



CCEC Member Owned Renewables

ND Solar Workshop

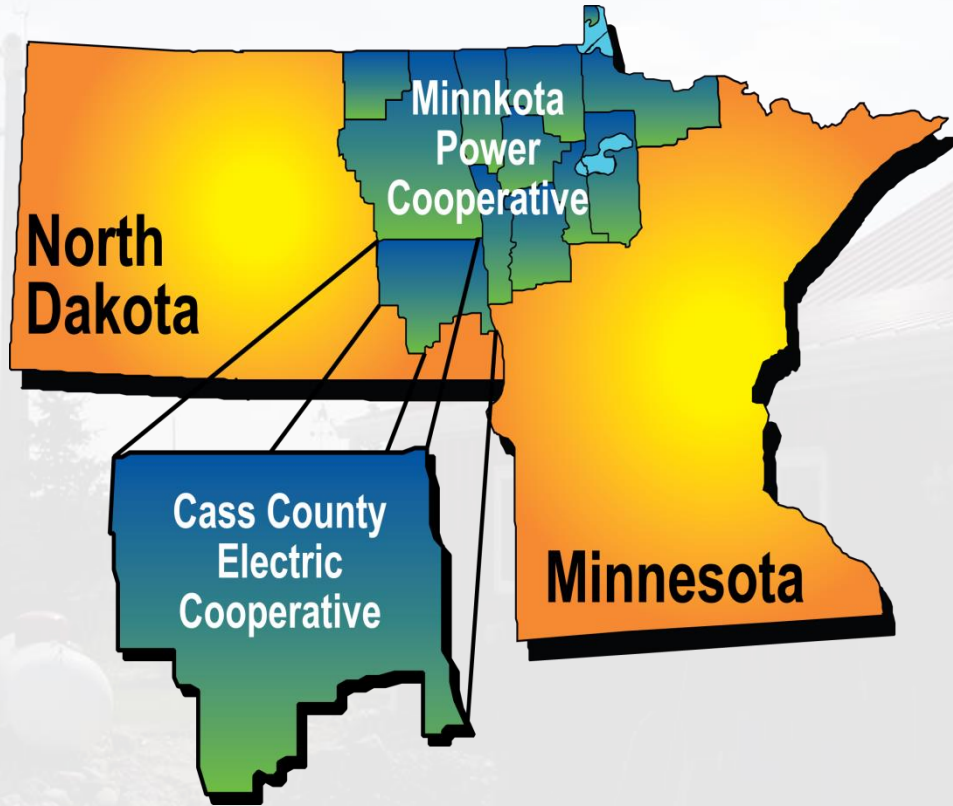
May 12, 2015

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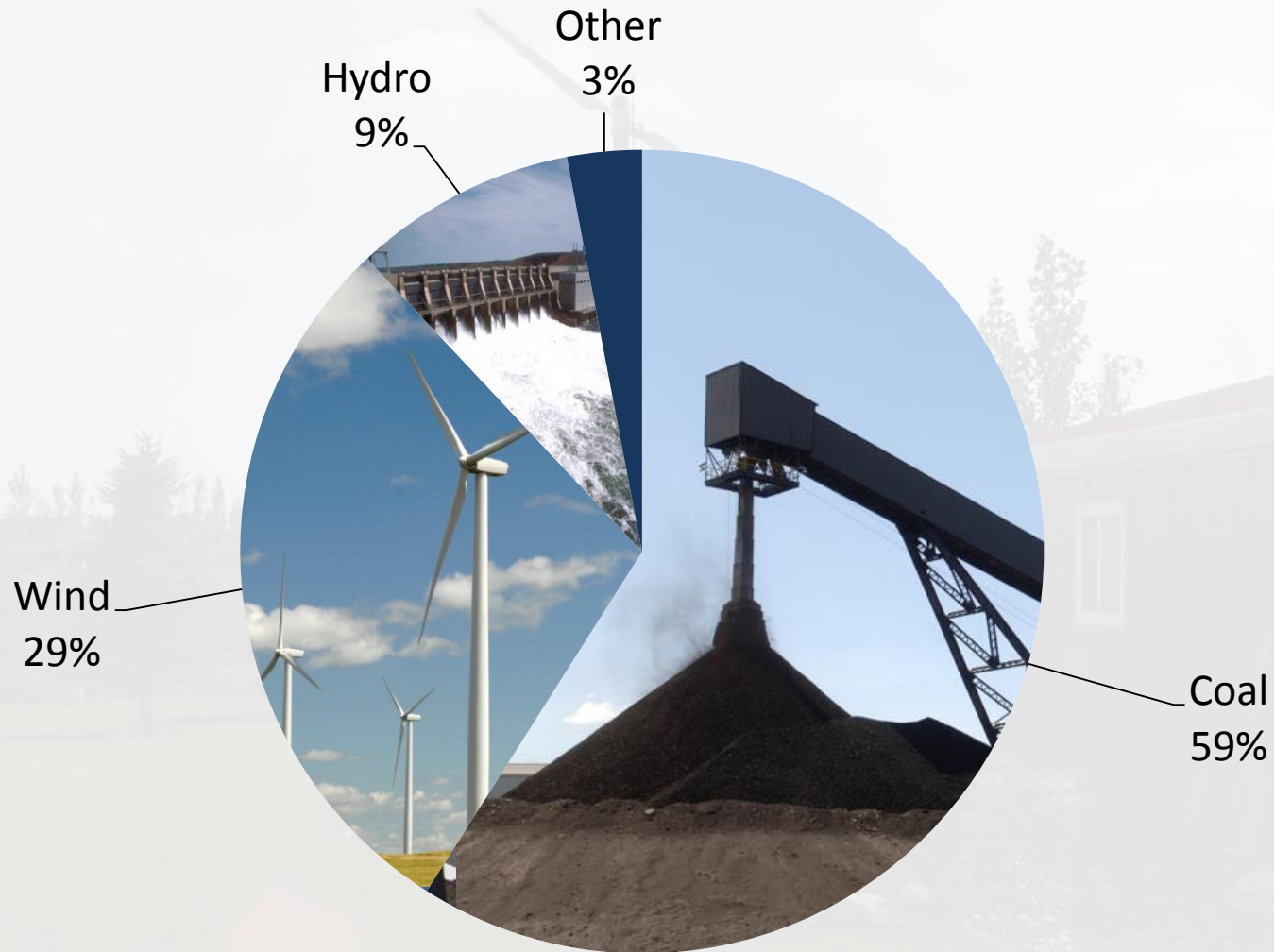
CCEC Overview

- 43,000 total accounts
- 4,700 miles of line
- 5,000 mi² service area
- Service to all or parts of 10 counties
- 260 MW system peak



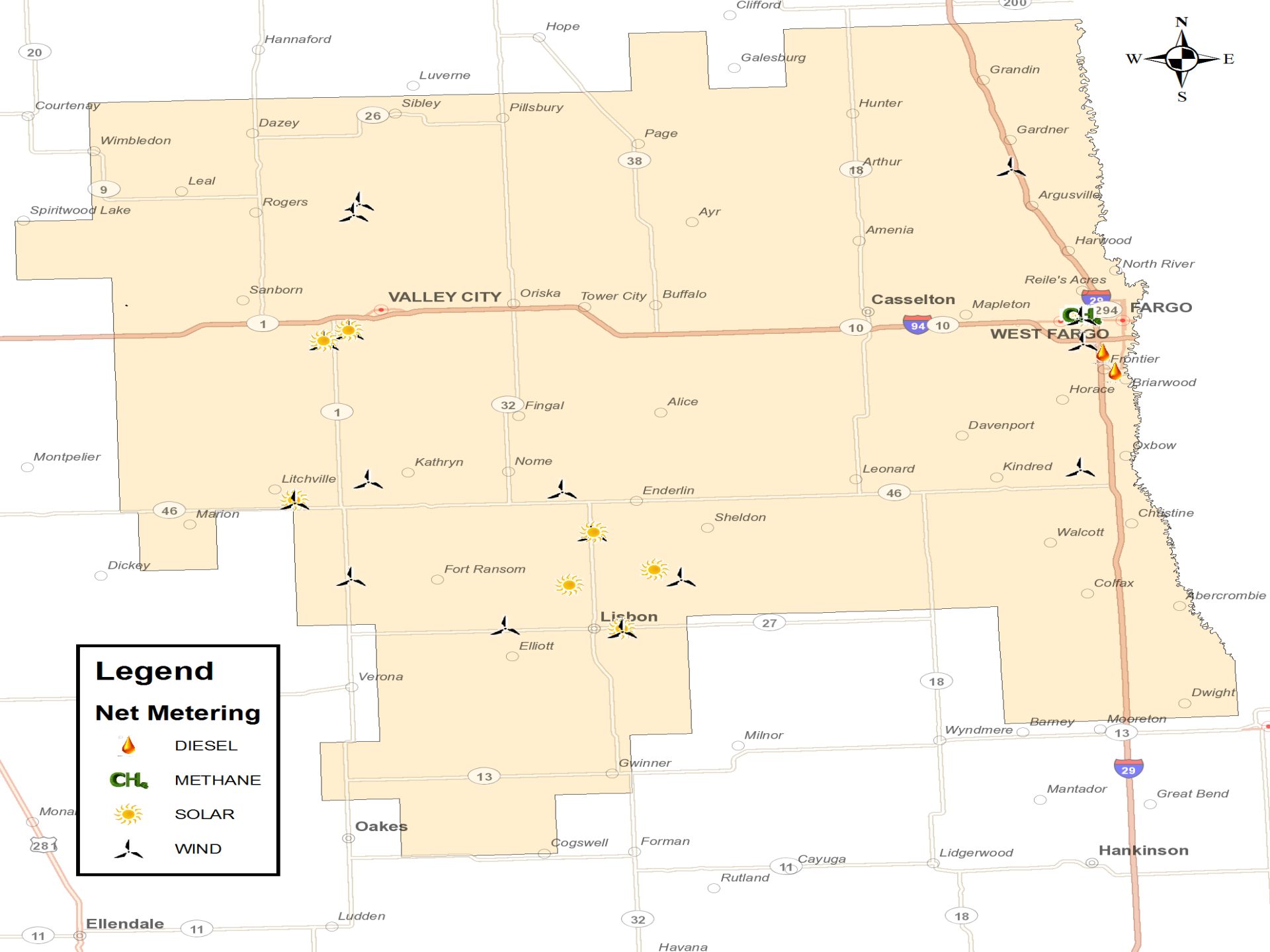


Minnkota's 2014 Energy Production

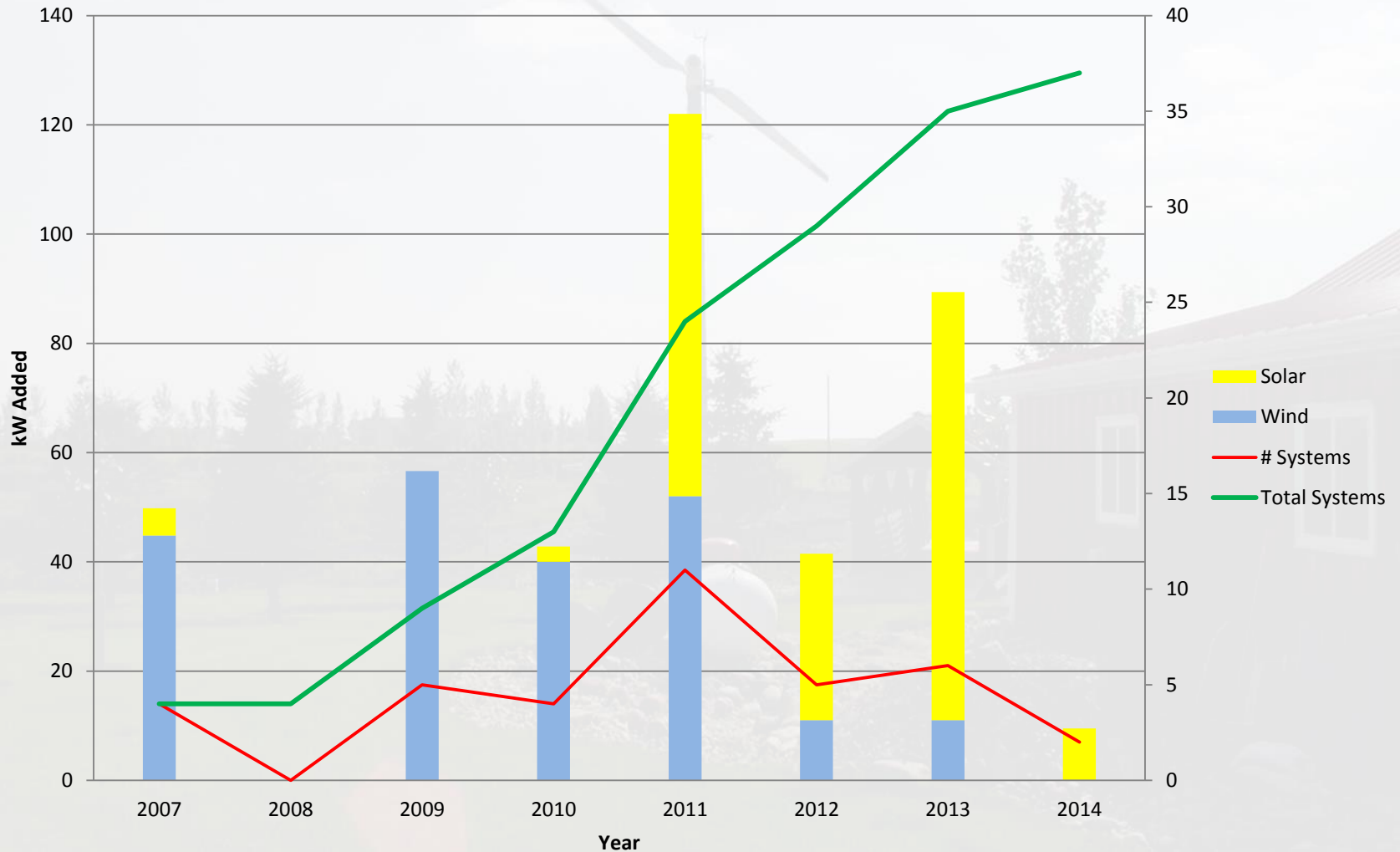


CCEC Member Owned Systems

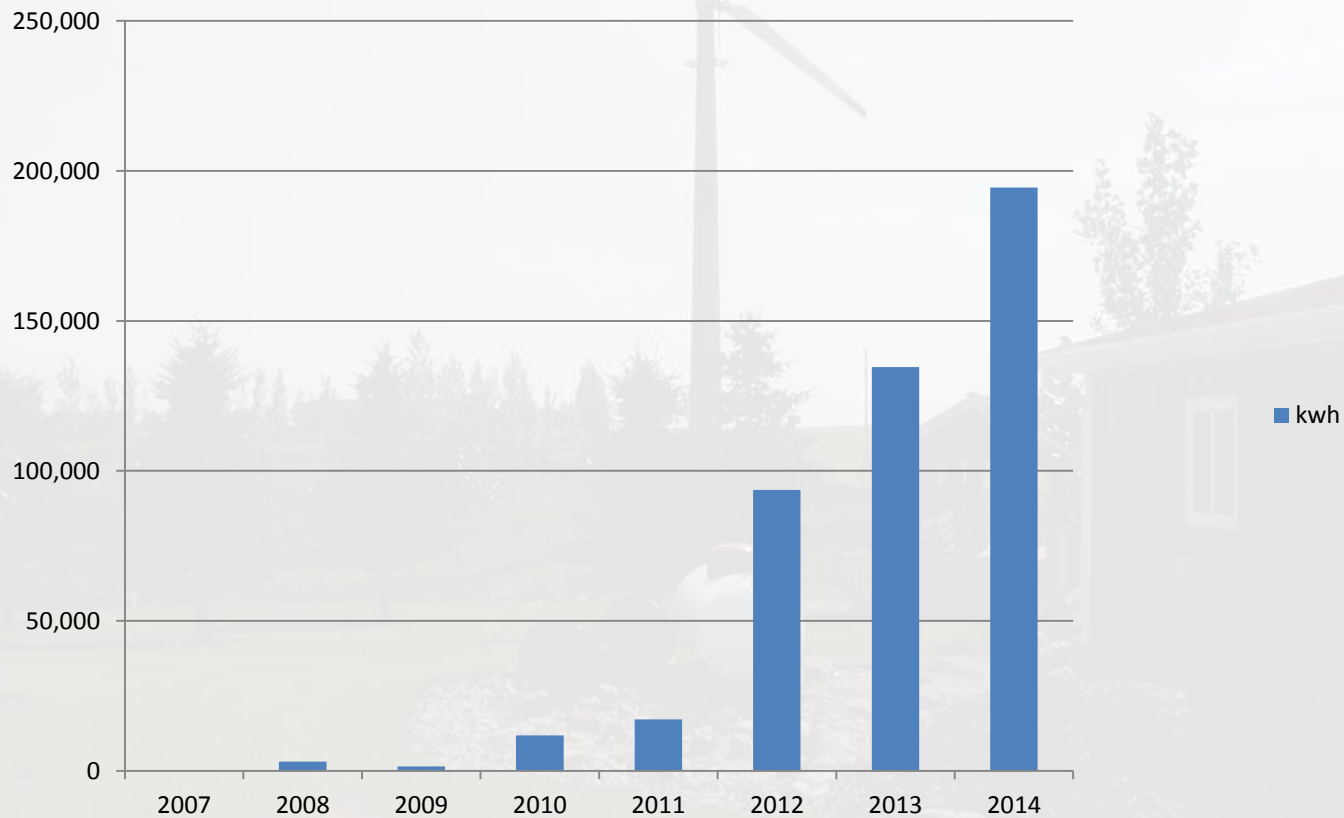
- CCEC currently has 409 kW member owned wind/solar
 - 36 total installations (28 members)
 - 18 Wind: 225 kW (2.4 kW-33 kW)
 - 18 Solar: 184 kW
- Landfill methane gas generator 925 kW



System Additions by Type and Year



Excess Generation History

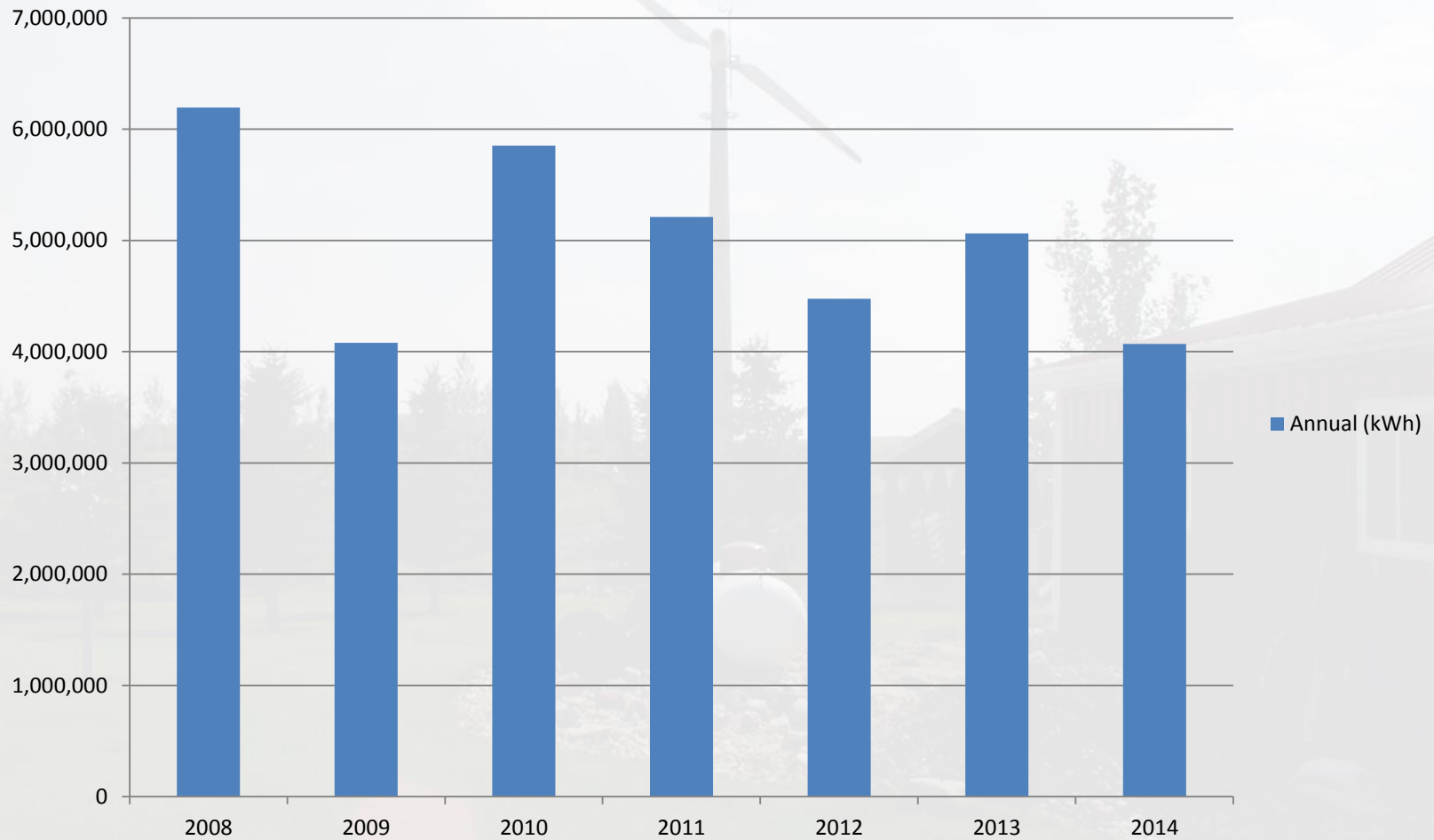


Fargo Methane Landfill Generator

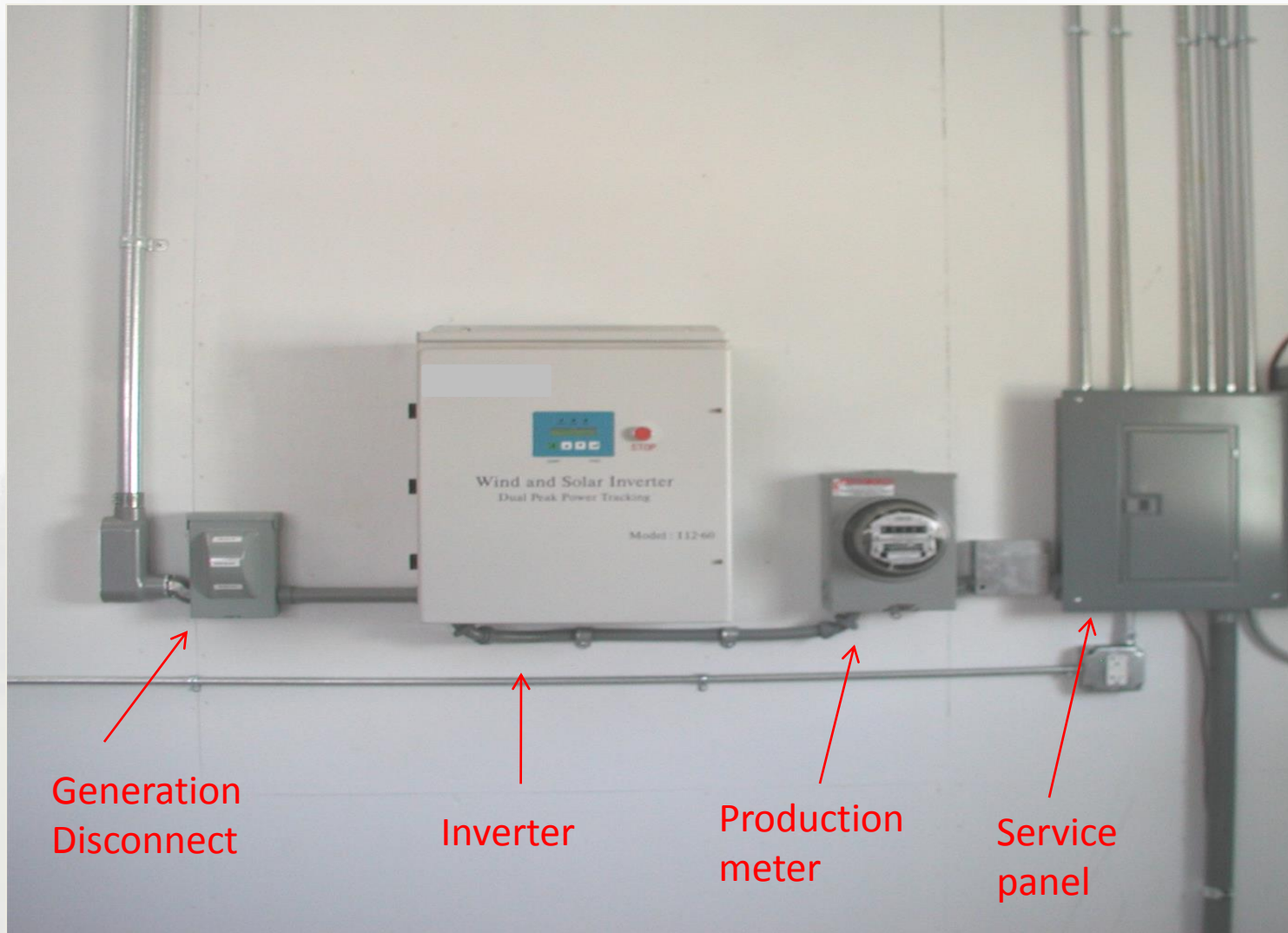
- Rated at 925 kW
- Continuously connected to CCEC
- Averages $\approx 5\text{M kWh/yr}$



Landfill Generator Output



Typical DG Interconnection



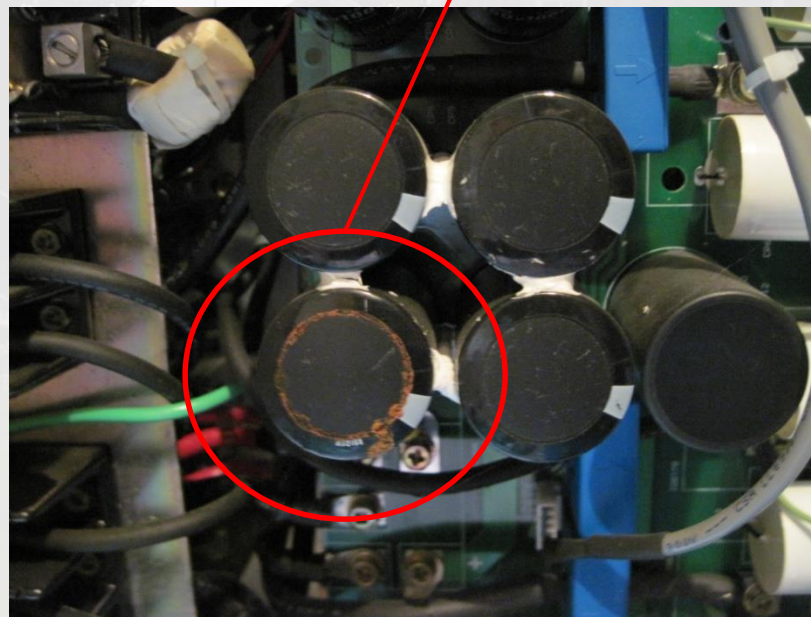
Maintenance

– Scheduled Maintenance

- Repack bearings
- Change hydraulic oil
- Every X years

– Unscheduled Maintenance

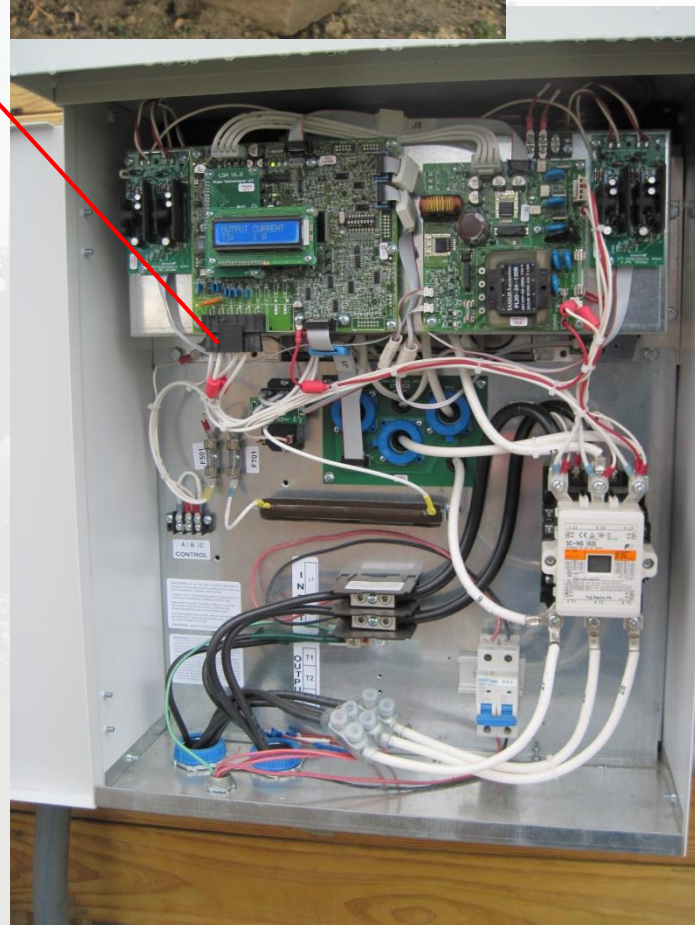
- Inverter breakdown
 - \$5,000-\$10,000
- Damages
 - Forces of nature
 - Incidental damage



Potential Problems

- Power Quality
 - Harmonics
 - Radio frequency interference
- Vibration
 - Build to specs
- “Weatherproof Enclosures”
- Lower than Expected Output
- High Maintenance Costs
- Lots of Electronics!





Financial Calculator

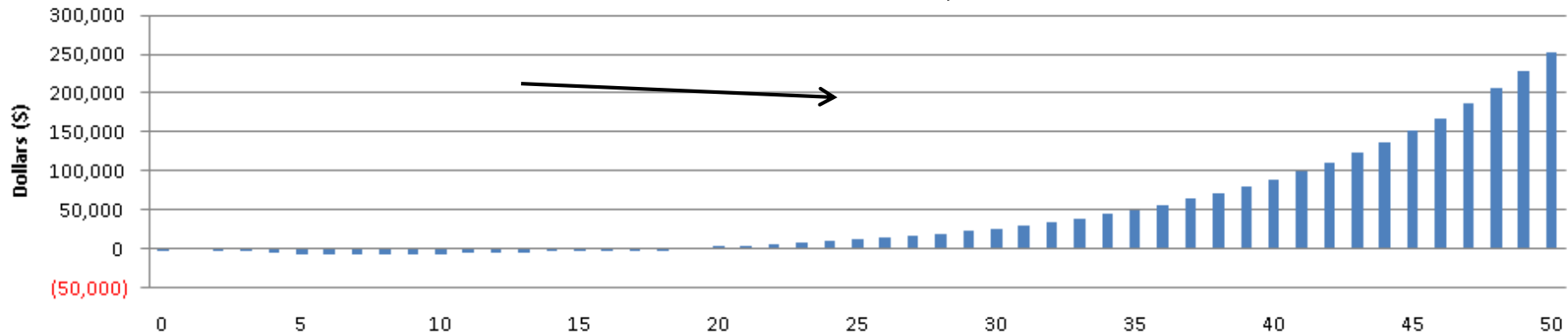
Small Wind Cash Flow Calculator - economics paper [Compatibility Mode]

Cass County Electric Cooperative		CCEC Small Wind Cash Flow Calculator	
Model Inputs		Model Inputs	
Project Specifications		Year	Financing/ Tax Credit
manufacturer		0	(\$1,400)
rotor diameter (ft.)		1	\$1,660
cut in wind speed (mph)		2	(\$2,540)
inverter UL 1741 listed (V/N)		3	(\$2,540)
		4	(\$2,540)
		5	(\$2,540)
		6	(\$50)
Project Investment		7	(\$50)
Total installed cost, \$	\$14,000	8	(\$50)
Grants, %	0%	9	(\$50)
Net project cost	\$14,000	10	(\$50)
		11	(\$50)
investment tax credit (yr. 1), %	30%	12	(\$50)
ND renewable energy tax credit	15%	13	(\$50)
		14	(\$50)
Annual insurance prem. diff	\$50	15	(\$50)
		16	(\$50)
		17	(\$50)
Financing		18	(\$50)
Down payment, %	10%	19	(\$50)
Loan amount	\$12,600	20	(\$50)
Interest rate, %	5%	21	(\$50)
Loan term, years	6	22	(\$50)
Loan payment, yearly	\$2,910	23	(\$50)
Loan payment, monthly	\$239	24	(\$50)
		25	(\$50)
Energy Production		26	(\$50)
Rated capacity, kW	1.8	27	(\$50)
Capacity factor, %	18%	28	(\$50)
	2,838		

Model Inputs		Year	Financing/ Tax Credit	O&M	Net Energy Savings	Annual Cash Flow	Cumulative Cash Flow
Project Specifications		0	(\$1,400)			(\$1,400)	(\$1,400)
manufacturer		1	\$1,660	\$0	\$227.06	\$1,887	\$487
rotor diameter (ft.)		2	(\$2,540)	\$0	\$249.77	(\$2,291)	(\$1,804)
cut in wind speed (mph)		3	(\$2,540)	\$0	\$274.74	(\$2,266)	(\$4,069)
inverter UL 1741 listed		4	(\$2,540)	\$0	\$302.22	(\$2,238)	(\$6,307)
Project Investment		5	(\$2,540)	\$0	\$332.44	(\$2,208)	(\$8,515)
Total installed cost, \$		6	(\$50)	\$0	\$365.68	\$316	(\$8,200)
Grants, %							

Annual Cash Flow

Cumulative Cash Flow



Coming soon...



CCEC Community Solar

- CCEC partnered with the City of Fargo
- 100 kW community solar
- Optional participation offered to CCEC members
- Member purchases panel license(s)
- Will receive credits for production
- One panel of leased ownership costs \$ 1,670
- More details out soon...

Questions

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More Information

<http://www.kwh.com/content/renewable-energy>

