



# Sustainable Aviation Fuels Northwest: Powering Clean Economy Innovation

Pacific Northwest Defense Symposium

August 18, 2011

Ross Macfarlane

# Climate Solutions Mission

Accelerate *practical, profitable* solutions to global warming by:

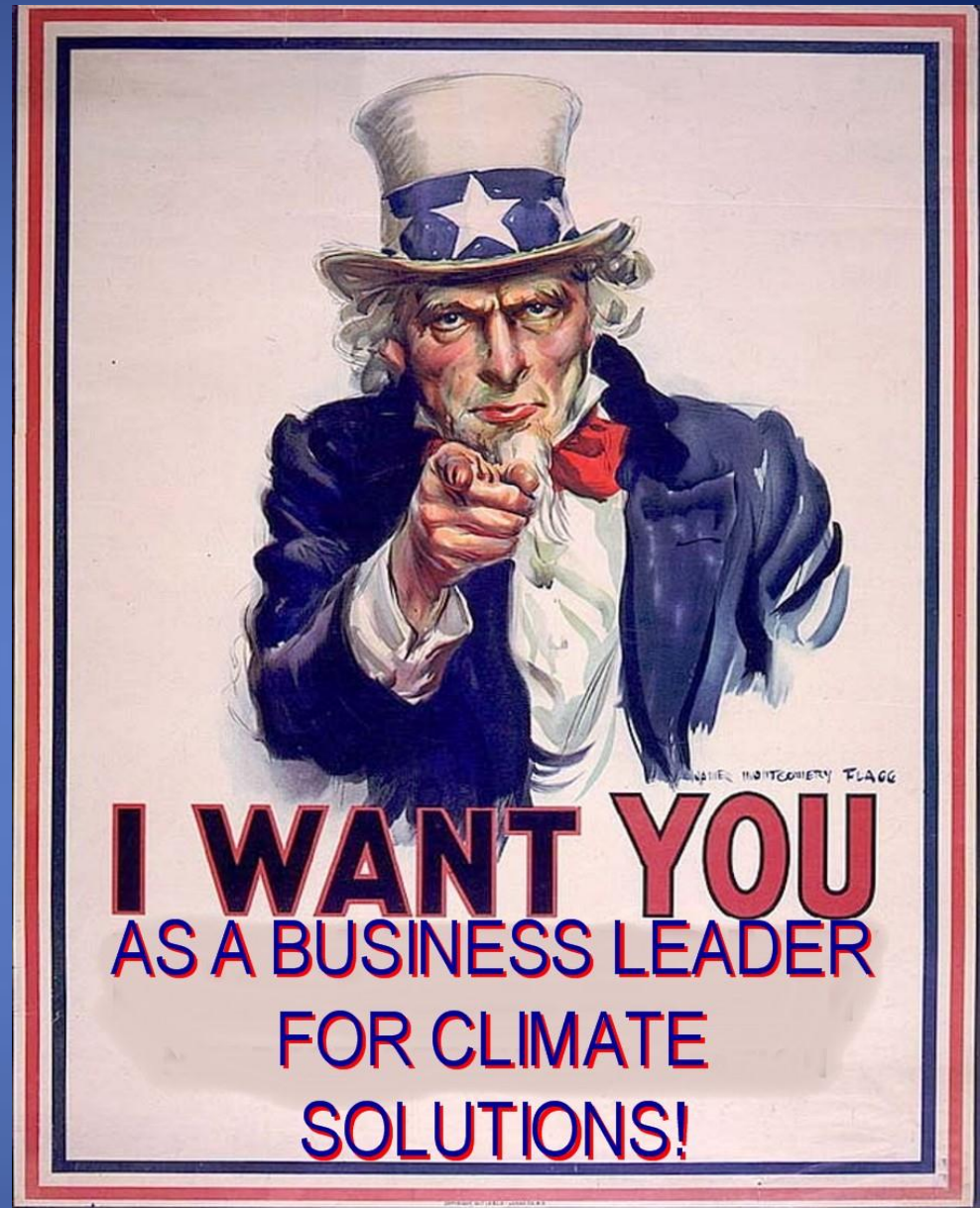
- ✓ Galvanizing leadership
- ✓ Growing investment
- ✓ Bridging divides

Make the Northwest a national and world leader in  
the clean energy economy



# Business Leaders for Climate Solutions

- Over 1000 NW Businesses and Executives
- Free network





**“Sandal-wearers won't save us from global warming - but greed and the U.S. Navy will”**  
**New Scientist 12/22/2010**



© Reuters



# Sustainable Aviation Fuels Northwest (SAFN)



**Climate Solutions**  
CLIMATESOLUTIONS.ORG

# What is SAFN?



- Mission: Explore opportunities and challenges in production of sustainable aviation fuel using Pacific Northwest feedstocks
- Regional stakeholder process: +40 participants
- First in the U.S.; Australia, Mexico, EU, UAE
- Geographical scope (WA, OR, ID, MT)
- Climate Solutions: facilitator and lead for research and writing

# SAFN Conveners

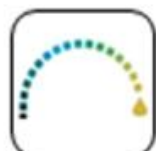




# Sustainable Aviation Fuels Northwest Stakeholders



Honeywell



Imperium



Great Plains



Bioalgene



Biopure  
Fuels



Steel River



Conservation  
NW



Weyerhaeuser



OSU



Sun Grant



Alt Air



Spokane  
Industries



ADAGE



DLA



Duke Energy



Core Fuels



Green  
Diamond



VVA Env.  
Council



Simpson  
Investment



ATA



Nature  
Conservancy



NW Biodiesel  
Network



NRDC



OR Environ  
Council



OR Wheat  
Growers



Roundtable  
Sustainable Biofuels



MATRIC



Houghton  
Cascade



OR Dept  
of Agriculture



USDA - RD



USDA - ARS



WA Dept  
of Comm



VVA - DNR



W&GR



Parametrix



Ruckelshaus  
Center



USDA



Alaska Air



Spokane



Boeing



Port of SEA



Port of PDX



WSU



Climate Solutions



# DEFENSE LOGISTICS AGENCY

AMERICA'S COMBAT SUPPORT LOGISTICS AGENCY



## Defense Logistics Agency Energy "Sustainable Aviation Fuels Northwest"

Pam Serino  
Director, Quality Technical Support Office  
DLA Energy  
Dec 8, 2010

# Strong Goals for Clean Fuels

## Air Force

- *AF Energy Plan 2010* – “Increase Supply” Goals
  - By 2016, be prepared to acquire 50% of domestic aviation fuel via alternative blends greener than petroleum
  - Increase facility renewable energy at annual targets
  - Increase non-petroleum-based fuel use by 10% per annum in motor vehicle fleet

## Army

- *Army Energy Security Implementation Strategy* – 2009
  - ESG 3: Increased use of Renewable/Alternative Energy
  - ESG 4: Assured Access to Sufficient Energy Supply
  - ESG 5: Reduced Adverse Impacts on the Environment
  - Established a Tactical Fuel and Energy Implementation Plan Working Group (DLA Energy supporting)

## Navy

- *Navy Energy Goals*, published Oct 2009
  - Green Strike Group by 2012
  - Reduce petroleum by 50% in the commercial vehicle fleet by 2015
  - Produce 50% of shore based requirements from alternative sources by 2020
  - Supply 50% of total energy consumption from alternative sources by 2020

## Marines

- *Facilities Energy & Water Management Program Campaign Plan*, published September 2010
  - Reduce energy intensity 30% by 2015 relative to 2003 baseline
  - Supply 50% of total energy consumption from alternative sources by 2020

**Courtesy Defense Logistics Agency**



# Industry Efforts to Reduce Emissions



## Using less fuel:

- More Efficient Airplanes
- Operational Improvements



## Changing the fuel:

- Sustainable Biofuels





Picture1

## Aviation Actions to Reduce CO<sub>2</sub>



Carbon-Neutral Growth and Reduction Timeline



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# Technology for “Drop In Fuels”

- Not like first generation biofuels
- **No** compromises on safety or performance
- Approval process critical

# Sustainable Biofuel Test Flights



Feb 2008  
**Virgin Atlantic**  
Coconut and Babassu



Dec 2008  
**Air New Zealand**  
Jatropha



Jan 2009  
**Continental**  
Algae and Jatropha



Jan 2009  
**Japan Airlines**  
Camelina, Jatropha, Algae



Apr 2010  
**F/A-18**  
Camelina



June 2010  
**Dutch AH-64 Apache**  
Algae and Cooking Oil

# Sustainable Aviation Biofuel Projects



SAFUG-Europe  
Member Projects



Working Together MOUs with  
CAAC, Air China, PetroChina



Sustainable Aviation  
Fuels Northwest



Project  
Flight Path



Aviation Biofuel  
Assessment  
Project



Life  
Cycle  
Analysis

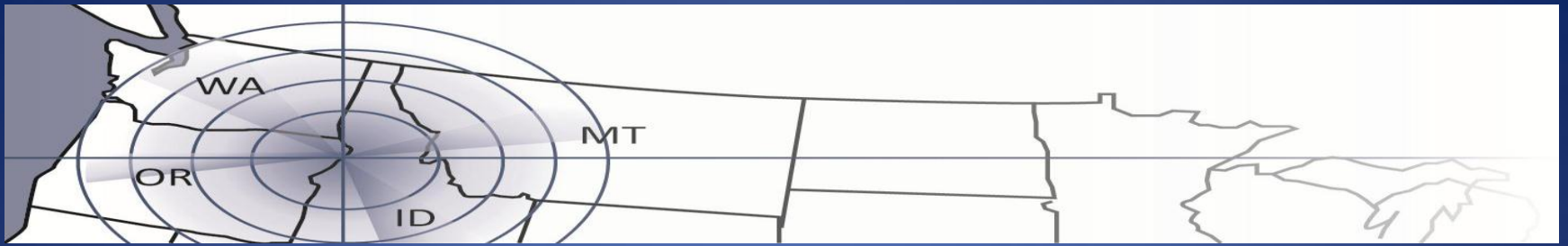


Aviation Biofuel  
Road Map



Masdar  
Research  
Project



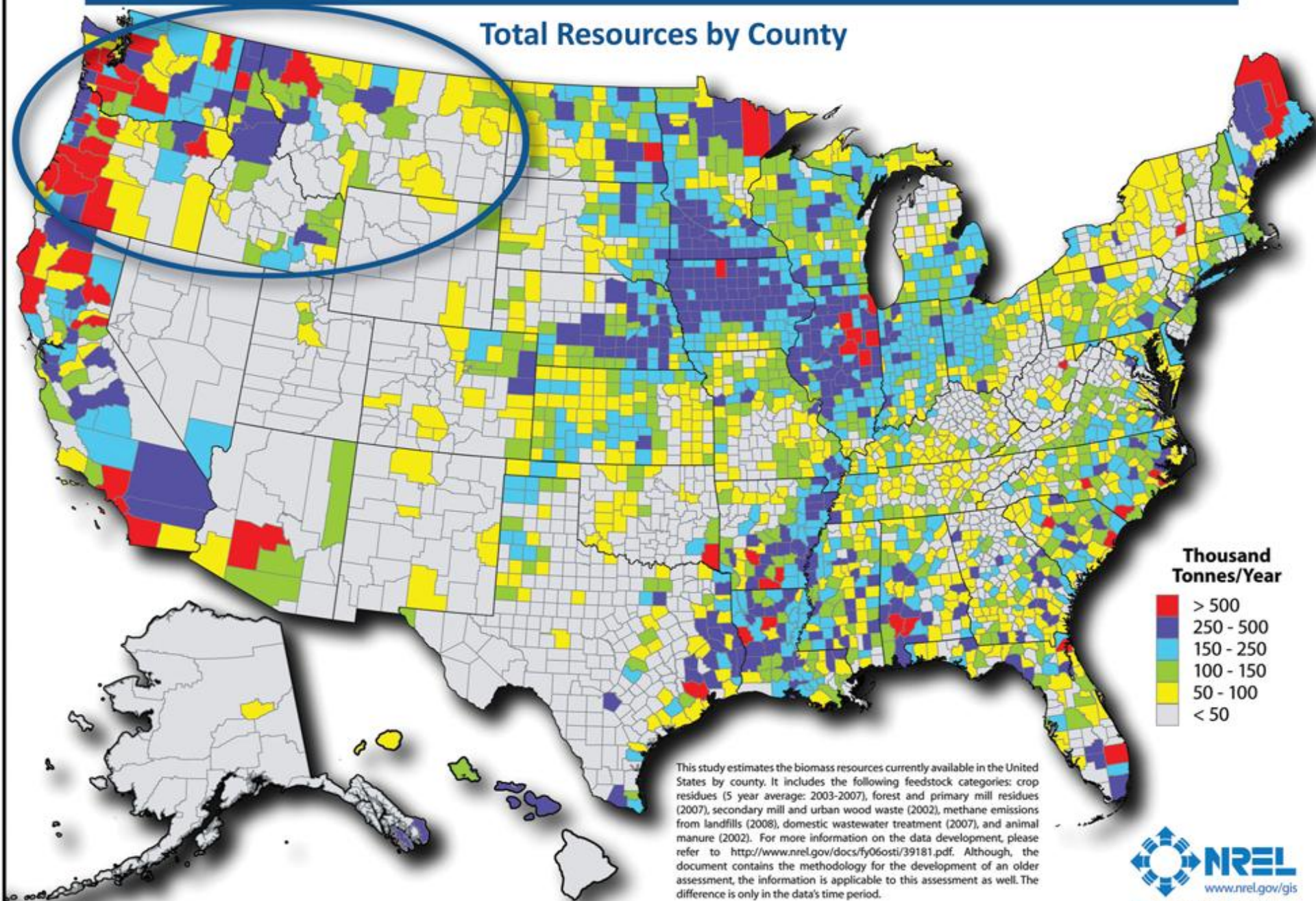


# Northwest Prime Location

- Rich and diversified biomass resources – farm, forest, municipal
- Policy and business leadership
  - ✓ RFS in MT, OR, WA
  - ✓ Climate framework in OR, WA
  - ✓ Major bioenergy focus at universities, federal labs
  - ✓ Interest by established players plus numerous business start-ups

# BIOMASS RESOURCES OF THE UNITED STATES

## Total Resources by County



# “Aviation Priority”



Cleaner alternatives to petroleum fuels needed to put aviation on an economic and environmentally sustainability path

- Aviation fuels should receive **priority** consideration for development of fuels from available sustainable feedstocks
  - This **does not** mean that aviation fuels should be only use of bio-materials – marine fuels and other diesels will be produced and likely also deserve priority



# Sustainability is Key



## Not all bio-energy is sustainable energy

- Report focused on second and third generation biofuels that meet sustainability criteria
- Important to address stakeholder concerns and develop scientific information

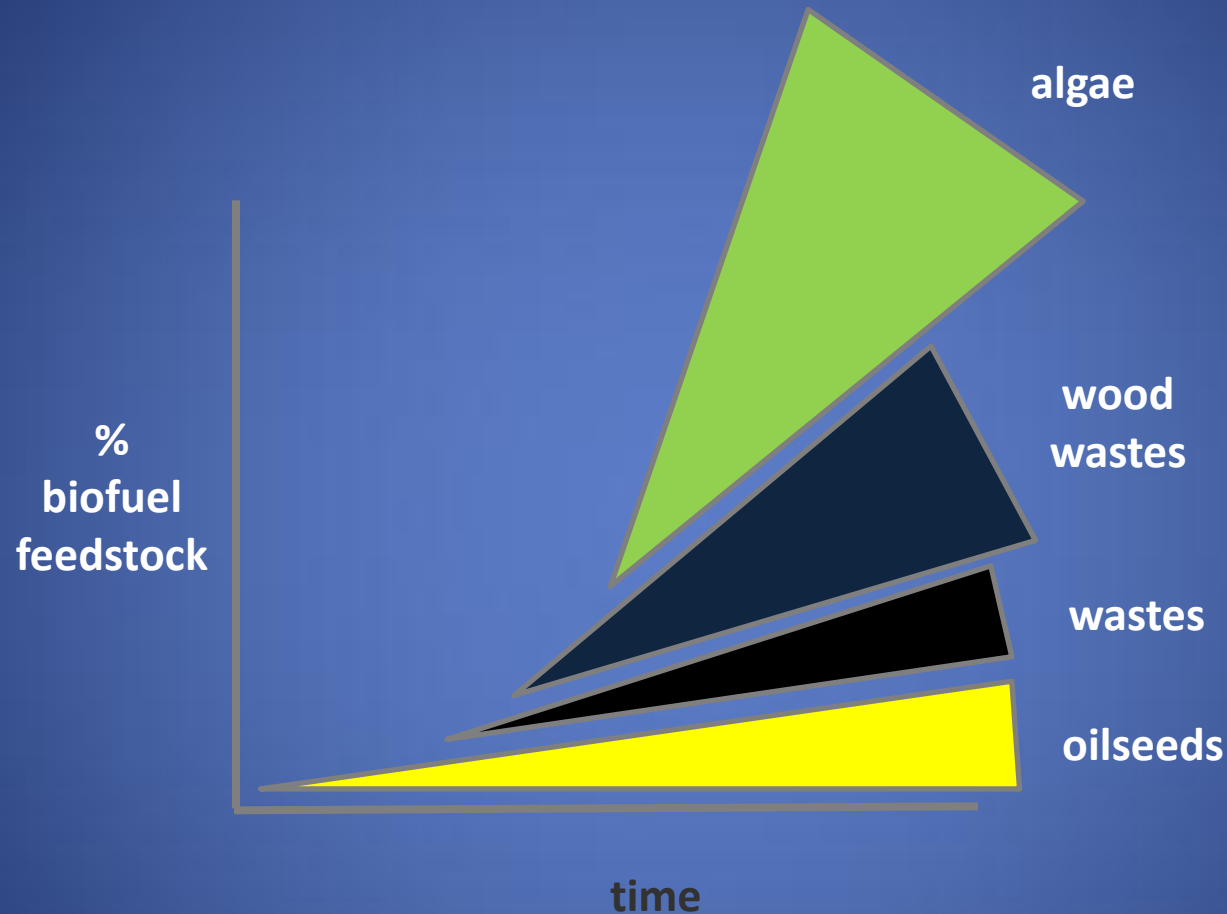


# Most Promising Feedstock Pathways

- Oilseeds
- Algae
- Forest Residuals/Thinnings
- Municipal Solid Waste



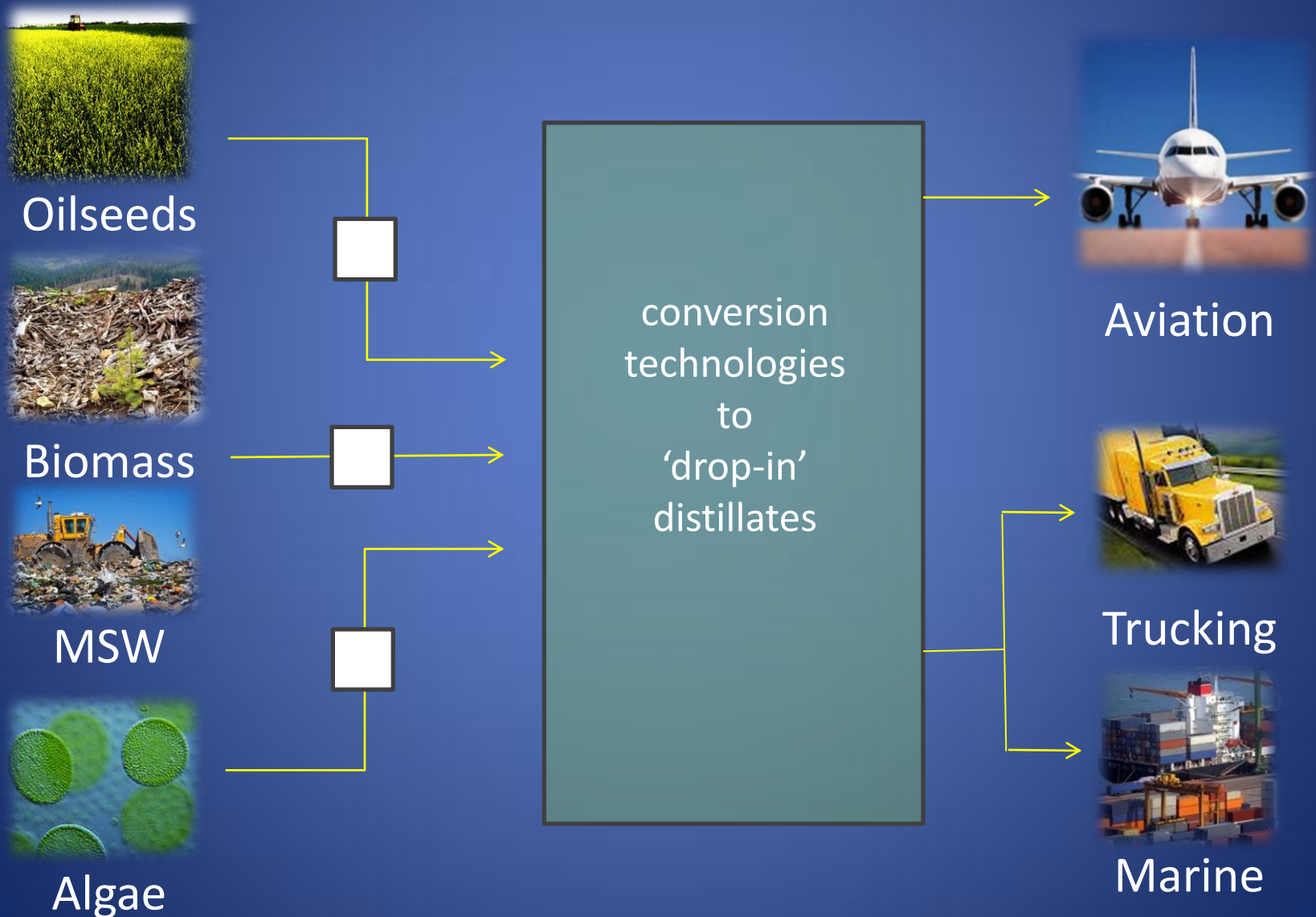
## Building Blocks to Creating Scalable Supply: *Illustrative Case*



**No Single Feedstock or Process Will Meet Objectives**

# Develop Full Supply Chains

Feedstocks → Processing → Biorefining → Distribution/Utilization



# Existing Aviation Fuel Delivery System

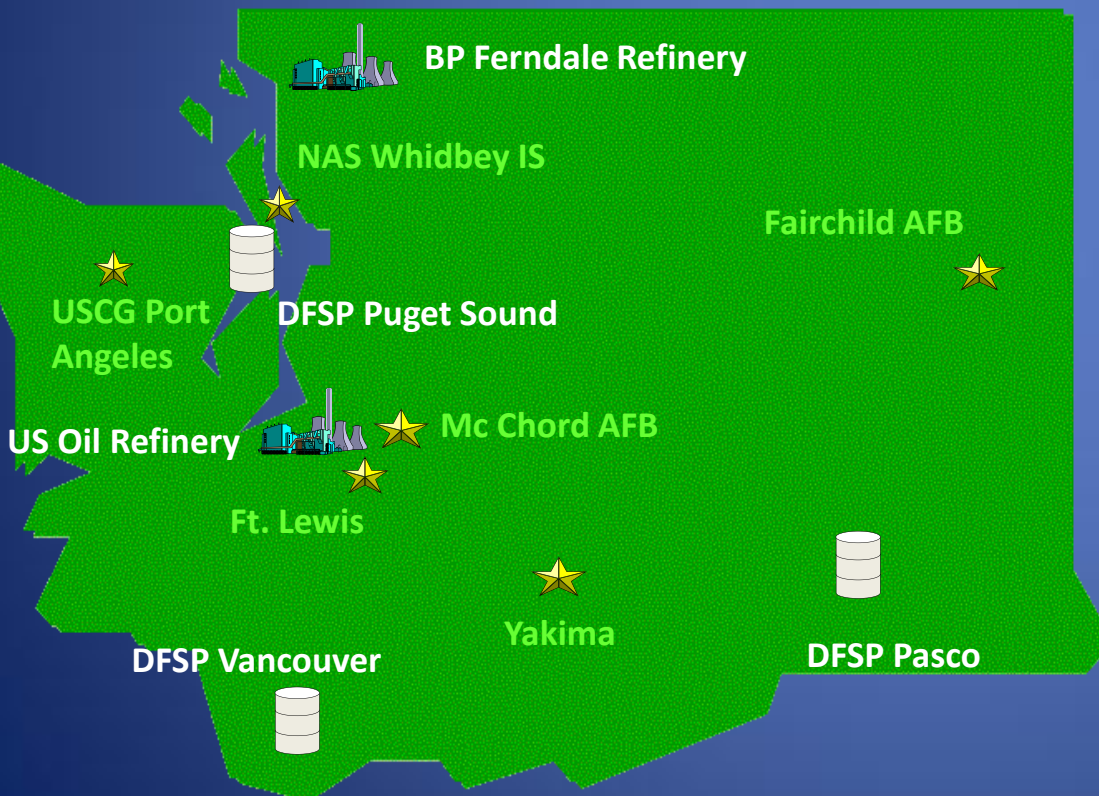




# Washington/Oregon Requirements

Location – JP5	Receipt Mode	Annual USG
DFSP Puget Sound	Tanker/Barge	5,150,000

Location – F76	Receipt Mode	Annual USG)
DFSP Puget Sound	Tanker/Barge	20,740,000



Location – JP8	Receipt Mode	Annual USG
DFSP Puget Sound	Tanker/Barge	63,150,000
McChord AFB(*)	Pipe/Truck	35,000,000
NAS Whidbey Island	Barge/Truck	25,000,000
Fort Lewis	Truck	2,000,000
Yakima	Truck	950,000
USCG Port Angeles	Truck	200,000
DFSP Vancouver	Tanker	30,810,000
Pasco/Fairchild AFB	Barge/Pipe	17,000,000
ANG Portland	Truck	6,000,000
Kingsley Field	Truck	7,000,000
Other Oregon Customers	Truck	810,000
<b>TOTAL</b>		<b>93,960,000</b>

(\*) Requirements currently included in AF Jet-A Initiative

# Alternative Fuel Supply Chain “Pillars”

- Must be a drop-in-replacement fuel
  - Use existing transportation and distribution infrastructure
  - No modifications to weapons platforms
- “Competitive” price
  - Requires Departmental/Service definition (i.e. what is the acceptable premium for “greenness” and/or energy security)
- Environmentally compliant with Section 526 of the Energy Independence and Security Act
- Complies with existing procurement statutes/regulations

Courtesy – Defense Logistics Agency

# Defense Leadership Critical

- Defense Logistics Agency key participant
  - DLA purchases fuels for all armed services
- DLA Contracting Process for aviation fuels delivered at Manchester, Washington
- Aviation fuels and marine diesel critical to “Great Green Fleet” proposal

# Defense Leadership Critical

- Section 526 compliance critical driver
- Long-term contracting authority
  - D-FENS bill
    - Inslee
    - Cantwell/Murray
  - Baucus/Tester
- Building supply chains will require coordinated efforts from Defense and Commercial Aviation



# Defense Leadership Critical

- President Obama announced major initiative yesterday to support commercial production of drop in fuels for aviation and marine uses
  - Agreement between Navy, USDOE and USDA
  - \$510 Million funding over 3 years
  - Highly consistent with SAFN recommendations
  - Great opportunity for Washington!

# Thank You!

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