Heating the Midwest with Renewable Biomass
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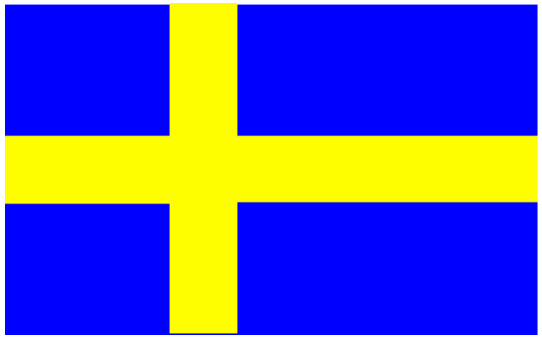
Gränna, Sweden

Minnesota & Sweden Similarities

- No domestic natural gas production
- Abundant Forests—wood resource
- Greenhouse Gas Reduction goals
  - Minnesota 15% by 2015, 30% by 2025; 80% by 2050
  - Sweden carbon neutral by 2050



- Population: Sweden (9+ million); MN & Wisconsin combined (11 million)

Minnesota & Sweden Differences

SWEDEN

- Carbon tax
- Binding CO2 reduction goals

MINNESOTA

- GHG reduction goals but no implementation mechanism
- Biomass Sustainability Safeguards

Sweden Energy Mix

Sustainable Sweden

- Over 47% of all energy from renewable sources
- 1/3 of energy from bioenergy

Sweden timetable

- Carbon neutrality by 2050
- 40% reduction in carbon footprint by 2020
- 50% renewables by 2020
- No fossil fuels in transportation by 2030
- EU goals for GHG reduction, energy consumption reduction, renewables also drive markets

Sweden Policy Drivers

- CO2 tax (1991) and energy taxes
- Emissions trading
- Tradeable green certificates for renewable electricity production
- Tax exemptions for biofuels

Sweden's District Energy Success Story

- 1970's highly dependent on imported oil
- Over 500 district energy heating systems in Sweden--
  - Late 1970's: 90% fueled by heating oil
  - 2010: 70% fueled by biomass
- Swedish model of community scale district energy systems

Many Examples

- Klevshult, Sweden: Jernforsen Energi--6 MW heating plant using locally-produced wood waste such as bark, sawdust, and wood chips.
- Gränna, Sweden: mid-sized heating plant utilizing wood chips--two 2 MW boilers along with a flue gas condensation unit operate at the heart of the plant.

Minnesota's Biomass Sustainability Safeguards

- MN Master Logger Program
  - Master Logger Education
  - Certification program: third-party audited certification of a logging operation's business and harvest practices.
- Majority of MN's Forests maintain dual Third Party Certification (SFI and FSC)
- Sustainable Biomass Harvesting Guidelines

Minnesota was first U.S. state to have sustainable biomass harvesting guidelines

- *Biomass Harvesting Guidelines* were developed in 2007 by the Minnesota Forest Resources Council (MFRC)
- Required for state and county forests, certified forests but voluntary for others.
- Can be used as marketing tool

- **Recommended** that **33% of fine woody debris and brush is retained** on-site during biomass harvesting to sustain forest biodiversity, soil health, and wildlife habitat.

Biomass guidelines protect:

- **Cultural resources**
- **Soils**
- **Riparian Areas**
- **Water quality, quantity, wetlands**
- **Wildlife Habitat**
- **Native Plant Communities**

Biomass guidelines help reduce:

- **Rutting and soil depression**
- **Soil compaction and erosion**
- **Nutrient depletion**
- **Nonpoint source water pollution**
- **Sensitive site disturbance**
- **Loss of habitat**

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

Projects include:

- St. Paul District Energy (next 4 slides)
- Fibrominn turkey-litter project (55 MW)
- Virginia/Hibbing: Two municipal district energy cogeneration plants (combined 66 MW)

St. Paul Cogeneration – Combined Heat & Power

- 65 MW thermal and 25 MW of electricity
- Renewable, clean, urban wood residue
- Greenhouse gas CO_2 reduced up to 280,000 tons per year

Integration of Biomass

St. Paul District Energy

- Up to 300,000 tons/year
- Clean wood waste diverted from landfills
- Created new industry for collecting and processing wood
- Up to $12 million annually put into local economy

Biomass – Where does it come from?

St. Paul District Energy

- Wood residuals from manufacturing processes
- Construction waste/clean dimensional lumber
- Urban and park tree trimmings
- Storm and disease damaged trees
  - Example: Emerald Ash Borer
- Trees removed as part of a timber management plan/restoration

Largest Solar Thermal in MN

St. Paul District Energy

- **1 MW** solar thermal provides hot water and heat to convention center & hockey arena in St. Paul
- Excess goes to District Energy system heating and cooling State Capitol & downtown with biomass (wood)

Propane to Biomass Potential

- Most Minnesotans use natural gas for heat but…
- Over 750,000 Minnesota households are NOT connected to natural gas, a large portion of those use propane
- For residential biomass system, potential 12-26% cost savings compared to propane depending on size of type of system

New Biomass Heating Projects

- Grand Marais
- Ely
- Other communities
- Small scale—no natural gas access—locally sourced wood—build on existing sawmill/logging industry

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

Thank you!

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