



Developing Biomass Infrastructure

National Biorefinery Siting Model

Biomass 2009
National Harbor, MD
March 17, 2009

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Program Director | Western Governors' Association



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- Mission



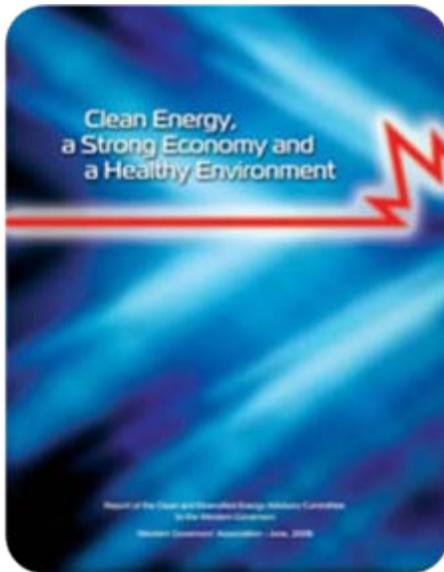
- WGA addresses important policy and governance issues in the West, advances the role of the Western states in the federal system, and strengthens the social and economic fabric of the region.
- WGA develops policy and carries out programs in the areas of natural resources, the environment, human services, economic development, international relations and state governance.
- WGA acts as a center of innovation and promotes shared development of solutions to regional issues



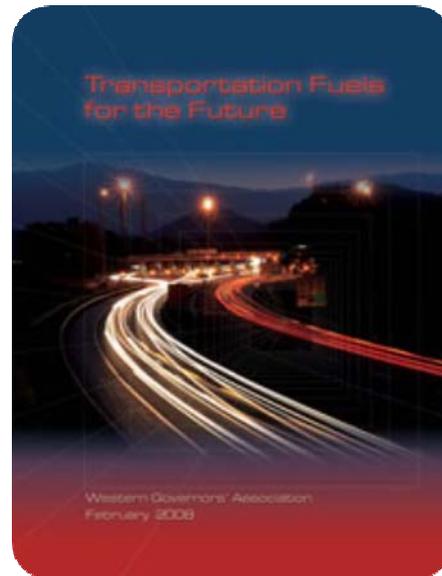
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- Relevant Initiatives

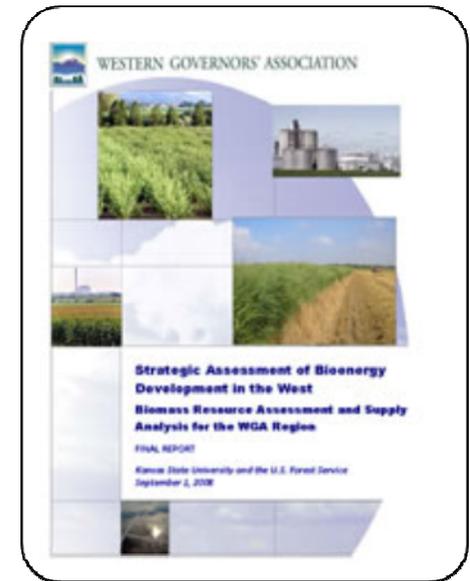
“An enormous national commitment is necessary to transform our energy infrastructure and our economy as we shift to low-carbon-emission energy sources” – WGA letter to President Obama



**Clean and Diversified
Energy Initiative
(2004)**



**Transportation Fuels
for the Future
(2006)**



**Western Strategic
Bioenergy Assessment
(2008)**

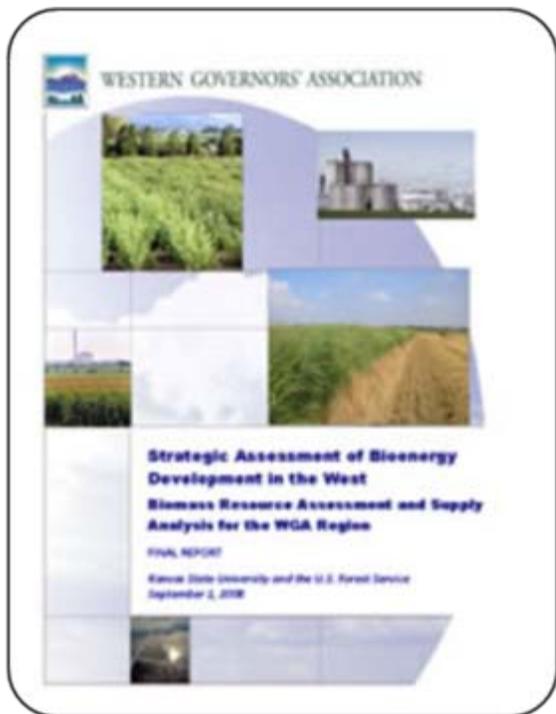


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- Western Strategic Bioenergy Assessment

Goal: To develop a biomass supply chain optimization model for the Western United States

- Provide a projection for the role that biofuels could play in the West by 2015
- Inform policies and steps that can be taken to encourage the development and deployment of biofuels.



Project contributors: University of California- Davis, Antares Group, Kansas State University, NREL, U.S. Forest Service

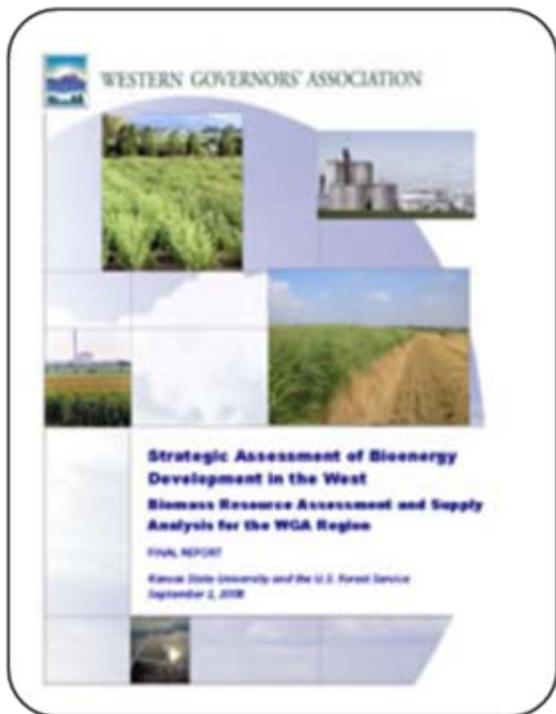


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- Western Strategic Bioenergy Assessment

Project Components

- Biomass Resources in the Western United States
- Biofuel Conversion Technologies
- Spatial Analysis and Supply Curve Development
- Analyses of Deployment Scenarios and Policy Interactions





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Resource Assessment and Conversion Technology Models

Bioenergy Resources

Agricultural crop residues (corn stover, wheat straw)

Tallow and yellow grease

Orchard and vineyard trimmings

Forest thinnings

Energy crops (switchgrass, mixed grass prairie, big bluestem)

Corn and select oilseeds (soy and canola)

Municipal Solid Waste

Current Conversion Technologies

Grain to Ethanol – Wet and Dry Mill

Fatty Acid to Methyl Ester

Technologies Projected by 2015

Lignocellulosics to Ethanol
(Hydrolysis/Fermentation)

Lignocellulosics to Gasoline
(Upgrading/Pyrolysis)

Lignocellulosics to Middle Distillates
(Fischer Tropsch)

Gasoline Substitutes

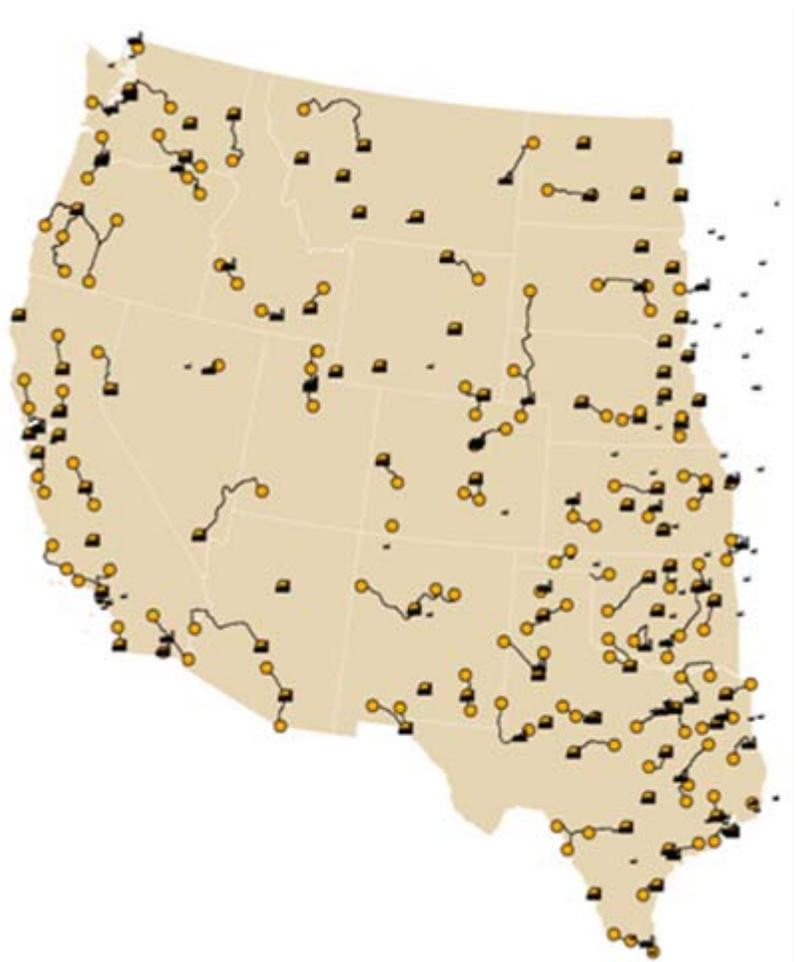
Diesel Substitutes



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Spatial Analysis – Infrastructure Modeling



- Feedstock and fuel were modeled using barge, rail, and truck
 - Local fuel delivery is not included
- Existing facilities considered

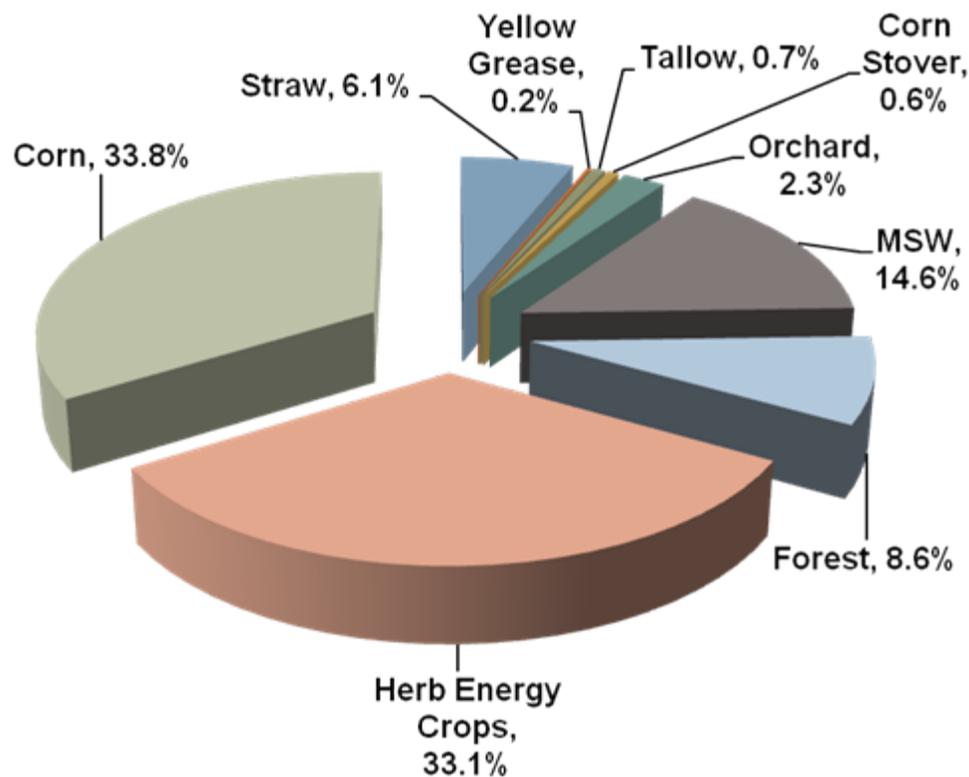


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Potential Growth Projections (2015)

- 11 billion gallons of biodiesel and biofuels per year (a four fold increase from 2006)
- \$18 billion into the western rural economy for fuels
- About \$23 billion investment in technology and infrastructure in the West

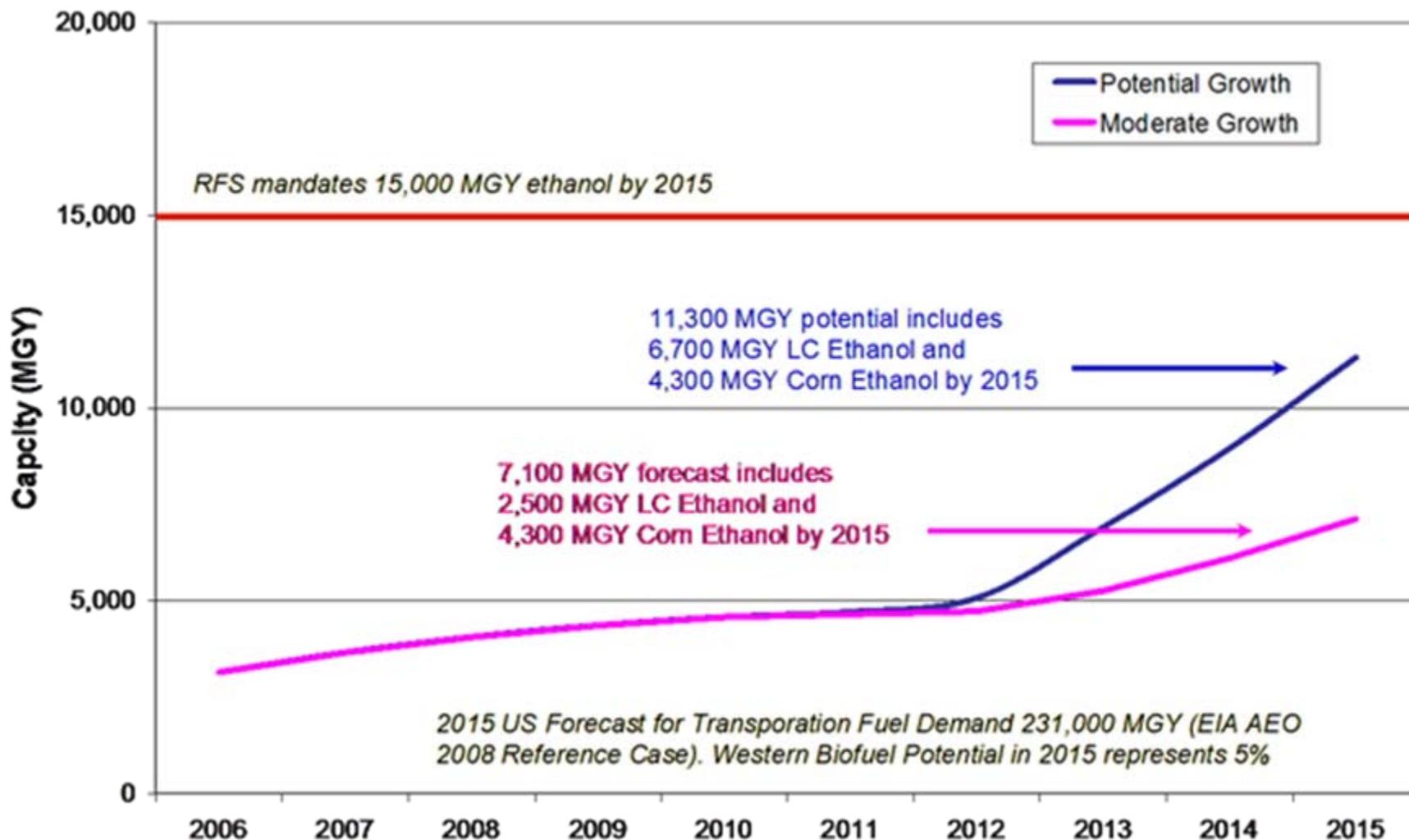


Feedstock Distribution in Potential Growth Case



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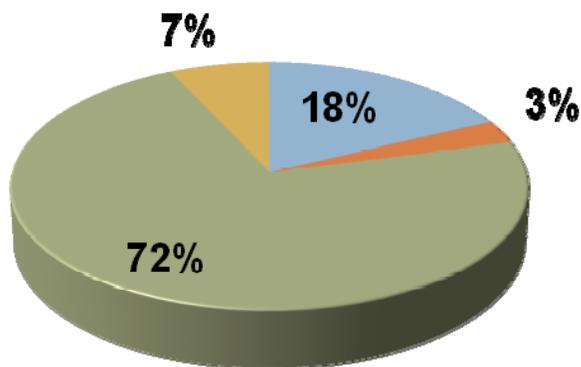


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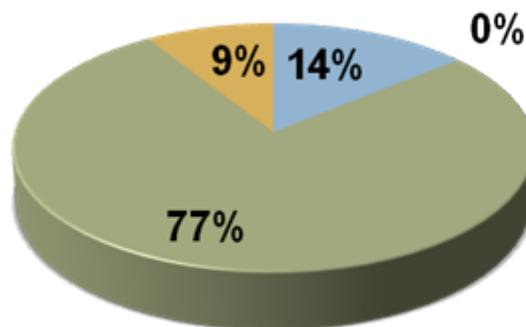
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Average Cost for Biofuels Produced

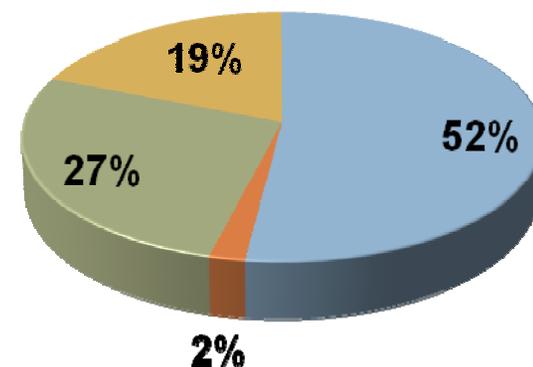
Corn Ethanol



Diesel Replacements



Cellulosic Ethanol



 Conversion

 Distribution

 Procurement

 Transport



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Spatial Analysis – Siting Trends



- Majority of refineries are near large municipal sources of waste or in agricultural areas
- Most active areas are Pacific Coast and Great Plains
- Over 125 existing corn ethanol facilities in the West



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Improved and (Kind of) New



- Will cover the entire U.S. and include improved feedstock data
- Provide a more detailed look at environmental impacts and sustainability considerations
- Model a broader array of potential national policies and infrastructure scenarios
- Economic assumptions will be updated
- Inputs will be modularized to allow for easier updates
- Results will be available in manner that is accessible and user-friendly



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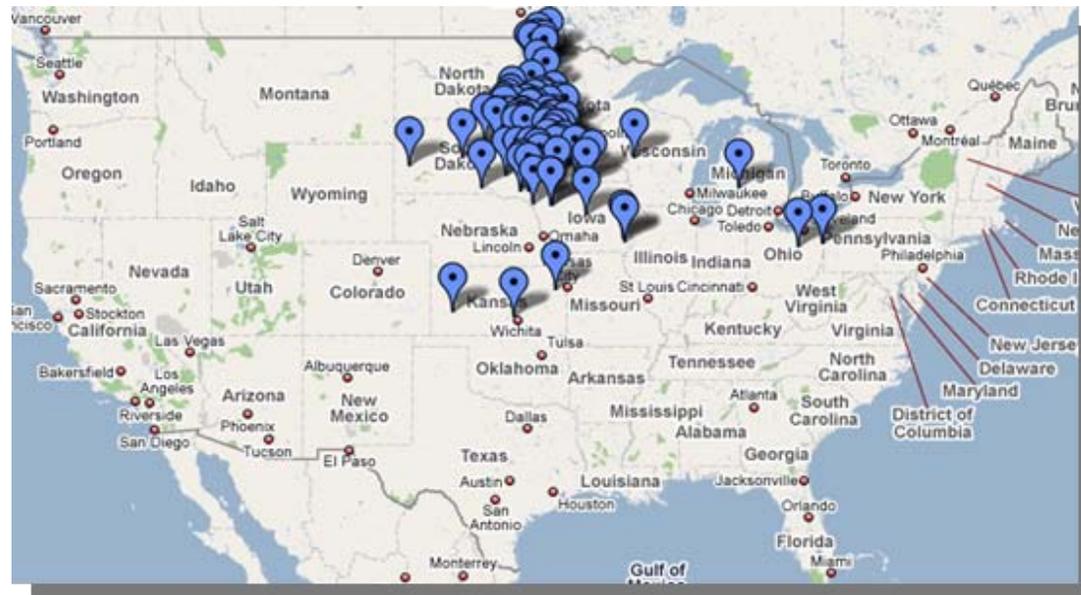
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Potential Infrastructure Scenarios

- Localized Distribution (e.g. blending pumps)
- Use of dedicated or existing pipelines

Other Potential Scenarios

- GHG reduction policies
- Technology progression
- Commodity price fluctuations
- Competition among feedstock end uses





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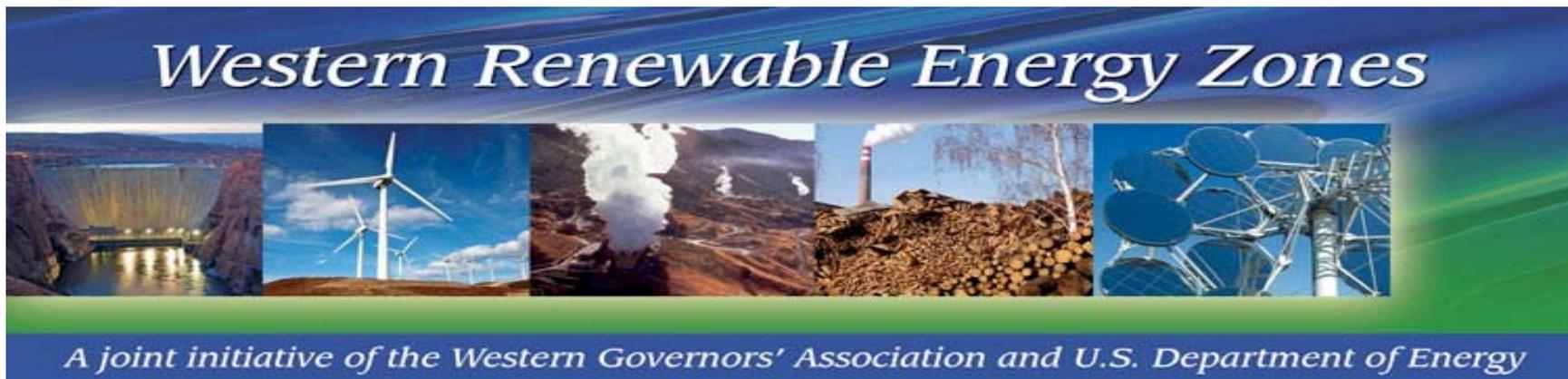
Timeline

- April 30 - Initial feedstock assessment and conversion technology models completed
- May 30 – Data available from initial model runs and scenario cases finalized
- June-August – Feedstock, conversion technology, and infrastructure model adjustments. Begin scenario analyses
- August 15 - Draft project reports
- September 30 – Final reports and model



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- Western Renewable Energy Zones



Building Transmission for Renewables in the West

- The goal of the Western Renewable Energy Zone (WREZ) initiative is to develop a *consensus* proposal among the states and provinces in the Western Interconnection on how best to develop and deliver energy from renewable resource areas throughout the region to load centers.

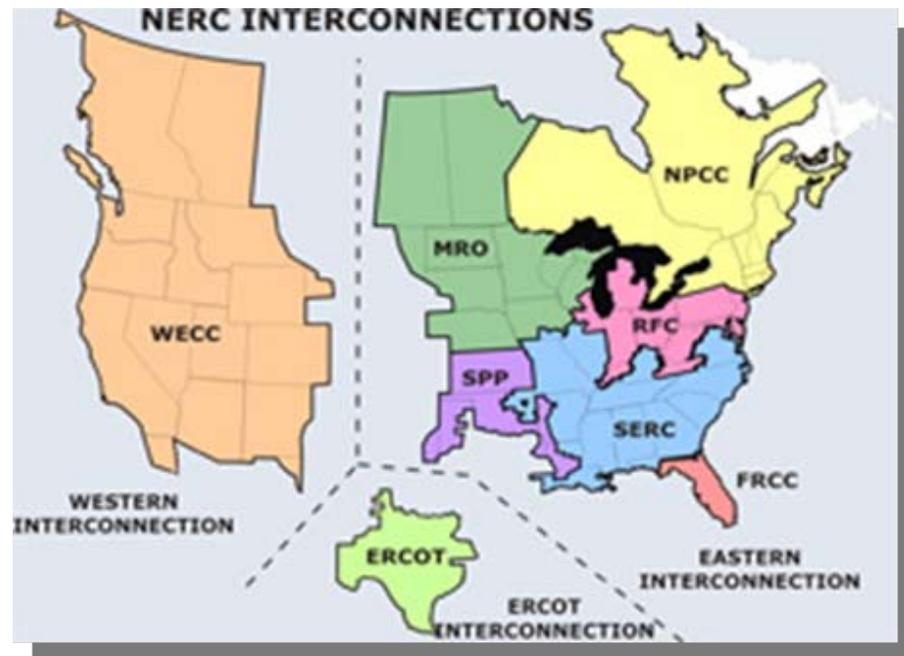


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- Western Renewable Energy Zones

Building Transmission for Renewables in the West

- The biggest obstacle to installing large amounts of new renewable energy generation is building new transmission lines.
- The best renewable energy resources in the West are not near existing transmission lines, which were built to carry electricity from fossil fuel burning power plants.



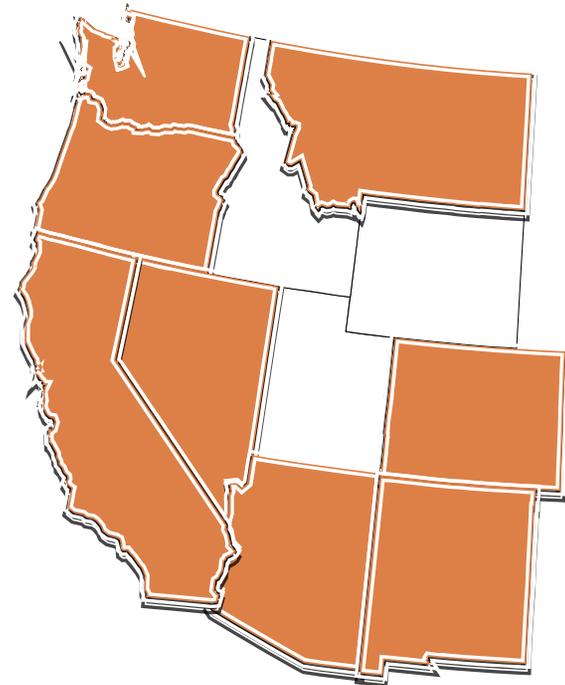


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Policy Driver - Western States with an RPS

- ▣ Arizona 15% by 2025
- ▣ California 20% by 2010
- ▣ Colorado 20% by 2020
- ▣ Montana 15% by 2015
- ▣ Nevada 20% by 2015
- ▣ New Mexico 20% by 2020
- ▣ Oregon 25% by 2025
- ▣ Washington 15% by 2020





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- Western Renewable Energy Zones

Building Transmission for Renewables in the West

- Identification of WREZs (Phase 1)
- Conceptual transmission from WREZs (Phase 2)
- Coordinated procurement for renewables (beyond current budget period) (Phase 3)
- Institutional options to facilitate interstate transmission for renewables (beyond current budget period) (Phase 4)

Timeline

- May 15 - Final Report
- June 14-16 - Presentation to Western Governors
- Fall 2009 – Completion of Phase 2

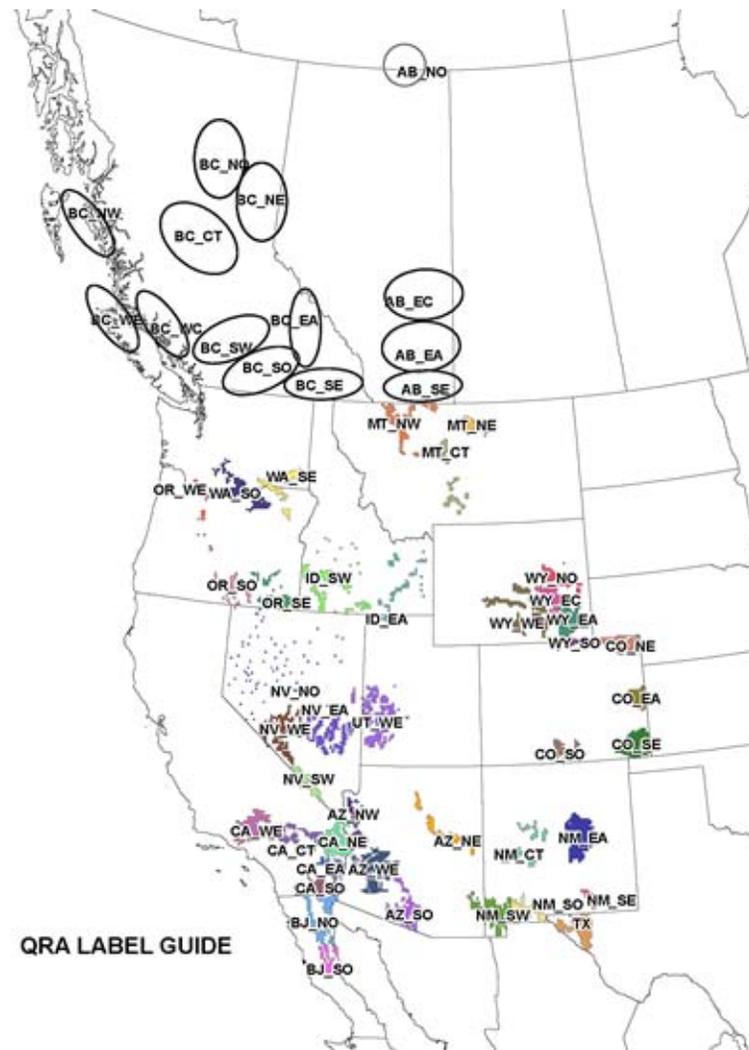


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Potential NBSM Application

- Provide precise data for biomass availability in a given renewable energy zone
- Develop location specific analysis of competition for biomass





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For more information, please visit

www.westgov.org

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