GAS-to-OIL: NEW GENERATION of GTL TECHNOLOGY

Sell Your Gas at $65 per Barrel!
in•fra tech•nol•o•gies  |ˈɪnfra tekˈnɒlədʒɪz| — an innovation company in the field of advanced energy and new materials. The company has developed the new generation of Fischer-Tropsch process — technology for producing high quality synthetic oil and transportation fuels from carbon-containing feedstock (gas, coal, biomass).

**Invention**

INFRA.xtl technology. Unique proprietary highly productive catalyst and original patented Fischer-Tropsch reactor.

**Result**

For the first time in history synthetic fuel production becomes profitable.

**Technology Applications:**

— economically viable associated petroleum gas utilization;
— monetization of stranded gas and oil fields (for example, offshore and heavy oil);
— synthetic fuel, jet and motor fuel production.
INFRA.xtl is a breakthrough GTL technology that allows to produce synthetic oil and motor fuels directly from Fischer-Tropsch reactor without wax stage.

Just in one stage. Just one product.
Technology

Conventional technologies
- Gasification
- Fischer-Tropsch synthesis
- Hydrocracking / Upgrading
- Logistics

INFRA.xtl technology
- 1 product: synthetic crude

INFRA – NEW GENERATION OF GTL TECHNOLOGY
Highly productive catalyst —

porous granules of composite material loaded with cobalt nano-particles. INFRA has started industrial production of the Fischer-Tropsch catalyst at its own newly built factory. The catalyst is also being transferred for mass fabrication to an US manufacturer.
Highly productive catalyst

Advanced 3D reactor model

of transport phenomena in the catalytic bed allows to integrate all complex calculations of heat and mass transfer simplifying the design process for reactors of differing scale — from modular field units to large industrial sized facilities.
INFRA.xtl highlights

Highly productive catalyst

Advanced 3D reactor model

Patented Fischer-Tropsch fixed-bed reactor design

works with proprietary catalysts to increase productivity and reduce capex and operating costs.
Highly productive catalyst

Advanced 3D reactor model

Patented Fischer-Tropsch fixed-bed reactor design

Technology flowsheet

Chemcad modeling of more than 100 flows optimizes the process for specific locations and feed gases of varying composition and caloric value. Flowsheet variations provide a product output range between 330 and 450 kg of syncrude per 1,000 cubic meters of methane. Improved efficiency of heat and CO₂ utilization increases product yield.
INFRA.xtl is based on unique proprietary Fischer-Tropsch catalyst

Produces more than 400 kg of synthetic oil per 1,000 m³ of gas
Has low capital and operating expenses
Has no by-products

INFRA.xtl ensures positive NPV of GTL plants on a standalone basis even for small-scale facilities.
# Liquid product

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Method</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBP (°C)</td>
<td>ASTM D86</td>
<td>83</td>
</tr>
<tr>
<td>Distillation residue (weight %)</td>
<td>ASTM D86</td>
<td>1.7</td>
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<tr>
<td>FBP (°C)</td>
<td>ASTM D86</td>
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<td>Water content (weight %)</td>
<td>ASTM D4377</td>
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<td>Paraffin content (weight %)</td>
<td>UOP-46 modified</td>
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<tr>
<td>IBP—180 (weight %)</td>
<td>ASTM D86</td>
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</tr>
<tr>
<td>180—FBP (weight %)</td>
<td>ASTM D86</td>
<td>52</td>
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<tr>
<td>120—250 (weight %)</td>
<td>ASTM D86</td>
<td>45</td>
</tr>
<tr>
<td>Cetane index of diesel fraction</td>
<td>GOST 305</td>
<td>70</td>
</tr>
<tr>
<td>Pour point (°C)</td>
<td>ASTM D97</td>
<td>−3</td>
</tr>
</tbody>
</table>

**INFRA S1**

**SYNTHETIC OIL**

- **Gasoline**
- **Jet fuel**
- **Diesel**

*INFRA − NEW GENERATION OF GTL TECHNOLOGY*

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**INFRA S1**

**SYNTHETIC OIL**

- **Gasoline**
- **Jet fuel**
- **Diesel**

*INFRA − NEW GENERATION OF GTL TECHNOLOGY*
INFRA catalyst family

INFRA offers different catalysts to suit the preferred liquid product composition

- INFRA S1 SYNTHETIC OIL
- D1 DIESEL
- J1 JET FUEL
- G1 GASOLINE

Gasoline
Jet fuel
Diesel
Associated gas

INFRA.xtl technology allows to build low-cost and compact modular GTL plants on wells, or on clusters of wells, making processing associated gas economically viable.
M100 pilot/ddemostration plant

**60/40** mixture of gasoline and diesel
M100 produces 100 barrels of synthetic oil (60/40 mixture of gasoline and diesel with high share of jet fuel) from 1 million standard cubic feet of gas per day (methane equivalent).

**4,000** square feet footprint
INFRA – NEW GENERATION OF GTL TECHNOLOGY

INFRA 100 BPD GTL unit technology flowsheet

Natural Gas
1 MMscfd

Gas Cleaning
Desulfurization
Reformer
Syngas Conditioning
FT Reactor
Product Separation

Synthetic Oil
105 BPD

Self-sufficient in Water
Self-sufficient in Electricity
Self-sufficient in Steam

Heat

Syngas
H/CO: 2.15:1
Economy of scale for larger plant
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INFRA 100 bbl/d Plant Progress
INFRA — NEW GENERATION OF GTL TECHNOLOGY

INFRA 100 bbl/d Plant Progress
Engineering in Progress

5,000 – 1,000 FEED and feasibility studies for several customers in South-East Asia, Asia and Russia
Engineering in Progress

5,000 FPSO FEED. Malaysia