

## Petroleum Development Oman: Using steam to protect the planet

For large corporate incumbents in the oil industry, making a positive contribution to the environment does not always come naturally. A major change in the company's DNA is required not to mention a commitment by management and shareholders alike to put the planet before financial performance.

But changing its corporate DNA is precisely what Petroleum Development Oman (PDO) has done. And the result has been a radical re-think of the way it consumes energy and how it can mitigate the effect of its operations.

PDO has been producing oil and gas for over 40 years and operates over 120 oilfields throughout Oman. In order to maintain oil production – and secure Oman's income for future generations – PDO consumes a massive amount of electric power. To put this into perspective, PDO's operations use as much electricity as the whole of greater Muscat (population 1 million). Much of this power is used for to pump water into oilfields to maintain reservoir pressure and will soon be used in enhanced oil recovery projects using schemes to inject steam into oilfield.

To meet its rapidly growing power requirements, PDO planned to construct several new power stations. **The goal** was to ensure that this could be achieved while reducing its carbon footprint. As a direct result of its new planet-friendly mindset, PDO scrapped plans to site plants where the power was required. Instead, at a considerable extra cost, it chose to locate the plants at oilfields where waste heat could be used to generate steam for oilfield injection using an **innovative** process hitherto unused in Oman.

From these power stations, PDO will generate steam using exhaust heat that previously would have been wasted by direct venting to the atmosphere. The temperature of these exhaust gases is over 500 degrees C and can be used to make steam – a process referred to as cogeneration. This cogeneration takes place in a "Heat Recovery Steam Generation" unit that is built adjacent to the power station. By utilizing the power station waste heat cogeneration, the energy for the steam is provided without additional firing of fuel and there are no additional emissions.

And the Company has even sited one power plant next to an oilfield operated by a competitor. It will use the power but the steam will be used by the competitor. By adopting a **collaborative** approach, PDO has demonstrated a commitment to the environment as well as a desire to promote the uptake of innovative new technologies by other companies operating in energy-intensive industries.

The results show remarkable **effectiveness** and are **fully measureable**. Three power plants linked to cogeneration units currently under construction will save nearly 1 million tons of CO<sub>2</sub>/yr compared to the traditional direct-firing approaches. A further network of linked thermal EOR projects and power stations will be constructed over the coming years. These projects will help PDO realize a total emissions savings of over 4 million tons of CO<sub>2</sub>/yr within five years. In order to ensure a **sustainable** reduction in its carbon footprint in the coming years, PDO will continue to invest in this technology. Further power station and EOR expansions will yield savings totalling well over 6 million tons CO<sub>2</sub>/yr within the decade.

This re-think has not come cheaply. The heat recovery units typically add about 30% to the cost of the power stations. As well, the power must be transported to the demand centres via an overhead power line network that has required expansion and reinforcement.

PDO recognizes that what makes good environmental sense also makes good business sense.

The **impact** will be high. For other companies operating in Oman, this act of **leadership** is a demonstration that environmentally-friendly solutions are available to mitigate the effect of energy-intensive projects on the environment. It shows that in addition to protecting the planet by reducing the carbon footprint, there is an eventual payback in terms of the reduced fuel requirement.