

# Dispersed Renewable Generation Transmission Study

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## Phase II - Webinar Public Presentation

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# Webinar Overview

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- Introduction
- DRG Study Requirements
- DRG Study Phase I - Findings & Update
- DRG Phase II
  - Public Comments
  - Initial Scoping Ideas
  - Schedule
- Response to Webinar Questions



# DRG Study Requirements

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Analyze transmission impacts of 1200 MW of new dispersed renewable generation located statewide

## Two phases

- Study Phase I: 600 MW
  - Report by OES due June 15, 2008
- Study Phase II: 600 MW
  - Report by OES due September 15, 2009





# DRG Legislation

## (Next Generation Energy Act of 2007)

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### Sec. 17. **STATEWIDE STUDY OF DISPERSED GENERATION POTENTIAL.**

Subdivision 1. **Definition.** "Dispersed generation" means an electric generation project with a generating capacity **between ten and 40** megawatts that utilizes an "**eligible energy technology**," ....

Subd. 2. **Study participants.** **Each electric utility subject to Minnesota Statutes, section 216B.1691, must participate** collaboratively in conducting a two-phase study of the potential for dispersed generation projects that can be developed in Minnesota.



# DRG Legislation - Continued

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Subd. 3. **First phase study content; report.** In the first phase of the study, participants must analyze the impacts of the addition of a total of **600 megawatts** of new dispersed generation projects distributed among the following Minnesota electric transmission planning zones: the *Northeast* zone, the *Northwest* zone, the *Southeast* zone, the *Southwest* zone, and the *West-Central* zone.

Study participants must use a **generally accepted 2010 year transmission system model** including all transmission facilities expected to be operating in 2010.

The study must take into consideration regional projected load growth, planned changes in the bulk transmission network, and the long-range transmission conceptual plan being developed under Laws 2007, chapter 3, section 2.



# DRG Legislation - Continued

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In determining locations for the installation of dispersed generation projects that consist of [wind energy conversion systems](#), the study should consider, at a minimum, [wind resource availability](#), [existing and contracted wind projects](#), and [current dispersed generation projects](#) in the Midwest Independent System Operator interconnection queue.

The study must [analyze the impacts of individual projects and all projects in aggregate](#) on the transmission system, and [identify specific modifications to the transmission system](#) necessary to remedy any problems caused by the installation of dispersed generation projects, including [cost estimates for the modifications](#).

The study must analyze the additional dispersed generation projects [connected at the lowest voltage level](#) transmission that exists in the vicinity of the projected generation sites.

A preliminary analysis to identify transmission system problems must be conducted with the projects installed at initially selected locations.



# DRG Legislation - Continued

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The technical review committee may, after reviewing the locations selected for installation, recommend moving the installation sites once to new locations to reduce undesirable transmission system impacts.

The commissioner of commerce must submit a report containing the [findings](#) and [recommendations](#) of the first phase of the study to the commission no later than [June 15, 2008](#).



# DRG Legislation - Continued

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Subd. 5. **Technical review committee.** Prior to the start of the first phase of the study, the commissioner of commerce must appoint a technical review committee consisting of between ten and 15 individuals with experience and expertise in electric [transmission system engineering](#), [renewable energy generation](#) technology, and [dispersed generation](#) project development, including representatives from the federal [Department of Energy](#), the [Midwest Independent System Operator](#), and [stakeholder interests](#).

The technical review committee [must oversee both phases](#) of the study, and must:

- (1) make recommendations to the utilities regarding the [proposed methods and assumptions](#) to be used in the technical study;
- (2) in conjunction with the appropriate utilities, [hold public meetings](#) on each phase of the study in each electricity transmission planning zone prior to the [beginning of each phase](#) of study, [after the impact analysis is completed](#), and [when a draft final report](#) is available;





# DRG Legislation - Continued

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The **technical review committee** must oversee both phases of the study, and must:

(3) establish procedures for handling **commercially sensitive information**; and

(4) **review** the **initial** and **final drafts** of the study and **make recommendations** for improvement, including problems associated with the interconnections among utility systems that may be amenable to solution through cooperation between the utilities in each zone.

During each phase of the study, the technical review committee may recommend that the installation of dispersed generation projects be moved to new locations that cause fewer undesirable transmission system impacts.

# DRG Study Status

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- OES Appointed TRC in July 2007
- Phase I was completed June 2008
- Phase II begins Nov 2008
- Scoping process is underway





# Key Results of AC Analysis

## Statewide Aggregation

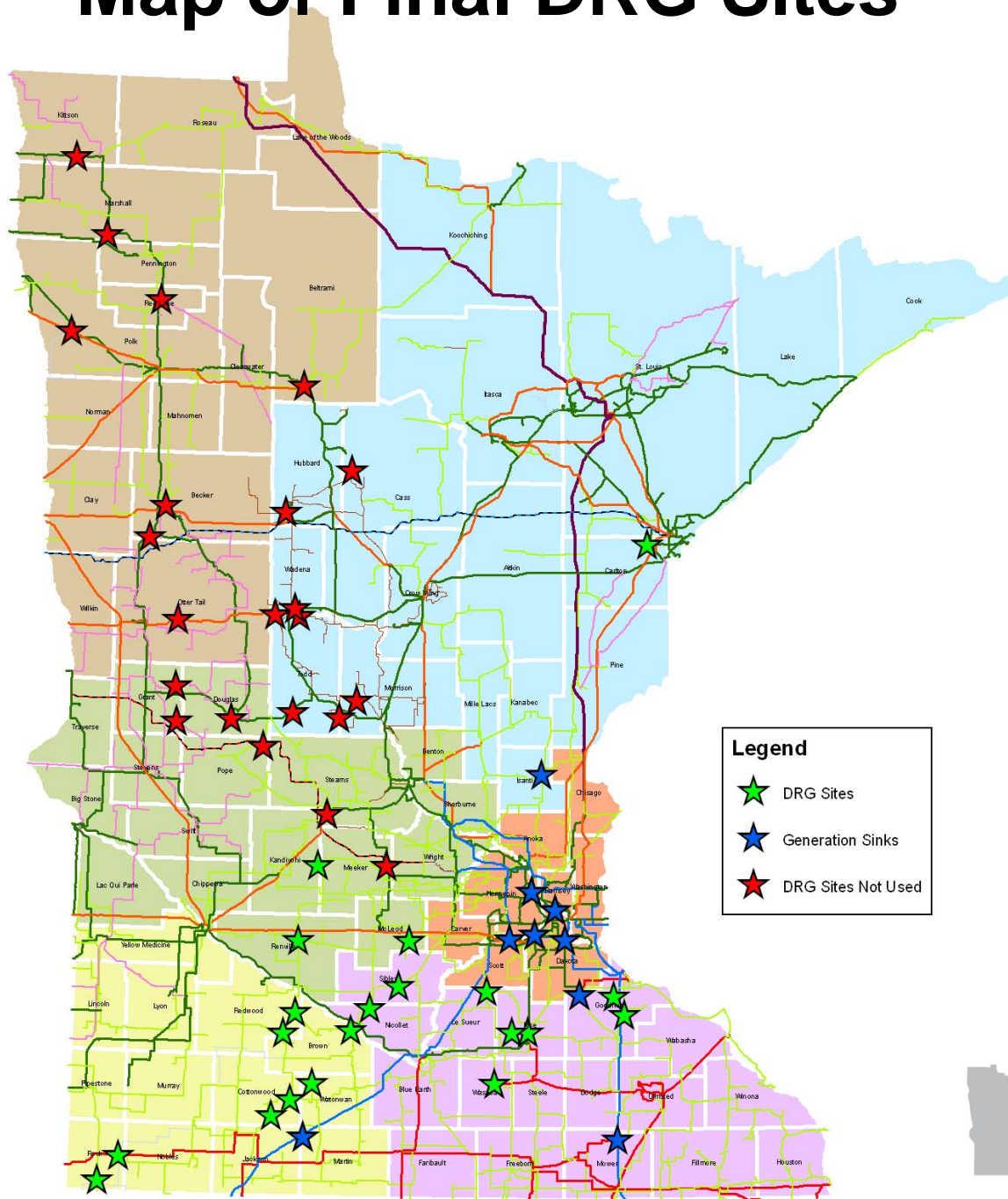
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Zone	Name	Single Site (MW)	Zone (MW)	Zone	Name	Single Site (MW)	Zone (MW)
NW	Viking	0	0	NE	Little Sauk	0	40
	Silver Lake	0			RDO	0	
	Plummer	0			Aldrich (Verndale)	0	
	Halma	0			Bertram	0	
	Cormorant	0			Walker	0	
	Crookston	0			Hewitt	0	
	Audubon	0			Aldrich	0	
	Bemidji Airport	0			Flensburg	0	
					Cloquet	40	
					<div>Statewide Total600 MW</div>		
Zone	Name	Single Site (MW)	Zone (MW)				
W-C	West Port	0	100				
	Swan Lake	0					
	Paynesville	0					
	Hoffman	0					
	Glencoe Municipal	40					
	Erdahl	0					
	Birds Island	40					
	Atwater	20					
	Alexandria	0					
				<div>Statewide Total600 MW</div>			
Zone	Name	Single Site (MW)	Zone (MW)				
SW	Sveadah	19	160				
	Steen	21					
	New Ulm	21					
	Mountain Lake	21					
	Morgan	21					
	Magnolia	16					
	Lakeside Ethanol	21					
	Brookville	19					
				<div>Statewide Total600 MW</div>			
Zone	Name	Single Site (MW)	Zone (MW)				
SE	Waseca	39	300				
	Vasa	39					
	New Prague	39					
	Lafayette	29					
	Goodhue	39					
	French Lake	39					
	Crystal Food	39					
	Airtech	39					



# Map of Final DRG Sites

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# Summary

- The analysis successfully demonstrated a DRG scenario where 600 MW could be sited without significantly affecting any transmission infrastructure.
- Extensive study and analysis showed that even dispersed generation can have substantial impacts on the electric grid.
- This study report represents a snapshot in time and is only a representative of the results which may be discovered during more extensive analysis.
- DRG developers need to contact the local utility to examine opportunities for DRG site selection and foster coordination for further study work and/or interconnection requirements.
- There may be existing interconnection requests in a utility queue or MISO queue that might occupy these potential DRG sites.





# DRG Study Phase 1 Study

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The full report is posted on the MN Department of Commerce Website and can be located with the following steps:

1. Go to [www.energy.mn.gov](http://www.energy.mn.gov)
2. Type “DRG” in the search box in the upper right-hand corner and hit enter.
3. Click the first link titled “Minnesota Commerce: Dispersed Renewable Generation Study”

# Response to DRG Phase I

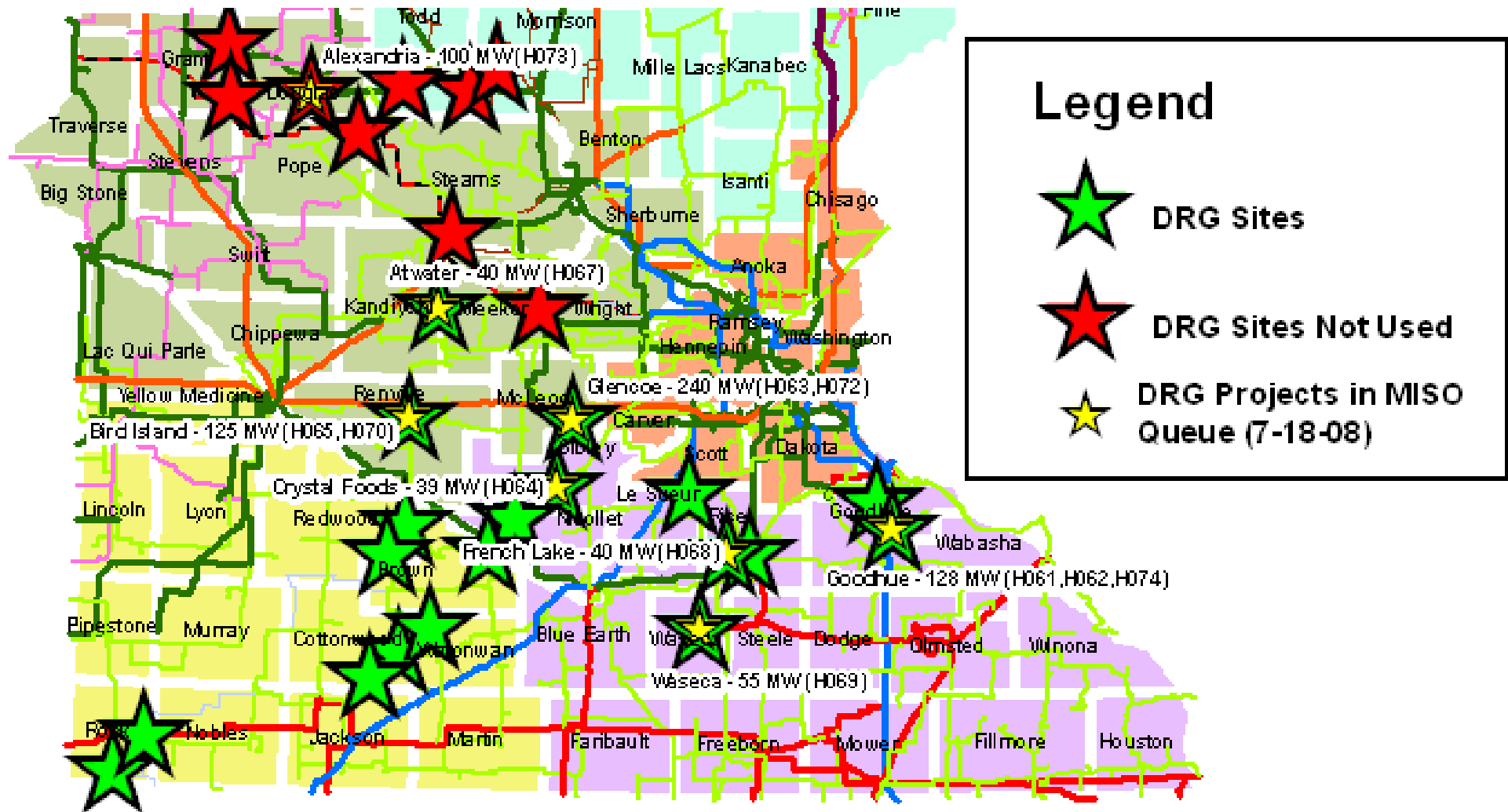
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- MISO Queue Requests since June 16.
  - 11 Interconnection Requests at DRG sites
  - All Wind Plants
  - Total of 667 MW



# Response to DRG Phase I

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# Additional Analysis of DRG Phase I <sup>17</sup>

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- MISO Queue Analysis of Final 20 Sites

The method of examination of the interaction between the final 20 DRG sites and the prior MISO generation queue **requests earlier than June 16, 2008** is as follows:

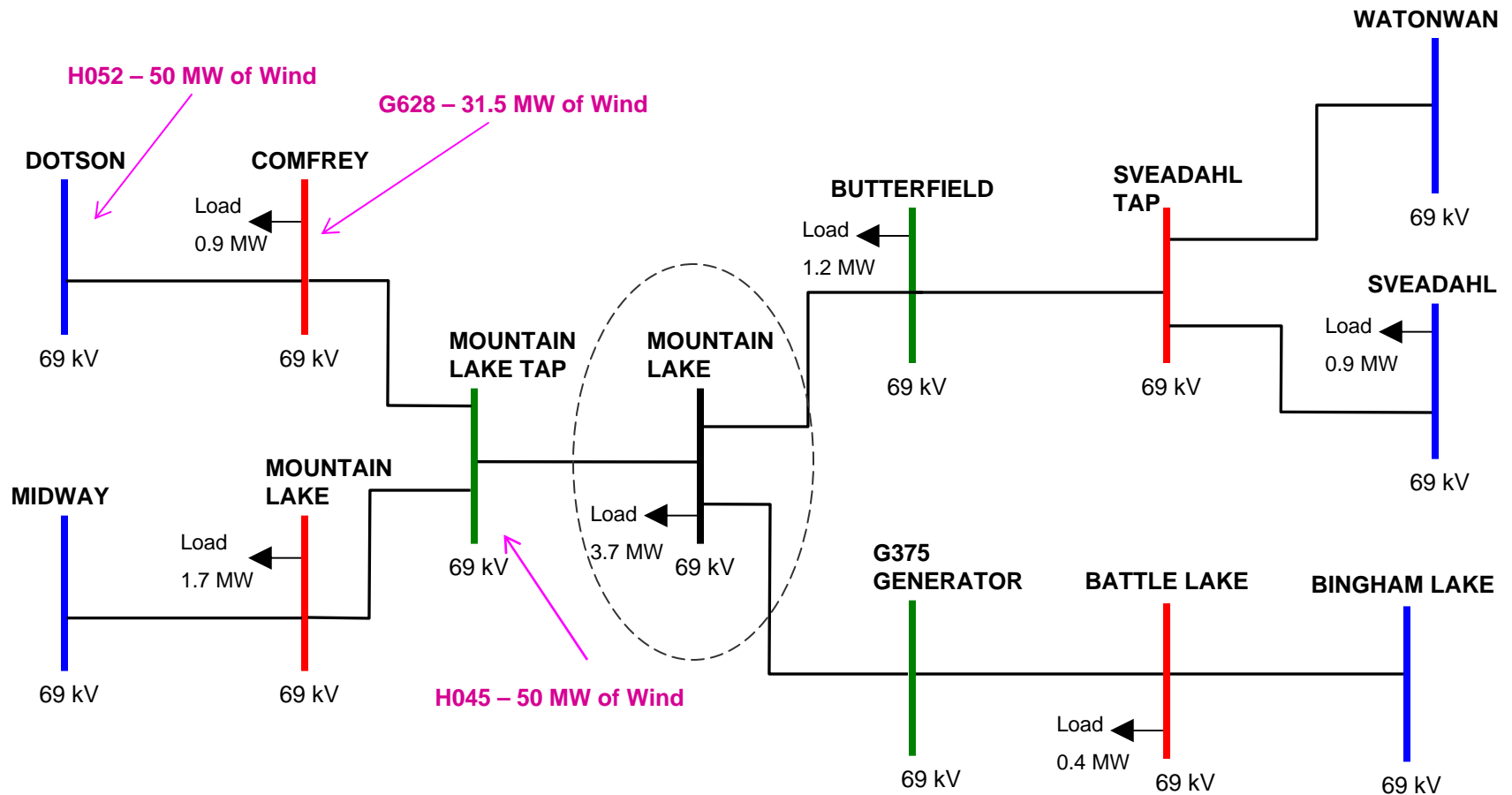
At each Final 20 DRG sites:  
number of requests & total MW:

1. within 1 electrical bus
2. within 2 electrical buses (excluding within 1 bus)
3. within 3 electrical buses (excluding within 1 & 2 buses)
4. within the same county (excluding steps 1- 3)
5. within the adjoining counties (excluding steps 1- 4)

# MISO Queue Analysis of Final 20 Sites

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## Example - Mountain Lake Site



# MISO Queue Analysis of Final 20 Sites

## (Prior to June 16, 2008)

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DRG Site Name	Bus Voltage (kV)	County	Planning Zone	MW within 1 bus (# of projects)	MW within 2 buses (# of projects)	MW within 3 buses (# of projects)	MW in County (# of projects)	MW in Adjoining Counties (# of projects)	Total MW from steps 1-5 (# of Projects)
Airtech	115	Rice	SE	300 (1)	0 (0)	134 (3)	0 (0)	6711 (12)	7145 (16)
Atwater	69	Kandiyohi	WC	20 (1)	0 (0)	20 (1)	20 (1)	411 (15)	471 (18)
Bird Island	69	Renville	WC	0 (0)	0 (0)	0 (0)	0 (0)	1021 (12)	1021 (12)
Brookville	69	Redwood	SW	0 (0)	50 (1)	32 (1)	120 (3)	1649 (16)	1851 (21)
Cloquet	115	Carlton	NE	0 (0)	0 (0)	0 (0)	0 (0)	50 (1)	50 (1)
Crystal Food	69	Sibley	SE	0 (0)	0 (0)	20 (1)	0 (0)	3000 (2)	3020 (3)
French Lake	69	Rice	SE	0 (0)	0 (0)	0 (0)	340 (2)	6711 (12)	7051 (14)
Glencoe Municipal	115	McLeod	WC	0 (0)	0 (0)	0 (0)	0 (0)	2123 (5)	2123 (5)
Goodhue	69	Goodhue	SE	0 (0)	0 (0)	0 (0)	600 (3)	5200 (11)	5800 (14)
Lafayette	69	Nicollet	SE	20 (1)	0 (0)	0 (0)	0 (0)	209 (5)	229 (6)
Lakeside Ethanol	69	Cottonwood	SW	0 (0)	0 (0)	0 (0)	471 (6)	2102 (27)	2573 (33)
Magnolia	69	Rock	SW	120 (2)	38 (2)	0 (0)	0 (0)	553 (10)	711 (14)
Morgan	69	Redwood	SW	72 (2)	0 (0)	0 (0)	80 (2)	1762 (17)	1914 (21)
Mountain Lake	69	Cottonwood	SW	50 (1)	32 (1)	50 (1)	401 (4)	1952 (26)	2485 (33)
New Prague	69	Le Sueur	SE	0 (0)	0 (0)	0 (0)	0 (0)	3536 (8)	3536 (8)
New Ulm	69	Brown	SW	0 (0)	0 (0)	0 (0)	113 (3)	972 (12)	1085 (15)
Steen	69	Rock	SW	0 (0)	0 (0)	0 (0)	120 (2)	553 (11)	673 (13)
Sveadahl	69	Watonswan	WC	0 (0)	200 (1)	0 (0)	75 (1)	1837 (22)	2112 (24)
Vasa	69	Goodhue	SE	0 (0)	0 (0)	0 (0)	600 (3)	5200 (11)	5800 (14)
Waseca	69	Waseca	SE	0 (0)	44 (1)	100 (2)	0 (0)	1618 (10)	1762 (13)

# Implementation Steps of DRG Phase I Projects

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- MISO Generation Interconnection Queue Reform
  - Creation of a 'fast-lane' for generation projects in areas with relatively unconstrained transmission
  - Transition from a 'first-in, first-served' to a 'first-ready, first served' approach
- C-BED Project Development as of June 30, 2008:
  - **59.2 MW** of C-BED projects completed,
  - **57 MW** of C-BED projects under contract
  - Additional **4.5 MW** expected by the end of 2008
- Utilities are working to lessen impediments to lower voltage interconnections for DRG type projects





# DRG Legislation – Phase II

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...participants must analyze the impacts of an **additional total of 600 megawatts** of dispersed generation projects installed among the five transmission planning zones, **or a higher total capacity amount** if agreed to by both the utilities and the technical review committee.

The utilities must **employ an analysis method similar to that used in the first phase** of the study, and must use the **most recent information available**, including information developed in the first phase.

The second phase of the study must use a **generally accepted 2013 year transmission system model** including all **transmission facilities** that are expected to be **in service at that time**.

The commissioner of commerce must submit a report containing the findings and recommendations of the second phase of the study to the commission no later than **September 15, 2009**.

# DRG II Study Scope Overview

## Comments from Public

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Public comments were requested by Oct 8

### One Comment was Received

- Ignore Dorsey Loop Flow Issues
- Examine different Generator Sink Assumptions
- Per Legislative Statute, study 1200 MW “or more”
- Revise substation screening methodology
- Perform more in depth Zonal Analysis
- Perform CapX Sensitivity Analysis





# DRG II Study Scope Development

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## TRC Initial Ideas

1. Identify 600 MW - Legislative Requirements
2. DRG Sensitivity Analysis
3. ProMod Analysis (possibly)
4. DRG Opportunities with Grid Expansion



# Initial Scope Ideas

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## 1. Identify Additional 600 MW

- Objectives
  - Meet Legislative Requirements
  - Identify 600 MW of additional DRG
- Questions
  - How to better account for prior queued generation
  - How to further analyze impacts to high voltage transmission grid as found in Phase I
  - How to accommodate 1.5% conservation requirements
  - Which model to utilize
  - Study Beyond 600 MW





# Initial Scope Ideas

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## Prior Queued Generation

### Possible Options

- Likely generation based upon MISO Queue  
‘Reform’ feasibility process
- Add 1000, 1500, 2000 or more MW
- Geographical spread
- Other ?



# Initial Scope Ideas

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## 1.5% Energy Conservation Goal

- Reduce model load (demand)
  - According to DOC Calculated Formula
  - Reflect utility Integrated Resource Plans



# Initial Scope Ideas

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## Which Model to Utilize

- 2013 Timeframe
- Summer Peak & Summer Off-Peak
- Phase I DRG
- Focus on analysis not model building
- 2013 MTEP 07 Series (Same as Phase I)
  - Update Topology
- New Model



# Initial Scope Ideas

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## 2. DRG Sensitivity Analysis

- Objectives
  - Provide additional insight into DRG Scenario
  - Examine interaction between DRG Sites and prior Queued Generation.
- Methodology
  - Examine Phase I sites for impact of queued gen
  - Examine Phase II sites for impact of queued gen
  - Examine Phase I & II sites for impact of queued gen



# Initial Scope Ideas

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## 3. ProMod Analysis

- Objectives
  - Provide additional insight into DRG Scenario
  - Study DRG scenario for meeting 2012 RES
  - Examine Capital Cost of Generation + Transmission
  - Determine economics for each site
  - Determine if additional transmission is required to ensure reliable system operations (similar to 2006 Wind Integration Study).

# Initial Scope Ideas

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## 4. Grid Expansion

- Objectives
  - Provide additional insight into DRG Scenario
  - Determine if grid expansion enables additional DRG opportunities
  - Examine reliability benefits of DRG & Grid Expansion



# DRG Phase II Schedule

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- Scheduled TRC Meetings
  - Sept 16, 2008, Conference Call
  - Oct 29, 2008, In-Person
  - Jan 14, 2009, In-Person
  - Apr 21, 2009, In-Person
  - July 21, 2009, In-Person





# Next Steps

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- Email additional ideas/comments by end of Week, Oct 17, to [Dgstudy.Commerce@state.mn.us](mailto:Dgstudy.Commerce@state.mn.us)
- TRC will meet late Oct to discuss & develop Phase II scope while building on Phase I and considering public comments.
- Public Webinar (After the impact analysis is completed)
- Public Webinar (When a draft final report is available)
- Report due to MN PUC no later than **September 15, 2009**