Multiplying Social Value through Sustainability

Innovating Towards a Green Economy

Airports Going Green
October 26, 2015

Angela Foster-Rice
Managing Director
Environmental Affairs & Sustainability
United Airlines
**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 continues to increase our fuel efficiency through innovation in technology and processes

**250+**
new fuel efficient aircraft on order through 2022

**>25%**
of ground service equipment electric or alternatively fueled

**Winglets**
Installed on 330+ aircraft with 5% reduction in emissions; launch partner “split scimitar” winglet

**34%**
Improvement in fuel efficiency compared to 1994
Alternative fuels are one of the most promising innovations to reduce carbon emissions of aviation while creating other significant benefits.

**Lifecycle CO2 Reduction**

**Fuel Diversification**
- Reduce long term price volatility
- Improve energy security

**Economic & Community Benefits**
- Feedstock producers
- Bio-refining industry
- Clean technology jobs

**Protect natural resources**
- Reduce impacts from extraction process
- Wastes as feedstocks/reduce landfill needs
United continues to seek advancement of sustainable aviation fuels

2009
First U.S. test flight biofuels

2011
First U.S. Commercial alternative fuel flight

2012
MASBI Biofuels Collaborative

2013
First to sign definitive fuel supply agreement for sustainable aviation biofuel - AltAir Fuel

2015
$30M Equity investment in Fulcrum BioEnergy
United is the first U.S. carrier to enter a commercial-scale fuel supply agreement for sustainable alternative aviation fuels

- **Alt Air Fuels** repurposed largely idled refinery in Paramount, CA, creating +100 full-time jobs

- Fuel for flights out of LAX

- United can purchase up to 15 M gallons over 3 years

- Fuel will achieve >50% reduction in CO2 on life-cycle basis

- HEFA process; feedstock flexible – can include edible, second-generation plant oils/animal fats

- Pursuing RSB sustainability certification

- Fuel production start-up 4Q 2015
In June 2015, United announced a $30 million equity investment in U.S.-based alternative fuels developer Fulcrum

- Co-develop up to 5 facilities; 90 Million gallons/year
- Greater than 80% reduction in carbon emissions (lifecycle basis)
- Divert landfill waste, capture recyclables
- Create jobs, generate renewable electricity credits
Working with Stakeholders to innovate for a green economy

STAKEHOLDERS

- Non-profit organizations
- Universities
- Educational Centers
- Employees
- Customers
- Suppliers
- Airports
- Local Communities
- State & Federal Government
Mentoring the next generation of innovators through United’s partnership with Clean Energy Trust

Since 2009, United has partnered with the Clean Energy Trust – a Chicago-based, clean energy business accelerator.

Clean Energy Challenge

- Contest provides mentoring and funding to support young clean energy companies to become successful businesses
- United, Boeing, & UOP sponsors Aviation Innovation Award

Advisory Board

- United provides support to strategic vision
Educating and energizing the next generation of scientists through teacher training workshops with iBio

- **United** is collaborating with **iBio** and **Argonne National Laboratory** with the “Farm to Flight: Can Biofuels Green Aviation?” workshop for high school and middle school science teachers.

- Four-week course to educate teachers in curriculum for their students

**Key Features of Workshop:**

- Problem-Based Learning and hands-on laboratory experiments
- Learn from United Airlines and Argonne Lab
- Make career connections
United has partnered with the Illinois Sustainable Technology Center – supporting a vision of innovation towards a green economy

The Illinois Sustainable Technology Center’s (ISTC) integrates applied research, technical assistance, and information services to advance innovation to address environmental challenges.

- United, ISTC and the Chicago Department of Aviation (CDA) are currently working together to explore new technologies for ways to enhance recycling at Chicago O’Hare International Airport.

- ISTC's Advisory Board is composed of members from businesses (including United), government, non-profit agencies, and academia.
Collaborating with our customers to contribute to valuable carbon offset programs that provide a multitude of social benefits

UNITED provides flight level data for enterprise-wide CO2 reductions

CUSTOMER selects which offset project

SUSTAINABLE TRAVEL INTERNATIONAL Provides offsets

Forest Conservation in California
Renewable Energy in Texas
Forest Conservation in Peru
Recent United/airport/government collaborations will result in an annual reduction of >25,000 metric tons in CO2 emissions!
Up-cycle partnership with Columbia College Chicago, CDA, and RE:NEW creates new life for waste materials while providing social benefits

Chicago Department of Aviation introduced us to Columbia College Chicago’s design department which led to:

• College class competition on bag design using old United banners and materials – educational opportunity

• Hiring of RE:NEW to make the bags – an organization that helps refugee women in Chicago with skill-building and employment

• Creation of great travel bags – sold out!
eco-skies

friendly

Committed to creating a more sustainable future.

fly the friendly skies™