Issues Affecting XTL Projects

Dr. Ronald Sills
Director, XTL & DME InstituteSM

Zeus Development Corp.
North American Gas Seminar
Houston, March 6, 2012
In 1979, I joined the team at Mobil developing the Methanol-to-Gasoline technology.
A Story: My GTL experience…. (cont’d)

The MTG process was commercialized in New Zealand

New Zealand Gas to Gasoline Plant: 1985 Start-up
Outline

• My Story
• What is XTL
• Key Issues for XTL Projects: Scorecard for Success
  • New Zealand Gas-to-Gasoline: MTG (ExxonMobil)
  • Qatar GTL Projects: Oryx (Sasol) and Pearl (Shell)
  • Generic GTL Project X in North America
• Prospects for DME in North America
• Key Message
• Q&A
What is XTL*

Primary Energy Source

- Natural Gas
- Coal
- Biomass

Conversion Technologies

- Synthesis Gas Production
- Multiple Reforming Technologies
- Coal Gasification
- Biomass Gasification
- Biomass Pyrolysis
- BioChemcial

Transport Fuels

- Fischer-Tropsch
- Upgrading
- Diesel
- Methanol
- MTG
- Gasoline
- DME
- Methanol
- Mixed Alcohols
- Ethanol
- BioDiesel

Catalytic Processes to Multiple Transport Fuels

- Transesterification
- BioDiesel

Mixed Alcohols

• Other transport fuels include oxygenate additives (e.g. MTBE), CNG, electricity and hydrogen; direct coal liquefaction is another coal conversion route; F-T route can also produce gasoline; oil shale is another alternative energy source.
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Transport Fuels

- Fischer-Tropsch
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- Dehydration
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- Catalytic Processes to Multiple Transport Fuels
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- Ethanol
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## Scorecard for XTL Projects*

**New Zealand Gas to Gasoline Plant - 1985**

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### Degree of Support for Project Success*

- **High**
- **Medium**
- **Low**
- **For Discussion**

*Success defined in terms of project execution from concept to start-up and at least 1st year operation*

XTL & DME InstituteSM
## Scorecard for XTL Projects

**New Zealand Gas to Gasoline Plant (ExxonMobil)**

**Qatar Oryx GTL Project** (Sasol)

**Qatar Pearl GTL Project* (Shell)**

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* In process of increasing production to design capacity

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Qatar Oryx and Pearl GTL Plants - 2007 to present
Traditional Roles for GTL

1. Moving Gas to Markets

2. Grow Existing Markets and Creation of New Markets
   - Power Generation
   - Transportation
   - Chemicals
   - Fuel Additives
   - Syn-LPG

3. Gas Access
   GTL, creating new markets for gas, can give access to stranded gas resources

Source: BP presentations in early 2000s
Roles for GTL in North America

1. Moving Gas to Markets

Options:
- Pipelines
- LNG (export)
- GTL

2. Grow Existing Markets and Creation of New Markets

- Transportation Fuels
- Chemicals
- Fuel Additives

3. Other

- Eliminate flaring
# Scorecard for XTL Projects

**Generic GTL Project in North America - present**

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What are the prospects for DME in North America

• Of the 3 key global markets for DME, the most likely in N.A. is as a diesel alternative
• Transportation fuel alternative market is challenging with significant competition
• Government support is currently a work in progress.
• Vehicles for DME (neat) demonstration are not available in N.A. today.
• In the future, demo vehicles can come from abroad; for example, Volvo HD trucks.
• Early-stage efforts in North America are:
  • Oberon Fuels (USA)
  • GV Energy (Canada)
  • International DME Association’s North American Affairs Committee
About the BioDME project in Sweden

BioDME consortium

- Chemrec and Haldor Topsoe develop and build the DME plant in Piteå
- Volvo Trucks develops and builds DME trucks and a fuel injection system together with Delphi
- ETC, the Energy Technology Centre in Piteå, contributes its technical expertise
- Preem is responsible for Bio-DME distribution and builds fuel stations in Sweden
- Total is responsible for fuel and lubricant specifications
- The project is financed by the participants, the EU and the Swedish Energy Agency

Field test status 2011-11-07

- Trucks at customer: 9
- Mileage last week: 11 643 km
- Average last 5 weeks: 10 778 km
- Accumulated mileage: 213 069 km

Source: Volvo Presentation, 7th Asian DME Conference, Japan, November 2011
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  - GV Energy (Canada) www.gvenergyinc.com
  - International DME Association’s North American Affairs Committee
Successful *integrated* GTL projects in North American will likely have high scores for each issue;

- Feedstock availability and cost
- Conversion technology
- Market for products
- Government support including environmental issues
- Commitment of project owner(s) and technology provider(s)
- Comparison vs other alternatives
- Economics and financing
Questions
Dr. Ronald (Ron) Sills is an Alternative Energy Consultant in conversion technologies and analyses of the natural gas/coal/biomass to products value chain. He is Co-Director of the XTL & DME (Dimethyl ether) Institute, an educational service, and is a member of the Technical Advisory Board for CoolPlanet Energy Systems, Inc (www.CoolPlanetBiofuels.com). Ron is President, Ronald A. Sills, LLC.

He is recognized internationally as an alternative energy expert, particularly in the area of hydrocarbon conversion to fuels. Ron is an honorary member of the International DME Association. In 2010, he was the GTL Peer Reviewer for the IEA World Energy Outlook. Before his retirement from BP in 2009, he was Gas Conversion Network Leader and Engineering Manager in the Conversion Technology Centre. Prior to joining BP in the 1990s, he was manager of Mobil’s Research Planning Group as well as a member of the team for the development and commercialization of the fixed-bed Methanol-to-Gasoline (MTG) process.

Dr. Sills holds a PhD and M.S. in Chemical Engineering from M.I.T and a B.S. in Chemical Engineering from Columbia University.
About the XTL & DME Institute℠

Newly-created educational service (2010) provided by Dr. Theo Fleisch (Fuel Conversion Solutions, LP) and Dr. Ronald Sills (Ronald A. Sills, LLC), Co-Directors, on all aspects of the XTL supply chain, including DME as a fuel and chemical feedstock.  www.XTLinstitute.com

DME Fundamentals Tutorial at DME4 in Stockholm, September, 2010

XTL Tutorial at Future Fuels for Australia Conference in Brisbane, July, 2011

Next DME Fundamentals Tutorial at DME 5 in Beijing, September 2012
www.aboutDME.org
Acknowledgments and Disclaimer

**Acknowledgments**

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