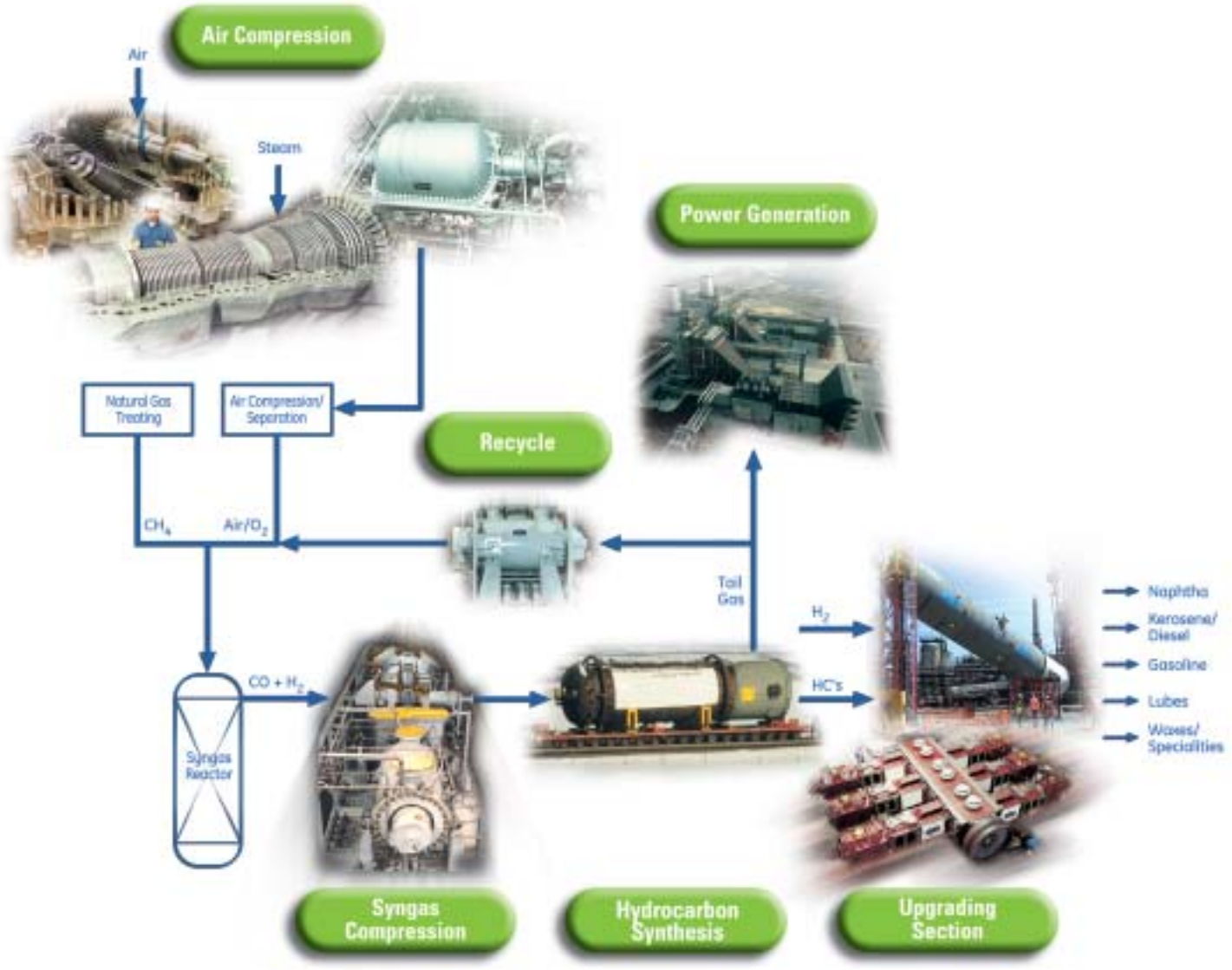
GE
Oil & Gas

Gas-To-Liquids

The Power of Technology, Experience and Innovation

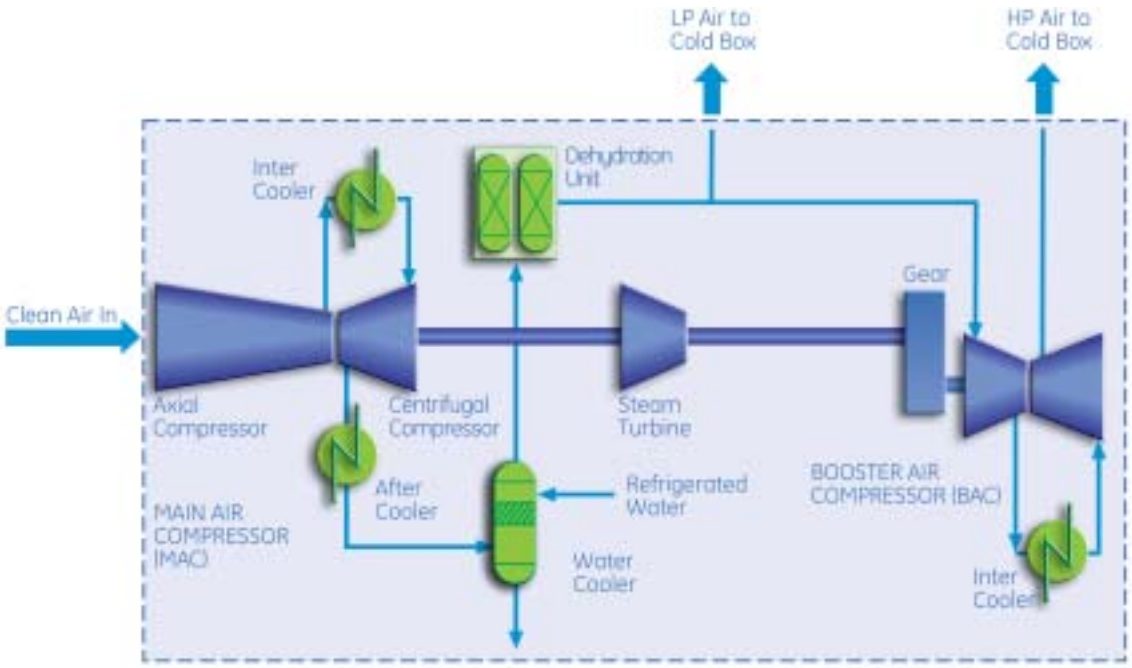
Gas-To-Liquids (GTL) technology is a new way to monetizing stranded natural gas reserves by chemically converting the gas into clean syntethic fuels. The GTL process consists of three major process steps: the syngas production, the liquid hydrocarbon synthesis (Fisher-Tropsch) and the final upgrade.
GTL is a capital intensive technology facing the challenge of reducing the investment cost per unit of production. Power generation, air compression/ separation, water treatment and utilities play a key role in the overall plant optimization and economics of the investment.
The GE's Oil & Gas Business boasts a long history as a technology leader working with the oil & gas industry to develop the innovative solutions required to establish the economic viability and the technical feasibility of the processes.
As already done with the LNG industry, GE is currently collaborating with the developers of the GTL process to create larger scale compression solutions to help drive down the investment cost of plants.



Air Compression

The air compression system is the starting point of the GTL process.
It may feed the syngas plant directly or the Air Separation Unit (ASU) if the production of oxygen is required by the process.
GE can provide the entire air compression island under single source and responsibility.
We design and manufacture all the core equipment for the air compression process and have all the necessary in-house system capabilities to design, install, start, commission, and maintain the complete air compression island to meet Customer requirements.

Our experience includes:
- main air compressors
- centrifugal compressors
- drivers (steam or gas turbines)
- coolers, steam condensers and other auxiliaries
- civil and structural systems
- construction, installation and startup activities
- life cycle services



Typical sketch of a GTL air compression application

Besides the manufacturing of key equipment, other activities involved in completing air compression island include system engineering (electrical, mechanical, instrumentation), the supply of the balance of plant (separators and coolers, valves, piping, electrical and control systems), start-up and commissioning and project management. Design and engineering are available in-house. GE's Oil & Gas organization also has dedicated personnel to execute all aspects of project management (planning, material mgmt, quality, etc.).
Leveraging on our long-standing experience with offshore modularization, the air compression island can be supplied as modules to minimize on-site installation and construction activities.

Power Generation

GE is fully equipped to satisfy the power and energy needs of GTL plants.
Oil & Gas solutions vary from “packaged” simple cycle turbo-generators to complete power generation and waste heat recovery systems that can be furnished on a turnkey basis.
Gas turbines, steam turbines, condensers and other auxiliaries are integrated under single source and responsibility.
GE has a broad range of heavy-duty gas turbines and extensive experience in burning low Btu gases including process tail gas.

Standard turbine-based industrial power generation configurations include:

Gas Turbine Power Generation Islands

A single-shaft gas turbine is connected directly or through a reduction gear to the electric generator. The electric power produced by the generator is increased to the required voltage level through a step up transformer.
GE’s typical scope of work includes basic and detailed civil, mechanical, electrical and instrumentation engineering, gas turbine(s), electrical generator(s), main step-up transformer, fuel system, automation and control, civil and structural system, construction and installation activities.

Steam Turbine Power Generation Islands

A steam turbine is connected directly to the electric generator. The electric power produced by the generator is increased to the required voltage level through a step up transformer.
GE’s typical scope of work includes basic and detailed civil, mechanical, electrical and instrumentation engineering, steam turbine(s), steam condensers electrical generator(s), automation and control, civil and structural systems, construction and installation activities.

Power Generation & Waste Heat Recovery Systems

The typical configuration of a waste heat recovery system for power generation and steam production for process applications or heating consists of a closed steam cycle.
Besides production of electric power, as with the simple cycle configuration, the heat content of the gas turbine exhaust gas is recovered using a boiler to produce steam for various applications in the GTL plant. The boiler and its auxiliaries are added to the typical simple cycle scope.

Product Portfolio

The Oil & Gas business of GE has the experience and the capabilities to design and manufacture complete multi-product solutions and services for GTL plants. We cover the complete spectrum of the project from initial conception through installation, operation and life cycle support. Thanks to our experience in Processing applications, Air Compression and Power Generation, we are able to cover a wide range of GTL plant process units from Syngas to Product Upgrading through the Fischer-Tropsch Hydrocarbon Synthesis process.

Our product portfolio satisfying the requirements for all these GTL process units includes:

Turbocompressors for various recycle applications throughout the entire GTL process and syngas compression units comparable to our referenced methanol and ammonia synthesis trains. We have a complete range of centrifugal compressors (vertically and horizontally split, overhung-impeller and integrally geared) together with electric motors, steam turbines (impulse or reaction design) and gas turbines drivers, ranging from 1MW through 120MW.

Reciprocating Compressors incorporating the latest technology developments and improvements built on many years of experience including a world-class record in hydrogen make-up compressors, which are particularly relevant for the GTL Product Upgrading unit. Our process compressors include balanced opposed and horizontal machines with or without lubrication, up to 36 MW/unit, and with packaging available.

Reactors include heavy wall reactors for the Product Upgrading hydro-process, up to more than 300 mm in thickness and of more than 1,500 tons, and Hydrocarbon Synthesis tubular reactors with diameters up to 8 m with more than 30,000 tubes. Our high tech fabricated equipment capabilities include extensive experience in welding technology and in manufacturing with the most advanced CrMoV material.

Turboexpanders designed for applications such as energy recovery and hydrogen purification in plants under any process conditions.

Centrifugal Pumps for high pressure and heavy duty service and special applications including hydrocracking in the Product Upgrading section.

Valves, both safety and control, for conventional and heavy-duty service, and for special applications such as turbine bypass and compressor anti-surge.

Air Coolers and Air Cooled Steam Condensers broadly used in process plants with flat & A-frame configurations, forced & induced draft, and pre-assembly & site assembly options.

Nuovo Pignone S.p.A.
via F. Matteucci, 2
50127 Florence - Italy
T +39 055 423211
F +39 055 4232800
www.ge.com/oilandgas

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