre from the plant, and a local contractor, Gas Arabian Services Company, is constructing a spur to bring the fuel gas to the PP11 site.

To export the energy the gas generates, the local branch of Indian engineering services company Larsen & Toubro has constructed the 23 kilometre high voltage power lines that connect the plant to the grid. “They have done a truly exceptional job despite having to overcome a number of problems,” comments Cooper.

ADEN SERVICES

ADEN Services is designing and building a luxurious compound with entertainment plaza, restaurant and Arabic style apartments, lost in the middle of an oasis with a fantastic view of the surrounding desert.

This new challenge for ADEN Services, to be completed within eight months, will be available for Dhuruma Electricity Company employees’ accommodation at the brand new Power Plant II by Dhuruma, west of Riyadh in Saudi Arabia. ADEN Services will also provide a three-star hotel level of service to carry out the full village management including reception, guarding, catering, cleaning, housekeeping and other related services.

Internationally, ADEN Services also manages projects in DR Congo, Vietnam, Eritrea and Kazakhstan, specialising in the mining, oil and gas, construction and heavy industry sectors.

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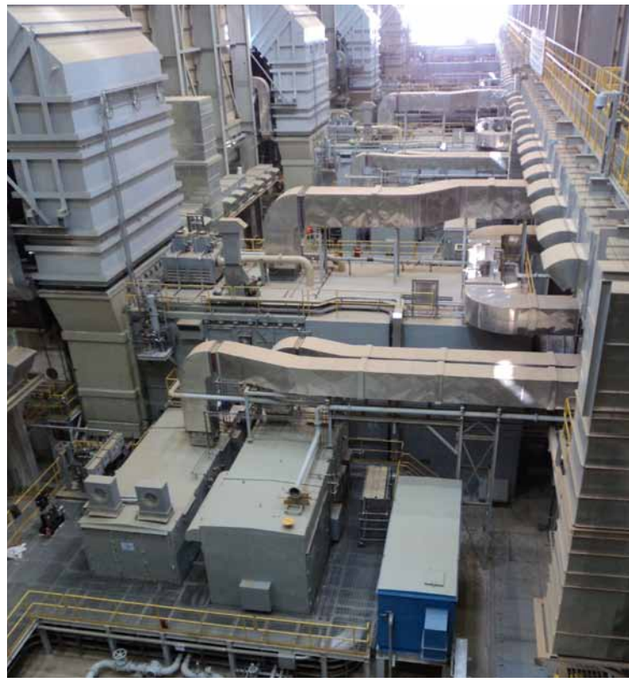
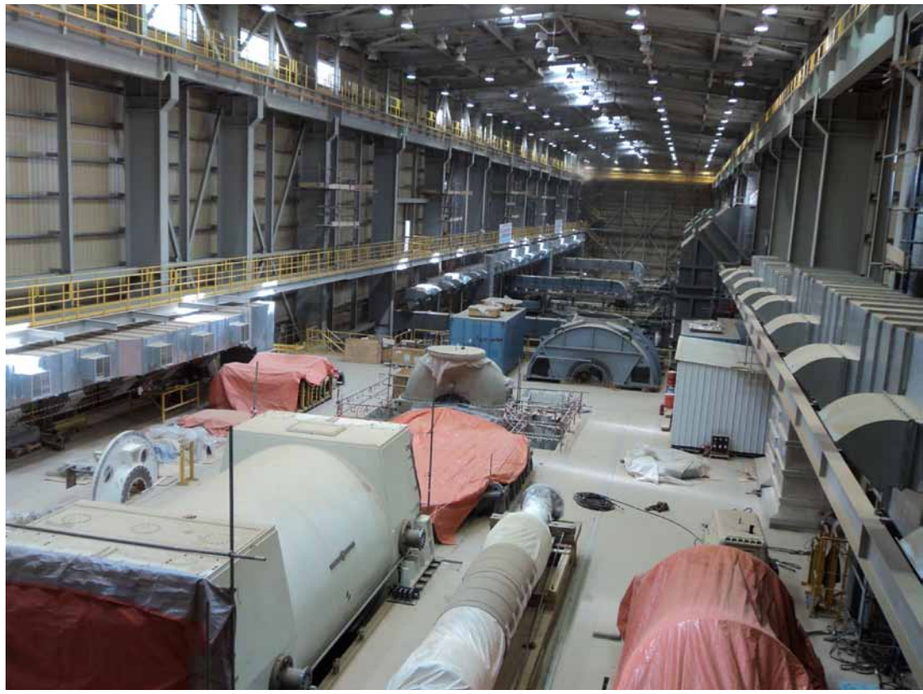


Block I turbine hall prior to the successful first fire of GTII

Phase I of the Gas Insulated Substation (GIS) under erection



Block 2 turbine hall showing the steam turbine generator under erection

The IPP model addresses a lot of the headaches afflicting SEC, explains Cooper. "When the state body specifies the design, engineering and capacity of a plant and then also supervises its construction, we generally find that the decision-making processes can be slower and, as a result, projects tend to take more time to come to fruition."

BOOT provides a perfect solution: SEC's investment is reduced because the capital cost is split between the shareholders and an international portfolio of banks. However, it is not possible for the country to move over entirely to this model because of the difference between the peak summer and lower winter demand levels: an IPP plant cannot afford to shut down when it is not required. "You need to have a balance between high efficiency IPP and lower efficiency legacy generating capacity that can be turned off in the winter," Cooper says.

On the national scale that is probably true, but one of DEC's jobs is to prove the efficacy of IPPs in meeting the country's accelerating energy needs. A second plant of the same size, PP12, is due to start construction alongside PP11 next year followed by another, and at present it is thought that SEC will construct and own these plants itself. But one of Cooper's objectives is to convince his customer that it could serve its objectives better were it to use the IPP BOOT model once again. To support this argument he really needs to bring the project in on time or even ahead of time.

> "YOU NEED TO HAVE A BALANCE BETWEEN HIGH EFFICIENCY IPP AND LOWER EFFICIENCY LEGACY GENERATING CAPACITY"

Progress has gone pretty well so far, he says. As at the end of 2011, all the major civil construction and steelwork erection was finished. The turbine halls are substantially complete and all seven gas turbines have been installed together with their generators. Most of the cabling and pipework has also been put in place. “We are looking at bringing in the operation slightly ahead of schedule,” he says. “We are definitely on target to meet our contractual commitment to supply early power by May 2012 and supply 500 MW to the grid over the summer months. And I think that as long as SEC is prepared to buy it, we could be producing electricity for them somewhat earlier than that.”

Cooper is hopeful of winning his case: “Subject to the release of fuel supplied by SEC, I want to prove everything can run and work, and start to generate electricity before the end of April. We have said that four of the seven gas turbines will be commissioned by then, and I would like to think we can improve on that number.” The efficiency of PP11 has impressed the local industry as well as SEC itself, and DEC’s ability to lean on the contractors to meet the deadline has opened many eyes. Cooper is especially proud of the way the international workforce has pulled together despite many challenges. Despite not having direct control over the subcontractors, he has earned their gratitude by involving his own talented cosmopolitan team to assist them in resolving issues affecting safety and performance and thereby getting progress back on track.

> “WE ARE DEFINITELY ON TARGET TO MEET OUR CONTRACTUAL COMMITMENT TO SUPPLY EARLY POWER BY MAY 2012”

Block 2 air cooled condenser with associated steam feed pipes

Coolers for the closed cooling water system on Block 2

A particular concern of Cooper’s has been to inculcate a safety culture on the site, something that, while nominally in place, was not always seen as contributing directly to productivity. Two UK safety professionals were recruited to transfer world-class standards to the site and its 5,000-plus workforce, few of whom come from a safety-conscious culture; as a result, the project in December recorded 10 million man hours without a single lost-time incident—a major contribution to the smooth progress to date. BE

For more information about Dhuruma Electricity Co: PPII project visit: **www.ppII-ipp.com**

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