GAS-to-OIL: NEW GENERATION of GTL TECHNOLOGY

Sell Your Gas at $80 per Barrel
INFRA TECHNOLOGY PROGRESS

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INFRA - NEW GENERATION OF GTL TECHNOLOGY

First commercial license issued

2009 - 2010

Full-cycle Pilot Plant launched, FT catalyst manufactured, product samples received

2011

Key patents issued for FT catalyst and reactor

2012

INFRA Technology supplied the integrated pilot GTL unit to Gazprom

2013

New pilot plant with 6m FT reactor

2014

First 100 bbl/d GTL unit launch

2015

Pilot plant

2016

Catalyst Industrial Manufacturing

2017

2018 - 2019

First commercial license issued
INFRA Technology offers a technology for the production of value-added light synthetic crude oil and clean liquid synthetic transportation fuels from natural and associated gas, as well as from biomass and coal.

Our GTL product - light synthetic oil - is fully compatible with the existing oil industry infrastructure. No sulphur, aromatics and asphaltens. Mixes well with mineral crude. Can be upgraded to ultra-high quality drop-in motor fuels.

Breakthrough technology, developed by INFRA, is based on Fischer-Tropsch synthesis and produces single liquid product straight out of the Fischer-Tropsch reactor without additional hydrocracking stage.

Unique proprietary highly productive catalyst and original patented Fischer-Tropsch reactor design.

Just one stage. Just one product. Lowest Cost FT Reactor.

INFRA offers significantly lower capital cost and operating expenses, finally making production of synthetic oil from natural gas economically feasible, ensuring the GTL process is profitable as a rule rather than an exception.

But Houston, we have a problem, maybe more than one.......
INFRA GTL M100 DEMONSTRATION PLANT

- **1.0 MMscf/day = 100 barrels of synthetic oil per day**
  Modular transportable GTL plant for processing natural and associated gas into synthetic oil, producing 100 barrels of synthetic oil from 1 million cubic feet of gas per day.

- **65/35% diesel and gasoline fraction mixture using INFRA S2 catalyst**
  M100 produces synthetic oil – a mixture of diesel and gasoline fractions in 65/35% proportion. Up to 45% kerosene fraction.
  Product contracted to Shell Deer Park refinery.

- **Compact footprint**
  4,000 square feet
  14 road and ship transportable modules

Watch video of M100 on: INFRA_final.mov
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**Proof of Concept Technology Development Stage**

- INFRA designed and built a proof-of-concept GTL plant in Houston (M100) in order to test and demonstrate the operation of a multi-tubular reactor with INFRA FT catalyst:
  - INFRA built the plant on an EPC basis. In addition to the proprietary FT block, the Steam-Methane Reformer (SMR) and synthesis gas conditioning system were designed in-house.
  - Both the multi-tubular FT reactor block and the SMR have become “first of its kind” designs for small-scale GTL – all engineering remains with INFRA.

- **In-house SMR design led to much longer start-up time and significant budget overrun:**
  - SMR commissioning started in May 2017 and continued until July 2018. At that point, INFRA achieved stable operation of synthesis gas production and conditioning.
  - SMR and amine CO₂ removal blocks fully commissioned, stable operation and synthesis gas target parameters achieved.
  - The Hydrogen membrane used for adjusting synthesis gas composition was damaged during start-up due to design and operational errors. INFRA managed to achieve the best ratio of synthesis gas, H₂/CO=2.95 (design requirement for FT synthesis is equal to 2.15) and operated at this level for >8 weeks.

- **FT reactor:**
  - FT catalyst activation and development was not started since the required ratio of synthesis-gas (H₂/CO=2.15) was not achieved.
  - FT block cold commissioning is complete, FT reactor is ready for start-up.

Achieved SMR and Amine system design parameters of 3.0:1 ratio
- Lowering the $\text{H}_2:\text{CO}$ ratio to the required 2.2:1 for operation of the FT section was not reached.
- The ratio adjustment at the membrane separators was not within its design parameters.
Field-scale G-Reformer® run completed Q1/2018
To be deployed in production Q1 2020 at Wharton
Converts natural gas into synthesis gas as part of the two-stage GTL process
Syngas Output Volume: 3,300 mcfd
H₂:CO Ratio: 1.7 to 2.5 (2.15 for M100)
Carbon Conversion Efficiency: 91%
Paired with INFRA’s M100 FT to produce fuel: 100 BBL to 2,000 BBL per day
**Press Release**

27 September, 2019 - Gas Technologies LLC ("GasTechno"), the parent company of GasTechno Energy & Fuels (USA) LLC and GasTechno Energy & Fuels Holding (UK) Limited, has signed a Memorandum of Understanding with INFRA Synthetic Fuels, Inc. ("INFRA") to enable joint marketing and deployment of their respective industry-leading, patented, small-scale gas-to-liquids (“Mini-GTL®”) technologies.

Dmitry Popov, Director of INFRA Synthetic Fuels, states, “The GTL industry is still in its infancy. Until global multinational companies (MNC’s) hop on board the GTL technology bandwagon, we smaller companies will have to carry the torch through proof of concept, commercial development and multi-plant deployment.

GasTechno will accelerate this deployment via its access to the SERFund by offering MNC’s low cost and low risk equipment leasing structures. INFRA supports this market approach and **whether the end product liquid is methanol or syncrude, we see the importance of developing the GTL industry prior to squandering marketing dollars on competitive posturing. We prefer to collaborate to build the GTL industry first!**"
INFRA TECHNOLOGY PROCESS FLOWSHEET

REFORMER Agnostic

Low Cost, Small Footprint, Modular 5 – 50 MMscfd SynGas Reformer
INFRA’S CATALYST FACTORY

- INFRA has commissioned its own production of the proprietary Fischer-Tropsch catalysts. Production capacity is up to 30 tons per year.

- Fischer-Tropsch catalysts are being produced since June 2015.
CRUDE OIL: ONE LIQUID PRODUCT, NOWAXES, NO BYPRODUCTS

### Parameter of INFRA synthetic crude oil

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Method</th>
<th>Value</th>
<th>Unit</th>
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<tbody>
<tr>
<td>API at 60°F</td>
<td>ASTM D4052</td>
<td>59.6</td>
<td>API</td>
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<tr>
<td>Vapor Pressure, VPCR at V/L=4 and 100°F</td>
<td>ASTM D6377</td>
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<td>psi</td>
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<tr>
<td>Kinematic Viscosity, at 20°C (68°F)</td>
<td>ASTM D445</td>
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<td>cSt</td>
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<tr>
<td>Pour Point</td>
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<tr>
<td>Sulphur content</td>
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<td>mg/kg</td>
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<tr>
<td>FT Naphtha/gasoline fraction (IBP-300°F)</td>
<td>ASTM D2892</td>
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<td>wt%</td>
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<tr>
<td>FT Jet/Kerosene fraction (300-575°F)</td>
<td>ASTM D7169</td>
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<td>wt%</td>
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<tr>
<td>FT Diesel fraction (300°F-FBP)</td>
<td>ASTM D2892</td>
<td>65</td>
<td>wt%</td>
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<tr>
<td>Heavy paraffin content</td>
<td>UOP-46 modified</td>
<td>28</td>
<td>wt%</td>
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Syncrude produced with S2 INFRA FT catalyst in 6m (20ft) reactor tube
Testing by SGS (July 2018); Saybolt (October 2018)
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BUSINESS MODEL

- **Go to Market Product**
  INFRA are focused on detailed design of a 500 BPD FT module for use with syngas sources of opportunity. The design is a 6m tall reactor of 2.2m diameter, two stage, that transports inside ISO container dimensions, moved vertically on site for operations. Multiple 500 BPD FT modules up to 3000 BPD can be deployed.

INFRA will generate revenue through:

- **Sale of technology licenses** based on INFRA’s GTL technology,
- **Engineering studies** (feasibility studies, conceptual studies, pre-FEED, FEED),
- **Project-related engineering services, Commissioning, Training** (procurement, fabrication, owner’s engineer, operator training, catalyst replacement),
- **Sale of small-scale modular transportable GTL units (M100)** for shale gas and associated gas utilization, Biomass to Liquids production, and
- Regular supplies of the **proprietary catalyst**.
PROPOSED PROJECT EXECUTION

- FT design experience
- Partners for reforming and fuel upgrade
- Multi-disciplinary team
- Working on the family of highly-productive catalysts
- 8 years of pilot plant experience
- Independent verifications

- EPC partner

- Modules designed to the dimensions of standard shipping containers
- Detailed operating & safety procedures prepared
- Trained team of operators

- Set down and bolt up type installation

R&D  ENGINEERING  PROCUREMENT  CONSTRUCTION  INSTALLATION  OPERATIONS

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