Biofuels for Aviation Summit

September 1—2, 2009
The DoubleTree Hotel Crystal City (Arlington), VA

Summary Report
Deployment Track

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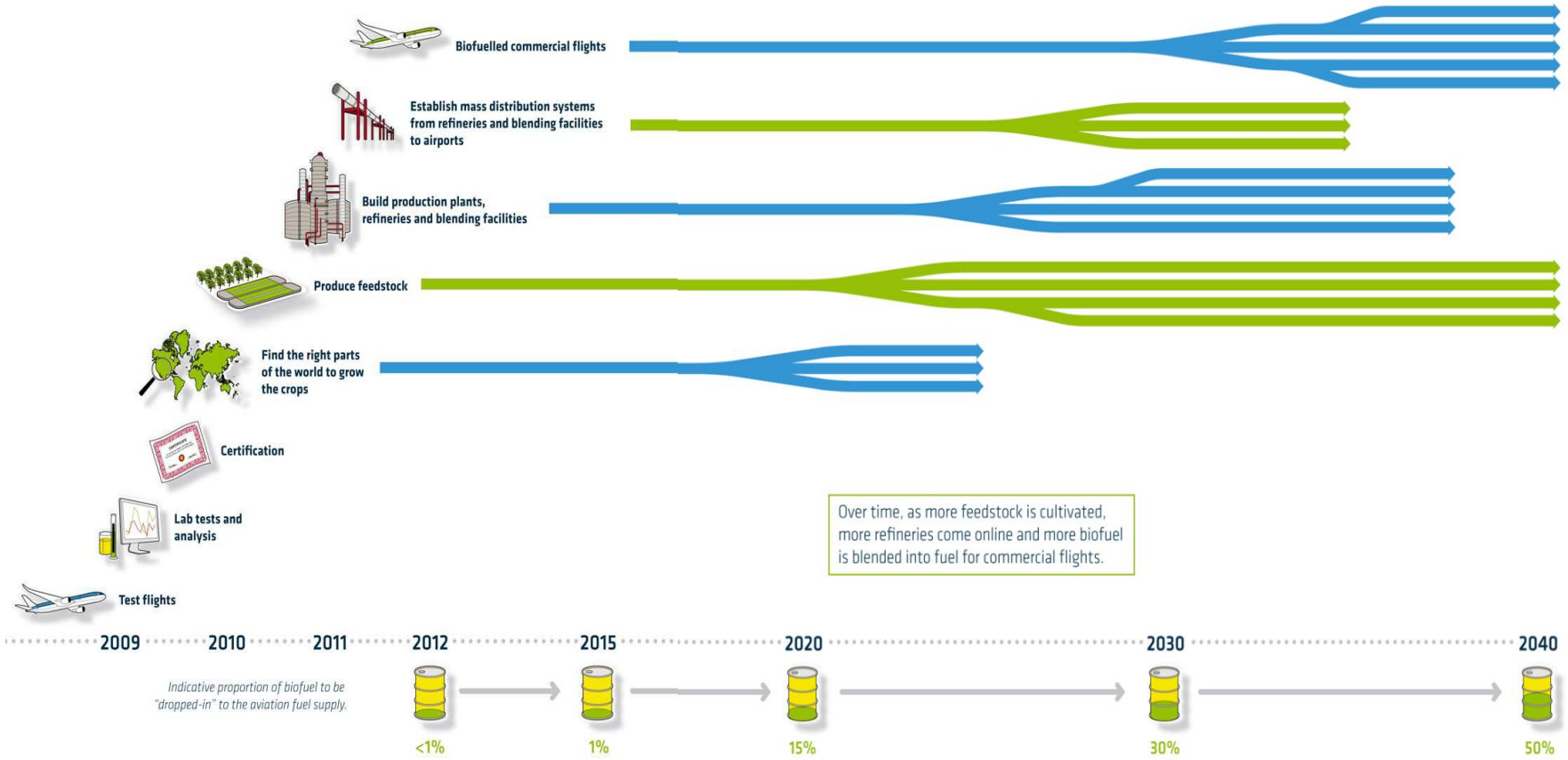
Flightplan to Commercialization of Aviation Biofuels



Beginner's Guide to Aviation Biofuels, May 2009, Air Transport Action Group (ATAG)

Deployment Issues

- **Safety and Certification**
- **Performance**
  - **High energy density and low sulfur**
  - **Reduced carbon footprint (life cycle)**
- **Compatibility**
  - **“drop in” fuel**
  - **Use current delivery system**
- **Sustainability / Greenhouse Gases / Food vs. Fuel**

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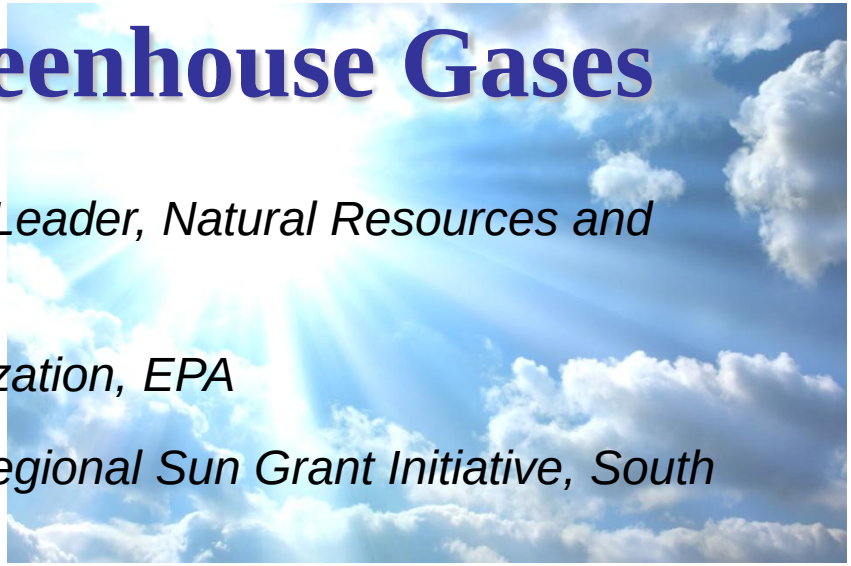
Carbon and Greenhouse Gases



Ray Knighton, *National Program Leader, Natural Resources and Environment, USDA/CSREES*

Donna Perla, *Chief, Waste Minimization, EPA*

James Doolittle, *North Central Regional Sun Grant Initiative, South Dakota State University*

Questions Addressed

- **How does deployment relate to carbon and greenhouse gas issues?**
- **What are the land use implications for deployment?**
- **How are developments in technology likely impact deployment strategies?**

Deployment Recommendations: Carbon and Greenhouse Gases

- **Conduct quantitative studies on carbon life cycle analysis for aviation fuels.**
- **Address nitrogen cycle concerns and uses for coproducts that are high in nitrogen.**
- **Proximity of feedstock production to conversion and blending facilities to provide a more favorable greenhouse gas profile.**

Deployment Recommendations: Carbon and Greenhouse Gases

- **Develop small scale system options for distributed fuel and reduced risk for supply disruption (security).**
- **Focus on high density feedstocks (carbon footprint is directly proportional to feedstock density).**

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Sustainability

Larry Russo, *U.S. Department of Energy*

John Gardner, *Vice President for Economic Development & Global Engagement, Washington State University*

Robin Shepard, *Executive Director, North Central Cooperative Extension Association (NCCEA)*

Questions Addressed

- **How are regional deployment considerations different for oil, starch, sugar and cellulose based aviation fuel production systems?**
- **How do we deploy to assure sustainable biofuel for aviation systems?**
- **What are the scale of conversion impacts on deployment systems?**

Deployment Recommendations: Sustainability

- Sustainability through improved efficiency for feedstock collection as well as modularity.
- Fractionate fuels to meet ground and air transportation needs to have a more efficient and sustainable system.
- Collaboration between farmers, Cooperative Extension Service and land grant universities operating at the community level.

Deployment Recommendations: Sustainability

- Minimize stress on natural resources by selecting regionally appropriate feedstocks.
- Select crops with drought tolerance and high nitrogen use efficiency per ton of production.
- Increase yields to reduce nitrogen and water inputs per ton produced.
- Support sustainability criteria and indicators.

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Food vs. Fuel

James Trapp, *Associate Director of Extension, Oklahoma State University*

Craig Kvien, *Professor, Crop Physiology and Management, University of Georgia*

Thomas C. Dorr, *CEO & President, Thomas C. Dorr & Associates*

Questions Addressed

- **What are food fuel issues for deployment in aviation biofuel production?**
- **What can the Air Force contribute to the developments in technology, organization and policy to accelerate the biofuels for aviation industry?**
- **How does government policy federal and state reach and influence deployment strategies?**

Deployment Recommendations: Food vs. Fuel

- Yield increase reduces pressure for acreage and competition for food production.
- In the near term the primary feedstocks will probably be oilseeds and wastes.
- Some were more supportive of the near term potential for algae based aviation fuels. Some testing has identified that algae can meet jet fuel specifications, but additional testing is needed.

Deployment Recommendations: Food vs. Fuel

- General agreement that the food vs. fuel issue from last year was exaggerated in the United States.
- Oil prices had a major impact on the increase of agriculture and food.
- Fuel energy crops have limited markets outside of fuel and therefore are more vulnerable to disruptions in the biofuels market.

Other Deployment Recommendations or Observations:

- Implement strategies to mitigate the impact of excess nitrogen.
- Develop business models to address inherent risks to secure long-term buy-in from all parties.
- “Drop-in” aviation fuels should have few, if any, infrastructure constraints.

Other Deployment Recommendations or Observations:

- Long-term fuel off-take purchase agreements may be critical to the emerging biofuels aviation industry.
- Meeting grower/feedstock needs are critical to the successful deployment of aviation biofuels.
- Our panelist commented that the time frame for deployment is highly aggressive.