

Thermal Gasification of Biomass United States Update

IEA Bioenergy Task 33

Second Semiannual Task Meeting 2014

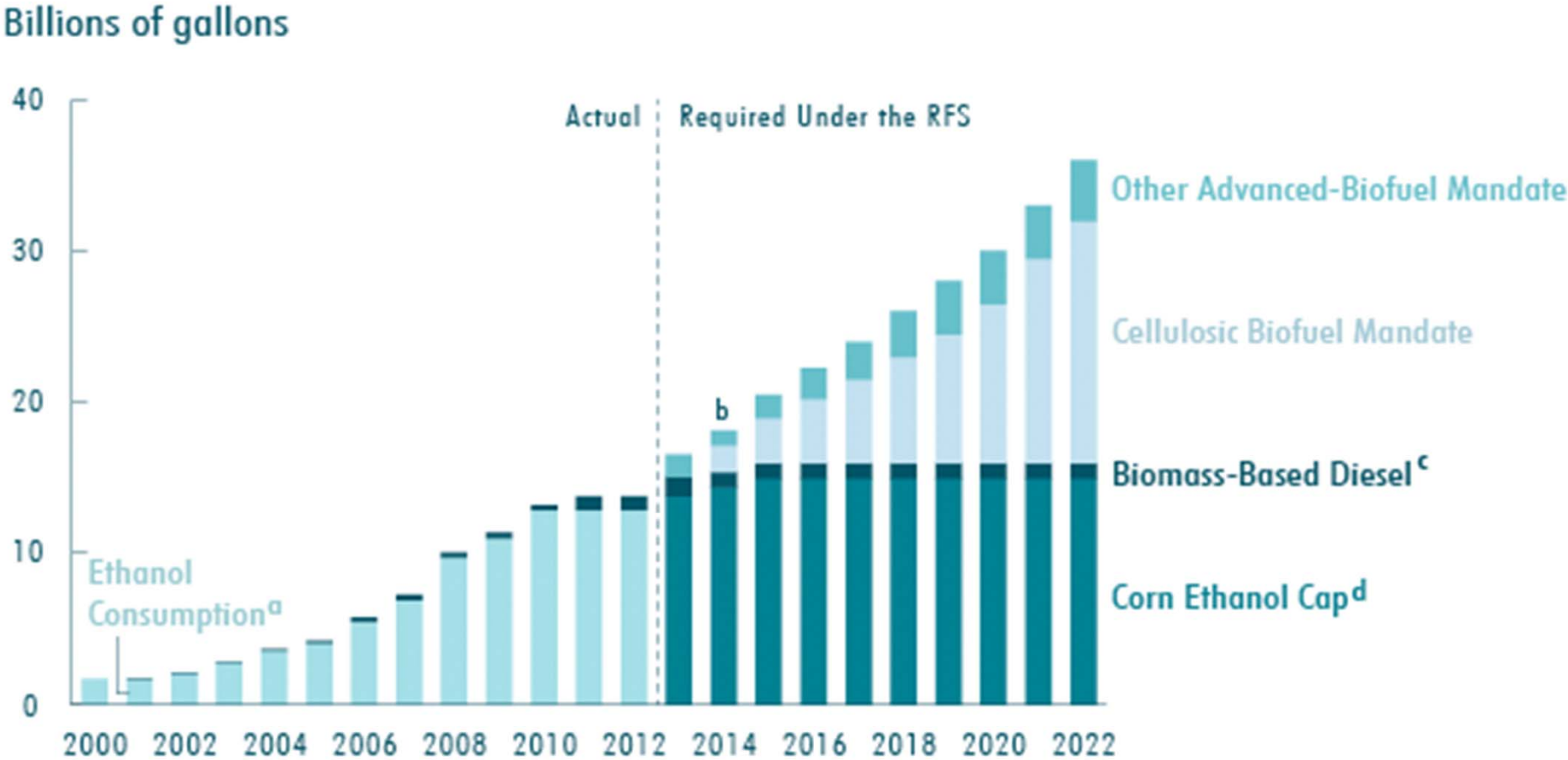
Karlsruhe, Germany 3 October 2014

Kevin Whitty

U.S. Biomass Gasification Technology Providers

- Carbona
- Concord Blue
- Emery Energy
- InEnTec
- Sundrop Fuels
- TRI
- Many others...

Renewable Fuel Standard



Update to U.S. Biomass Gasifier Database

- Multiple data sources
 - BCS Inc. commissioned by U.S. Dept. of Energy
 - EIA database
 - GTC/DOE database (Higman)
- Updating continues
 - No new plants identified since last update
 - Effort to confirm that all plants in the database are properly coded in terms of operating/on hold/stopped/canceled and dismantled

Current Map of Operating Gasification Facilities in the U.S.



INEOS Indian River Bioenergy Center

INEOS Bio, Vero Beach, Florida

- Feedstock: Vegetable and yard waste, MSW
- Products: Ethanol and power
- Scale: 300 tons feed/day
- Gasification technology: Proprietary oxygen-blown
- Cost: More than \$130 million
- Status: First biofuel production July 2013, but technical challenges since then.
- Update Sept 2014: “We fully expected to encounter new challenges as we scaled up this exciting new technology. We’ve taken the time to develop solutions that will enable reliable production of high quality bioethanol. The efforts moving forward will continue to focus on safe operations, optimizing the technology, and de-bottlenecking the plant to achieve full production capacity.”



GTI / Haldor Topsoe Pilot Plant

Chicago, Illinois

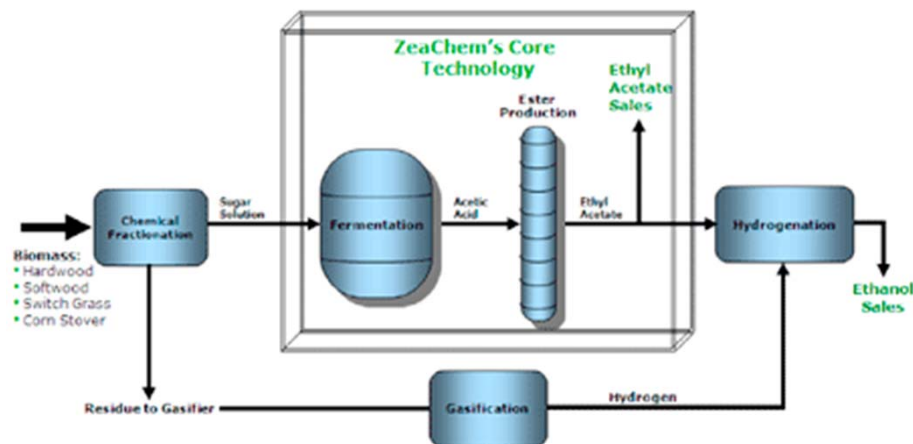
- Feedstock: Wood chips
- Products: Gasoline
- Scale: 20 tons/day feed; 20 bbl/day gasoline
- Gasification technology: Carbona
- Cost: unknown
- Status: First gasoline production June 2013
- Update Nov 2014: Nothing new and notable



Zeachem Pilot Plant

Boardman, Oregon

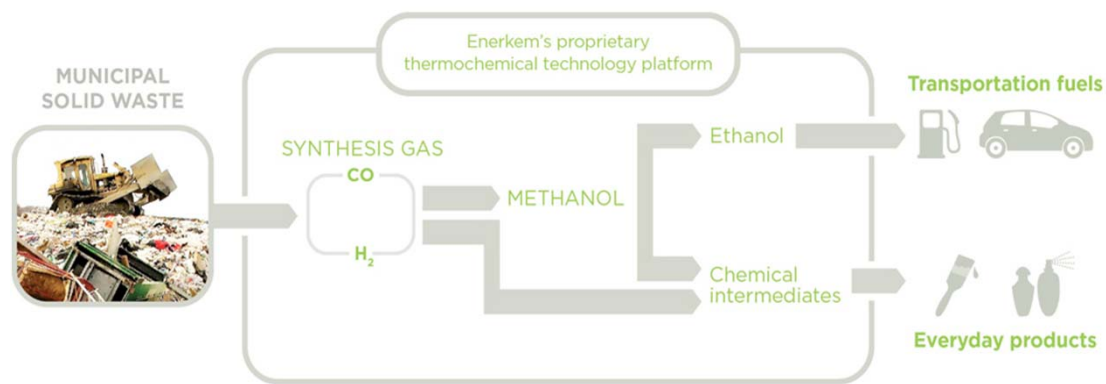
- Feedstock: Poplar + others
- Products: Ethanol + intermediate chemicals
- Scale: 10 tons/day feed; 250,000 gal/yr ethanol
- Gasification technology: Proprietary; gasifies only lignin
- Cost: unknown
- Status: First ethanol production March 2013
- Status Nov 2014: New agreement for sugars production



Enerkem Pilot Plant

Ponotoc, Mississippi

- Feedstock: MSW and wood residues
- Products: Ethanol and methanol
- Scale: 300 tons/day feed; 10 million gallons/year
- Gasification technology: Enerkem proprietary
- Cost: unknown
- Status: Under development
- Update Nov 2014: Still under development... Construction not yet started



Freedom Pines Biorefinery

Soperton, Georgia

- Targeting biofuel production through LanzaTech's syngas fermentation technology
- Host site is old Range Fuels site in Soperton, Georgia. Acquired for Freedom Pines Biorefinery in January 2012
- Concord Blue chosen as gasification technology provider
- Update Nov 2014: No new news on status of Freedom Pines

