

# Growing the Bioeconomy: Solutions for Sustainability

Opportunities for Minnesota

Saint Paul, MN

December 2, 2009

## IDENTIFYING EFFECTIVE BIOMASS STRATEGIES

---

Quantifying Minnesota's Resources and Evaluating Future  
Opportunities

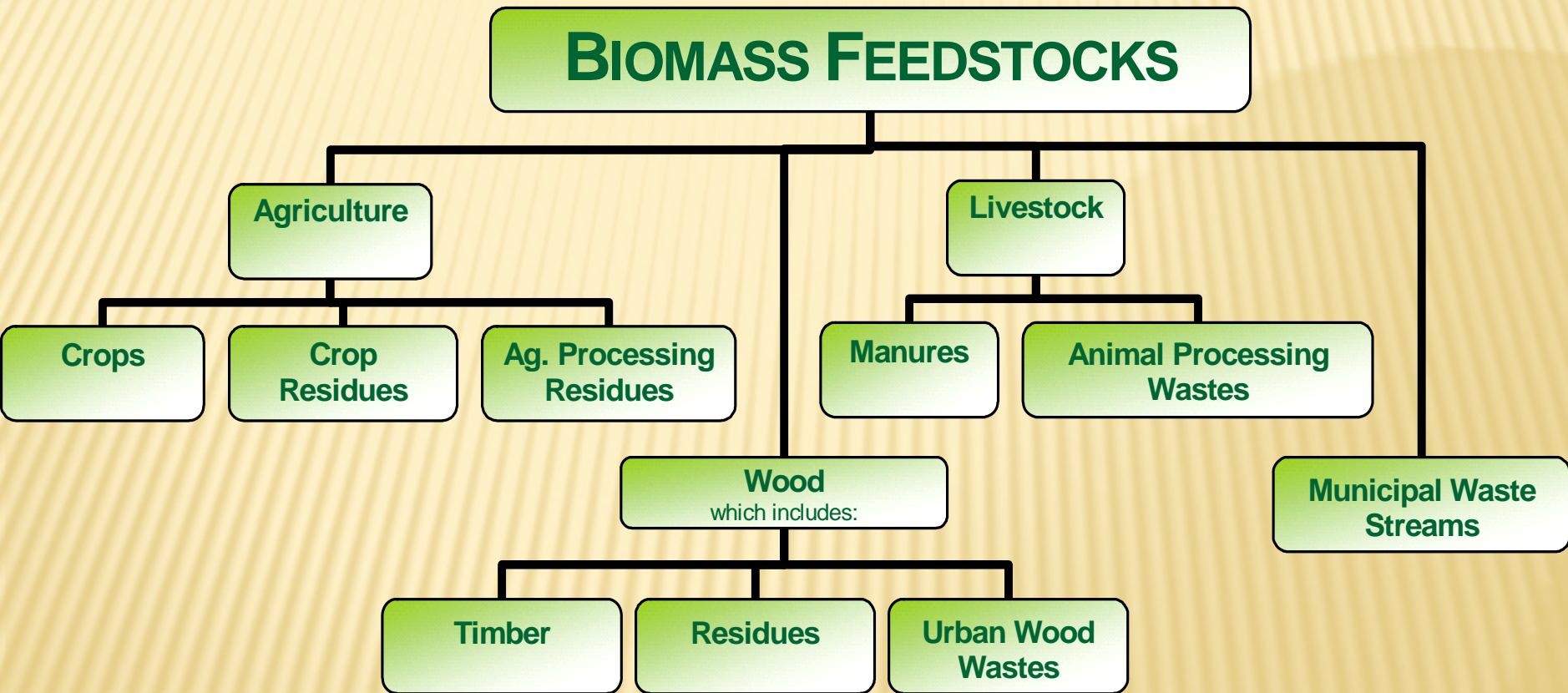
Presented by:  
Keith R. Butcher

# PROJECT BACKGROUND

---

- ✘ Conducted by the Center for Energy and Environment and funded by Xcel Energy
- ✘ Audience
  - + Policy Makers and Project Evaluators
- ✘ Mission
  - + Conduct a statewide evaluation of biomass resources
  - + Describe current processing technologies
  - + Understand the existing infrastructure
- ✘ Goal
  - + Establish a framework to evaluate and compare diverse projects
  - + Bridge the gap between industries
- ✘ Outputs
  - + Final Report
  - + BioPET (BioPower Evaluation Tool)
  - + *gopher* (aka SkyView)

# FUEL CHARACTERISTICS



# AVAILABILITY AND PROCESSING

---

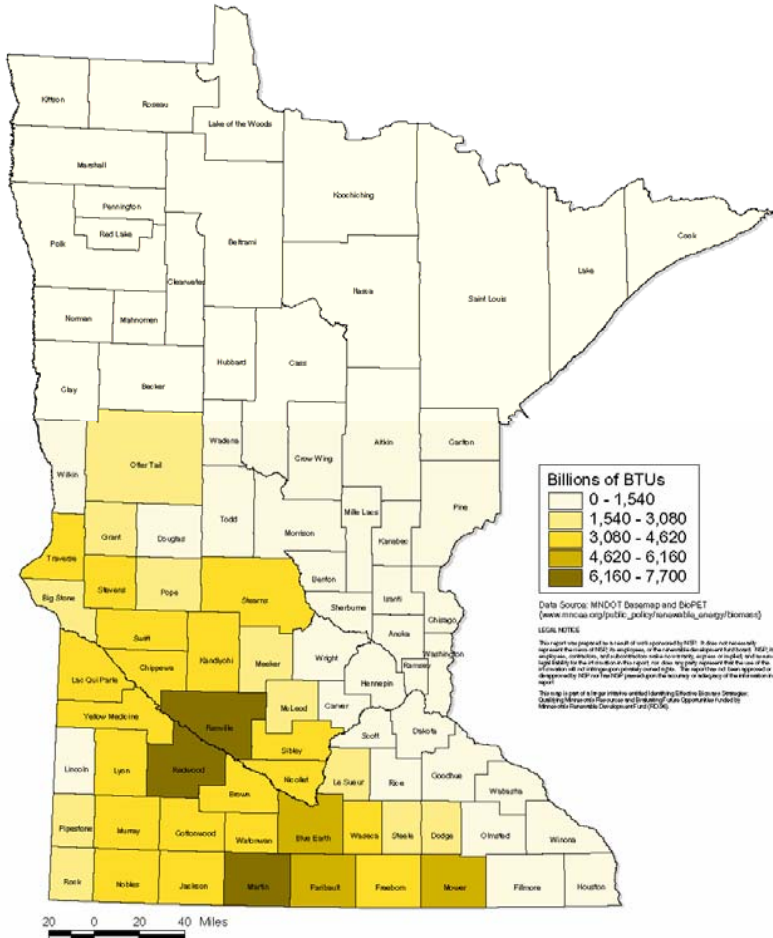
## ✘ Assessment

- + Energy Content and other Physical Characteristics
- + Estimated volumes by county
- + Estimated processing costs
- + Estimated delivery costs

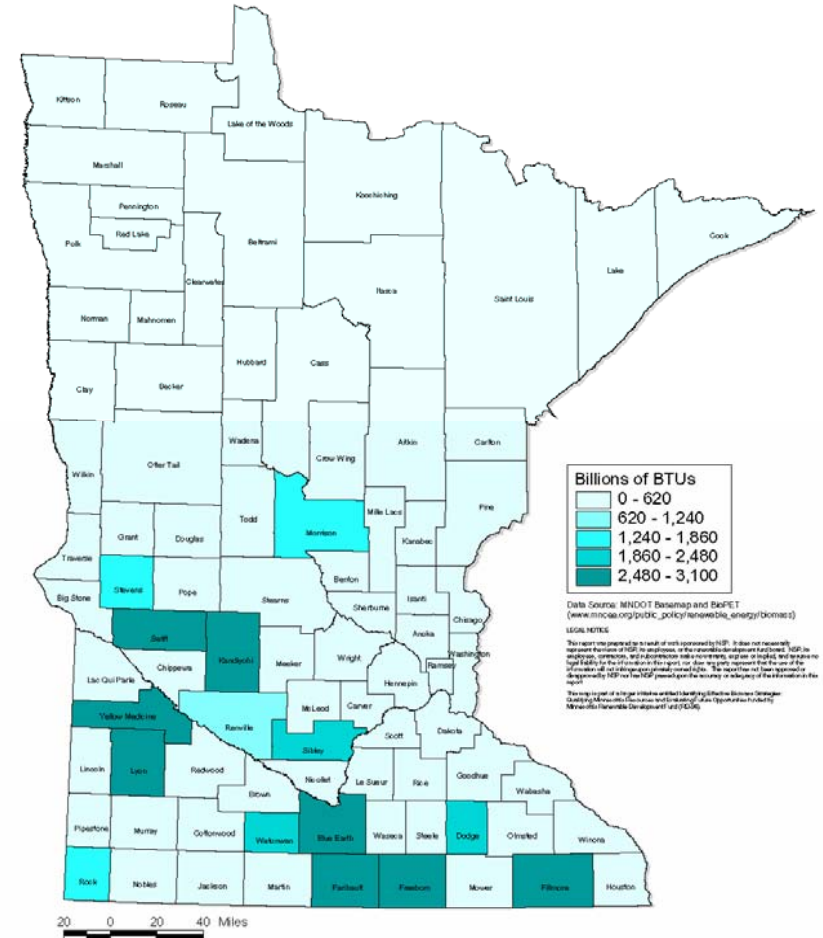
## ✘ From Theoretical to Technical to Economic Availability

# SAMPLE MAPS

Identifying Effective Biomass Strategies in Minnesota  
**Corn Stalks**  
 Energy Content by County

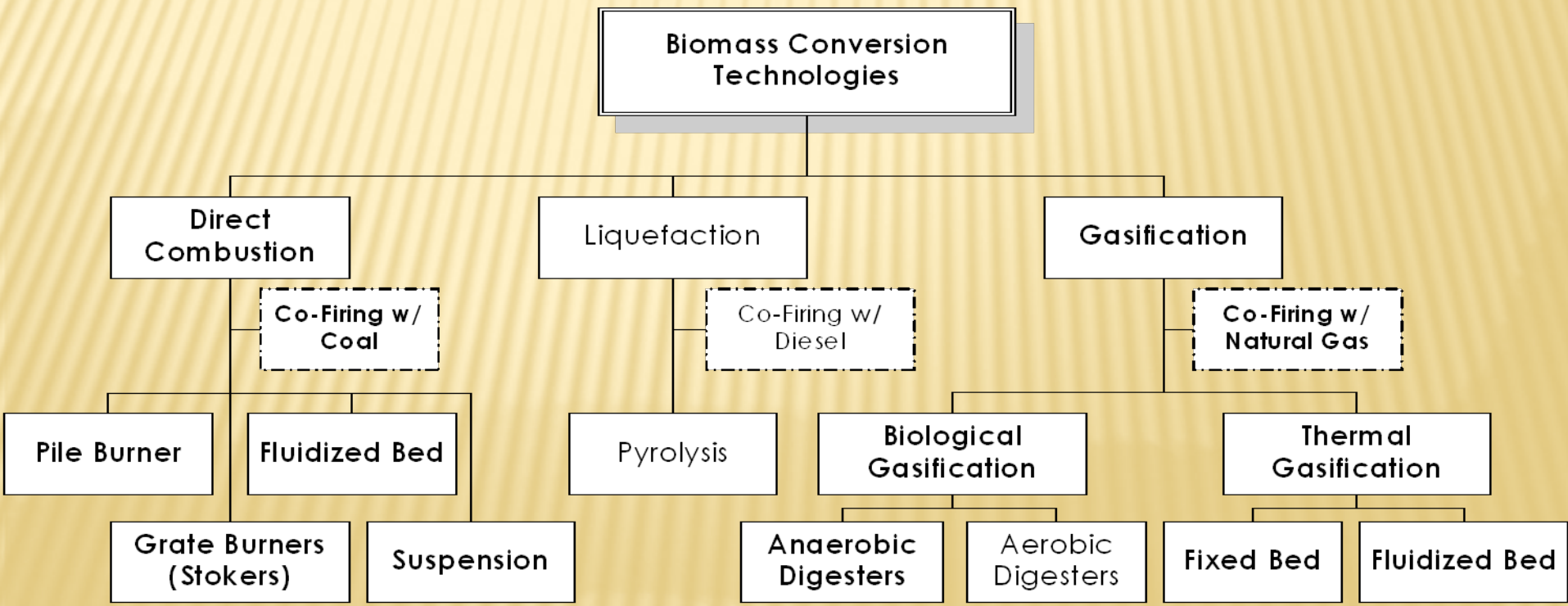


Identifying Effective Biomass Strategies in Minnesota  
**Ethanol DDGS**  
 Energy Content by County



# ENERGY CONVERSION TECHNOLOGIES

- ✘ Summary of different types and examples
- ✘ Issues to be aware of
- ✘ Discussion of Research Areas



# POLICY INITIATIVES

---

- ✘ 1994 Biomass Mandate
- ✘ Economic Development Programs and Issues
- ✘ Community Based Energy Development (C-BED)
- ✘ Minnesota's Renewable Energy Standard

# ECONOMIC EVALUATION

## ✘ Bio-Power Evaluation Tool (BioPET)

- + Define Fuel Delivery Path
- + Scenario Generation
- + Sensitivity Analysis

## ✘ Output

- + ¢/kWh
- + \$/kW

**Navigation Bar**

- Main
- Directory
- Feedstock
  - Availability
  - Defaults
- Processing
- Storage
- Power Plant
- Power Plant
  - Expenses
  - Financing
- Project Summary
- Logs
  - Feedstock
  - Power Plant
  - Project

## BioPower Evaluation Tool

Main

**Worksheets**

- Step 1) Define and Save Feedstock Scenarios
- Step 2) Define and Save Power Plant Scenarios
- Step 3) Evaluate and Save Project Summaries

**Tools**

- User's Manual
- Scenario Logs
  - Feedstock
  - Power Plant
  - Project

**Resources**

- Minnesota Directory

**Internet Links**

- Xcel Energy's Renewable Development Fund
- CEE Reports

Center for Energy and Environment

This tool is intended only to provide general guidance in estimating costs of various biomass feedstocks and technological strategies. The tool provides a comparative analysis of various biomass strategies and not necessarily an accurate estimate of actual final costs.

### LEGAL NOTICE

This tool was prepared as a result of work sponsored by NSP. It does not necessarily represent the views of NSP, its employees, or the renewable development fund board. NSP, its employees, contractors, and subcontractors make no warranty, express or implied, and assume no legal liability for the information in this report; nor does any party represent that the use of this information will not infringe upon privately owned rights. This report has not been approved or disapproved by NSP nor has NSP passed upon the accuracy or adequacy of the information in this report.

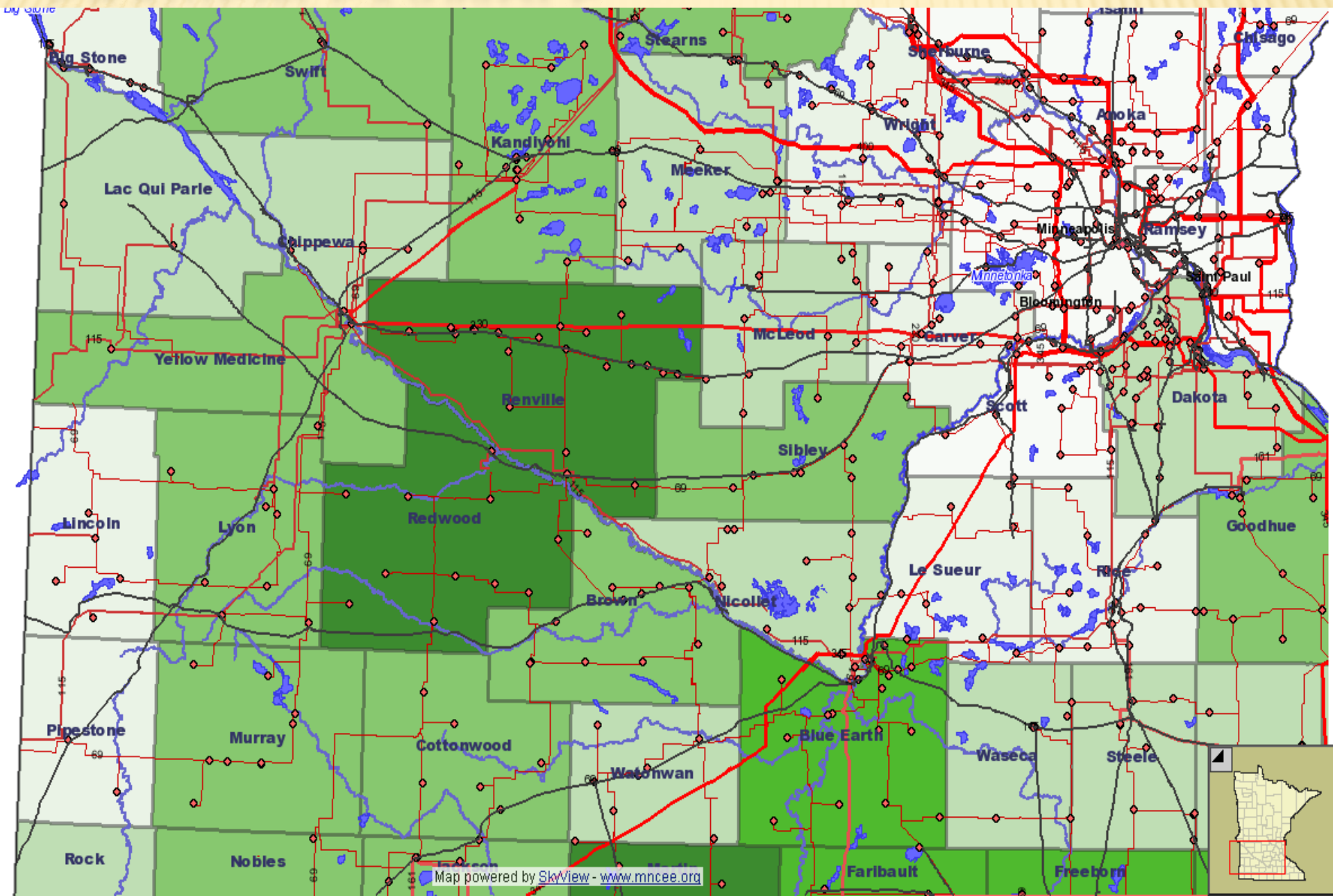


# *gopher* (aka **SKYVIEW**)

---

- + GIS Functionality
- + Resources
- + Infrastructure
- + Institutional Boundaries

# SKYVIEW EXAMPLE



# OVERCOMING BARRIERS

---

## ✘ Cost

- + Competition for fuels
- + Securing Long-Term Fuel Supplies
- + Financing and Permitting

## ✘ Legislative and Regulatory

- + Broad and Narrow Policy Measures
- + Facilitating the Regulatory / Project Development Process
- + Sustainability

# RESOURCES

---

- ✘ Center for Energy and Environment ([www.mncee.org](http://www.mncee.org))
  - + Click on “Biomass Resources”
- ✘ Xcel Energy ([www.xcelenergy.com](http://www.xcelenergy.com))
  - + Click on “Company” ; “Environment” ; “Renewable Development Fund”

*Stop by the Center for Energy and Environment's booth to see a live demonstration of SkyView*