Commercial Aviation Alternative Fuels Initiative

November 14, 2012

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COMMERCIAL AVIATION
ALTERNATIVE FUELS INITIATIVE

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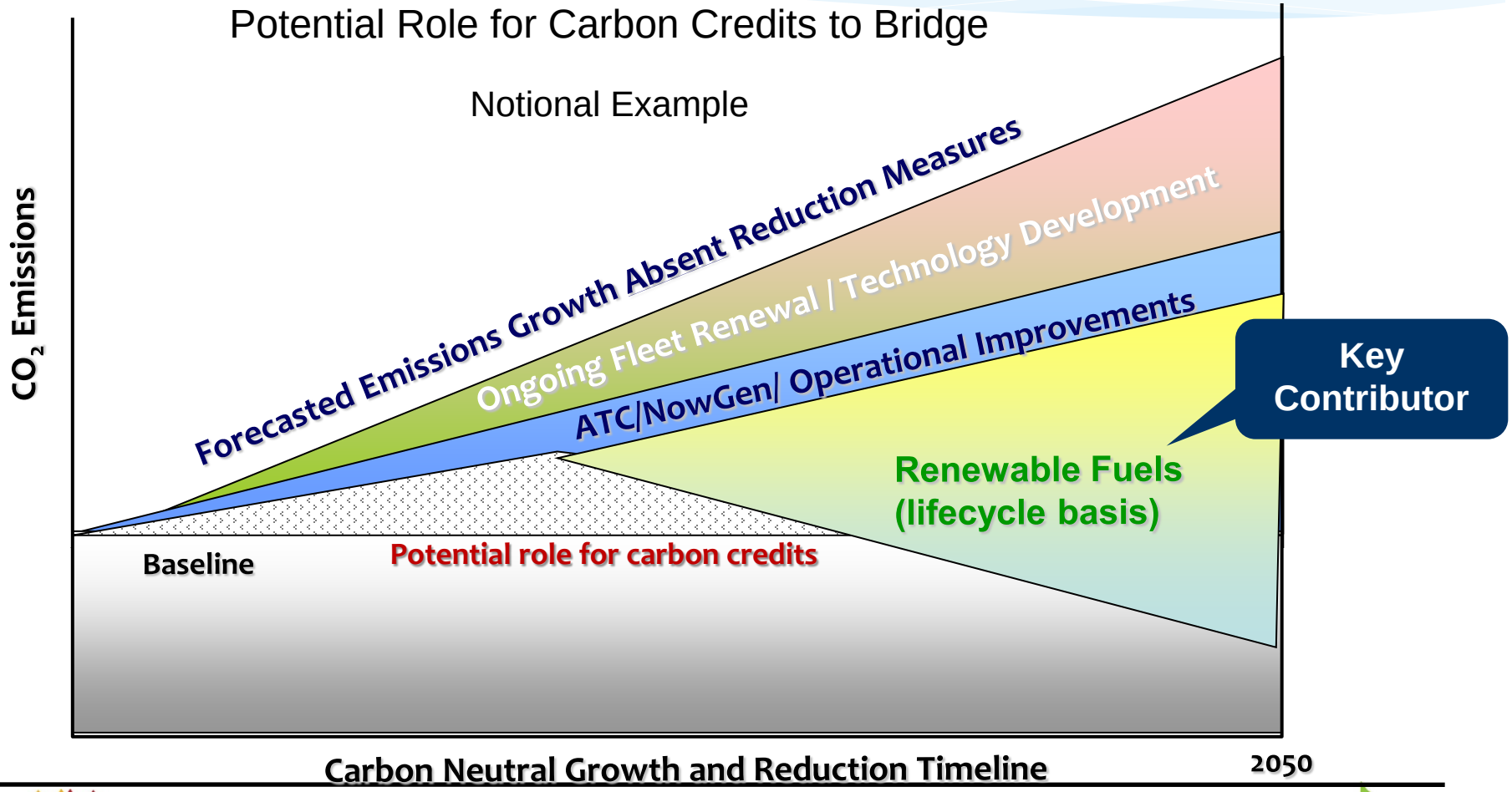
Why Do The Airlines Want Alternative Jet Fuels?

* **Caps on Carbon Emissions**
  * European GHG Emissions Trading Scheme (ETS)
  * US Energy Independence and Security Act (2007)
* **Fuel Supply Security**
  * Reliance on Imported Oil
* **Airline Economics**
  * Surging Fuel Expense Offsetting Labor Restructuring
* **Fuel Availability**
  * Demands from Other Transportation Modes
  * Peak Oil Production?

How Do We Meet Our Targets?

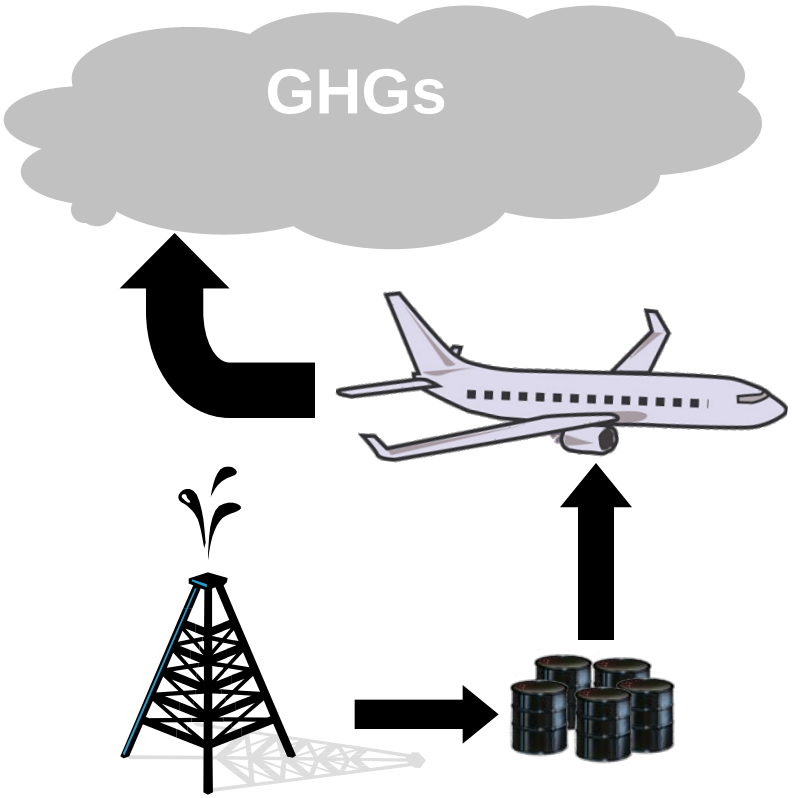
Technology, Fuels, Operations & Infrastructure



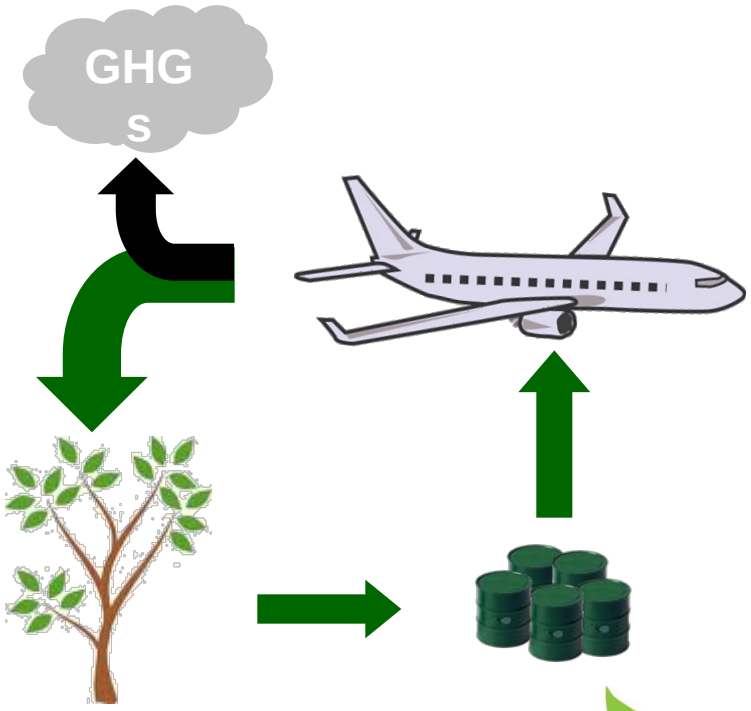
How Do Renewable Fuels Offset Greenhouse Gases?

Life Cycle Analyses (LCA)

Petroleum-Derived Jet Fuel



Bio-Derived Jet Fuel



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How Is the Aviation Industry Supporting Renewable Jet Fuels?

An Aviation Industry Coalition Established to…

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Facilitate and Promote the Introduction of Alternative Aviation Fuels

www.caafi.org

Who is CAAFI?

* **Sponsors**
  * Airlines for America (A4A)
  * Federal Aviation Administration (FAA)
  * Aerospace Industries Association (AIA)
  * Airports Council International-North America (ACI-NA)
* **300+ Members**
  * Aircraft/Engine Manufacturers
  * Airlines (Cargo & Passenger)
  * Government Agencies
  * Military
  * Aviation Fuel Producers/Oil Companies
  * Alternative Fuel Developers/Producers
  * Universities/Research Organizations
  * Consultants

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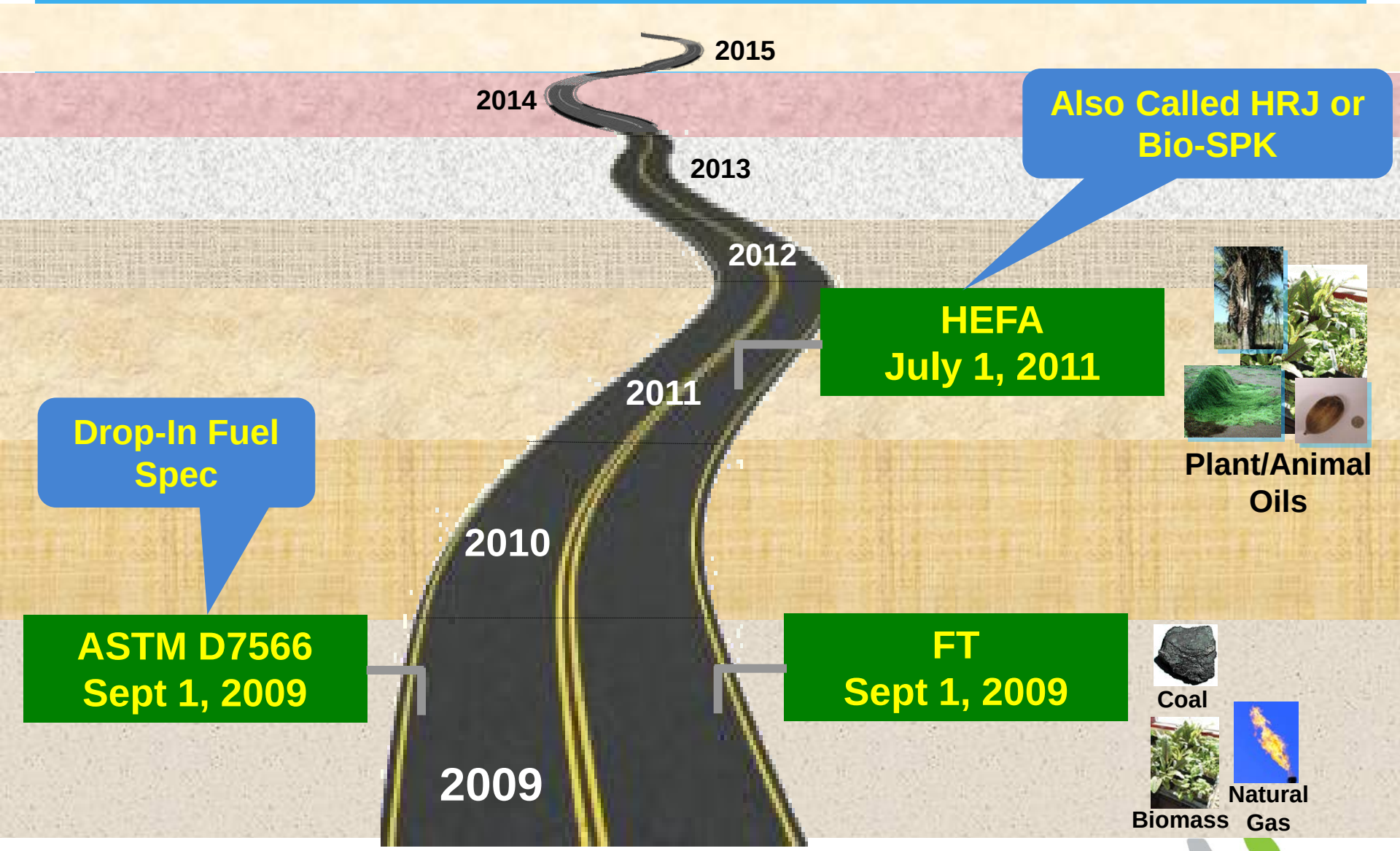
Approved Alternative Jet Fuels



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Airlines Are Now Flying With Drop-In Alternative Jet Fuels

FT From Coal:

1999 - Present

SOUTH AFRICAN AIRWAYS

FT From Natural Gas:

October 12th, 2009

QATAR AIRWAYS القطرية

April 30th, 2010

UNITED AIRLINES

HEFA From Plant Oils and Algae:

June 29th, 2011

KLM

November 14, 2012

July-Dec 2011 (1,187 Flights)

Lufthansa

Nov 7th, 2011

UNITED AIRLINES

Nov 2011 (75 Flights)

Alaska Airlines

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But… Production Scale-Up is a Challenge

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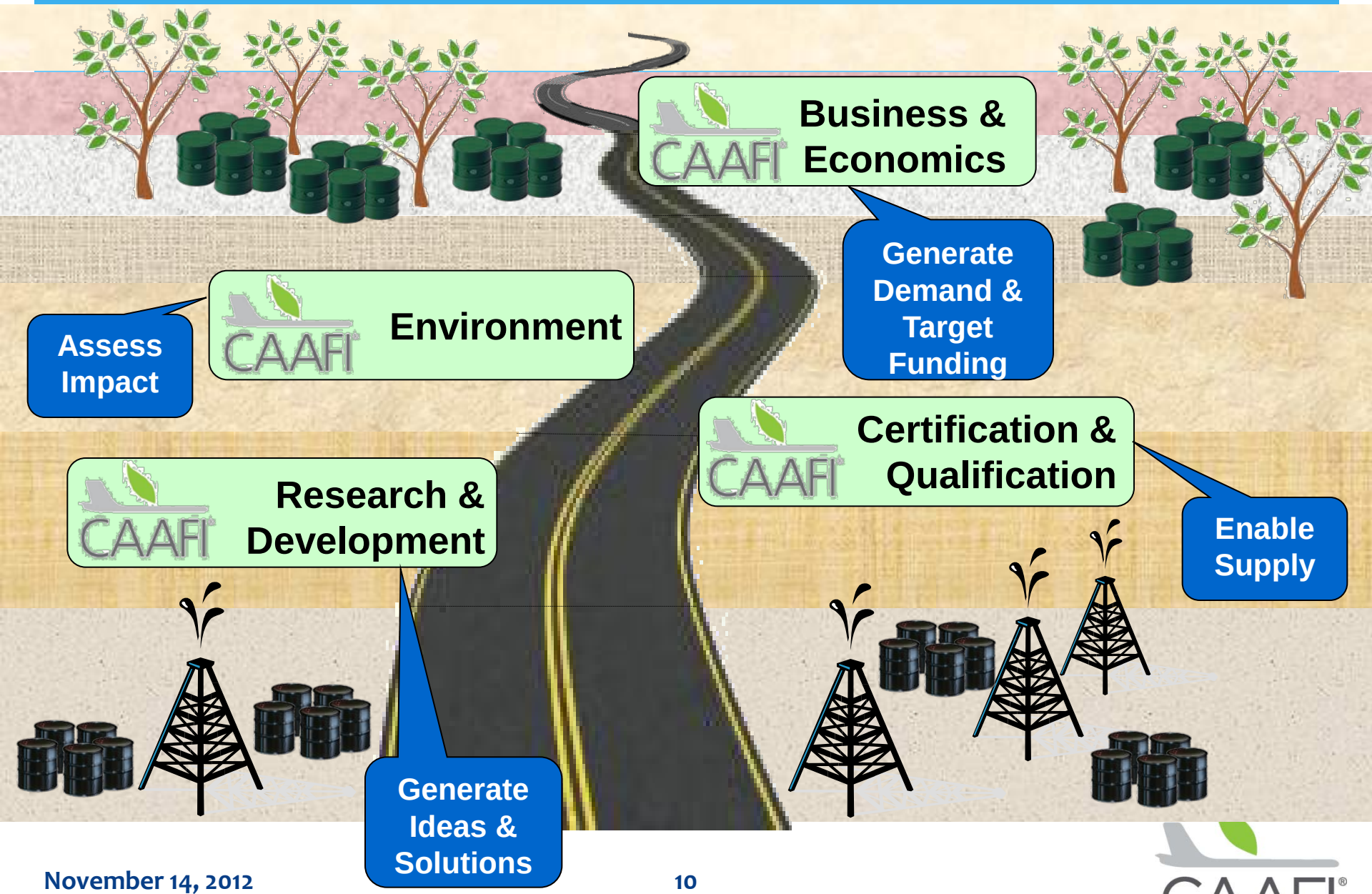
CAAFI Roadmap to Renewable Aviation Fuel



Research & Development

- **Funding Research**
  - FAA Continuous Lower Emissions, Energy, Noise (CLEEN) Program
    - Future Fuel Development
    - Testing of Future Fuels on Aircraft/Engines/Rigs
    - Advanced Jet Fuel Quality & Performance Control R&D Study
    - Alternative Jet Fuel Sustainability Evaluation
    - Materials Compatibility Study
- **Identifying Technology Gaps**
  - White Paper Solicitation/Review
- **Developing Tools**
  - Feedstock Readiness Level (FSRL)
  - Path to Fuel Readiness Guide
  - Fuel Readiness Level (FRL) Exit Criteria

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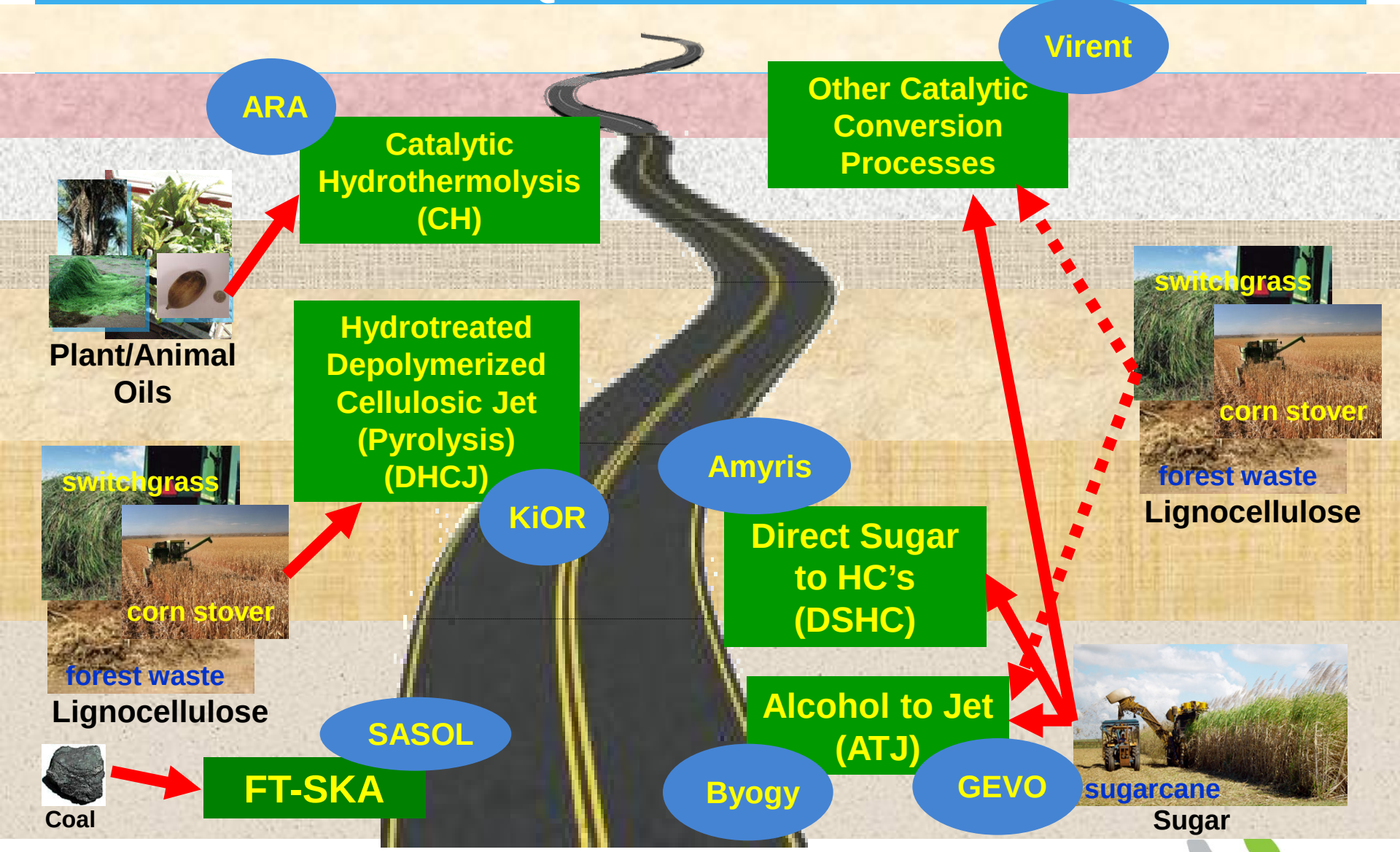
Certification-Qualification: Future Fuels



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Environmental

- **Life Cycle Analysis (LCA) of Greenhouse Gases (GHGs)**
  - Ongoing GHG Efforts at PARTNER (MIT) and Argonne National Labs (GREET.1.2011)
  - New FAA Center of Excellence (COE) for Noise, Emissions, Alternative Fuels
- **Sustainability**
  - Evaluation of Supply Chain Impact
  - Environmental Progression Milestones
  - FAA Funding of Sustainability Study
    - Support Development of Future Standard Procedure
- **Emissions**
  - NASA Engine and Aircraft Tests
    - Fuel effects on performance and emissions
    - Contrail ice formation

Business & Economics

- **Support of Production/Feedstock Scale-Up and Commercialization**
  - Defense Production Act (DPA) ($510M from USDA, DOE, USN)
  - Farm to Fly (USDA, Airlines for America™ (A4A) and Boeing)
- **Generate Demand**
  - **Military-Airline Procurement Alliance** (Defense Logistics Agency and A4A)
  - Airline Off-Take Agreements
- **Communication/Marketing**
  - Berlin Air Show (September 2012)
  - Paris Air Show (June 2011)
  - Australian Air Show (March 2011)
- **Engagement with US States**
  - Georgia: Center of Innovation – Energy
  - Hawaii: Green Initiative for Fuels Transition –Pacific (GIFTPAC)
  - Ohio Aerospace Institute
  - Washington: Sustainable Aviation Fuels Northwest (SAFNW)
- **Engagement with Foreign Initiatives**
  - Germany: Aviation Initiative for Renewable Energy in Germany (aireg)
  - Brazil: abraba & Sustainable Aviation Biofuels Brazil (SABB)
  - Australia: Australia Initiative for Sustainable Aviation Fuels (AISAF)
  - Spain: bioqueroseno

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FUELING SOLUTIONS FOR
SECURE & SUSTAINABLE AVIATION