Industry Perspective

Biogas and Fuel Cell Workshop
National Renewable Energy Laboratory
June 11 - 13, 2012

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Power For The Long Run

Outline

1. Critical Factors
   - Fuel Purity
   - Fuel Cost
2. Natural Gas – The Wild Card & Competition
3. IdaTech's Experience Implementing Biofuel

Critical Factor – Fuel Purity

All fuel cell system OEMs have fuel purity specifications

- Independent of
  - Raw materials or feed stocks
  - Manufacturing process
- Depends on
  - Fuel processor technology
  - Fuel cell technology – low temp PEM versus SOFC
  - Fuel cell system design – flow thru versus recirculation

Bottom Line

- Have to meet fuel purity specification
- If no, end of discussion, might get a field trial to prove it is OK
- If yes, how much does it cost?

Critical Factor – Fuel Cost

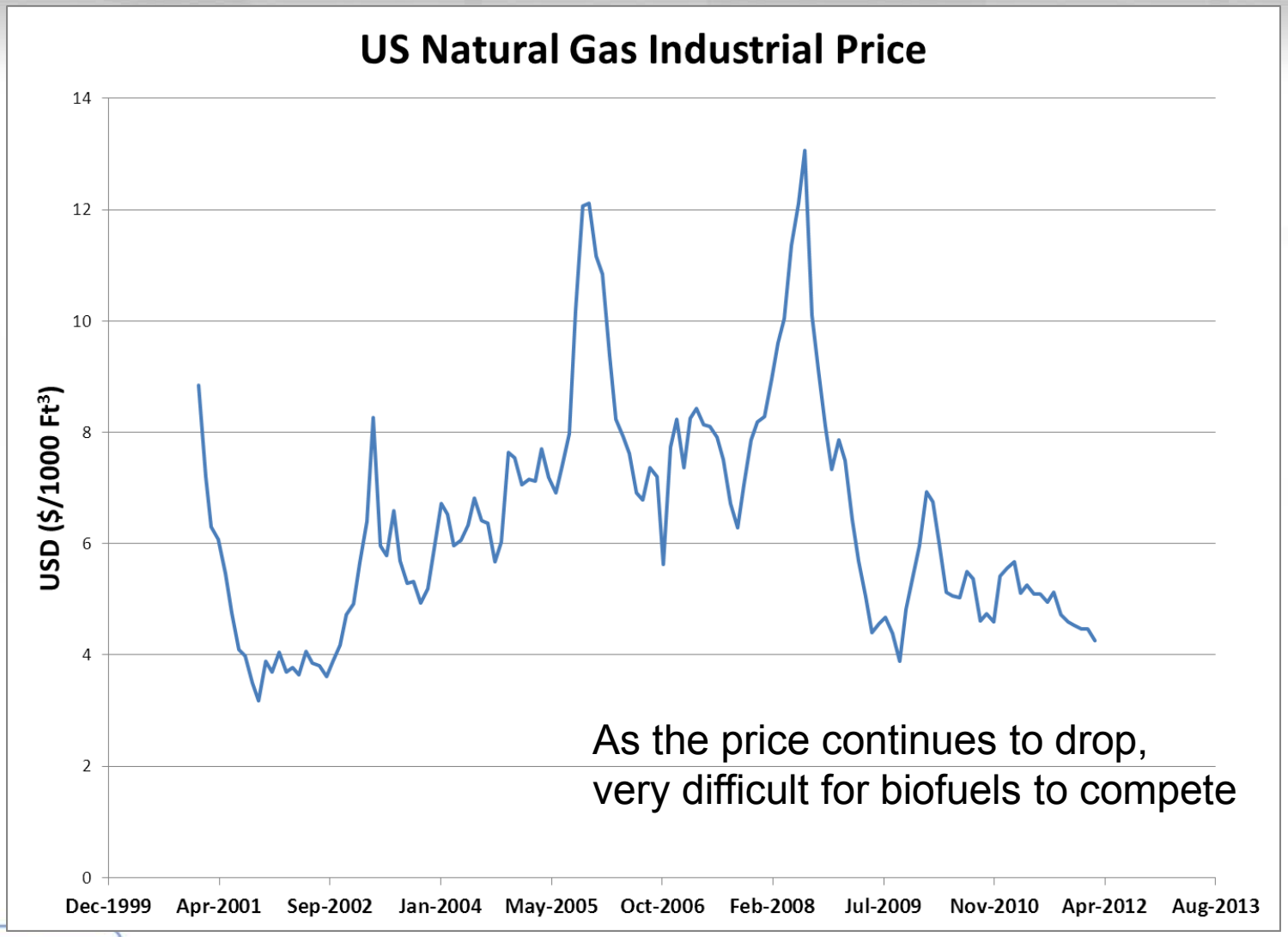
Biogas or biofuel needs to be ‘competitive’ with traditional fuels

- What about being ‘Green’?
- Isn’t it worth a price premium?
  - For a vast majority, the answer is no

Bottom Line

- Customer has to be willing to pay for it
- Need a ‘reasonable’ ROI

Natural Gas – The Wild Card & Competition



Energy Information Administration; http://tonto.eia.gov/dnav/ng/hist/n3035us3m.htm

Step 1: Source Bio-Methanol

Processes and Sources for Bio-Methanol

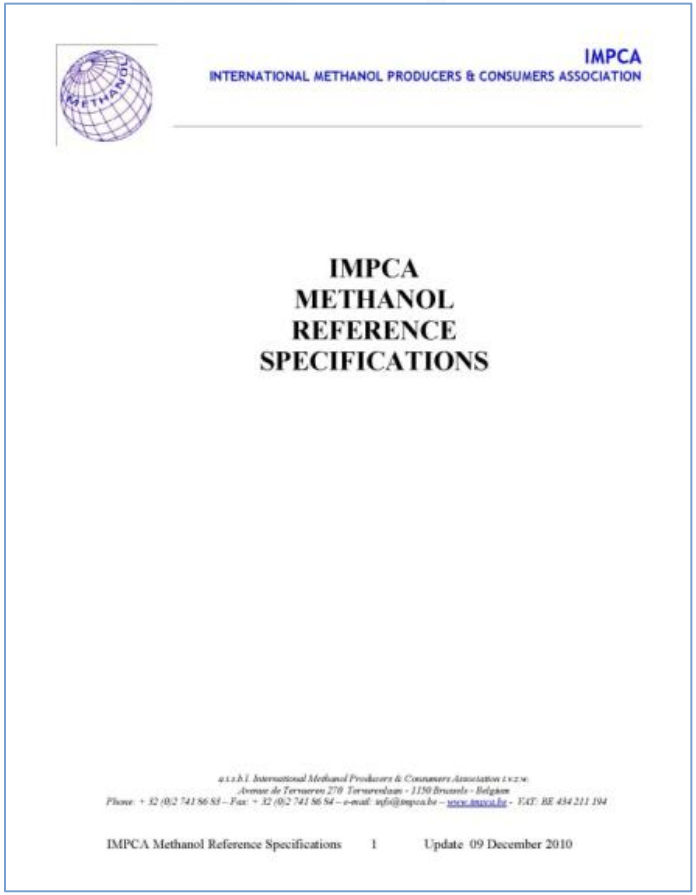
1. Cellulosic fiber to bio-methanol
   - North Dakota EERC (experimental), USA
   - Alberta Pacific Pulp and Paper Mill, Canada
2. Crude Glycerol to bio-methanol
   - BioMCN, The Netherlands
3. CO_2 to bio-methanol
   - Carbon Recycling International, Iceland
4. Black liquor to bio-methanol
   - Chemrec, Sweden
5. Others: animal waste, waste gas, etc.

BioMCN – only volume, commercial producer

Step 2: Bio-Methanol Fuel Quality

Selection of Bio-Methanol

- All methanol must be compliant with IMPCA specifications, http://www.impca.be/en/specs/reference_specs/
- Additional tests defined by IdaTech:
  - Specific Gravity
  - Boil down
- Experience with contaminants:
  - Xylene, Toluene, Benzene
  - Ethanol and various heavier alcohols
  - Water


IMPCA
INTERNATIONAL METHANOL PRODUCERS & CONSUMERS ASSOCIATION

IMPCA
METHANOL
REFERENCE
SPECIFICATIONS

IMPCA Methanol Reference Specifications 1 Update 09 December 2010

Step 3: Field Deployment

Field Application

- Bio-HydroPlus is used by T-Mobile in California.
- Refer to press release at: http://www.idatech.com/uploadDocs/TMobile%20Install%20%20102511.pdf
- Bio-HydroPlus was only economical due to state and federal government rebates

For Immediate Release

October 25, 2011

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California Telecom Site Installs IdaTech's Backup Power Fuel Cell System Fueled with Renewable Fuel

BEND, ORE, USA, October 25, 2011 – IdaTech plc (AIM:IDA) a global leader in the development and manufacture of Proton Exchange Membrane (PEM) fuel cell products for telecommunications and other critical backup power applications is pleased to announce the first use of Bio-HydroPlus renewable fuel. Bio-HydroPlus is a liquid fuel mixture of bio-methanol (62% methanol by weight) and de-ionized water for powering IdaTech's backup power fuel cell systems.

IdaTech's ElectraGen™ fuel cell systems were developed specifically to provide critical backup power to the telecom market when loss of grid occurs. Telecom network operators are choosing fuel cell systems instead of diesel generators for backup power, and fuel cell systems with renewable fuel provide operators with clean, quiet power from a sustainable source.

T-Mobile® in the state of California recently installed the ElectraGen™ ME Fuel Cell System on its network, and is using Bio-HydroPlus fuel to power the system. Officials attending the installation witnessed the first use of Bio-HydroPlus in the state of California and saw the backup power fuel cell quietly startup and deliver 5,000 watts of clean power while operating on renewable fuel.

The availability of renewable fuel is exciting news for IdaTech, who worked extensively with bio-methanol suppliers to develop the fuel. As a result, customers can now qualify to receive additional government incentives associated with the renewable Bio-HydroPlus. The federal government rebate is 30% of the system cost plus an additional 30-50% rebate is offered in several states. Renewable fuel is required for participation in the California rebate program. These savings make fuel cell systems a more affordable backup power solution for telecom operators.

About IdaTech

IdaTech plc is an advanced fuel cell products company which is operationally headquartered in Bend, Oregon, USA and is listed on AIM with the ticker code IDA.

Step 4: How to Simplify Logistics – Certificate Trading

Certificate Trading

- IdaTech is investigating “certificate trading”:
  - simplifies supply logistics
  - reduces transportation emissions/costs
- Bio-methanol producer (BioMCN in Netherlands) trades certificates with IdaTech-approved local HydroPlus supplier.
- Locally produced HydroPlus is labeled as Bio-HydroPlus.
- Bio-HydroPlus is a requirement for participation in some government sponsored incentive programs.

Summary

Benefits of Biofuels:

- Reduced dependence on fossil fuels
- Reliance on domestically-produced fuel
- Carbon reduction
- Government incentives
- Green image

Disadvantages of Biofuels:

- Limited availability (few commercial manufacturers)
- Difficult supply logistics
- Higher Cost
  - Bio-methanol 3X premium

Need government assistance in order to drive down costs

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