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Net Metering and Distributed Energy Resources

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Presentation to the Maryland Public Service Commission

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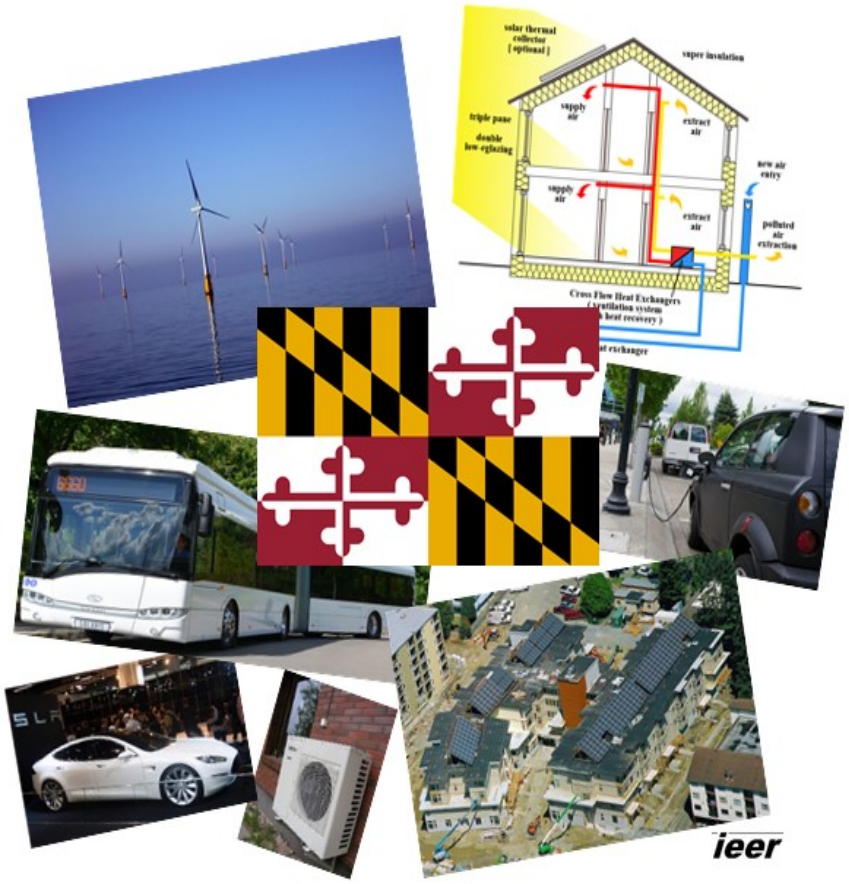
Context: Emissions-free energy system by 2050

- Affordable, renewable, resilient, reliable grid that gives consumers choices
- Requires a new approach to the grid
- Appreciate that PSC may initiate such a proceeding in Maryland



Overview regarding net metering

- There is no utility death spiral. Net metering does not add significant cost at low levels of penetration and has many benefits.
- Proposals to change net metering in the near term are hasty, ill-considered, unfair, and unnecessary. Higher connection charges, being imposed in some places, are an egregious example.
- Net metering should continue and be extended to community solar in Maryland so that low-income households and others can benefit from it.
- Change in net metering should be in the context of a transition to a more resilient, distributed, emissions-free grid with open access for consumers to become producers and transparency of the grid to all parties. Grid neutrality principles, recently articulated by former FERC chairman and co-authors, should form part of the starting point.

There is no utility "death spiral"

- Despite alarms regarding grid defection, there is no "death spiral" – former FERC chairman Jon Wellinghoff and co-authors called it a "red herring" in a recent article. (Note 1)
- Lawrence Berkeley Lab estimated rate impact at 2.5% net metered solar penetration in a northeastern utility (Massachusetts example) where generation is deregulated: 0.2 percent. (Note 2)
- Maryland currently has much less than 1% net metered solar PV. It has only an overall 2% solar RPS carve out by 2022.
- By this measure, the typical residential bill impact of net metered solar in Maryland at present should be remain small for some years though the specific percentage bill impact may be different than the example in the study.

Net metering change is premature

- The direct cost of net metering is low and will remain so for some time. There is no utility "death spiral" in Maryland.
- One premise of increased connection charges is that solar rooftop homes still have capacity needs, an opinion held by Exelon's CEO Chris Crane. (Crane 2014, Note 3)
- But McMansions also have high capacity needs. They are not charged more for 200-amp service (Mr. Crane's example). As you know, a flat fee applies generally. For instance, in Pepco territory it is for service up to 400 amps. (Note 4) There is usually no charge for service upgrades.
- Hostility to net metering is generally based on private, not public, interest.
- A low estimate for value of solar is the wholesale price of electricity (Mr. Crane's example). It is oriented exclusively to private corporate interest. This is contrary to a central principle of grid neutrality. It even ignores the significant reduction in distribution losses that accompanies rooftop solar, especially at low penetrations.
- The high estimates are in a study by the Maine PSC: 18 cents in the first year and 33 cents per kWh in the long-term. (Note 5) Both are comfortably more than Maryland residential rates. Note that in this estimate, the value of solar is variable: it increases from the first year as various benefits such as elimination of fuel price uncertainty increase.

Maine PSC Value of Solar – Year 1

First Year

		Distributed Value ($/kWh)
Energy Supply	Avoided Energy Cost	$0.061
	Avoided Gen. Capacity Cost	$0.015
	Avoided Res. Gen. Capacity Cost	$0.002
	Avoided NG Pipeline Cost	
	Solar Integration Cost	-$0.002
Transmission Delivery	Avoided Trans. Capacity Cost	$0.014
Distribution Delivery	Avoided Dist. Capacity Cost	
	Voltage Regulation	
Environmental	Net Social Cost of Carbon	$0.021
	Net Social Cost of SO_2	$0.051
	Net Social Cost of NO_x	$0.011
Other	Market Price Response	$0.009
	Avoided Fuel Price Uncertainty	$0.000
		$0.182

Maine PSC Value of solar: Long-term

25 Year Levelized		Gross Value A ($/kWh)	× Load Match Factor B (%)	× Loss Savings Factor (1+C) (%)	= Distr. PV Value D ($/kWh)
Energy Supply	Avoided Energy Cost	$0.076		6.2%	$0.081
	Avoided Gen. Capacity Cost	$0.068	54.4%	9.3%	$0.040
	Avoided Res. Gen. Capacity Cost	$0.009	54.4%	9.3%	$0.005
	Avoided NG Pipeline Cost				
	Solar Integration Cost	($0.005)		6.2%	($0.005)
Transmission Delivery Service	Avoided Trans. Capacity Cost	$0.063	23.9%	9.3%	$0.016
Distribution Delivery Service	Avoided Dist. Capacity Cost				
	Voltage Regulation				
Environmental	Net Social Cost of Carbon	$0.020		6.2%	$0.021
	Net Social Cost of SO_2	$0.058		6.2%	$0.062
	Net Social Cost of NO_x	$0.012		6.2%	$0.013
Other	Market Price Response	$0.062		6.2%	$0.066
	Avoided Fuel Price Uncertainty	$0.035		6.2%	$0.037
					$0.337

Net metering recommendations for the next several years

- Maintain net metering limit at least to its present 1,500 MW limit
- Initiate grid of the future proceedings as a complement to this distributed energy PC 40 effort.
- Initiate action to ensure net metering is inclusive of low-income households beyond the pilot community solar program. Low-income people have been almost totally shut out of rooftop solar. The vast majority cannot benefit from it directly. Community solar legislation is far off.
- Give solar access to low-income households in other ways. IEER's Energy Justice report shows that a community choice aggregation solar program for all recipients of electricity bill assistance can provide universal solar access and reduce costs of assistance at the same time. (Note 6)

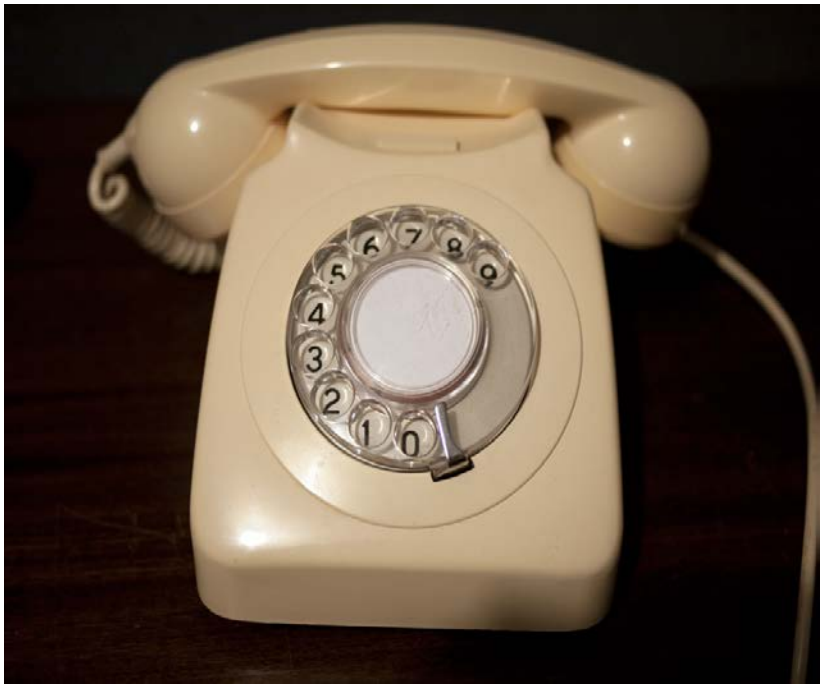
Long-term context

Consider value of solar and changes in present net metering policy only within the context of:

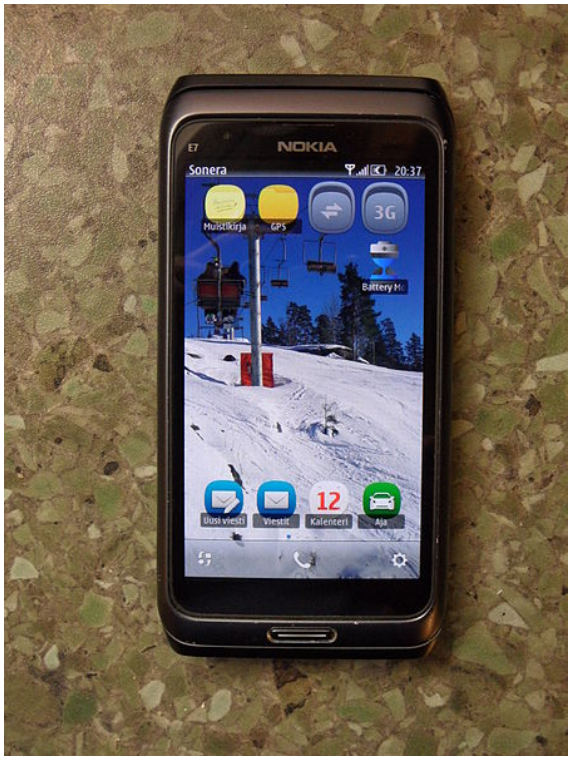
- Adopting of grid neutrality principles
- Making the grid transparent to small scale solar producers and consumers
- Establishing a path to a distributed, resilient, emissions-free (or nearly so) grid
- Considering system benefits and costs in the presence and absence of distributed storage and ownership of that storage
- Including health and other social and economic benefits accompanying distributed solar, including the reduced pollution and the potential for more well-paying local jobs along with the costs that distributed solar creates for the grid (for serving as its storage)

Net metering: short and long-term

Net metering OK in the present stage of the grid



Change as we become closer to this stage of the grid



Grid Neutrality Principles

Hu, Kann, Tong, and Wellinghoff have proposed the following:

- Empower the consumer while maintaining universal access to safe, reliable electricity at reasonable cost
- Demarcate the boundary between public and private interests; protect the "commons"
- Align risks and rewards across the industry
- Create a transparent, level playing field
- Foster open access to the grid to parties who meet system-wide standards.

I would elaborate somewhat on the last point:

- Foster open access that is not discriminatory to small-scale producers and consumers, including low-income households and small businesses who do not have suitable rooftops for solar installations.

And add:

- Establish resilience at reasonable cost, with a stress on renewable microgrids
- Ensure compatibility with an emissions-free (or nearly so) electricity system in the long term (2040-2050)

Implications for net metering

- Net metering is approximately aligned with some grid neutrality principles: it empowers consumers to become producers, creates open access, though it is still very limited in the absence of community solar.
- Neither utility nor distributed solar producer has actionable information for optimizing costs and benefits when it concerns behind-the-meter systems. In other words, despite "smart meters" there is a marked lack if transparency,
- Transparency of the commons to all parties is essential if its demarcation is to be equitable and subject to democratic processes.

Maryland has some advantages

- Having come late to solar relative to other leading states, Maryland has the time to develop and adopt grid neutrality principles over the next few years along with other changes needed for a grid of the future.
- Promotion of smart appliances, real-time information for consumers while protecting privacy and security is an important priority. This is a large part of the technical basis on which grid neutrality can be created.

Complete grid transformation can be done by 2050. Electricity needs will grow even with efficiency increases. Transport and HVAC will need to be efficiently electrified to achieve a low-emissions energy sector

Conclusions

- Maintain net metering for distributed solar at least to its 1,500 MW limit
- Expand solar access to include low-income households
- Include grid neutrality principles in PC 40.
- Change in net metering should be in the context of long-term needs for a resilient, affordable, emissions-free grid with far more distributed resources and adoption of grid-neutrality principles.
- Individuals must have much more transparency - and the technical means to take advantage of it.
- There is plenty of room in the transition to the future grid for individuals, workers, and businesses, including utilities, to benefit. Specifically, even with efficiency, electricity requirements will grow considerably since a low-emissions energy future will require efficient electrification of most HVAC and transportation.
- IEER will be submitting materials for the PC 40 record in the coming weeks.

Notes by Slide Number

3. These comments on net metering apply mainly to the contiguous United States and, in many places, specifically to Maryland and the PJM grid. However, some parts, such as grid neutrality principles, are generally applicable.
4. (Note 1) Jenny Hu, Shayle Kann, James Tong, and Jon Wellinghoff. "Grid Neutrality: Five Principles for Tomorrow's Electricity Sector," *Public Utilities Fortnightly Magazine*, October 2015, at http://www.fortnightly.com/fortnightly/2015/10/grid-neutrality.
4. (Note 2) Andrew Satchwell, Andrew Mills, and Galen Barbose. *Financial Impacts of Net-Metered PV on Utilities and Ratepayers: A Scoping Study of Two Prototypical U.S. Utilities*. Prepared for EERE, Solar Energy Technologies Office, U.S. DOE. Berkeley CA: Environmental Energy Technologies Division, Lawrence Berkeley National Laboratory, September 2014, at http://emp.lbl.gov/sites/all/files/LBNL%20PV%20Business%20Models%20Report_no%20report%20number%20%28Sept%2025%20revision%29.pdf. September 25, 2014 revision.
5. (Note 3) *Energy Revolution: Utilities Confront the Shifting Energy Landscape. RFF Policy Leadership Forum: A Conversation with Chris Crane, President and CEO, Exelon, May 13, 2014*. Washington, DC: Resources for the Future, 2014, at http://www.rff.org/Events/Pages/Energy-Revolution-Utilities-Confront-the-Shifting-Energy-Landscape.aspx, with audio at: http://video.rff.org:8000/~rff/140513.mp3. Conversation with RFF President Phil Sharp. From 56:27 min to 57:32 min.
5. (Note 4) Potomac Electric Power Company. *Applying for New or Upgraded Residential Service: District of Columbia*. Washington, DC: PEPCO, accessed October 19, 2015, at https://www.pepco.com/uploadedFiles/wwwpepcocom/Pepco%20Apply%20for%20New%20Service%20Res%20DC.pdf.
5. (Note 5) Maine. Public Utilities Commission. *Maine Distributed Solar Valuation Study*. Presented to: The Joint Standing Committee on Energy, Utilities and Technology, 127th Maine Legislature. Hallowell, ME: Maine PUC, March 1, 2015, at http://www.nrcm.org/wp-content/uploads/2015/03/MPUCValueofSolarReport.pdf, from link at http://www.maine.gov/mpuc/electricity/elect_generation/valueofsolar.shtml. Figure ES-1 and Figure ES-2
6. Maine PUC 2015, Figure ES-1
7. Maine PUC 2015, Figure ES-2
8. (Note 6) Arjun Makhijani, Christina Mills, and Annie Makhijani. *Energy Justice in Maryland's Residential and Renewable Energy Sectors*. Takoma Park, MD: IEER, October 2015, at http://ieer.org/resource/energy-issues/energy-justice-marylands-residential. See Section VII.
10. Rotary phone: at https://upload.wikimedia.org/wikipedia/commons/b/b6/New_Zealand_Rotary_Telephone.jpg. Photo by Nition1.
10. Smart phone: at https://commons.wikimedia.org/wiki/File:Nokia_E7-00_mobile_phone.JPG. Photo by Villeke1.
14. Montour power plant: at https://commons.wikimedia.org/wiki/File:HD.6D.194_(10822384526).jpg. Photo from ENERGY.GOV
14. Solar: Lake City Village low-income housing, Seattle, Washington. *Photo courtesy of SolarWorld* – *www.solarworld.com*.