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focus on energy℠
Partnering with Wisconsin utilities

Rooftop Solar Potential Study

Second Stakeholder Meeting

June 30, 2021

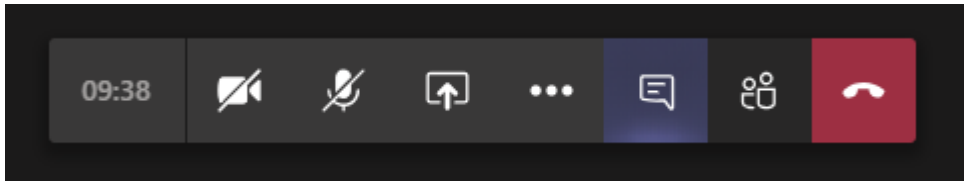
Webinar Logistics & Guidelines

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



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Agenda

1

Model Input and Assumptions

- Cost
- Performance
- Financing
- Federal ITC
- Net Metering
- Maximum adoption
- Focus Incentives

2

Approach to Income Qualified Modeling

- Population distribution
- Economic variables

3

Approach to Multifamily Modeling

- Focus on Energy participation
- Modeling approach

4

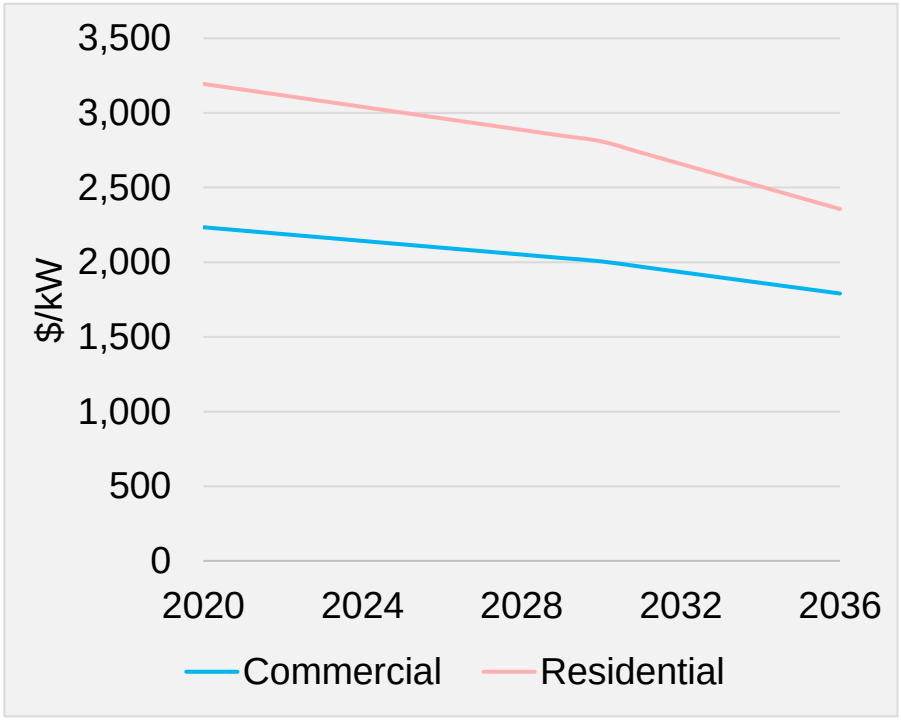
Proposed Economic Scenarios

- Federal ITC
- Focus incentives
- Technology cost trajectories
- Project financing

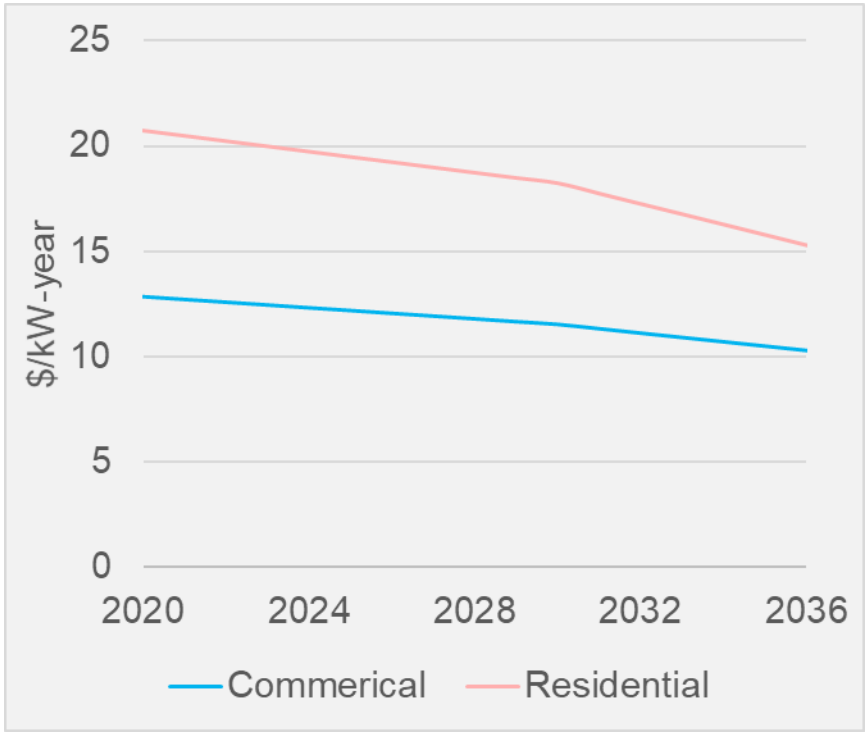
1. Model Inputs and Assumptions

PV Costs

CAPEX



O&M



Commercial and Residential CAPEX (capital expenditures) from Focus Program Data (change over time from ATB). O&M values from ATB.

ATB: NREL 2020 Annual Technology Baseline (ATB) – "Chicago conservative scenario"

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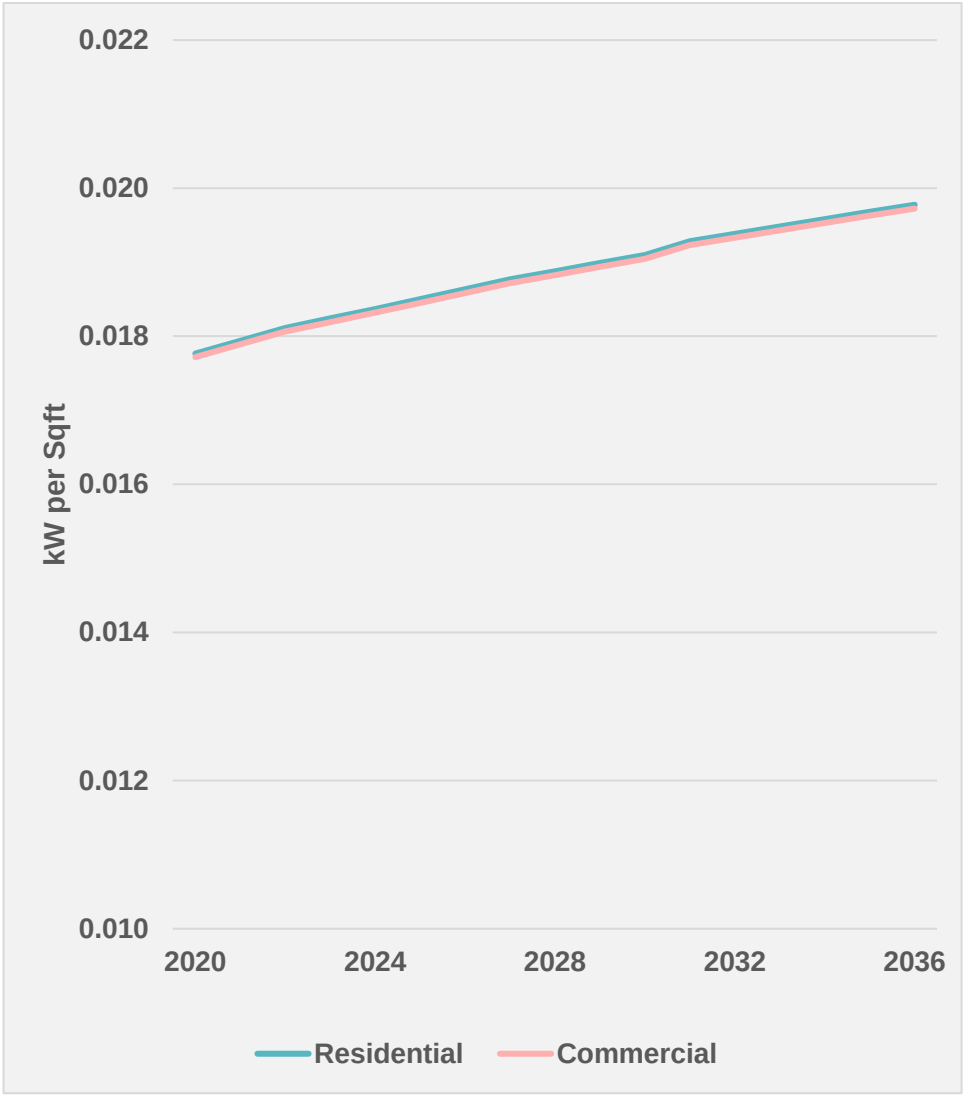
Performance (Power Density)



0.5%

Degradation Factor

PV Performance: Focus on Energy program data (2020)

Extrapolated efficiency change: International Technology Roadmap for PV (ITRPV) and market share projections for mono and polycrystalline

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Project Financing

Sector	Project Lifetime	Loan Term	Loan Interest Rate	Discount Rate	Down Payment Fraction
Residential	30	30	4%	4.2%	40%
Commercial	30	30	4%	4.2%	26%

All project finance metrics from NREL ATB (2020).

Financial metrics critical for calculating project payback period.

Electric price changes based on EIA Annual Energy Outlook (reference case).

Federal ITC

Residential

System Installment Date	Tax Credit (%)
2020-2022	26%
2023	22%
After 2023	0%

Commercial

System Commencing Construction	Tax Credit (%)
2020-2022	26%
2023	22%
After 2023	10%

Residential: ITC claimed on federal tax returns. Eligibility: PV system installed by Dec 2023. Customers must own system, system must be new.

Commercial: ITC claimed on federal corporate tax returns. System must be new. Min 5% of project costs incurred or "physical work of significant nature" begun before claiming credit.

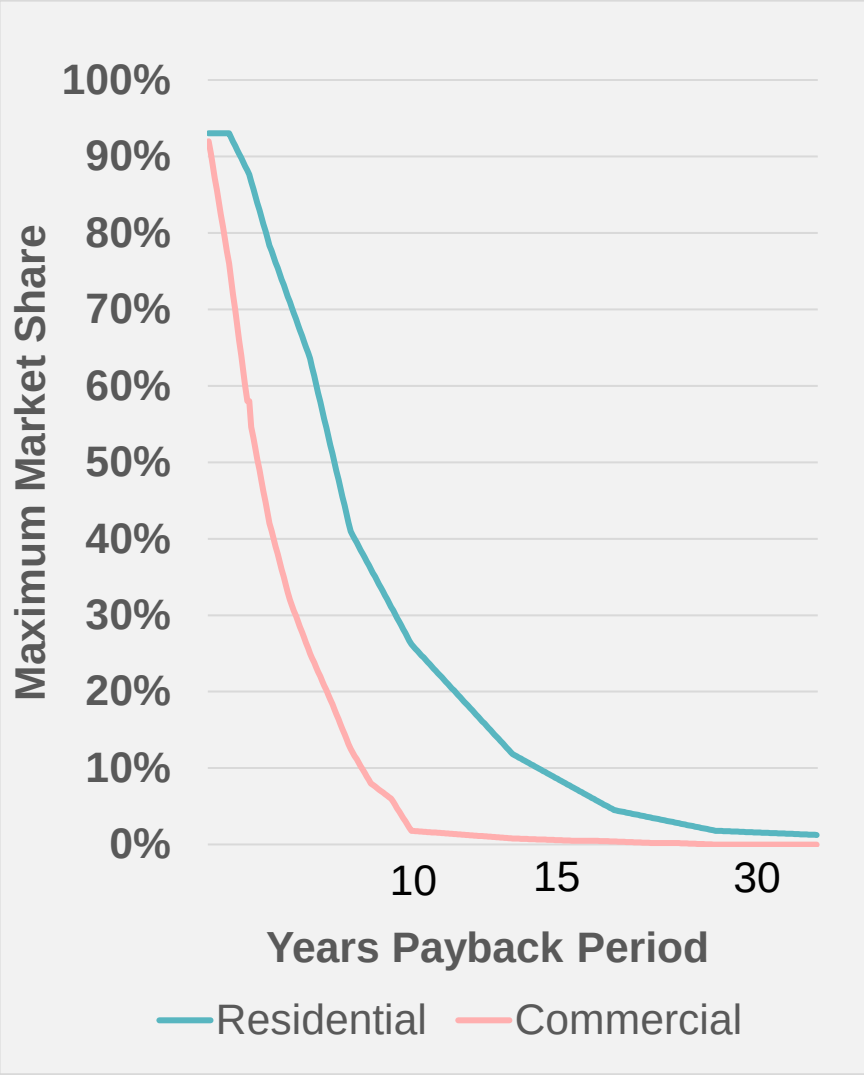
Net Metering

Utility	Sector	Compensation Type	Maximum Capacity (kW)	Sunset Year
WPSC	Commercial	Net billing	20	None
WPSC	Residential	Net billing	20	None
WEPCO	Commercial	Net billing	300	None
WEPCO	Residential	Net billing	20	None
NSPW (Xcel)	Commercial	Net metering	100	None
NSPW (Xcel)	Residential	Net metering	100	None
MGE*	Commercial	Net metering	100	None
MGE*	Residential	Net metering	100	None
WP&L (Alliant)	Commercial	Net billing	20	None
WP&L (Alliant)	Residential	Net billing	20	None
All others	Commercial	Net metering	20	None
All others	Residential	Net metering	20	None

To calculate net metering and net billing benefits dGen compensates excess generation at retail (net metering) or wholesale (net billing) rates on a monthly basis.

***Classified as net metering since customer can rollover excess generation credits to future months**

Maximum Adoption



Relationship between maximum market share and economic attractiveness key model input.

dGen includes maximum adoption curves for Residential and Commercial customers.

Adoption curves based on NREL research, most reliable curves available.

Commercial customers more sensitive to payback period (almost no adoption if payback period > 10 years).

Comparatively residential customers less sensitive to payback period.

Cadmus does not have a better source than NREL research.

Wisconsin Focus on Energy Incentives

Sector	Incentive Type	Maximum Incentive	CBI (per Watt)
Residential	Rebate	$500	NA
Commercial	Rebate	$50,000	$0.1

Incentive data set at the state level based on the Focus on Energy Renewable Rewards Program.

CBI is the capacity incentive associated with sector.

Incentive data used to determine project payback.

dGen does not process tiered incentives: commercial value is average. Additional residential rural incentives cannot be modeled.

The Floor is Open – Feedback Welcome!

Questions/Comments?

- Model inputs
- 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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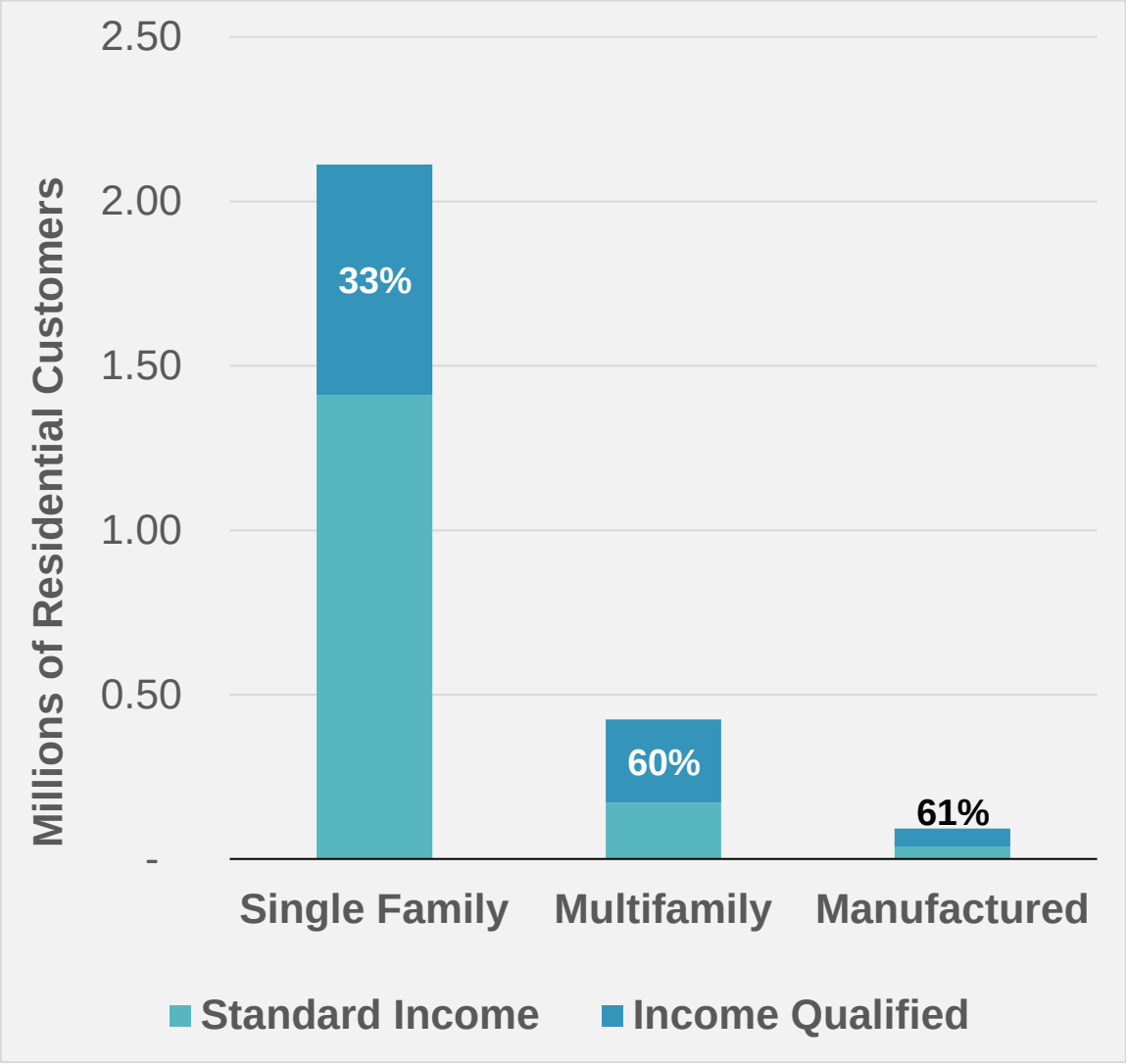
2. Approach to Income Qualified Potential

Income Qualified Population



Income Qualified Definition

Annual Income less than or equal to **80%** of the state median income.

Determined based on household size.

38%
of Residential Customers identified as Income Qualified

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Income Qualified Modeling Approach

Income qualified populations likely more sensitive to cost of solar projects.

dGen model does not treat income qualified customers specifically.

In addition to modeling income qualified potential by population, economic parameters can be adjusted.

Income qualified Qualitative research to provide input on varying key economic metrics.

Maximum market adoption sensitivity to cost

Derate maximum adoption curve

Time-value of money

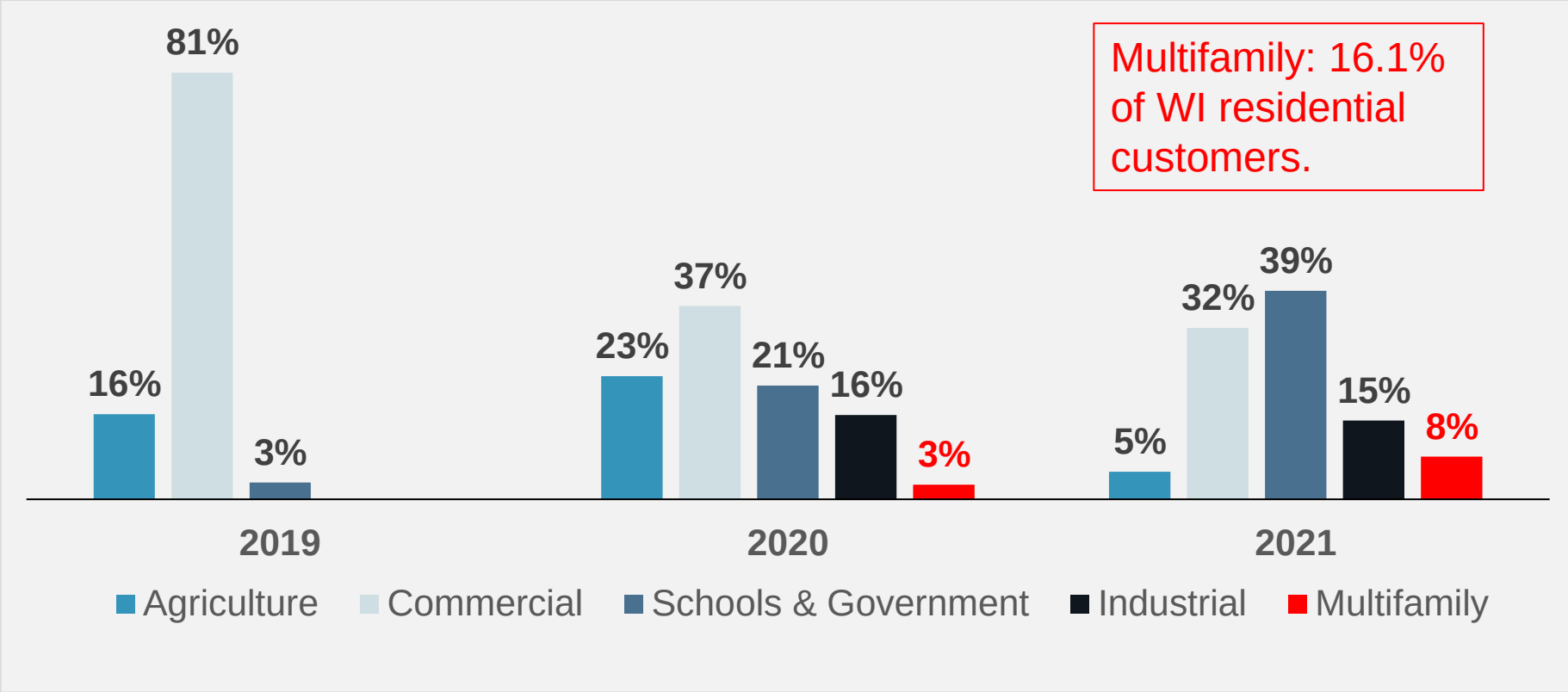
Adjust discount rate to reflect greater risk of investment

Down payment fraction

Increase down payment fraction to reflect lower access to capital

3. Approach to Multifamily Potential

Focus on Energy Non-Residential PV Participation



Multifamily incentives part of non-residential Focus on Energy Renewables program.
Multifamily small fraction of overall program activity.

About 25% of incentives for new construction projects.

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Multifamily Modeling Approach

MULTIFAMILY TECHNICAL POTENTIAL
Can be estimated in dGen based on rooftop area and Lidar data

MULTIFAMILY MARKET POTENTIAL
Cannot be estimated as a commercial decision in dGen

CADMUS APPROACH

- Calculate Multifamily Technical potential in dGen
- Calculate market adoption by applying adoption rate from other commercial sector
- Given past program performance, this would be a slow-adopting segment

dGen current treats multifamily solar adoption in the residential sector, assuming residential customers will make investment decisions

Cadmus proposes to treat multifamily adoption as a commercial investment decision, requiring an update to the dGen estimation method

The Floor is Open – Feedback Welcome!

Questions/Comments?

- Approach to multifamily modeling
- Approach to income-qualified modeling
- 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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4. Economic Scenarios

Proposed Economic Scenarios

Federal ITC

Historic driver of solar adoption

Scenario: Extend ITC by 2 years (commercial and residential)

Focus Incentives

Localized policy driver of adoption

Scenario: Increase per kW incentive 200% (commercial and residential)

Proposed Economic Scenarios

Technology Cost

NREL Annual Technology Baseline includes cost scenarios

Scenario: Model market adoption using “Advanced” price trajectories – lower costs

Financing

Financing options may significantly drive solar uptake

Scenario: Model potential with a 100% financing scenario for residential and commercial systems

The Floor is Open – Feedback Welcome!

Questions/Comments?

- Economic scenarios
- Anything else?

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5. Next Steps

Thank You

Next Stakeholder Meeting:

Draft Results (July/August)

Cadmus will present draft results of the study.

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)