

Table 1: Saudi Aramco's downstream megaprojects

Project	Investors	Capacity	Cost	
			(\$bn)	Start-up
Jizan	Saudi Aramco	400,000 b/d	7-8	2015
Satorp	Saudi Aramco/Total	400,000 b/d	12	2013
Yanbu	Saudi Aramco/Tbc	400,000 b/d	10	2014-15
PetroRabigh 2	Saudi Aramco/Sumitomo	2.5-3m t/y	8-10	2014
Ras Tanura	Saudi Aramco/Dow	4m t/y	20	2015-16

depend on the price it must pay for ethane feedstock. The plant's naphtha feed will come from the 400,000 b/d Satorp refinery at Jubail (*PE* 8/10 p23), which will be operational in 2013.

Saudi industrial and utility companies pay an eye-wateringly low \$0.75/m British thermal units (Btu) for their gas feedstock, but this price – which harks back to the days of cheap associated-gas production – could change soon. Associated gas is becoming scarce, and new non-associated production costs are projected to come in at more than \$4/m Btu. This may force new prices on buyers.

If gas prices to industrial users are to be raised, the push to reach FID on Ras Tanura could be the catalyst the Saudi energy ministry needs to force the decision.

Meanwhile, with gas reserves in short supply, Aramco has been exploring the Empty Quarter through four joint ventures set up with foreign partners. But progress has been disappointing and no sizeable discoveries have been made.

In January, Aramco gave the joint venture featuring Eni and Repsol six months to drill a fourth and final exploration well. The partners in the other three ventures are Shell, Sinopec and Lukoil. Shell and Sinopec have committed to a second round of exploration, but Lukoil will forego further exploration to develop a discovery it made in 2007. ●

Alternative energy

India targets renewable energy development

INDIA COULD be the next hotspot for solar power developments, as it strives to boost green energy capacity to help overcome severe power constraints and cut pollution. The country is primed to build Asia's maiden solar park as part of its wider goal to quadruple generating capacity from renewable sources to 72.4 gigawatts (GW), or nearly 16% of total capacity by 2022.

The government hopes the expansion of solar and other green energy sources will fill a huge supply gap, which sees some 50% of the population having limited or no access to commercial energy. Gujarat state will invest more than \$2.3bn to build Asia's first solar park, which will provide infrastructure for 500 megawatts (MW) of capacity. Electricity from the facility, which expects 330 sunny days a year, will be sold to the state government, which has agreed to buy power from as much as 933 MW of new capacity.

Gujarat has set its sights high, with chief minister Narendra Modi claiming that apart from "making a mark in nuclear, wind, hydro and other thermal energy, Gujarat will soon become the world capital in solar energy". Modi added that Gujarat intends to provide a business environment to encourage investment, rather than offering subsidies to stimulate renewable-energy growth.

Indeed, solar is starting to form a larger part of India's renewables mix with the central government offering scores of fiscal incentives to attract companies to set up solar plants. Under the \$19bn National Solar Mission, launched last year, the country is aiming for 1 GW of capacity to be bought on line by 2013, increasing to 4 GW by 2017.

In December, India auctioned 620 MW of solar projects to 37 companies, an early step in the programme that aims to have 20 GW of solar capacity by 2022. Achieving this goal would see India outpace many nations in solar power – including the US, which the International Energy Agency predicts will have 17 GW of capacity by 2020.

Around 11%, or 18.3 GW, of the nation's 167 GW generating capacity is based on renewable sources, mainly wind. Solar accounts for only around 15 MW. But a recent report by Lux Research identifies India as an ideal market for solar based on abundant sunlight, surging demand and huge, mostly off-grid population. Lux notes that high levels of energy imports, coupled with low grid efficiency, will encourage solar expansion.

But some analysts remain cautious, saying an early rush of investors may slow to a trickle if concerns including lower-than-expected returns and hard-to-source credit are not resolved, putting the future of the solar programme at risk. So far, the renewables sector has suffered from slow lending by risk-averse commercial banks, reluctant to fund green energy projects that are more expensive than conventional power developments.

To help offset this, in November, the power ministry introduced renewable-energy certificates, which, it says, will increase the flow of much-needed investment by reducing financial risk. The certificates, which serve as an economic incentive for renewable generation, are tradable on power exchanges and will allow utilities to meet their obligation to buy part of their electricity requirement from green sources.

India aims to add about 35 GW of renewable generating capacity by 2015, with the private sector expected to invest some \$55bn, according to the Indian Renewable Energy Development Agency. It says renewable investments in the country hit \$3bn during the past fiscal year, ending March 2010, and are likely to rise by 15% by the end of March 2011. During the 2009-10 period, 2.33 GW of renewable capacity was added, included 1.57 GW of wind. And the Ministry of New & Renewable Energy expects to reach its target of 9 GW of wind capacity by March 2012.

Although large-scale wind and solar projects are important for the ministry, they are not the only green technologies being promoted. Over 400 million people in India have no access to electricity and many live in isolated communities where grid access is not commercially viable. For these areas, wind and solar, but also biomass, biogas and micro-hydro are the main options, often in combination.

In addition, India is yet to realise its geothermal potential. Estimated at 10.6 GW, geothermal capacity could provide energy to remote off-grid areas within the country. Private-sector investors are examining development opportunities, but getting projects moving will largely depend on government incentives that, as yet, do not exist. ●

Natural gas

GTL: a glut-inspired idea for North America's shale-gas abundance

UNCONVENTIONAL gas from Canada's Montney shale play could be converted into synthetic oil products to exploit the dramatic structural divergence of North American oil and gas prices.

South Africa's Sasol has agreed to take a stake in shale-gas assets owned by Canada's Talisman Energy – and a gas-to-liquids (GTL) project is one potential monetisation option. This would give producers of unconventional gas access to the markets for road vehicle and aviation fuels, without the refuelling and recharging infrastructure headaches posed by a shift to natural gas vehicles (NGVs) and electric cars.

Sasol is not the first company to have set its sights on this opportunity, but is by far the most credible. It is one of just three companies in the world with commercial-scale GTL plants in operation. The other two are Shell and South Africa's state-owned PetroSA. Neither has yet given any indication of interest in pursuing a GTL project in North America.

Sasol said in December that it plans to invest C\$1.05bn (\$1.05bn) in a 50% interest in Talisman's Farrell Creek shale-gas assets and the associated gas-gathering and processing systems. Talisman will continue to operate the assets, in the Montney basin, British Columbia.

The firms claim the 52,000 acres involved have estimated potentially recoverable resources of 9.6 trillion cubic feet (cf), the mid-point of a 4 trillion to 12 trillion cf resource range. This leaves some uncertainty about how much gas might be ultimately commercially recoverable. That helps to explain how the deal has been structured. Sasol