



Review of State Net Energy Metering and Successor Rate Designs

Brief summary of NRRI Report No. 19-01, by Tom Stanton¹

Net energy metering (NEM) has been a common rate design used for customers with small-scale generators on their premises (on the customer side of the meter). By 2015, at least 43 states and the District of Columbia had NEM programs for at least some of their regulated utility companies. Recently, though, state legislatures and utility regulatory commissions (PSCs, PUCs, and the like) have directed attention to modifying or finding alternatives to NEM, with related deliberations underway or recently concluded in nearly all jurisdictions.

Customers who supply some of their electricity by self-generating still require the existing utility grid for two very important uses: (1) as the provider for obtaining supplemental energy whenever their local usage is greater than their on-site generation; and, (2) as the receiver for excess generation whenever their usage of electricity is less than the output of their on-site generator. Exports from NEM customers represent a service that the customer provides to the utility system. As such, the regulatory treatment should appropriately charge NEM customers for the costs they impose upon and compensate them for the services they deliver to the system.

States have been considering and adopting changes to NEM or more generally all distributed energy resource (DER) rate designs, including primarily these approaches:

- Changing the rate credited to customers for excess generation delivered to the utility grid, basing the new rates not on the retail prices that the customers pay for their own usage from the grid, but rather on either their utility's administratively-determined avoided costs, or a calculated value of solar (VOS) or value of distributed energy resources (VDER) to the grid;
- Adjusting rates from being primarily consumption-based (e.g., per kWh) to including a demand (per kW) component, or factoring into rates the capacity of their self-generation;
- Increasing the fixed charges all similar customers pay in retail rates, regardless of their use of self-generation; or,
- Treating self-generating customers as a separate customer class, determining class-specific system costs, and developing new rates to collect such costs from those customers.

These and related activities are tracked in a series of quarterly activity reports and annual summaries produced by the North Carolina Clean Energy Technology Center.¹ Each state is addressing these challenges in its own way, but similarities are observed in multiple states. In many jurisdictions, these include changes intended to ensure that customers with self-generation will contribute their fair share towards distribution system costs, and compensation for excess generation that will vary based on the time of delivery. These activities are well underway in many states, but few jurisdictions have entirely completed the related proceedings.

The *NARUC Manual on Distributed Energy Resources Rate Design and Compensation* explains the importance of jurisdictions determining the actual and desirable levels and pace of adoption of DERs before deciding on policy reforms. Increases in the numbers and types of interoperated DERs will have different impacts on each utility. Policy actions are best made after policymakers request and review analyses for their own jurisdictions. Policy reforms can have unintended consequences, including creating volatile business conditions of boom and bust cycles for DER businesses. It is

¹ See <http://nrri.org/download/nrri-19-01-review-of-state-net-energy-metering/>.

² See the *50 States of Solar* reports at <https://nccleantech.ncsu.edu/our-work/policy/the-50-states-reports/>.

necessary to understand how current policies and the associated rates of growth in DER adoption are affecting: (a) utility system costs and revenues; (b) DER business models; and, (c) the costs and benefits that accrue to different parties (e.g., utility, customers, others) from DER technologies and services. Once those factors are well understood, policymakers can consider changes in rate designs and other support policies.³

This Table describes three different kinds of general market conditions that can apply to any distributed energy resources, particularly the small generating technologies used to self-generate, like solar photovoltaics (PV). Generally, the markets tend to progress from left to right as manufacturing and installation costs decline and performance improves. Those changes are associated with expanding market share and accelerating rates of growth. They combine with overall trends in utility sales and those market conditions, as a whole, will generally reflect the time pressures that regulators might face in changing rate designs and that non-regulatory policy makers might face in changing other related support policies.

Table: Preliminary Model of Different DER Market Conditions

Market Model Name	Price Support	Transitional	Price-competitive
DER market status	Uneconomic	Pre-economic	Grid-competitive
B/C ratio¹	B < C, long-term ROI, if ever	B ≈ C, modest ROI, payback under optimistic scenarios	B > C, patient ROI or better, payback under many scenarios
LCOE to VDER comparison²	LCOE > VDER	LCOE ≈ VDER	LCOE < VDER
Other relevant support-policy impacts	Low	Medium	High
Types of adopters³	True believers, Innovators	Early adopters	Early majority
Market share for DER⁴	~1% or fewer customers	~1 to 2.5%	>2.5%
DG, NEM growth rates⁵ (customers or capacity)	< 1/3 per year	1/3–2/3 per year	Annual doubling or more
Trend in total utility sales	Growing or flat	Growing, flat, or declining	Flat or declining
Time pressure for taking regulatory action	Low	Medium	High

Source: Author's construct based on Taylor, McLaren, et al. 2015 (NREL/TP-6A20-62361) and adapted from Rogers 2003, *Diffusion of Innovations, Fifth Edition*.

¹ The benefit/cost (B/C) ratio takes into account utility rates, and includes as benefits available support policies, like financial incentives, plus any other costs that distributed energy resources (DER) can avoid.

² Levelized cost of energy (LCOE) and value of distributed energy resources (VDER)

³ Adopter types from Rogers 2003.

⁴ Market share characterizations shown are the author's construct based on Rogers 2003 and observations of NEM growth reported by U.S. Energy Information Administration.

⁵ DG, NEM growth rates depicted here are the author's construct, based on personal observations and published solar market data. Depending on the purpose for analysis, growth rates might be measured in terms of cumulative capacity or numbers of customers, for example.

³ See *NARUC Manual on Distributed Energy Resources Rate Design and Compensation*, Prepared by the Staff Subcommittee on Rate Design, 2016, <https://www.naruc.org/rate-design/>.

Net Metering and DER Rate Reform: Recent State and Utility Activity

At least 35 states have considered net metering successor tariffs or rate design changes for customers with distributed energy resources (DERs) since the beginning of 2015. One of the dominant compensation structures for successor tariffs has been net billing, whereby excess generation (typically measured in real-time, 15-min, or 60-min intervals) is credited at a rate separate from the utility's retail electricity rate. The other dominant compensation structure has been a continuation of retail rate net metering, sometimes with the adoption of additional non-bypassable charges or credit adjustors.

Table 1: Summary of Net Metering Successor Tariffs Adopted as of July 2019

State	Year of Decision	Compensation Mechanism	Excess Generation Credit Rate	Notes
AZ	2016	Net Billing	Avoided cost (phased approach)	Credit rates were approved in individual utility proceedings.
CA	2016	Net Metering	Retail time-of-use rates	Includes non-bypassable charges
HI	2015 2017	Net Billing & Self-Consumption Net Billing & Smart Export	Avoided cost	Customer Grid-Supply reached its cap in November 2017. Customer Grid-Supply Plus and Smart Export Tariff were approved in October 2017.
IN	2017*	Net Billing	Avoided cost x 1.25	*Takes effect in July 2022 or when aggregate cap is reached
KS	2018	Net Metering	DG Tariff Retail Rate (KCP&L: ~81% of standard retail rate, Westar: ~62% of standard retail rate)	Residential DG tariffs include lower retail rates than the standard residential tariff; includes mandatory demand charges.
ME	2017 2019	Buy-All, Sell-All Net Metering	Avoided cost (phased approach) Retail rate	Legislature restored net metering in 2019.
MI	2018*	Net Billing (Inflow/Outflow)	Power supply rate or locational marginal price	*Changes are being implemented in individual utility rate cases.
NH	2017	Net Metering	Retail rate	Includes non-bypassable charges
NV	2015 2017	Net Billing Net Metering	Avoided cost Retail rate	Legislature restored net metering in 2017.
NY	2017*	Net Billing	Value of DER rate	*Not yet implemented for all customer types
UT	2017	Net Billing	Slightly below retail rate*	*Transitional credit rate Study underway to help develop credit rate for excess generation.
VT	2017	Net Metering	Retail rate*	*Also includes positive and negative credit adjustors, based on siting, size, & REC ownership. Adjustors are applied to gross production.

At least 30 states, plus DC and Puerto Rico, have considered net metering changes (of any type) so far in 2019, with 17 states approving changes. The majority of these changes related to net metering successor tariffs, while system size limits, aggregate caps, monthly net excess generation rates, and the treatment of net metering facilities paired with energy storage systems were also issues under consideration.



Figure 1: Net Metering Changes Approved January to July 2019

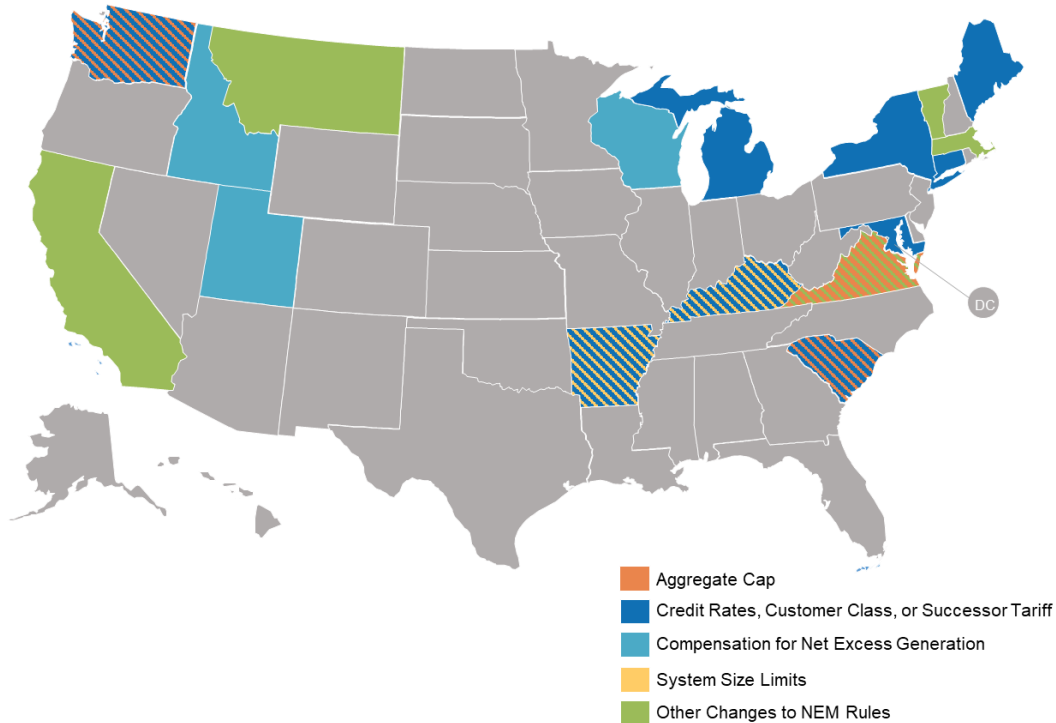


Table 2: Summary of Major Net Metering Changes Approved January to July 2019

State	Bill/Docket	Summary of Changes
AR	S.B. 145	Authorizes the PSC to adopt approaches other than retail rate net metering for customers on tariffs without a demand component, including credits based on avoided cost plus quantifiable benefits and an adder of not more than 40% of avoided costs or a kWh fee to recover demand-related distribution costs not avoided by net-metered systems and offset by quantifiable benefits. Increases commercial system size limit from 300 kW to 1 MW.
CT	H.B. 5002	Extends current net metering rules until Dec. 31, 2021. Allows the successor tariff to use a netting period of up to one month. Initiates a value of DER study.
KY	S.B. 100	Increases the system size limit from 30 kW to 45 kW. Directs the PSC to determine credit rates for excess generation.
ME	L.D. 91	Restores retail rate net metering by prohibiting the gross metering practice used in the existing successor tariff.
MI	Docket Nos. U-20162, U-20276	The PSC approved outflow credit rates for DTE Electric and UPPCO successor tariffs. Rejected proposed system access charges.
SC	H.B. 3659	Extends current net metering rules until June 1, 2021. Directs the PSC to establish a successor tariff including compensation for benefits customers-generators provide. Initiates a net metering cost-benefit investigation and directs the PSC to develop a methodology to calculate the value of energy produced by customer-generators.
WA	S.B. 5223	Increases the net metering aggregate cap from 0.5% of the utility's 1996 peak demand to 4%. Authorizes utilities to file successor tariffs when the aggregate cap is met or July 1, 2029, whichever comes first.

Committee on Energy Resources and the Environment

State Journeys in NEM and DER Rate Reform: A Long
and Winding Road

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Review of State Net Energy Metering and Successor Rate Designs:

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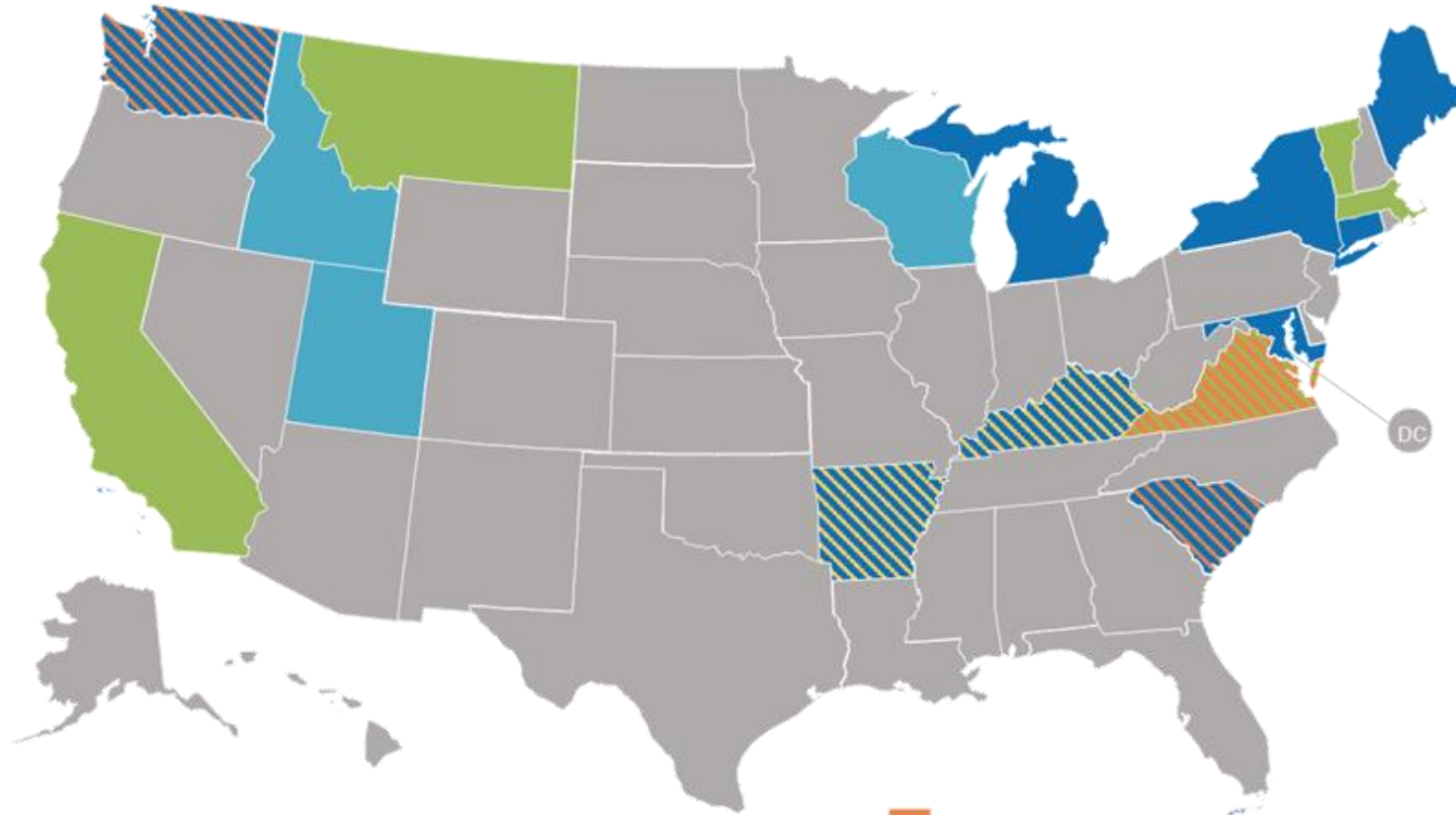
**Tom Stanton, Principal Researcher
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**Presentation for NARUC ERE Committee session:
State Journeys in NEM and DER Rate Reform: A Long and Winding Road**

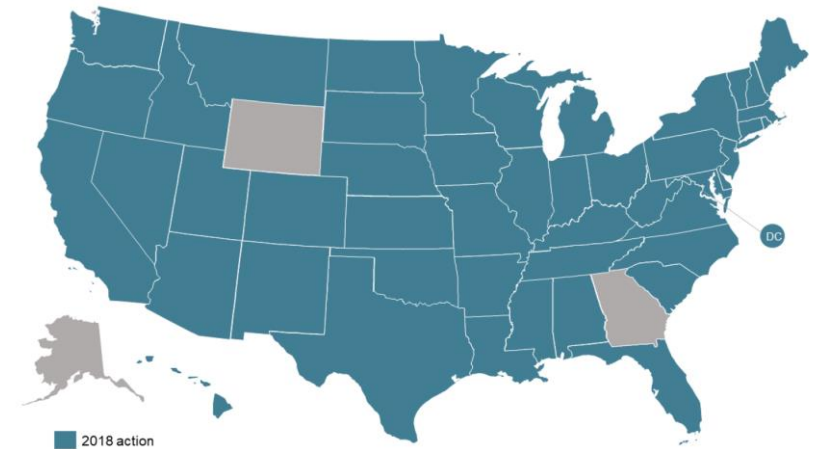
* <http://nrri.org/download/nrri-19-01-review-of-state-net-energy-metering/>



Net metering changes approved January–June, 2019



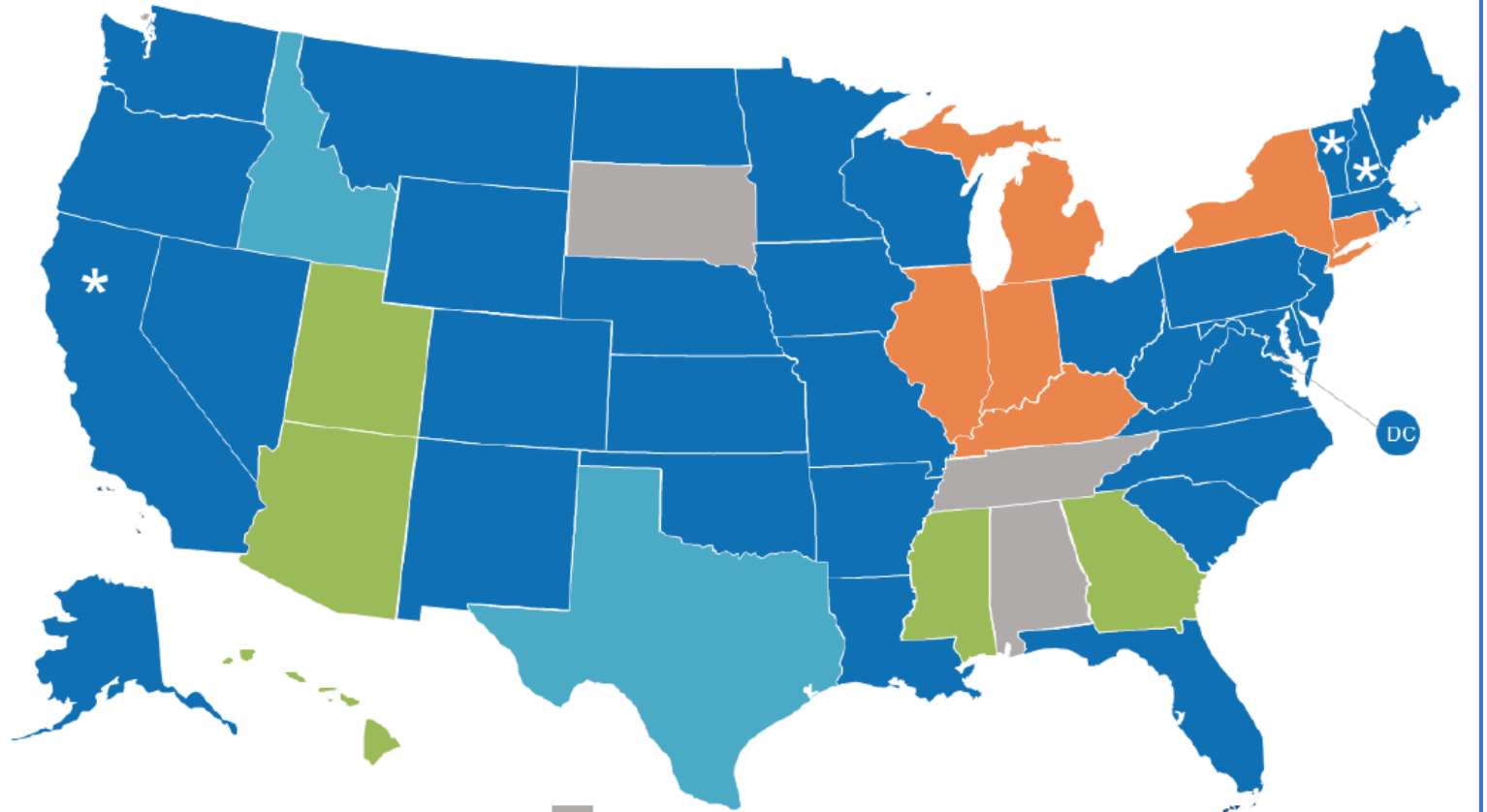
- Since 2015, some rate changes for NEM and DER have been adopted in nearly every state.



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Source: NC-CETC *50 States of Solar* Reports, 2018-19.

Current state NEM and DG compensation policies



* Per-kWh credit adjusters or non-bypassable charges



- No statewide DG compensation rules
- Statewide DG compensation rules other than net metering
- In transition from net metering to other statewide DG compensation rules
- No statewide mandatory net metering rules, but some utilities offer net metering
- State-developed mandatory net metering rules for certain utilities

Source: NC-CETC 50 States of Solar Reports, 2018-19.

Main types of changes adopted:

- Credit rates reset for net-excess generation, or all generation
- Fixed-charge increases for all similar customers
- Grid-access charges applied based on customer demand or capacity of self-generating equipment
- Separate rate class created for self-generating customers

Guidance from NARUC Staff Subcommittee on Rate Design

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Understanding markets for PV and other DER

Market Model Name	Price Support	Transitional	Price-competitive
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What can we say about lessons learned?

(Spoiler alert: That's why we're here, today!)

- It's early days: Few states are done making adjustments. States can be monitoring markets for changes.
- Incremental changes could be best: Avoid boom & bust cycles for market players. Avoid two steps forward and one step back.
- Legislative overrides? Court challenges? Are they good, bad, or indifferent?
- Be careful what you wish for: How real is the potential for grid-defection or load-defection?



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