

Sustainable Aviation Biofuels What's Next?

DOE Biomass Energy Conference
July 27, 2011

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Executive Director,
Commercial Aviation Alternative
Fuels Initiative (CAAFI)



www.caafi.org

Organized, Focused, Meeting Challenges



www.caafi.org

"I'm directing the Navy and the Departments of Energy and Agriculture to work with the Private sector to **create advanced biofuels that can power ..not just fighters..but trucks and commercial airliners.**"

..... U.S. President Barack Obama, March 30, 2011

Alternative Jet Fuels - Snapshot 2011

- **First New Fuel Qualification in 20 years BTL (09/09), HEFA (07/01)**
- **Commercial service evaluations at Lufthansa, Thomsen, KLM, Finnair**
- **IATA Commitment to Carbon Neutral Growth Goal (2020), Carbon Life cycle outcomes quantified**
- **Production incentives via BCAP, section 9003, DOE pilots / demos**
- **Multiple Global Commercial Initiatives (9/09 - 7/11)**
- **Major global biofuels marketing in focus (eg. Paris 6/11)**



Alternative Jet Fuels - Goals 2011 +

- **Advanced process qualification 2013 – 2015 and beyond**
- **HEFA Service Evaluations, FAA/ATA assure operational “ramp up” success**
- **Lower production costs via process (DOE) and feedstock yield (USDA) gains**
- **Certainty in sustainability criteria**
- **Private sector carries deployment non- recurring burden**
- **Accelrating Global/U.S. State projects**
- **CAAFI Conference, CAAFI Expo 11/30, 12/1/11, Georgetown, Wash. D.C.**



Advanced Process Paths To Increase Supply

Advanced Fermentation



Genetically Engineered
Microbes

Fermentation



Jet Fuel

Alcohol Oligomerization



Fermentation



Dehydration



Olefins

Conventional Refinery Processes



Polymerization



Hydroprocessing



Jet Fuel

Pyrolysis



Pyrolysis



Bio-Crude



sugarcane

Sugar



switchgrass



corn stover

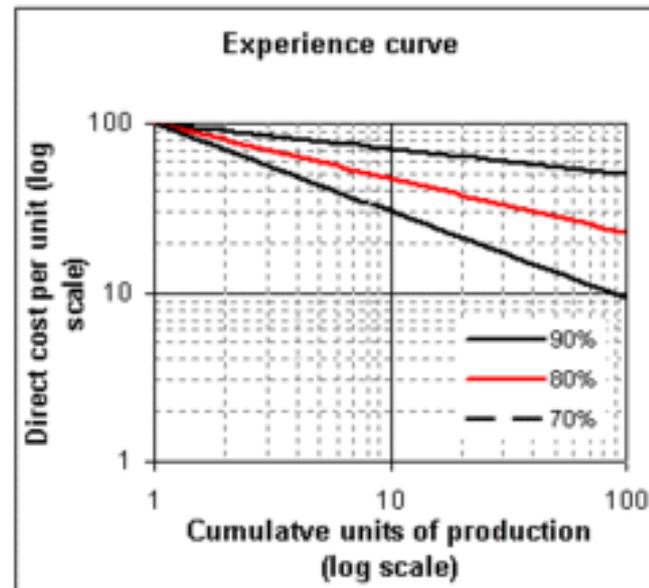
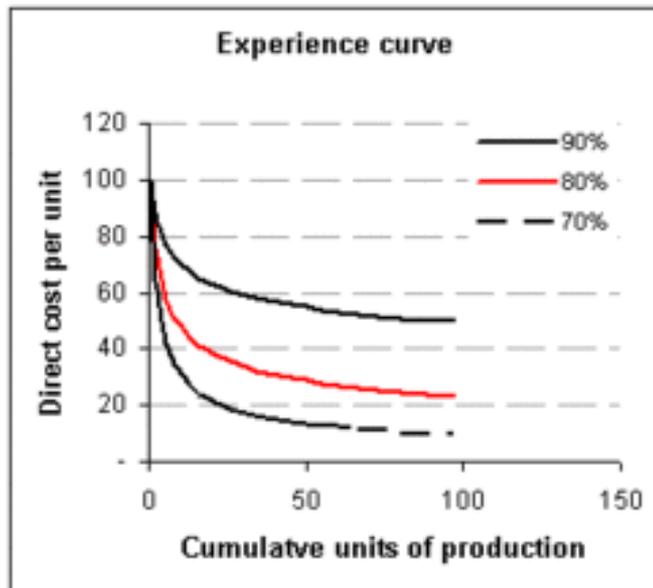


forest waste

Lignocellulose

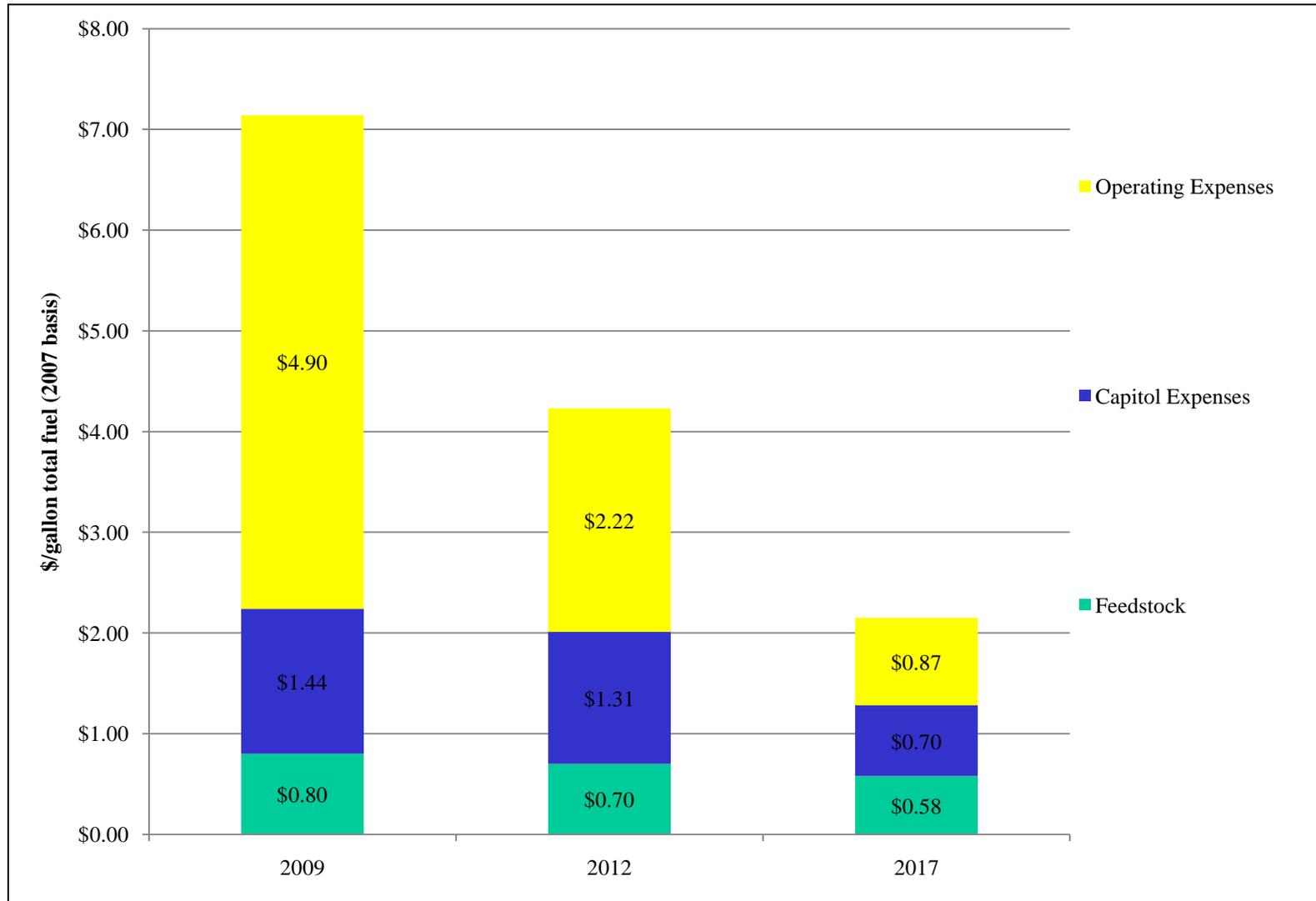
Biofuel Cost Lower with Accelerated Learning

- **USDA/FAA** advancing Feedstock Readiness (FSRL)... example HEFA
- **DOE** Process improvements for advanced processes - example Pyrolysis



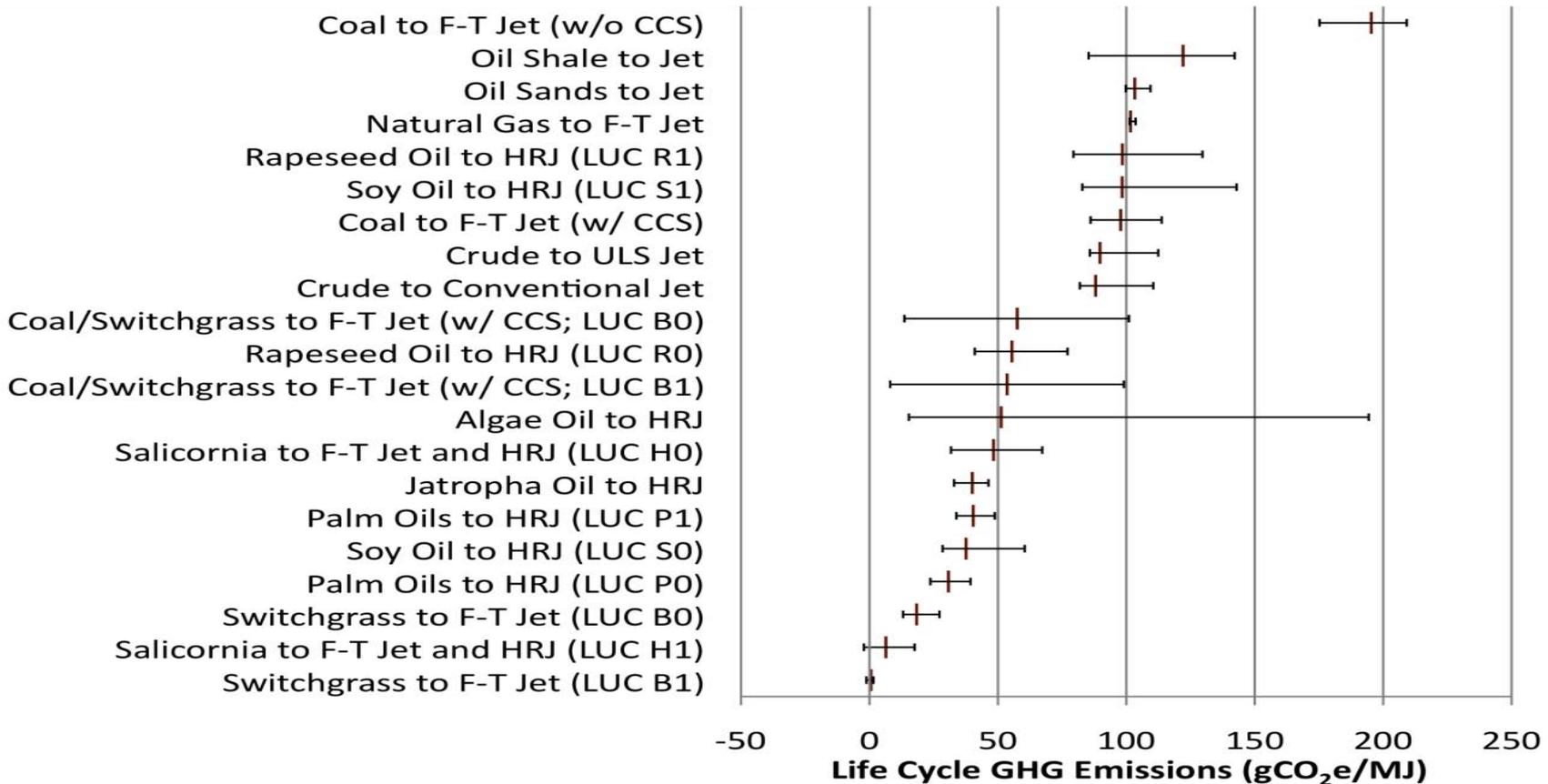
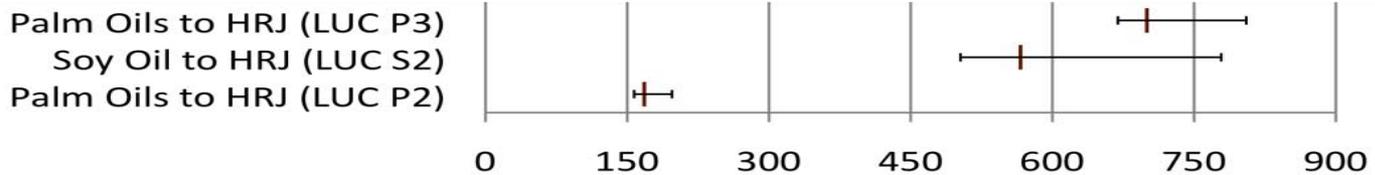
Competitive Costs for Long Term Offtakes!

Drive Down Cost - U.S. DOE Process



*DOE - Current funded pathway to \$2.00 /Gallon Pyrolysis Oil

Aviation Life Cycle GHG Quantified



Data from Stratton et al. MIT/PARTNER (2010)

Global Aviation Coalitions Growing

2006 - 11



SWAFEA / Alfa bird



ABRABA

2011*



Safug Austalia



Bioqueroseno



Sky NRG



IFP Led Coalition



Air Reg

Global Roadmaps and Alignment targeted

* Initiative announcements in 2011

Success Models Building Through US States



Arizona
California*
Florida **
Georgia**
Hawaii**
Illinois
Louisiana*
Michigan**
Mississippi*
Ohio**
New York**
Pennsylvania**
Oklahoma
Tennessee**
Texas**
Washington*
Wisconsin

* **airline/producer MOU's** ** study proposals or Pilot Plants

CAAFI 2011 Conference and Expo

Nov. 30, Dec 1 Washington D.C.*

- Results, plans from CAAFI R&D, Cert., Enviro, Bus team leaders
- Key leaders on State, Federal, Global stage
- CAAFI Expo to
 - maximize producer, research stakeholder visibility
 - access decision makers, funding sources, buyers
 - gain media / investor attention as 2nd generation aviation biofuels leader

* **Sec. Vilsack (top), Sec. Lahood (middle), media “horde” at CAAFI showcase Paris Airshow 06/11**



Future is “Looking Up”! – What’s Next?

The Economist - October 28, 2010 <http://www.economist.com/node/17358802>



Dave Simonds

- **Advanced Fuel Qualification focus**
 - **Improved Economics through learning**
 - **Certainty in Sustainability findings**
 - **High Profile Deployment Success**