State-Federal RPS Collaborative Webinar

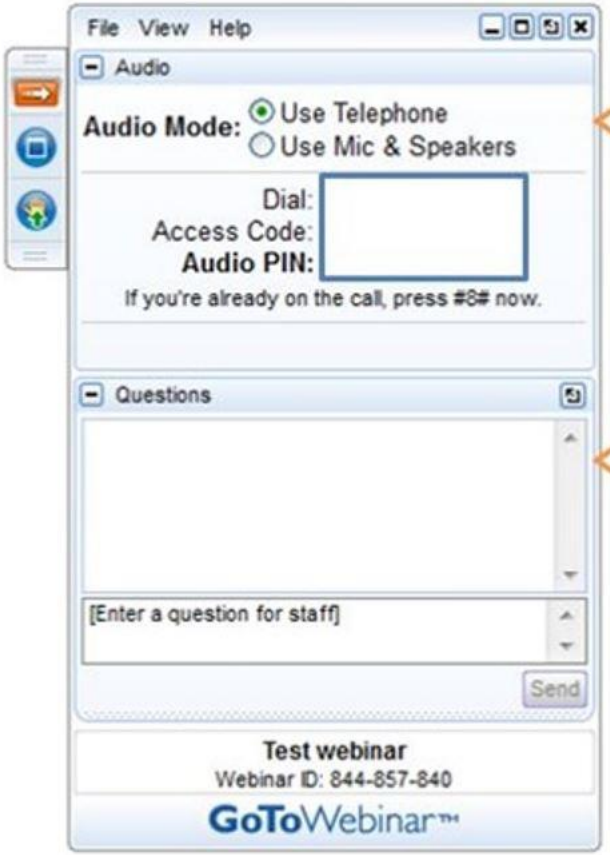
Implications of Scheduled Solar ITC Reversion for RPS Compliance

Hosted by
Warren Leon, Executive Director, CESA

Monday, October 26, 2015

CleanEnergy States Alliance

Housekeeping



All participants are in "Listen-Only" mode. Select "Use Mic & Speakers" to avoid toll charges and use your computer's VOIP capabilities. Or select "Use Telephone" and enter your PIN onto your phone key pad.

Submit your questions at any time by typing in the Question Box and hitting Send.

This webinar is being recorded.

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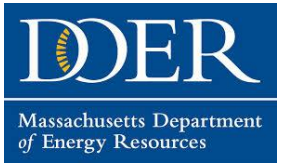
Clean Energy States Alliance (CESA) is a national nonprofit coalition of public agencies and organizations working together to advance clean energy.

Renewable Development Fund



State-Federal RPS Collaborative

- With funding from the Energy Foundation and the US Department of Energy, CESA facilitates the **Collaborative**.
- Includes **state RPS administrators**, **federal agency representatives**, and other stakeholders.
- Advances dialogue and learning about RPS programs by **examining the challenges and potential solutions** for successful implementation of state RPS programs, including **identification of best practices**.
- To sign up for the Collaborative listserve to get the **monthly newsletter** and announcements of **upcoming events**, see: www.cesa.org/projects/state-federal-rps-collaborative

Today's Guest Speaker

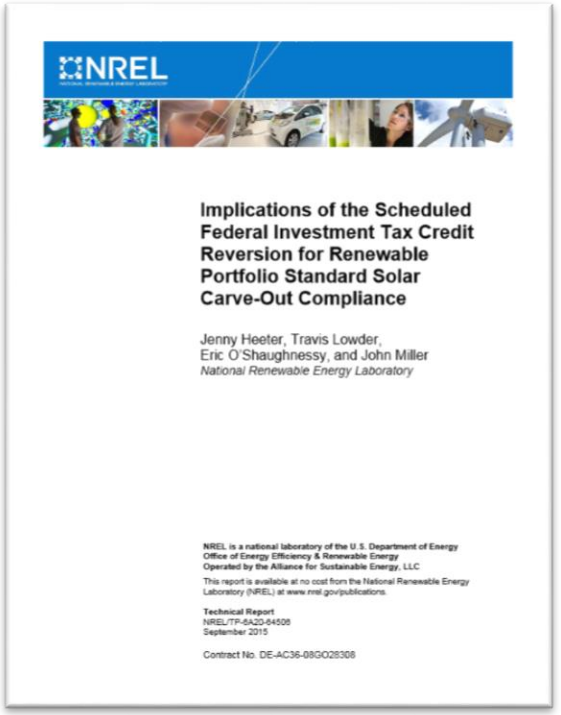
Jenny Heeter, Energy Analyst, Market and Policy Impact Analysis Group, National Renewable Energy Laboratory (NREL)

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

Implications of the Scheduled Federal Investment Tax Credit Reversion for Renewable Portfolio Standard Solar Carve-Out Compliance

Find this report on NREL's website at:
http://www.nrel.gov/docs/fy15osti/64506.pdf

The report is also available as a webinar "handout." See the link in your webinar console.



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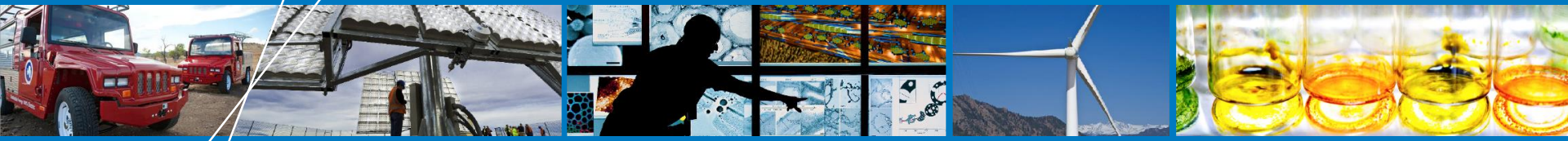
Implications of Scheduled Solar ITC Reversion for RPS Compliance



RPS Collaborative Webinar

Jenny Heeter

October 26, 2015

Presentation Outline

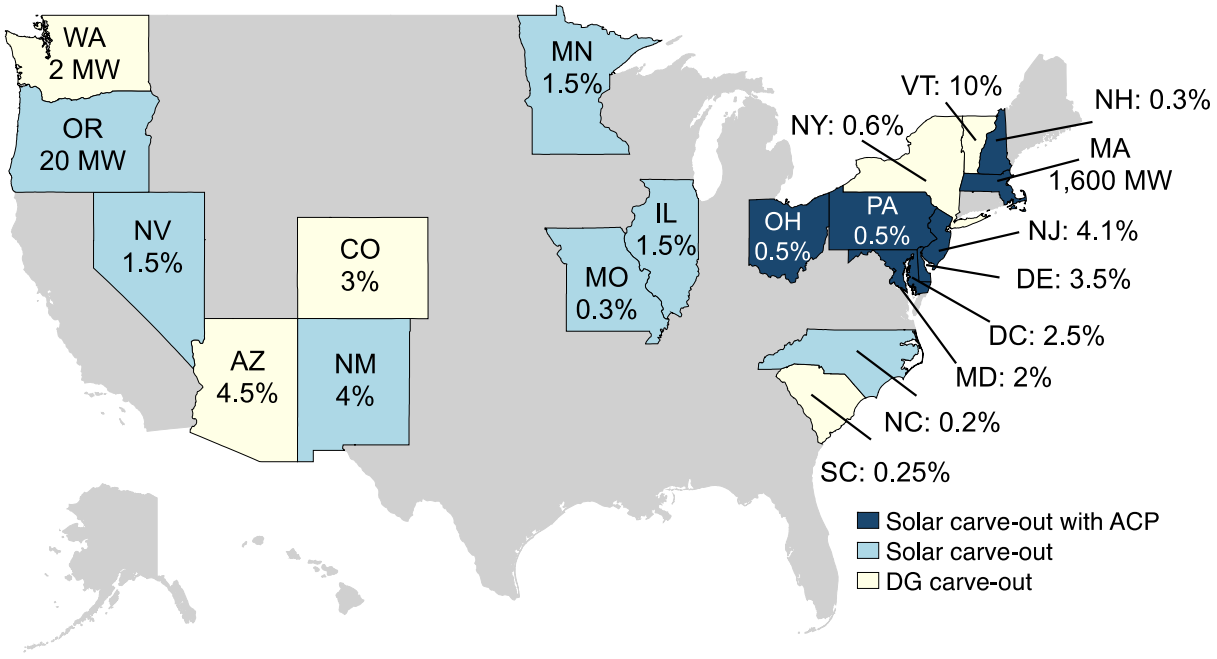
- **Background Information**
  - Scope of paper
  - Current status of solar carve-out programs
  - Future SACP rates
- **Future Outlook of Solar Carve-out Compliance**
  - Projected capacity
  - State-required additional capacity
- **Projected Future Carve-out Compliance**
  - Installed capacity under forecasted ITC Reversion
- **Modeled Effects of ITC Reversion on PPA Prices**
  - Areas of cost reduction: Balance of System Costs, Developer/Installer Margin and Overhead, and Cost of Capital
  - Solar Competitiveness in SACP Markets

Scope of Paper

- **Examined states with a solar carve out and an alternative compliance payment (ACP), to determine the impact of the investment tax credit reversion on compliance.**
- **This study explores both factors to answer two questions:**
  - Are states that have a solar carve out and an ACP likely to meet their solar carve-out targets?
  - What is the potential for ACP use in these states after ITC reversion?

Solar Carve-out Programs and ACP Policies

- **Analysis was limited to: Delaware, District of Columbia, Maryland, Massachusetts, New Hampshire, New Jersey, Ohio, and Pennsylvania**

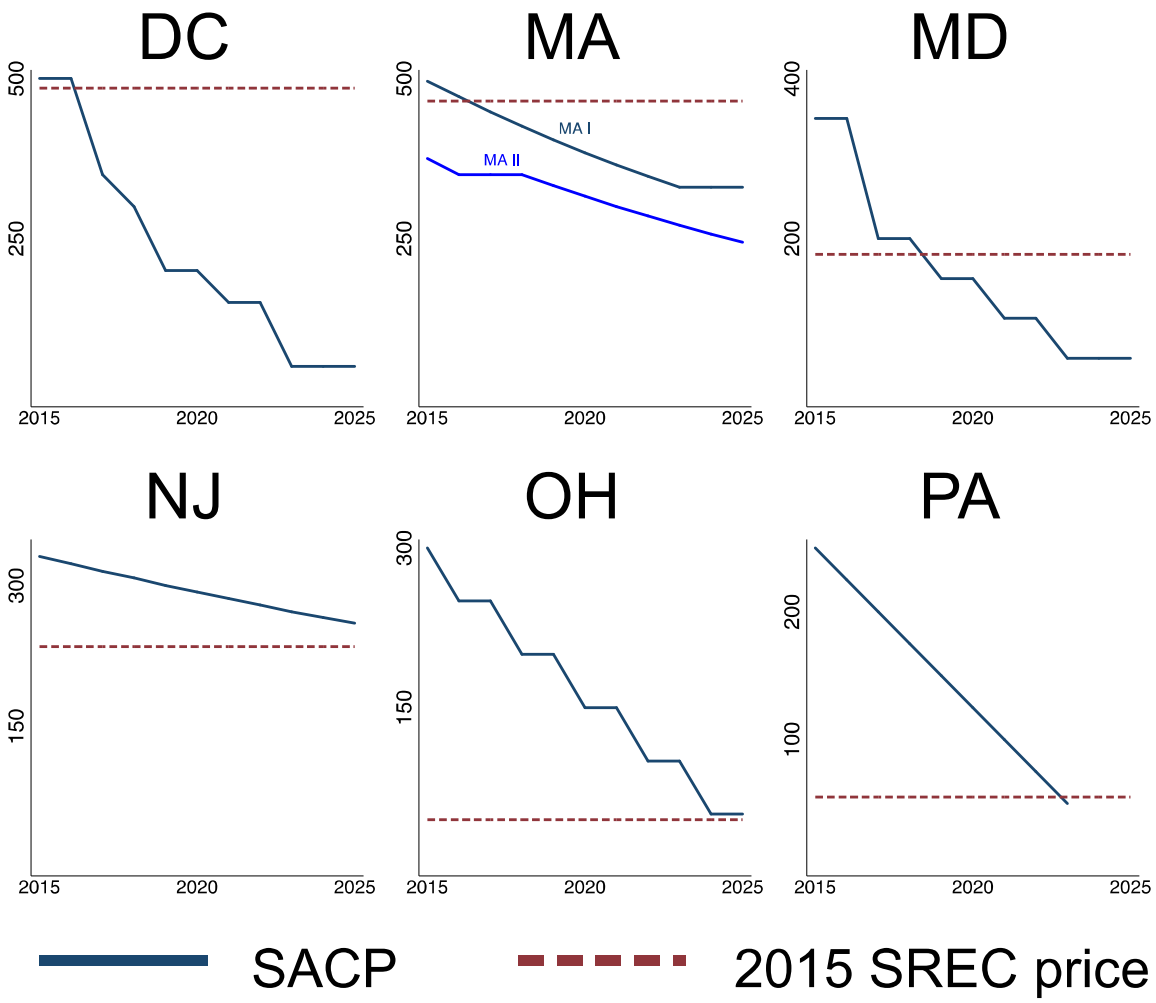


Summary of State Solar Carve-outs (2014)

State	Solar carve-out	SRECs required (x1,000)	Carve-out compliance rate (%)	Installed capacity (MW)
Delaware	3.5% by 2025	66	100	61
District of Columbia	2.5% by 2023	65	96	13
Maryland	2% by 2020	206	100	242
Massachusetts	1,600 MW by 2020	506	97	806
New Hampshire	0.3% by 2014	32	76	8
New Jersey	4.1% by 2028	1,430	100	1,489
Ohio	0.5% by 2026	149	100	104
Pennsylvania	0.5% by 2021	128	100	247

SACP Rates from 2015 to 2025

- **SACP rates in most states decline each year, in recognition of projected declining solar costs.**



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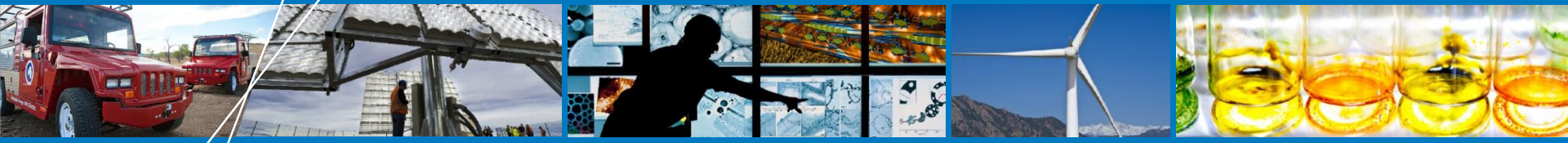
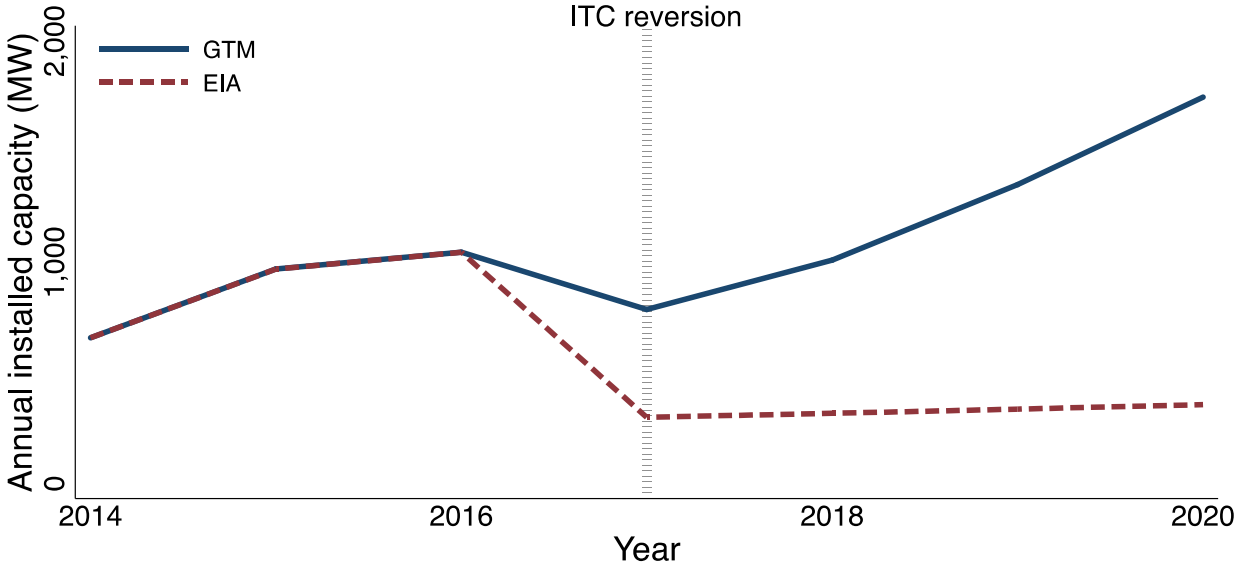


Capacity projections

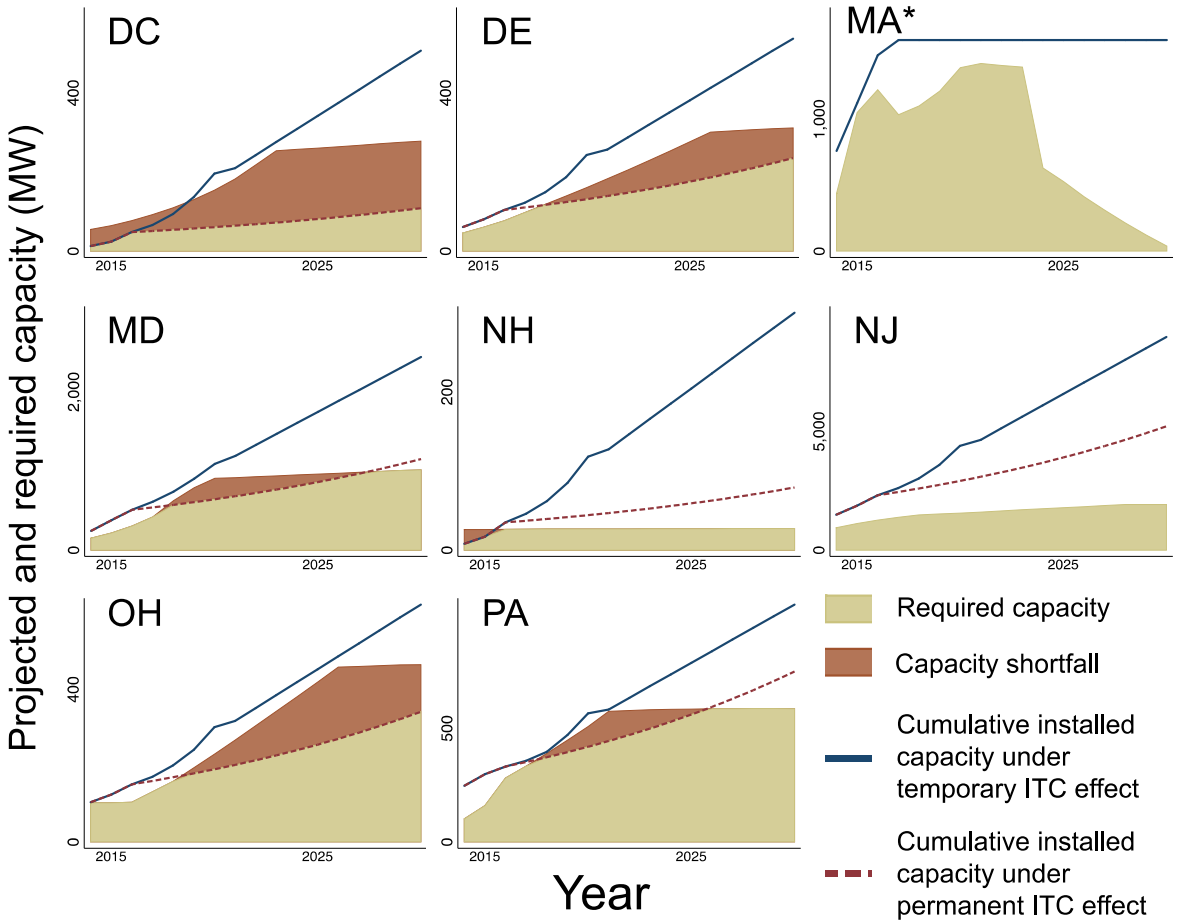
Annual Capacity Addition Projections



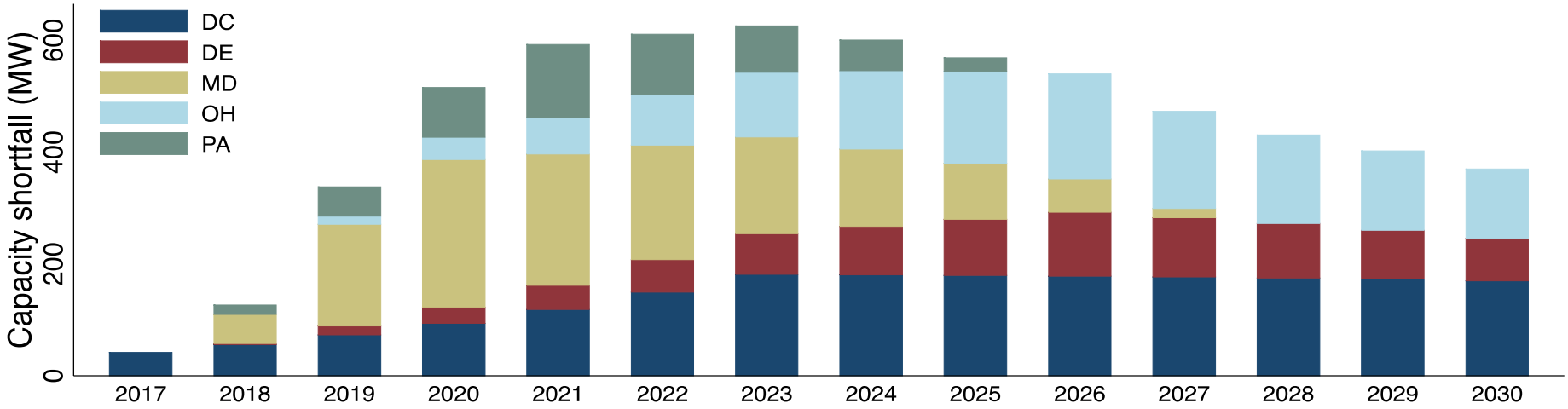
- Market and government forecasts differ in their projections of the sustained effect of the ITC reversion.
  - GTM (2015) projects a temporary reduction in annual installed capacity. GTM projects annual installed capacity growth in the solar ACP states to fall to 16% in 2017, but rise in every subsequent year to 21% by 2020.
  - EIA (2015) projects a more sustained depression in annual installed capacity, with annual growth in residential and commercial capacity falling from 30% to 6% following the ITC reversion and remaining at about 6% annual growth through 2040 (Figure 3).

Projected and Required Capacity

- **Projected and required capacity differ by market**



Projected Capacity Shortfalls in the Permanent ITC Effect Scenario



Capacity shortfalls under the permanent ITC scenario are highest in Maryland, DC, and Ohio

Summary of Deployment Scenarios

State	Sensitivity to ITC reversion	Years of potential SREC shortages (permanent ITC effect)
Delaware	Very sensitive	2017-2030
D.C.	Very sensitive	2018-2030
Maryland	Sensitive	2018-2027
Massachusetts	Robust	-
New Hampshire	Robust	-
New Jersey	Robust	-
Ohio	Very sensitive	2019-2030
Pennsylvania	Sensitive	2018-2025

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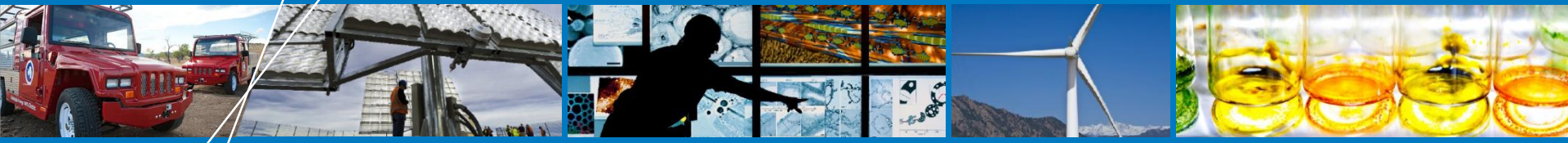


Modeled Effects of ITC Reversion on PPA Prices

Methodological Considerations

- State incentives
- Utility rates and load profiles
- Role of shared solar
- Accounting for SREC payments in SAM
- PPA Calculations

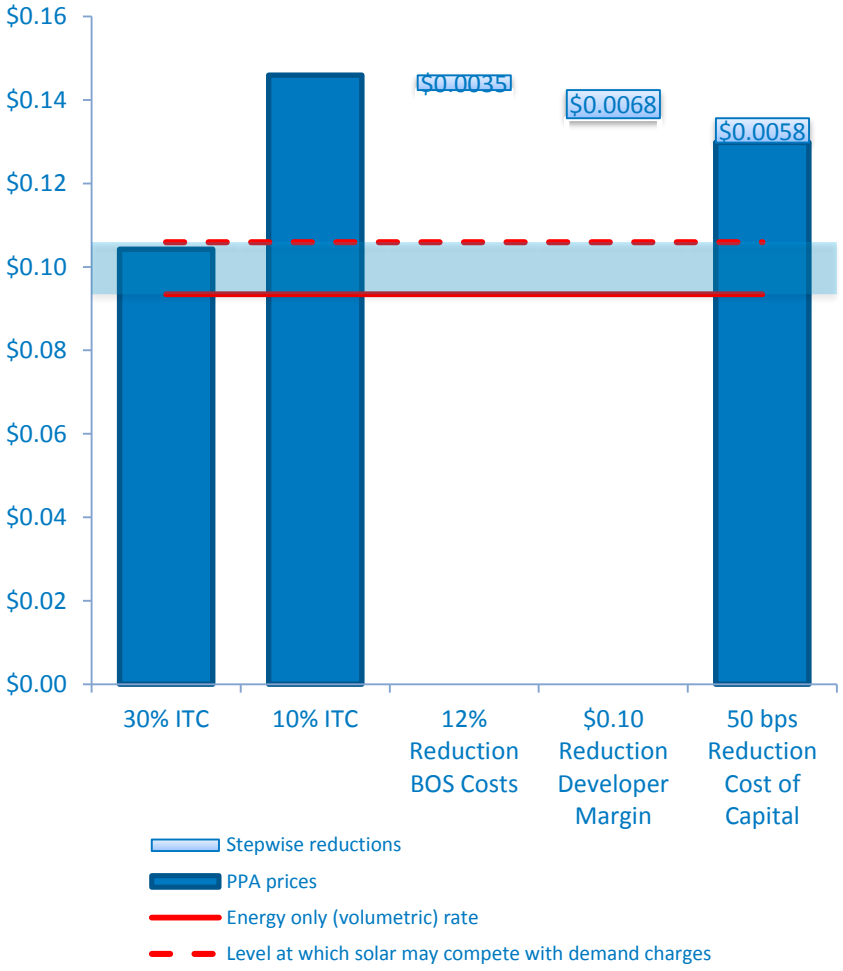
Assumption	Value
System Size	500 kW
Installed Cost	Variable by state
Balance of Systems (BOS) Costs	15% of installed cost
Installer/Developer Margin and Overhead	32% of installed cost
Cost of Capital/Internal Rate of Return (IRR)	7.5%
Inflation	2%/yr
PPA Escalation Rate	2%/yr
Analysis Period (PPA Term)	20 yrs
Real Discount Rate	5.39%
Federal Tax Rate	35%
State Tax Rate	Variable by state
Operations and Maintenance Costs	$15/kW/yr
Degradation Rate	0.5%/yr

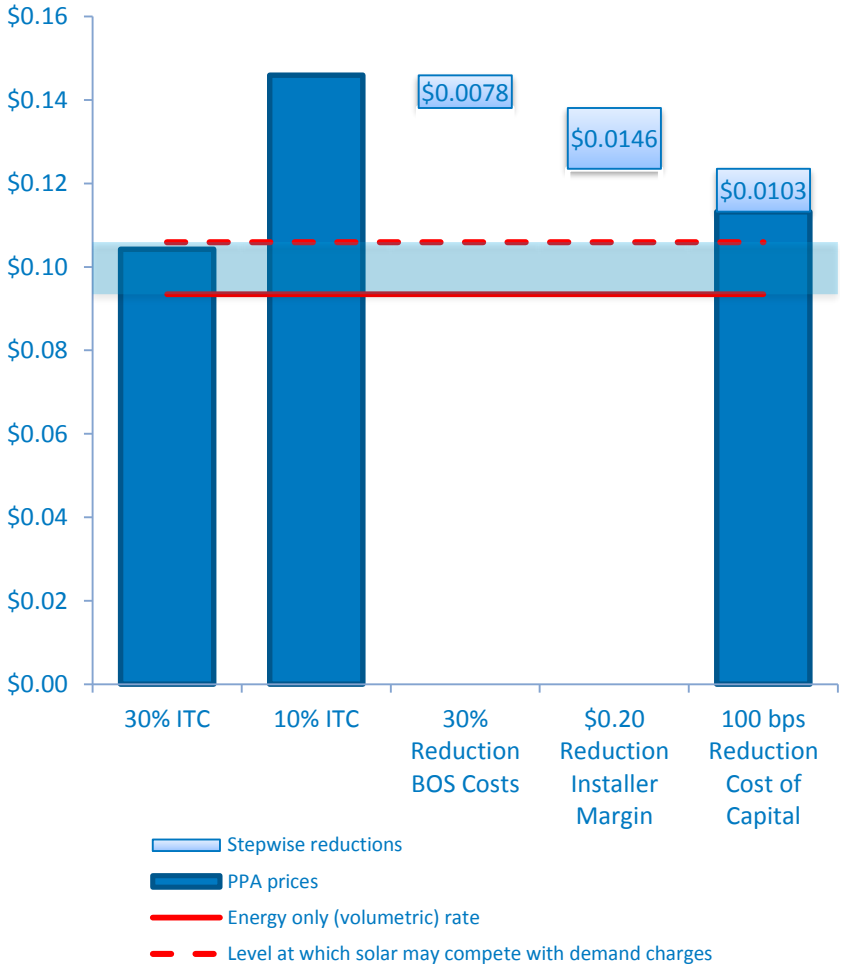
Modeled Cost Declines in SAM

- **BOS Costs:** While module prices are expected to remain mostly flat in the near term, installed costs are projected to decline due to reductions in BOS costs.
- **Developer/Installer Margin and Overhead:** GTM/SEIA 2015a, 2015b, and 2015c, as well as previous NREL analyses, have benchmarked installer margin, overhead, and profit between 30% - 38% of total installed costs. Reductions in this proportion in future years could come through corporate productivity gains and tighter profit margins, among other things.
- **Cost of Capital:** Typical tax equity returns range from 8%–10% on investments that constitute about 50% of the total project cost (Chadbourne 2015a and 2015b; Bolinger 2014). In 2017, there will be fewer tax credits generated by solar projects, which means that tax equity players will likely make smaller investments, thus reducing the WACC. Additionally, investor perceptions of solar project risk are continually improving with the increasing availability of performance and credit data, and this could also lead to lower project WACCs.

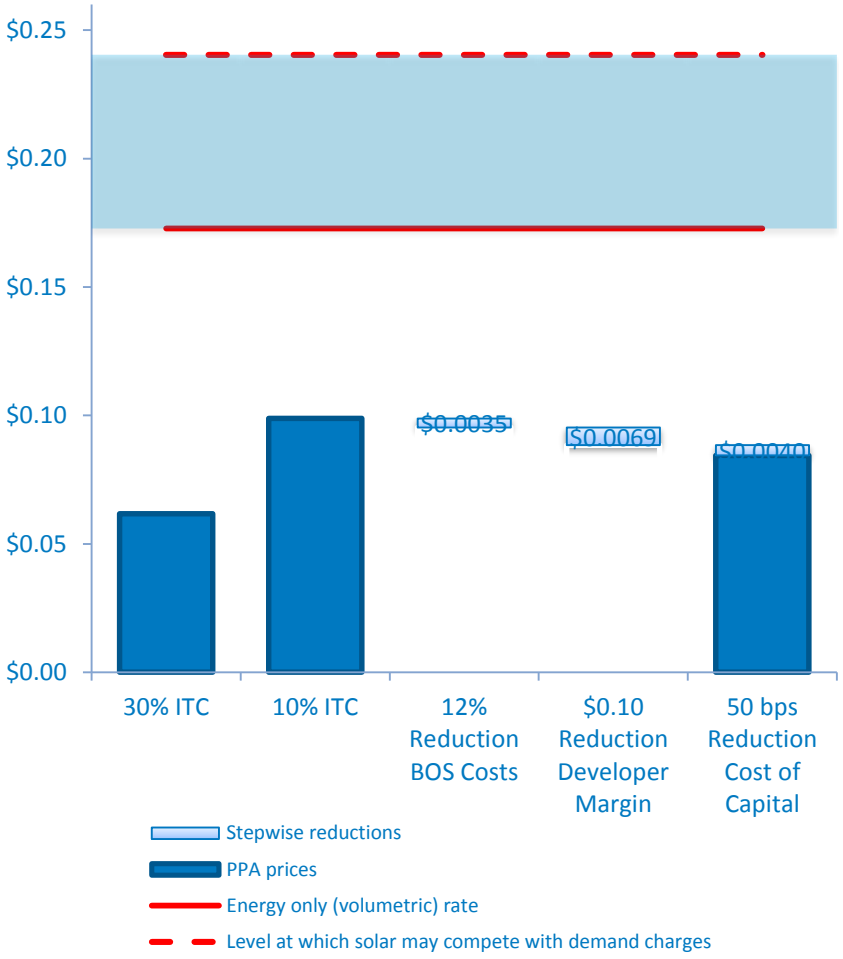
Scenario	BOS Reduction	Installer Margin Reduction	Cost of Capital Reduction
High	12%	$0.10/W	50 basis points (bps)
Low	30%	$0.20/W	100 bps

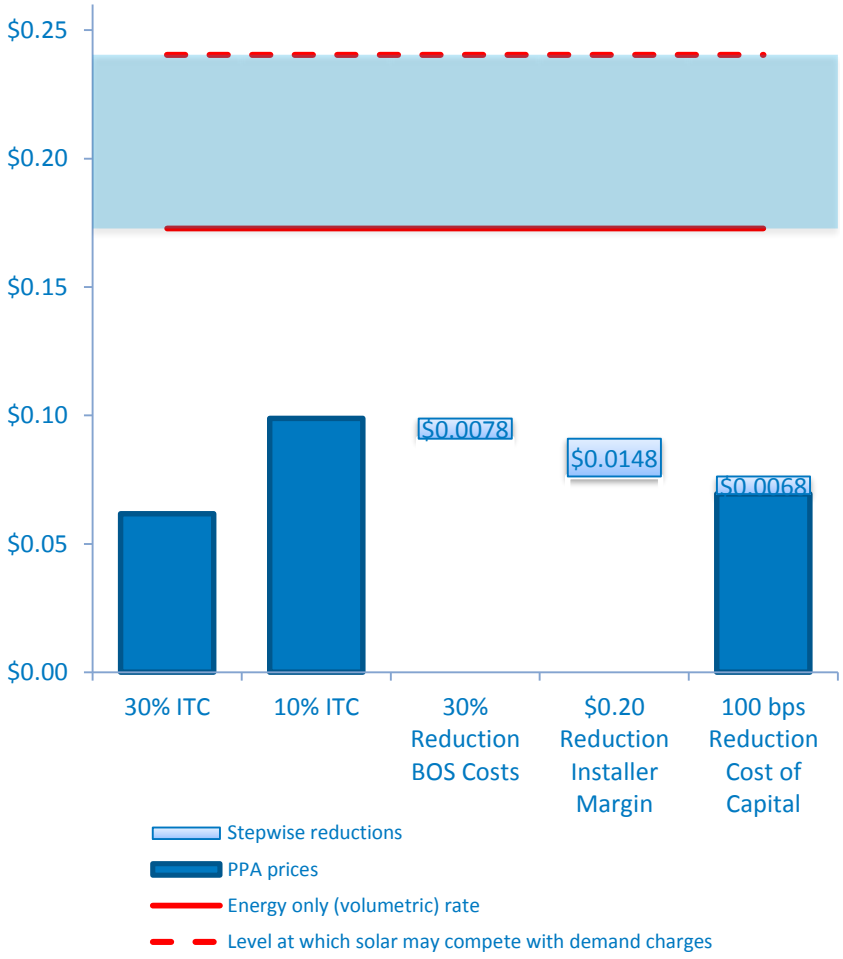
Maryland High and Low Installed Cost Scenarios



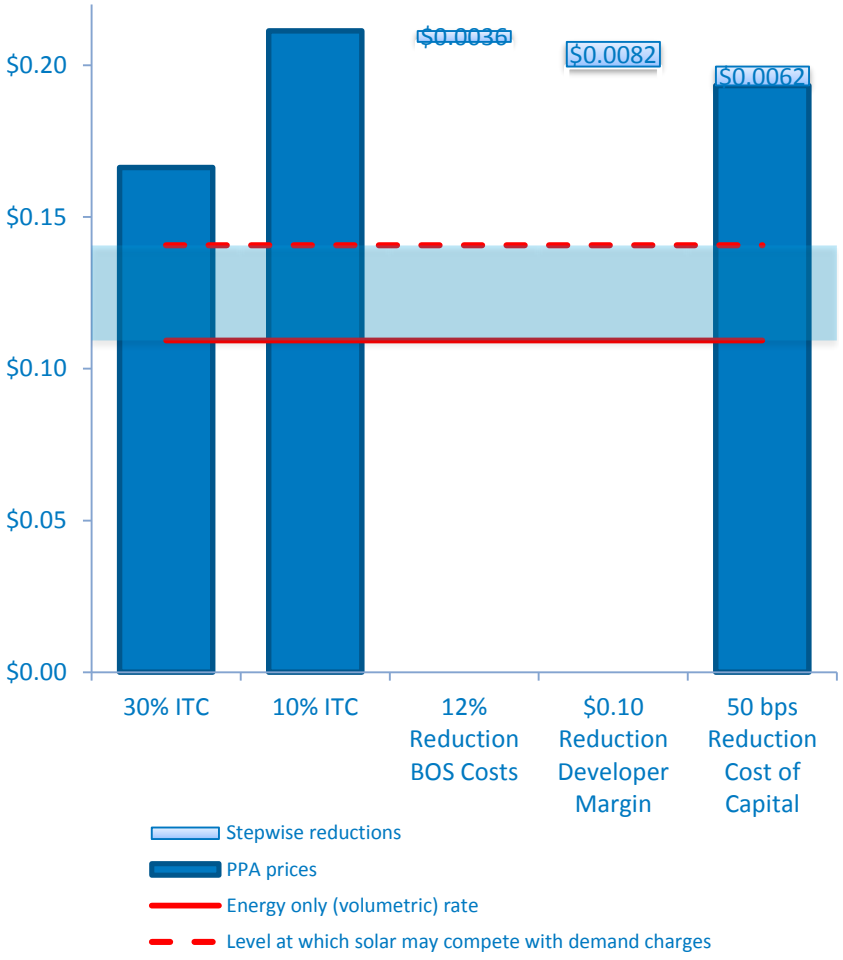


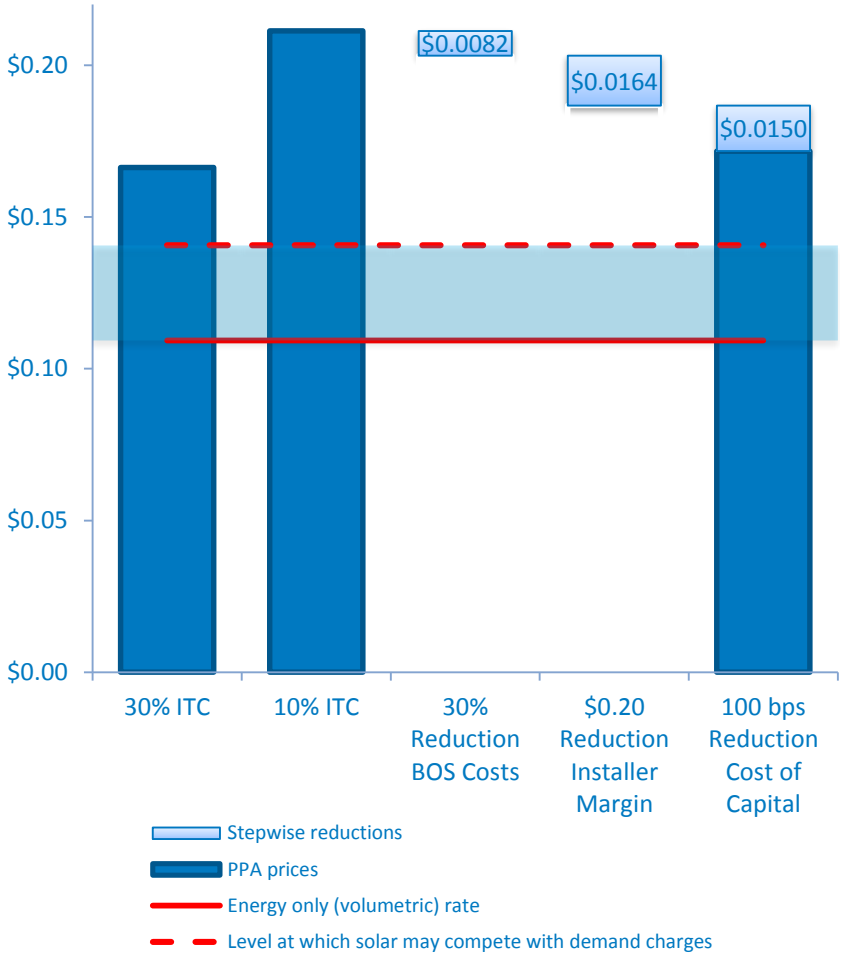
Massachusetts High and Low Installed Cost Scenarios



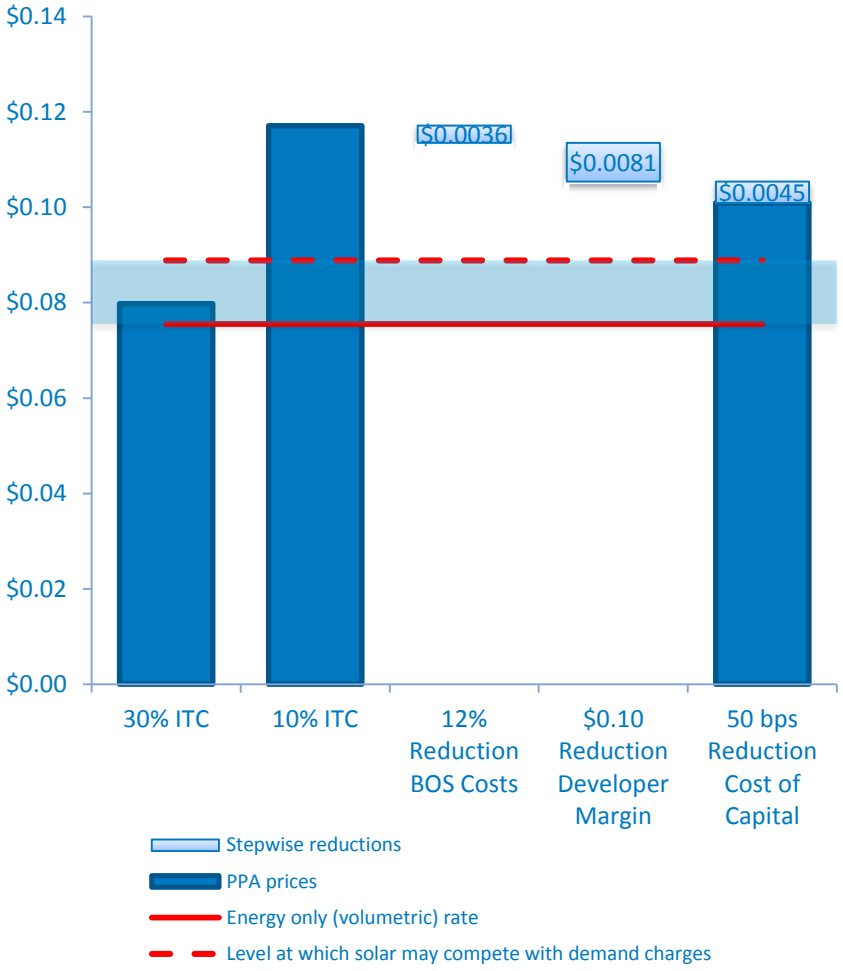


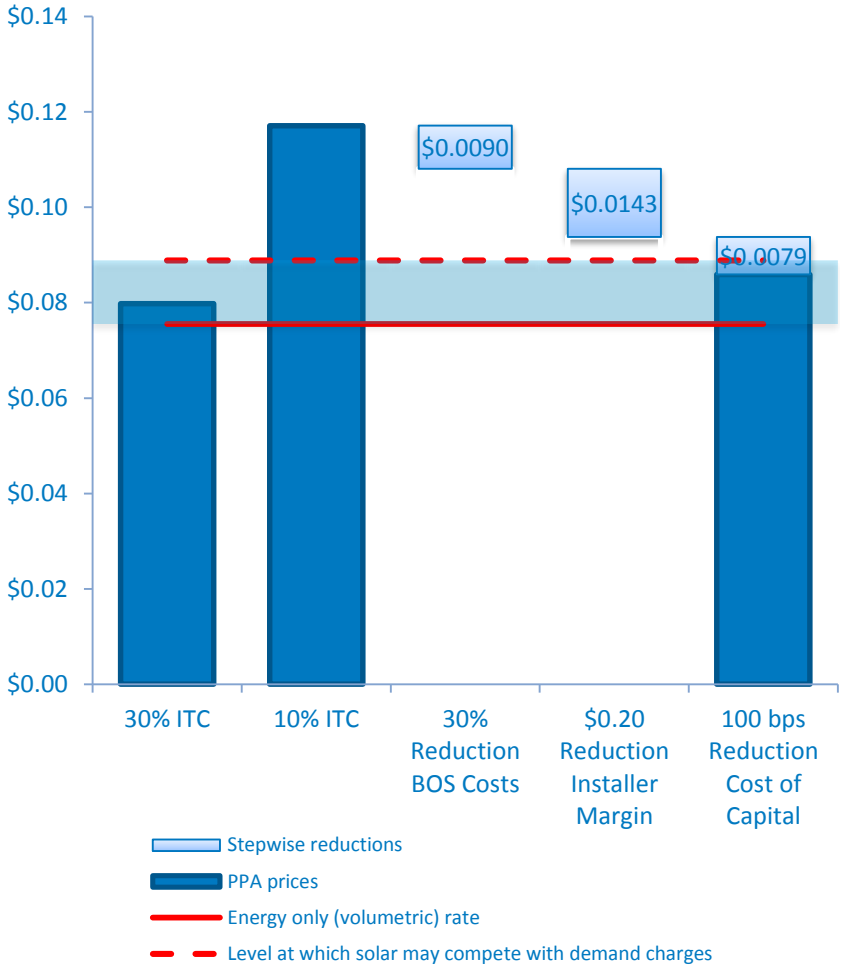
New Hampshire High and Low Installed Cost Scenarios



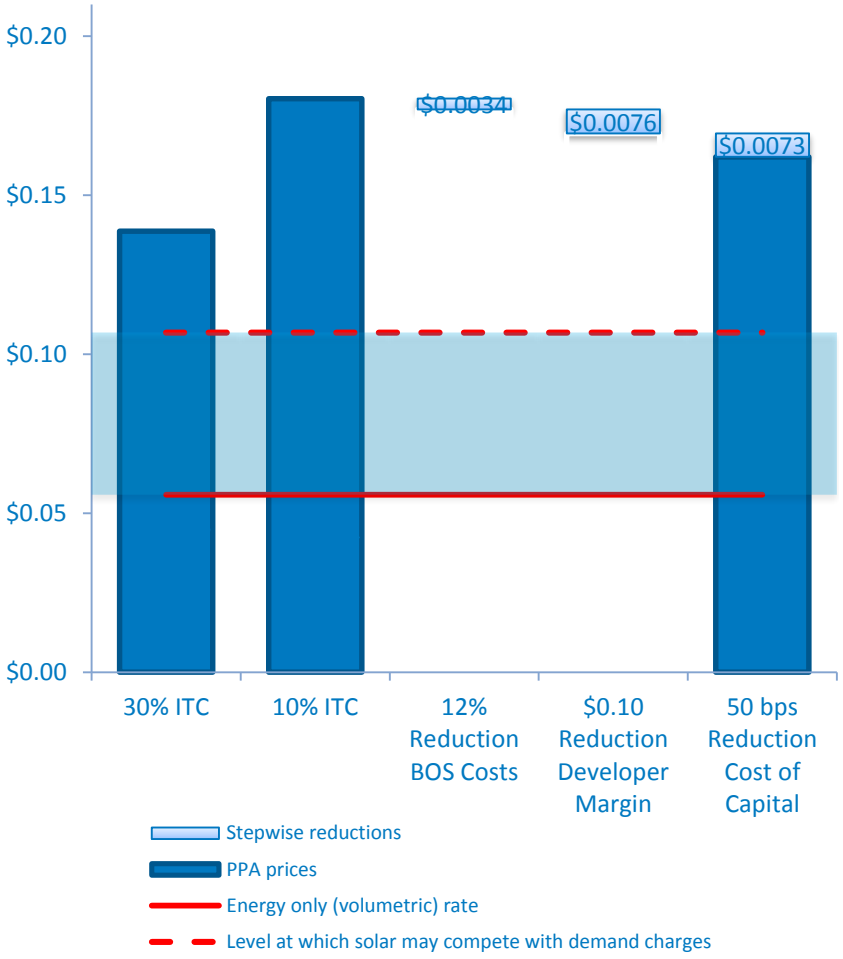


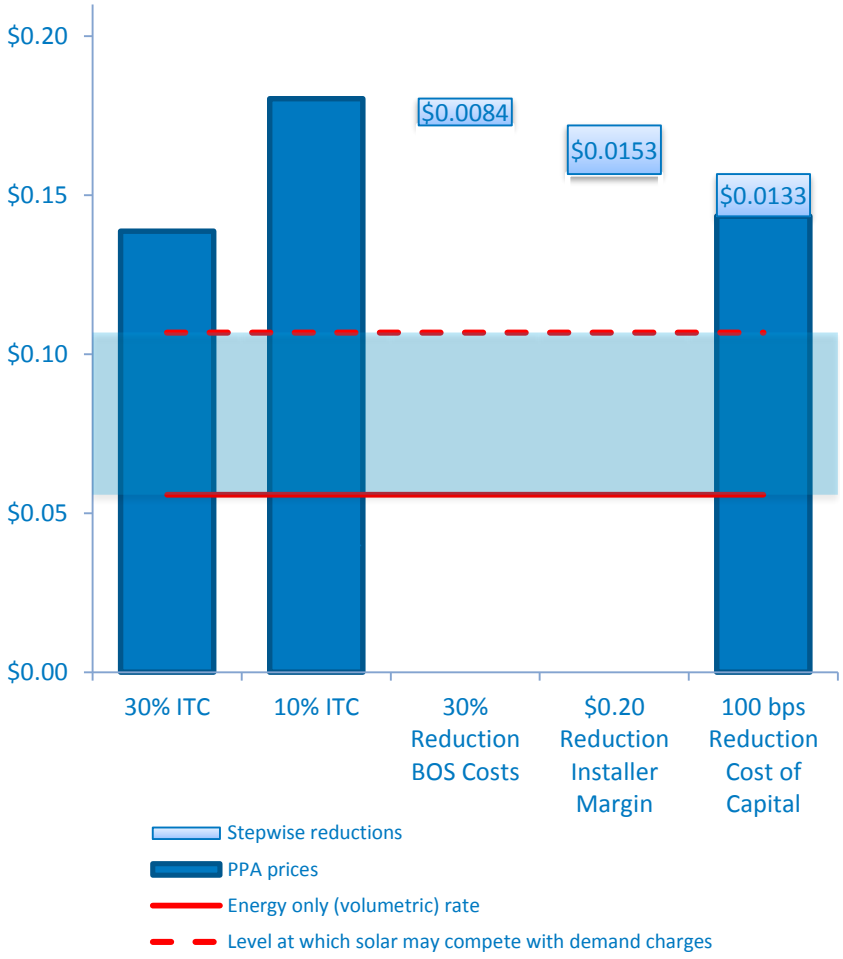
New Jersey High and Low Installed Cost Scenarios



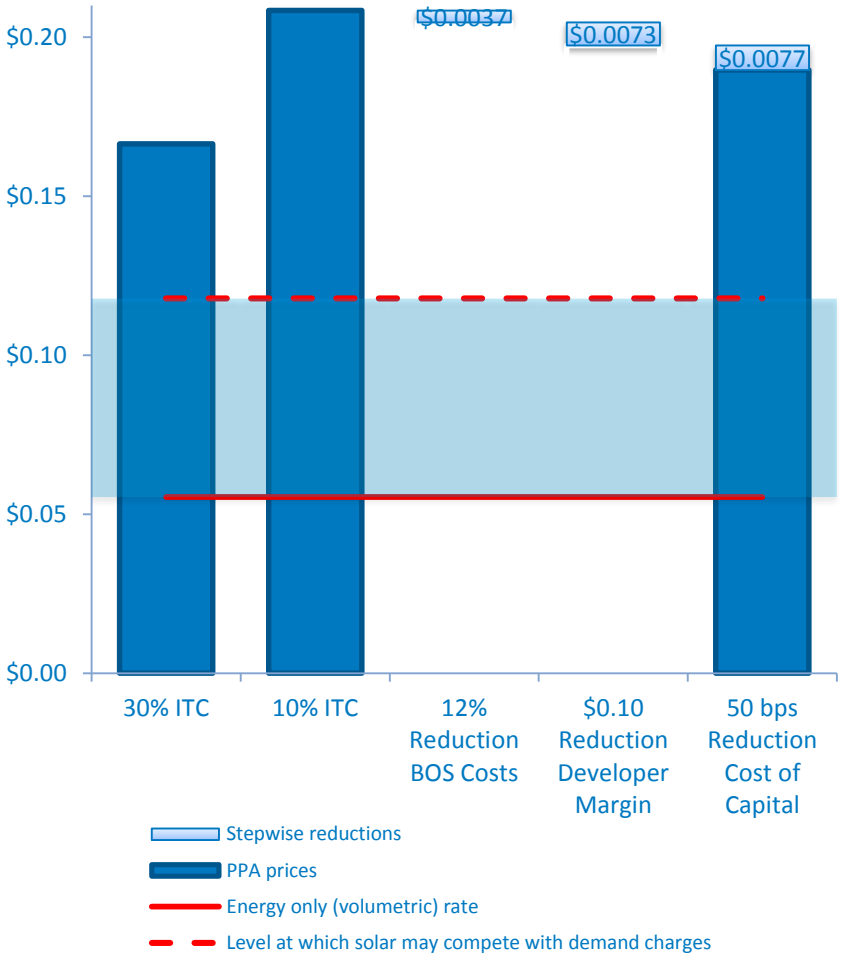


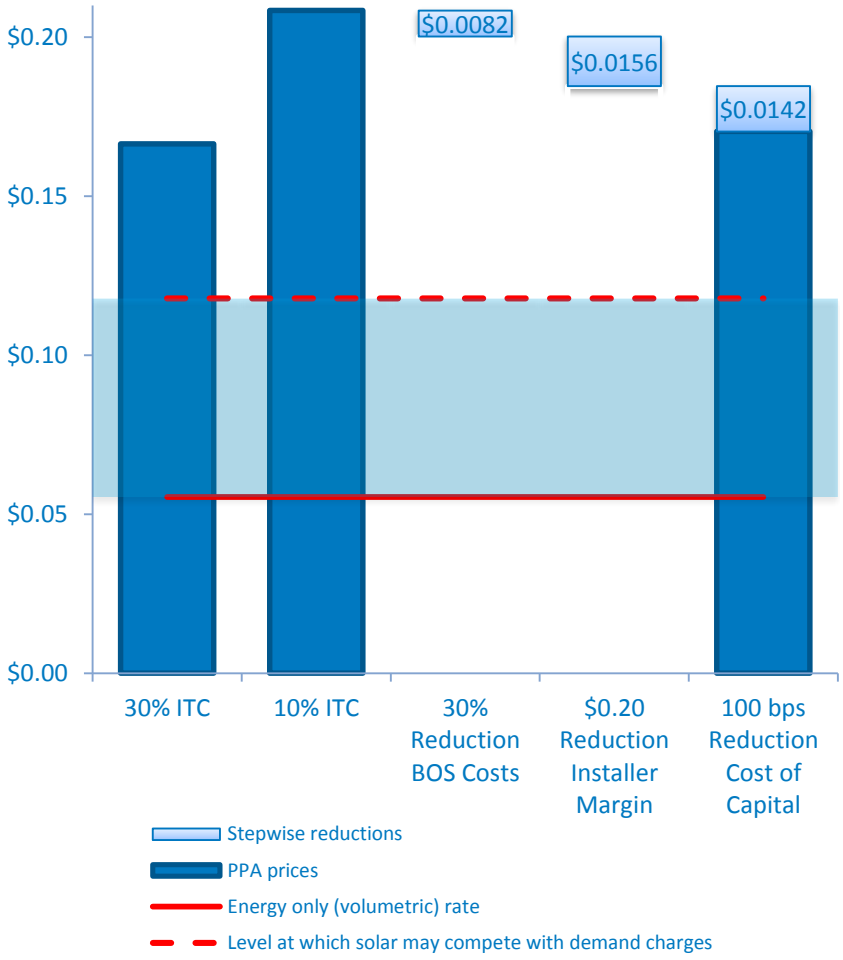
Delaware High and Low Installed Cost Scenarios



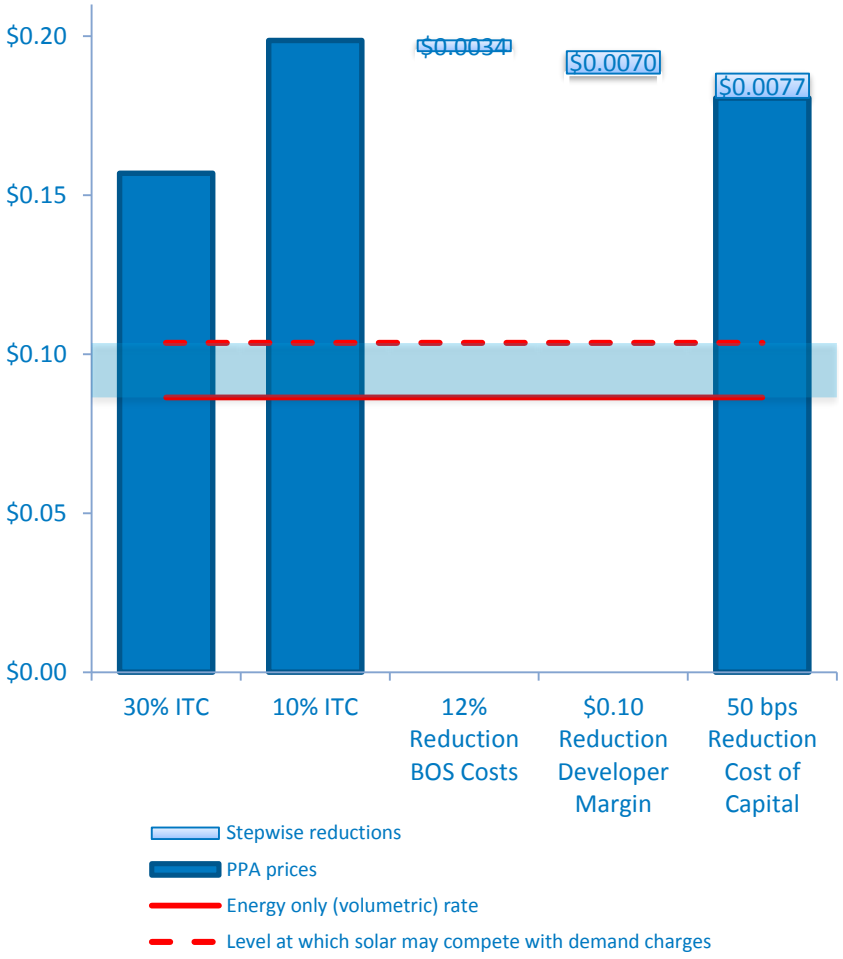


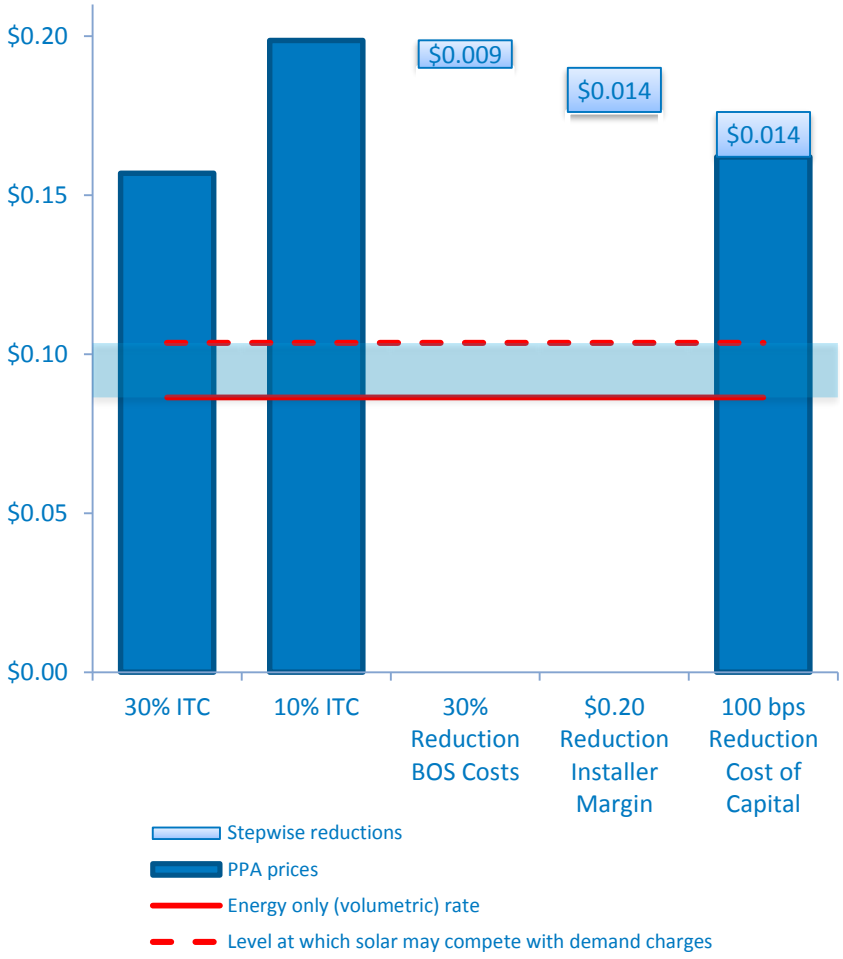
Ohio High and Low Installed Cost Scenarios



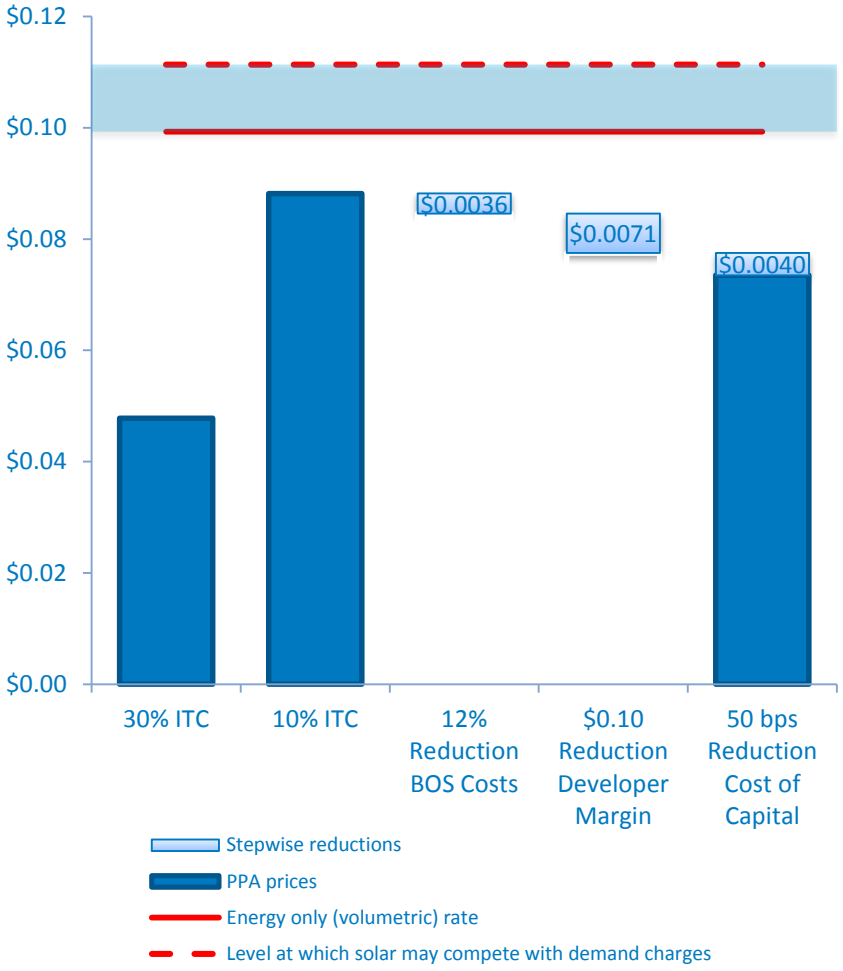


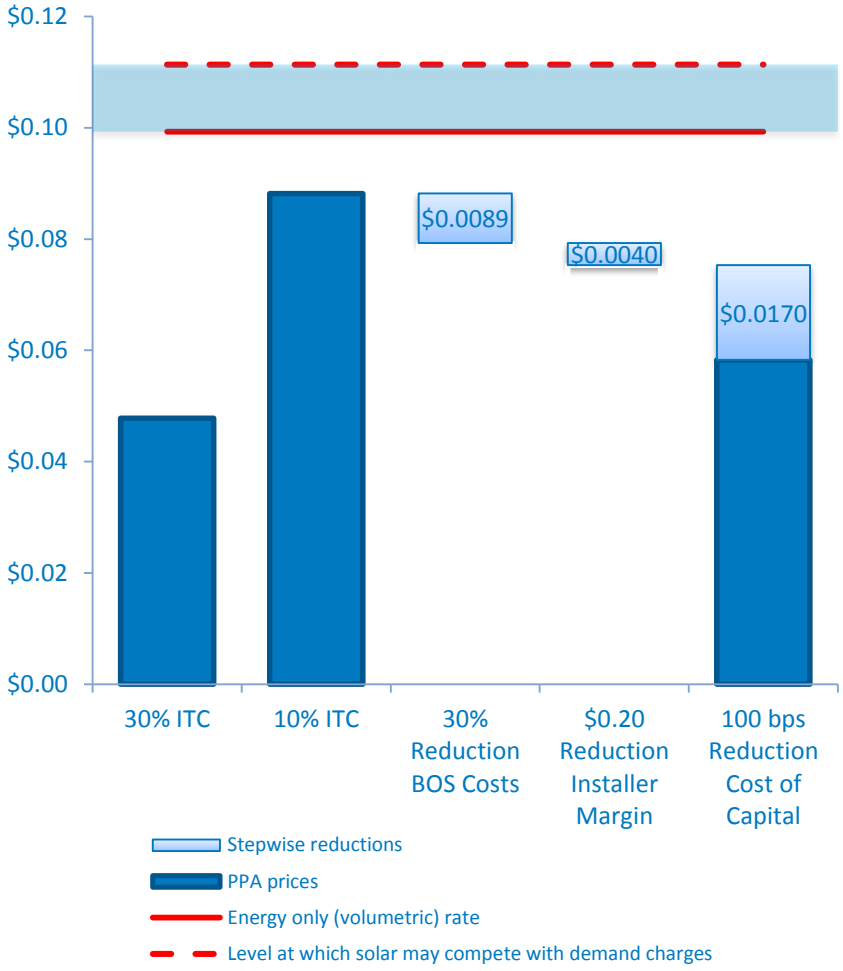
Pennsylvania High and Low Installed Cost Scenarios





Washington, D.C. High and Low Installed Cost Scenarios





Summary and Conclusions

State	Sensitivity to capacity reductions	Sensitivity of project economics	Overall sensitivity to ITC reversion
Delaware	High	High	High
D.C.	High	Low	Medium
Maryland	Medium	Medium	Medium
Massachusetts	Low	Low	Low
New Hampshire	Low	Medium	Low
New Jersey	Low	Medium	Low
Ohio	High	High	High
Pennsylvania	Medium	High	Medium

- State incentives (other than SRECs) play a critical role in determining competitiveness
- Other state actions (e.g. net metering policies, new rate designs) impact carve-out compliance

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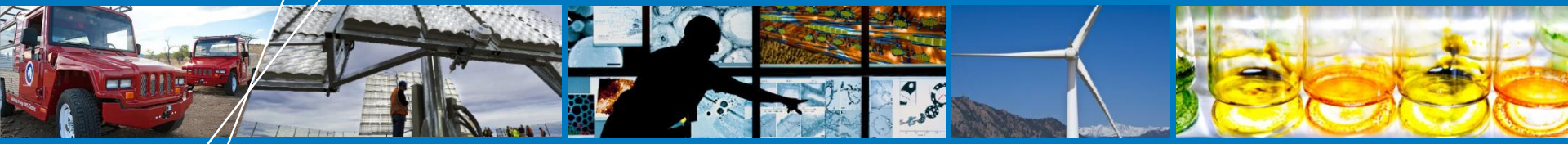

Thank you!

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Thank you for attending our webinar

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