



Rooftop Solar Potential Study Third Stakeholder Meeting

August 26, 2021

Webinar Logistics & Guidelines



All parties except presenter muted to avoid unnecessary noise distraction

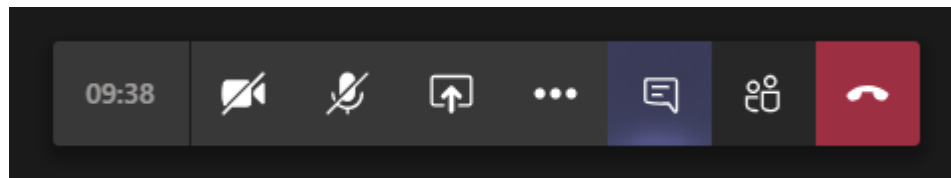


If you have an immediate question, or audio or video is poor please send an instant message to the moderator



We will stop today's presentation several times to take questions

Your Settings



Agenda



Draft Solar Potential Results

- Technical Potential
- Market Potential



Draft Solar Economic Scenario Results

- Increased Incentives
- Attractive Financing
- Net Metering
- Extended Federal ITC



Cost Effectiveness Analysis

- Rooftop Solar Cost Effectiveness
- Comparison to Energy Efficiency Measures' Cost Effectiveness



Income Qualified Research

- General Findings
- Policy Barriers
- Equity Framework



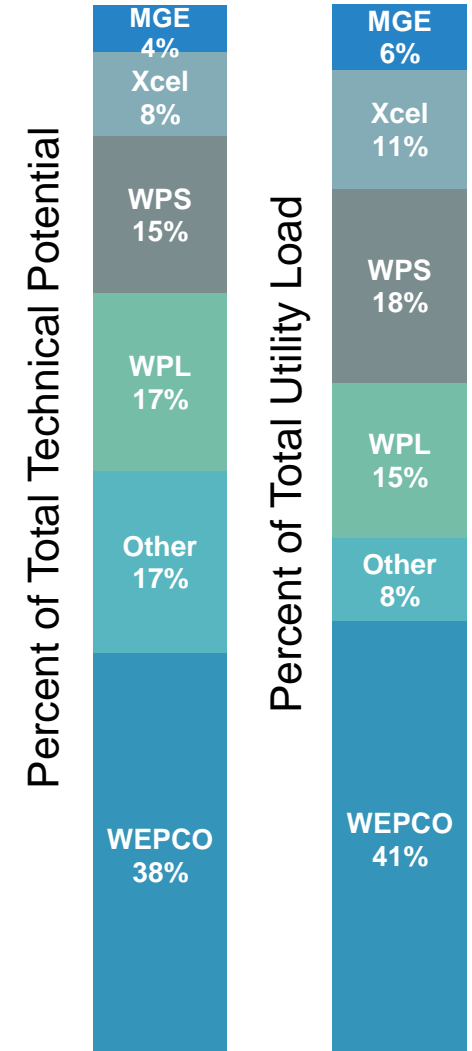
1. Draft Technical and Market Potential

Draft Technical Potential

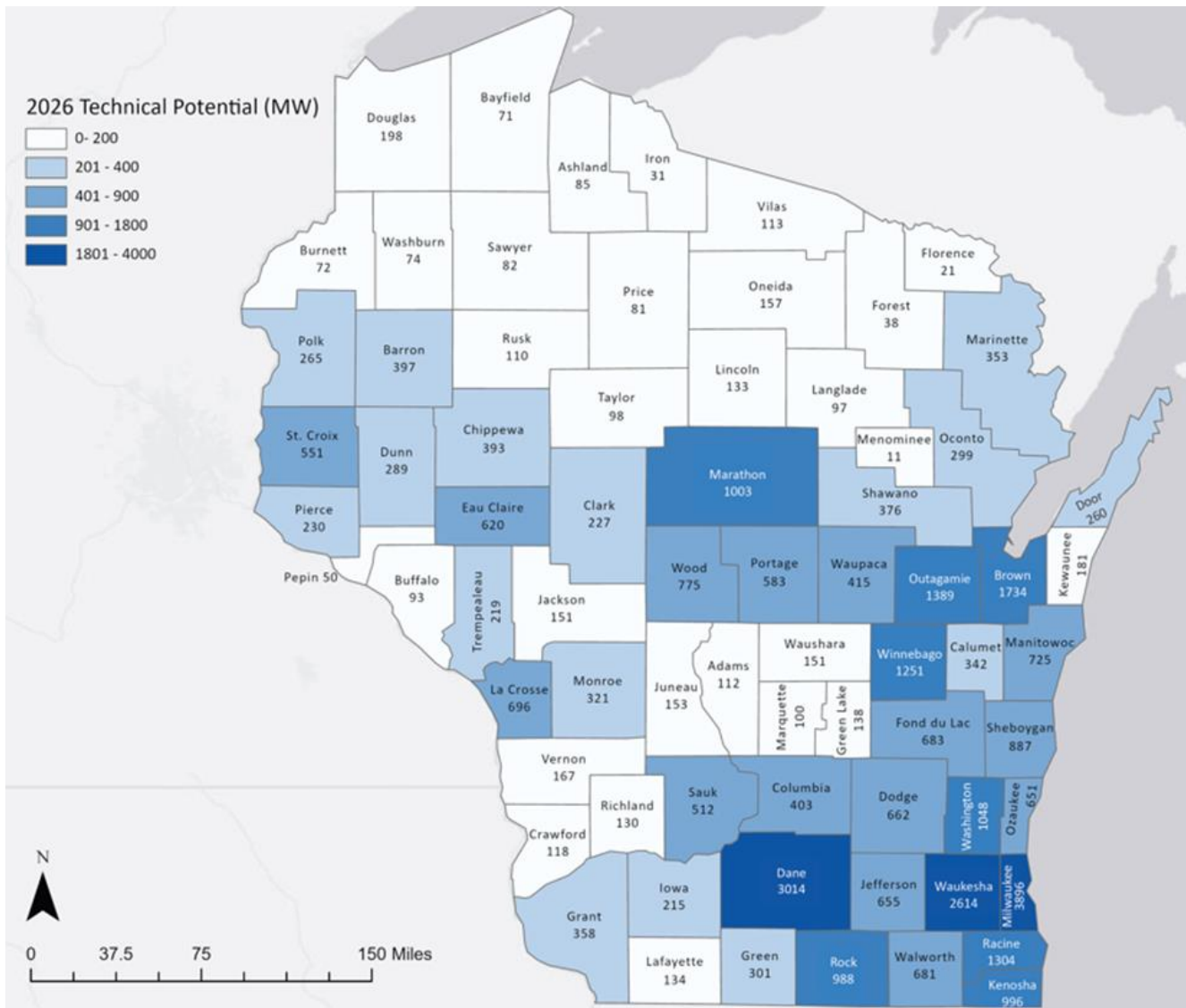
Utility	2034 Technical Potential	
	MWh	MW
Wisconsin Electric Power Company	17,861,445	14,834
Other	8,008,724	6,734
Wisconsin Power and Light	7,857,789	6,566
Wisconsin Public Service	6,944,868	5,964
Xcel	3,702,886	3,121
Madison Gas and Electric	2,065,052	1,679
Total	46,440,763	38,898

63% of the 2034 Technical Potential (MW) Comes from the Residential Sector

Note: WEPCO has the highest technical potential, but not proportionally high historic adoption – this affects market adoption



Concentration of Technical Potential



Technical Potential is concentrated in counties with most unobstructed Rooftop SQFT

Statewide Technical Potential is **265%** of Statewide Nameplate Capacity

Statewide Technical Potential is **70%** of Statewide Energy Production (due to low capacity factor of solar)

Market Potential Baseline

Net Metering Baseline

Current Market

WPS, WPL, and WEPCO are net billing utilities

Financing Baseline

20% Residential Down Payment Fraction

26% Commercial Down Payment Fraction

3.5% Interest Rate

Incentive Baseline

Residential Standard Income: \$500
Maximum Incentive

Residential Income Qualified: \$500
Maximum Incentive

Commercial: \$0.1/Watt and \$50K Maximum
Incentive

Federal ITC Baseline

Residential:
26% thru 2022

22% in 2023

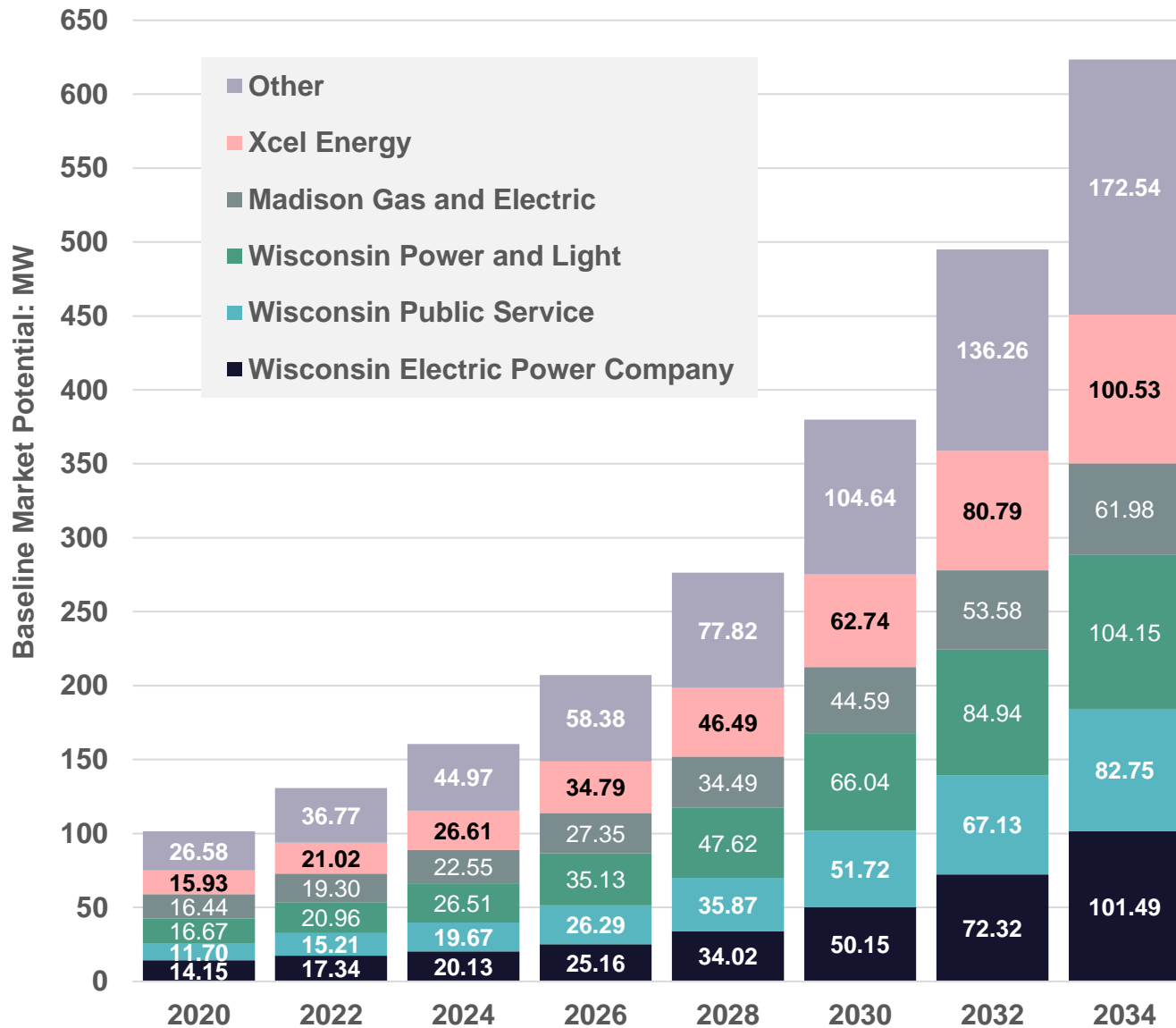
0% after 2023

Commercial:
26% thru 2022

22% in 2023

10% after 2023

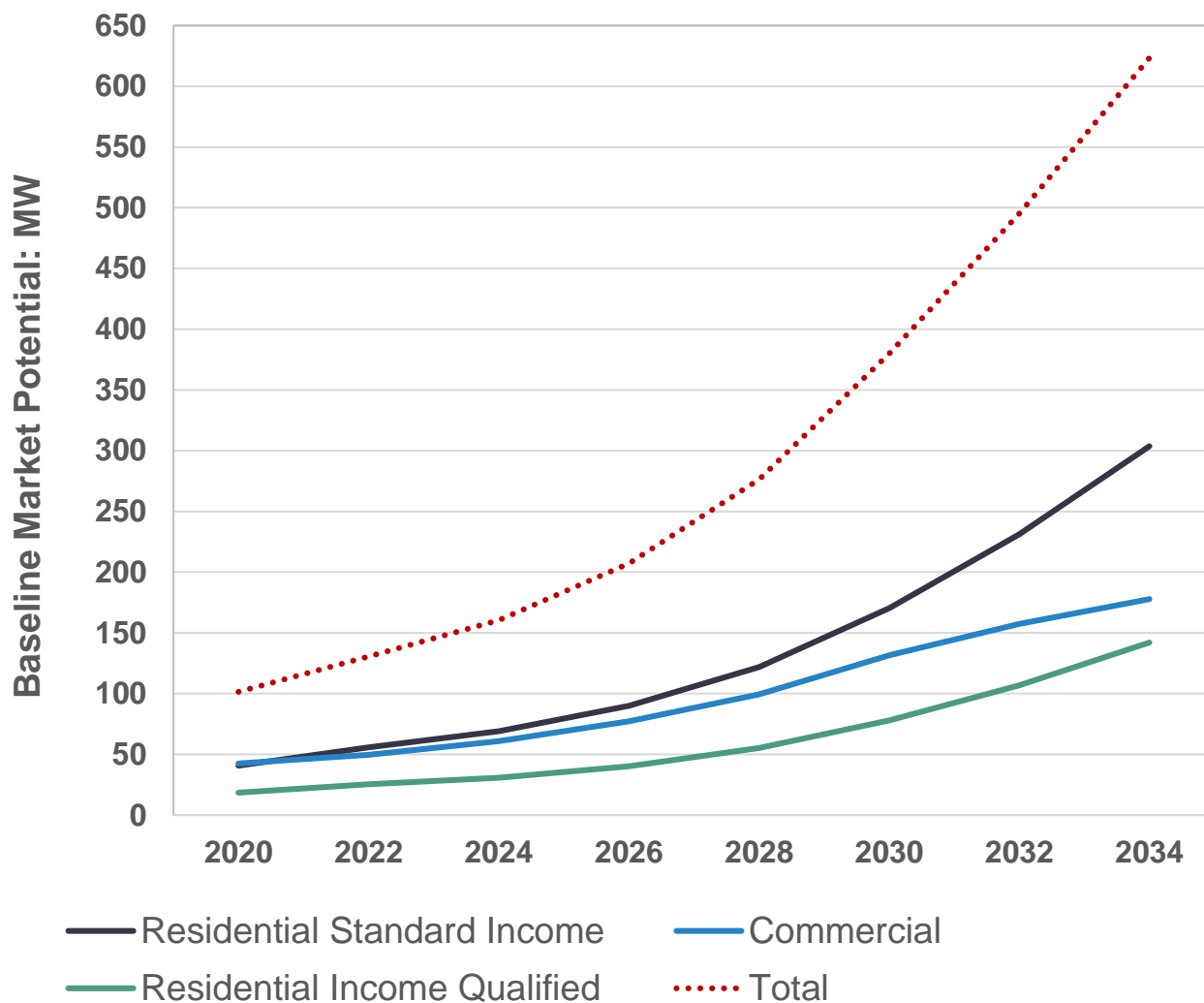
Draft Market Potential by Utility - Baseline



Cumulative
Baseline Market
Capacity Adopted
in 2034:
623 MW
(includes historical
adoption)

Average Annual
Growth Rate
(2020-2034)
30%

Draft Market Potential by Sector / Income



Cumulative Draft Market Potential 2034

Residential SI: **304 MW**
 Residential IQ: **142 MW**
 Commercial: **178 MW**

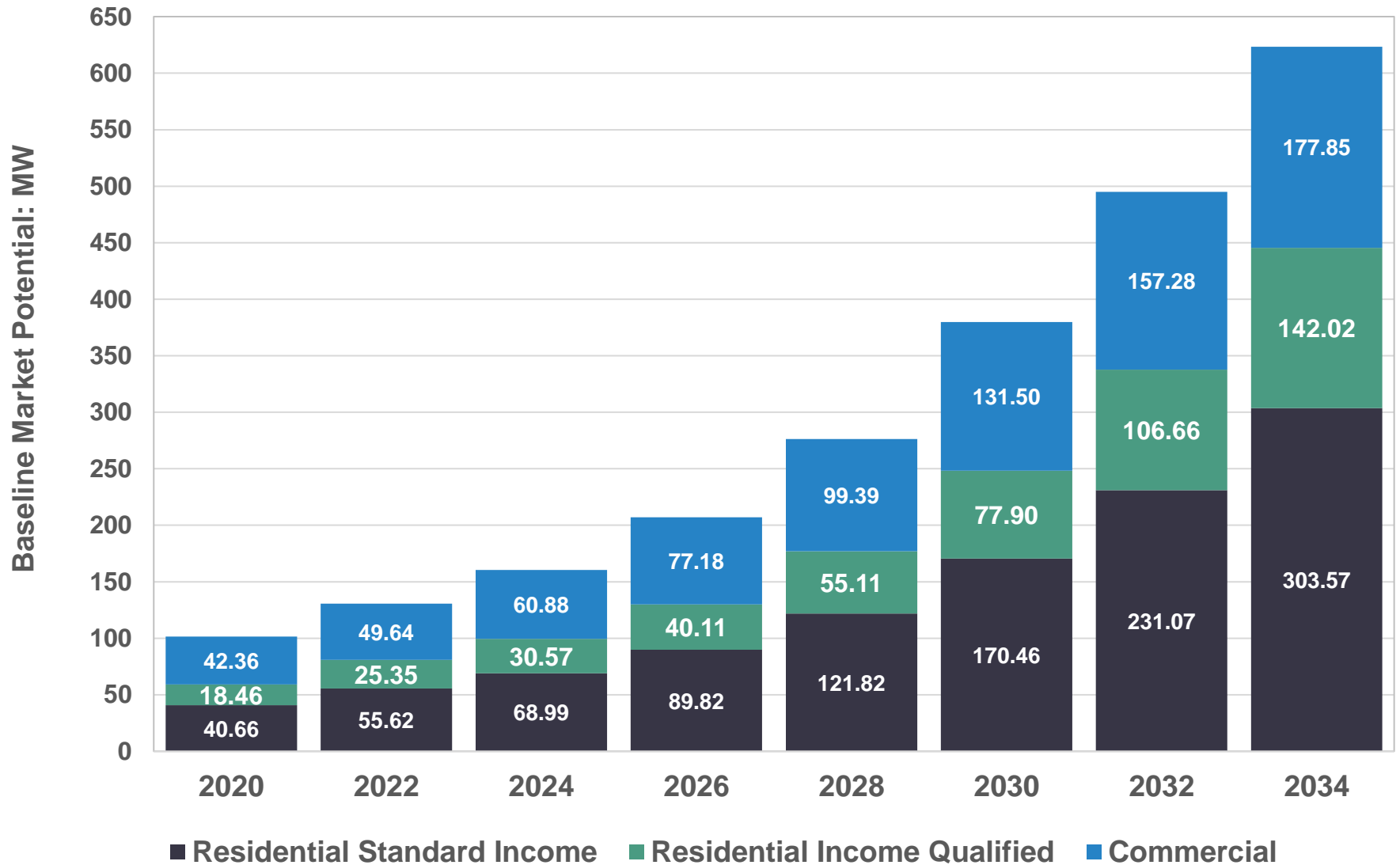
2020-2034 Percent Increase

Residential SI: **647%**
 Residential IQ: **669%**
 Commercial: **320%**
 Total: **514%**

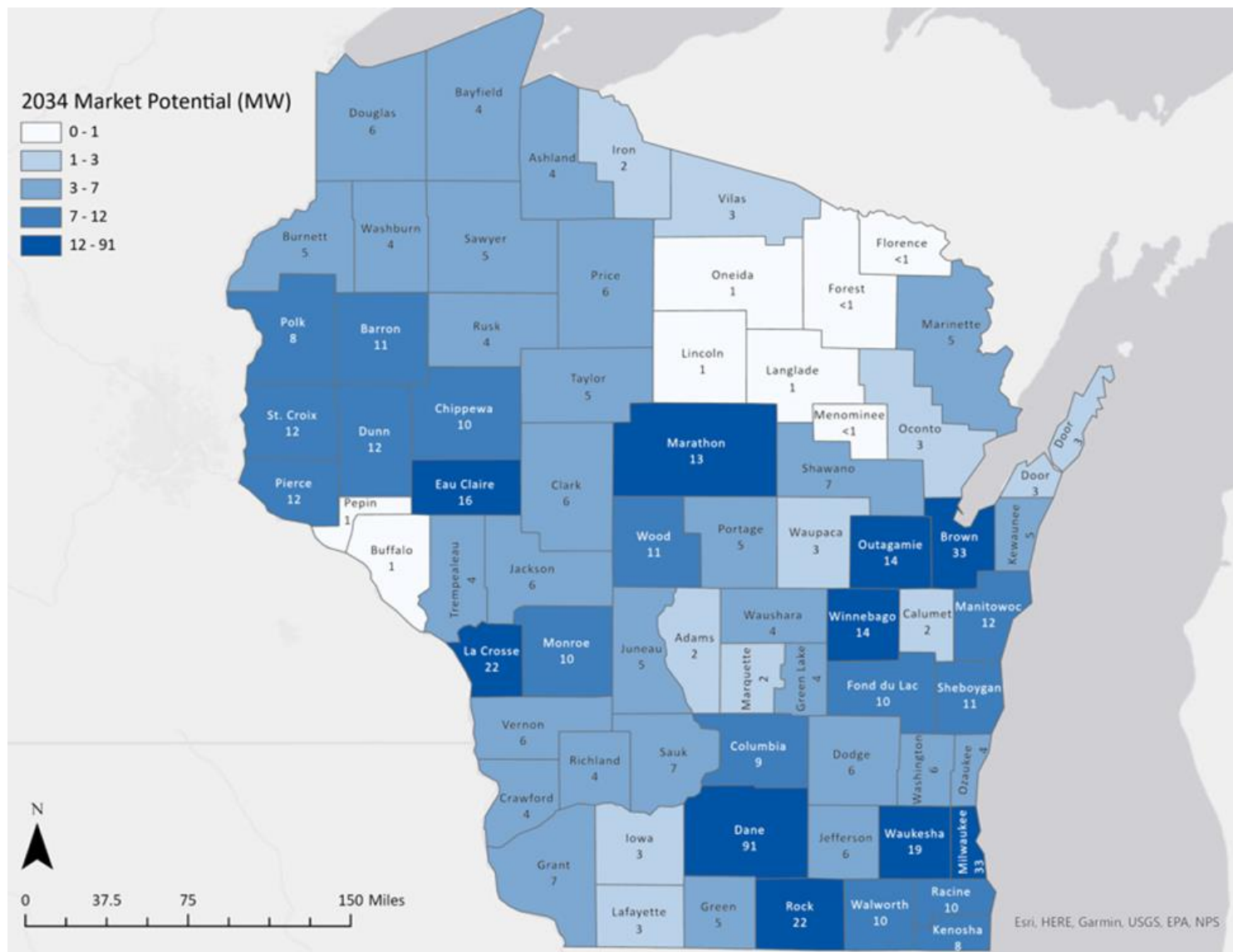
Commercial Sector:

Offices, Retail, Restaurants, Warehouses, Multifamily, Healthcare, Lodging, Schools

Draft Market Potential by Sector / Income



Concentration of Market Potential - 2034

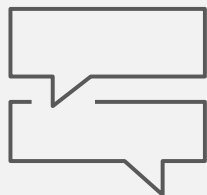


The Floor is Open – Feedback Welcome!



Questions/Comments?

- Overall results
- Utility results
- Anything else?



Please add your questions to the meeting chat: we will address questions in the order that they are received & provide opportunity for clarification.

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2. Draft Rooftop Solar Economic Scenario Results

Economic Scenario Assumptions

Net Metering Assumptions

Net Metering with a Maximum Capacity of 500 kW for ALL Customers

Attractive Financing Assumptions

0% Down Payment Fraction
2.5% Loan Interest Rate

Increased Incentive Assumptions

Residential Standard Income: \$0.9/Watt and \$4.5K Maximum Incentive

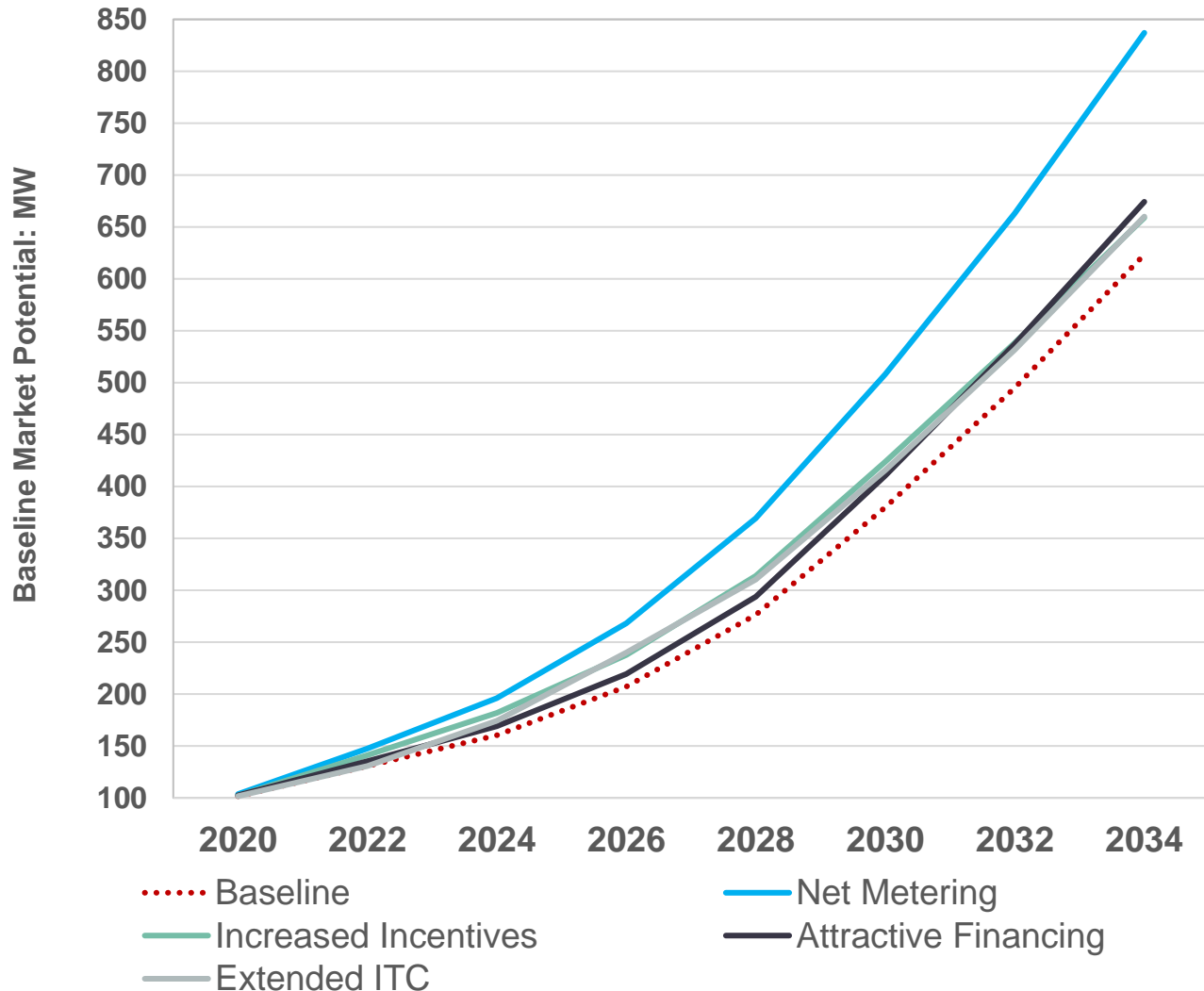
Residential Income Qualified: \$1.5/Watt and \$10.5K Maximum Incentive

Commercial: \$0.3/Watt and \$180K Maximum Incentive

Extended Federal ITC Assumptions

Residential:	Commercial:
26% thru 2026,	26% thru 2026,
22% in 2027,	22% in 2027,
0% after 2027	10% after 2027

Draft Economic Scenario Results



Scenario Cumulative Draft Market Potential 2034

Baseline:
623 MW

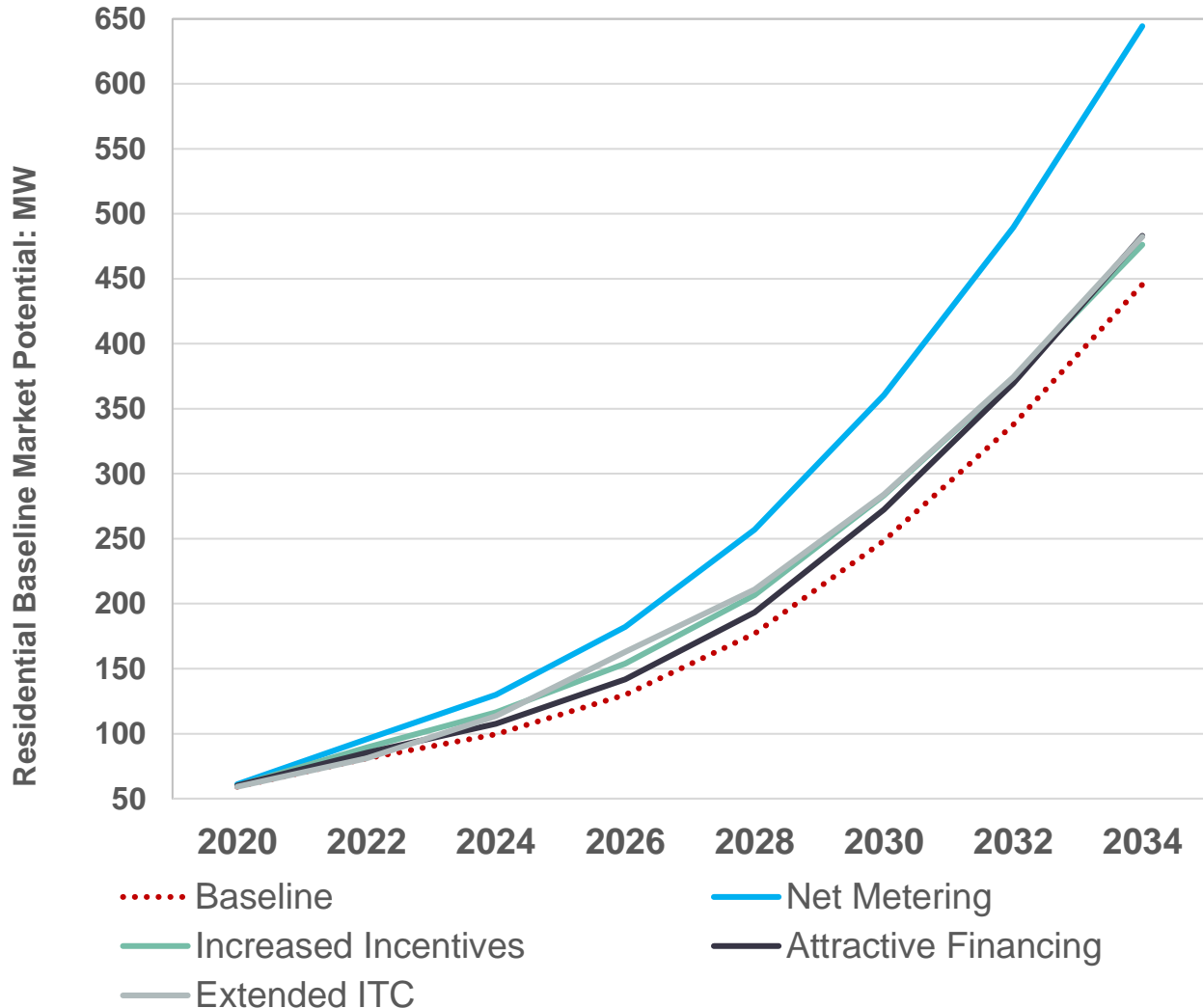
Increased Incentives:
659 MW
(6% Increase)

Extended ITC:
660 MW
(6% Increase)

Attractive Financing:
674 MW
(8% Increase)

Net Metering:
837 MW
(34% Increase)

Draft Residential Economic Scenario Results



Scenario Cumulative Draft
Market Potential 2034

Baseline:
446 MW

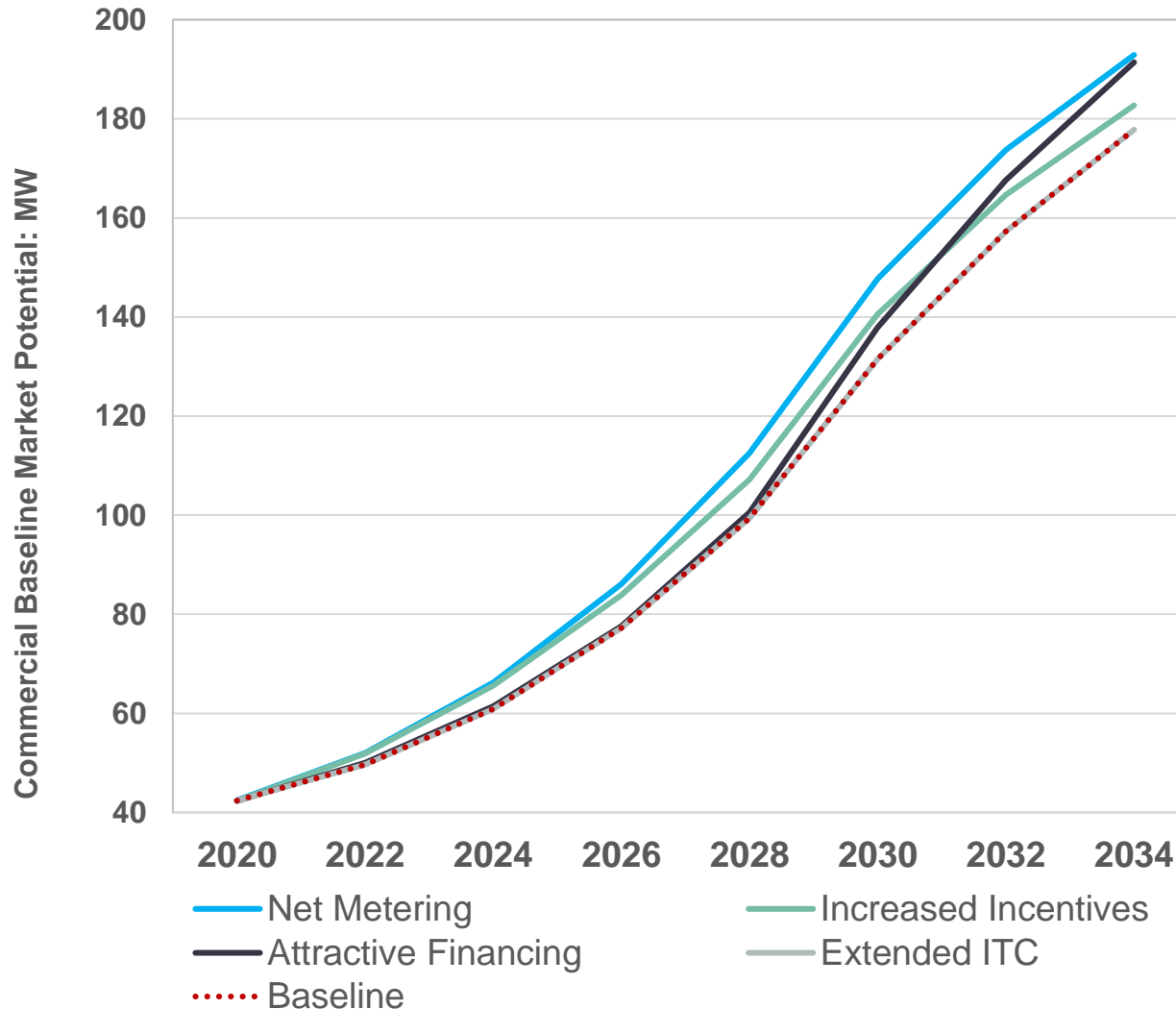
Increased Incentives:
476 MW
(7% Increase)

Extended ITC:
482 MW
(8% Increase)

Attractive Financing:
483 MW
(8% Increase)

Net Metering:
644 MW
(45% Increase)

Draft Commercial Economic Scenario Results



Scenario Cumulative Draft
Market Potential 2034

Baseline:
178 MW

Extended ITC:
178 MW
(0% Increase)

Increased Incentives:
183 MW
(3% Increase)

Attractive Financing:
191 MW
(8% Increase)

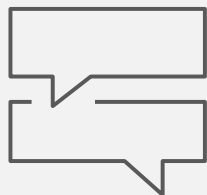
Net Metering:
193 MW
(8% Increase)

The Floor is Open – Feedback Welcome!




Questions/Comments?

- Economic scenario results
- Anything else?



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3. Cost Effectiveness Analysis

Cost Effectiveness Test (Modified TRC)

Costs

- Incremental Equipment and Labor Costs
- Administrative Costs

Benefits

- PV Avoided Energy Supply Benefits
- Non-energy Benefits (15\$/ton CO₂)

Cost Effectiveness Comparison

Residential Measure Name	MTRC
Residential Rooftop Solar PV Project	0.86
CO2 Heat Pump Water Heater	0.20
Heat Pump - Air Source Advanced	0.82
Heat Pump Water Heater – Energy Star	1.12
Heat Pump - Air Source ENERGY STAR	1.34

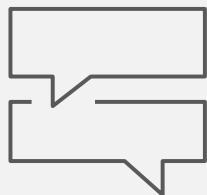
Commercial Measure Name	MTRC
Commercial Rooftop Solar Project	1.48
Chillers > 300 tons (centrifugal) - Advanced Efficiency (Water Cooled)	1.25
DX Package 240 to 760 kBtuh - Premium Efficiency	3.35
Water Heater LE 55 Gal - Heat Pump - Enhanced Efficiency	3.53
Water Heater LE 55 Gal - Heat Pump Water Heater - Advanced Efficiency	3.14

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Questions/Comments?

- Cost-effectiveness measures
- Anything else?



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Research Activities



Benchmarking

- Online search for rooftop solar programs for income-qualified residents or with specific considerations for income-qualified residents
- Chose 5 exemplary programs to fully benchmark



Policy Review

- Review of WI policies that could create barriers for low-income solar ownership
- Asked WI interviewees about potential policy barriers



Interviews

- 3 interviews with Wisconsin stakeholders and program administrators
- 5 interviews with out-of-state program administrators

Market Barrier #1: Cost Burden

Income-qualified residents are **extremely** sensitive to **upfront** costs.

Incentives/Grants

Provide grants and incentives,
not loans

Provide flexible incentive options

Consider all costs (*e.g., permitting*)
when determining incentive size

Benchmarked programs cover 30-
100% of project costs

Policy Considerations

Allow for third-party ownership

Standardize/establish ground
rules for net metering

Market Barrier #2: Home Readiness

Most existing income-qualified housing stock may not be able to support solar arrays without repairs.

Funding

Provide incentives or grants to cover home/building repairs

Additional Support

Provide administrative support to help IQ participants select a trusted and qualified contractor

Energy Efficiency

Better home efficiency increases value of solar

Leverage existing programs that may already have health & safety funds for home repairs

Market Barrier #3: Multifamily Limitations

Unique Problems



Split incentive
between tenant
and landlord



Additional upfront
costs of retrofiting
master-metered
buildings for net-
metering capabilities

Potential Solutions



Structure incentives
for property owners



Standardized
net-metering



Virtual net
metering

Equity Framework

Equity Framework for Income-Qualified Rooftop Solar Program Design



The questions below provide a framework for program stakeholders to use to embed equity into planning for and implementing rooftop solar programs that target income-qualified communities.



Engagement

DESIGN

- Did the program engage local, community organizations to help understand the target population and establish trust?
- Was the program developed based on data/outreach gathered regarding the needs of the target population?
- Does the program include funds to educate the market (consumers/workforce)?

IMPLEMENTATION

- Who are the parties involved in the implementation of the program and what are their roles?
- How is the program going to engage participants?
- Does the program's recruitment strategy include varying channels to accommodate for populations with disabilities, who speak a primary language other than English, or who have a technological illiteracy.



Beneficiaries

WHO

- Who is the program advocating on behalf of?
- Who is eligible for the program?
 - Who is the target population?
 - What housing types are eligible?
 - Who is not included?

HOW

- How will eligibility be verified?
- Does the program make efforts to target multilingual participants (such as with multilingual applications, program staff, and marketing materials)?
- What languages, other than English, will the program accommodate?
- Does the program benefit a workforce, supply chain, or another area of the market?



Program/Policy Design

PROGRAM

- What is the program advocating for? Why?
- What is the program offering to participants?
- Will the program initially launch as a pilot?
- What are the available ownership structures through the program?
- What incentives does the program offer?
 - Who are incentives paid to?

POLICY

- Does the program:
 - Have consumer/workforce protections in place?
 - Partner with other available energy and housing programs?
 - Encourage energy-efficiency prior to participation?
 - Ensure high-quality installation and ongoing maintenance for participants?

POLICY

- To what extent does local policy allow for:
 - Net metering?
 - Virtual net metering?



Burden

FINANCIAL

- Does the program minimize participant costs (without increased debt burden)?
 - Installation costs?
 - Insurance/permitting costs?
 - Structural or safety repair costs?
 - Metering changes or connection fees?
 - Ongoing panel/system maintenance costs?
- Does the program offer ongoing incentives to participants?
 - Net metering?
 - Solar credits?

ADMINISTRATIVE

- Does the program provide the following support to participants:
 - Understanding the application/enrollment process?
 - Choosing a qualified solar installer with a competitive bid?
 - Finding/selecting a contractor for any structural/safety improvements?
 - Securing landlord approval to participate (if eligible)?
 - Securing supplemental incentives/funding sources to further minimize upfront cost (if needed)?



Outcomes

- What are the short-term outcomes of the program?
- What are the long-term outcomes of the program?
- What are the consequences if the program does not have the intended outcomes?
- What are the metrics to measure program success?

Potential Key Performance Indicators:

- Percentage of income-qualified population with rooftop solar
- Achievement of participation targets
- Percentage of participants who transition out of arrears or off bill assistance (if eligible)
- Participant satisfaction
- Greenhouse gas reductions
- Non-energy benefits

Equity Program Development Process



Source:

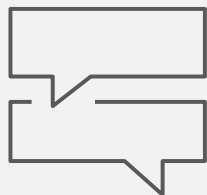
Cadmus. September 2018. *A Guidebook on Equitable Clean Energy Program Design for Local Government and Partners*. Prepared for Urban Sustainability Directors Network.

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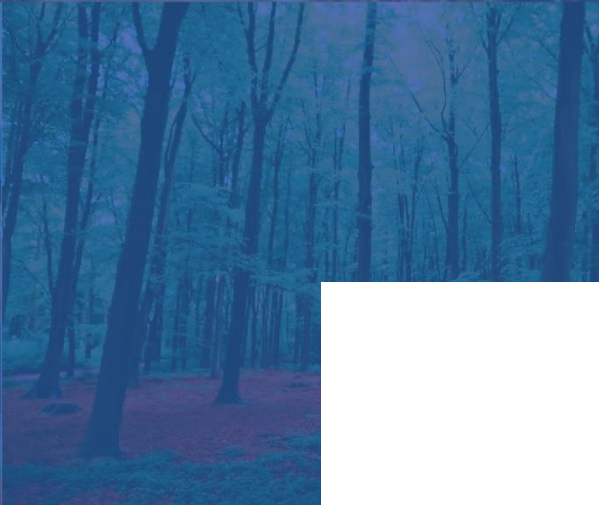
Questions/Comments?

- Market barriers?
- Framework?



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5. Next Steps

Thank You

Next Steps

Stakeholders will have an opportunity to review the draft report.

Sep 10: Stakeholders receive draft report

Sep 22: Stakeholders provide report comments

Your feedback and input is important, please send us feedback

Other feedback opportunities

Email **Amalia Hicks** at Cadmus
(amalia.hicks@cadmusgroup.com)

or contact **Mitch Horrie** at PSC
(Mitch.Horrie@wisconsin.gov)