OBP Overview

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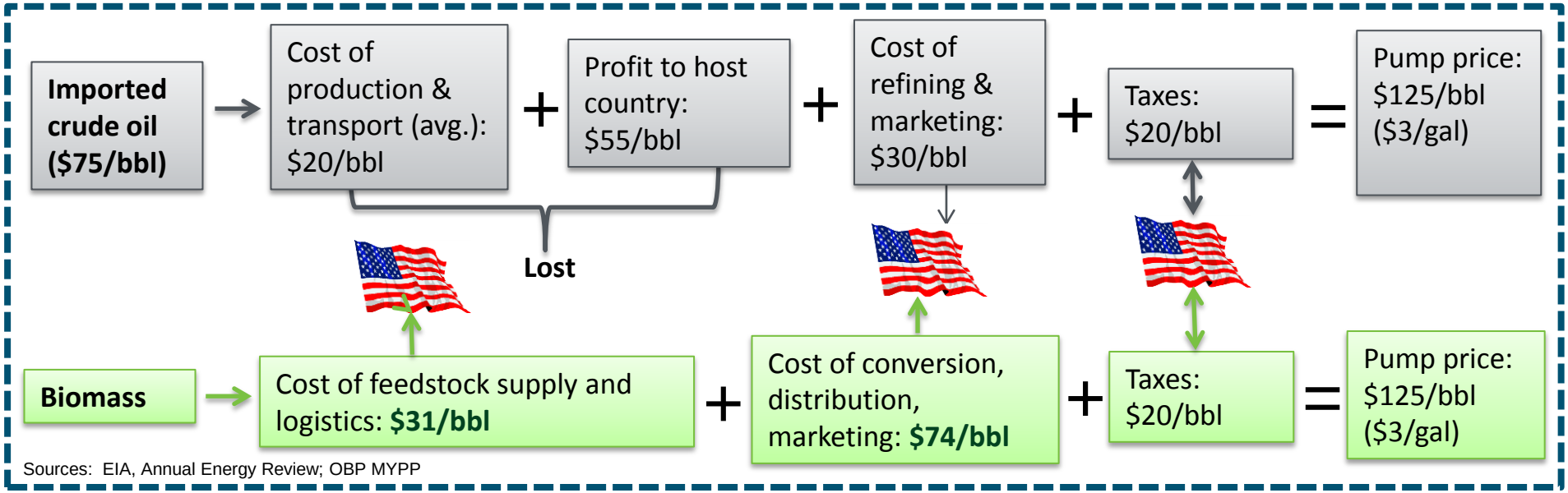
Creating a National Biomass Economy

- Jobs Creation and Balance of Trade - displacing oil imports offers massive opportunity for domestic jobs creation, with virtually no consequent job destruction
- Climate Change Mitigation - sustainable biomass production can provide >50% GHG reduction vs. petroleum-based fuels on a complete life-cycle basis
- Energy Security - domestic production decreases vulnerability to short-term economic disruption due to war, civil unrest, OPEC action, speculation, etc.



Sources: EIA, Annual Energy Review; OBP MYPP

Price differential between *imported* crude oil and *domestic* biomass:
$75/barrel x 4.3 billion barrels/year = $323 billion/year

Program Overview

Mission: Through targeted RDD&D, enable sustainable, nationwide production of advanced biofuels that are compatible with today's transportation infrastructure and can displace a share of petroleum-derived fuels to reduce U.S. dependence on oil.

Goal: Reduce the cost of biofuels to be able to compete with petroleum-based fuels in the market.

Key Cost targets:

- By 2017, achieved a modeled cost of $3/gallon for the pyrolysis pathway to drop-in renewable gasoline, diesel, and jet fuel
- Develop additional pathways to enable utilization of a larger variety of biomass resources and conversion technologies that will also aim to achieve the $3/GGE.

Commercialization strategy:

- After validating a cost target for a given pathway, the program will assist partners in scaling up technologies appropriately to ensure smooth transition from the bench to commercial facility, helping to reduce barriers along the way.
- Deployment efforts will continue to focus on innovative technologies for new viable pathways that are down-selected to those with the best chance of success, while continuing to leverage lessons learned from the program's existing portfolio of pilot, demonstration, and commercial scale biorefineries.
- Funding R&D designed to overcome these barriers will reduce the technology and financial risks and facilitate a greater sense of confidence and stability that will allow private capital to flow

Integrated Biorefinery Projects

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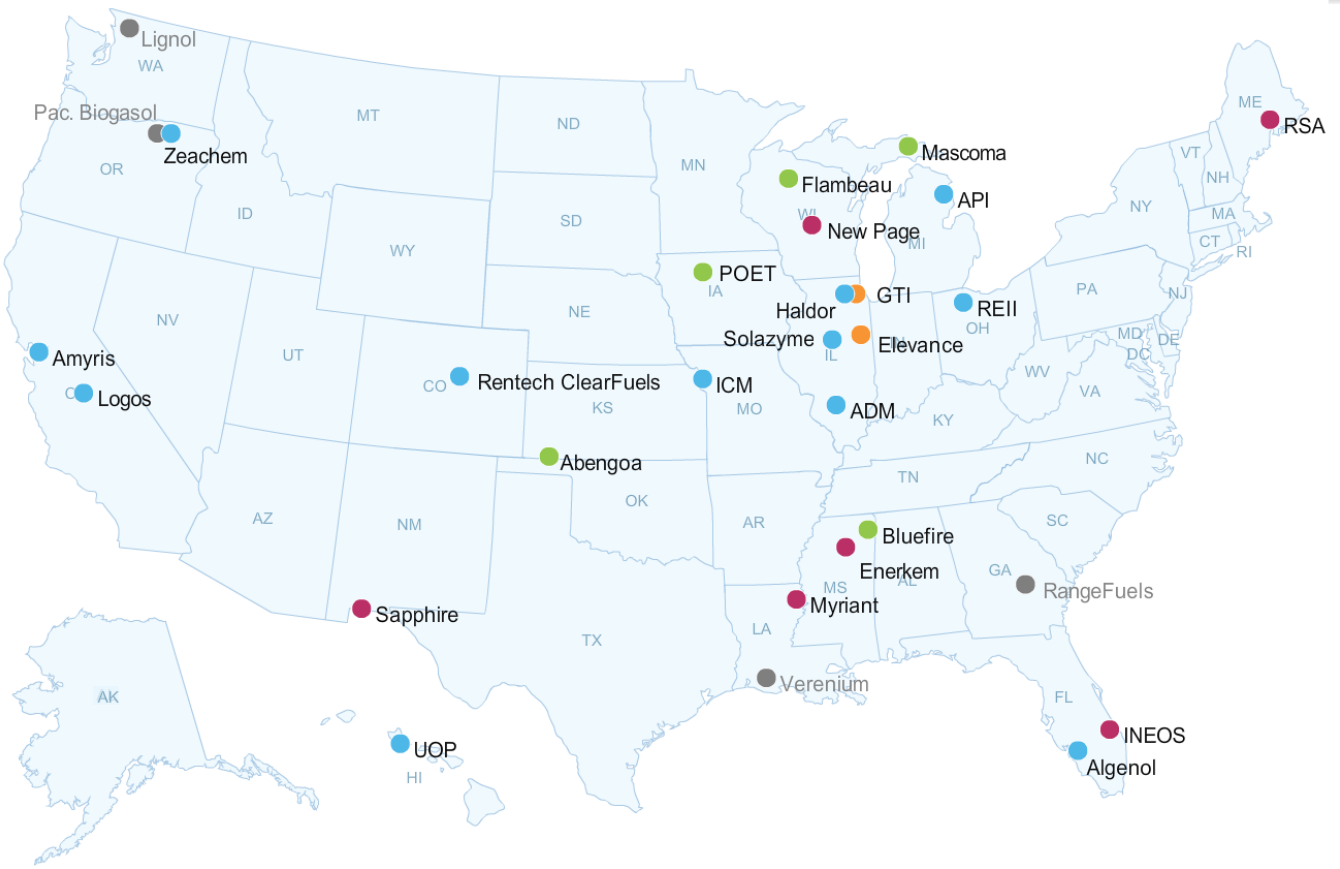
- 11 IBRs will produce hydrocarbons from biomass
- 12 IBRs will produce cellulosic ethanol from biomass

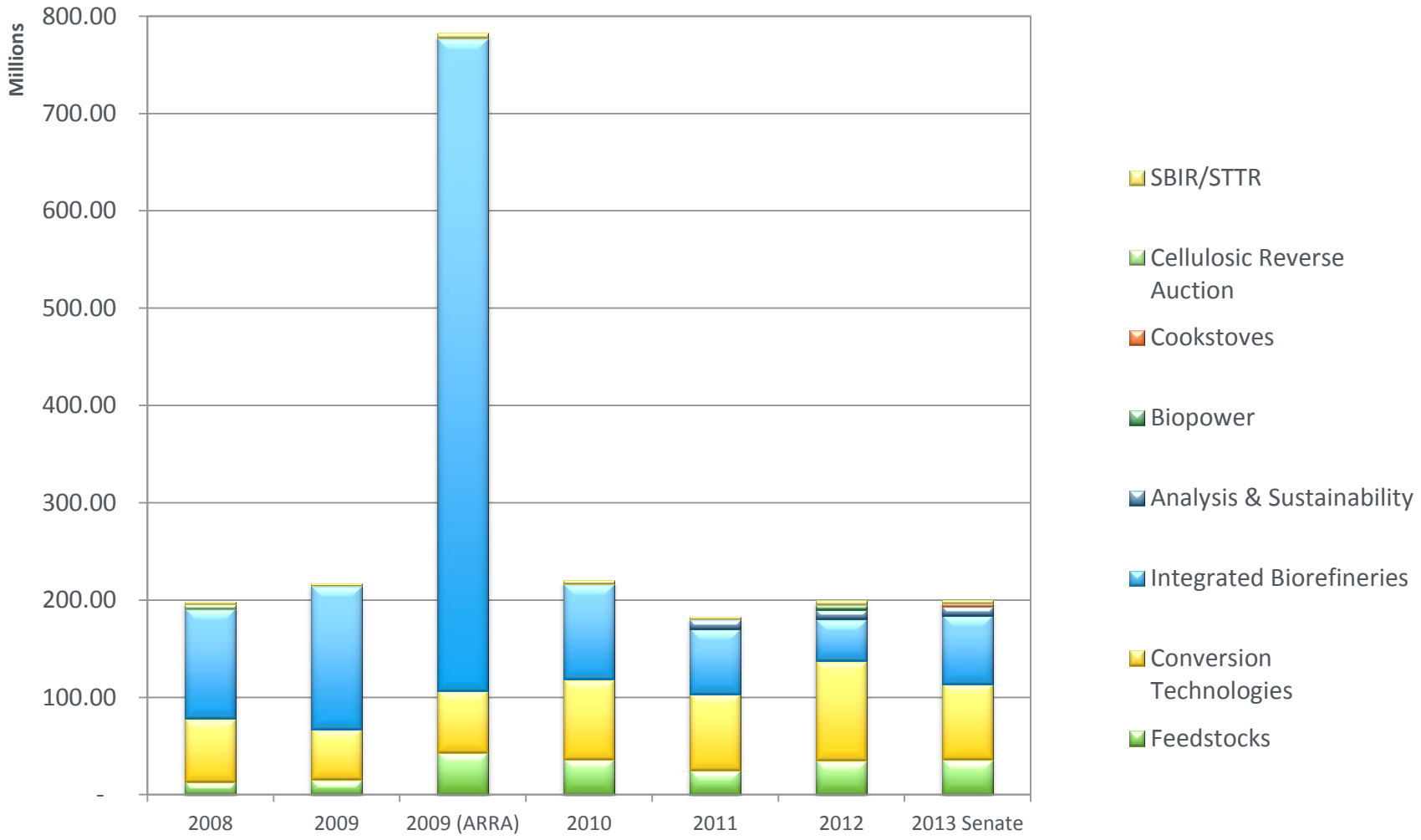


Project Scale Key

- Research and Development
- Pilot
- Demonstration
- Commercial
- Complete/Inactive

For more information visit:
http://www.eere.energy.gov/biomass/integrated_biorefineries.html

Program Budget



Sustainable Feedstock Supply

Feedstock supply efforts focus on RD&D to develop and optimize cost-effective, integrated systems for harvesting, collecting, storing, preprocessing, handling, and transporting.

FEEDSTOCKS

Sustainable feedstocks include:

- Agricultural residues
- Forest resources
- Dedicated energy crops
- Algae

ADVANCED PREPROCESSING

UNIFORM FORMAT TARGETS

A new uniform format advanced supply system design will improve the capacity and efficiency of each feedstock logistics unit operation.

The *U.S Billion-Ton Update* provides an assessment of potential biomass resource availability across the nation through 2030.

Biomass Feedstocks Overview: Accomplishments

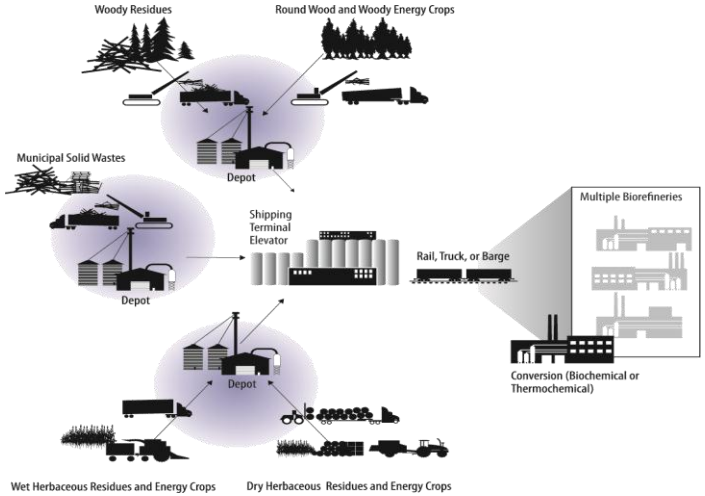
- **Biomass Assessment**
  - Billion ton update
  - Bioenergy KDF
- **Biomass Production**
  - Sun Grant Regional Partnership
  - Science conference
  - Sustainability projects
  - Algal developments
- **Biomass Logistics**
  - High tonnage/commercial systems development
  - Uniform format supply system
  - Process Demonstration Unit
  - Integration with sustainability/supply chain
  - Feedstock properties database
  - Analysis and sustainability
  - Meeting cost targets

PDU Workshop

Feedstock Process Demonstration Unit

Biomass Feedstocks Overview: Future Directions

- **Assessment, analysis and sustainability**
  - Refine and improve Billion-Ton Update analysis
  - Improve economic/environmental data (at various scales)
  - Develop business cases, production, and cost models
  - Work toward meeting MYPP cost/volume targets
- **Production**
  - Continue Regional Partnership plot monitoring
  - Synthesize crop performance across geography and climate
  - Develop best management practices
  - Ensure sustainability
- **Logistics**
  - Focus on cost/volume targets
  - Implement uniform-format supply system
  - Enhance knowledge, data, and models
  - Integrate logistics with production and conversion – material flow value
- **Cooperation**
  - Work with other agencies, universities and industry
  - Focus on PDU deployment



Feedstock Logistics Industrial Scale FOA

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Project Lead	Feedstock(s)	IBR Partner	Technical Focus	Total Project Cost
FDC Enterprises	Herbaceous Energy, Ag Residues	Abengoa	Whole system business model: multi-feedstock single pass harvester, high efficiency bale handling	$10.42 M
AGCO	Ag Residues, Herbaceous Energy	Poet, Abengoa	Single pass harvester development	$11.29 M
SUNY-ESF	Short Rotation Woody (willow, poplar)	Zeachem, ABS	High throughput harvesting equipment development	$2.67 M
Auburn Univ.	Loblolly Pine	Coskata, Genera, Rentech	Increase harvester efficiency, harvest and collection process improvement	$10.0 M
Genera	Switchgrass	DDCE	Bulk biomass format handling system	$9.96 M


Kelderman Self Loading Trailer


Freeman 1592D High Density Self Propelled Baler

Useful Websites

- DOE Biomass Program
  - http://www1.eere.energy.gov/biomass/
- Billion-ton Report and Knowledge Discovery Framework
  - https://www.bioenergykdf.net/
- High Volume Systems and Uniform-Format Supply System
  - http://www1.eere.energy.gov/biomass/pdfs/feedstocks_four_pager.pdf
- Multi-Year Program Plan
  - http://www1.eere.energy.gov/biomass/pdfs/mypp_april_2012.pdf
- MOU Defense Production Act Jet Fuel
  - http://www.rurdev.usda.gov/SupportDocuments/DPASignedMOUEnergyNavyUSDA.pdf
- Feedstock Process Demonstration Unit
  - https://inlportal.inl.gov/portal/server.pt/community/newsroom/257/feature_story_details/1269?featurestory=DA_582285
- Sun Grant Feedstock Regional Partnership
  - http://www.sungrant.org/Feedstock+Partnerships/
- Biomass Board
  - http://www.usbiomassboard.gov/

WBUG - http://www.forestsandrangelands.gov/Woody_Biomass/