

***WOOD BIOMASS MARKETS***  
***CURRENT STATUS & STATEWIDE USES***

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# PRESENTATION OUTLINE

- ❑ Current Wood Biomass Markets in the state
- ❑ Ramifications of the Changing Biomass Markets
- ❑ Wood Biomass Opportunities “ A Focus on the Positives”
- ❑ Realities and Recommendations
- ❑ Questions and Discussion

## The Big Hitters Industrial CHP + Power Gen

Plant	Operation	Total Wood Consumption	Forest Derived
Benson Power previously FibroMinn (*also burns turkey litter)	55 MW (net) power plant *2014 Numbers		
Rapids Energy	CHP – UPM-K 27 MW		
Hibbert	CHP – Verso 42MW		
SAPPI	CHP – SAPPI		
Laurentian Energy Authority	CHP - District heating @ 2 sites combined 66MW		
St. Paul DE	CHP – District heating 25MW electric 65 MW thermal		
Total	*Includes Residues, tops. Limbs, non merch. Green tons/yr.	*1,695,700	788,850

# Middle sized CHP

Plant	Operation	Total Wood Consumption	Forest Consumption
PCA- Boise	CHP * New in 2015 upgrade increased capacity *estimate		
Koda	CHP 23.4 MW		
Total	*Includes Residues, tops. Limbs, non merch. Green tons/yr.	*300,000	*10,000 + ?

## Other- known Large Commercial/Industrial Thermal Systems

Total known facilities approximately +/- 32

Roundwood consumption Wood Energy

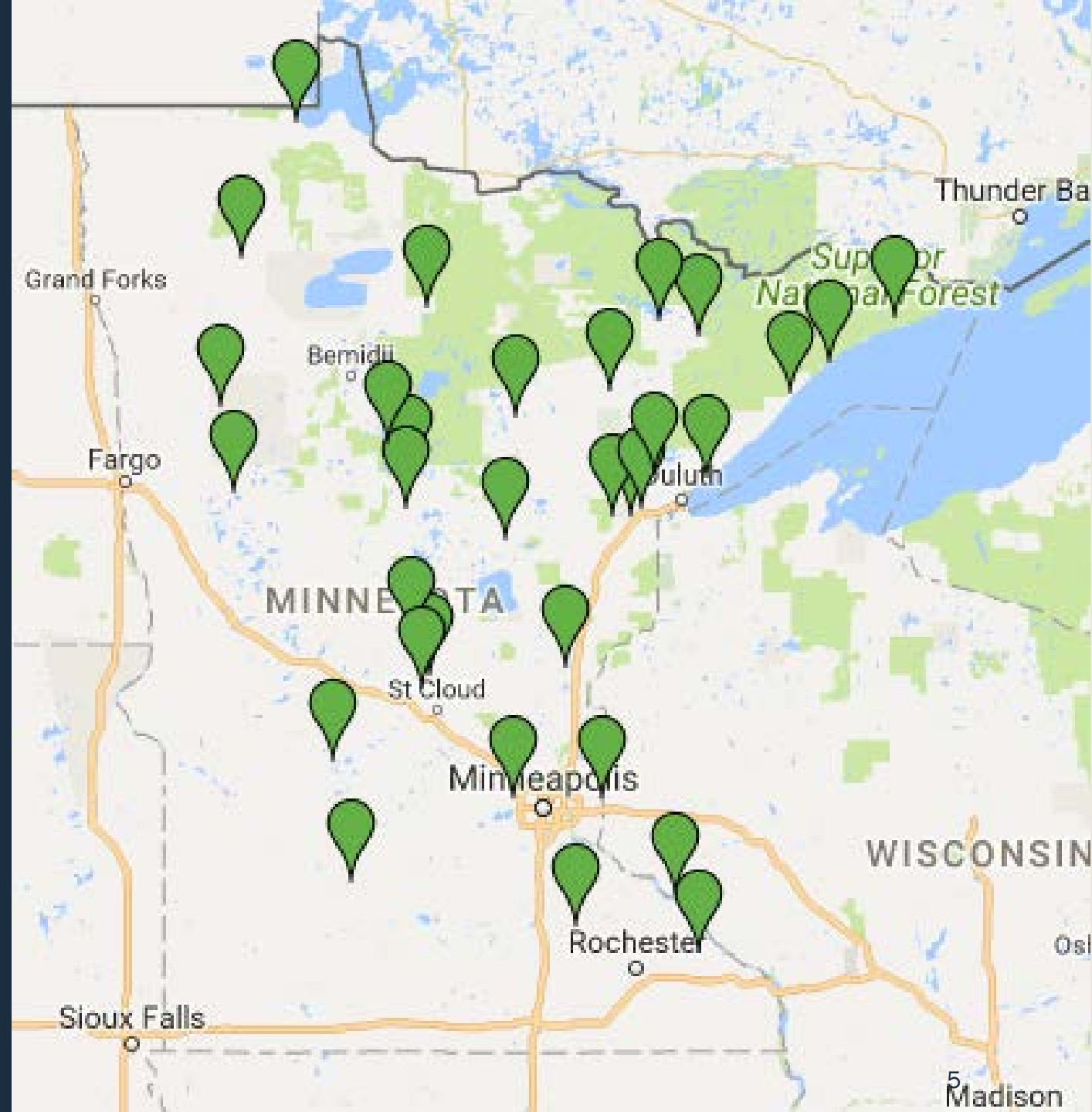
\*Residential fuelwood/Commercial 273,000 cords

\*\*Commercial facilities 55,000

Fuelwood/Industrial Wood Energy is about 9% of total annual roundwood consumption in the state.

\*Live trees on timberland

\*\*non-merch pulpwood size



# Who Drives Biomass Markets

## Large Industrial Commercial ( CHP)

- Can burn wet wood economically
- Consumes significant volumes
- Can typically burn chips, grindings and residues i.e. almost anything
- Baseload generation
- Scale of economy

## Commercial and Public Buildings (Thermal Heat)

- Seasonal
- Handling delivery and, storage issues
- Low volume consumers
- Multiple delivery points
- Systems not efficient with green wood
- Not economical for systems to utilize all types of wood fuel.
- No economy of scale.

# Wood Energy Policy

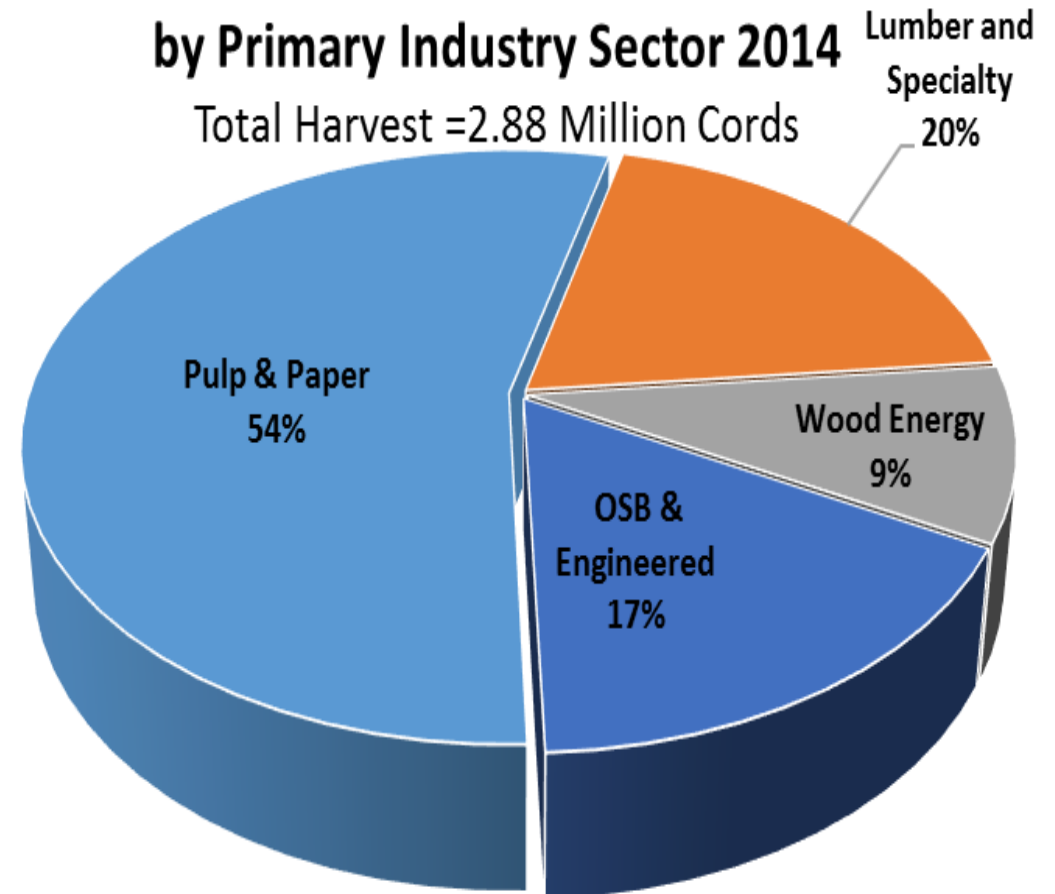
## *Legislative Action in Minnesota*

- NSP then Xcel Energy Mandate
- Renewable energy targets in lieu of dry cask storage at the Prairie Island Nuclear Facility
  - Required to solicit RFPs for renewable power
- 2007 MN Legislature – 25 X 25 passed with bipartisan support
- Target of 25% of electrical generation by 2025, higher for Xcel Energy – 30%

## Estimated Wood Use From Minnesota Timber Harvest

### by Primary Industry Sector 2014

Total Harvest = 2.88 Million Cords



# Minnesota Biomass Mandate

Xcel Energy must build or contract for 110 MW of electricity generated from biomass

- Must be farm-grown herbaceous crops, trees, agricultural waste, and aquatic plant matter to generate electricity, specifically excludes mixed municipal solid waste

## Power Purchase Agreements results of the Mandate RFP's:

- St. Paul District Energy ( 65 MW Thermal 25 MW Electric)
- Benson Power (FibroMinn) turkey-litter project (55 MW)
- Laurention Energy Authority (Virginia/Hibbing: Two municipal district energy cogeneration plants (combined 66 MW)

# The Impacts of the Loss of Benson Power as a Market



- One of the top Wood Biomass consumer in the state
- Single electric only producer in the State that relied on wood biomass
- Not attached to a facility (i.e. all open market purchases)
- Large market for sawmill residues
- Large consumer in an area already heavily impacted by other facility closures.
- Potential larger impact to private forest management in the area.
- Larger than average impact to suppliers for investments.
- Loss of the investment and infrastructure that is “one of a kind”

# The Impacts of the Loss of LEA as a Market



- Reduced opportunities to reduce hazardous fuels.
- Market to utilize undesirable unmarketable species.
- Impacts to suppliers who have geared their business to supply these markets.
- Had been a diversified market for a changed industry.
- Large consumer of “in-woods” forest residues.
- One of the largest consumers in the state of wood biomass.
- Stand alone facility not tied into residues from an adjacent facility.
- Loss of the infrastructure and investment that was made.

# Total Ramifications to the Changing Biomass Markets

- Disappearance of wood energy markets have ramifications to the industry
  - *Loss of markets for mill residues*
  - *Loss/reduction in logging and trucking infrastructure*
  - *Loss of available wood supply because sites won't get managed sites are now "non-marketable"*
  
- Disappearance of wood energy markets have ramifications to maintaining land as forested.
  - *The absence of low value markets inhibits the ability to generate income from harvest and landowners are forced to consider alternatives to ownership.*
  - *Other societal and environmental values of forest depend on forest staying forest.*
  
- Disappearance of wood energy markets have ramifications to Forest Management across all ownerships
  - *Decreased forest management less acres getting needed treatments- "poorer quality trees remain and represent the future forest condition".*
  - *More acres remaining in an unproductive state.*
  - *Undermanaged forests potentially lead to: greater susceptibility to wildfire, disease and storm damage*
  - *Costs are incurred vs. averted or minimized*
  - *The resource is now wasted energy vs. usable energy.*
  
- Wood energy/biomass represents substantial markets and renewable portfolio options in MN
  - *Appx. 350,000 cds (forest-derived, mostly tops and limbs,)*
  - *1.7% of MN's total renewable energy primarily as process steam and heat with some electrical. ( not stand alone base electric)*
  - *Loss of Benson Power, LEA over 60% of the market.*

# Opportunities

## Why not CHP at more Sawmills?

### Economics and ROI

- It is important to recognize that the initial cost of engineering, construction, and equipment is higher for biomass energy systems.
- Facilities with on-site maintenance capabilities that have year-round demand for steam or heat are excellent candidates for woody biomass energy.

### It already makes Sense..

- Forest Industry has already been doing this for decades....where it makes sense.
- Possible opportunity but limited in size and scope.

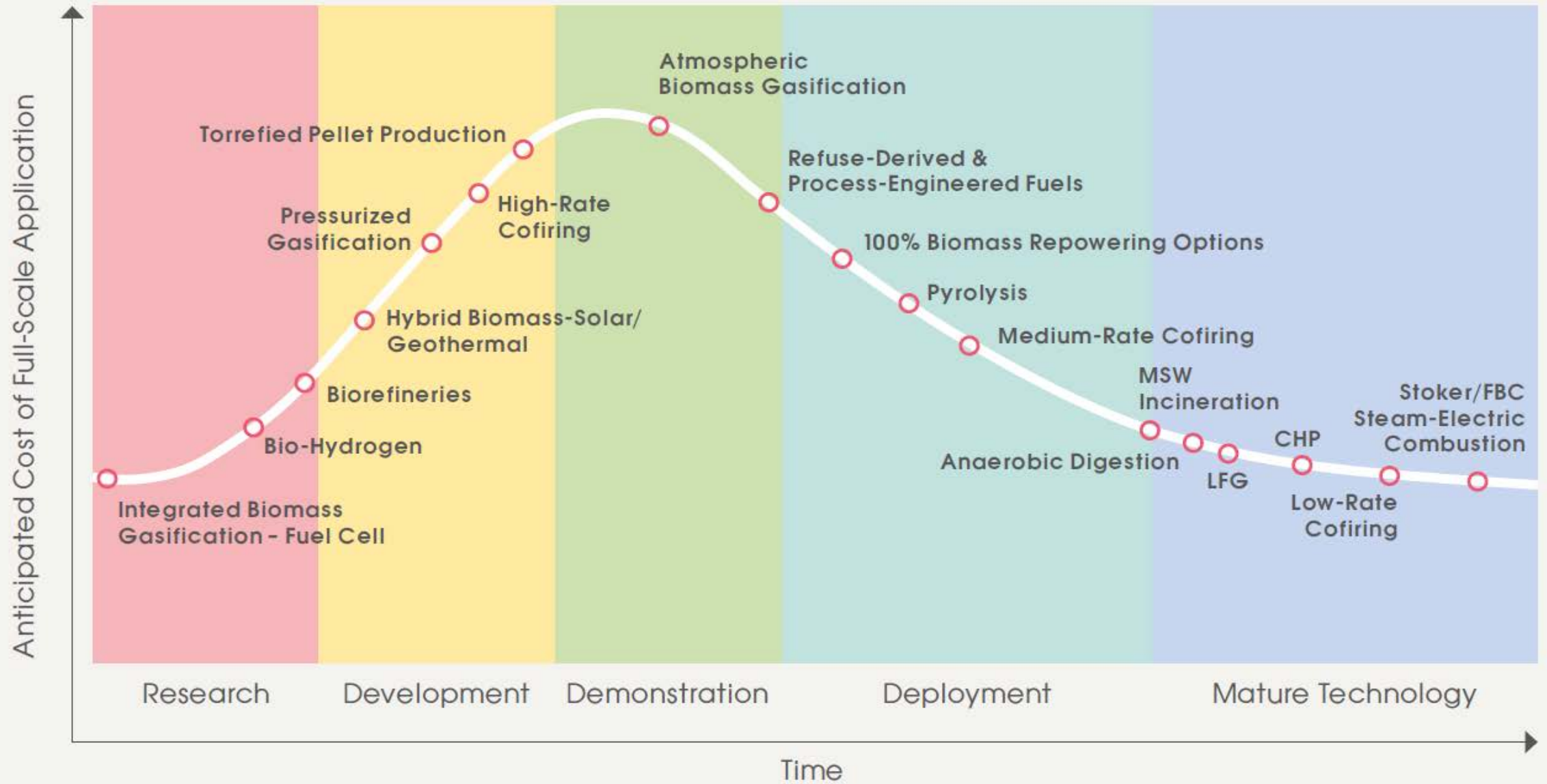


FIGURE 2.1: BIOMASS POWER GENERATION TECHNOLOGY MATURITY STATUS

# Thermal Application Opportunities

## Opportunities

- Fuels for Schools Programs
- District Heating Systems
  - *Municipalities/Hospitals*
  - *Campuses*
  - *Community Centers*
- Residential fuelwood use is on the rise
- Conversion of residential fossil fuel systems to wood biomass heat.

## Value from Local, Small Scale Thermal Wood Biomass Clusters

- Localized Economic Development
- Dollars spent on fuel stay in community (reduce export of energy dollars spent on fuel oil/propane)
- Energy security—local, renewable energy supply
- Help maintain forest health
- Support strong forest industry and supply chain, loggers
- Climate change mitigation goals

# Policy Influences

## Legislation Introduced

- A residential tax incentive for Minnesota homeowners to make biomass heating more competitive in the marketplace with non-renewable sources because wood biomass heating systems can cost twice the amount of similarly-sized fossil energy systems.
- As market penetration continues to increase, economies of scale will be achieved and this incentive can be scaled down or eliminated.

## Policy Ideas

- Expanding Conservation Improvement Program (CIP) goals and incentives to promote use of utility and non-utility owned CHP, including biomass thermally-led CHP
- Expanding the Renewable Energy Standard (RES) to include goals for CHP technologies and provisions for RES credit to encourage use of biomass thermal energy; and
- Require electric utilities to demonstrate they have considered CHP opportunities before building new generation capacity

Thank you to Gregg Mast of Clean Energy Economy MN



**BIO-BASED FEEDSTOCK**



**BIO-BASED PRODUCTS**



## Bioeconomy 101

The Bioeconomy refers to the conversion of bio-based feedstock (agricultural and forestry biomass, municipal and livestock waste) into bio-based products like biofuels, renewable chemicals, and heat.

Biofuels are fuels derived from renewable materials like corn and soy. Advanced biofuels are renewable fuels designated by the EPA under the Renewable Fuel standard to have lifecycle greenhouse gas emissions that are at least 50% less than gasoline. *Examples: cellulosic ethanol, biodiesel, butanol, biogasoline, biogas*

Biochemicals (or renewable chemicals) are chemicals, polymers, monomers, or plastics that are not sold primarily for use as food, feed, or fuel and are composed of at least 51% of bio-based feedstock. *Examples: plastics, PVC, 3D printing, specialty chemicals, household chemicals, fabrics, paint*

Biothermal is heat produced from biomass (living or recently living biological materials that can be used for fuel or industrial production). *Example: combusting solid biomass in a boiler to supply heat for a business*

BioCNG is compressed natural gas derived from biological sources, often through anaerobic digestion

Source <http://mnbioeconomy.org/bioeconomy/>

# Wood Cellulosic Bio Business Bio-Industry Opportunities

- Biochemical
- Biomaterials (bioplastics)
- Biofuels

## MN Drivers

### AGRI Bioincentive Program

- Advanced Biofuel
- Renewable Chemicals
- Biomass Thermal Energy

### BioEconomy Coalition

## Opportunities

- MN fourth in nation in ethanol production capacity could be synergy in co-location of facilities
- Midwest Research (Iowa) in small mobile units to do onsite processing.
- MSP is the 16th busiest U.S. airport for passengers and 15th for aircraft operations. It's also a base for hometown carrier Sun Country Airlines and Delta Air Lines' second largest hub.
- Institutions like NRRI and AURI
- Bioeconomy Coalition

# Wood Cellulosic Bio Business

## What Stage of development are we at?

### Status

- Sweetwater
- Segatis
- Others.....

### Main Challenges

- Established companies looking at sugar production (Furfural (synthetic resin), Glycols ( alcohol) and Xylitol (sugar substitute) concerned about competition of long-term feedstock, lack of commercialization.
- Renewable Chemical Companies issue is start-up capital and cost to ship to processors in the South.

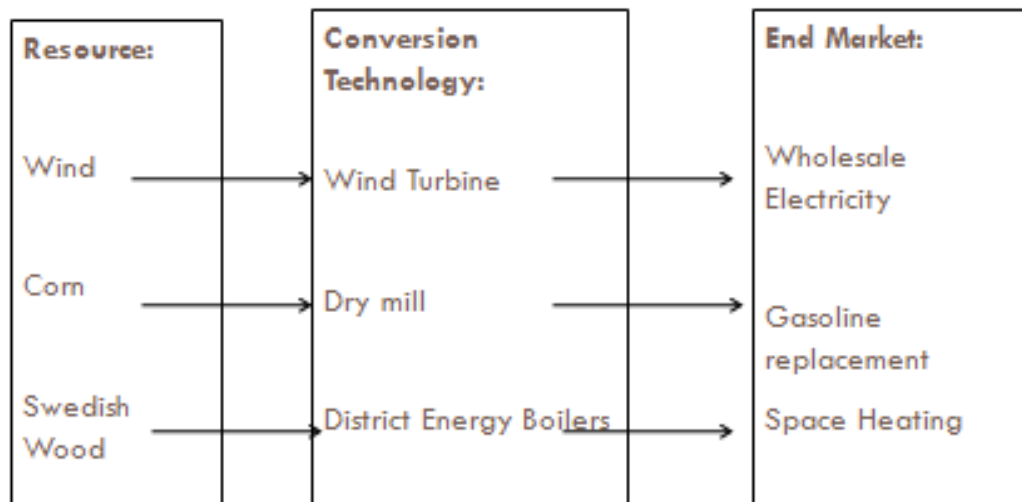
Thank you to Lisa Hughes of DEED

# Challenges (Opportunities) for BioIndustry Development

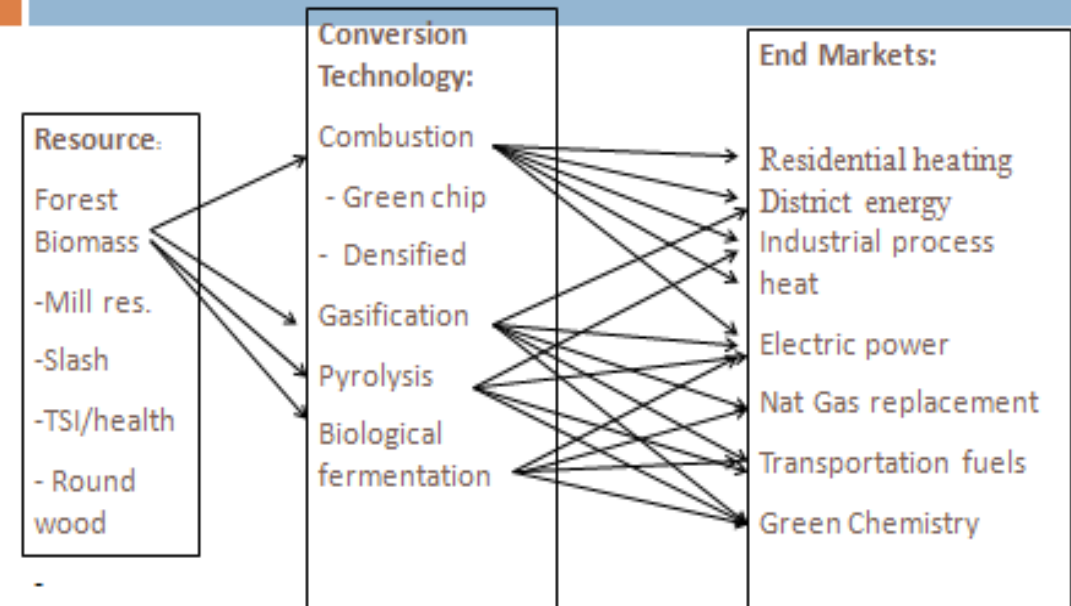
- Pick a Pathway.....

- Any pathway....

## Clarity – enables investment



## Complexity – limits investment



# What's going on now?

## Wood for energy, Power -Thermal application

- ✓ AURI/NRRI/CERT's/CEEM/EDA;s
- ✓ Legislative DEED Economic Analysis of Wood Biomass Impacts
- ✓ Interest in Fuels for Schools Program
- ✓ SWET Grant Work
- ✓ LCCMR Grants; Camp Ripley. ICC and Fond du Lac reservation
- ✓ Heating the Midwest Organization
- ✓ State Policy Work
- ✓ Project Stove Swap.

## ■ Wood for Products

### Wood Cellulosic Biobusiness Development

- ✓ NRRI/ Bio economy Coalition
- ✓ EDA's/State Agencies
- ✓ Projects
- ✓ Incentives

# Where do we go from here?

Challenging to “marry”  
technology, policy, opportunity,  
financing and entrepreneurs

- Recommendations
  - *Seek Industry Partners- opportunities for grants and business development.*
  - *Policy Work continue promoting state incentives and funding for research and emerging technology commercialization*
  - *Remain proactive and connected*

# Conclusions

- Potential for wood biomass in MN thermal energy market. Fuel price is cost competitive even against low fossil fuel prices. Capital investment wood biomass system cost is the challenge.
- Bioenergy benefits- “tell the story” education and outreach create buy in that wood biomass can significantly increase the amount of money kept locally in communities, can be used 365 days a year under any environmental condition, promotes more jobs than other renewable energy sources, is carbon cycle neutral and has lower carbon emissions when burned.
- There's more than enough biomass available on the landscape to source several district heating systems or a few co-fired plants or wood biomass electric plants ( sized and placed appropriately) in Minnesota.
- Forest products industry is largely supportive of bioenergy IF it complements and doesn't displace wood products manufacturing jobs. Bioenergy succeeds under a healthy forest products industry
- State policy needs a clear path and a push forward to show lawmakers and the public the rural economic benefits and role wood biomass can play in renewable energy.

# Thank You

# Questions?

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U&M website; <http://www.dnr.state.mn.us/forestry/um>

# Wood Biomass Market “pluses”

## Discussion of Recommendations to Improve Wood Biomass Markets

- We have a renewable resource opportunity
- We have an infrastructure but it has really been “challenged” in the last decade by facility closures and market losses.
- We have a positive “story to tell”
- Safeguards in place to guide this development sustainably
  - *Biomass Harvest*