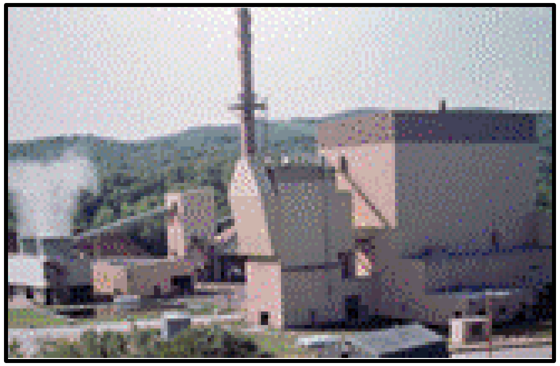
Biomass Opportunity Overview & Update

Presented to Client



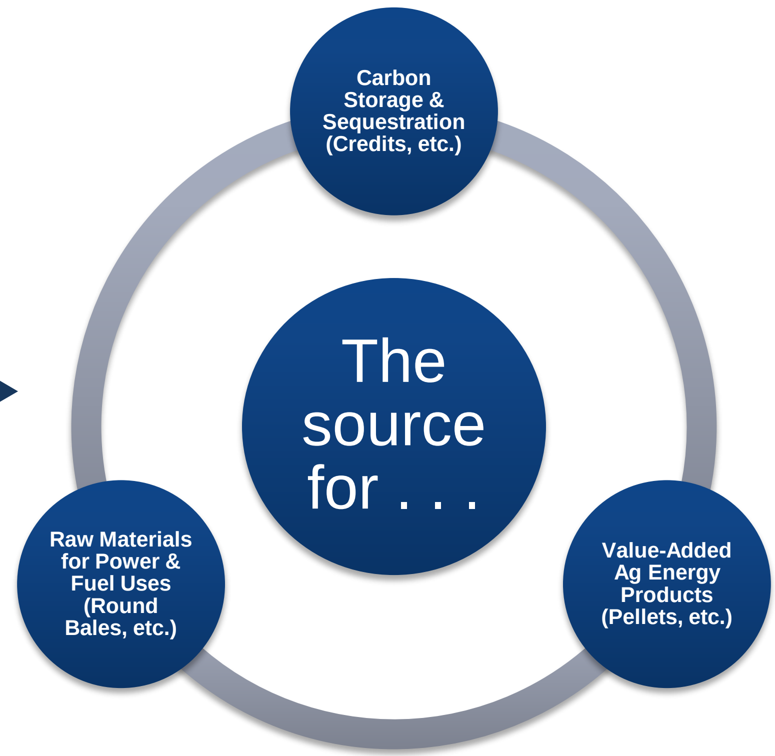
June 22, 2010

Table of Contents

Overview / Recap

The Future of US Energy Production . . .

- Runs Straight Through America's Forests & Farms!

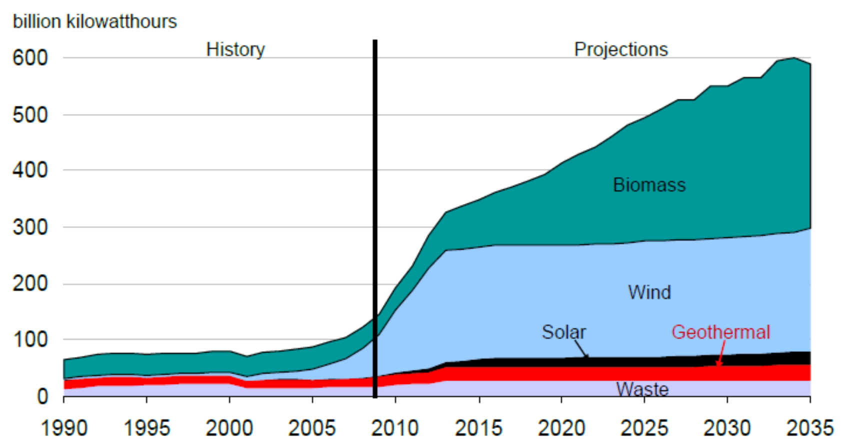


Demand

EIA Annual Outlook & Projections
(Power)

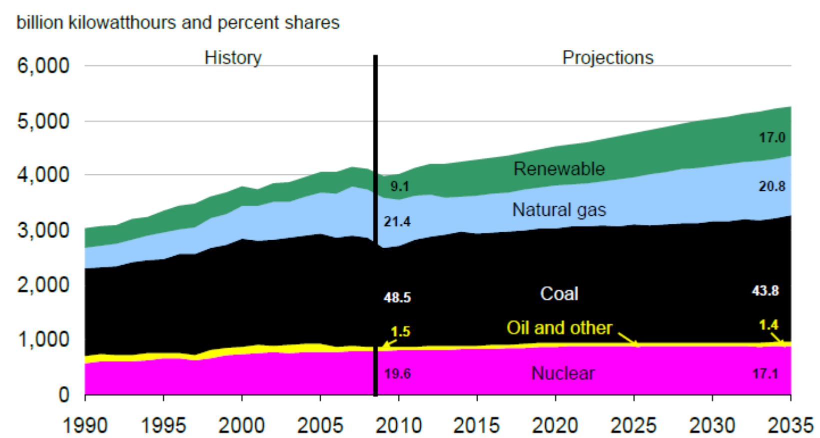
Biomass is the single fastest growing baseload renewable power source in the United States

Nonhydropower renewable sources meet 41% of total electricity generation growth from 2008 to 2035



Richard Newell, SAIS, December 14, 2009 Source: *Annual Energy Outlook 2010* 21

Renewables gain electricity market share; coal share declines



Richard Newell, SAIS, December 14, 2009 Source: *Annual Energy Outlook 2010* 20

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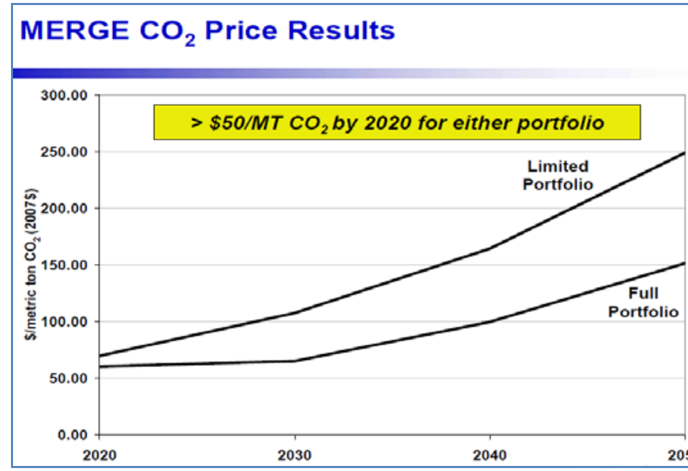
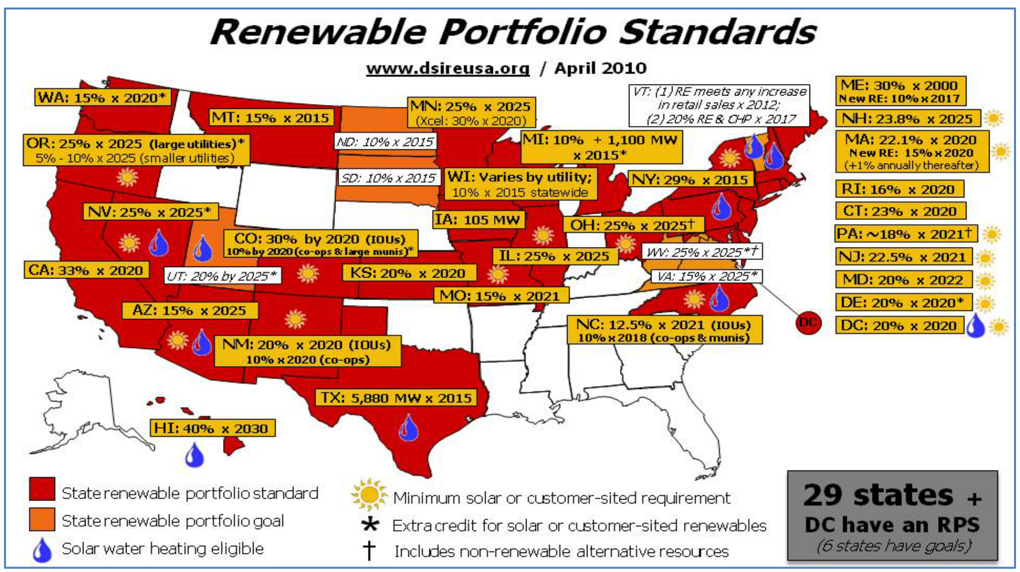
Demand / Drivers - Power

- Government Mandates & Incentives
  - Power
    - State RPS
    - Federal Incentives (ARRA, etc.)
  - Fuel
    - RFS2
  - Energy
    - GHG legislation (RGGI, Western Gov's, etc.)
    - AB 32





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Utility Perspective – Biomass Power

Great River Energy

- Coop serving 640,000 homes & businesses in ND & MN

Case Study: Spiritwood Station

- 99 MW CHP
- Circulating fluid bed boiler has some inherent fuel flexibility
- Abundant regional biomass
- Seeking additional steam partners

10% co-firing at Spiritwood

- 70,000 tons per year
- Ten tons per hour @ 5,000 Btu/lb
- Twenty big bales per hour @ 1,000 lb

11 to 17 MMBtu/ton
5 to 10 dry tons/acre
~10,000 acres

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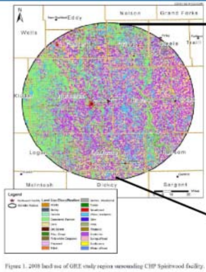
Spiritwood biomass inventory



Biomass Resource	Acres	Estimated Dry Tons Per Year
Corn Cobs	720,000	400,000
Corn Stover		1,200,000
Wheat Straw	640,000	690,000
Switchgrass on CRP (est)	*470,000*	*3,500,000*
Hay	400,000	550,000
Barley Waste	110,000	54,000
Sunflower Hulls	72,000	8,800
Sugar Beet Foliage	4,100	100,000
Wood Waste	N/A	14,000
MSW	N/A	13,000

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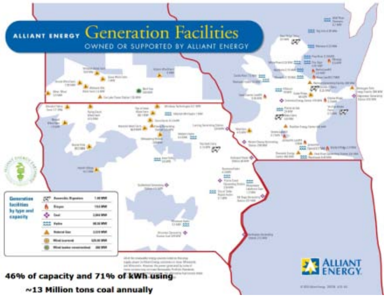
Alliant Energy



Power Plants in WI, MN & IA

The 50 mile circles around each represent the likely hauling radius that biomass can be collected from.

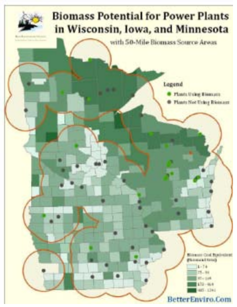
-1735 power plants, 42,659 MW

-188 coal plants, 19,161 MW

-10% replacement, 9,299,210 tons @ 6,000 BTU's / lb.

Potential for:
1,859,842 acres grassland or
4,649,605 acres of corn stover
929,921 woodlands annually

10,000 tons / MW



Alliant Energy Biofuel Experience 1995-2006

- Ottumwa, IA (southern Iowa) 725 mW base load pulverized (PBR) coal generating station
- Co-fired switchgrass at 5%
- Studied grass production cultural practices, fuel processing, fuel handling, boiler chemistry, ash and emission impacts…

Biomass Supply Business Development Select Considerations

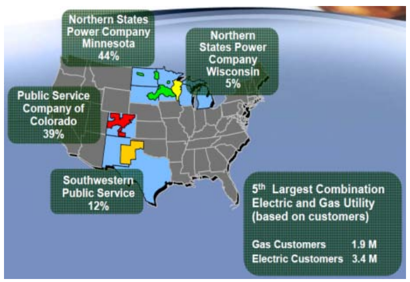
Contracts

- Transparent Btu based pricing mechanisms
- Long term contract development w/ integration of economic attributes…and reflects land-owner-operator appropriate risk/return scenarios
- Uniform quality assurance fuel standards

Risk Management

- Understanding of land stewardship, crop production, harvesting, storage and fuel processing
- Fuel supply competition or synergy? Biomass supply could be challenged if rapid adoption of biofuels occurs
- Chain of custody, crop insurance, standard contract language…

Xcel Energy



Company Biomass Strategy to Date

- Current Company Biomass Capacity: Over 200 MW
- 2009 Activities:
  - Application for the Bay Front Station gasification project
  - Microgy biogas contract approval
  - Policy work including biomass definitions and tax treatment
- 2010:
  - System-wide resource assessment
  - Support R&D and Testing: EPRI, MN RDF, DOE BioPower Division, Co-firing opportunity assessment, Innovative Clean Technology Program (Summit County Biomass Project)
  - Evaluate external opportunities as they arise
  - More policy work

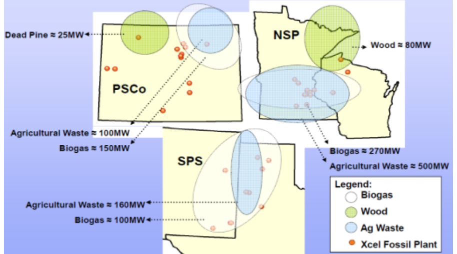
3. Agricultural Waste

- Very large supply base (Minnesota)
- Multiple applications:
  - Direct combustion
  - Solid fuel co-firing
  - Gasification

- Electrical Capacity Equivalent:
  - 10,000 tons ≈ 1MW
- Potential* by Company:
  - NSP: ~500MW
  - PSCo: ~100MW
  - SPS: ~160MW
- Competition and sustainability create numerous risks and management issues
- Costs: Linkages to larger commodity markets; volatility and risk

*Highest volume of waste with company infrastructure nearby

Resource Capacity Opportunity



Capacity potential represents the available fuel as a fossil fuel substitute or used in a new generation plant. Competition for these resources may exist. Total opportunity ≈1,400MW

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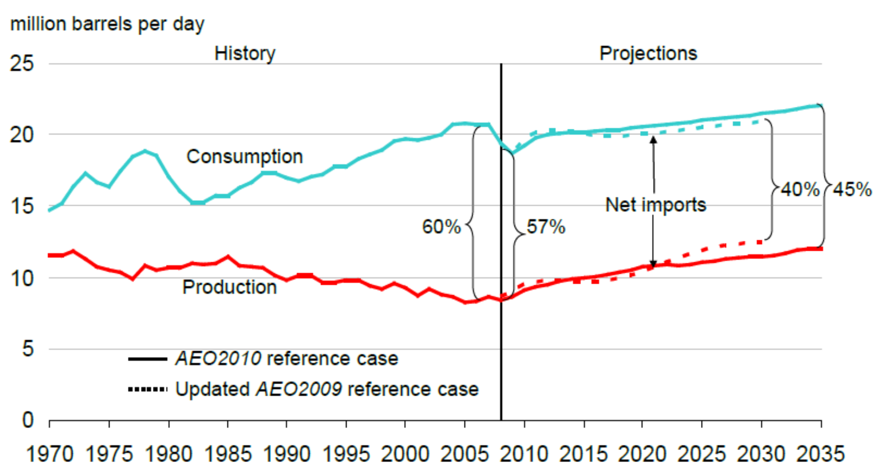
EIA Annual Outlook & Projections
(Fuel)

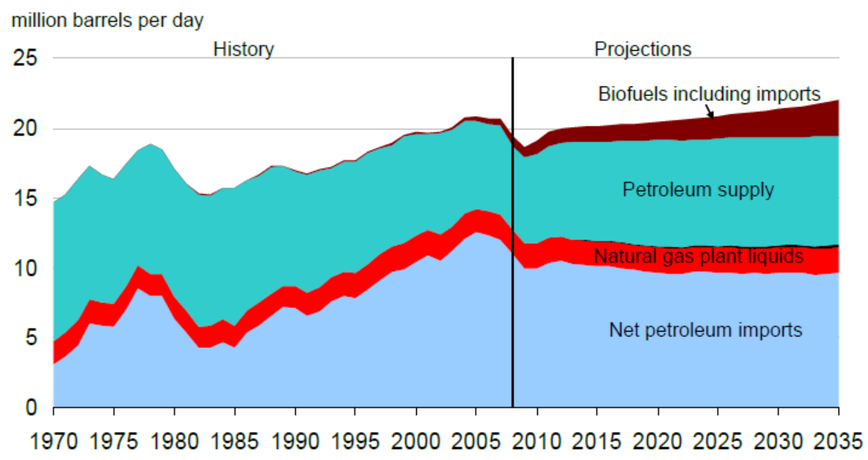
Growing use of alternative fuels of all types to meet increasing liquid fuel use

U.S. reliance on imported liquid fuels is reduced by increased domestic production and greater fuel efficiency



Richard Newell, SAIS, December 14, 2009 Source: *Annual Energy Outlook 2010* 9

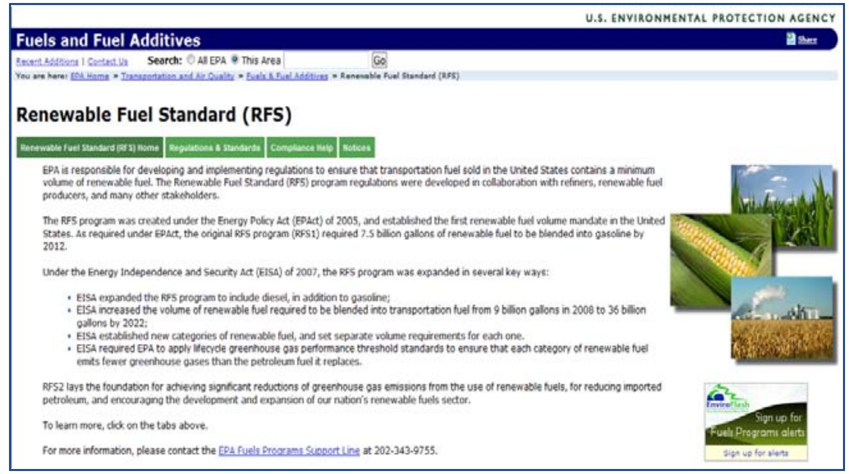
Biofuels meet most of the growth in liquid fuels supply



Richard Newell, SAIS, December 14, 2009 Source: *Annual Energy Outlook 2010* 10

Demand / Drivers - Fuel

- Government Mandates & Incentives
  - Federal
    - RFS2
    - GHG legislation
  - State / Regional
    - AB 32 / CARB



U.S. ENVIRONMENTAL PROTECTION AGENCY

Fuels and Fuel Additives

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You are here: EPA Home » Transportation and Air Quality » Fuels & Fuel Additives » Renewable Fuel Standard (RFS)

Renewable Fuel Standard (RFS)

Renewable Fuel Standard (RFS) Home | Regulations & Standards | Compliance Help | Notices

EPA is responsible for developing and implementing regulations to ensure that transportation fuel sold in the United States contains a minimum volume of renewable fuel. The Renewable Fuel Standard (RFS) program regulations were developed in collaboration with refiners, renewable fuel producers, and many other stakeholders.

The RFS program was created under the Energy Policy Act (EPAct) of 2005, and established the first renewable fuel volume mandate in the United States. As required under EPAct, the original RFS program (RFS1) required 7.5 billion gallons of renewable fuel to be blended into gasoline by 2012.

Under the Energy Independence and Security Act (EISA) of 2007, the RFS program was expanded in several key ways:

- EISA expanded the RFS program to include diesel, in addition to gasoline;
- EISA increased the volume of renewable fuel required to be blended into transportation fuel from 9 billion gallons in 2008 to 36 billion gallons by 2022;
- EISA established new categories of renewable fuel, and set separate volume requirements for each one.
- EISA required EPA to apply lifecycle greenhouse gas performance threshold standards to ensure that each category of renewable fuel emits fewer greenhouse gases than the petroleum fuel it replaces.

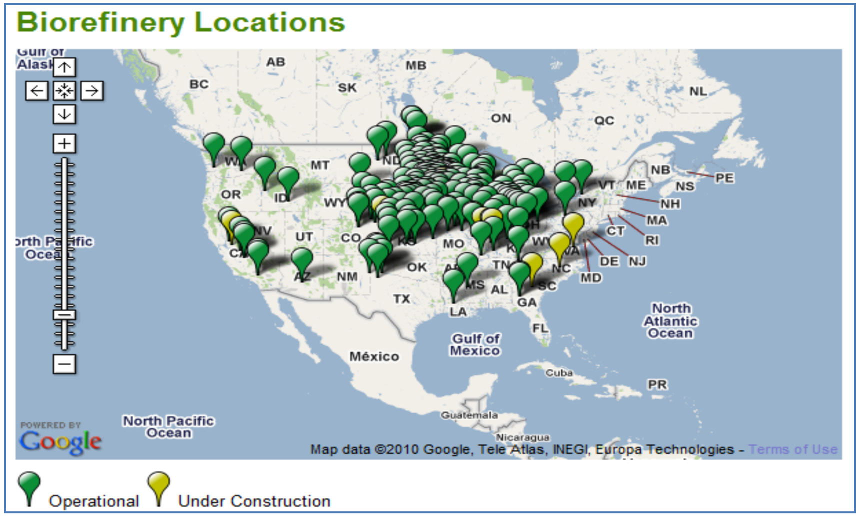
RFS2 lays the foundation for achieving significant reductions of greenhouse gas emissions from the use of renewable fuels, for reducing imported petroleum, and encouraging the development and expansion of our nation's renewable fuels sector.

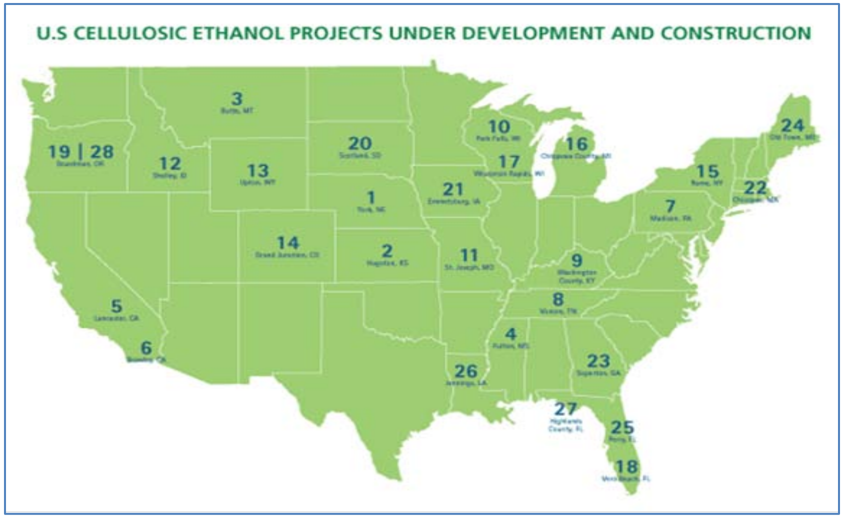
To learn more, click on the tabs above.

For more information, please contact the EPA Fuels Programs Support Line at 202-343-9755.

Sign up for Fuels Programs alerts

Sign up for alerts





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Supply

Supply (Geography)