Enabling Oil and Gas Field Development
Our Approach

Offering the world’s first approved and operating, fully integrated modular GTL system, CompactGTL provides a proven solution to the upstream industry, for the conversion of associated gas, stranded and shale gas into liquids at the point of production.

The technology features a modular plant design, incorporating mass produced reactors connected in parallel, providing a flexible, operable solution.

Stranded gas monetisation

The abundance of gas globally and the sustained high arbitrage between gas and oil prices, represents a compelling opportunity for small GTL projects in remote locations with limited or no gas infrastructure.

The plant converts most natural feed gas streams into synthetic crude oil, alternatively, the syncrude may be further refined to diesel on site, depending on available export logistics and economic drivers.

CompactGTL’s FT reactors can be combined with established SMR and ATR reforming equipment. This plant configuration takes advantage of the economies of scale offered by conventional reforming technology and combines this with the flexibility of the CompactGTL modular FT reactor technology.

Associated gas

As gas flaring becomes more unacceptable from political and environmental viewpoints, proposals for new oilfield projects in remote or deep water locations must increasingly demonstrate how the associated gas will be processed without continuous flaring.

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

The solution is particularly well suited to the conversion of associated gas in remote or deepwater environments. As the associated gas is converted to syncrude it can be blended with the natural crude at the point of production.

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 re-injection of the gas into the reservoir. It also eliminates the need for separate product storage, transportation and marketing arrangements that would be required for other gas handling solutions including LNG, CNG, DME and Methanol.

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.

Onshore

- 5 – 150 MMscf/d
- Monetise stranded & shale gas
- Convert associated gas
- Avoid flaring restrictions & penalties
- Unconventional gas – UCG, CBM

Offshore

- Avoid costly gas export or re-injection
- Avoid flaring restrictions & penalties
- Extended Well Test Facilities
- Early Production Systems
- Full Field Development FPSO
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, at the end of 2010.

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
Technical Overview

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, provides 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 maximise efficiency and 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.

Key Attributes of the CompactGTL modular gas solution

**Safety**
- No oxygen supply
- Flameless
- Low surface temperatures

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

**Seaworthiness**
- Low liquid inventory
- Low centre of gravity
- Motion insensitivity
The Way Forward with CompactGTL

CompactGTL is focused on providing a unique value creating solution to the upstream oil and gas industry, by offering a proven solution for the conversion of natural gas into liquids.

The economic value of this solution is much greater than the synthetic crude (syncrude) produced as it enables the costs associated with gas re-injection, or flaring penalties, to be avoided, and can even facilitate the development of marginal or remote fields.

CompactGTL is committed to ensuring that the application of the technology meets individual client requirements. Therefore the whole approach from project feasibility study, through FEED to FID, is tailored to suit individual project needs.

CompactGTL – a turnkey solution provider

- Feasibility / Conceptual Study
- Pre-FEED and FEED Contract
- EPC Contract
- Training, 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 varies 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 overall field 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 phase, leading up to FID for an EPC contract.

The CompactGTL solution can benefit new or established onshore fields as well as offshore oilfields with associated gas. It is ideally suited for:

**Onshore stranded gas monetisation**
- Fields producing 5 – 150 million standard cubic feet (MMscf) of gas per day
- Fields where the distance to market, a lack of alternative solutions, and the location of reservoirs restricts development
- Fields where production is not economically viable as the local gas market is saturated

**Associate gas – onshore and offshore**
- Oilfields producing 5 – 150 million standard cubic feet (MMscf) of associated gas per day onshore, or up to 50MMscf offshore
- Oilfields with reserves of up to approximately 400 million barrels of oil (MMBO)
- Oilfields where flaring is being phased out or heavily taxed
- New oilfields where gas export is not viable because of the low volume of associated gas, distance to market or local geographical constraints
- New oilfields where high reservoir pressure prevents gas reinjection
- New oilfields where re-injection is the only technical option but results in significant capital cost; increased complexity of reservoir management or potential damage to the reservoir

From concept to delivery

benefiting new or established oilfields
In July 2008 CompactGTL’s first pilot plant was successfully commissioned at Wilton, UK, and has been operating successfully since 2008.

This facility demonstrates 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.

Strategic alliances have been established for mass production of the CompactGTL proprietary SMR and FT reactors. The development and successive approval of the reactors and catalysts that were manufactured for the Petrobras Commercial Demonstration Plant is testament to the partnerships formed to meet commercial demand. Sumitomo Corporation and Sumitomo Precision Products of Japan, manufacture and supply the SMR and FT brazed reactor blocks for CompactGTL alongside our alliance with the world class major catalyst manufacturer, Johnson Matthey; for the development, manufacture and supply of catalysts. Kawasaki Heavy Industries has become a strategic supply chain partner to execute the reactor modularisation; the construction of the reactors and the subsequent modularisation benefit from the close proximity of the Sumitomo Precision Products plant in Amagasaki and Kawasaki Heavy Industries facilities, in Harima. The shipping of the complete reactors will then take place from Kawasaki’s quayside facilities at Harima, to clients around the world.

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 scoping 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.

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.

Kawasaki Heavy Industries Ltd is an international corporation based in Japan that has forged an extensive global presence; which today spans a growing number of fields. Continually moving forward to meet the ever-changing demands of the marketplace, KHI has branched out into the energy and environmental sector and also broken new ground in the field of industrial equipment.

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 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.

Johnson Matthey is a leading specialty chemicals company underpinned by science, technology and its people. A leader in sustainable technologies, many of its products enhance the quality of life for millions of people around the world. Drawing on its expertise in catalysis and materials science, Johnson Matthey develops and manufactures a wide range of high technology products for the automotive, chemical and oil, gas and refineries industries worldwide.
SBM Offshore is seeking solutions to reduce flaring on offshore fields. We have joined forces with CompactGTL, cooperating exclusively on offshore projects, to provide a solution using a pioneering new technology to be used on FPSOs, propelling the oil & gas industry into a new era of increased productivity, while leaving the problem of flaring behind.

A commercial demonstration facility has been in operation onshore in Brazil for two years for Petrobras.

This optimized FPSO with an integrated GTL plant can be applied to an Early Well Test (EWT) service or on a full field development. This is the only on-board no-flare solution currently available on the market for offshore oil production and eliminates the need for costly gas export or re-injection infrastructure. By combining the world’s leading supplier of FPSOs and the pioneering compact GTL specialist – we bring to the industry an elegant solution for disposal of associated gas. Together, after four years of collaboration, we have found a way to liberate stranded oil and to develop fields while meeting increasingly higher environmental constraints.

This solution has been “Approved in Principle” by Det Norske Veritas in February 2012.

Key Concept Design Features:

- An Extended Well Test Facility for a wide range of water depths
- Ability to quickly relocate from field to field for a program of EWts
- Minimise flaring by adopting CompactGTL technology for conversion of all surplus associated gas (after fuel) into Synthetic Crude Oil (syncrude)
- Maximise integration between CompactGTL process and the FPSO topsides process, utilities and marine systems for improved operability and Capex / Opex optimisation
- Reservoir properties based on a wide range of inlet compositions
- Extendable to full field developments
- Ideally suited for remote, deep water locations, and typically for fields with low Gas to Oil ratios

Key Facts:

- 30 - 60,000 bpd oil production
- Up to 37 MMscfd feed gas to GTL plant
- 2,300 bpd synthetic crude oil production
- 400 bpd NGL Extraction