10 Years of Reducing Emissions from Flaring.
10 Years of Improving Energy Efficiency.

Global Gas Flaring Reduction: A Public-Private Partnership

GASTECHO
GAS TECHNOLOGIES LLC
WALTER BREIDENSTEIN, CEO
GasTechno® Process

- World’s Lowest CAPEX
- GasTechno® Platform provides direct conversion of gas

Products Include:
- Alternative Fuels
- Plastics & Resins
- Consumer Products
- Many, many more...

Natural Gas Preconditioning

FLARE
GTL – Proprietary Reactor

- Over 50 Pending & issued patents in 42 countries
<table>
<thead>
<tr>
<th>Processing Stage</th>
<th>GasTechno</th>
<th>Syngas F-T</th>
<th>Capital Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed gas compression</td>
<td>X</td>
<td>X</td>
<td>Medium</td>
</tr>
<tr>
<td>Gas pretreatment</td>
<td></td>
<td>X</td>
<td>High</td>
</tr>
<tr>
<td>Gas reforming</td>
<td></td>
<td>X</td>
<td>High</td>
</tr>
<tr>
<td>Partial oxidation reaction</td>
<td>X</td>
<td></td>
<td>Low</td>
</tr>
<tr>
<td>Process steam generation</td>
<td></td>
<td>X</td>
<td>Medium</td>
</tr>
<tr>
<td>Syngas compression</td>
<td>X</td>
<td></td>
<td>Medium</td>
</tr>
<tr>
<td>Fisher Tropsch synthesis</td>
<td>X</td>
<td></td>
<td>Medium</td>
</tr>
<tr>
<td>Waste heat recovery</td>
<td>X</td>
<td>X</td>
<td>Medium</td>
</tr>
<tr>
<td>Liquid separation</td>
<td>X</td>
<td>X</td>
<td>Low</td>
</tr>
<tr>
<td>CO2 scrubbing</td>
<td>X</td>
<td></td>
<td>Low</td>
</tr>
<tr>
<td>Cooling water system</td>
<td>X</td>
<td>X</td>
<td>Medium</td>
</tr>
<tr>
<td>Gas recycling</td>
<td>X</td>
<td>X</td>
<td>Low</td>
</tr>
<tr>
<td>Product separation (distillation)</td>
<td>X</td>
<td></td>
<td>Medium</td>
</tr>
</tbody>
</table>
GasTechno Plants

Product-line based on nameplate capacity

Feedstock Source
- Unconventional Gas
- Associated Gas
- Off-spec Gas

Site Licensing
- Brownfield (NG flaring)
- Greenfield (CBM/CMM)

Product Slate
- Baseline blend
- Methanol Derivatives

<table>
<thead>
<tr>
<th>GTL Plant</th>
<th>Footprint</th>
<th>MMscfd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flare (small)</td>
<td>![Image]</td>
<td>1 – 30</td>
</tr>
<tr>
<td>Field (mini)</td>
<td>![Image]</td>
<td>0.2 – 1.5</td>
</tr>
<tr>
<td>Mobile (micro)</td>
<td>![Image]</td>
<td>&lt; 0.2</td>
</tr>
</tbody>
</table>
## GasTechno® Plant Scales

### Mini-GTL Plants

![Mini-GTL Plants Diagram]

<table>
<thead>
<tr>
<th>Estimated CAPEX</th>
<th>Nominal (MSCFD)</th>
<th>Min (MSCFD)</th>
<th>Max (MSCFD)</th>
<th>Bbls/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>$500,000(^1)</td>
<td>25</td>
<td>15</td>
<td>50</td>
<td>4</td>
</tr>
<tr>
<td>$750,000(^1)</td>
<td>75</td>
<td>45</td>
<td>150</td>
<td>11</td>
</tr>
<tr>
<td>$2,500,000</td>
<td>200</td>
<td>100</td>
<td>400</td>
<td>37</td>
</tr>
<tr>
<td>$5,000,000</td>
<td>750</td>
<td>400</td>
<td>1,500</td>
<td>121</td>
</tr>
</tbody>
</table>

\(^1\)Assuming purchased liquid oxygen for the 25 and 75 MSCFD plants

### Full Scale GTL Plants

![Full Scale GTL Plants Diagram]

<table>
<thead>
<tr>
<th>Estimated CAPEX</th>
<th>Nominal (MMSCFD)</th>
<th>Min (MMSCFD)</th>
<th>Max (MMSCFD)</th>
<th>Bbls/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>$15,000,000</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>400</td>
</tr>
<tr>
<td>$20,000,000</td>
<td>3</td>
<td>1.5</td>
<td>6</td>
<td>600</td>
</tr>
<tr>
<td>$25,000,000</td>
<td>5</td>
<td>2.5</td>
<td>10</td>
<td>1,070</td>
</tr>
<tr>
<td>$43,000,000</td>
<td>10</td>
<td>5</td>
<td>20</td>
<td>2,100</td>
</tr>
<tr>
<td>$63,000,000</td>
<td>15</td>
<td>7.5</td>
<td>30</td>
<td>3,160</td>
</tr>
</tbody>
</table>
Status of the Technology: Commercialization

Risk versus Time to Commercialization

Product Road Map

- **2013** Go To Market Phase: Deployment of GasTechno Mini-GTL Plant
- **2012** Introduction of Early Adopter Program
- **2011** Field demonstration of Mobile Trailer Unit
- **2010** Construction & Testing Mobile Trailer Unit
- **2008/09** Design & Engineering of Pilot Plant #1
- **2006** Methanol Competitiveness Study (Nexant)
- **2005** 3rd Party Technology Validation & Patents
Current Operations

Demonstration Facility

- Deployed at a producing natural gas facility
- Processing off spec gas with 18% nitrogen, 12% ethane
- Up to 10,000 scfd
- Field demonstration & operational testing
- Converted 1050 BTU and 1300 BTU natural gas into raw liquids on site PROVING process

Off- Spec Gas

Gas Composition

- Methane 62.67%
- Ethane 12.34%
- Propane 5.33%
- I-Butane 0.40%
- n-Butane 0.82%
- I-Pentane 0.07%
- n-Pentane 0.09%
- Hexane 0.01%
- Nitrogen 18.21%
- Carbon dioxide 0.06%
Associated Gas

Bakken Example (North Dakota)

Natural gas feedstock
- Production decreases
- Gas-oil ratio increases

GasTechno Mini-GTL plant

Production
- Recycle loop allows flared gas-to-liquid conversion ranging from 350 mcf (54 bbls/d) to 75 mcf (21 bbls/d).
  - Effect of improved process efficiency at lower feeds without changing equipment
  - Optimal case designed with feedstock cost and market price of GTL products
  - Total production: 91,000 bbls/10 yrs ($5.2 MM)

Revenues
- Flaring fees avoided
- Payback period minimized

Royalties based on 12.5% and gas @ $6.00/MSCF
Taxes based on rate of $0.85 per MSCF
**Value-added downstream fuels & chemicals**

- **Methylal**
  - Solvent
  - PET polyesters
  - Ethylene glycol

- **Formalin**
  - Resins, Adhesives
  - Poly Acetal
  - Polyhydric Alcohols
  - Urea-formaldehyde

- **Olefins, Gasoline, Distillates**
- **Baseline Blend**
  - Methanol, Ethanol, Formalin

- **DMC**
  - Dimethyl-Carbonate
  - + CO Plant
  - Methyllating agent
  - Polycarbonates
  - Isocyanates

- **DME**
  - DiMethyl-Ether
  - Functional fluids
  - Dimethyl-formamide
  - Formic Acid

- **Formates**
  - Methyl-Formate

- **Formates**
  - Acetic Acid
  - Methylamines

**Combined Heat/Power**
- Fuel wood substitute

**INCREASING CAPEX**
GasTechno® Licensing Package

Early Adoptors (JV) – Contract Production (LLP)

GasTechno – Tech Partner

Limited Partners (Upstream wellheads)

Owner/Operator

Operator

Off-take Distributor

3rd Party Maintenance

General Partner (central processing)

Independent Operator

Operator – wellhead (Natural Gas source)

Co-financing (Selected EAP)

DBOOM: Design-Build-Own-Operate-Maintain

Design-Build-Own-Transfer
GasTechno® DME

- NGL projects are often scrapped due to lack of solutions for dry gas
- 70% or more of the fuel value of wet gas is left with the dry gas
- GasTechno DME is a potential solution
  - No more flared gas
  - Compatible with LPG

GasTechno DME

- Turn DRY GAS into LPG
- Increases associated gas value
GasTechno® Gasoline

- Methanol to gasoline is underutilized
  - Uncompetitive with traditional gasoline
  - Methanol feedstock price is primary driver

- GasTechno changes the dynamic completely
  - Scalability means marginal gas can be used
  - Reduces volatility of methanol pricing
  - Perfect application for “pipeline” methanol at a refinery
Historical Price Comparison

24-Month NYMEX (Henry Hub) Natural Gas Price per MSCF Versus GasTechno® Product Pricing

GasTechno® Product Slate

GasTechno® Process

Single Step Process

- Feed Stock
  - Natural Gas
  - Biogas
  - Coal Mine Methane
  - Flared Gas
  - Landfill Gas

- Ethanol
- Methanol
- Formaldehyde
- LPG Condensate

Realized Value

- Hydrogen
- Ethylene Glycol
- Olefins
- Biodiesel, Gasoline
- DME

- Proven
- Simplicity of operation/reliable
- No catalyst required
- Automated process
- Transportable product and plant
- Realize full potential of methanol value chain
- THE solution for cost effective GTL
- Monetize stranded gas
- Environmentally friendly
- Adaptable
- Modular
- Small footprint
- Centralized processing facility
- Highly scalable
## Associated Gas

<table>
<thead>
<tr>
<th>Component</th>
<th>Cost (k USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vessels</td>
<td>350</td>
</tr>
<tr>
<td>Controls</td>
<td>250</td>
</tr>
<tr>
<td>Rest of plant</td>
<td>200</td>
</tr>
<tr>
<td>Storage</td>
<td>100</td>
</tr>
<tr>
<td>Distillation</td>
<td>200</td>
</tr>
<tr>
<td>Oxygen</td>
<td>900</td>
</tr>
<tr>
<td><strong>SUBTOTAL</strong></td>
<td><strong>2,000</strong></td>
</tr>
<tr>
<td>Other project costs</td>
<td><strong>25%</strong></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>2,500</strong></td>
</tr>
</tbody>
</table>

**ISBL & OSBL CAPEX**
Associated Gas

Historic and Future Revenues (Oil + GasTechno Fertilizers)

- Total Monthly Revenues Applied to CAPEX (Oil + GasTechno Fertilizer)
- Total monthly revenue from GasTechno Fertilizer
- Total Monthly Revenues from Increased Oil Production
- Base Monthly Oil Revenues (w/ flare)

Monthly revenues (thousands of dollars)

Month