Michigan Solar Market Potential

Abhilash "Abhi" Kantamneni| Michigan Technological University

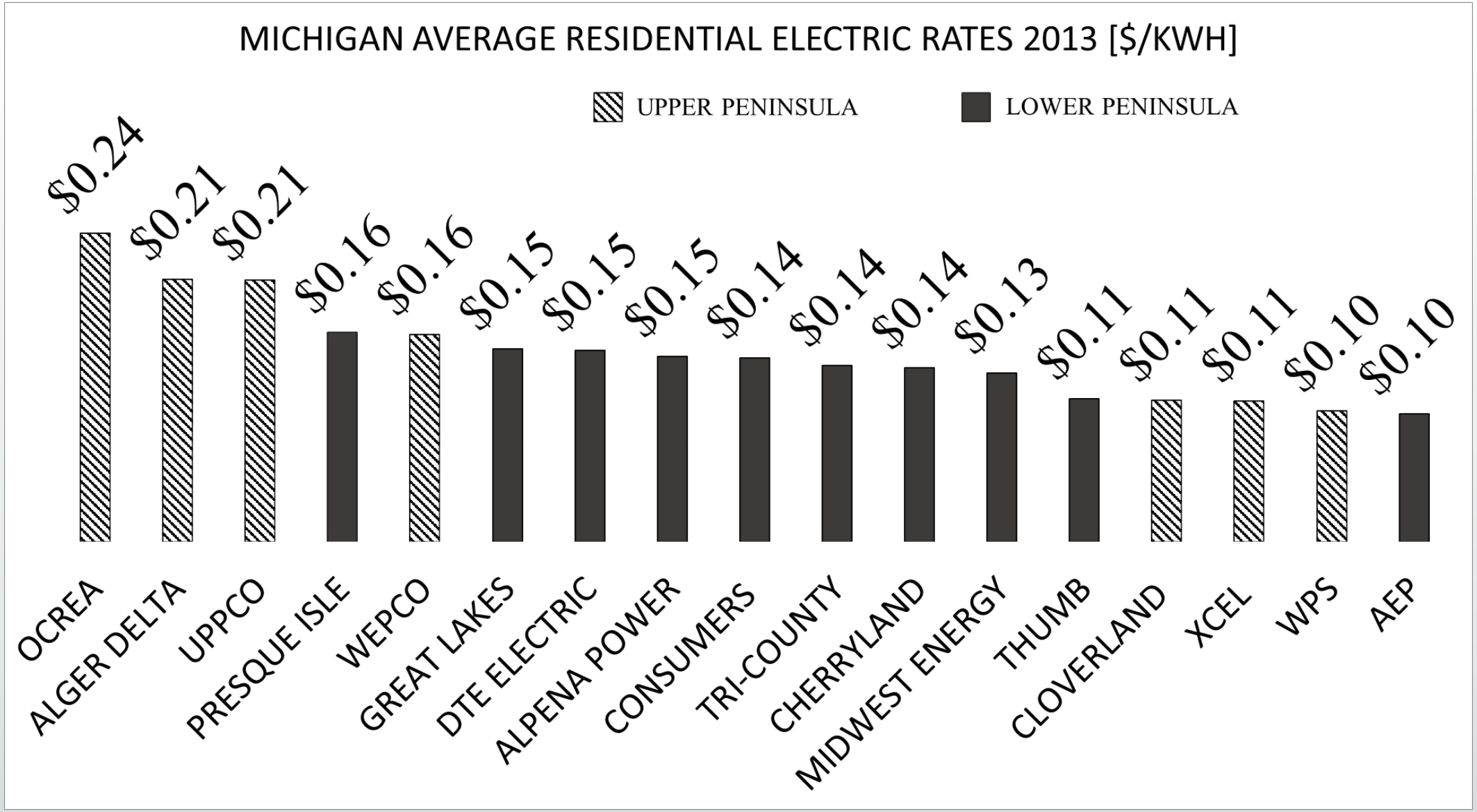
Houghton Winters

Source: Mining Journal

Source: Michigan Tech Alumni

Source: boniashburn.com

Source: Mining Gazette



Source: [MPSC Annual Net Metering Report 2014]

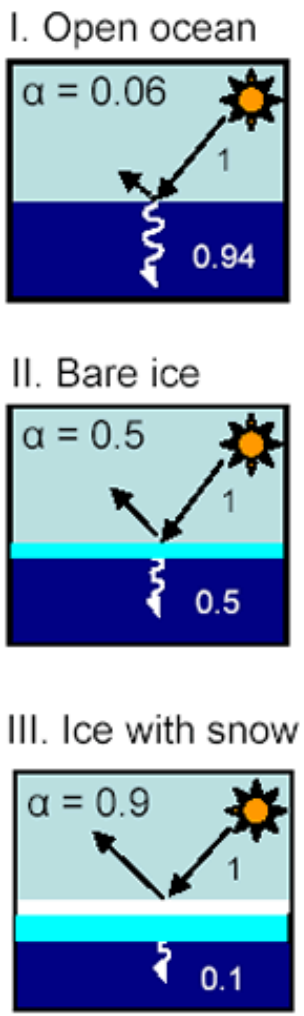
Average Residential Electricity Retail Rates by State (2013)

State	Average Price [$/kWh]
Hawaii	$0.37
Houghton	**$0.21-$0.24**
New York	$0.19
Alaska	$0.19
Connecticut	$0.18
Vermont	$0.18
New Hampshire	$0.17
California	$0.16
New England	$0.16
Middle Atlantic	$0.16
Massachusetts	$0.16
New Jersey	$0.16
Michigan	**$0.15**

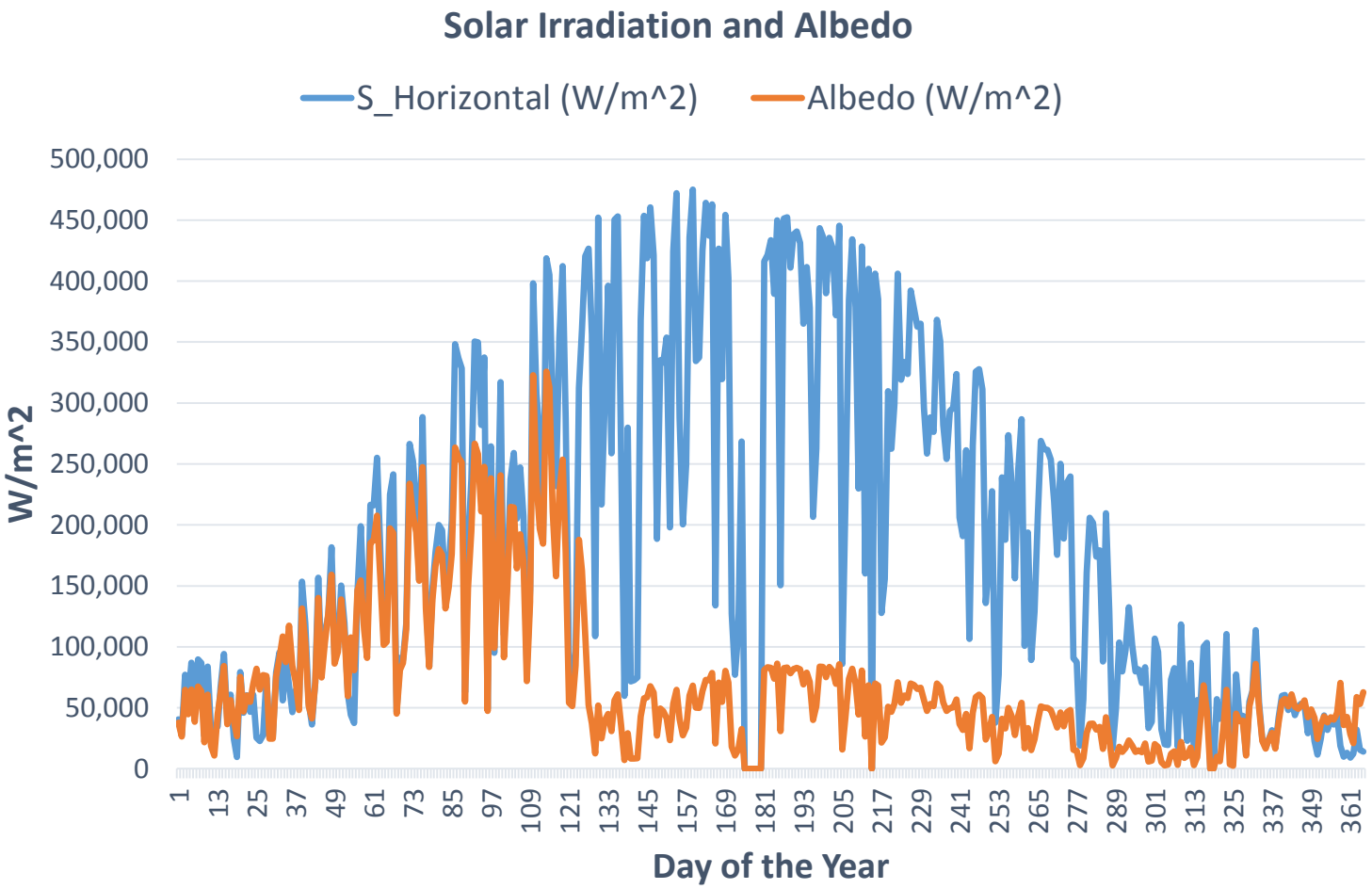
Source: www.eia.gov

Michigan Tech KRC Photovoltaic Research Center

Advantages of High Module Tilt: Albedo

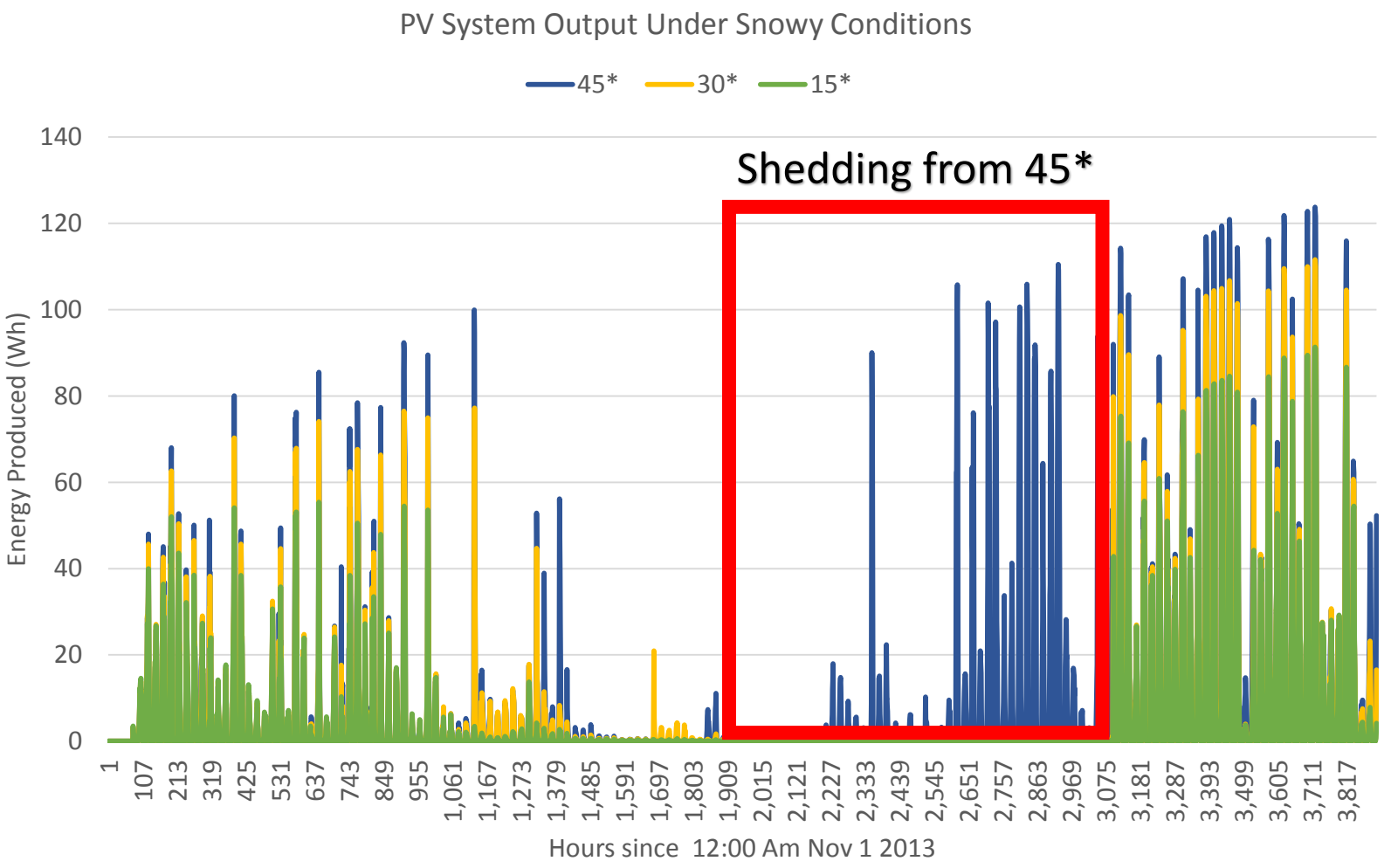


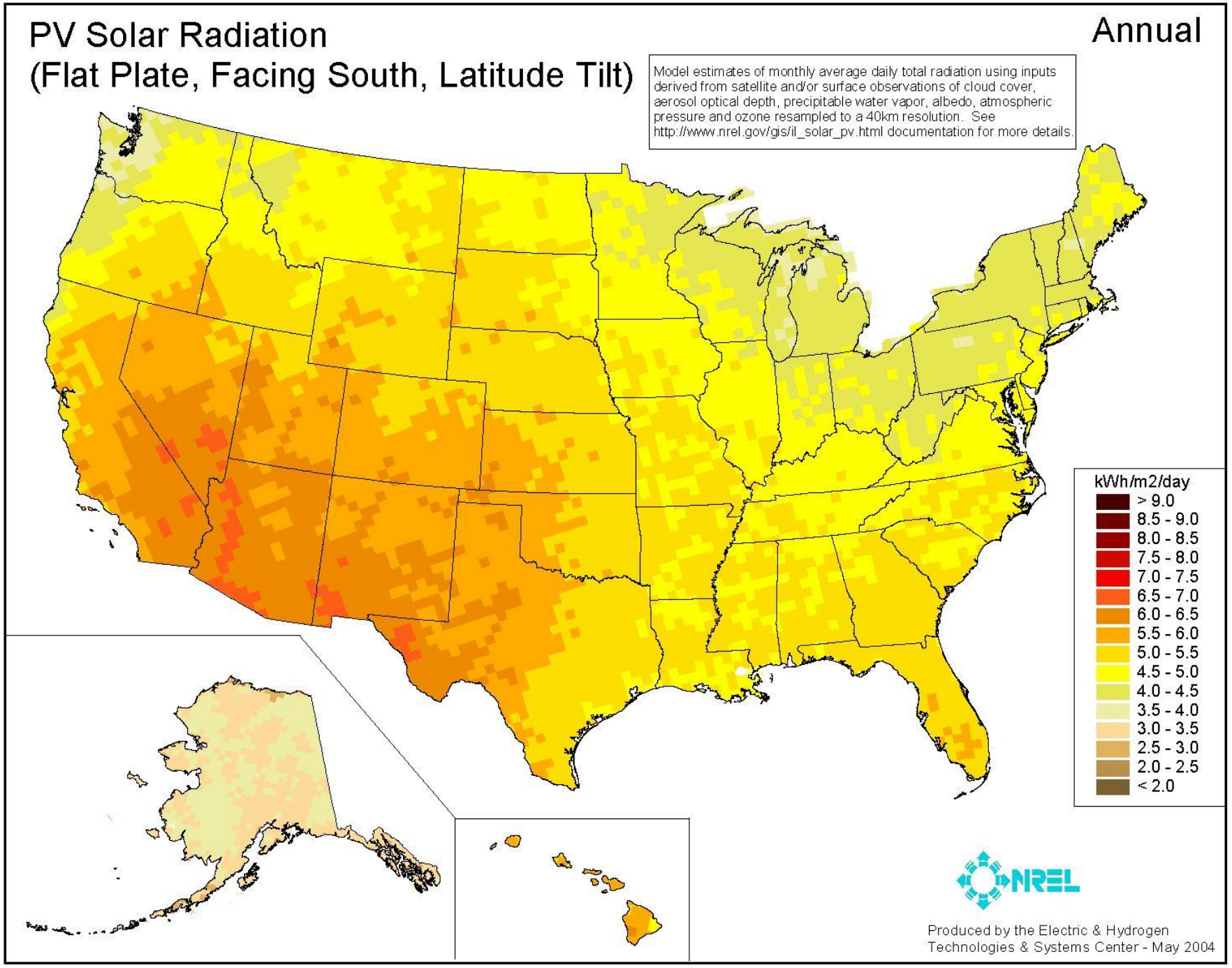
Source: nsidc.org



Source: MTU KRC

Advantages of High Module Tilt: Snow Shedding





Source: www.nrel.gov

Simple ROI Calculation

Location	Estimated System Size [kW]	System Costs [$]	Average Electric Rate [$/kWh]	Annual Savings [$/year]	Payback Period [Years]	Net Savings over Warranty Period [$]	Net Savings as % of total system cost
Houghton, MI	**5.4**	**13,448**	**0.19**	**1,140**	**12**	**15,048**	**112%**
Los Angeles, CA	**3.6**	9,044	0.10	614	15	6,313	70%
Austin, TX	**4.2**	10,441	0.09	562	19	3,605	35%
Miami, FL	**4.0**	9,936	0.12	714	14	7,913	80%
Alburquerqee, NM	**3.3**	8,154	0.08	482	17	3,903	48%
Phoenix, AZ	**3.1**	7,855	0.10	591	13	6,909	88%

Barriers to Solar

- Does it make ene?
- High Installation Costs:
- Financing

‘Solarize Houghton’

- Solar Calculator
- DIY Bulk Purchasing
- MichiganSaves.org + Local Credit Union

Solar Market Penetration in Houghton

- 2013 MPSC Net Metering report:- **~30kW**
- Summer 2014: **60kW** added (all residential)
- Fall 2014: **+200kW** expected. (County Road Commission, City Center, Public Library, Golf Course, Ski Hill, Coffee Shop, State Park….) and Upper Peninsula's first Community Solar with Ontonagon REA.

Benefits of Renewables

- Michigan Public Service Commission Report on Renewable Energy Standards (RES) says phased integration of renewables cheaper than new coal generation facilities.
- Michigan Department of Energy, Labor & Economic Growth Report on Green Jobs says renewable energy sector job creation = 3% of all private sector employment in state
- International Energy Agency Report on Energy Security says renewable energy systems reduce supply disruptions and reliance on imported fuel.

Actual Quote: "The only green that matters, is the color of my $$"

(Obviously, not a philosopher)

Where is the Solar Market Potential in Michigan?

Spoiler: Not in RES Compliance.

MI PA 295 Renewable Energy Standard RES requires all Michigan electric providers to meet 10% of their retail sales using renewable energy*

Currently all MI utilities are on track to meet RES Compliance*

*Source: [MPSC Report on RES Compliance]

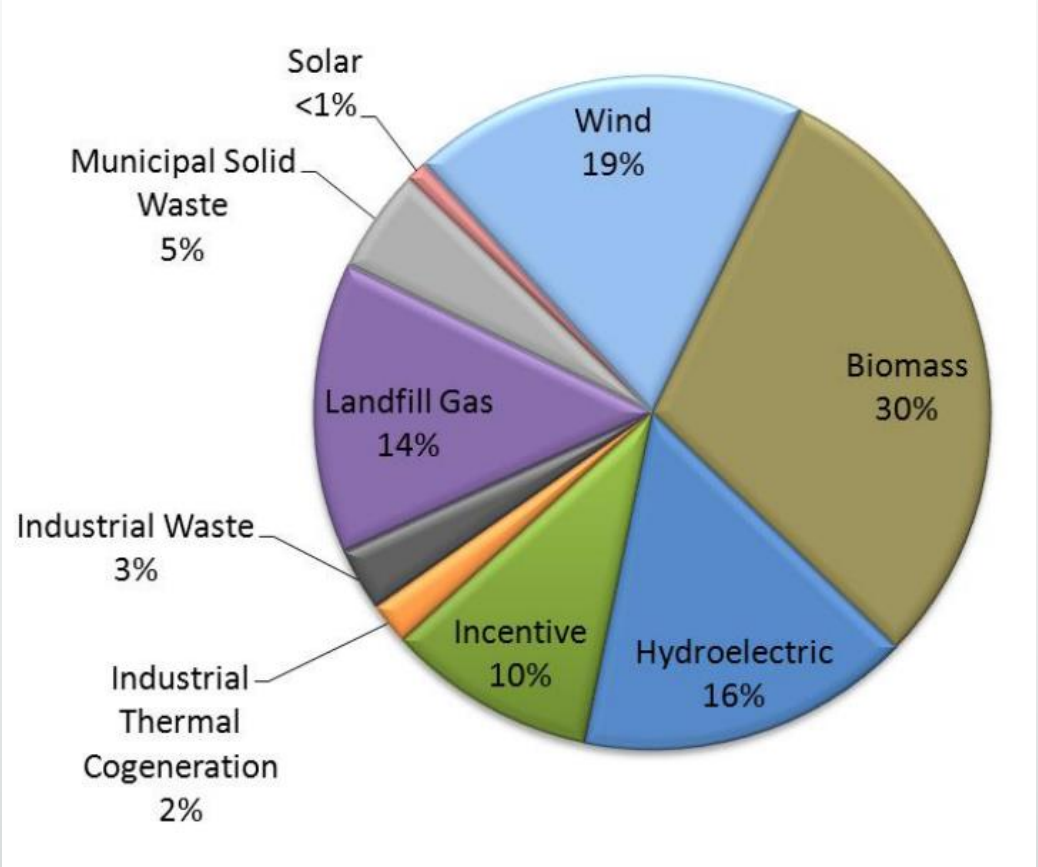


***Figure: MIRECS 2009-2013 Credits by Energy Source**

Answer: Grid Tied Net Metered Systems

Large majority of installed net metered customer generation is Solar.

Source: [MPSC Annual Net Metering Report 2014]

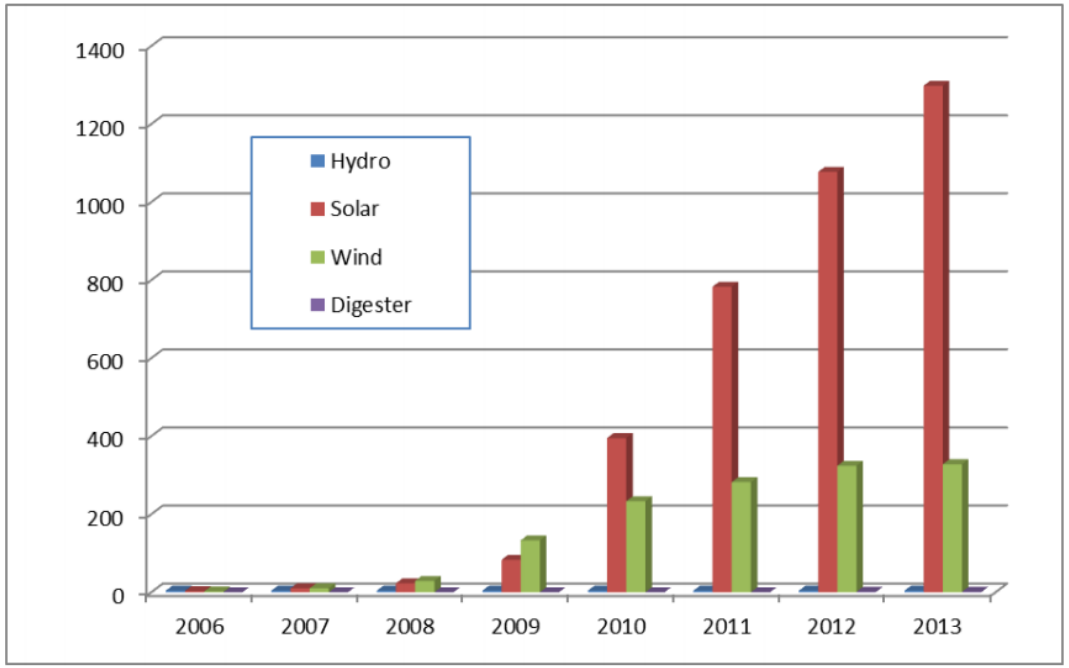


Figure: MPSC 2013 Net Metering Program - Installations

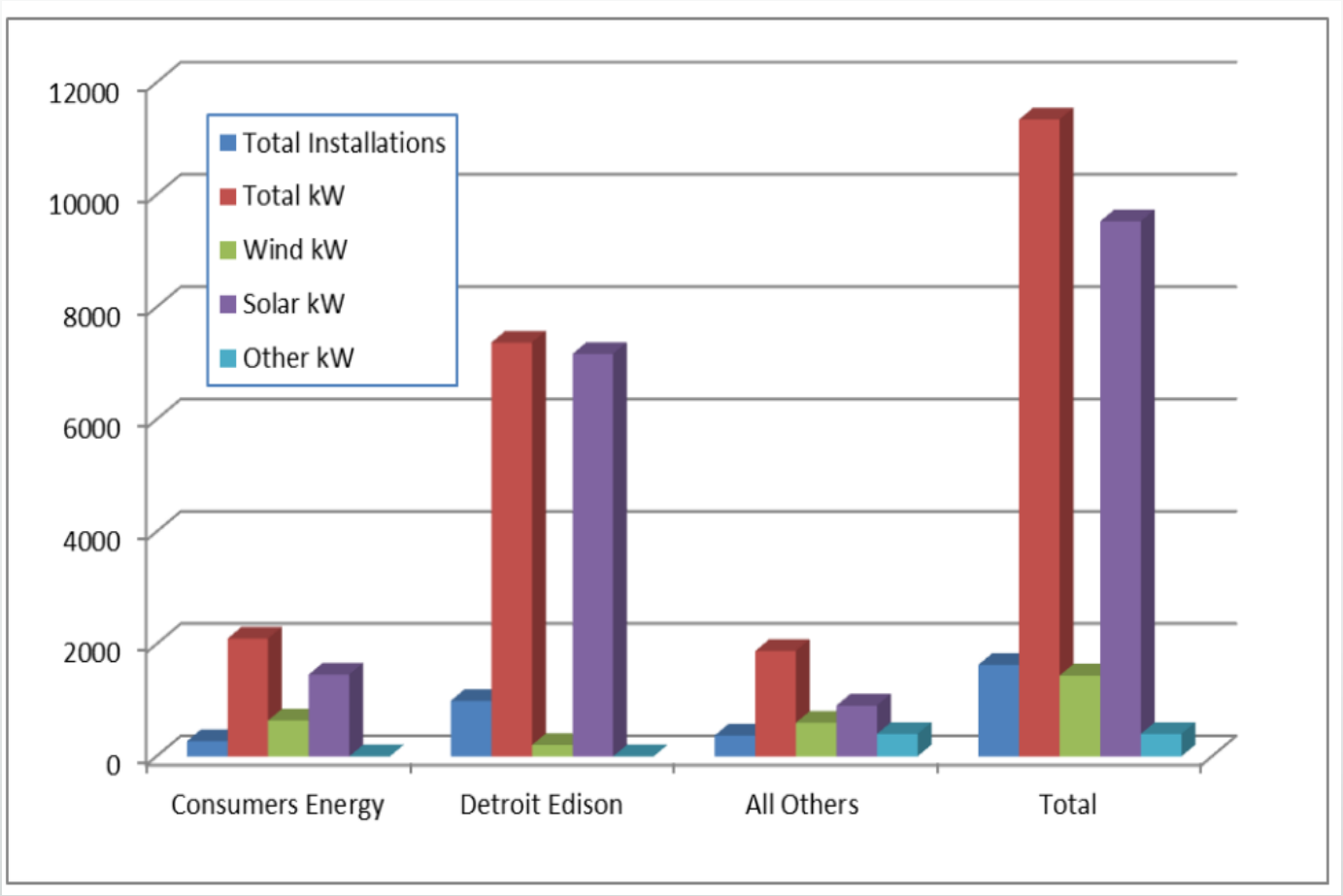


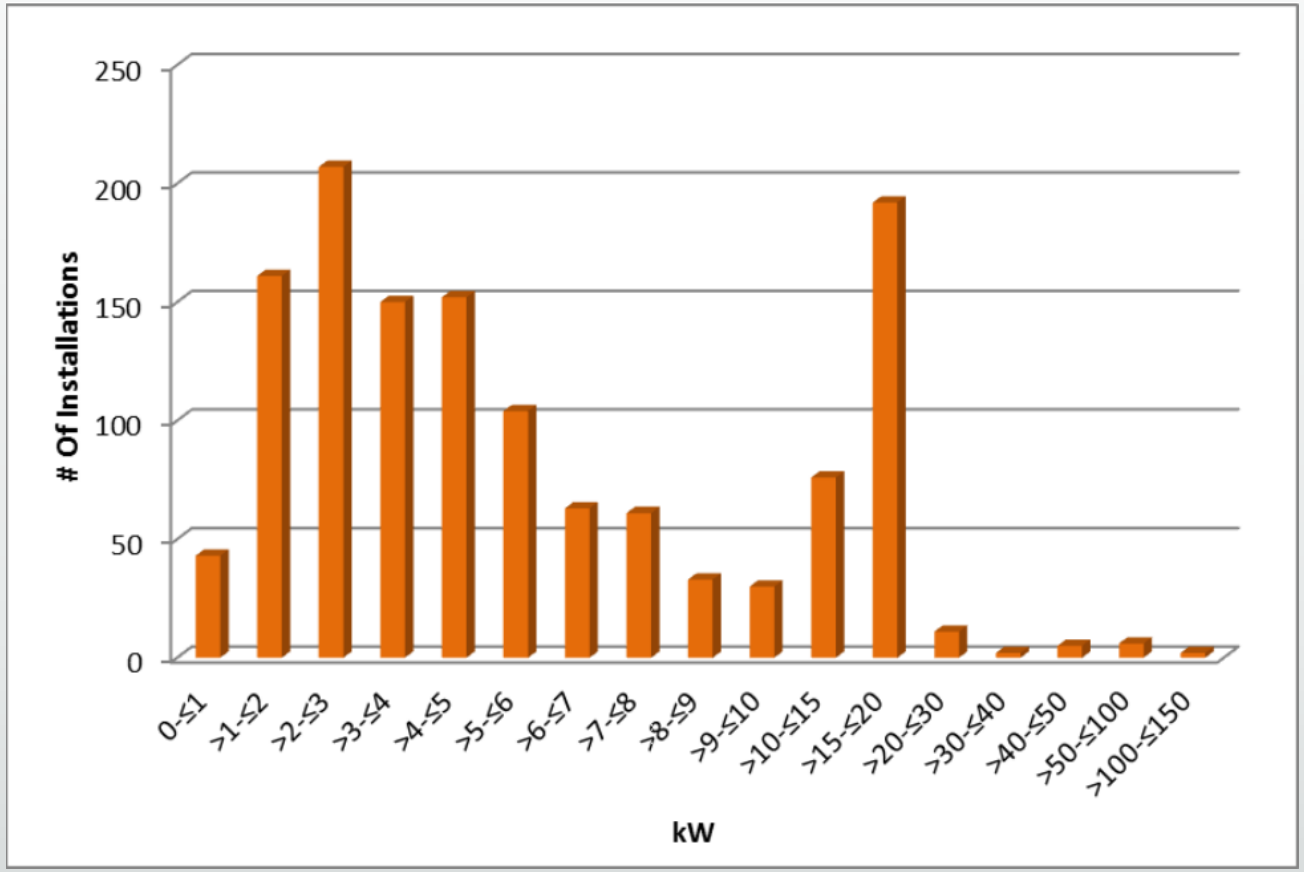
Figure: MPSC 2013 Net Metering Program - Installed Capacity

Understanding Net Metering

Category I: Systems < 20KW. Full Credit on excess generation.
Limit: 0.5% of Utility's peak load.

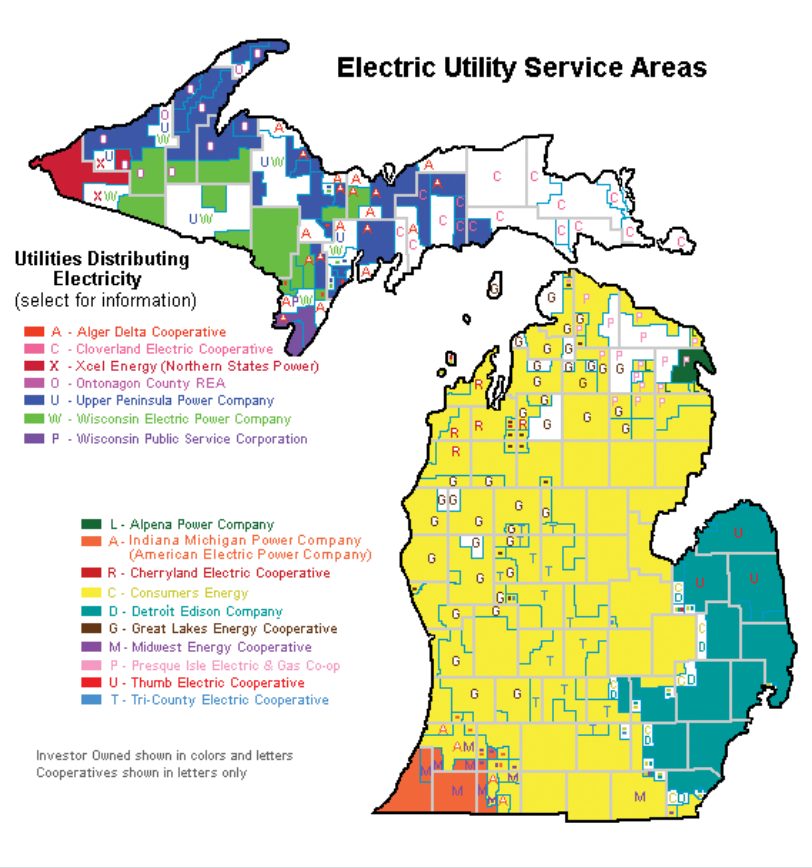
Category II: Systems > 20KW < 150kW. Partial Credit on excess generation.

Category III: Systems > 150kW.
Methane Digester projects up to 550 kW



Source: [MPSC Annual Net Metering Report 2014]

PV Market Opportunity by Utility Service Area



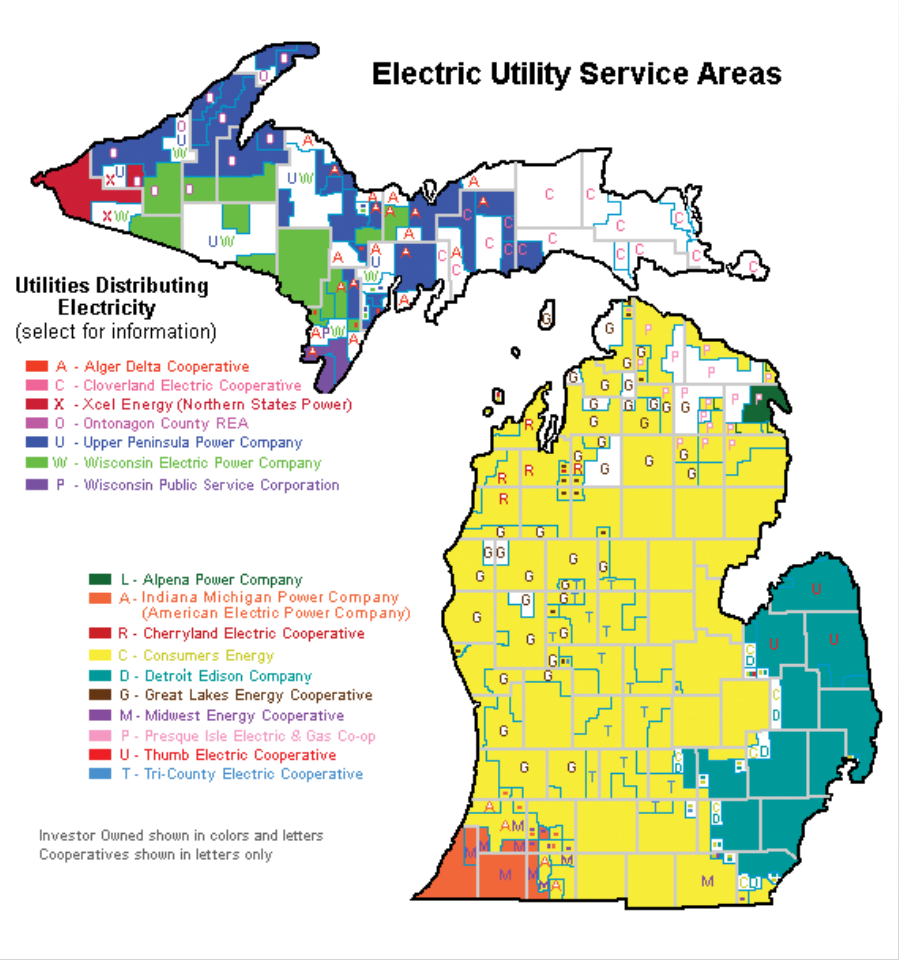
8 Investor-Owned Utility Companies

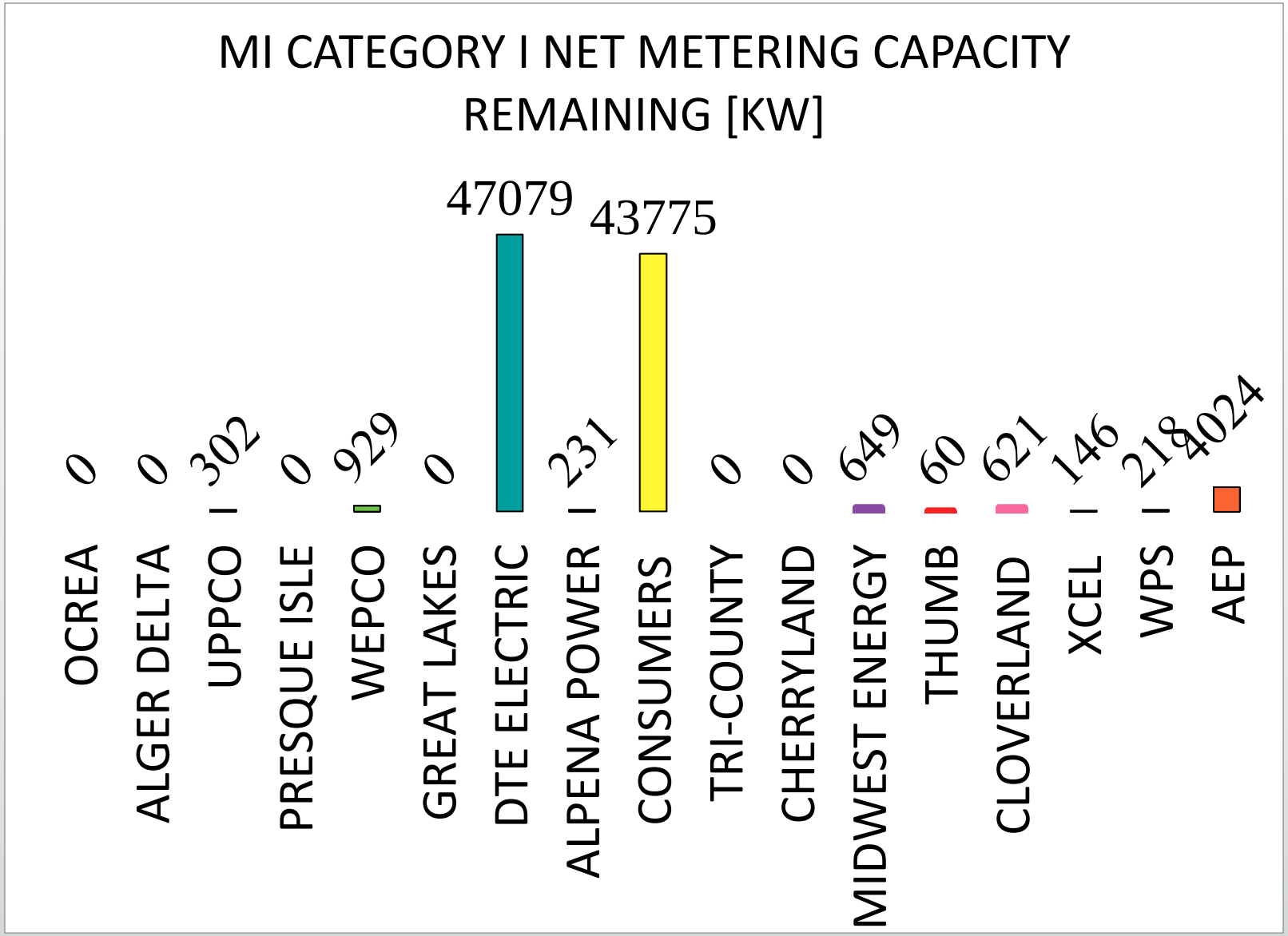
9 Rural Electric Cooperatives

41 Municipal Electric Utilities

PV Market Opportunity by Available Net Metering Capacity

Source: [MPSC Annual Net Metering Report 2014]

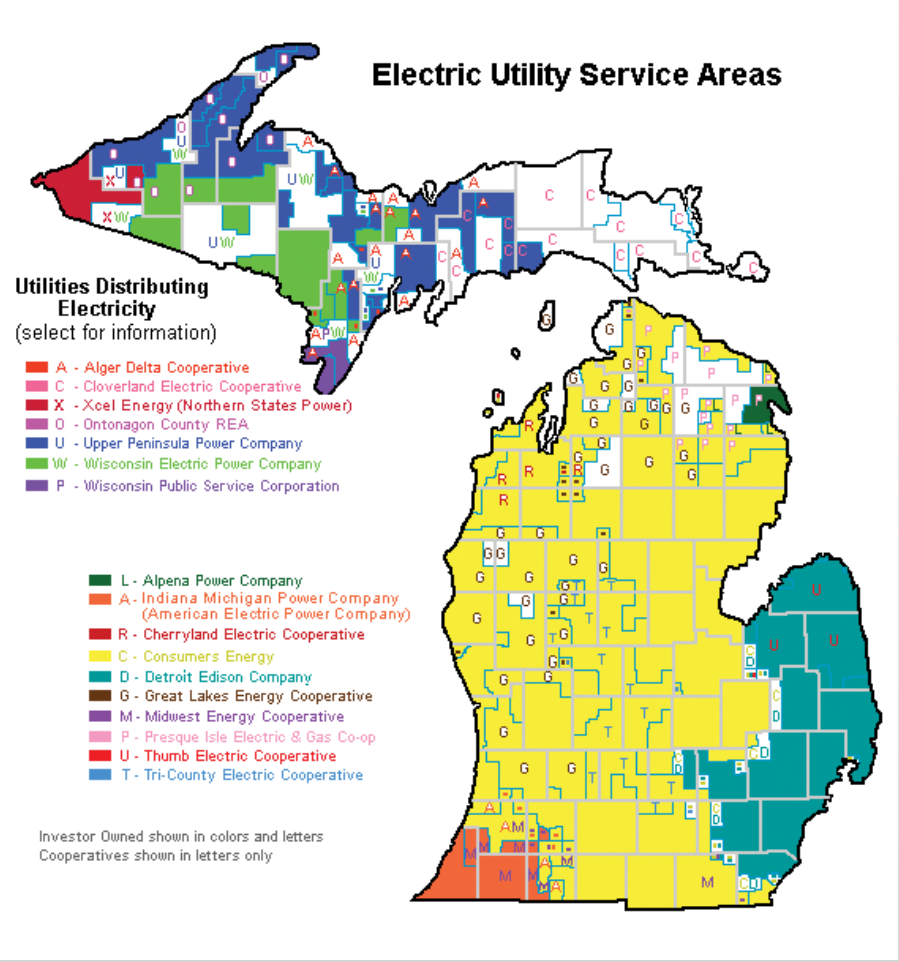


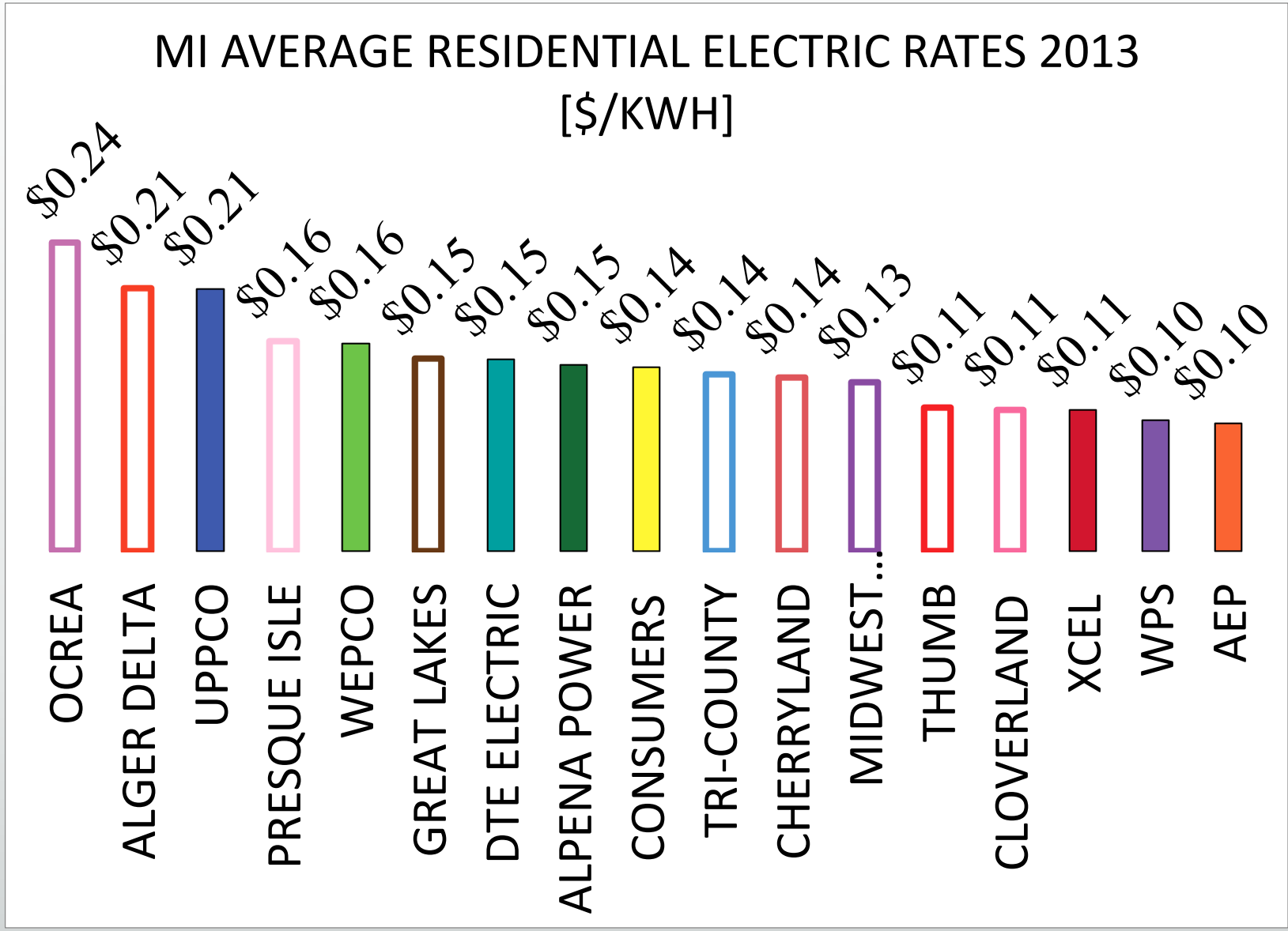


PV Market Opportunity by Utility Electric Rates

MI Average: $0.14/kWh

Source: [MPSC Utility Company Annual Reports 2013]

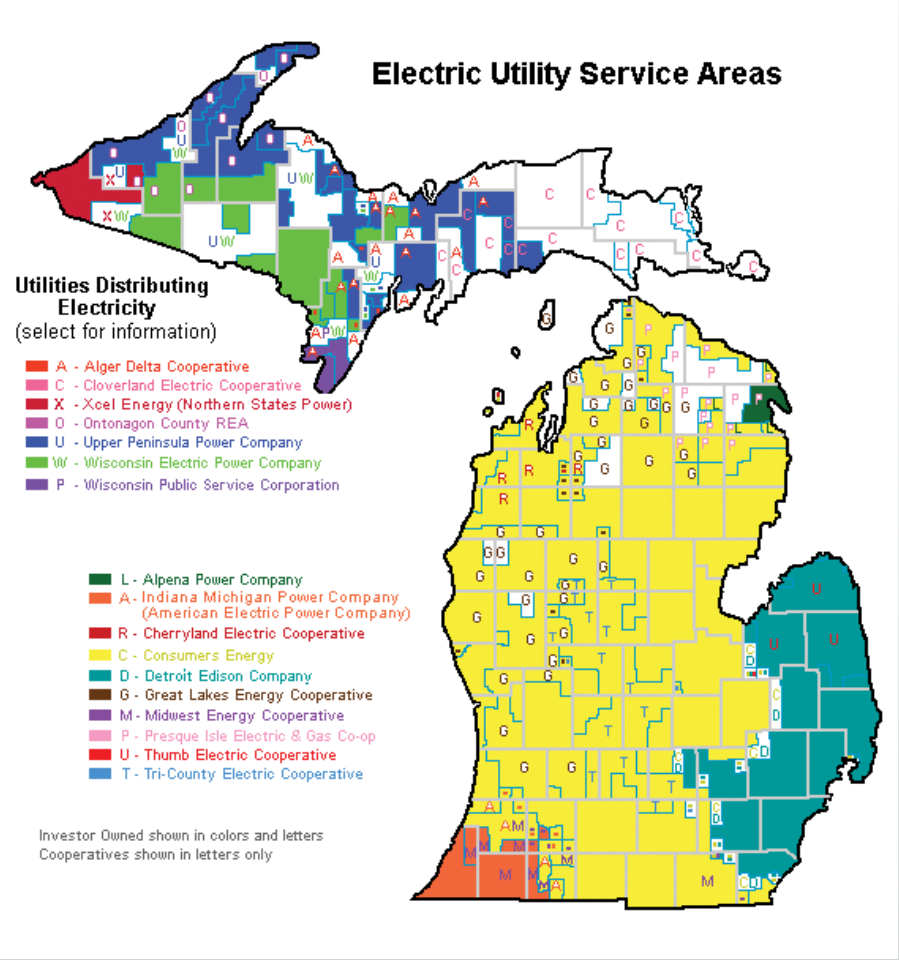


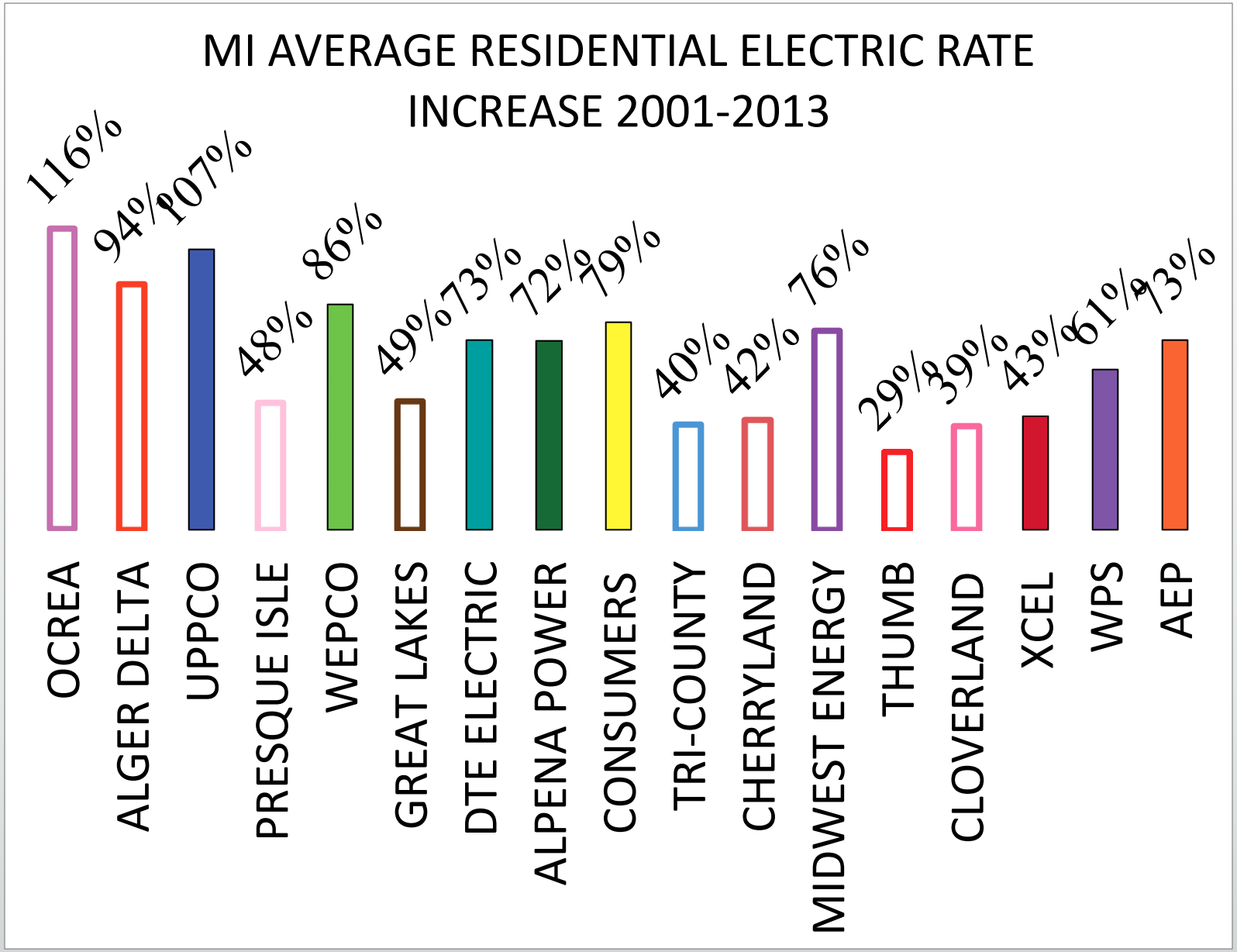


PV Market Opportunity by Utility Electric Rate Increases

MI Average: 74%

Source: [MPSC Utility Rates Summary]

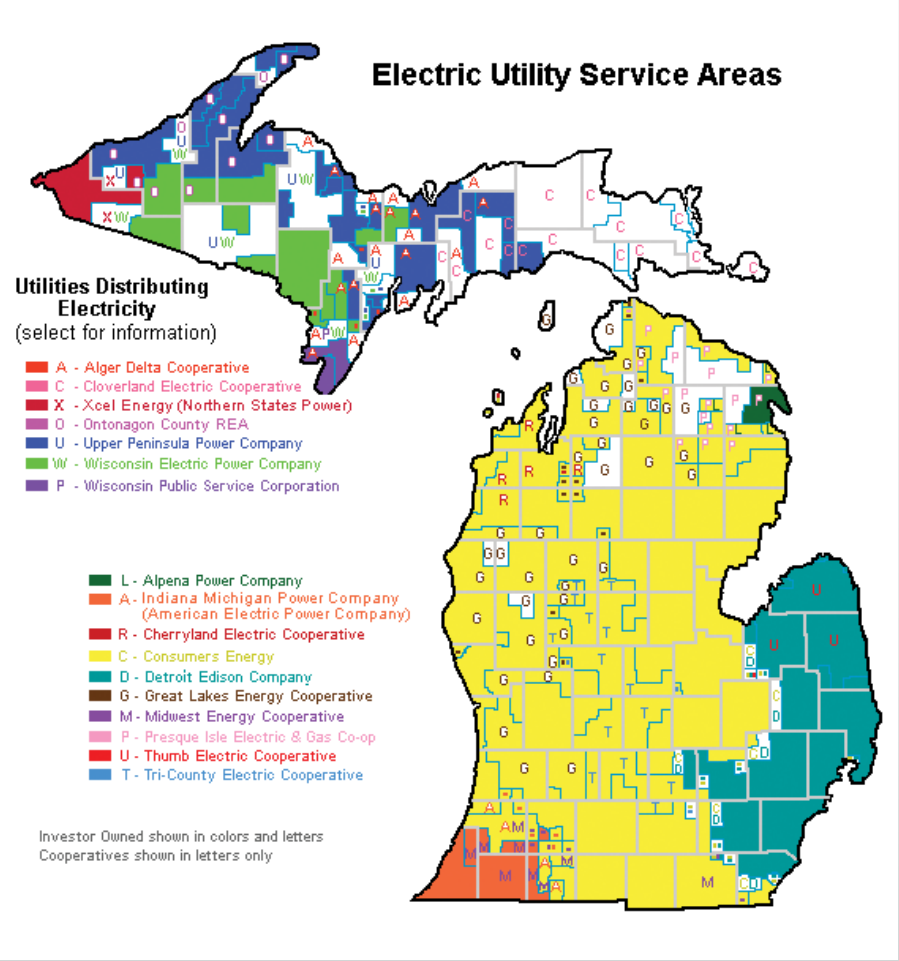


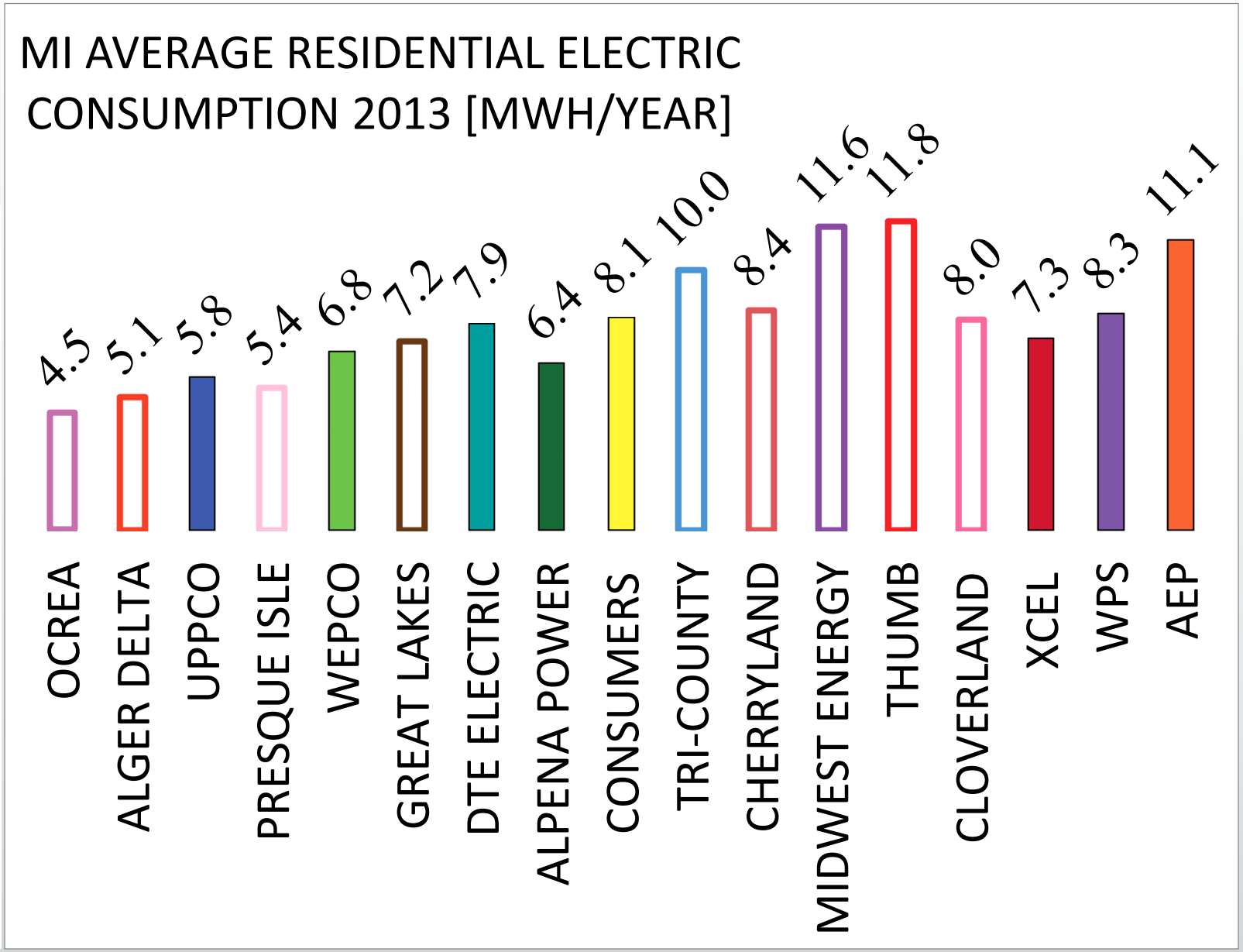


PV Market Opportunity by Average Annual Consumption

MI Average: 8MWh/Year

Source: [MPSC Utility Company Annual Reports 2013]





PV Residential Solar Market Potential

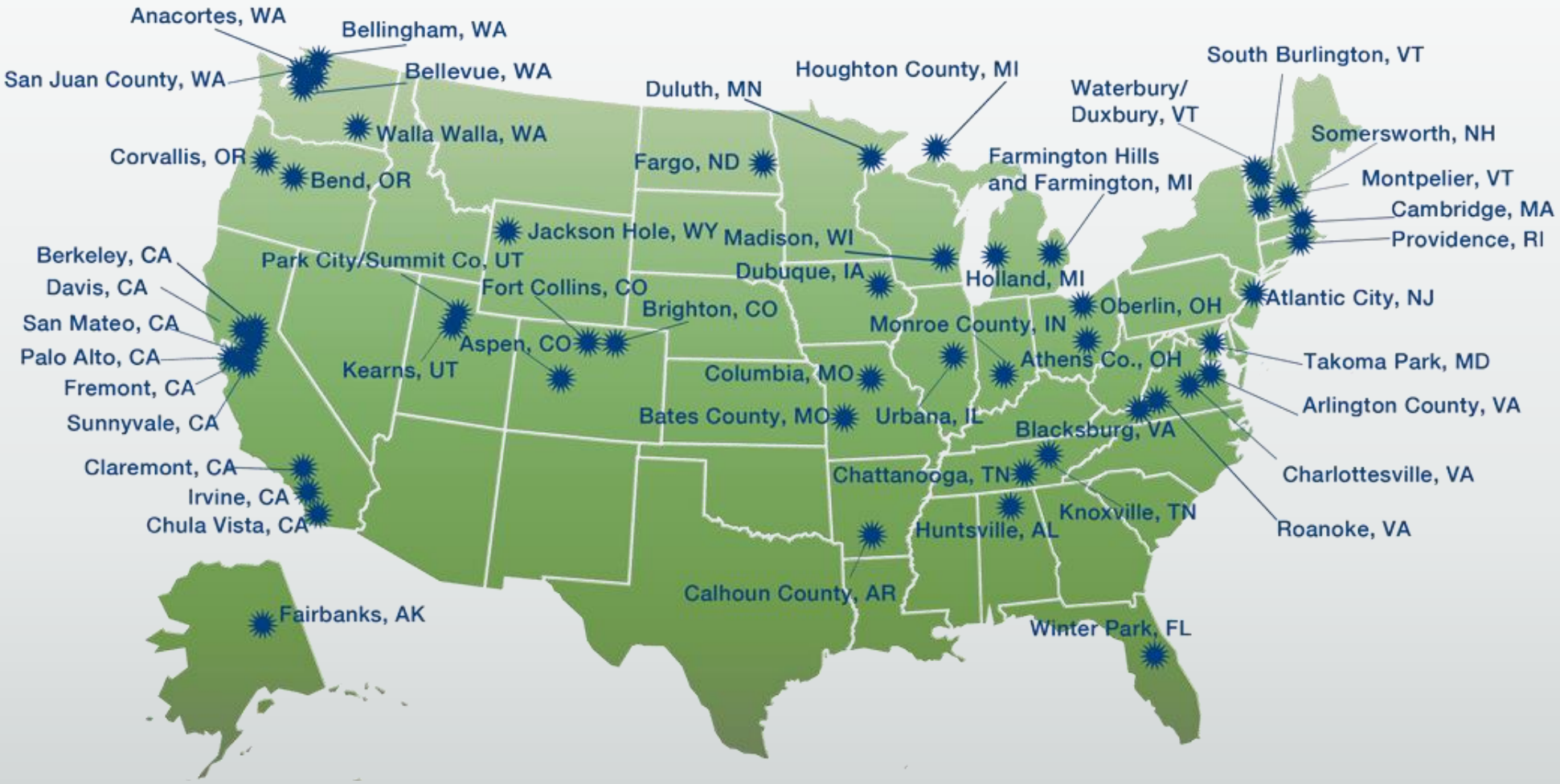
Utility	Rank by Available Capacity*	Rank by rates	Rank by rate Increase	Rank by Consumption	Aggregate Rank
OCREA	12	1	1	1	1
UPPCO	7	3	2	4	2
ALGER DELTA	12	2	3	2	3
WEPCO	4	5	4	6	3
DTE ELECTRIC	1	7	8	9	5
CONSUMERS	2	9	5	11	6
ALPENA POWER	8	8	9	5	7
PRESQUE ISLE	12	4	12	3	8
GREAT LAKES	12	6	11	7	9
MIDWEST ENERGY	5	12	6	16	10
AEP	3	17	7	15	11
CLOVERLAND	6	14	16	10	12
XCEL	10	15	13	8	12
WPS	9	16	10	12	14
CHERRYLAND	12	11	14	13	15
TRI-COUNTY	12	10	15	14	16
THUMB	11	13	17	17	17

PV Commercial Solar Market Potential

Utility	Rank by Available Capacity*	Rank by rates	Rank by rate Increase	Rank by Average Consumption	Aggregate Rank
ALGER DELTA	12	2	1	3	**1**
OCREA	12	1	2	4	**2**
MIDWEST ENERGY	5	8	3	7	**3**
WEPCO	5	4	4	14	**4**
ALPENA POWER	8	6	5	8	**4**
UPPCO	7	3	8	12	**6**
TRI-COUNTY	12	5	11	2	**6**
GREAT LAKES	12	7	12	1	**8**
CLOVERLAND	6	12	9	6	**9**
CONSUMERS	2	9	7	16	**10**
WPS	9	14	6	9	**11**
PRESQUE ISLE	12	10	14	5	**12**
DTE Electric	1	13	13	17	**13**
AEP	3	17	10	15	**14**
CHERRYLAND	12	11	16	10	**15**
THUMB	11	15	17	11	**16**
XCEL	10	16	15	13	**16**

Summary: “Go West, Young Man”

Georgetown University Energy Prize Quarterfinalist: Houghton County



Contact Information

Abhilash Kantamneni

221 Rekhi Hall
Michigan Tech
1400 Townsend Drive
Houghton MI

akantamn@mtu.edu

www.SolarizeHoughton.org