Enabling Oilfield Development
Our Approach

CompactGTL has a standalone modular gas solution offering strong economics for the oil industry; where flaring, gas infrastructure and reinjection are avoided.

CompactGTL’s modular solution enables oil companies to resolve the issue of associated gas handling. As flaring becomes more unacceptable from a political and environmental viewpoint, oilfields with no viable associated gas solution may be required to curtail production or in the extreme case, cease production entirely.

The CompactGTL modular gas solution is a project enabler and enhances oilfield NPV by unlocking the potential of oil field developments previously stalled or considered to be uneconomic, by overcoming flaring restrictions and creating additional syncrude revenues.

The solution is particularly well suited to the conversion of associated gas in remote or deepwater environments. The focus of our development has been to simply convert the gas into syncrude at the point of production, as a means of converting otherwise worthless gas into an easily transportable and marketable commodity.

As the associated gas is converted to synthetic crude, it can be co-mingled with the natural crude produced from the field and transported to market using the existing oil transportation infrastructure.

The process thus provides an incremental income stream that augments the economics of the oilfield and eradicates the need for flaring or the potentially damaging and costly injection of the gas into the reservoir. It also eliminates the need for separate product storage, transportation and marketing arrangements as required for other possible solutions including LNG, CNG, DME and Methanol.

The CompactGTL plant is designed to be integrated within FPSOs and implemented in remote onshore locations. The plant is modular and, accordingly, has the flexibility to match the production profile of the associated gas.

As the field’s production declines the number of active reactor modules can be adjusted to match the associated gas production profile over time; providing operating efficiency and a reduction in costs.

Associated gas

The disposal of associated gas can be a significant impediment to oilfield developments in remote and deepwater locations where there is no ready market for the gas. Similarly, re-injection of the gas is costly and can have an adverse impact on future oil recovery.

Current associated gas options can cost in excess of US$100 million and provide no direct economic benefit. Consequently, much of the gas is flared, which, with increasingly stringent environmental regulations, is becoming exceedingly unacceptable from a political and environmental viewpoint.

Independent studies estimate that global associated gas reserves with no current commercial value exceed 1,000 trillion cubic feet (tcf) and are associated with over 700 million barrels (mmbbls) of oil.

In 2008, the World Bank’s Global Gas Flaring Reduction Partnership (GGFR) reported that five tcf of gas was flared worldwide: an amount equivalent to 27% of the annual United States gas consumption and additionally, 14 tcf of gas was re-injected globally.

CompactGTL estimates that 4 – 5 tcf of this represented distressed re-injection: gas that was re-injected because of a lack of a technically feasible or economic alternative.

The solution is a project enabler; benefitting new or established oilfields

- Industry approved and operating
- Addresses gas flaring bans and penalties
- Accelerates oilfield development and increases NPV
- Replaces extensive gas export infrastructure
- Avoids gas re-injection cost and gas breakthrough risk
- Associated gas converted into bookable reserves
- Eases Government concern over resource preservation

Our Team

CompactGTL’s senior management team has a substantial track-record of success in the oil and gas sector and is committed in taking the business forward as a solution provider to the upstream markets.

In support of the management team CompactGTL benefits from an adept group of people with extensive experience of working in the oil and gas industry, including the design, commissioning and operation of world scale GTL plants and the delivery and commercialisation of innovative technology.

The highly qualified workforce includes process engineers, operations and project management personnel, contracts and commercial specialists, chemists, plant technicians and other relevant disciplines.
In 2008 Petrobras committed to a Joint Testing Agreement directly with CompactGTL, for a GTL demonstration plant funded by Petrobras. This contract included the design, engineering, procurement, construction and testing of a large scale demonstration plant, which was required to illustrate all aspects needed for commercial application.

The CompactGTL team was supported by Genesis Oil and Gas Consultants Ltd during the process design stage of the contract.

The SMR and FT reactors were manufactured by Sumitomo Precision Products Co, Ltd in Osaka, Japan and due to CompactGTL’s modular, small scale approach the complete set of GTL reactors were dispatched to Brazil by air freight. Zeton Inc. was awarded the EPC contract for the balance of plant and the GTL demonstration plant was constructed at Zeton’s facility in Burlington, Canada.

The Commercial Demonstration Plant was successfully commissioned at Petrobras’ Aracaju site in Brazil.

In 2012 Petroleo Brasileiro S.A’s CENPES Research and Development Centre successfully concluded its extensive test programme of the CompactGTL modular small scale GTL facility and approved its process conception for use by Petroleo Brasileiro S.A (Petrobras).

The Brazil plant demonstrates the world’s first fully integrated small scale GTL facility, at 200,000scf/d capacity, incorporating:

- Gas pre-treatment
- Pre-reforming
- Reforming
- Waste heat recovery
- Process steam generation
- Syngas compression
- Fischer Tropsch synthesis
- FT cooling water system
- Tail gas recycling

It has been a real team effort working with Petrobras on this test programme which has produced some extremely positive results and qualified the technology for commercial deployment. We can now progress our plans, in conjunction with clients worldwide, to develop commercial scale modular gas to liquid plants.

Nicholas Gay, Chief Executive Officer

We have ensured the commercial validity of the technology through collaboration with our strategic partners worldwide; establishing a supply chain to deliver commercial scale plants.

Iain Baxter, Director of Business Development

The Commercial Demonstration Plant started up exceptionally well taking into account that it’s a fully integrated, first of its kind, modular GTL plant.

Rudie Minnie, Head of Operations
Our modular gas solution combines both stages of the GTL process into one highly efficient, closely integrated system that provides high levels of volumetric efficiency, safety and reliability.

The solution converts the associated gas into syncrude for blending with the natural crude, eliminating the need for additional transportation infrastructure and storage infrastructure or access to market for the converted product.

The technology features proprietary catalysts and reactor designs derived from plate and fin heat exchanger manufacturing techniques. Modular plant design, incorporating multiple reactors in parallel, produces a flexible, operable solution to accommodate gas feed variation and decline over the life of the oilfield.

At the heart of the process are two banks of modular reactor blocks. Using an advanced derivative of plate and fin heat exchanger technology, these reactors allow the precise control of heat and gas flow over our proprietary metal-supported structured catalysts, located in a regular array of thousands of closely-spaced channels.

The first reactor uses Steam Methane Reforming (SMR) to convert natural gas into syngas, a mixture of carbon monoxide and hydrogen. The syngas is fed into the second reactor where it is converted via the Fischer-Tropsch process into synthetic crude oil, water and a ‘tail gas’ composed of hydrogen, carbon monoxide and light hydrocarbon gases.

The close relationship between the two reactors in the CompactGTL process is a vital element in the efficient management of the overall system. The two reactions are tuned to work together to minimise waste streams depending upon the specific application and location of the plant. The water produced in the Fischer-Tropsch reaction can be treated to remove impurities and recycled back into the steam reforming process.

CompactGTL’s proprietary reactor technology enables the design of a highly self-contained plant operating a stable process that does not require an oxygen supply. The process involves only small volumes of fluids, which proofs the system against wave motion in the offshore environment.

Maximising plant reliability and operability

Key Attributes of the CompactGTL modular gas solution

Safety
- No oxygen supply
- Flameless
- Low surface temperatures

Operability and Reliability
- Handles rich CO2 feed gas
- No catalyst handling on site
- Reactor modules exchangeable with plant on stream

Seaworthiness
- Low liquid inventory
- Low centre of gravity
- Motion insensitivity
From concept to delivery

The Way Forward with CompactGTL

The CompactGTL business and strategy is focussed on providing a unique value creating solution to the costly problem of associated gas disposal in the upstream oil and gas industry.

CompactGTL’s proprietary technology solution converts gas into synthetic crude oil, or syncrude. However, the economic value of this solution is much greater than simply the syncrude produced as it also enables the costs associated with gas re-injection, or flaring penalties, to be avoided and can even facilitate the development of marginal fields.

This provides a clear distinction from the proposition offered by conventional GTL technologies where projects rely on economies of scale and focus on converting gas into high value refined petroleum products.

CompactGTL is committed to ensuring that the application of the technology meets individual client requirements therefore the whole approach from project feasibility to defined scope can be tailored to suit individual client and project needs.

CompactGTL – a turnkey solution provider

- Feasibility / Conceptual Study
- Pre-FEED and FEED Contract
- EPC Contract
- Service and Support

The CompactGTL proprietary reactor module design and operation remain a common factor for each plant, however, the balance of plant, overall configuration and project execution approach vary from project to project.

To support this activity, CompactGTL carries out a project specific Feasibility Study in conjunction with the client. The Feasibility Study examines the technical and commercial aspects for the proposed solution at a conceptual design level.

Typical aspects include the expected feed gas composition and flow profile, site location, availability of utilities, syncrude yield, budgetary capital expenditure and economic impact on the oilfield development.

In addition, the Feasibility Study will generate the required information to generate a proposal for the next phase of project definition, namely a pre-FEED and/or FEED study leading up to an EPC contract.

The CompactGTL modular gas solution can benefit new or established, onshore or offshore oilfields. It is ideally suited for:

- Fields producing 10 – 50 million standard cubic feet (MMscf) of associated gas per day
- Fields with reserves of up to about 400 million barrels of oil (MMBO)
- Fields where flaring is being phased out or heavily taxed
- New fields where re-injection is not viable because of the low volume of associated gas, high reservoir pressure, the distance to market, a lack of on-shore solutions and the location of reservoirs
- New fields where re-injection is the only current viable option but results in significant capital cost, increased complexity of reservoir management, potential damage to the reservoir and limits on oil production rates

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In July 2008 CompactGTL’s first pilot plant was successfully commissioned at Wilton, UK, which demonstrated the fully integrated process.

The test facility in Wilton has enabled the full evaluation and development of the process operating ‘envelope’ as well as the start-up, shut-down and normal operating procedures.

The plant, which incorporates our proprietary SMR and FT technology, demonstrates the fully integrated CompactGTL process operating under commercial conditions.

Throughput is 1 bbl of syncrude per week and the feedstock can be controlled to test the variety of associated gas compositions encountered and during testing the plant runs 24 hours a day.

Testing at this scale provides valuable operability data that feeds into our larger scale pilot plant and commercial plant projects. We now also use the plant as a training facility for customer operative training.

As part of the Commercial Demonstration Plant project, the Wilton site was responsible for training over 20 Petrobras employees as plant operators.

The employees were trained as two groups and after an initial induction session were trained by CompactGTL operators during our own working shift patterns.

CompactGTL continues to strengthen the team located at Wilton, and the facility is now established as a training centre for CompactGTL clients.
To ensure the economic viability of the critical components and the manufacturing capacity exists to meet the growing demand for commercial plants CompactGTL has developed alliances with world class experts to form a supply chain. CompactGTL works closely with the established supply chain to sustain a technical and commercial advantage for our clients.

We have developed strategic alliances with Sumitomo Corporation and Sumitomo Precision Products, of Japan; to produce the CompactGTL proprietary reactors alongside an alliance with a world class major catalyst manufacturer. This has led to the development of reactors and catalysts that were manufactured for the Petrobras Commercial Demonstration Plant, making the product more suitable for mass production in commercial volumes.

CompactGTL has developed a strategic relationship with SBM Offshore, of the Netherlands, the world’s largest Floating Production Storage Offloading (FPSO) vessel contractor. This has allowed the integration of the Plant into an FPSO to be challenged, optimised and refined.

Fluor Limited is focusing on the delivery of pre-FEED and FEED studies in co-operation with CompactGTL. Fluor will also support CompactGTL in the execution of feasibility and scouting studies and delivery of CompactGTL’s EPC (Engineering Procurement & Construction) contracts. Fluor has proven experience in the relevant process technologies making them an ideal strategic partner.

**FLUOR**

Fluor is one of the world’s largest publicly owned engineering, procurement, construction, maintenance and project management companies. Over the past century Fluor has become a trusted global leader in providing exceptional services and technical knowledge. Fluor is a Fortune 200 company, with a workforce of over 42,000 men and women serving clients on six continents.

**SBM OFFSHORE**

SBM Offshore N.V. is a pioneer in the offshore oil and gas industry. Worldwide, it has over 5,000 employees representing 47 nationalities, and is present in 15 countries. Activities include the engineering, supply, and offshore installation of most types of offshore terminals or related equipment.

**SUMITOMO PRECISION PRODUCTS COMPANY, LTD. (SPP)**

Sumitomo Precision Products Company, Ltd. (SPP) is an integrated manufacturer of aerospace equipment, heat exchangers, hydraulic controls, wireless sensor networks, sensors, micro-electronics technology, and environmental systems.

**SUMITOMO CORPORATION**

Sumitomo Corporation is a leading general trading company, boasting 150 locations in 70 countries throughout the world. The entire Sumitomo Corporation Group (“the Group”) consists of nearly 780 companies and more than 70,000 personnel.
CompactGTL is working in alliance with SBM Offshore to offer commercial solutions for associated gas by integrating its modular, mini-channel GTL technology into Floating, Production, Storage and Offloading (FPSO) vessels. SBM Offshore is the owner and operator of the world’s largest fleet of FPSOs and provides support to CompactGTL through its engineering and offshore expertise.

The integrated FPSO solution to be offered by SBM Offshore and CompactGTL will simultaneously produce oil from the reservoir whilst converting the associated gas into synthetic crude oil; by means of an on board modular GTL plant. The syncrude can then be co-mingled with the natural crude produced from the field and transported to market using the existing oil transportation infrastructure. The process thus provides an incremental income stream that augments the economics of the oilfield and eradicates the need for flaring or the potentially damaging and costly injection of the gas into the reservoir.

The CompactGTL and SBM Offshore collaboration has allowed the integration of the modular GTL plant on board an FPSO to be challenged and refined.

Studies have established that associated gas feed rates of 10 to 50MMscfd can be processed and estimated to produce between 1,000 to 5,000 bpd of syncrude to supplement oil production. Some key benefits of this approach are:

- Use of existing storage or transportation infrastructure for syncrude produced
- Standalone integrated solution with no requirement for additional floating facilities
- Modular GTL technology provides operational flexibility and turn-down
- Oilfield NPV increased through faster development and syncrude revenue
- Associated gas can be booked as reserves.