For Immediate Release
July 8, 2008
U.S. Army Corps of Engineers

Mussayib Generation Plant putting more Electricity on the Grid

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Mussayib Thermo Generation Plant: Only three hundred yards from GRD's recently rehabilitated Mussayib 400 MW gas turbine plant sits this thermo generation plant built in the mid-1980s. It runs on crude oil and can crank out considerably more power than the smaller compact gas turbine plant; however, it takes much longer to construct and front end expenses are considerably higher. (USACE Photo)

MUSSAYIB, Iraq – Iraqis are immersed in another summer of triple digit heat. Electrical demand largely fueled by more consumable purchase and use of electricity loving appliances like air conditioners, washing machines and microwave ovens continue to outstrip supply. Electricity generated from new and refurbished electrical generation facilities like the Mussayib Gas Generation Power Plant help reduce the gap between need and capacity by putting additional mega watts (MW) on the grid.

The Gulf Region Division engineers and the

Government of Iraq's Ministry of Electricity (MoE) are working in partnership to solve the enduring problem of providing more electricity to the Iraqi people. The $26.8 M Mussayib Gas Generation Power Plant project is among the most recent plant refurbishments that is adding valuable electricity to the grid.

"This power plant will bring on-line approximately 400 MW of electricity which is enough to power 36,000 Iraqi homes," said Joseph Wendl, GRD Electrical Generation Lead. "But, the added value of Mussayib centers on the new refinery currently being commissioned. The new state of the art refinery has the capacity of producing more than 40,000 barrels of diesel each day."

Construction work at the plant include building the water treatment plant, energizing the switch yard, rehabilitating the plant's LM6000s engine driven generators – the same engines that power 747 jumbo jets -- and building the new refinery (topping plant).

By co-locating a refinery at Mussayib, the plant is set to have a steady supply of diesel to run the facility's powerful generators.

"Ideally, the refinery will produce more diesel than is required at Mussayib," said Wendl. "The Minister of Electricity plans to use the additional fuel to help power other Baghdad-area gas engine generation plants. This is very important because diesel is difficult to come by in this country."

The General Electric LM 6000 generators were in place prior to arrival of GRD in 2004, but weren't functioning. The facility was almost scrapped for number of factors – all synonymous to the electrical problem in Iraq. The plant suffered from a severe shortfall in maintenance, trained workers and access to essential spare parts.

"The most obstacles we face inside the power plant is the unavailability of important materials inside Iraq," said Abdul Latif Mohammed, Mussayib's Contract Director. "Usually, these materials must be imported from outside Iraq. Iraq did not have access to mechanical parts

General Electric LM 6000 generators were in place prior to GRD's arrival in 2004 but weren't functioning. The facility was almost scrapped; GRD in partnership with GoI, dedicated $26.8M toward refurbishing the Mussayib Gas Generation Plant. Each of the facilities 10 LM 6000 units have the capacity to generate 400 MW of electricity. (USACE Photos)

and trade due to the long Iran War, Gulf War and the liberation from Saddam in 2003. Much of the time Iraq was under embargo for specialized equipment."

In addition to the shortage of materials and skilled labor, the Mussayib facility lacked a fuel source. The construction of the refinery was of critical importance for the MoE and GRD.

"Diesel fuel is a difficult commodity to get your hands on. Crude oil, on the other hand, is comparably easy to get," said Kent McAnany, GRD Deputy Energy Sector Lead. "The crude is piped or trucked to Mussayib and refined into diesel at the new topping plant. The Mussayib plant will use a portion of the diesel and the rest will be exported to other gas turbine power plants."

According to McAnany there are distinct advantages to the modular design of power plants that use gas turbine engines to generate electricity. "Assuming we can get a hold of the gas turbine engines, the generators and all the connecting equipment, it doesn't take long to get a new facility like this up and running."

Contractors that build power plants say such a plant can be built in less than a year in western countries where parts are easier to come by and security isn't a problem. In Iraq, it may take 14 months or longer.

The drawback to gas turbine engines is the cost. With expenses nearing $50 M for each LM 6000, they are extremely expensive in relation to output.

In contrast, thermal generation plants like the facility not more than 300-meters from Mussayib's gas generation facility was built in the mid-1980s. It runs on crude oil and can crank out ten times as much power. It takes much longer to construct and the front end expenses are much higher.

"The output with a thermal plant is a quantum leap above the gas turbine system," adds McAnany. "Also, they are cheaper to operate because you are getting more megawatts out of less fuel; and, remember raw crude is much easier to get in Iraq so access to fuel isn't that difficult."

Safety is a priority at the new Mussayib topping plant (refinery) that is being commissioned by GRD and GoI. Regular tests and drills are scheduled to insure the safety of the facility and plant employees. Special safety equipment, including respirators, oxygen tanks and protective suits are strategically located at the plant. (USACE Photo)

Over time, the savings could offset the extremely high expenses of building large thermal plants.

"Deciding which types of plants to install is an ongoing process between GRD and the MoE," said McAnany. "There remains a tremendous amount of work that needs to be done in order to have an electrical grid similar to the one we have in the United States. These things take time and a lot of money – money that was not invested in the grid over the past 25 years."

The U.S. is investing $6.6B into Iraq's electrical program. Still, the World Bank's 2004 estimate of $20 B will not be reached by U.S. contributions. Current U.S. Department of State Iraq Transition Assistance Office estimates the cost of 'fixing' Iraq's electricity infrastructure likely approaches $30 B.

All is not bleak, however. "The GoI is increasingly stepping up with their own Iraqi funds for projects and are anxious to build on what we have started," said Wendl. Again, creative partnerships continue to be the key to solving Iraq's electricity puzzle.

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