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Office of Energy Policy and New Uses**

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# **USDA – Update on Biomass R&D Activities**

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**Director**  
**Office of Energy Policy and New Uses**

**Biomass Research & Development Board  
Technical Advisory Committee  
Crystal City, VA  
March 30, 2017**



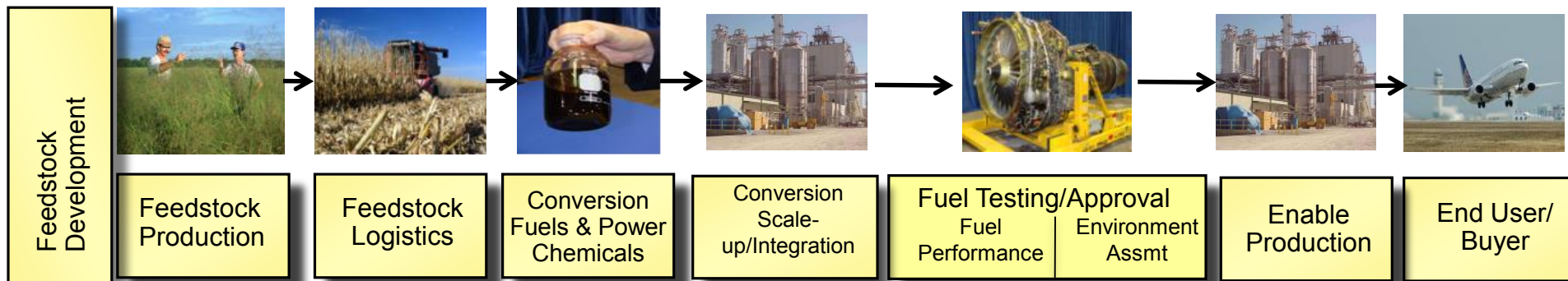
## **AGENDA**

- **USDA Research**
  - ARS, NIFA (CAPs), FS, BRCs
- **USDA Policies**
  - 9003, BCAP, BIP, BioPreferred®
- **USDA Partnerships**
  - Navy, DOE, EPA
  - DPA & Farm to Fleet
  - Bioeconomy (BR&DB initiative)
- **Farm Bill**



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# Supply Chain Approach for Biofuels, Biopower, and biobased products



Feedstock Development & Production  
Research and Education

Feedstock pathways – Integration - Scale Up  
Commercial Production

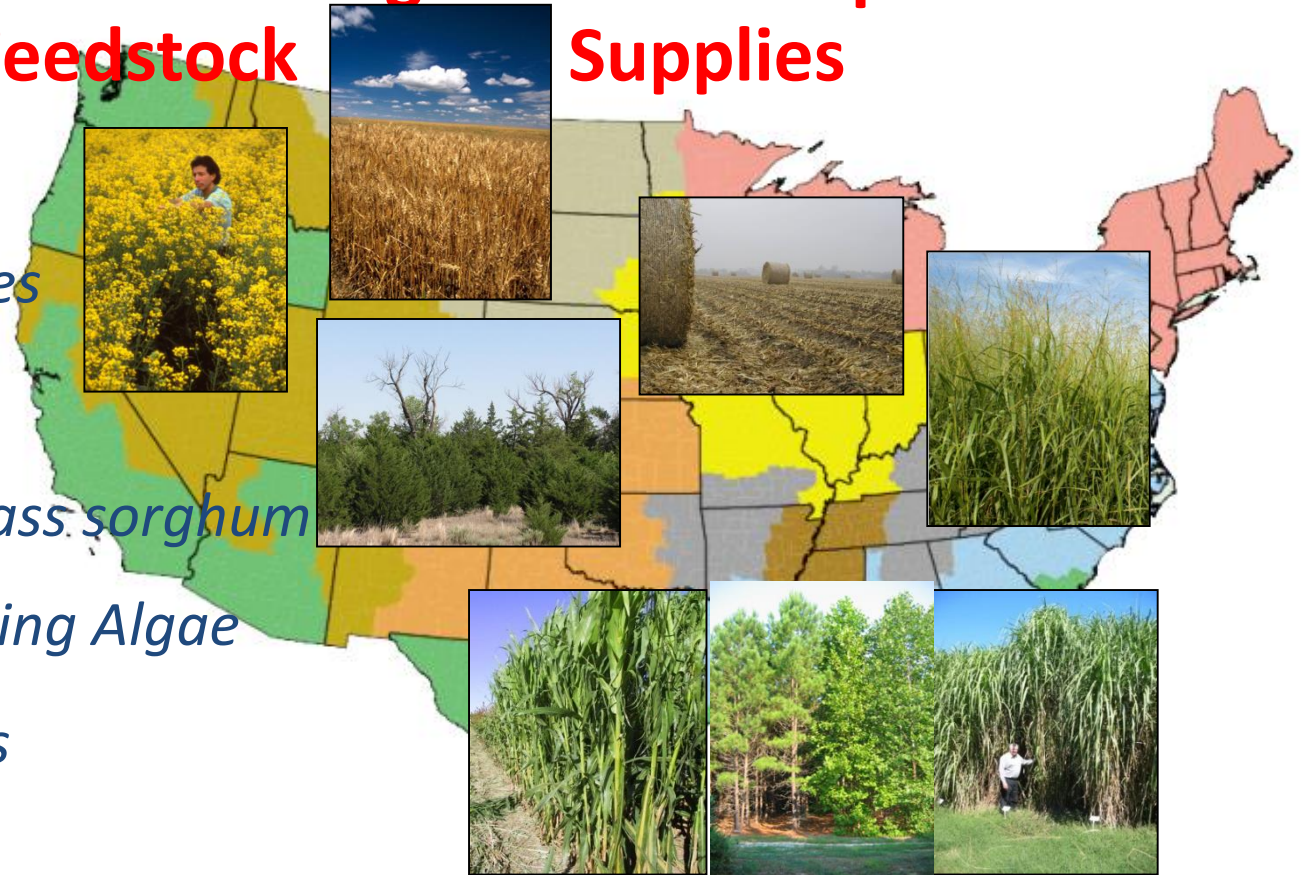
End –Use  
Alternative Fuels  
Heat & Power  
Biobased Products



# Biomass Research Centers

## Use Region-based Strategies to Develop Sustained Feedstock Supplies

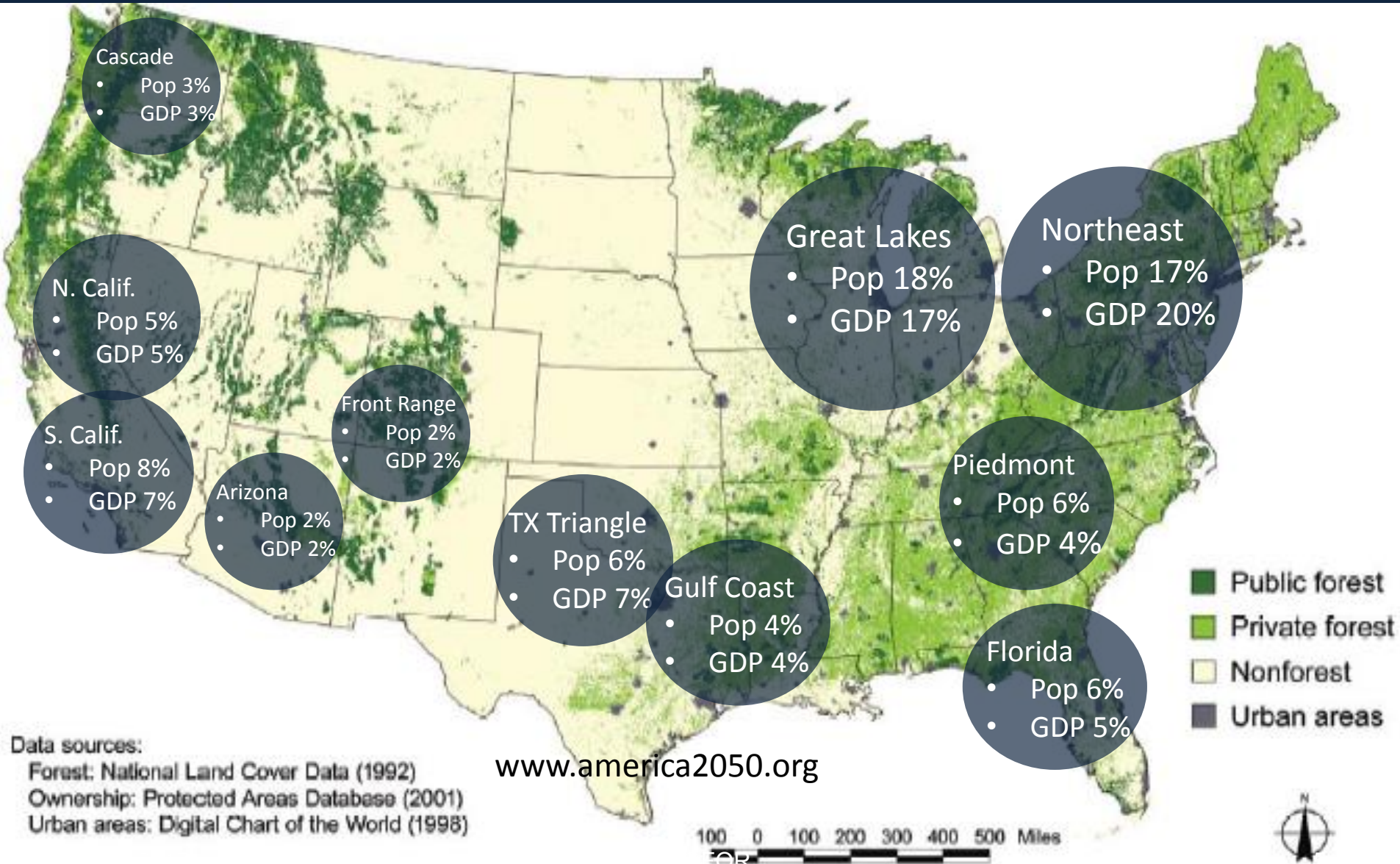
- *Crop residues*
- *Perennial grasses*
- *Energy cane*
- *Non-food biomass sorghum*
- *Oil Seeds including Algae*
- *Woody Biomass*



*No one feedstock will meet all national biofuel needs*



# Why Forest Bioeconomy Megacenters in 2050





FP R&D

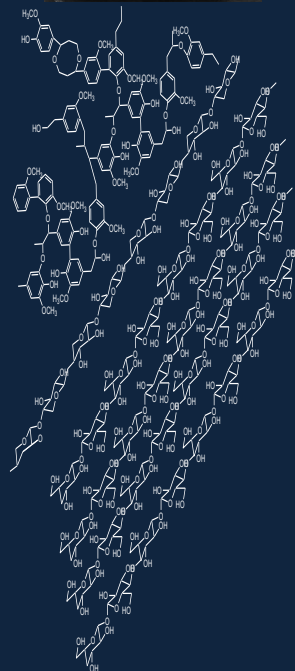


FP R&D

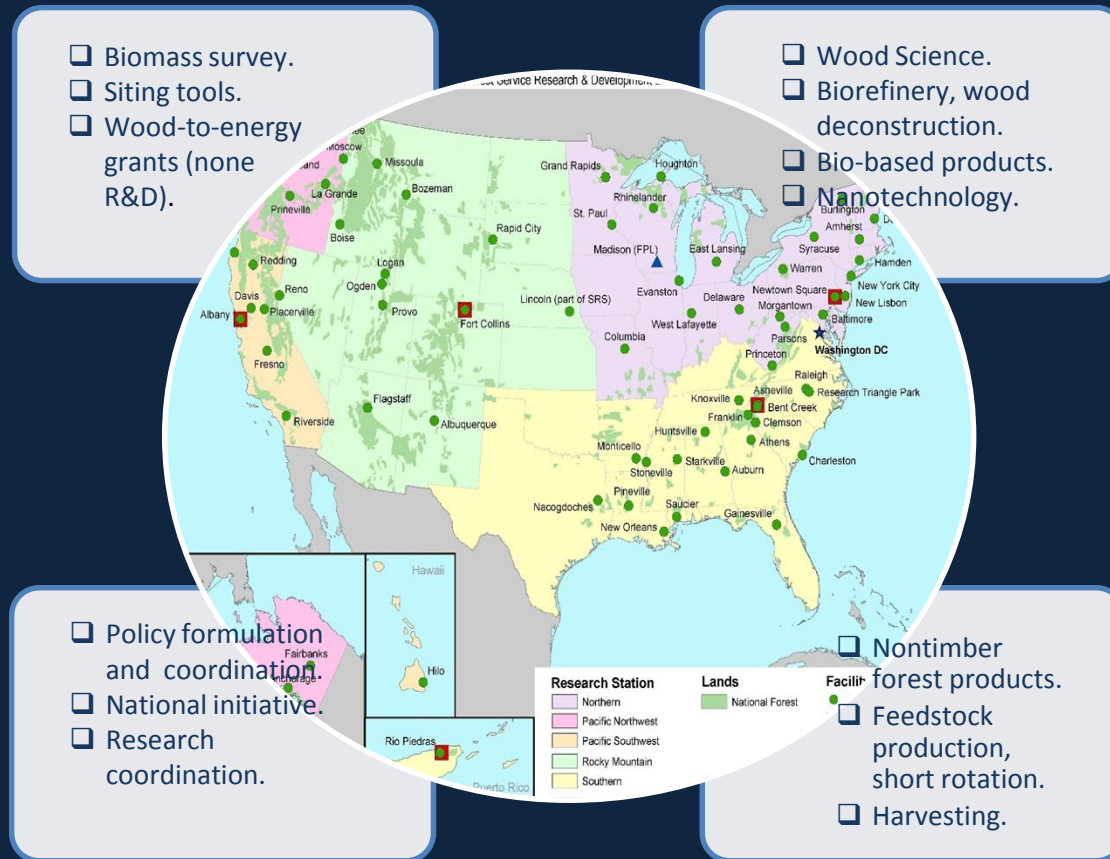
Mature Technology

FP R&D

Or High TRL



# Forest Service Bioeconomy Research







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# ARS

SE: Napiergrass hybrid 10-12 tons/ac



‘Liberty’ switchgrass

Central-East  
Western  
Northwestern

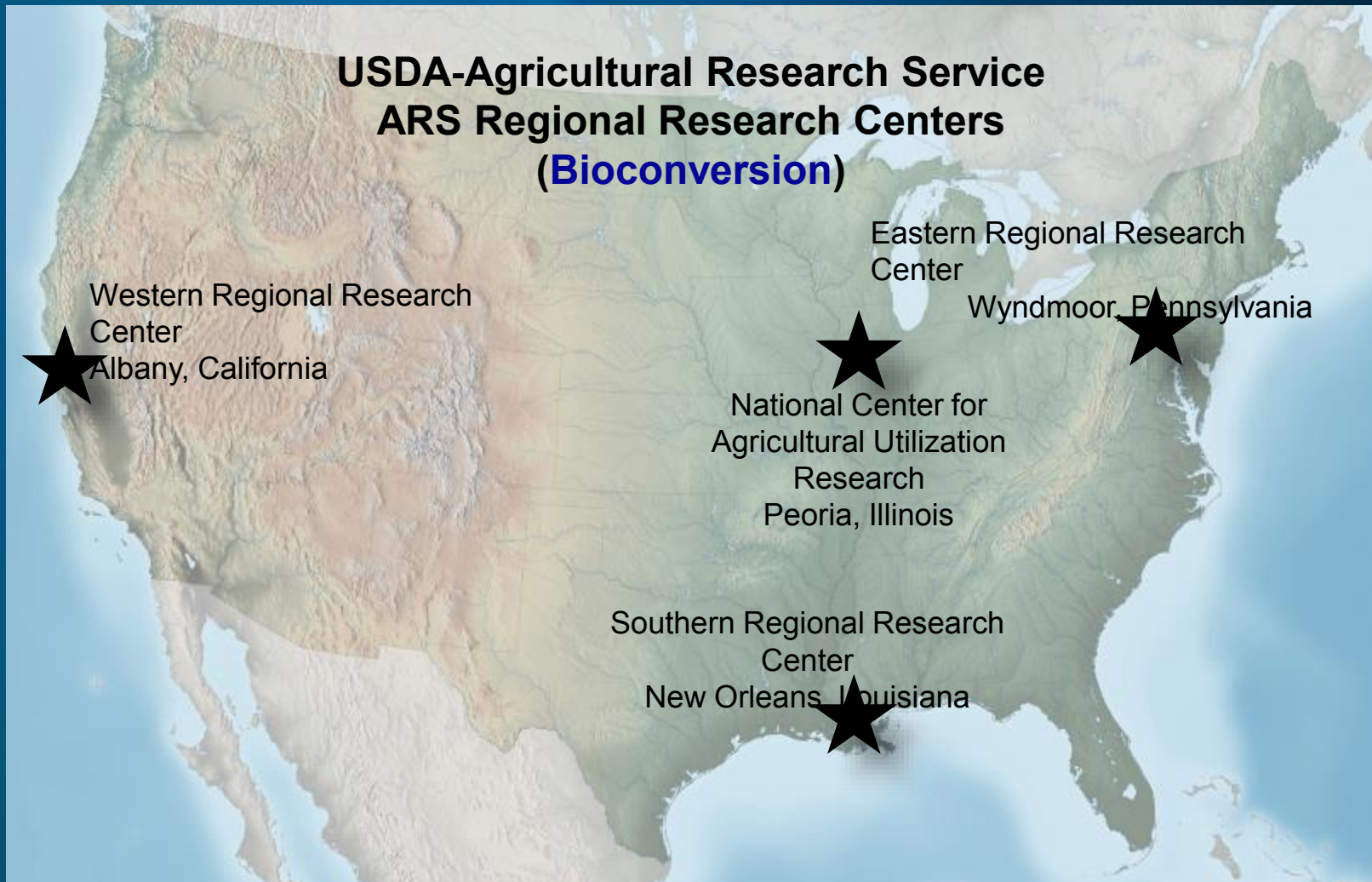
19.7 tons/ha (8  
tons/ac)  
Western Nebraska



# ARS



# Biomass Utilization Centers





**Switchgrass**



**Oily Yeast**



**Supply 20% U.S. Diesel**



# *Guayule natural latex rubber*



**Guayule**, native  
US desert plant



Patagonia environmentally friendly wetsuits







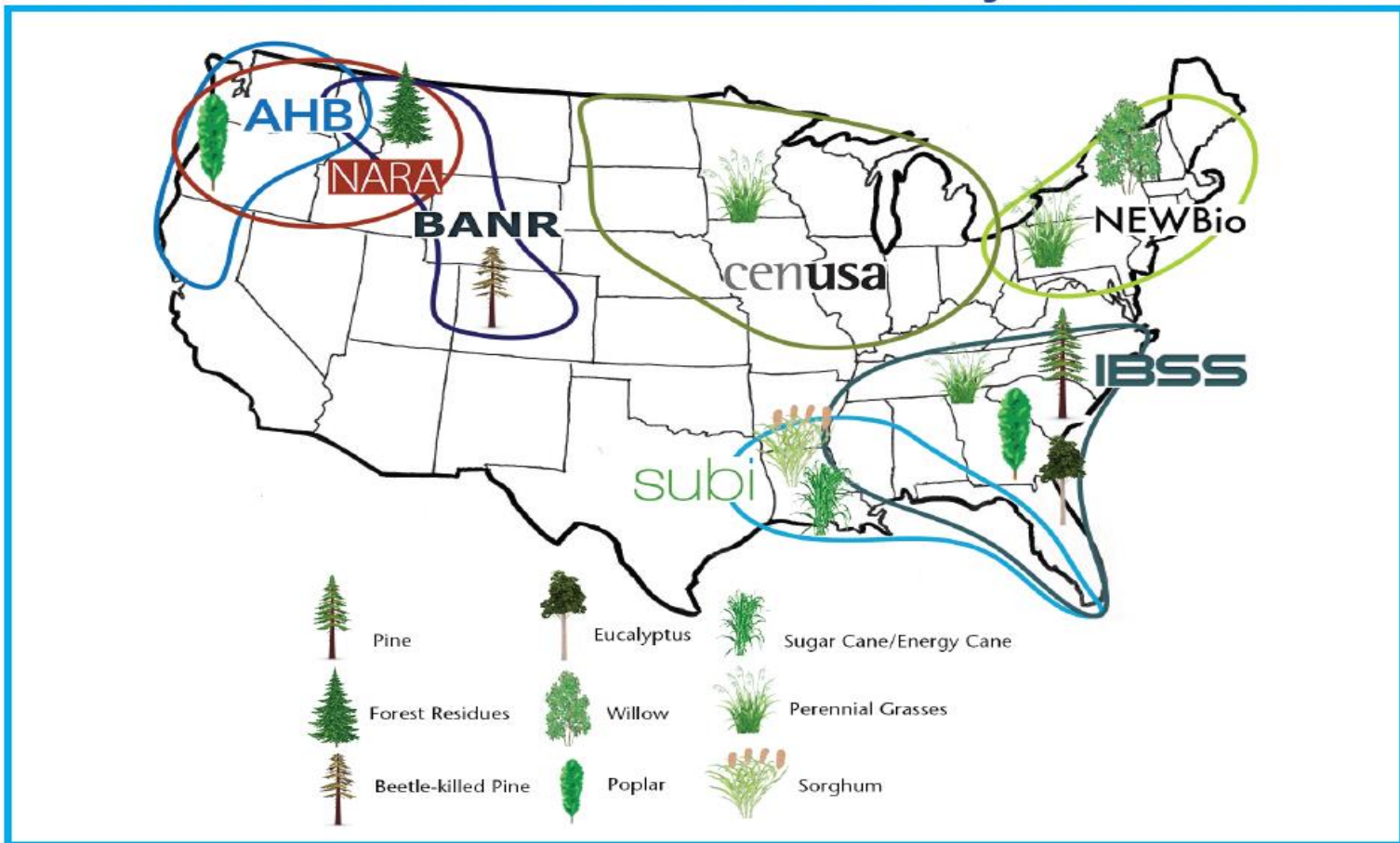
## **NIFA-AFRI Coordinated Agricultural Projects**

- **Regional Projects** facilitating the development of sustainable systems for the production of bioenergy and biobased products.
- **University-led Public Private Partnerships**
- **Transdisciplinary whole systems approach**
  - Focus on feedstock development, production, and delivery
  - Must partner with feedstock users & well-align with appropriate conversion technologies and industry for bioproduct production
  - Integrate Research, Development, Demonstration, Education, Outreach
- **Sustainability Performance Analysis**
  - Environmental
  - Economical (viable and competitive)
  - Social
- **Focus on understanding risk and developing a value proposition that will attract investment** <sup>12</sup>



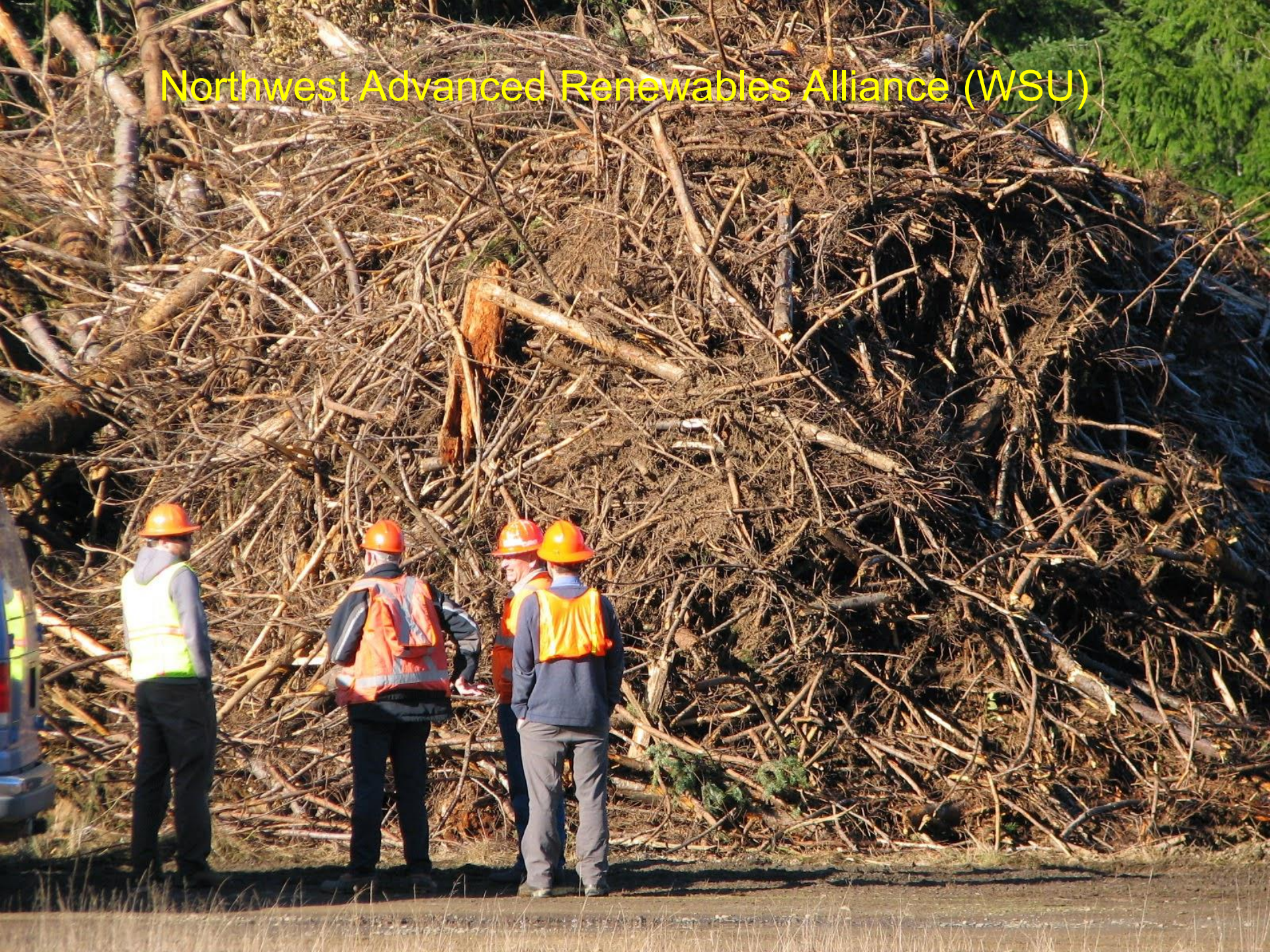
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## AFRI Biofuel Feedstocks and Project Locations





# Northwest Advanced Renewables Alliance (WSU)









# NARA: Feedstock to Fuels



FRP

## FOREST RESIDUES PREPARATION

Primary feedstock targets include forest residues from logging and thinning operations. We are also considering mill residues and discarded woody material from construction and demolition, in regions where these materials are under utilized.



T

## TRANSPORTATION

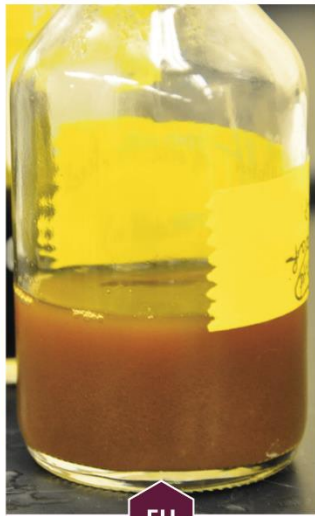
Feedstocks are transported from the collection site to a conversion facility. Chipping can take place at the loading or in a preprocessing facility.



PT

## PRE-TREATMENT

Wood chips are treated to make the sugar polymers (polysaccharides) accessible to degrading enzymes. These processes allow the lignin to be available for separation.



EH

## ENZYMATIC HYDROLYSIS

Specific enzymes are added to hydrolyze (cleave) the polysaccharides and generate simple sugars (monosaccharides).



F

## FERMENTATION

Specialized yeast convert the monosaccharides into isobutanol.



BCP

## BIOJET & CO-PRODUCTS

Aviation fuels can be generated from the platform molecules derived from wood sugars. Lignin can be used to generate co-products such as epoxies, structural materials and bio-based plastics. As an alternative, lignin can be burned to produce renewable energy.

1000 kg BONE DRY WOODY BIOMASS

+

DIESEL

+

HEAT, WATER, & CHEMICALS

=

~300 kg LIGNIN

AND

~260 LITERS ISOBTANOL

OR

~190 LITERS BIOJET



# Successful Alaska Airlines Demo Flight



# Energy Cane



Sustainable Production



Harvest



Deliver



Process

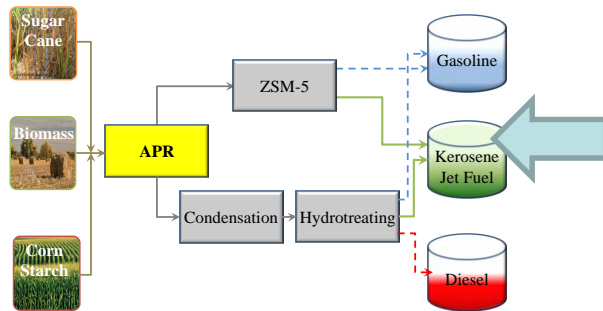


Storage

sugars, syrups, cellulose



Intermediate Product



Conversion to Fuel  
and Co-Products

*Value to Consumer*

lignin for power







# **Biorefinery, Renewable Chemical, and Biobased Product Manufacturing Assistance Program (9003)**

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## **Two types of projects by Statute:**

- Commercial-scale Biorefineries using Eligible Technology
- Biobased Product Manufacturing Facilities



## 9003 - Eligible projects are the development, construction, ...

### **9003 Biorefineries:**

or Retrofitting of Commercial-Scale Biorefineries using Eligible Technology.

- Must produce an advanced biofuel
- May produce biobased products and renewable chemicals

### **Biobased Product Manufacturing:**

and Retrofitting of Technologically New Commercial-Scale facilities that

- Convert Renewable Chemicals and other biobased outputs of Biorefineries (biobased products of biorefineries) into
- End-user products on a Commercial Scale
- Technologically New



## Key points:

- Loans of up to \$250 Million (no minimum)
- Loan amount cannot exceed 80% of eligible project cost (generally 50 – 60%)
- New technology is eligible
- Not limited to rural locations
- Competitive application process

## 9003 Program Status Update:

- *Letters of Intent – March 6, 2017*
- *Phase One Applications – April 3, 2017*

## Funds Available

- Approximately ***\$500 million***





# Biomass Crop Assistance Program (BCAP)

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## BCAP MATCHING PAYMENTS (\$20/dry ton):

- Payment made to eligible biomass material owners harvesting and delivering to a qualified facility
- 60 facilities are qualified. The listing is posted at [www.fsa.usda.gov/bcap](http://www.fsa.usda.gov/bcap)
- ***FY 2017, \$1.5 million are already contracted to support deliveries of 75,000 dry tons-wood biomass & corn stover, approximately \$0.5 to Iowa corn stover.***
- Since FY 2011 over \$10.5 million was allocated to support the delivery of 436,301 dry tons of ag and forest residues.



# Biofuels Infrastructure Partnership (BIP)

- BIP offers competitive grants from the U.S. Department of Agriculture (USDA) to state-led efforts to test and evaluate innovative and comprehensive approaches to marketing higher biofuel blends, such as E15 and E85.
- \$100 million has been awarded to 21 states, with a more than 1:1 match from private and state resources, USDA estimates that the BIP grants will support nearly 5,000 pumps at over 1,400 fueling stations across the country.
- ***BIP supported construction has been initiated in 19 of the 21 States and is scheduled for completion December 2017. Over 30 percent of the 1,400 stations have been completed.***
- ***Environmental Assessments have been conducted on nearly 60 percent of the targeted fueling stations.***
- Funding was provided under Section 5(e) of USDA's Commodity Credit Corporation (CCC) Charter Act.



# BioPreferred® Program

Mission: Identify and expand new markets for biobased products

## 1) Federal Purchasing Program

- By law, federal agencies and contractors are required to buy biobased products in categories designated by USDA
- 97 diverse categories including cleaning products, bioplastics, lubricants, and adhesives representing about 15,000 products in BioPreferred catalog that qualify for federal purchasing preference



## 2) Certification Program – USDA Biobased Product Label

- Manufacturers may apply for certification and ability to display the USDA Certified Biobased Label on product
- Independent third party certification partnership with ASTM International to verify biobased content of product
- FP on label indicates product qualifies for federal purchasing preference
- Currently about 2,800 certified products.





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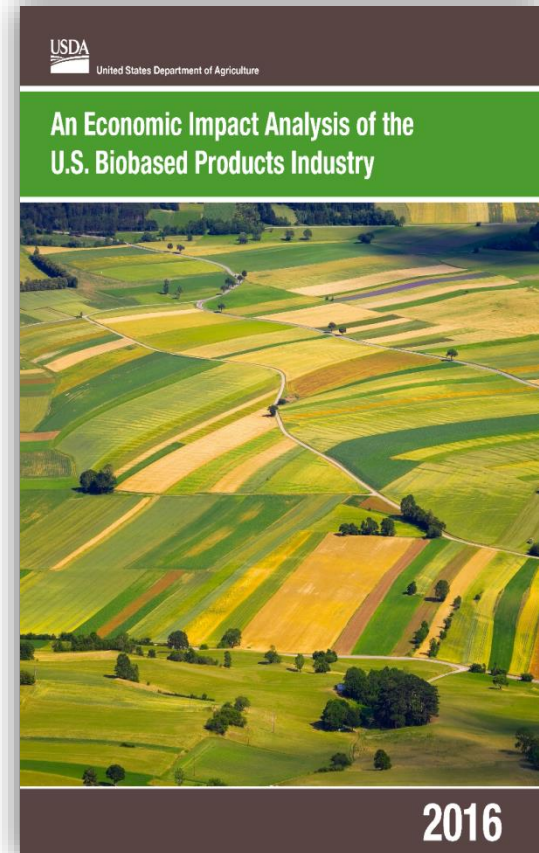
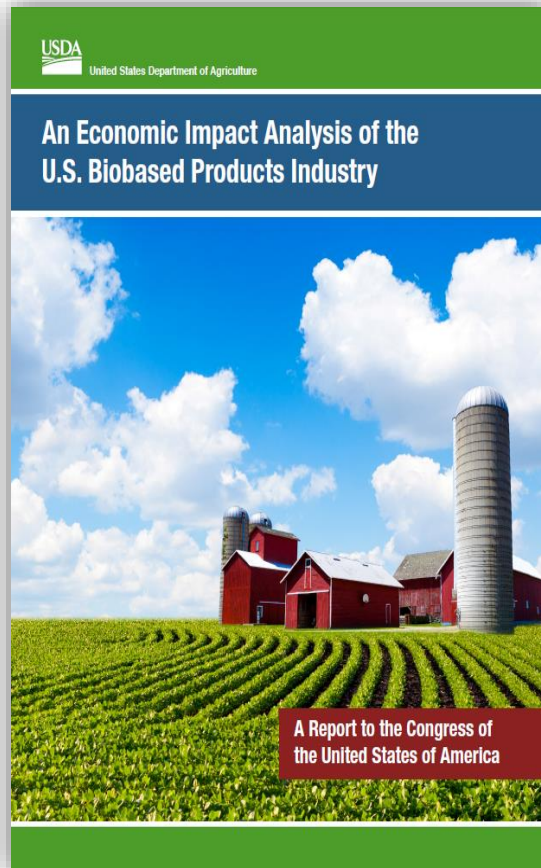
## Designating Intermediate Categories for Federal Purchase

- *Round 11 – Proposed Rule was published on Jan. 13, 2017.*
- USDA accepting public comments through April 13, 2017.
- Designates approximately **12 categories of intermediates** for mandatory federal purchasing
  - Many of these products are already included in the BioPreferred Program under the voluntary certification initiative.
  - The intermediate ingredients and feedstock materials proposed for designation are the primary ingredients in hundreds of finished, consumer products that are purchased by federal government agencies as well as the general public. Designation of those finished products will be accomplished in a future rulemaking (Round 13) and will significantly expand the number of products that are subject to the procurement preference.



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# Economic Impact Study Released in October 2016 – State by State Analysis







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# USDA Partnerships

## *With Navy and DOE*

- *Defense Production Act*

## *With Navy*

- *Farm-to-Fleet Program*

## *With EPA*

- *Feedstock review, risk assessments*



## Defense Production Act (DPA) Title III Advanced Drop-In Biofuels Production Project (ADBPP) Biofuels 2

- FOA announced January 19, 2017 BY DPA Title III Office
- Objective: to further increase domestic advanced biofuels production capacity by establishing additional Integrated Biofuel Production Enterprise (IBPE) capabilities
- \$55 million in funding available (likely 1 facility)
  - This does not include any CCC funds
  - The Commodity Credit Corporation (CCC) Charter Act (15 U.S.C 714 et seq)
    - ***CCC funding would be used to support and develop new and expand existing markets for agr commodities***
- Solicitation closes May 25, 2017

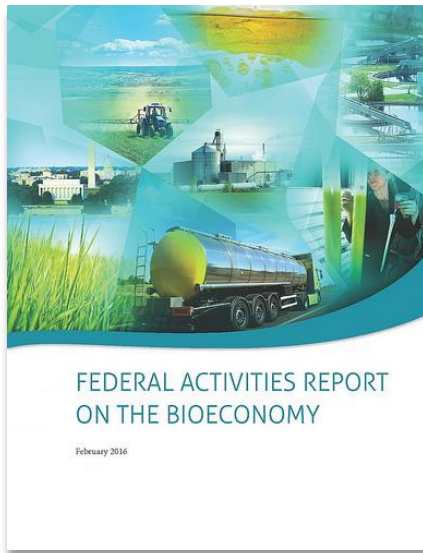




## Farm-to-Fleet

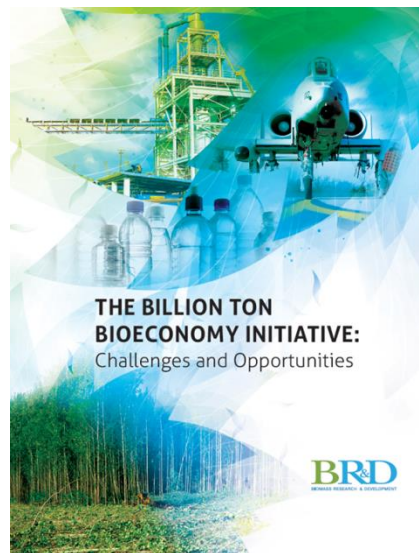
- There have been six fuel procurement solicitations to date; Inland/East/Gulf Coast and the Rocky Mountain/West Coast/Offshore (3 of each)
- Rocky Mountain/West Coast/Offshore solicitation, posted January 6, 2017 and closes February 21, 2017
- The Commodity Credit Corporation (CCC) Charter Act (15 U.S.C 714 et seq)
  - ***CCC funding would be used to support and develop new and expand existing markets for agr commodities***
- To date, one award made under farm to Fleet Program
  - To Alt Air for 77.7 million gal military spec bio-marine diesel
  - CCC Biofuels Production Incentive - \$0.1586 per gallon biofuel
  - Actual payment to date - \$7.963 million (Feb. 5, 2017)

# A Path Forward for the Bioeconomy Initiative



## FARB

- Released in February 2016



## Challenges & Opportunities

- Released at Q4 TAC Meeting on November 17, 2016

## THE BILLION TON BIOECONOMY INITIATIVE: ACTION PLAN



## Action Plan

- Target release FY17 in first 100 days of next administration



# A BILLION DRY TONS OF SUSTAINABLE BIOMASS

HAS THE POTENTIAL TO PRODUCE

**1.1 MILLION  
Direct Jobs**

and keeps about  
**\$260 BILLION**  
in the U.S.  
(direct contribution  
and inflation adjusted)



**75 BILLION\***  
kWh of electricity  
to power

**7 MILLION**  
households. Plus  
**990 TRILLION BTUs**  
of thermal energy.



**50 BILLION**

gallons of biofuels  
displacing almost

**25%**

of all transportation  
fuels.



**50 BILLION  
POUNDS**

of biobased  
chemicals and bio-  
products, replacing  
a significant portion  
of the chemical  
market.



**450  
MILLION  
TONS**

of CO<sub>2</sub>e  
reductions  
every year.



## STEPS TO BUILDING THE BIOECONOMY

- 1 Accelerate research & technology development
- 2 Develop production, conversion and distribution infrastructure
- 3 Deploy technology
- 4 Create markets and delivery systems

### Projections based on:

Rogers, J. N., Stokes, B., Dunn, J., Cai, H., Wu, M., Haq, Z. and Baumes, H. (2016).  
An assessment of the potential products and economic and environmental impacts resulting from a billion ton bioeconomy. *Biofuels, Bioprod. Bioref.* doi:10.1002/bbb.1728

\* Includes 27 billion kWh and 90 TBtu from livestock anaerobic digestion



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**THANK YOU**





Western Region

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guayule

**Cooper CS4 tire made completely out of rubber from guayule, a desert shrub that can be grown in the U.S.**

**Bridgestone makes its first tires with guayule rubber.**





# The Bioeconomy

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- In February, the Biomass R&D Board released the [Federal Activities Report on the Bioeconomy](#) (FARB).
- The report aims to educate the public on the wide-ranging, federally funded activities that are helping to bolster the bioeconomy.
- **The vision** for the Billion Ton Bioeconomy is to sustainably reach the full potential of biomass-derived products as a way of expanding our nation's economy. In doing so, the bioeconomy will provide multiple economic, environmental, and social benefits to the Nation.
- **The goal** of the Billion Ton Bioeconomy is to develop and provide innovative ways to remove barriers to expanding the sustainable use of Nation's abundant biomass resources for biofuels, bioproducts, and biopower, while maximizing economic, social, and environmental outcomes.

