

Electric Vehicles – A Utility perspective

Eddie Webster
Great River Energy

GREAT RIVER ENERGY®

A Touchstone Energy® Cooperative



Agenda

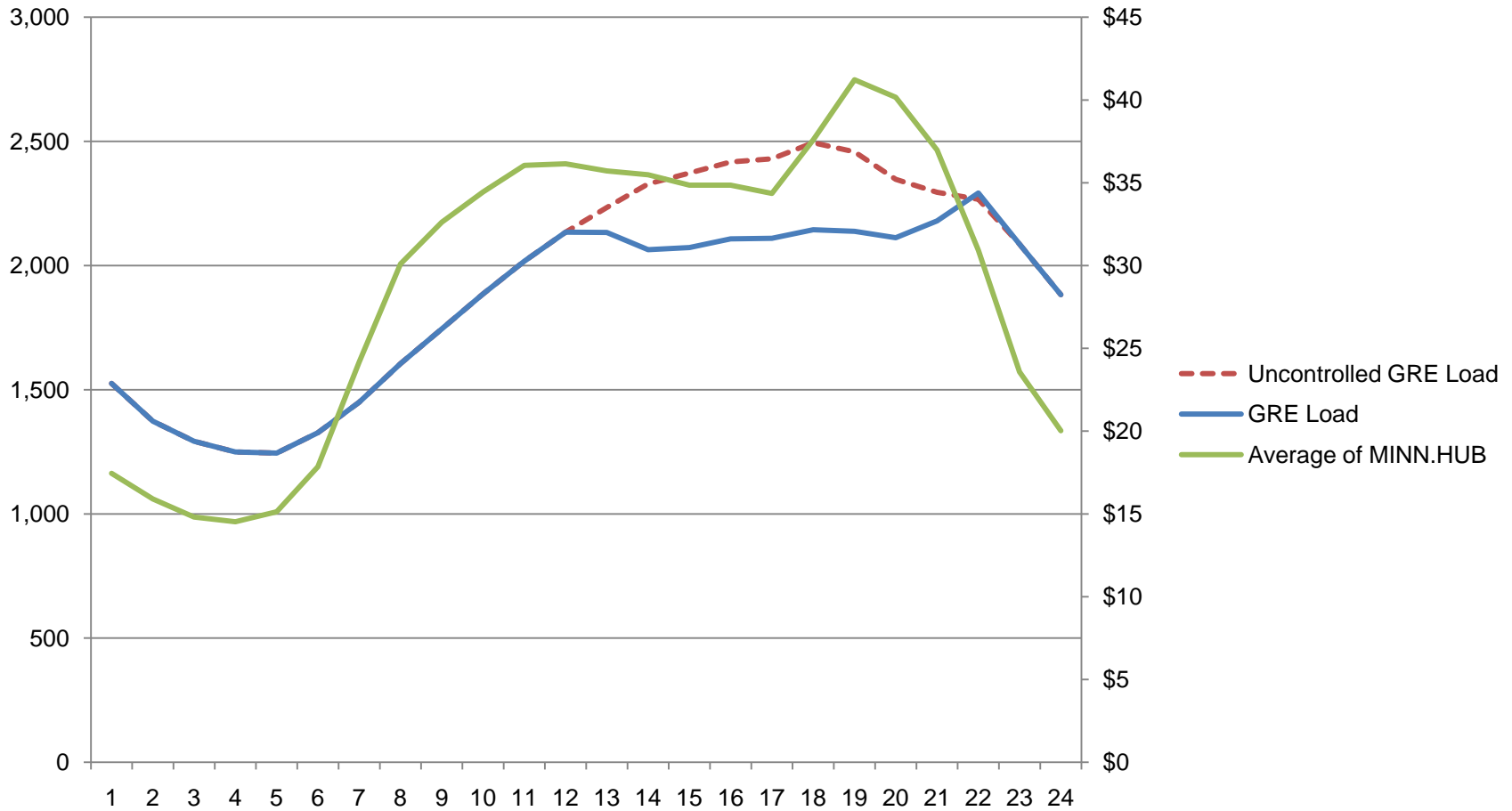
- Great River Energy Overview
- EV Challenges
 - On-peak charging
 - Quick charging
- EV Opportunities
 - ChargeWise
 - 2nd life for batteries
 - Increased Sales

Great River Energy

- G&T Cooperative
- 28 member cooperatives
- 634,000 members
- Sales:
 - 57.4% residential
 - 40.2% commercial and industrial, agriculture
 - 2.4% Seasonal
- 5th largest G&T in nation
- Second largest utility in Minnesota

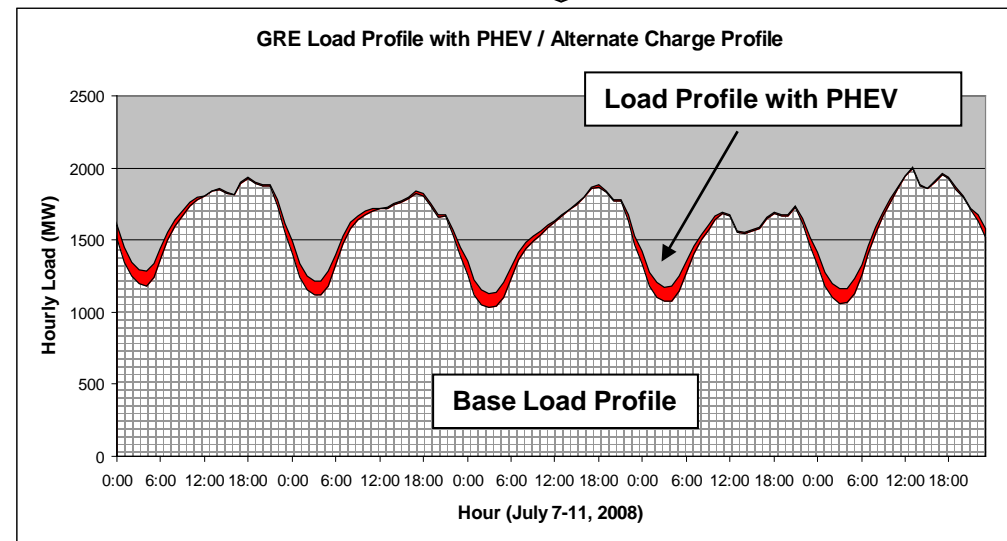
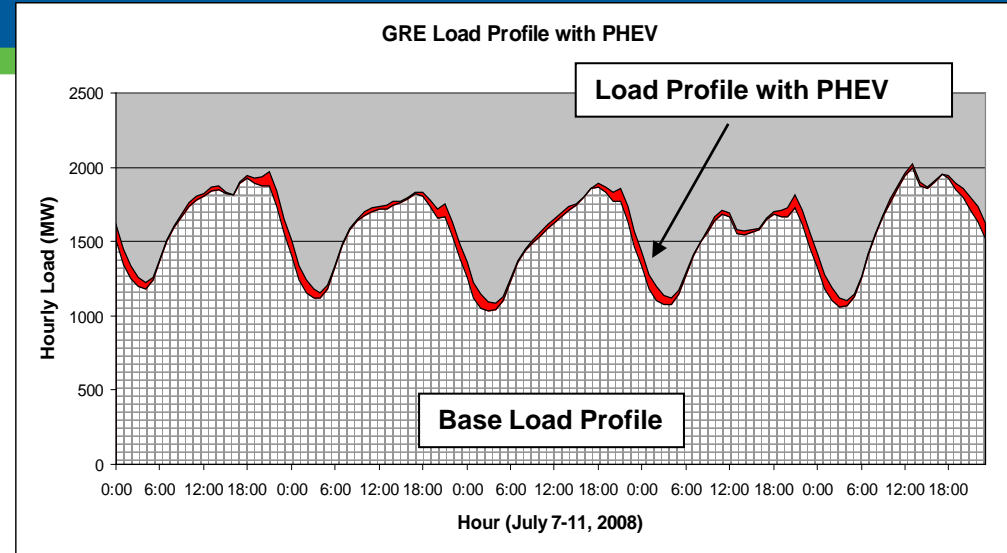


Cost of service



GRE Load Profile with PHEVs

- 125,000 PHEVs among GRE members (12% penetration) in sample week of July 2008
- Additional 50MW during peak hours.
- Controlling recharge times can dramatically change load shape
- 40MW less during peak hours



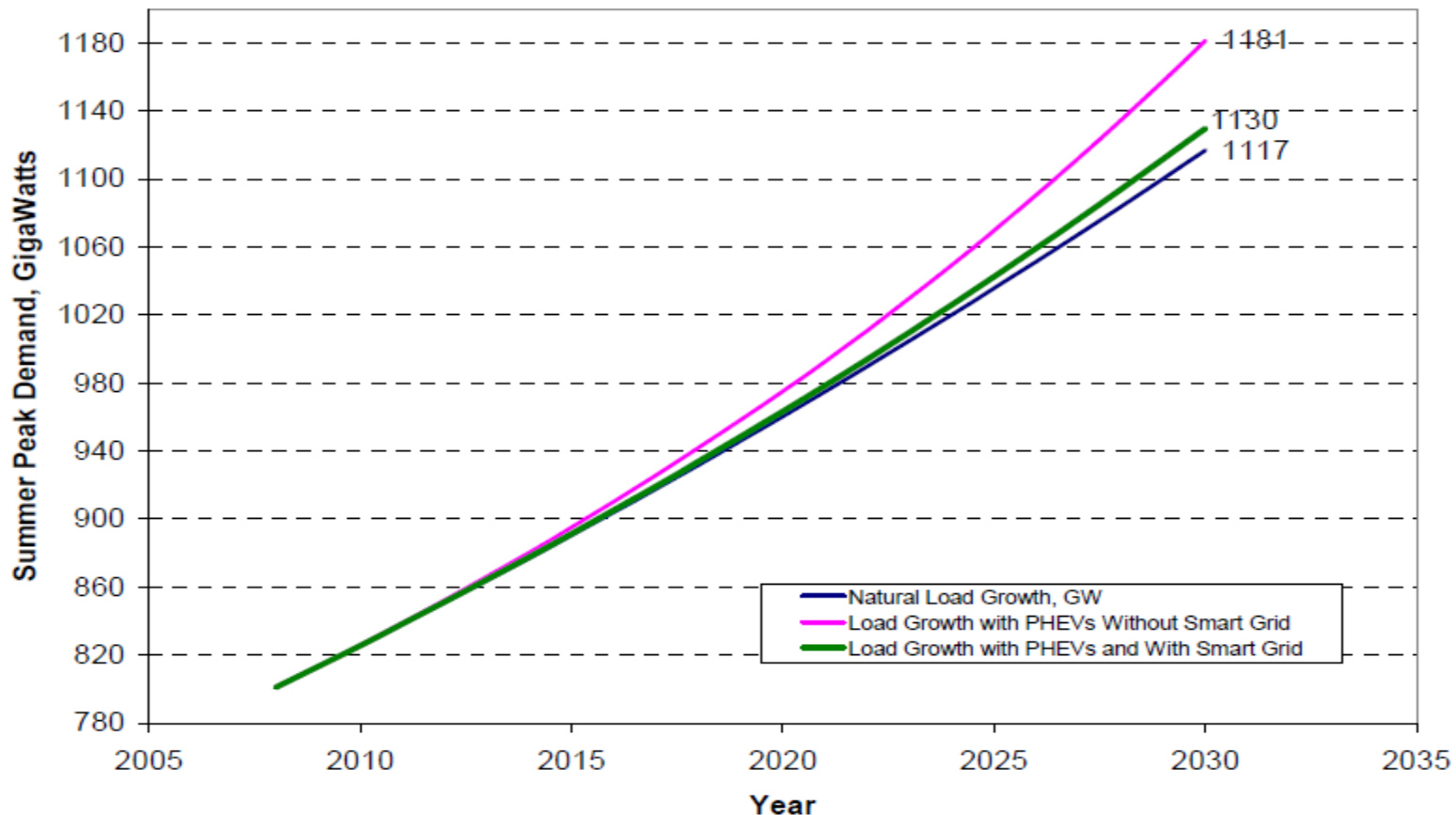
Financial Impact

- 2010 Rates
- 125,000 vehicles charging according to EPRI profile vs. ChargeWise Profile

Season	PHEV Load (MW)		Difference	Demand Charge	Monthly Savings
	EPRI Profile	ChargeWise			
Summer	50	10	40	\$20	\$830,000
Winter	50	10	40	\$15	\$625,000
Spring	50	10	40	\$10	\$420,000
Fall	50	10	40	\$10	\$420,000

Impact of recharging off-peak

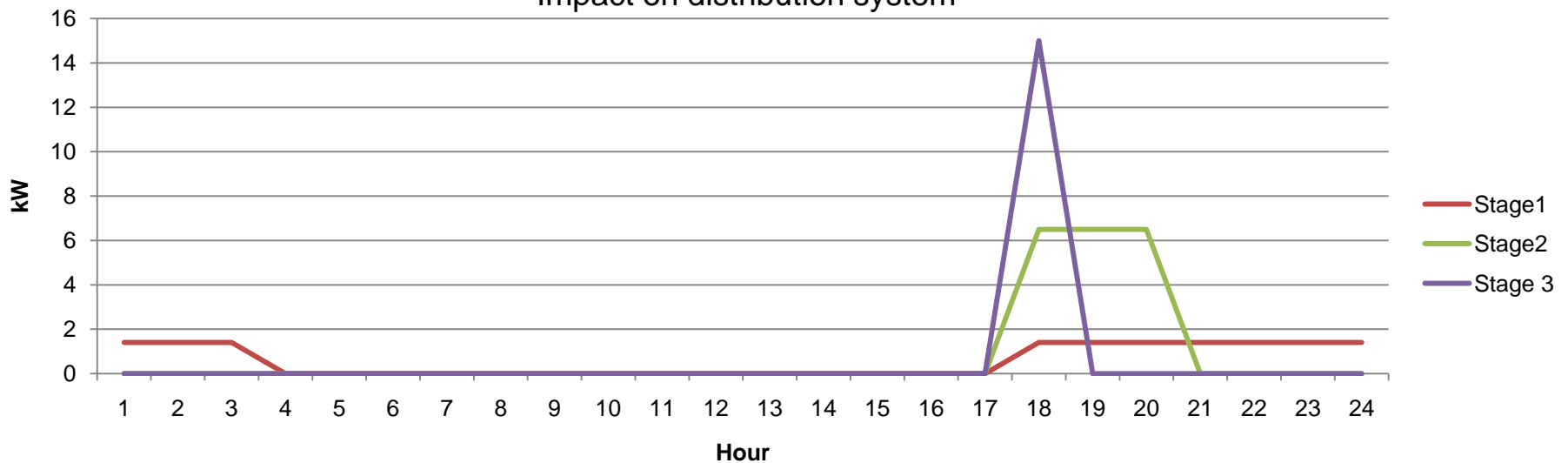
- EPRI study - 30% penetration by 2030



Distribution system impact

Level	Voltage (VAC)	Current (A)	Power (kVA)	Recharge Time	Phase	Standard Outlet
1	120	12	1.44	8-10 Hours	single	NEMA 5-15R
2	208/240	32	6.7/7.7	4-6 Hours	single	SAE J1772/3
3	480	400	192	10 Minutes	three	N/A

Impact on distribution system



Opportunities

- ChargeWise Program
 - Mitigates negative impact of EVs
- 2nd life for EV batteries
 - 80% capacity remaining
 - Neighborhood energy storage systems
- Increased Sales
 - Alleviates upward rate pressure
 - When controlled no additional resources needed



Questions

