

# United Airlines

# Alternative Fuels

**DOE BETO**

**Demonstration & Deployment  
Workshop**

**March 12, 2014**



A STAR ALLIANCE MEMBER 

UNITED   
eco-skies 

# ***Eco-Skies: United's environmental commitment and sustainability platform***

## **Fuel Efficiency**

Aircraft replacement, technology investment and process improvement

## **Alternative Fuels**

Commercialization and utilization both in the air and on the ground

## **Product & Facility Sustainability**

Innovation, recycling and product improvement

## **Stakeholder Engagement**

Promoting accountability and awareness in protecting the environment

## **Environmental Compliance**

# United is committed to leading commercial aviation as an environmentally responsible company by taking actions today that shape an environmentally sustainable future

## 32%

improvement in fuel efficiency since 1994



## Winglets

Installed on more than 330 aircraft; 5% reduction in emissions; North America launch partner split scimitars  
**280**

new fuel efficient aircraft on order through 2022

## New Cup

50% recycled content; recyclable in single-stream; United Clubs & In-Flight

## 85+ million

gallons of fuel saved in 2013



**ATW Eco-Aviation  
Airline of the Year**



## Alternative Fuels

U.S. airline to sign definitive fuel supply agreement for sustainable aviation biofuel



# As part of United's commitment to improved communications and stakeholder engagement, we released an enhanced cargo emissions and offset calculator

- Calculates per capita carbon emissions for customers shipping via United Cargo
- Only U.S.-based carrier to offer the calculator to its customers
- Methodology recognizes actual flight data (average payload, fuel burn, and distance) related to aircraft type, routes and seasonality
- Accounts for additional mass associated with passenger infrastructure (e.g., seats, galleys, etc.)

**Offset your cargo**

Our carbon calculator will provide you with calculation of the carbon footprint specific to your cargo. It is based on actual routes, planes used, load factors, fuel usage, and weight calculations attributed to freight.

Total cargo weight:  lb  kg

From:

To:

One-way  Multi-city

[Continue](#)

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**UNITED CARGO**

Home [Learn about offsets](#)

## United Cargo's carbon offset program

LGA to LAX 2464 miles, 1,5568 metric tons [Remove](#)

Note: The flight chosen is not a direct United flight. The result displayed is based on the mileage between the points of origin and destination you have selected and does not take into account specific flight information.

Total: 1,5568 metric tons

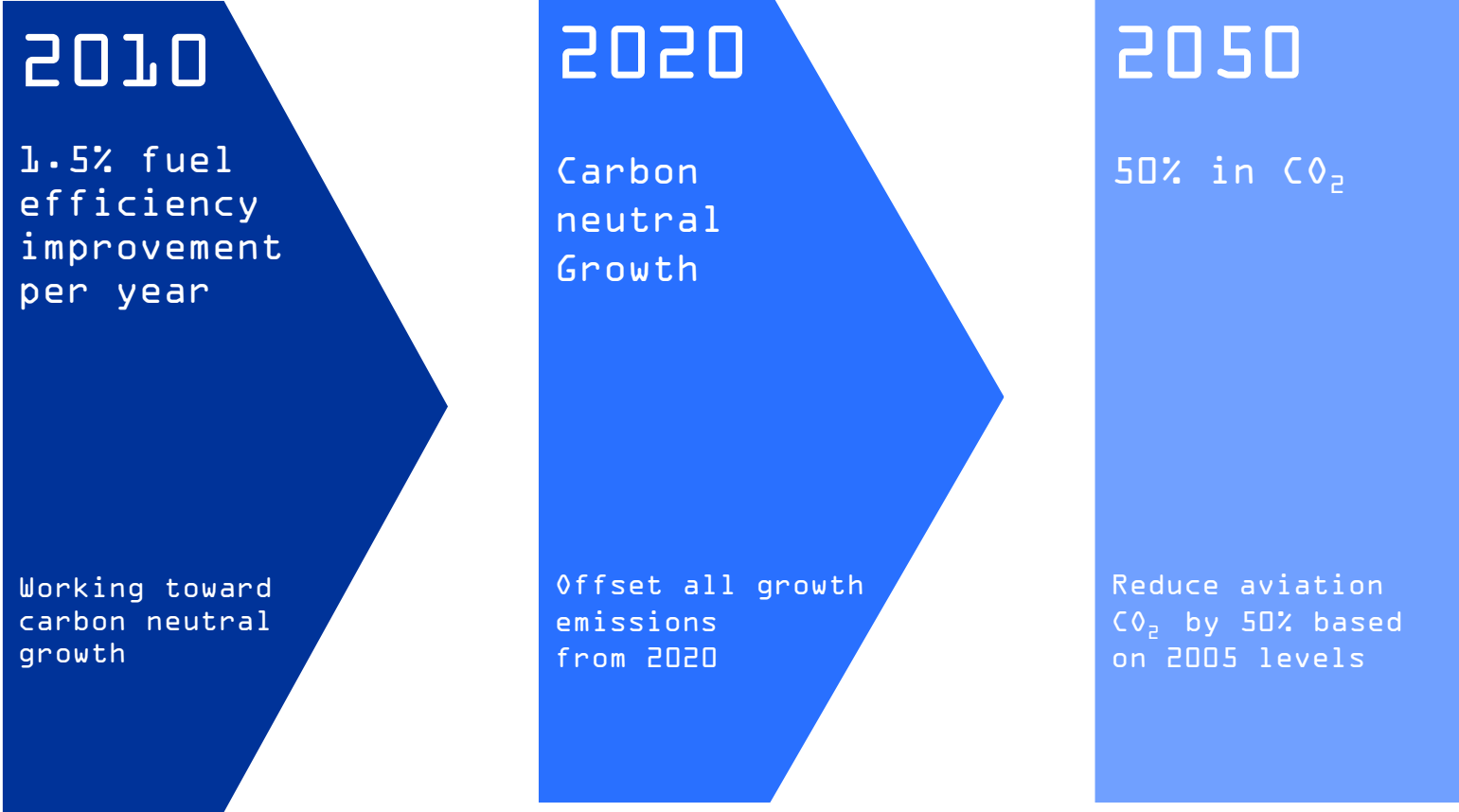
Note: Calculations represent CO2 emitted during fuel combustion and do not account for upstream CO2 emissions from fuel production, refining and transportation of the fuel by oil companies. While upstream emissions have a high degree of uncertainty, some estimates suggest that upstream emissions account for approximately 10% of a fuel's total life cycle CO2 emissions.

### Results

We are pleased to offer you the opportunity to join us in protecting the environment by offsetting the carbon footprint associated with your air travel. Please choose from one of the following independently reviewed and verified quality offset project portfolios offered by Sustainable Travel International (STI), a non-profit organization.

- \$31.14 Forest Conservation in California**  
Your support of the Garcia River Forest Project helps to conserve forestland, restore wildlife habitat and protect local forestry jobs in the heart of California's Redwood region. Preservation of this forest land allows for the storage of 77,000 metric tons of greenhouse gas emissions annually and is an independently verified carbon offset project registered with the California Climate Action Reserve.  
[Learn more](#)

# Aviation Industry Seeks Global Approach to reduce emissions, with following commitments



Subject also to government investment in technology, operations & infrastructure improvements

Source: IATA

# Four Pillars for Aviation Industry GHG Emissions Reduction Strategy

*Invest in new*  
**TECHNOLOGY**

*(including sustainable aviation biofuels)*



*Fly using more efficient*  
**OPERATIONS**

*Build and use efficient*  
**INFRASTRUCTURE**

*Use effective, global,*  
**MARKET-BASED MEASURES**

# Alternative fuels present a long-term opportunity to manage risks and continue United's leadership

- Reduction of key environmental impact
- Alignment with stakeholder interests
  - Customers
  - Societal focus on carbon reduction
- Fuel diversification to protect against supply chain risks and manage a significant cost
- Strengthens the economy
- Inability in near-term to modify aircraft engines

# United – Engagement in Advancing Alternative Fuels



**2009:** First North American Biofuel Test Flight

**2010:** First Demonstration Flight on synthetic fuel

**2011:** First US Commercial Biofuel Flight - 40% blend algae based renewable jet fuel

**2012:** Launch of Industry-Leading Collaborative, Midwest Aviation Sustainable Biofuels Initiative, MASBI to help in defining action plan for biofuel development regionally

United joins Sustainable Aviation Fuel Users Group (SAFUG)

**2013:** First to sign definitive fuel supply agreement with first use by U.S. carrier in on-going flights starting 2014





# Midwest Aviation Sustainable Biofuels Initiative

- In May 2012, United led the development of the of the Midwest Aviation Sustainable Biofuels Initiative (MASBI) to drive integration across the value chain and define a regional roadmap to seek acceleration of commercial development
- Steering Committee Members: United, Boeing, UOP Honeywell, Chicago Department of Aviation, Clean Energy Trust
- Members & Advisory Committee:
  - Representing 40 different public, private, & non-profit org.
  - Including agriculture, industry leaders, technology providers, airport officials, policymakers, academic institutions & national laboratories
  - Advisory Committee led by Argonne National Lab and included as advisors USDA, FAA, World Wildlife Federation
- Report : Recommendations to policymakers, stakeholders and investors



# MASBI Outcomes – Key Recommendations to Further Accelerate Commercialization

- Improve feedstock production through agricultural innovation
- Tailor agriculture products such as oil-seed crops for jet-fuel production
- Investigate the impacts of uncertainty on production
- Advance technologies to convert lignocellulosic biomass
- Identify means to expedite approvals by the ASTM International and EPA
- Allow producers to optimize product portfolios
- Pursue deal structures that balance risk and reward for early adopters of technology
- Demonstrate industry demand with aviation jet fuel purchase guidelines
- Create pool of capital to invest in biofuels
- Create longer-term policies that enable investment and production
- Level the policy playing field for advanced biofuels with the conventional petroleum industry
- Fully fund the Defense Production Act Title III for the production of biofuels
- Build regional demonstration facilities supported by municipal and state policies
- Incorporate sustainability standards and advance certification

*Full Report at [www.masbi.org](http://www.masbi.org)*

# Sustainable alternative aviation fuel produced by AltAir Fuels will fuel a portion of United's LAX flights starting this year

<b>Technology</b>	<ul style="list-style-type: none"><li>• HEFA Process</li><li>• Honeywell UOP's Green Jet process</li><li>• Feedstock flexible including non-edible oils/agricultural waste</li></ul>
<b>Fuel</b>	<ul style="list-style-type: none"><li>• 15 million gallons of bio jet and green diesel over 3 years</li></ul>
<b>Location</b>	<ul style="list-style-type: none"><li>• United will use the biofuel on flights operating out of its Los Angeles hub (LAX)</li><li>• Delivery planned for Q3/Q4 2014</li></ul>
<b>Lifecycle Impacts</b>	<ul style="list-style-type: none"><li>• 50 percent reduction in CO<sub>2</sub> emissions as compared to traditional jet fuel</li></ul>
<b>Refining</b>	<ul style="list-style-type: none"><li>• Repurposed idled portion of a refinery to produce 30 million gallons total of renewable fuel</li></ul>
<b>Logistics</b>	<ul style="list-style-type: none"><li>• Fuel will be blended at the refinery near Los Angeles</li><li>• Finalizing logistics to United operations</li></ul>
<b>Co-Products</b>	<ul style="list-style-type: none"><li>• Refinery will produce green diesel, naphtha, and other distillates</li></ul>



# Why AltAir Fuels?

## Key Criteria

Approved Technology for current fleet (or near term)	Management Credibility	Low Environmental Impact	Sufficient Financing	Near Term Commercial Production	Competitive Price Point	Logistics (near hub)
✓	✓	✓	✓	✓	✓	✓

# What's Next?

## Seeking greater quantities of alternative fuel

- United issued RFP Fall of 2013 seeking proposals
- Seeking alternative fuels for multiple locations
- Key factors remain: lower carbon, cost-competitive, can deliver

## Challenges Remain

- Sufficient low-price feedstocks?
- Sufficient investor interest?
- Sufficient interest in alternative jet fuel production where higher certification requirements and potentially higher production costs than ground transportation fuels?

Alt fuels commercialization requires action today to ensure available in the future

**Thank-you for your engagement  
in Alternative Fuels!**