



Sustainable Aviation Biofuel - Boeing's Work in China

International Energy Agency Task 39 Meeting
Beijing, April 2018

Boeing – China

Partnership

Leadership



Sustainability



Production



Provision



Technology and Innovation

Four Pillars of Partnership

Biofuel in China - Three Imperatives



DRIVE

Biofuel Technology
Towards Aviation Use



FACILITATE

Globally Harmonized,
In-Country Practical
Standard/ Regulation



SUPPORT

Aviation Biofuel
Commercialization and
Airlines Application

Biofuel for Boeing in China - Three Imperatives



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Research Efforts – Two focus areas

Waste Cooking Oils

- **Background** --- Illegal recycling of waste cooking oil generates food safety issues
- **Feedstock** --- Feedstock collection & logistics in eastern China
- **Technology** --- New catalyst for waste cooking oil to aviation biofuel

Agricultural Residues

- **Background** --- Huge capacity, yet severe air pollution
- **Feedstock** --- Evaluation of collectable quantity based on retaining soil sustainability
- **Technology** --- Process assessment and technical optimization



Waste Oil to Aviation Biofuel



- 250 gallon/day pilot plant
- Built by Hangzhou Energy Engineering & Technology, in collaboration with Boeing and COMAC
- Aviation biofuel produced meets or exceeds requirements

Agriculture Waste to Aviation Biofuel

- Collaboration with Guangzhou Institute of Energy Conversion
- Lab-scale feasibility demonstrated
- 2 pilot plants built
- Techno-economic analysis performed
- Sustainability and impacts analysis underway

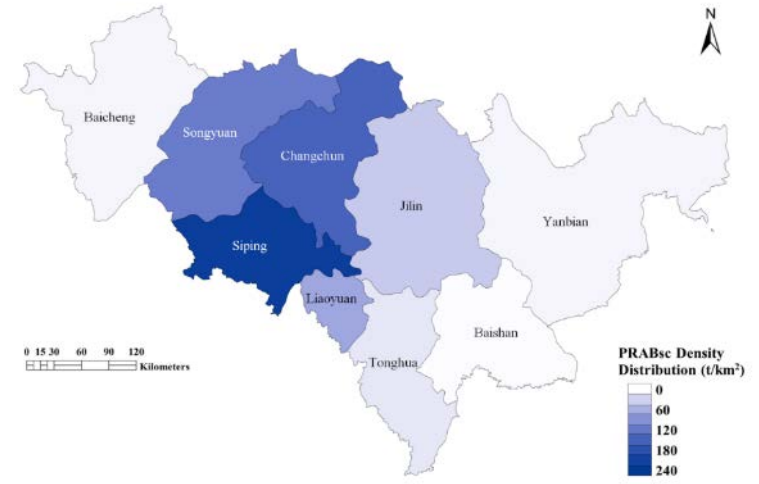
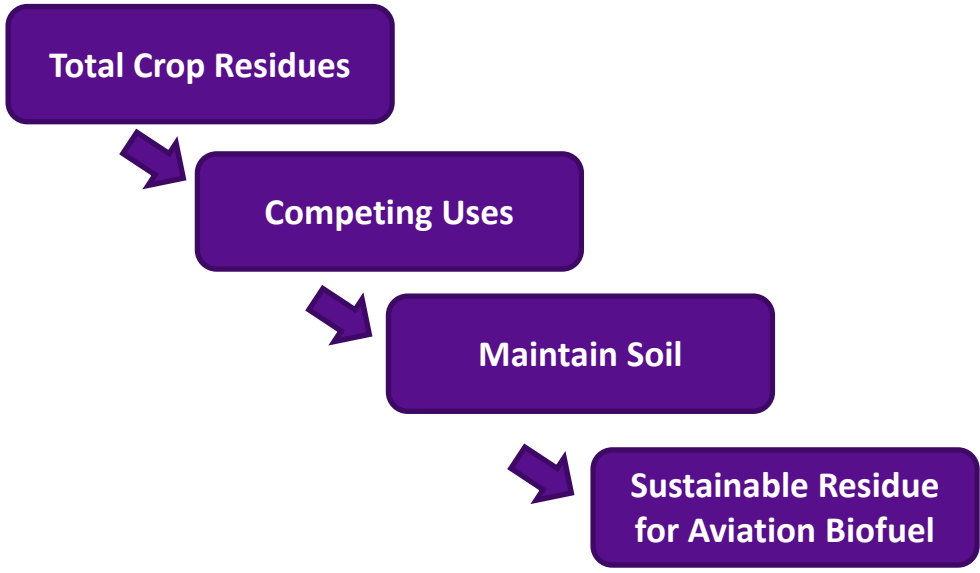


Pilot Plant (Foshan, Guangdong)
Capacity: 35 gallons/day

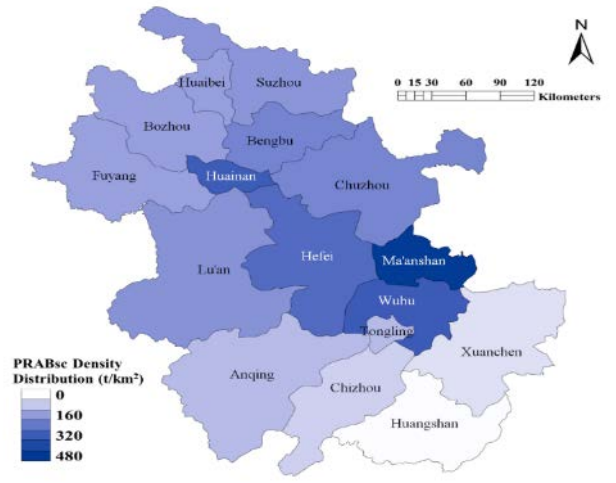
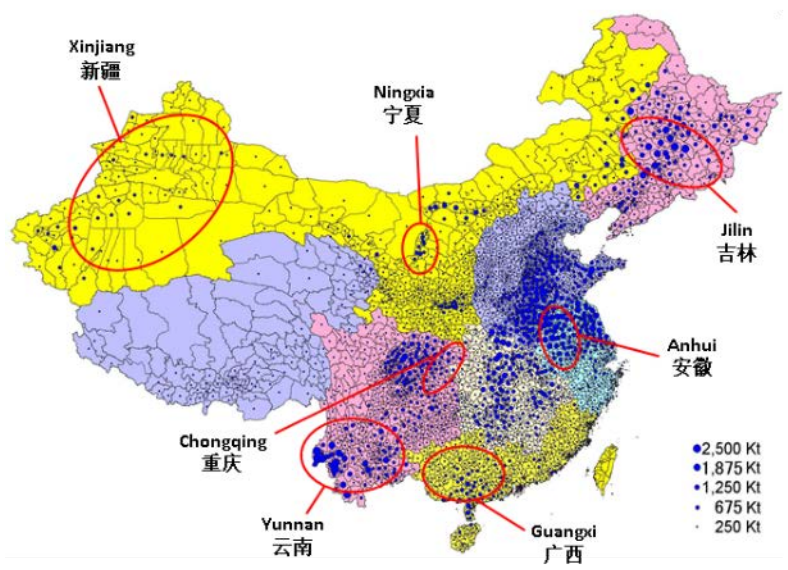


Pilot Plant (Yingkou, Liaoning)
Capacity: 165 gallons/day

Ag Waste – Sustainability Assessment



Jilin Province: **corn**



Anhui Province: **rice, wheat**

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Global Commercial Jet Fuel Standards

Governing body ¹				
Standard	ASTM D1655	UK MoD Def Stan 91-91	Chinese GB (SAC) GB 6537	Russia GOST 10227
Key Fuels produced	Jet-A Jet-A1 ²	Jet-A1 ³	No. 3	TS-1 RT
	<p style="color: green; text-align: center;">Allow 5 biofuel pathways</p>		<p style="color: red; text-align: center;">Allows 1 biofuel pathway</p>	

Note: Fuel and standard listings are not comprehensive, but intended to cover the most commercial used standards and fuels
 1. The 4 standards listed in Boeing flight manuals, many others exist 2. Tested to D1655 3. Tested to Def Stan 91-91

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Use of biofuels by airlines in China



- China's 1st biofuel demo flight conducted by Air China



- China's 1st biofuel passenger flight conducted by Hainan Airlines



- China's 1st transpacific biofuel flight conducted by Hainan Airlines

Boeing is committed to partnering for a better future

