

How One G&T Made Demand Response A Valuable Asset For Over 25 Years

Ed West, Director, Information Services

Peak Load Management Alliance - October 21, 2009

Practical Demand Response for a Complex Future



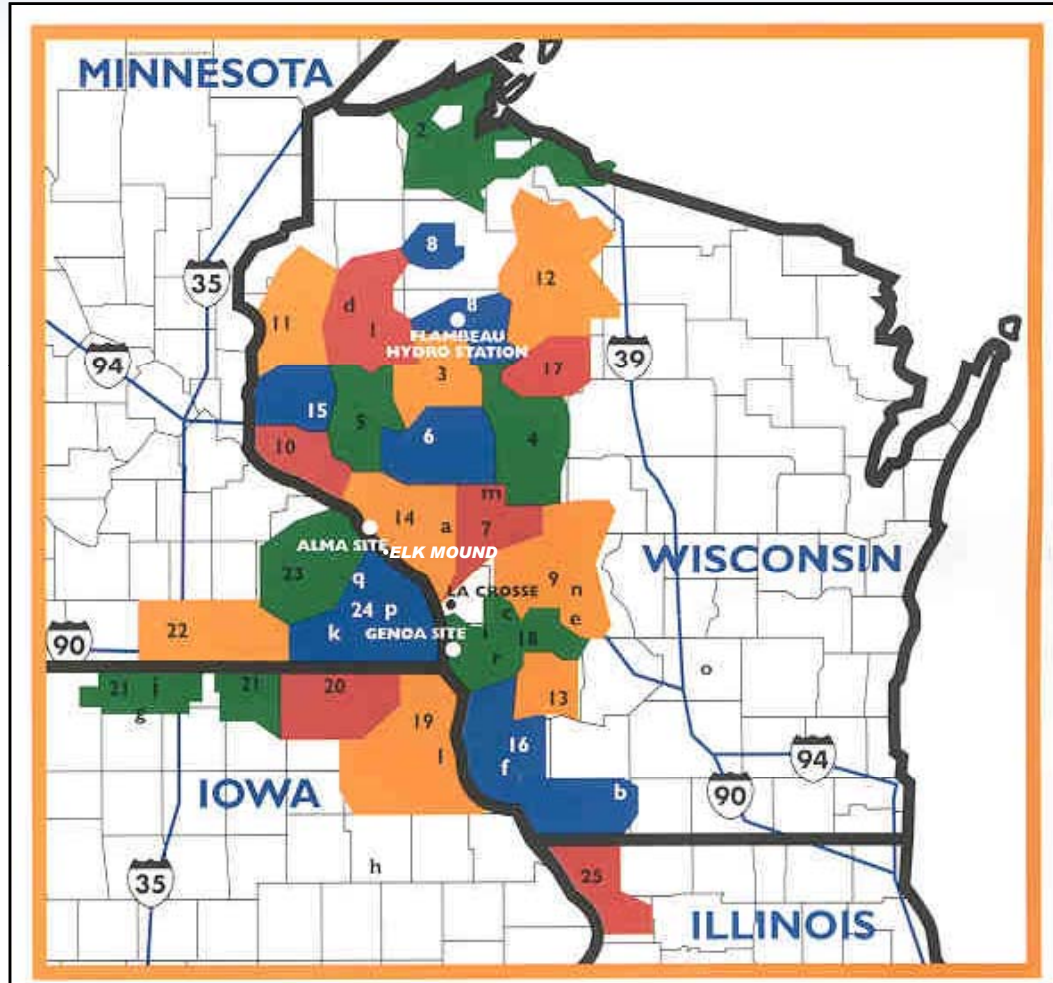
A Touchstone Energy® Cooperative 

Dairyland Power Cooperative



- 25 Member Co-ops
- 19 Municipals
- 256,000 Customers
- 1,200 MW Generation
- 3,134 Miles of Transmission Lines
- 330 Substations
- 44,500 Square Mile Service Area
- 886.9 MW Peak 7/06

Dairyland Power System



Why Is Load Management A Good Investment?

- **Keep demand for electricity below our ability to generate or economically buy electricity**
- **Keep the demand for electricity on all power lines to safe levels**
- **Reduce or eliminate the need to purchase expensive electricity from other suppliers**
- **Replace lost generation (or power purchase) for a short period of time**



Why Is Load Management A Good Investment?

- **Reduce the impact of rapid changes in demand (daily & seasonal peaks)**
- **Reduce load during system emergencies**
- **Provide rate alternatives to member consumers**
- **Shed Load During Substation Work**
- **Our Members Demand That We Have Programs**
 - **Until they run out of hot water**



Load Management System

- System went live in 1982
 - GE REMS Transmitters and Load Receivers
- In 1990 Switched to Scientific Atlanta Model 105 DCU's – (Now Comverge)
- In 2000 68 Glenayre Transmitters were installed to cover 44,500 square mile service area
 - Provide both digital (305) and analog (105/205) messages and paging
 - Now installing model 305 DCU's



Load Management System

- 82,000 Residential electric water heaters
- 30,000 Residential dual fuel heating systems
- 15,000 Residential Air Conditioners
- 8,000 Residential heat storage systems
- 380 commercial and industrial generators
- 170 Peak Alert voluntary load reduction (C&I)
- 220 Irrigation Systems
- 190 Agricultural grain dryers.
- 6 C&I bulk interruptible under direct control



Load Management At Dairyland Power

- Why Has It Worked?
 - Integrated Into System Operations Generation Desk
 - **First**, Provides Supplemental Operating (fast start) reserves
 - Historically, load was expected to exceed the capacity of inexpensive resources 830 hours or about 9% of the year, Then Load Management, market energy and peakers are called upon.
 - **Second**, Reduces Seasonal Peak Loads
 - Dairyland's distribution cooperatives (and their members) are involved in ongoing program direction



Summer Control Capability

- **C&I Peak Alert** 5 to 10 MW
- **C&I Generators** 10 to 20 MW
- **Residential Water Heaters** 20 to 30 MW
- **Dairy Water Heaters** 2 to 4 MW
- **Air Conditioners** 5 to 10 MW
- **Grain Drying / Handling** 2 MW
- **Interruptible Industrial Loads** 10 MW
- **Irrigation Systems** 0 to 10 MW
- **Total Summer Controllable Loads =** 50 to 80 MW

- **In Addition, 5 MW of storage heat water heaters are held off the peak daily**



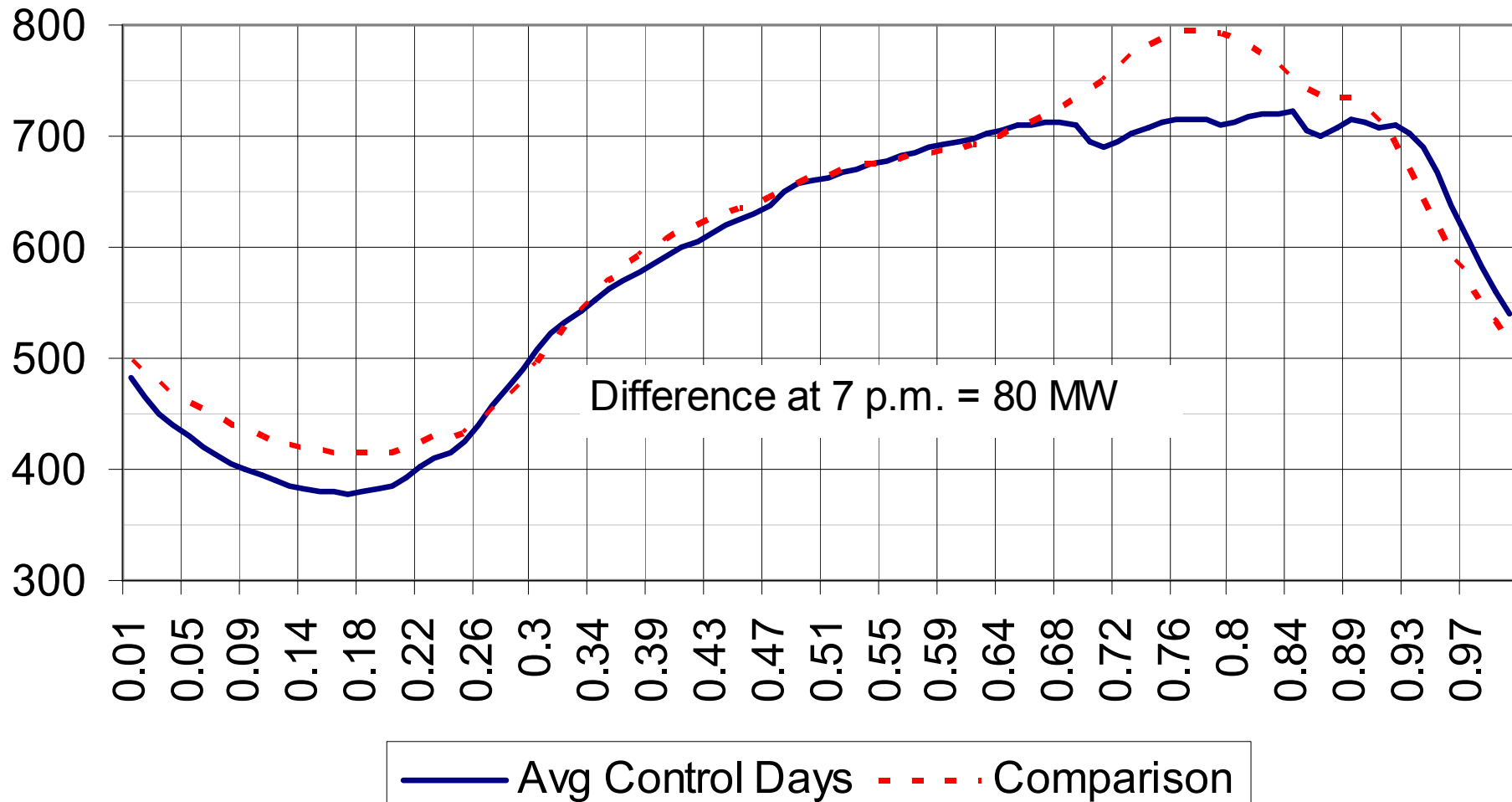
Summer Load Control

	2006		2007		2008		2009	
	events	hours	events	hours	events	hours	events	hours
Water heater	29	121	30	124	30	124	33	176
Air Conditioners	27	93	19	73	3	7	1	4
C&I	14	53	15	57	1	4	1	4
Irrigation	11	34	7	22	1	3	1	3
Value	\$845,000		\$480,000		\$97,050		\$55,762	

Load control events from June 25 through August 31



Summer Full Load Control



Winter Control Capability

- **C&I Peak Alert** 10 to 15 MW
 - **C&I Generators** 10 to 20 MW
 - **Residential Water Heaters** 30 to 40 MW
 - **Agricultural Grain Dryers** 2 to 4 MW
 - **Interruptible Heat** 30 to 60 MW
 - **Interruptible Industrial** 10 MW
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- **Total Winter Controllable Loads = 92 to 140 MW**
 - **In Addition, 35 MW of storage heat is held off the peak daily**



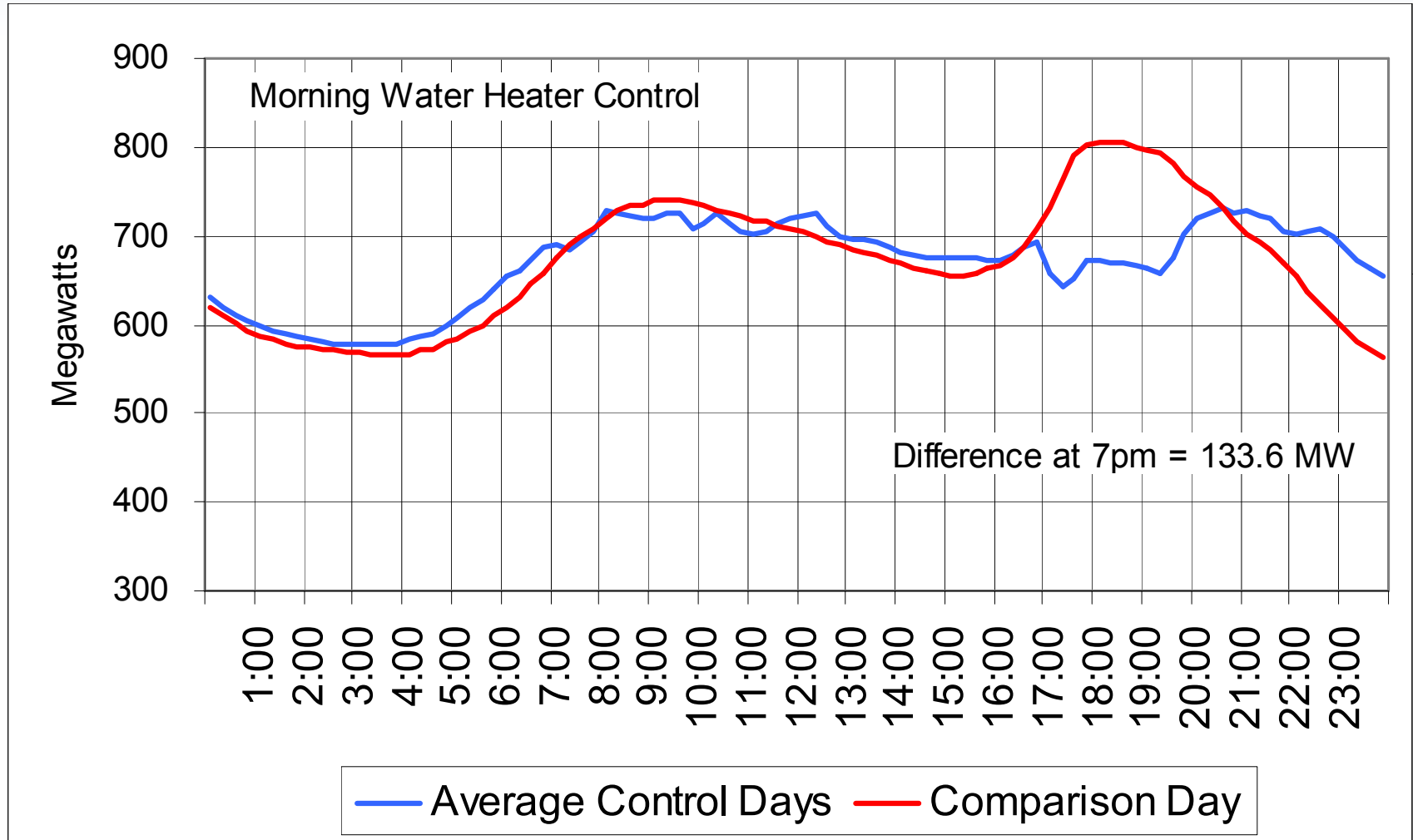
Winter Load Control

	2006-7		2007-8		2008-9	
	events	hours	events	hours	events	hours
Water heater	84	365	77	358	73	361
Interruptible Heat	29	54	45	119	51	187
C&I	4	12	5	15	6	18
Grain Drying	4	13	7	28	6	24
Dairy Water Heater	5	22	11	55	8	40
Value	\$1,467,000		\$1,135,000		\$1,142,000	

Load Control events from December 1 through February 29



Winter Load Control



Notification To End Use Members

- Web
- Automated Phone Notification
- Emails
- Text Messages
- Alert Devices
- Paging

Dairyland Power Cooperative
Load Control Status:
Commercial-Industrial-Agricultural

Advisory Message (08/16/2006): ----- NO Peak Alert - Full Load Control for Today -----

Load Class	Status	Typical Load
Dairy Water Heaters (4A)	No_Control	dairy water heaters
C&I Generators (5A/AE1)	No_Control	automatic backup generators
C&I Peak Alert (5B)	No_Control	automatic or manual load reduction or generators
Grain Drying (24)	No_Control	low temperature grain dryers and grain handling facilities
Irrigation (8)	No_Control	irrigation pumps

last changed at 7:01AM 08/17/2006

NOTE: Some Load Class options may not be available in your area.

Dairyland Power Cooperative
Load Control Status:
Residential

Advisory Message (08/16/2006): ----- NO Full Load Control for Today -----

Load Class	Status	Typical Load
Water Heaters 1B (large)	No_Control	water heaters (large)
Water Heaters 1A (small)	No_Control	water heaters (small)
Interruptible Heat 2A	No_Control	interruptible electric heat
Interruptible Heat 2B	No_Control	interruptible electric heat
Interruptible Heat 2C	No_Control	interruptible electric heat
Interruptible Heat 4B	No_Control	miscellaneous interruptible electric heat
Air Conditioners	No_Control	air conditioner cycling
Heat Storage	Interrupted ends 11:40AM	storage heat and/or storage water heaters
Heat Storage A1	Interrupted ends 11:35PM	storage heat and/or storage water heaters
Heat Storage (weekend)	No_Control	storage heat and/or storage water heaters

last changed at 7:01AM 08/17/2006

NOTE: Some Load Class options may not be available in your area.

Value Of Load Management

- Load Management Savings Over The Last 12 Months
 - Replacement Power \$1.4 Million
 - Operating Reserves \$.1 Million
 - Capacity Savings \$7.9 Million
 - **Total Annual Value \$9.4 Million**
- **The Energy Value Does not anticipate what the next increment from the market would have cost**




Dairyland To Join Midwest ISO

- Dairyland recently announced intent to join MISO as transmission owner on June 1, 2010
- Currently receiving reliability coordination services from MISO
- Recent regional changes and increased efficiencies resulting from MISO Ancillary Services Market have made MISO membership a cost effective solution
- Introduces new set of strategic and operational options and considerations



Demand Participation Options in Midwest ISO

- Energy Markets
 - Price responsive demand bid opportunities with LM
 - Demand Response Resources (DRRs) offered directly into market
 - Ancillary Services Markets
 - Regulation, spinning and supplemental reserves
 - DRRs can participate directly depending on resource characteristics
 - Emergency Demand Response
 - Offered & utilized during declared NERC emergencies
 - Resource Adequacy
 - Addresses capacity value of demand resources
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Additional Load Management Applications

- Load Shift to Minimum Loading Periods
 - Overnight water heater control
 - Avoids selling into depressed markets and/or bringing units below minimum
 - Reduces average operating costs
 - Approximate value of \$78,000 over last six months
- Management of Transmission Peak
 - Water heater control
 - Minimizes transmission service costs
 - Shifts load from critical time period used to determine transmission charges
 - Avoided costs of over \$3,000 per MW-month



Future Plans

- Interactive Water Heater Control
 - Variable kW input
 - Variable temp setting
 - Absorb green energy
 - Potential for regulation
- Member Initiated Load Control (CPP)
 - Two Distribution Cooperative's Plan Pilots
 - Similar to GoodCents at Gulf Power
 - Must Be Automatic
 - Can be overridden
 - Must Utilize Multiple AMR Systems



Questions?

Ed West

jew@dairynet.com

608-787-1447

