Biofuel Deployment: Jet Fuel Approach and Progress as a Case Study

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Biofuels ….The Future is "Looking Up"

- **concerted effort directed to our military and airline industry."**
……White House Biofuels Interagency Report (Agriculture / Energy) Working Group, (Feb.2010)

- **"Farm to Fly " with USDA (July 2010)**

- **The future (for Biofuels) is "looking up"**
…..the Economist (Oct. 2010)

37% of top 100 producers see 1 B. Gallons biojet by 2020……*Biofuels Digest 9/10/10*

Biofuels - The Future is Looking Up?

- **Aviation Biofuels - 2006 -2010… from afterthought to cutting edge**

- **CAAFI - Organized, Focused, Committed, to Create a "New Fuel Dynamic"**

- **Deployment Approach- mechanisms, success to date, challenges**

Alternative Jet Fuels - Snapshot 2006

- **No Options to Oil**

- **Industry Portrayed as Growing Polluter**

- **10 Years to Fuel Qualification**

- **Aviation only 10% of Transport Demand**

- **Not investible Industry**

Aviation BioJet an afterthought!

Alternative Jet Fuels - Snapshot 2010

- **First New Fuel Qualification in 20 years (Sept. 09')**

- **United Nations (ICAO) Endorsed Risk Management Tool (Fuel Readiness Level) (Nov. 09)**

- **Aviation Specific Carbon Life Cycle Analysis (via MIT/PARTNER) (March, 2010)**

- **USDA/FAA Feedstock Readiness Under MOU (Oct. 2010)**

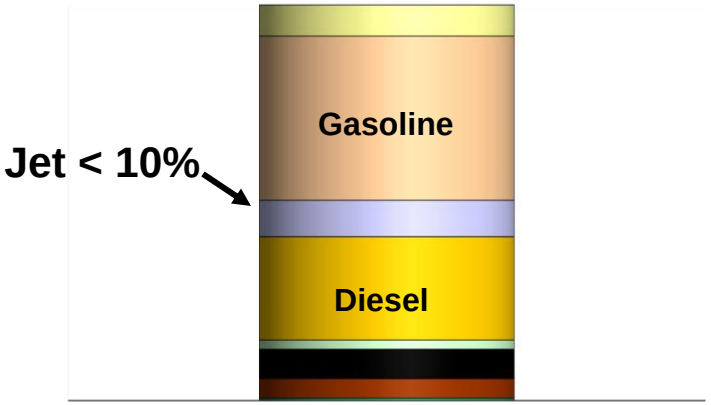
CAAFI Awarded Joseph S. Murphy Industry Service Award by Air Transport World (Feb. 2010

CAAFI.. Organized, Focused, Committed

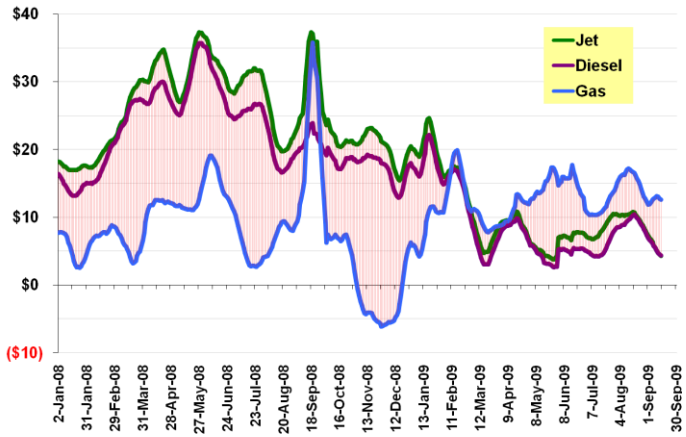
" the aviation industry is eager for an <u>entirely new fuel dynamic</u> and will be an enthusiastic purchaser "

……..Letter dated 1/16/09 to President Elect Obama

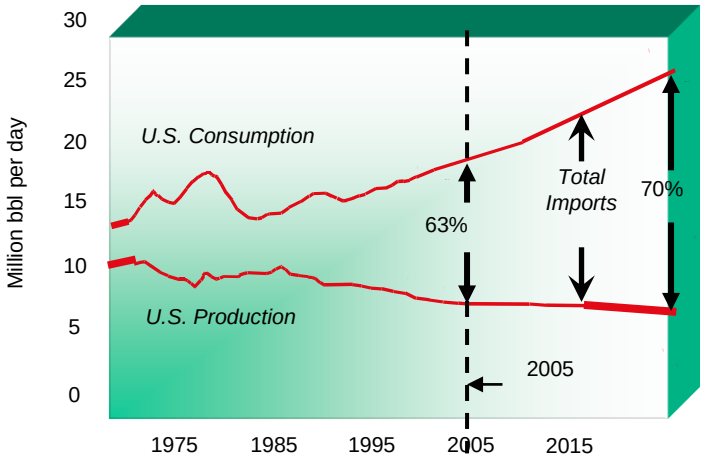
Sustainable Fuel Dynamic Economic Need



Improve Fuel Fraction



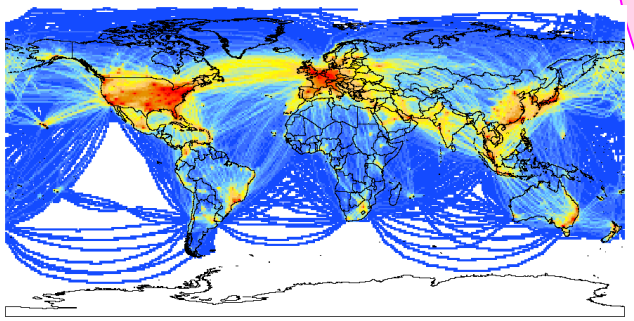
Reduce Crack Spread



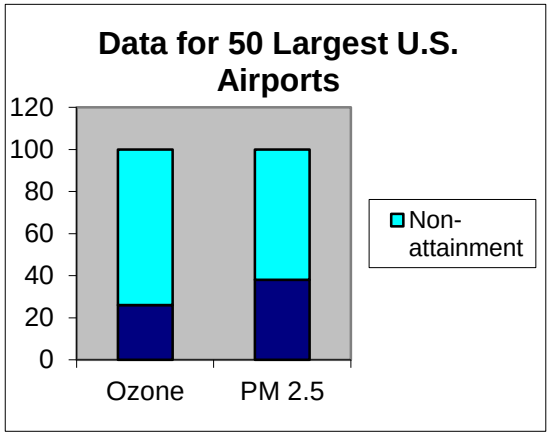
Enhance Supply Security

Sustainable Fuel Dynamic Environment Need

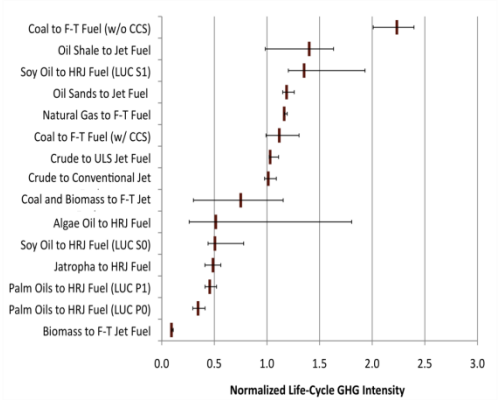
Air Quality



Global Climate



Reduce PM 2.5



Contain CO2 Growth

CAAFI - Who We Are

14 Aircraft, engine, subsystem OEM's

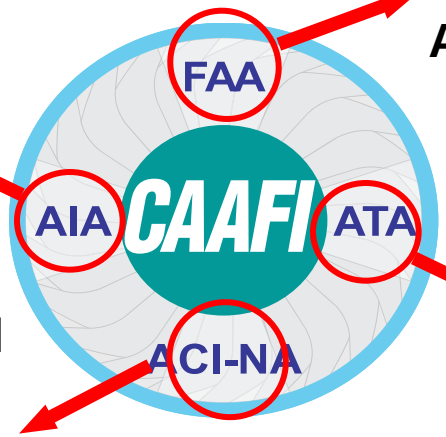
21 Airlines, Exec Jets, Military, airport orgs.

8 Universities, FAA Center of Excellence

Federal Aviation Administration

17 government agencies / labs

Aerospace Industries Association



Air Transport Association

Airports Council International – North America

3 International Finance

15 Think Tanks, Consultants

45 fuel producers

4 Oil service providers

350 Sponsors/Stakeholders From All Continents

* ***Actual attendance at 9/30/09 meeting 230 people, 125 entities***

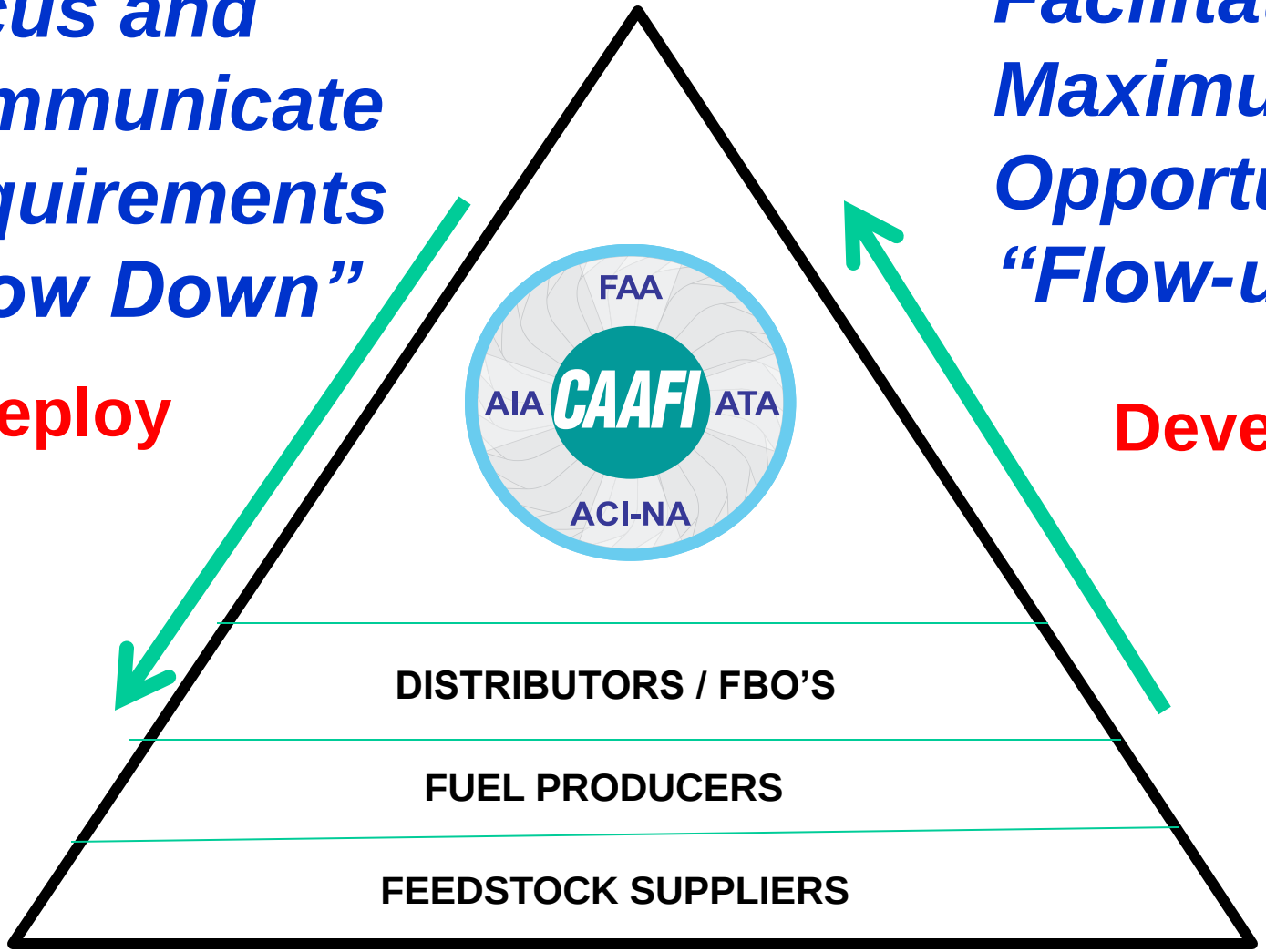
CAAFI – How We Operate

Focus and Communicate Requirements "Flow Down"

Deploy

Facilitate Maximum Opportunity "Flow-up"

Develop



CAAFI - Leverages Unique Market Strengths

- **Only Transport mode committed to Liquids**

- **Limited to "Drop-In" Fuel**

- **Qualification is "friendly barrier" to entry**

- **Airport "nodes" define distribution**

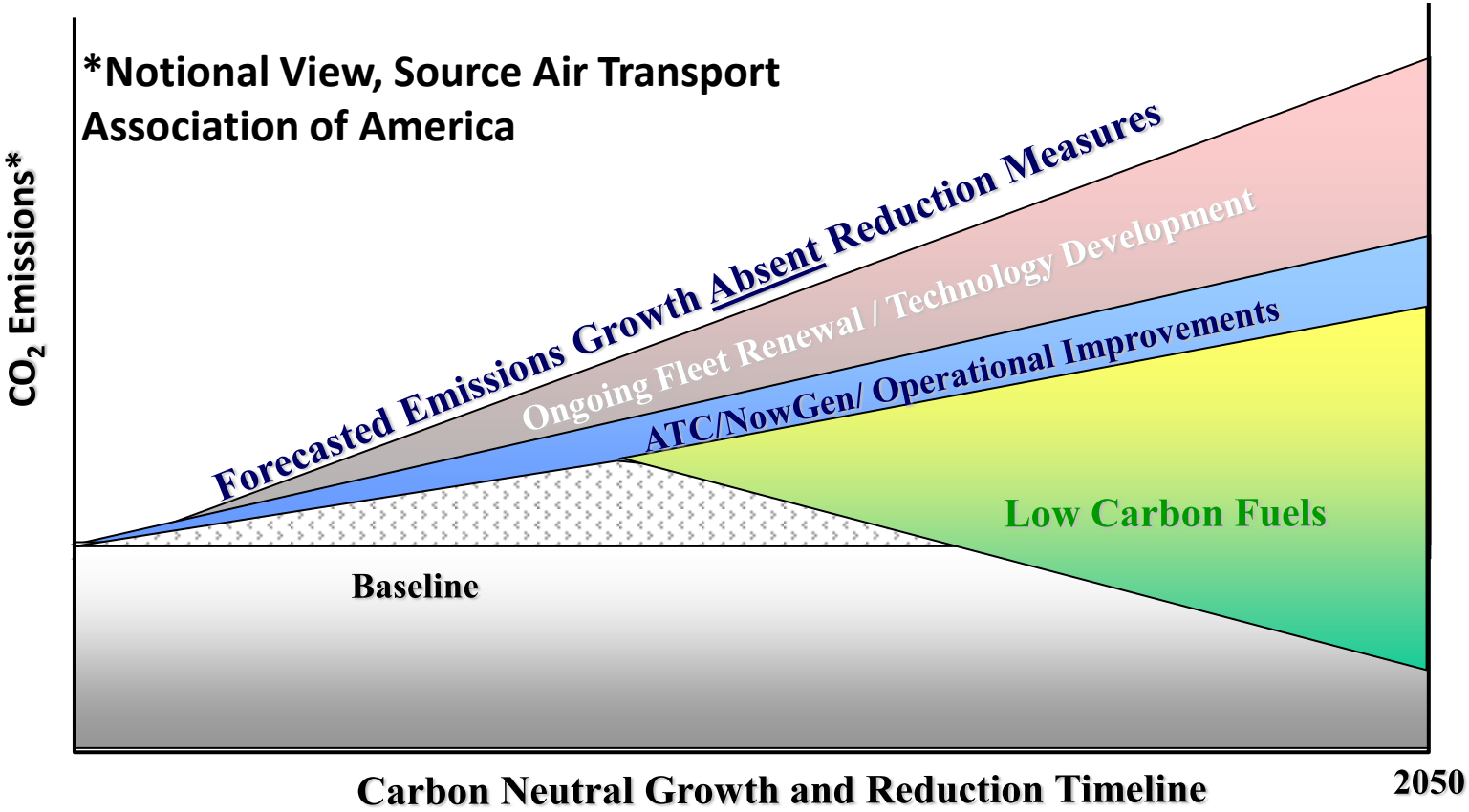
- **UN Global Environmental Framework…not 192 states.**

Half Of Biofuels Digest "Hottest 15 Companies" are Engaged in Jet Fuel*

*** December 2010 Biofuels Digest**

Aviation Carbon Neutral Growth Imperative

- …… for FAA "Next Gen" Enviromental Team in U.S.
- …… by International Airlines (IATA) globally



To Be Addressed at MIT in Boston Next Week….

Deployment – Technology's Valley of Death

Ref: Presentation AFRL (W. Harrison), 8/15/06

Deployment – Breaching “the Valley”

- Using Boundaries to Create Assets
- It’s How Many, Not How Much Early
- International Engagement – Leverage Proven Partner Assets
- TRB Role - Planning Tools
- Results to Date - Multiple Successes

Aviation - Boundaries Create Assets

Understand, Think "inside the box"

- Only Transport mode committed to Liquids

- Limited to "Drop-In" Fuel

- Qualification is "friendly barrier" to entry

- Airport "nodes" define distribution

Multiple Success Models Deployment Path

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

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

Europe/U.S. Have Strong Partner Assets

- Industry Partnerships – e.g. CFMI, IAE, P&W/MTU

- Significant standing (FAA/EU) dialogue

- EU / CAAFI program links now

- Shared contractors/processes

- Similar approach to ICAO (U.N.) (2009 common goals/methods)

Planning Tools In Place

Tool Suite Available or in process

- ACRP 02-07 Fuel Cost /benefit (complete)
- ACRP 02-18 Airport / Supply chain handbook
- ACRP 02-23 PM 2.5 Airport Priorities
- ACRP 02-36 Multi-Modal Transport Analysis (RFP)
- Carbon Neutral Growth Scenario Analysis
- Next Gen Insertion Optimization Tool
- “Farm to Fly” Project Candidates via OAI
- Feedstock Readiness Level Risk Management Construct under USDA / FAA MOU

Biojet – Challenges 2011 and Beyond

- **Private Finance - Remnants of the Crisis Remain**
- **Execute Certification To Plan**
- **Add projects, new dimensions under "Farm to Fly", DOT policies**
- **Apply TRB tools in implementation studies via "Farm to Fly" next steps.**
- **Realize International Cooperative Potential**

Biojet – Addressing the Challenges

- **Private Finance - New USDA Policies, Reduce costs via feedstock readiness**

- **Private Finance - DOC engaged to attract foreign Investment**

- **"Farm to Fly"- execute with States, project feasibility studies (e.g. USDA and FAA "value added" support)**

- **ACRP 02-36 multi-modal tool addition 02-18, 02-23 completion / use**

- **Globalize CAAFI with buyers/sellers**

Aviation's Cutting Edge Biojet Fuel Dynamic

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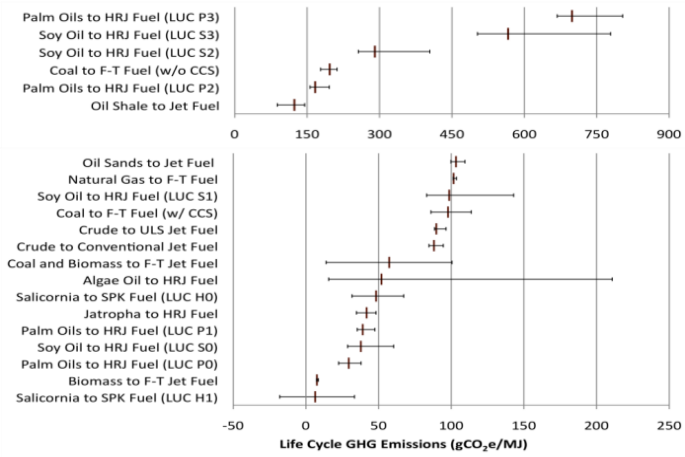

……The Future is Looking up……