Minnesota Biomass Policy Opportunities

MINNESOTA FOREST RESOURCES COUNCIL
NOVEMBER 18, 2015

GREAT PLAINS INSTITUTE
Better Energy. Better World.

Great Plains Institute Today

Mission: To transform the way we produce, distribute and consume energy to be both economically and environmentally sustainable.

18-yr. old non-partisan, non-profit that:

1. Develops better energy policy via consensus.
2. Catalyzes deployment of best energy technologies, practices & programs.
3. Provides reliable analysis & decision tools.

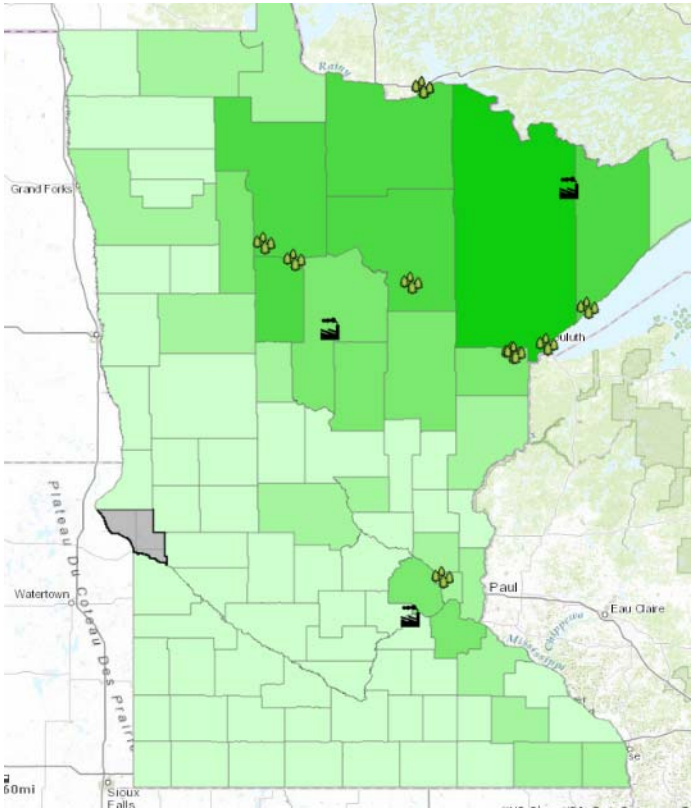
Great Plains Institute and the Bioeconomy

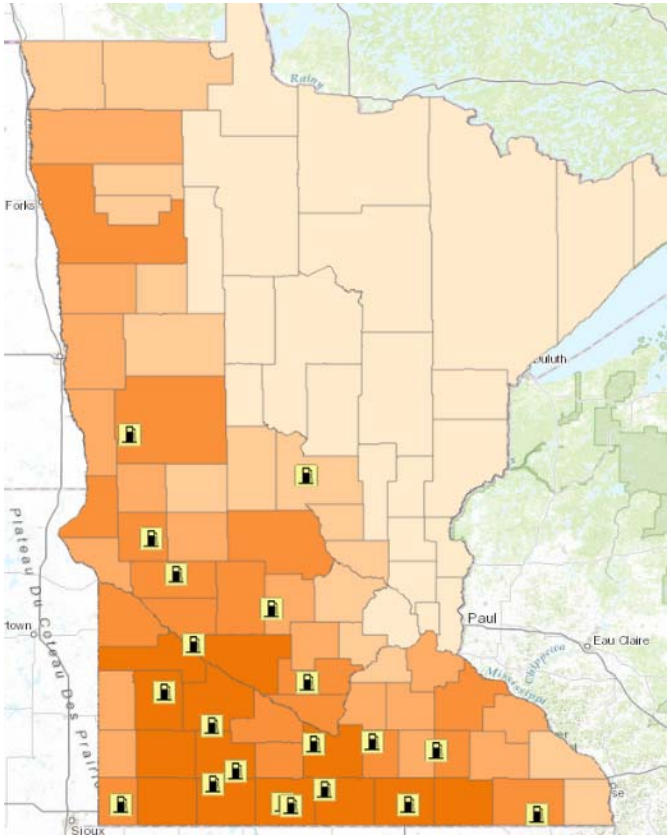
- 13 year history
- Project examples:
  - Bioeconomy Coalition of Minnesota
  - Dakota Spirit AgEnergy
  - DOE collaboration on native-grass biomass crops
  - MGA Energy and Climate

Important Biomass Opportunities for Minnesota

- Advanced Biofuels
- Renewable Chemicals
- Biomass thermal
- Combined heat and power
  - Biogas
  - Solid biomass
  - Non-renewable fuel

Large forestry biomass resource and large (but declining) forest products industry





Large agricultural biomass resource, and successful track record in creating an ethanol industry through effective state policy

Mission of the Bioeconomy Coalition of Minnesota

Articulate and implement a Minnesota state policy and regulatory agenda to expand renewable chemical, advanced biofuel, and biomass thermal energy industries, along the entire value chain from R&D through commercial production and use.

2015 Bioeconomy Coalition

Segetis
RELUCEO
GreenBiologics
gevo
butrolix
VerdeNero
SynGas Technology, LLC
Grand Rapids Area CHAMBER OF COMMERCE
NatureWorks
amec foster wheeler
Burns & McDonnell SINCE 1898
Earthtech Energy
Fredrikson & Byron, P.A.
firstgreen PARTNERS
Associated Contract Loggers & Truckers
Your Future, Your Voice Your Association
Potlatch
DOVETAIL PARTNERS INC.
A Trusted Source of Environmental Information
INSTITUTE FOR AGRICULTURE AND TRADE POLICY
minnesota power
AN ALLETE COMPANY
Hibbing Area Chamber of Commerce
GREAT RIVER ENERGY
A Touchstone Energy Cooperative
MINNESOTA FARMERS UNION
MinnesotaCorn GROWERS ASSOCIATION
cee Center for Energy and Environment
STOEL RIVES LLP ATTORNEYS AT LAW
CONSERVATION MINNESOTA
Protect the Minnesota you love.

What is an Advanced Biofuel?

Sugar
Beets, Corn

Cellulosic Biomass
Switchgrass, Wood, Corn Stover & Ag Residue

Waste
Municipal Waste, Livestock Waste

Processing

e.g. enzymatic hydrolysis,
dilute acid hydrolysis,
metal catalysis,
etc…

Cellulosic Ethanol

Biodiesel

Butanol

Biogasoline

Biogas

Required GHG reduction: 50% lower GHG emissions than gasoline

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What is a Renewable Chemical?

Sugar
Beets, Corn

Cellulosic Biomass
Switchgrass, Wood,
Corn Stover & Ag
Residue

Waste
Municipal Waste,
Livestock Waste

Processing

e.g. enzymatic hydrolysis,
dilute acid hydrolysis,
metal catalysis,
etc…

Plastics

PVC

3D Printing

Specialty Chemicals

Household Chemicals

Fabrics

Paint

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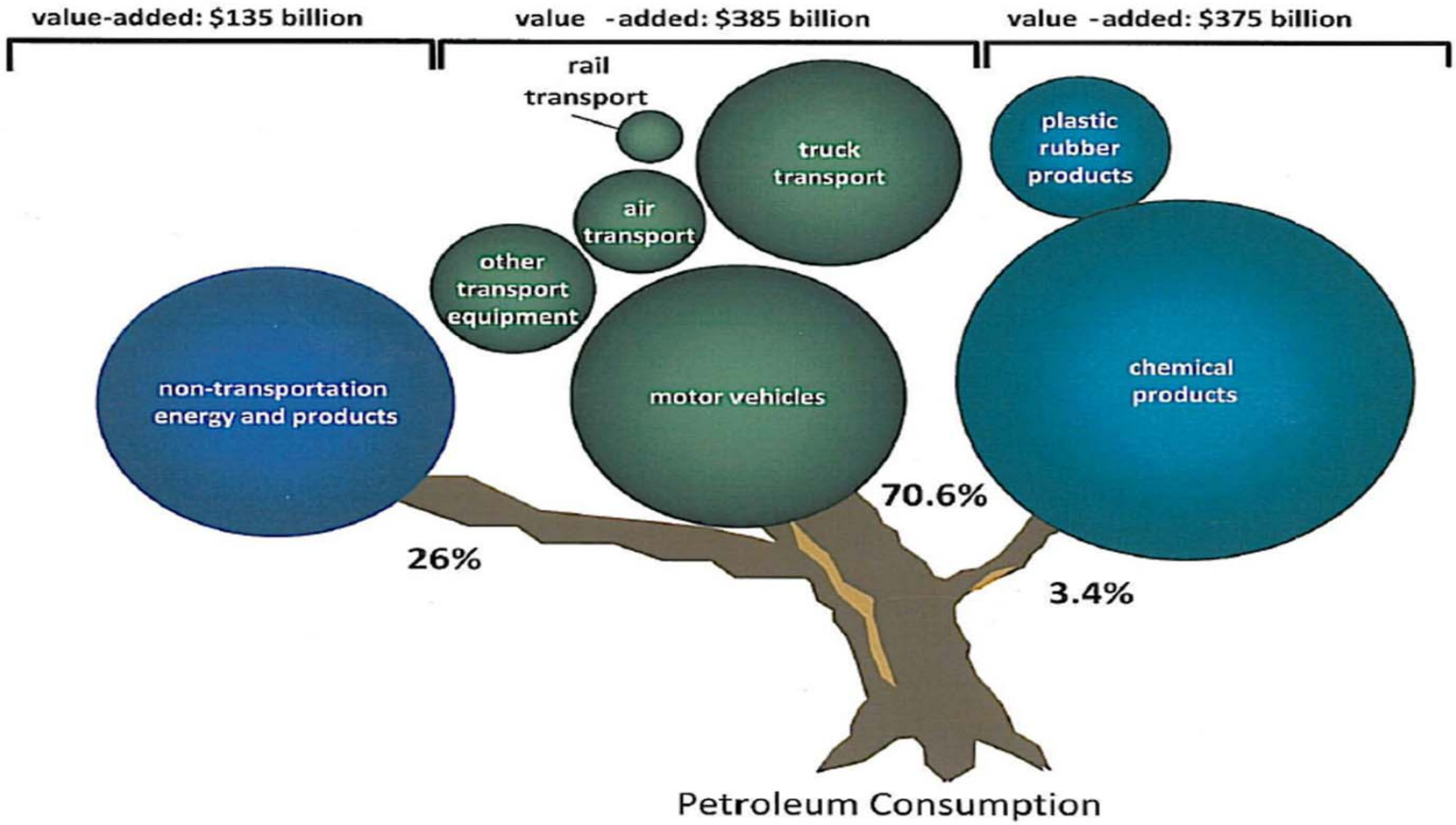
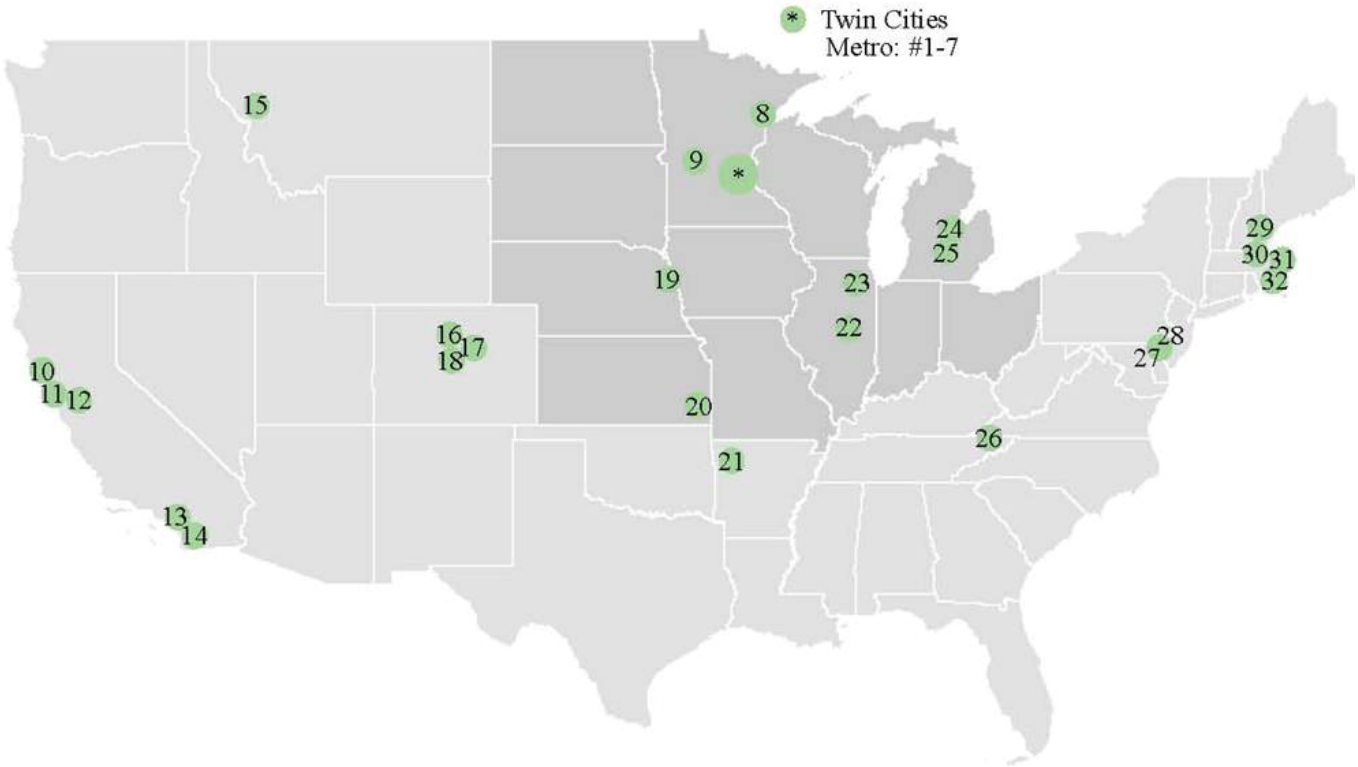
Renewable Chemical Value



Adapted From: Vol. 1 No. 1. Spring 2005 Industrial Biotechnology; New Scientist 2007.

Slide courtesy of BioAmber

Minnesota – **World Leading Cluster** of Biochemical Company Headquarters



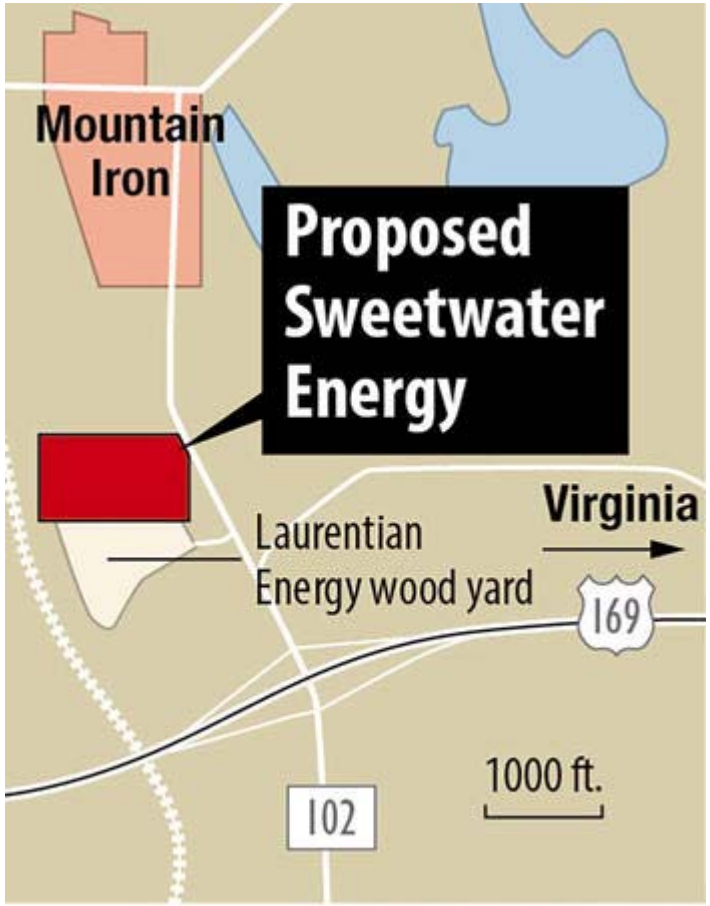
1	BioAmber	MN	12	Cobalt Technologies	CA	23	Elevance	IL
2	Cargill	MN	13	Verdezyne	CA	24	Dow	MI
3	CHS	MN	14	Genomatica	CA	25	MBI	MI
4	Cortec	MN	15	Rivertop Renewables	MT	26	Eastman Chemical Company	TN
5	Entropy Solutions	MN	16	OPX Biotechnologies	CO	27	Butamax	DE
6	NatureWorks, LLC	MN	17	Gevo	CO	28	DuPont Tate & Lyle	DE
7	Segetis	MN	18	Zeachem	CO	29	Itaconix	NH
8	Butrolix	MN	19	SoyGold	NE	30	Metabolix	MA
9	West Central Renewable Ammonia Development	MN	20	MCPU Polymer Engineering, LLC	KS	31	Celexion	MA
10	Syngest	CA	21	Agrol	AR	32	Myriant Corporation	MA
11	Rennovia	CA	22	ADM	IL			

Company Highlight: GreenBiologics

- Headquarters: Gahanna, OH
- Planned production facility: Little Falls, MN
- Renewable chemical compound: **n-butanol**
- Used to replace petroleum in the manufacture of:
  - Paints, coatings, adhesives, inks, cosmetics, and cleaners

Project Highlight: SWEETWATER ENERGY

- Headquarters: Rochester, NY
- Planned production facility: Mountain Iron, MN
- Renewable chemical compound: **industrial alcohol and activated carbon**
- Building block for other renewable chemical production processes



NEWS TRIBUNE GRAPHICS

Other projects

- Cellulosic Ethanol (from crop residues or perennial energy crops)
- Anaerobic digestion to BioCNG
- Biomass district heating
- MSW to fuels and chemicals

Historic Success – Ethanol Producer Payments

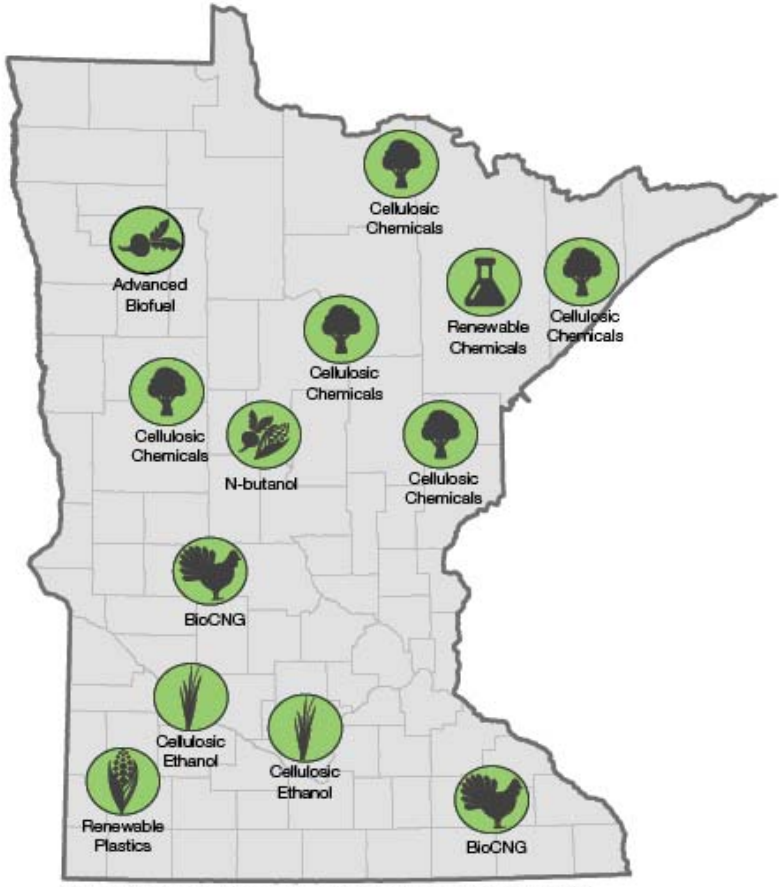
- 1994-2012: Minnesota spent over $450 million in producer payments to launch the state's ethanol industry
- $0.20/gallon paid for production
- No upfront money
- Current ethanol industry:
  - 21 ethanol plants, 1.1 billion gallons
  - $5 billion dollar industry

Bioeconomy Production Incentive – Why do this?

- Make Minnesota a world-class destination for building commercial-scale advanced biofuel and renewable chemical plants
- Production incentive can be included in private financing, and will attract projects to Minnesota.
- Legitimate government role in helping to build "first-of-a-kind" facilities, for which other forms of financing do not exist.
- Protection for the state. No payment occurs until production occurs.
- State government doesn't pick technology winners. They simply award the projects that cross the finish line.
- Minnesota has history with this approach, through the state's ethanol producer payment.

Minnesota Development Opportunities

Bioeconomy State Economic Contribution



Example project types and locations are hypothetical and for purposes of modeling economic impact of possible projects

A Growing Industry

14 hypothetical facilities:

- 1 x Renewable Chemicals from Sugar
- 1 x Renewable Plastics from Corn Sugar
- 2 x Cellulosic Ethanol from Ag. Residue
- 5 x Cellulosic Chemicals from Wood
- 1 x N-butanol from Corn and/or Beet Sugar
- 2 x BioCNG from Ag. and Livestock Waste
- 1 x Advanced Biofuel from Beet Sugar

$ 23.8 million temporary annual government investment*
$ 837.6 million permanent annual economic impact
$ 1.5 billion temporary construction economic impact

Economic Impact

	Type	Employment	Labor Income (millions)	Output (millions)
Annual	Direct	590	$ 36.8	$ 470.3
	Indirect	2,150	$ 115.8	$ 304.0
	Induced	450	$ 21.5	$ 63.3
	Total	**3,190**	**$ 174.1**	**$ 837.6**
Construction	Direct	4,380	$ 303.4	$ 867.8
	Indirect	1,690	$ 112.7	$ 306.2
	Induced	2,620	$ 122.1	$ 357.4
	Total	**8,690**	**$ 538.2**	**$ 1,531.4**

Impact estimates based on University of Minnesota Extension Economic Impact Analysis

*Over 15-20 years

BIOECONOMY
COALITION OF MINNESOTA

Bioeconomy Bill Authors

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Bioeconomy Production Incentive

- Program aims to attract commercial-scale production of renewable chemicals, advanced biofuels and biomass thermal energy
- Eligible facilities:
  - Must source raw materials (sugar, biomass) from Minnesota
  - Raw material must be from agricultural or forestry sources, or from solid waste.
  - Facility must be located in Minnesota
  - Facility must begin operation after July 1, 2015 (including existing facilities with significant retrofits to allow new production after July 1, 2015)
  - Project must start before July 1, 2025

Production Incentive Levels

- Advanced biofuels
  - $0.20/gal – cellulosic derived
  - $0.10/gal – sugar/starch derived
  - Total payments capped per year, available for 10 years
  - Up to 6 projects (or more if projects are smaller)
- Renewable Chemicals
  - $0.03/lb – sugar derived renewable chemical or cellulosic sugar
  - $0.06/lb – cellulosic derived renewable chemical
  - Total payments capped per year, available for 10 years
  - Up to 6 projects (or more if projects are smaller)
- Biomass Thermal
  - $5.00/MMbtu – agricultural or forestry feedstocks
  - Total payments capped per year, available for 10 years
  - Up to 5 projects (or more if projects are smaller)

Forestry Biomass Requirements

- Produced using Minnesota state biomass harvesting guidelines or brushland harvesting guidelines
- Biomass from land parcels greater than 160 acres must be certified by the:
  - Forestry Stewardship Council
  - Sustainable Forestry Initiative or
  - American Tree Farm System

Forestry Biomass Requirements

- Uncertified land from parcels of 160 acres or less must be:
  - Harvested from a logger who has completed biomass harvesting training from the Minnesota logger education program
  - Have a forest stewardship plan

Provisions Specific to Agricultural Biomass

- Cellulosic biofuel projects using agriculture biomass – must meet perennial feedstock requirements:
  - Year 1: 10%
  - Year 3: 30%
  - Year 5 and beyond: 50%
- Does NOT impact: sugar/starch projects, wood projects, any renewable chemical projects, any biomass thermal projects.

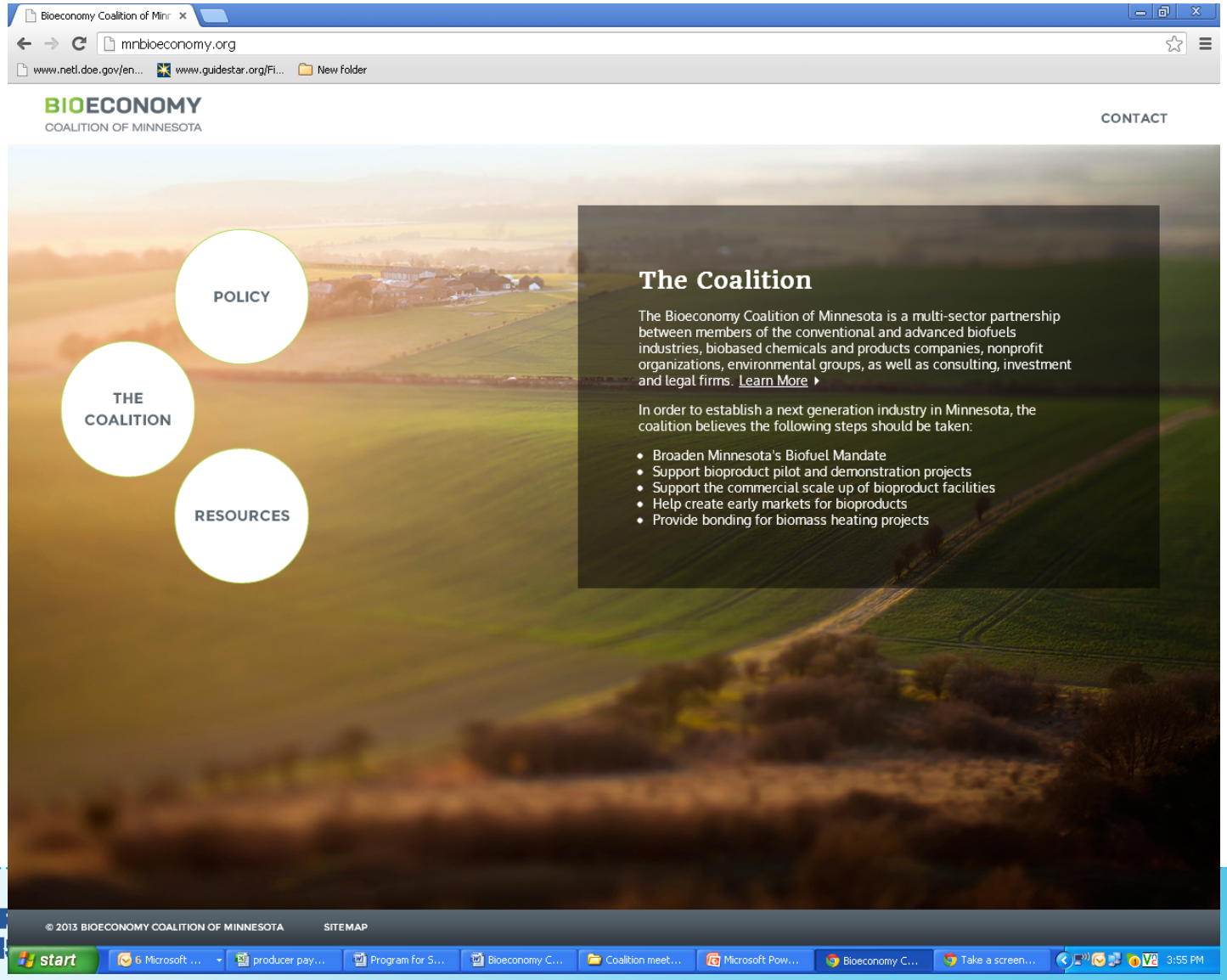
Responsible Biomass Sourcing Plan for Agricultural Biomass

- Detailed explanation for how agricultural biomass will be produced and managed in a way that:
  - Preserves soil quality
  - Does not increase soil and nutrient run-off
  - Avoids introduction of harmful invasive species
  - Limits negative impacts on wildlife habitat
  - Reduces GHG emissions

Program Funding

- $500,000 FY 2016 and $1.5 million FY 2017
  - FY 2015 must be spent by June 30, 2017
  - FY 2016 must be spent by June 30, 2018
- Base funding of $1.5 million in FY 2018 and FY 2019
- Statutory language will allow funding up to 6 fully commercial projects in each category (advanced biofuels, renewable chemicals, biomass thermal)

www.mnbioeconomy.org



COMBINED HEAT AND POWER

What is Combined Heat and Power (CHP)?

- Integrated energy system
- Simultaneously generates useful electric and thermal energy from single fuel source
- Not a single technology BUT a suite of currently available technology applications

CHP Applications

- Manufacturers
  - Biofuels, chemicals, oil refining, pulp and paper, food processing
- Institutions
  - Colleges and universities, hospitals, prisons
- Municipal
  - Wastewater treatment facilities, K-12 schools
- Residential
  - Multi-family units, condos, planned communities

Policy and Regulatory Issues

- Standby Rates
- Utility Interconnection
- Inclusion in Portfolio Standards (clean energy and energy efficiency)
- Output-based Emissions Regulations
- Incentives and tax treatment

MN Efforts

- MN Dept. of Commerce – Division of Energy Resources
  - CHP stakeholder process
  - CHP action plan
- MN Public Utilities Commission
  - Generic docket on standby rates

MN CHP Action Plan

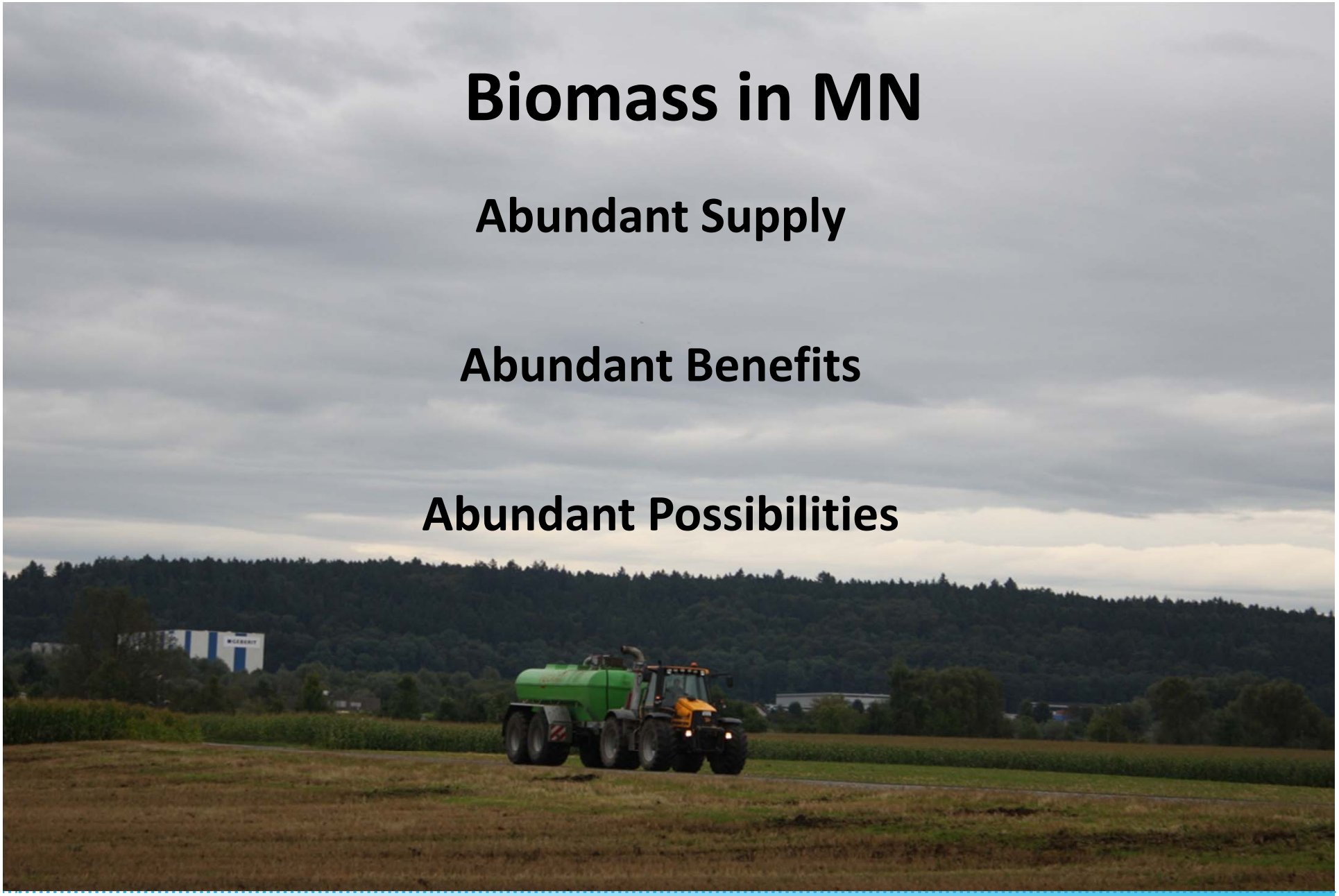
1. Establish a CHP **evaluation methodology** and criteria that would provide a fair, accurate, and comprehensive assessment and valuation of CHP projects.
2. Conduct an empirical study and granular analysis that would **map opportunities** for topping-cycle and bottoming-cycle CHP projects.
3. Address knowledge gaps and define options for CHP **education and training**.
4. Address a range of CHP **ownership problems and solutions** including utility resource planning, ratepayer risks, market power, and behind-the-meter operations.
5. Explore CHP supply-side investments as an eligible electric utility infrastructure (EUI) resource under the Conservation Improvement Program (CIP).
6. Introduce transparent, unbundled pricing for standby rates.

Biomass in MN

Abundant Supply

Abundant Benefits

Abundant Possibilities



Thank You!

More information:
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www.mnbioeconomy.org

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