

NRECA



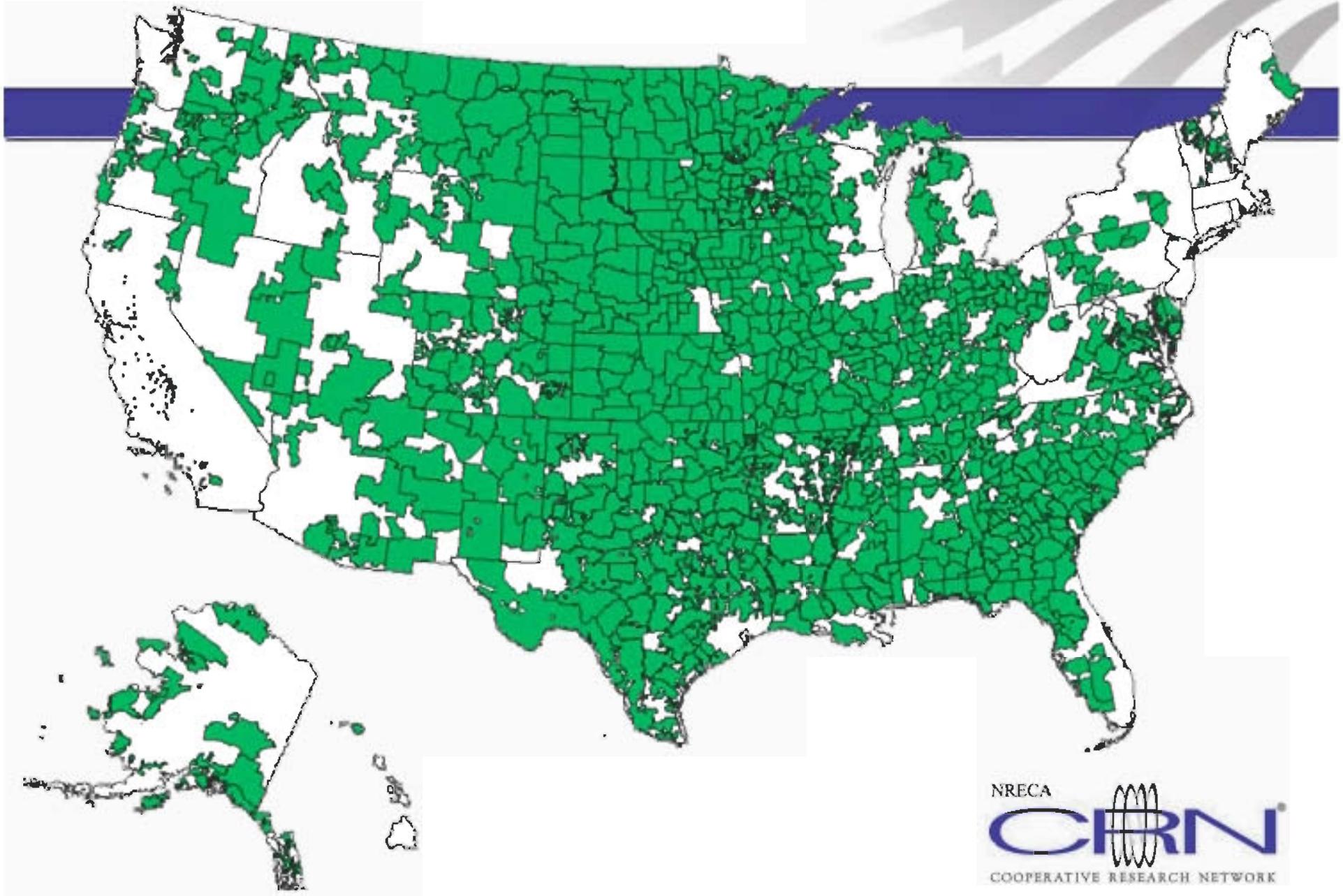
Distributed Generation and Renewable Energy in the Electric Cooperative Sector

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Cooperative Research Network (CRN)

National Rural Electric Cooperative Association

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NRECA

CRN

COOPERATIVE RESEARCH NETWORK

Co-op Basics

- Customer owned
- Serve 35 million people in 47 states
 - 75 percent of nation's area
- 2.3 million miles of line is close to half of nation's total
- Growth rate twice that of IOU Electric
- Six customers per line-mile vs 33 for IOU
- Co-ops view DP as a needed solution; not as a “problem”

Broad Range of Technologies



CRN Transportable 200kW Fuel Cell at Delta-Montrose EA in Durango, CO



Chugach EA 1-MW Fuel Cell Installation Post Office in Anchorage, AK



Plug Power Fuel Cell at Fort Jackson, SC LoganEnergy



Chugach EA Microturbine Demo Unit at Alaska Village Electric Co-op

Power Supply Program

- Distributed generation (non-renewable)
 - \$6.4M CRN dollars over 10 years
- Renewable energy
 - \$1.6M CRN dollars over 10 years
- Power generation

DG Projects

- Residential Fuel Cell Demonstration
- Microturbine Evaluations
- Megawatt Engines/Turbines Studies
- Utility Energy Storage

RFC Demonstration Purposes

- Ascertain key near-term / long-term DP benefits
 - Improved reliability and reduced service cost
 - Grid support for rural feeders
 - Reduced cost to serve remote customers
- Identify and resolve DP implementation barriers
 - Electrical Interconnect / PQ / Fuel / Thermal Recovery
 - Regulatory and Institution Issues (permitting, safety, interconnection, codes, etc.)
 - Product Cost and Market Applications
- Build solid foundation for co-op DG
 - Establish RFC success experience base
 - Develop public awareness of DP function and benefits
- Benchmark RFC technology for further effort

RFC Demo Participants

Manufacturers Under Co-op Review and Selection

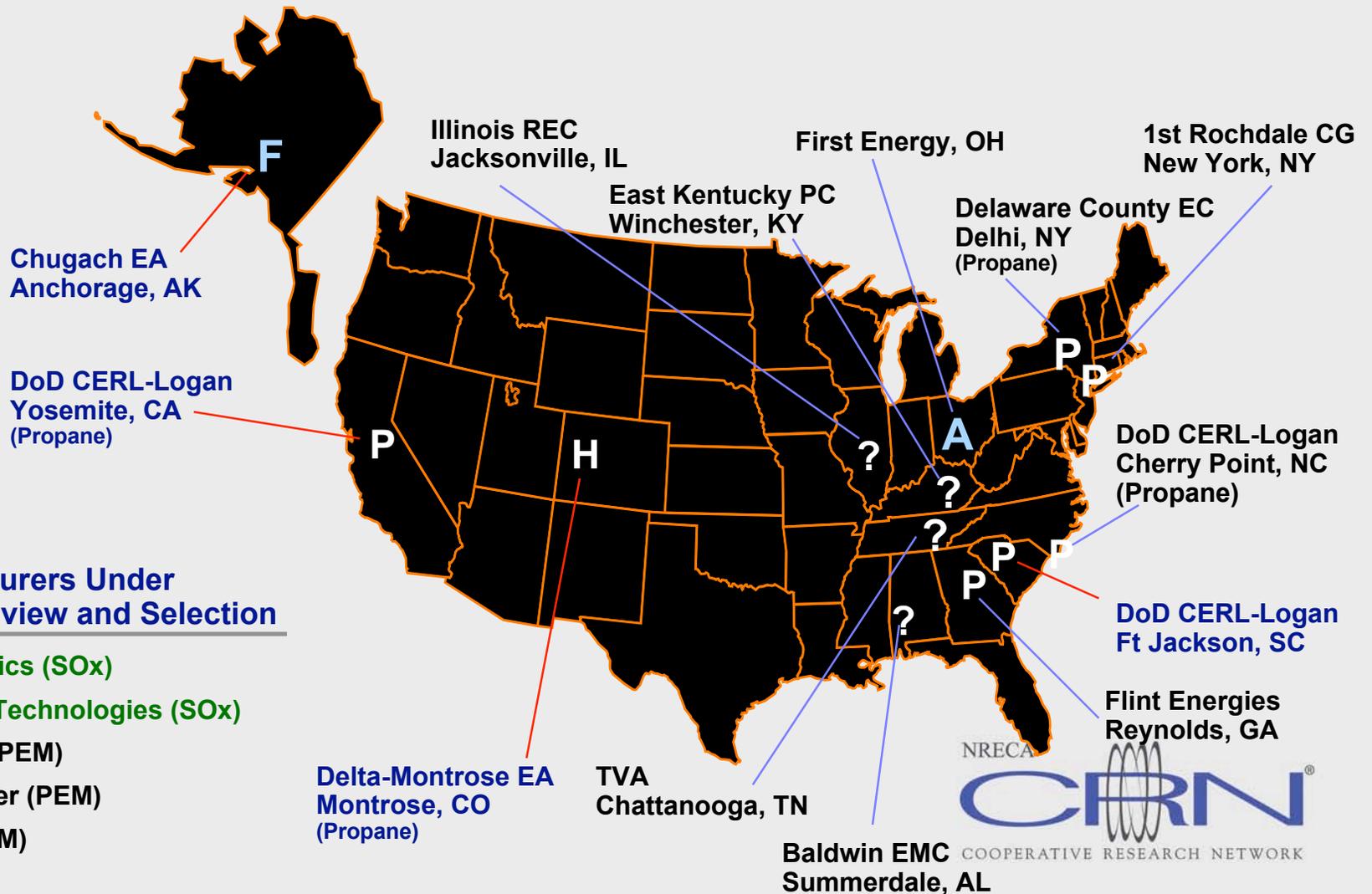
Acumentrics (SOx)

Fuel Cell Technologies (SOx)

H Power (PEM)

Plug Power (PEM)

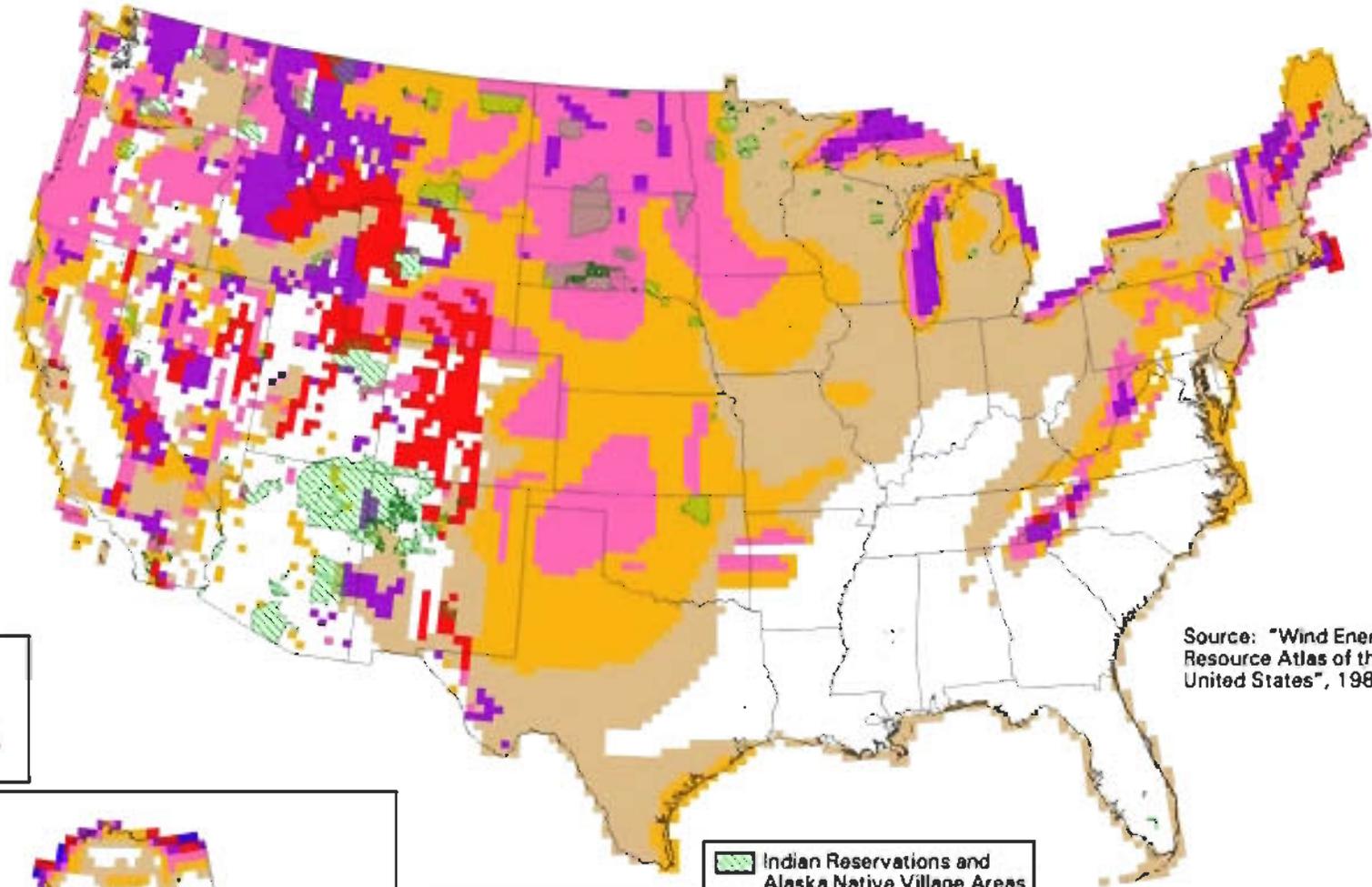
Other (PEM)



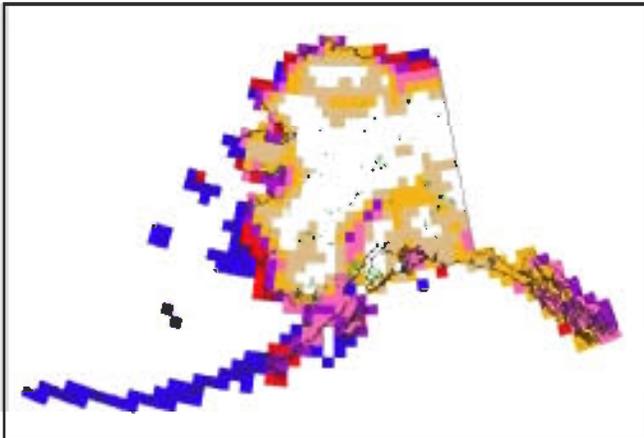
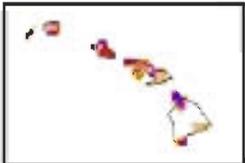
Co-op Renewables Survey

- Green power
- Wholesale purchases
- Wind power
- Biomass power
- Geothermal power
- Solar power

United States - Wind Resource Map



Source: "Wind Energy Resource Atlas of the United States", 1987



 Indian Reservations and Alaska Native Village Areas

Wind Power Classification				
Wind Power Class	Resource Potential	Wind Power Density at 50 m W/m^2	Wind Speed ^a at 50 m m/s	Wind Speed ^a at 50 m mph
	2 Marginal	200 - 300	5.6 - 6.4	12.5 - 14.3
	3 Fair	300 - 400	6.4 - 7.0	14.3 - 15.7
	4 Good	400 - 500	7.0 - 7.5	15.7 - 16.8
	5 Excellent	500 - 600	7.5 - 8.0	16.8 - 17.9
	6 Outstanding	600 - 800	8.0 - 8.8	17.9 - 19.7
	7 Superb	800 - 1600	8.8 - 11.1	19.7 - 24.8

^a Wind speeds are based on a Weibull k value of 2.0

U.S. Department of Energy
National Renewable Energy Laboratory



Wind Power Owners/Purchasers

- Kotzebue Electric Association (AK)
- Alaska Village Electric Cooperative (AK)
- Basin Electric Power Cooperative (ND)
- Minnkota Power Cooperative (ND & MN)
- East River Electric (SD)
- Great River Energy (MN & WI)
- Dairyland Power Cooperative (MN & WI)
- Dakota Electric (MN & WI)
- Salem Electric (OR)
- Orcas Power & Light (WA)
- Holy Cross Energy (CO)
- Yampa Valley Electric Association (CO)
- Tri-State G&T Association (CO)
- Flathead Electric Cooperative (MT)
- Western Farmers Electric Co-op (OK)

Basin Electric (ND)



Basin Electric Power Co-op is purchasing the output from two 40 MW wind projects located in Edgeley, ND and Highmore, SD from FPL Energy.

East River Electric (SD)

East River installed two 1.3 MW wind turbines near Chamberlain, SD. Capital to purchase the turbines was provided by the USDA Rural Utility Service.



Holy Cross Electric (CO)

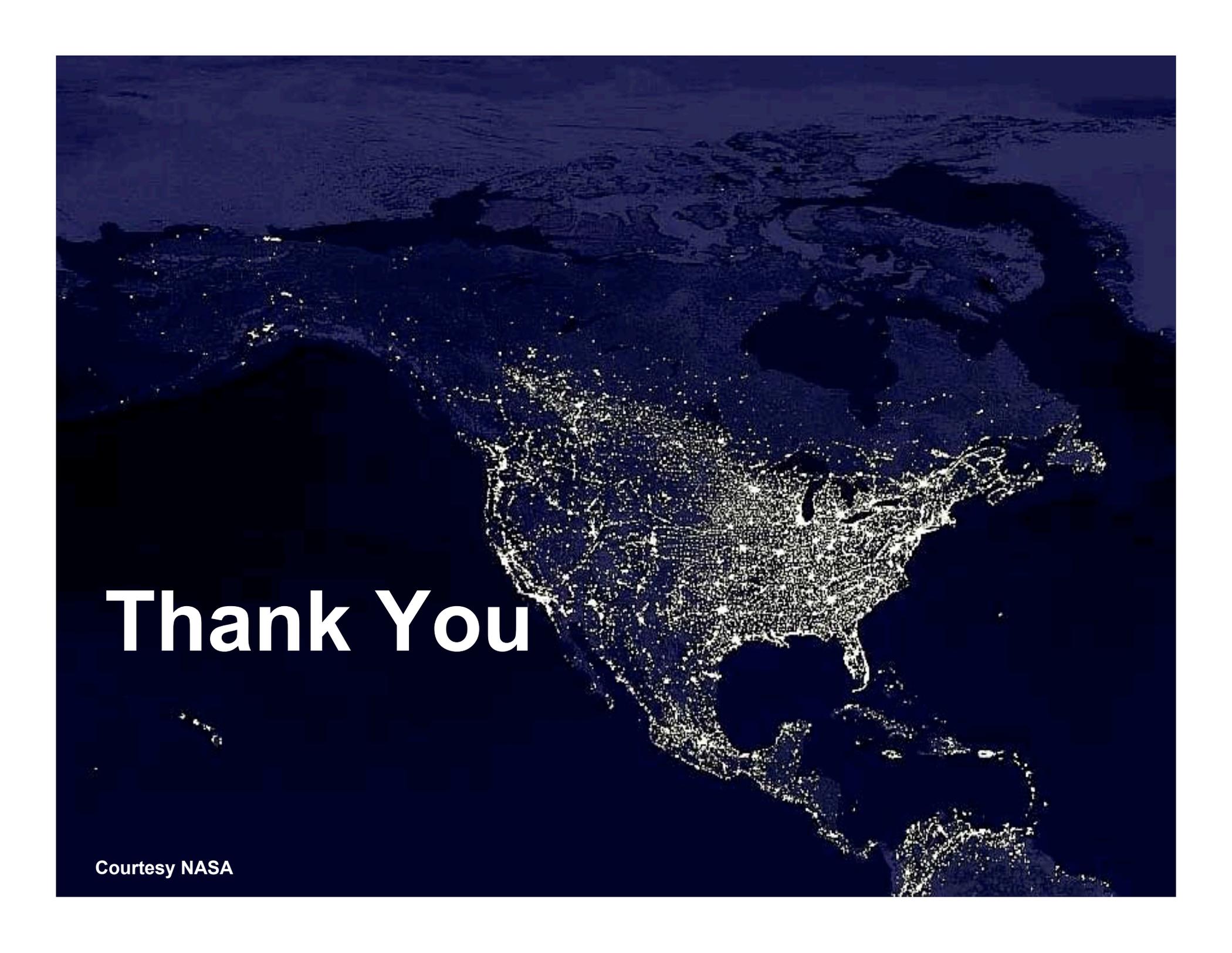


Holy Cross is buying 5 megawatts of wind power. About 2200 families, 115 businesses, and 12 local governments participate in the green energy program.

Great River Energy (MN)



Great River Energy, Minnesota's second largest utility, generates wind power for 29 cooperatives



Thank You

Courtesy NASA