GTL with a difference

If you can't flare it, reinject it or pipe it somewhere else, what do you do with associated gas? Petrobras thinks CompactGTL, a UK firm, may have a solution. Tom Nicholls writes

ASSOCIATED gas can be a blessing. If your oilfield is near a gas pipeline that feeds into a gas market, it can be a valuable revenue stream. But if there is no pipeline and no market – and there often is not – it can be a curse.

If building gas-export infrastructure is not feasible for technical or economic reasons, you are left with a choice of flaring or reinjecting the gas. The first option is not usually possible for environmental reasons. The second is often impractical: too much reinjection can cause reservoir damage – undermining production, reserves, recovery and profits.

If there is no pipeline, no way of building one and if flaring and reinjecting are out, then another solution for the associated gas is needed or the oil cannot be produced. CompactGTL, a privately owned technology company headquartered in Oxfordshire, has an alternative: converting associated gas to synthetic crude (syncrude) using gas-to-liquids (GTL) technology at the point of production. Its equipment is being designed to fit on floating, storage, offloading and production (FPSO) vessels or to be established as a standalone onshore facility. The syncrude is then co-mingled with the conventional oil and exported to market with the rest of the conventional oil production.

Compelling benefits

CompactGTL's chief executive, Peter Riches, who says this can be accomplished "easily and economically", claims several compelling benefits: no reservoir damage from reinjection, no carbon dioxide (CO_2) emissions from flaring, plus an increase in produced volumes. It also probably means more rapid field development because developers can get on with projects without having to negotiate access to someone else's infrastructure.

What the technology can offer, he claims, is the sale value of the syncrude; at most, it could be the key to monetising oil that, for want of a solution for the associated gas, would otherwise have had to stay in the ground. The hitch at this stage is that the technology is yet to be proved on a commercial scale. And if it does prove commercially feasible it is best suited to smaller fields.

The core technology is the same as in conventional GTL projects: natural gas is converted into a mixture of carbon monoxide and hydrogen – syngas – which is then converted into syncrude using the Fischer-Tropsch process. The difference with conventional GTL projects such as Sasol's Oryx plant in Qatar is that CompactGTL has no interest in producing refined products. And, not being a refining business, does not have to contemplate the very large economies of scale necessary in conventional GTL projects.

The company's target market is certainly very big. According to the World Bank, around 4.5 trillion cubic feet a year (cf/y) of natural gas are flared and vented (see Table 1) – equivalent to 25% of the US' gas consumption, 30% of the European Union's gas consumption or 75% of Russia's gas exports. But that cannot continue: gas flaring adds about 350m tonnes of CO_2 in annual emissions, according to the World Bank, and is therefore a significant contributor to the rising concentration of CO_2 in the world's atmosphere. Nigeria is the worst offender.

CompactGTL, bought by private equity firm Coller Capital from the UK Atomic Energy Authority in 2005, claims associated gas reserves with no commercial value exceed 1,000 trillion cf. In addition, around 12.5 trillion cf/y of gas are reinjected. The firm estimates nearly half of this gas is reinjected only because there is no alternative.

Reinjection is sometimes desirable because it can enhance crude oil production. But sometimes it is counterproductive, says Riches. Many other companies are experiencing the same problem. "It's the elephant in the sitting room," says Riches. "Everyone knows about it, but no-one's talking about it."

Or very few companies, at least. Total recently broke ranks with the industry by admitting that it cannot continue reinjecting gas into its Girassol oilfield offshore Angola without damaging the reservoir. And Petrobras, under pressure from the Brazilian government to reduce flaring, is experimenting with CompactGTL's technology for its fields offshore Brazil.

In October, CompactGTL announced an agreement with the state-controlled firm to produce up to 20 barrels a day (b/d) of syncrude in an onshore testing facility from next year, later moving to offshore testing. CompactGTL hopes this will lead to a commercial deal with Petrobras around the end of the decade. Carlos Tadeu, head of research and development at Petrobras, has described the project as a "potential major breakthrough". In theory, the technology will enable the firm to reduce flaring at production operations and carry out extended well testing without raising environmental concerns.

CompactGTL is marketing its technology to other companies in other regions. It is not yet prepared to say where, but typically, they will be remote and lacking in infrastructure – offshore west Africa is an obvious target.

The 'sweet spot'

Not all oilfields will be suitable, however. CompactGTL believes its technology will be applicable to fields with reserves of up to 400m barrels of oil and 1 trillion cf of gas, producing up to 150m cf/d of gas. But the "sweet spot" is in fields producing 10m-50m cf/d of associated gas. In offshore developments, this level of production means the processing units can be fitted onto the FPSO that will be used to develop the oil – obviating additional infrastructure. The technology is designed to be modular meaning that, as oil production declines, surplus modules can be switched off, "providing operating efficiencies and a reduction in operating costs".

Costs vary, depending on the field. But Riches predicts it will probably cost $250-300m to deal with 50m cf/d – equivalent to about 5,000 b/d of syncrude. If associated gas typically accounts for 10% of the hydrocarbons produced from an oilfield, that implies a 10% uplift in production. Reinjecting a similar amount would cost in the order of $100m-150m, yet this would not provide any direct economic benefit. Governments like the idea, says Riches, because the technology has the potential to change a tax cost – reinjection – into a revenue stream.

Progressing to a commercial agreement with Petrobras would be a milestone for CompactGTL and the firm appears confident that this is achievable. In the meantime, it plans to test financial markets' appetite for its technology with an initial public offering, listing in London, Europe and the Middle East before 2010. □

Table 1: Reported gas flaring worldwide

bn cf	2005	2004	% change
World total	**5,294.2**	**5,276.5**	***0.3***
of which:			
Nigeria	901.2	851.7	*5.8*
Russia	526.6	519.5	*1.4*
Iran	459.4	470.0	*-2.3*
Iraq	254.5	303.9	*-16.3*
Angola	226.2	240.3	*-5.9*
Venezuela	190.8	190.8	*0.0*
Qatar	137.8	159.0	*-13.3*
Algeria	123.7	152.0	*-18.6*
US*	120.2	99.0	*21.4*
Kuwait	106.0	95.4	*11.1*
Indonesia	106.0	130.8	*-18.9*
Kazakhstan	95.4	95.4	*0.0*
Equatorial Guinea	91.9	127.2	*-27.8*
Libya	88.4	88.4	*0.0*
Mexico	88.4	53.0	*66.7*
Azerbaijan	88.4	88.4	*0.0*
Brazil	88.4	53.0	*66.7*
Congo	77.8	42.4	*83.3*
UK	56.5	56.5	*0.0*
Gabon	56.5	49.5	*14.3*

*Data include an undifferentiated volume of vented gas. Many countries are known to vent significant quantities, but volumes are not reported

Source: World Bank