

**CONNECTING THE DOTS:**  
**CLIMATE CHANGE,**  
**ORGANICS RECYCLING,**  
**RENEWABLE ENERGY**

**October 28, 2014**

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Executive Director



**EESI**  
Environmental and  
Energy Study Institute



# EESI

Environmental and  
Energy Study Institute

- Founded in 1984 by a bipartisan Congressional caucus as an independent non-profit organization (but receives no Congressional funding)
- Source of non-partisan information on energy and environment policy development for Congress and other policymakers
- [Climate change](#) is one of the most serious problems facing civilization today – impacting infrastructure, water supply, agriculture, public health and natural ecosystems

# Outline:

- Making the case for biomass as a renewable feedstock for fuels & electricity generation
- Definition of biomass – feedstock types and end-uses
- What policies are moving the needle?
  - State RPS
  - Renewable Fuel Standard (RFS)
  - 2014 *Farm Bill*
  - EPA's Clean Power Plan
  - The Methane Reduction Strategy, Biogas Roadmap

# Biomass Is Abundant Resource



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Courtesy of Wikipedia



PSNH via a Creative Commons license

- Organics recycling
- Landfills
- WWT/MSW
- Food processing
- Dairy waste
- Agriculture waste
- Wood waste

# Utilizing Biomass Can Integrate Systems



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Courtesy of BioCycle



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- Food
- Animal feed
- Fertilizer
- Liquid fuels
- Electricity
- Fiber, Compost
- Feedstocks for chemicals



# Biomass is a Flexible Resource



Ethanol fuel pumps in SD, courtesy of Midwest energy news



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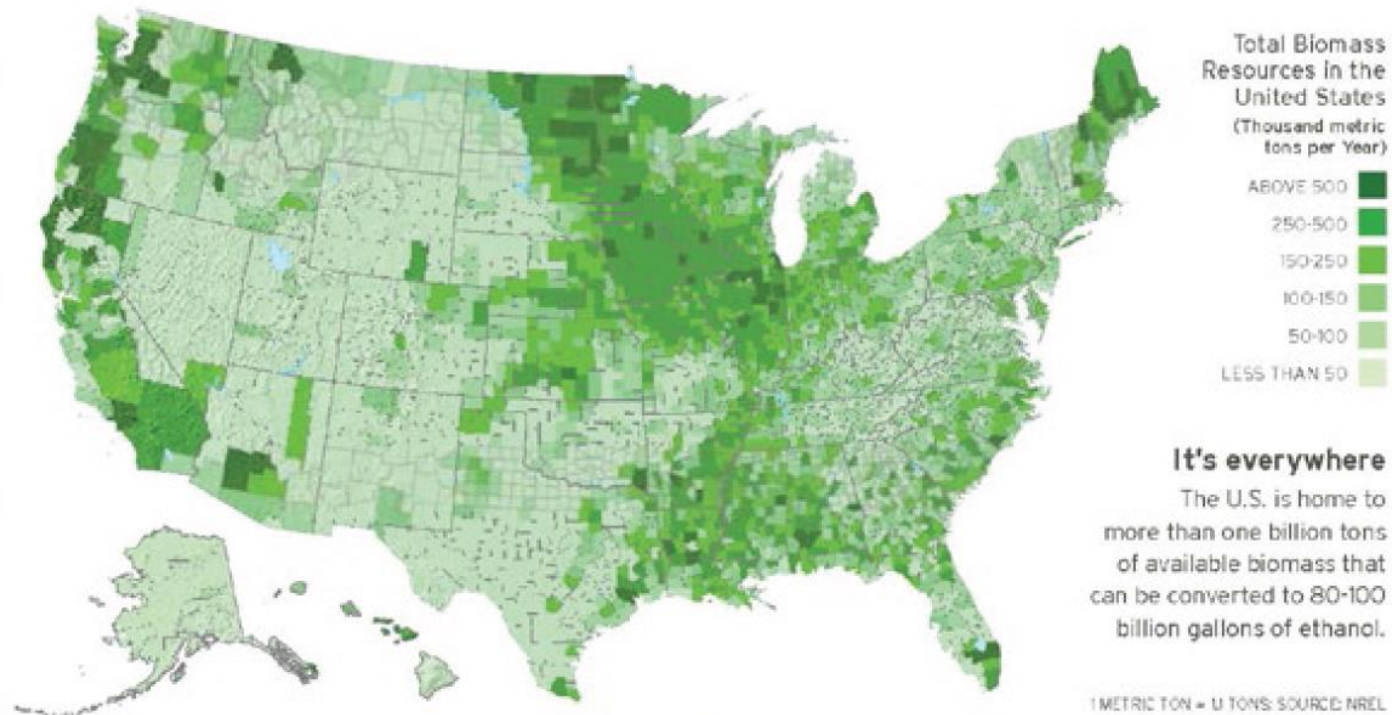
Courtesy of Wikipedia

- Liquid fuels
  - Ethanol
  - Biodiesel
  - Jet, marine fuel
- Biogas (renewable natural gas)
- Pellets/solid fuels
- All of these can be sourced from wastes

# Current Role of Biomass in Liquid Fuels

## Cellulosic Ethanol

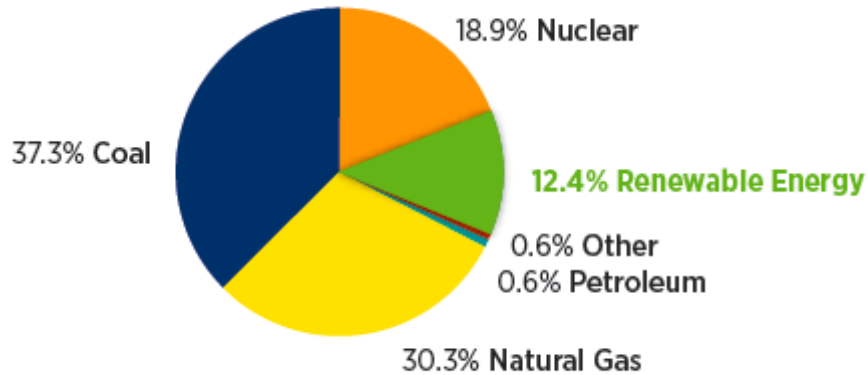
The "50 State" Solution



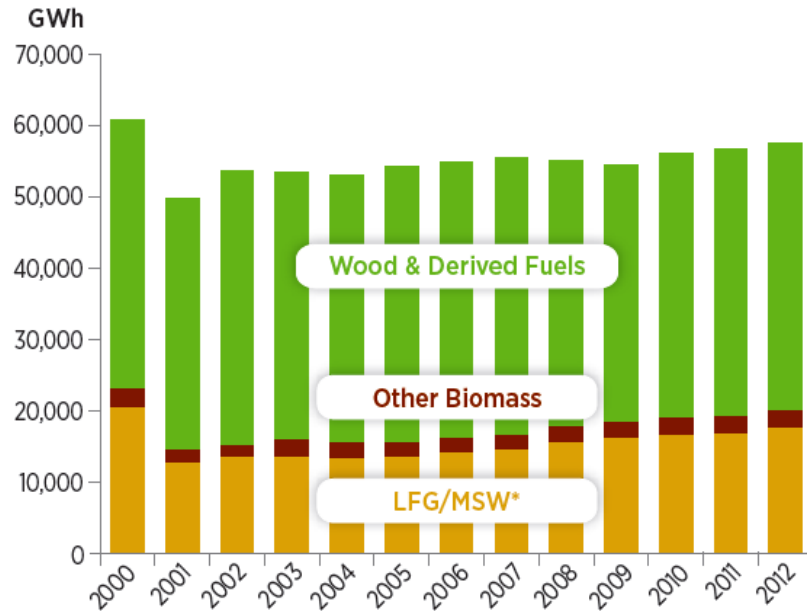
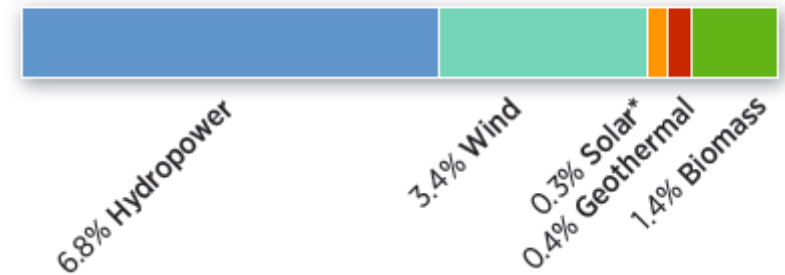
Courtesy of Growth Energy

# Current Role of Biomass in Utility Generation

U.S. Electric Net Generation (2012): 4,068 TWh



U.S. Renewable Generation: 504 TWh



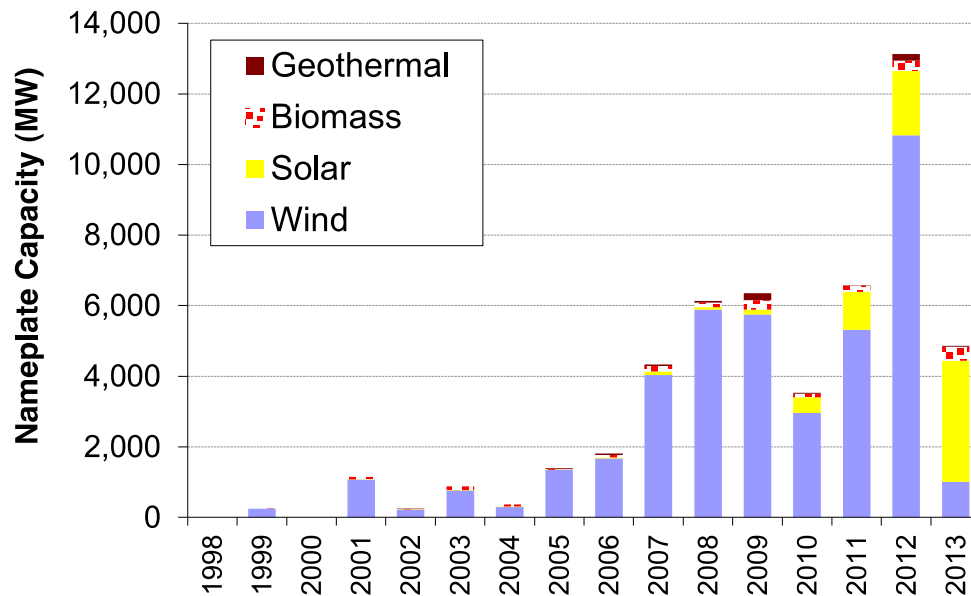
Courtesy of US DOE EERE



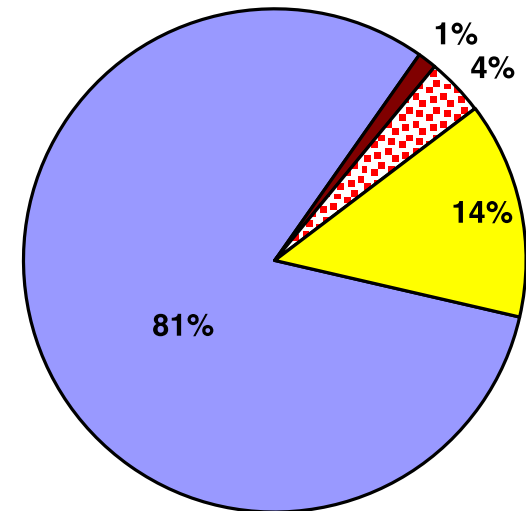


# Current Role of Biomass in RPS

## Annual RPS Capacity Additions



## Cumulative RPS Capacity Additions (1998-2013)



Courtesy of Galen Barbose, Lawrence Berkeley National Laboratory



# Why Biomass?

- Flexible resource: Can provide **base load power** to more intermittent renewables OR **fuels and fiber products**.
- Can be **co-deployed** with other renewable and non-renewable electricity
  - Biogas and Solar at landfills & wastewater treatment facilities
  - Combined Heat and Power (CHP) using biogas

# Biomass – Utilizing Waste Material

- Biomass is commonly disposed of as waste.
- A renewable resource that, **if not managed sustainably, can contribute to environmental degradation** and climate change.
  - Municipal solid waste → Landfill gas
  - Hazardous fuel build-up → Forest fires
  - Untreated manure → Nutrient loading in watersheds

# Utilizing Wastes for Energy:

- Provide additional revenue streams
- New business opportunities
- Keep dollars local
- Improve public health
- Reduce nutrient loading in waterways
- Improve soil quality
- Reduce fertilizer needs
- Address greenhouse gases

# Economics of Biomass

## Benefits local economies

- Biogas could support approximately 20,000 direct jobs
- Biomass power supports 18,000 direct jobs

**Provides multiple revenue streams to Producers, small businesses, municipal government in the forms of:**

- Gas, electricity
- Co-products



# Biogas – Anaerobic Digestion

- Biogas → Renewable Natural gas (RNG) → biomethane
- Biogas is derived from anaerobic digestion of wastes
- Feedstocks
  - Municipal solid waste (MSW)
  - Waste water treatment plants
  - Manure (cow & pig manure, poultry litter)
  - Food processing waste
- Can be converted to biogas, liquid fuels, compost, pellets, fiber products.

# Biogas Opportunities

Current digester numbers:

- 1,500 at waste water treatment facilities
- 576 digesters at landfills
- 239 at US farms and dairies

Potential for upwards of 11,000 anaerobic digesters in US.

# Digester Products – An Example

US dairy farms could support 2,600 digesters:

- 11.7 million megawatts of biogas per year
  - Valued at \$894 million

Co-Products:

- Nitrogen = \$467 million
- Phosphorous = \$325 million
- Fiber (ie. compost) = \$217 million

Data from the Dairy Checkoff



# Defining Biomass – Woody Fuels

- Timber residues – tops, limbs, sawdust, chips
- Agricultural residues
- Policy signals on GHG of woody fuels:
  - EPA’s Biogenic Carbon language in 111(d)
  - National Climate Assessment
  - Various state policies
- **Consensus exists on many accepted uses.**
  - Re-use of wastes, hazardous fuel reduction
  - Avoids sending to landfill, open burns

# EPA Clean Air Act Section 111(d): Existing Source Performance Standards

- “Sustainable forestry and agriculture can improve resiliency to climate change .. contribute to climate change mitigation by acting as a ‘sink’ for carbon.”
- “Burning biomass-derived fuels for energy recovery can yield climate benefits as compared to burning conventional fossil fuels.”
- “We anticipate that states ... consider biomass-derived fuels in energy as a way to mitigate the CO2 emissions attributed to the energy sector.”





# 111(d): biogenic carbon rule forthcoming

- “EPA expects that [it] will be a resource that could help inform states in the development of their CAA section 111(d) plans.”
- Senators advocating for “simple and implementable” regulations recognizing the utility of bioenergy in CO<sub>2</sub> in letter to Gina McCarthy.
  - Jeff Merkley (D-OR), Debbie Stabenow (D-MI), Mark Begich (D-AK), Angus King (I-ME), Amy Klobuchar (D-MN), Mark Udall (D-CO), Al Franken (D-MN), Ron Wyden (D-OR), Patty Murray (D-WA), Tammy Baldwin (D-WI) and Jeanne Shaheen (D-NH)



# Federal Support of Biomass & Biogas

- Renewable Fuel Standard
  - Biogas now has a pathway under the RFS – has provided HUGE boost to industry
- Production Tax Credit Sect. 45
- Title IX of the 2014 *Farm Bill*
  - Significant support for renewable energy, energy efficiency
- President's **Biogas Roadmap** (part of methane strategy)
  - Voluntary compliance
- DOI, USFS and others recognizing importance of woody biomass to hazardous fuels reduction.
- EPA's *Clean Power Plan* 111(d)
  - Policy signal that carbon will be increasingly expensive.

# What States Are Doing to Help Biomass

- Specifically recognizing biomass in RPS:
  - Connecticut: recognizes biogas, some biomass, trash-to-energy, waste heat
  - Massachusetts, New Jersey, Vermont: recognize biogas
  - New Hampshire: Class III – biomass/methane
- Creating carve-outs for DG
- Production Incentives
- Rebates
- Tax Credits

# What States Are Doing to Help Biomass

- **Grants, Loans**
  - CHP and anaerobic digestion incentives, CT
  - Biofuels Production Facility Grants, IL
  - Community Conservation Challenges, IN
  - Methane Digester Loan Program, MN
  - Biofuels/biodiesel tax credits, ME
  - Clean burning wood stove grant program, MD
- **Exemptions from sales tax/property taxes**
  - Cellulosic biofuel tax exemption: MA
  - General sales tax exemption for biomass technologies, WI

# Barriers and Opportunities

- **Distributed Generation** generally not favored in RPS
- Public **perceptions on biomass sustainability**
- Lack of knowledge on technology available for waste re-use
- States and federal government still working through **biogenic carbon issue**
- Renewable Fuel Standard proposed reduction – affects all areas of the biomass industry



# Action to Realize Biomass/Biogas Use

- **Biomass Assessments** are needed as part of State energy planning.
- Biomass Industries should work with state energy offices, state DEQ, PUCs to further:
  - Recognize the value of **distributed generation (DG)**
  - Include **thermal energy** in RPS
  - Incentivize **co-deployment** of renewable
  - Recognize **avoidance cost**
    - Reduced fossil fuel use, nutrient loads
- An integrated, multi-systems approach is needed!

# Installed Capacity in Biomass & Waste

State	MW installed as of 2012
Illinois	148.6 MW
Indiana	62.3 MW
Iowa	14.6 MW
Kansas	7.2 MW
Michigan	488.4 MW
Minnesota	491 MW
Missouri	9.8 MW
Nebraska	10.9 MW
North Dakota	9.8 MW
Ohio	185.8 MW
South Dakota	0 MW
Wisconsin	358.1 MW

State	MW installed as of 2012
Connecticut	259 MW
Delaware	8 MW
DC	0 MW
Maine	609 MW
Maryland	163 MW
Massachusetts	472 MW
New Hampshire	191 MW
New Jersey	254 MW
New York	558 MW
Pennsylvania	637 MW
Rhode Island	26 MW
Vermont	88 MW

Courtesy of ACORE, data from EIA. Includes combustion, anaerobic digestion, gasification, co-firing, landfill gas or pyrolysis.

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# THANK YOU

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# Bioenergy in the 2014 Farm Bill

**Energy Title (IX): \$694 million in mandatory funding over 5 years**

- Sec. 9002 Biobased Markets Program
- Sec. 9003 Biorefinery Assistance
- Sec. 9004 Repowering Assistance Program
- Sec. 9005 Bioenergy Program for Advanced Biofuels
- Sec. 9006 Biodiesel Fuel Education Program
- Sec. 9007 Rural Energy for America (REAP)
- Sec. 9008 Biomass Research and Development Initiative (BRDI)
- Sec. 9010 Biomass Crop Assistance
- Sec. 9012 Community Wood Energy Program (no mandatory funding)

