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Summary of *Value of Distributed Energy Resources*

Phase 1 Order

Context of Order

- As part of Reforming the Energy Vision (REV), NYS is transitioning away from net energy metering (NEM)
- NYS' Public Service Commission (PSC) recently released an order to start this transition
  - *Phase One* (issued March 9, 2017)
  - *Phase Two (*to come)

Introduction

- NEM has been effective at growing NYS' PV market
  - Policy in place since 1997
  - However, it's a blunt method for valuing distributed energy resources (VDER). Time and location of generation are not considered in compensation structure
- NYS PSC has begun to develop a more precise approach to VDER

Phase One

What's Impacted

- Solar PV, Wind, Hydro, Farm Waste Generation, and Fuel Cells up to 2MW AC
- Combined Heat and Power (CHP) up to 10kW AC
- National Grid, NYSEG, Central Hudson, Orange and Rockland, ConEd, Rochester Gas & Electric

Volumetric vs Monetary Metering

Volumetric metering tracks net kWh delivered to grid.

- NEM is a volumetric method. PV production exported to the grid is credited on the customer's utility bill with a kWh reduction on a 1:1 ratio.

Monetary metering converts energy production into dollars.

- PV customers see a dollar credit on their energy bill (rather than a kWh credit)
- Solar energy consumed onsite is not delivered to the grid and is not converted to a monetary credit

For both metering methods, PV kWh consumed on-site is a kWh not purchased from the utility. It reduces the customer's bill like energy efficiency.

Definition of Project Types

Mass Market

- PV system is located at off-taker site
- Residential or small commercial solar electric systems where customer has non-demand billing

Definition of Project Types

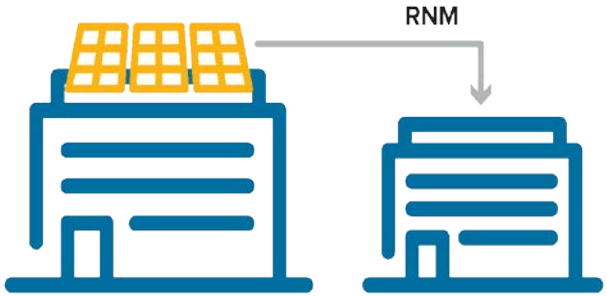
Large-scale onsite

- Onsite projects for commercial customers with demand billing or mandatory hourly pricing (MHP)

Definition of Project Types

Remote net metering (RNM)

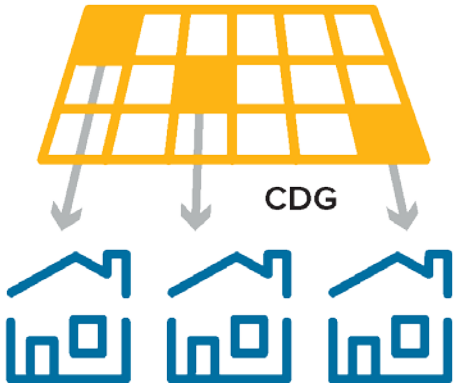
- Off-site projects of nonresidential customers; credits are used to offset use at remote meters
- Certain RNM projects already meeting specific criteria are grandfathered into monetary compensation. These projects must be installed by the end of 2017



Definition of Project Types

Community Distributed Generation (CDG) or Community Solar

- Off-site projects located behind a nonresidential host meter that provide bill credits to subscribed members
- Typically 10+ members, but in conjunction with VDER order, the PSC approved a waiver for multifamily projects



Phase One - Tariff Categories

1. **Net Energy Metering (NEM)** – no longer available for new projects
2. **VDER Phase One NEM** – temporarily available based on project criteria
3. **Value Stack** – available for most commercial/industrial projects moving forward

Phase One - Tariff Categories

Net Energy Metering (NEM)

- Volumetric crediting
- Compensation for life of the system
- Annual true-up for net excess production

Phase One - Tariff Categories

VDER Phase One Net Energy Metering

Phase One NEM is similar to NEM compensation except:

- Phase One NEM projects are subject to a 20-year term
- Credits will carry over to next billing periods, except those held by CDG sponsors
- Projects must have utility metering capabilities for recording net hourly use and delivery, except mass market

- After a 20-year period, projects will receive compensation structure in effect

Phase One - Tariff Categories

Value Stack - Overview

- The Value Stack consists of several elements representing the value of a clean kWh to the grid and the environment
- Some elements are time and location sensitive
- kWh produced in congested parts of the grid during peak demand time will be paid more
- CDG projects will receive an additional item (MTC) to align compensation with NEM

Phase One - Tariff Categories

Value Stack

- Applies to projects not eligible for NEM or Phase One NEM
- Monetary crediting only. Customers will see a dollar credit on their bill
- Compensation is based on electricity delivered to the grid (not consumed on site) on an hourly basis
- Projects receiving the Value Stack will have a compensation term of 25 years, then receive compensation structure in effect
- Credits will carry over to next billing periods, except those held by CDG sponsors
- CDG sponsors have two years to allocate annual excess credits not assigned to members

Net Energy Metering - *How to Qualify*

- All projects already interconnected or completed as of 3/9/2017 will retain NEM for the life of the system
  - Must have notified utilities of finished projects by 3/17/2017
- No action is required for already-interconnected projects to keep NEM

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Phase One Net Energy Metering – *How to Qualify*

Mass Market

- Projects installed between 3/9/2017 and 1/1/2020 are eligible for Phase One NEM
- Subject to MW allocation, limits specified by order
- PSC will determine appropriate action when 85% allocation is hit

Mass Market MW Allocations by Utility					
CHGE	O&R	NGRID	NYSEG	ConEd	RG&E
30	25	55	20	65	5

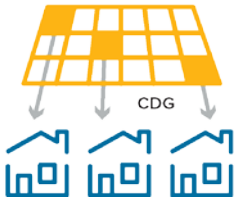
Phase One Net Energy Metering - *How to Qualify*

Commercial

- To qualify for Phase one NEM a project must have made payment of at least 25% of interconnection upgrade costs, or have executed an interconnection contract (SIR) if no upgrade payments are required by July 17th 2017.
- Non-grandfathered RNM and large-scale, onsite projects are eligible
- CDG project eligibility is also subject to capacity limits

Phase One Value Stack - *How to Qualify*

- Projects that do not receive NEM or Phase One NEM will receive the Value Stack
- Projects receiving NEM or Phase One NEM may opt into Value Stack
- All projects receiving the Value Stack must have advanced utility meter capable of measuring hourly electric exports and imports



Phase One Value Stack - Components

- **Energy (LBMP)** – the current wholesale energy price, changes hourly
- **Capacity (ICAP)** – mirrors the capacity credit currently provided under NEM, changes over time
- **Environmental benefits (“E”)** – project’s rate is locked in at interconnection. Certain CDG projects can take a non-tradable REC instead
- **Avoided demand (“D”)** – based on amount system will reduce distribution grid’s peak demand
- **LSRV (locational system relief value)** – additional value for location-specific congestion relief in distribution network
- **MTC (market transition credit)** – additional element for CDG or mass market opt-in, given in place of “D”

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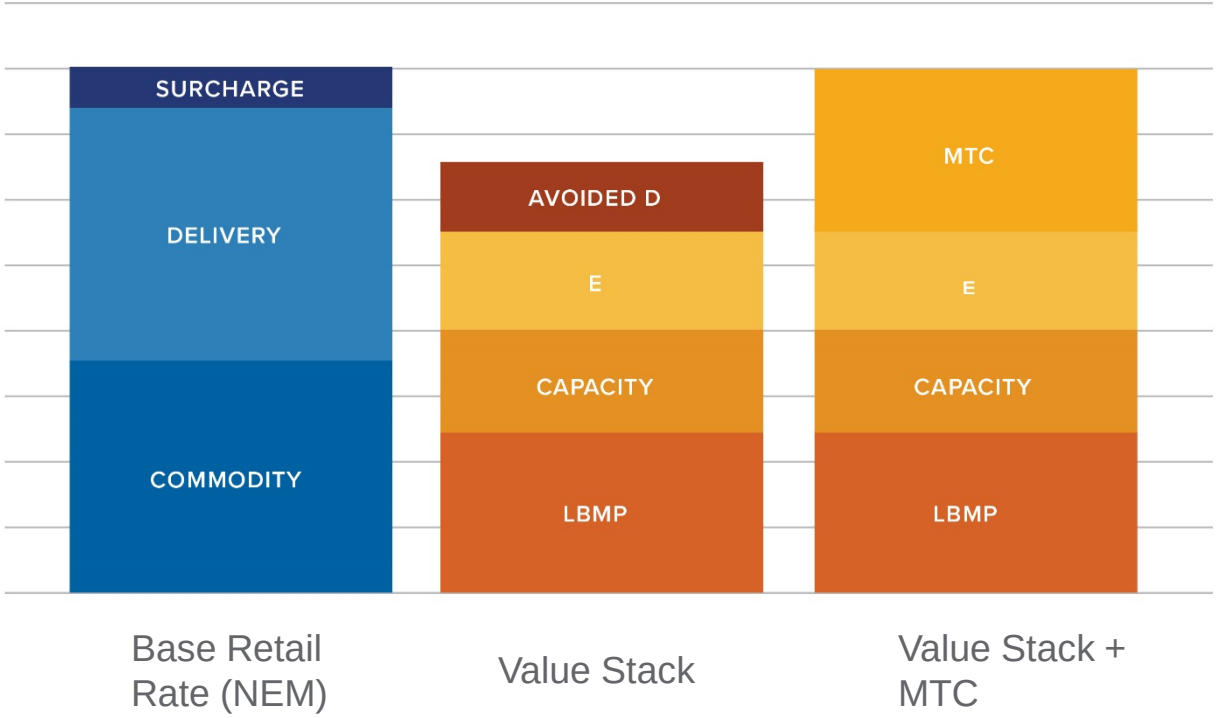
Phase One Value Stack - Components



- Avoided D – avoided demand
- E – environmental benefit
- Capacity – ICAP
- LBMP – energy commodity
- MTC – market transition credit for CDG

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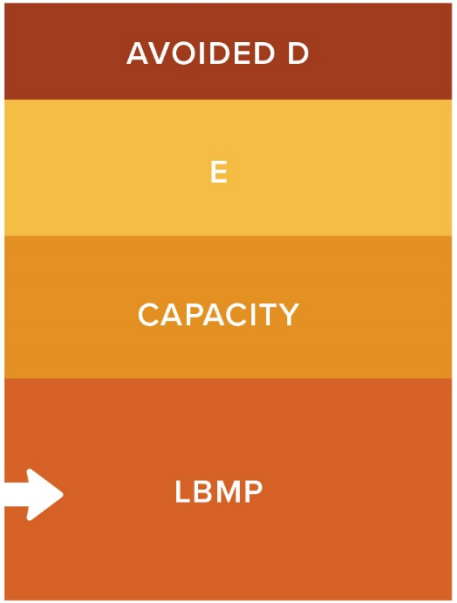
Phase One Value Stack Components –

Energy Value (LBMP)

The wholesale cost of energy:

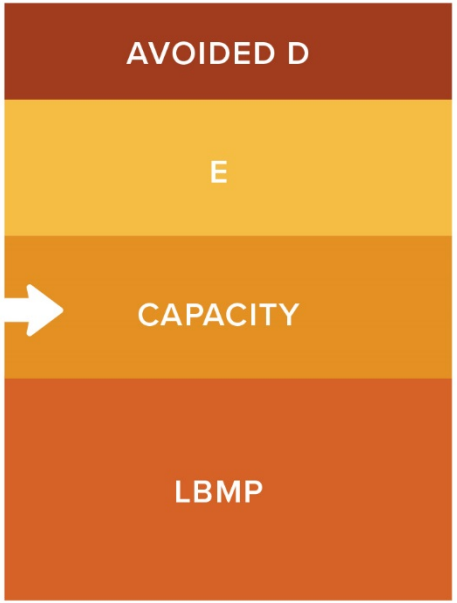
Day ahead Locational-based marginal pricing (LBMP) on an hourly basis inclusive of electrical losses. Compensation only for electricity exported into the grid at the time of generation.



Phase One Value Stack Components –

Installed Capacity (ICAP)

- Compensation per kWh, based on the capacity portion of the utility's full service market supply charges (same value as NEM)*
- Option 1 – spread across all hours of the year
- Option 2 – spread across 460 summer hours



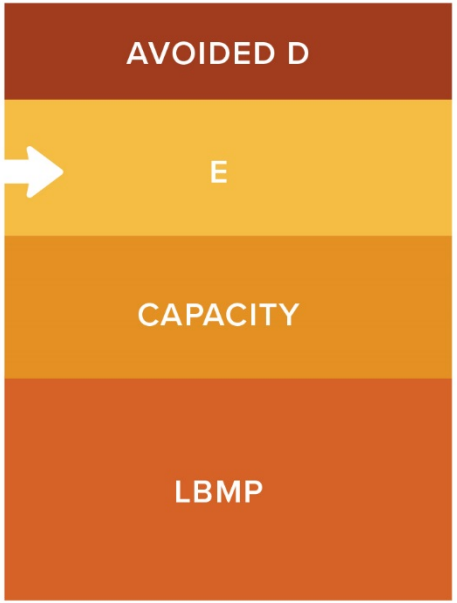
*For intermittent technologies

Phase One Value Stack Components –

Environmental Value (interconnecting-LSE option)

A fixed value representing environmental benefits

- Environmental compensation is the higher of:
  - The applicable Tier 1 REC price per kWh generated delivered (currently $0.02424 per kWh)
  - The social cost of carbon (SCC) per kWh value minus Regional Greenhouse Gas Initiative
- This value will be fixed for the Value Stack term and is locked in at interconnection

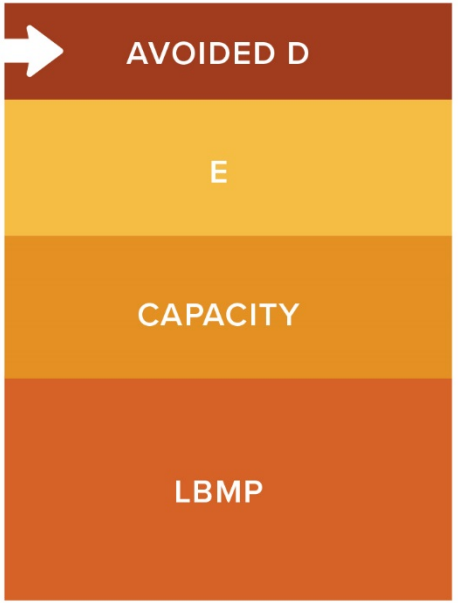


Phase One Value Stack Components –

Value of “D” (DRV) - Demand Reduction Value

Value of PV System’s Reduction of Peak Grid Distribution Demand

- Only for projects, or portions of projects, that do not receive MTC
- Compensation is tied to PV system performance over the grid’s 10 highest usage hours per year
- Details of calculation are available starting page 111 of Order

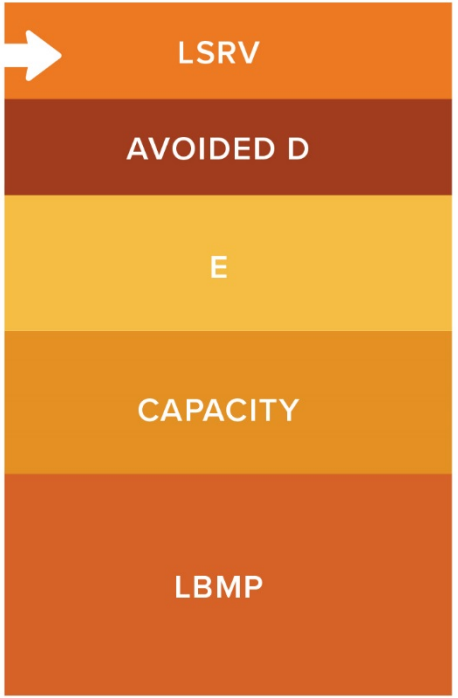


Phase One Value Stack Components –

Locational System Relief Value

A locational adder

- Utilities are required to identify high-value locations and any limits on the MW needed in those areas
- $ per kW-year value identified by utility, locked in, and paid for first 10 years of project
- LSRV can be received in addition to MTC, CDG projects are eligible
- Utilities have not yet identified LSRVs

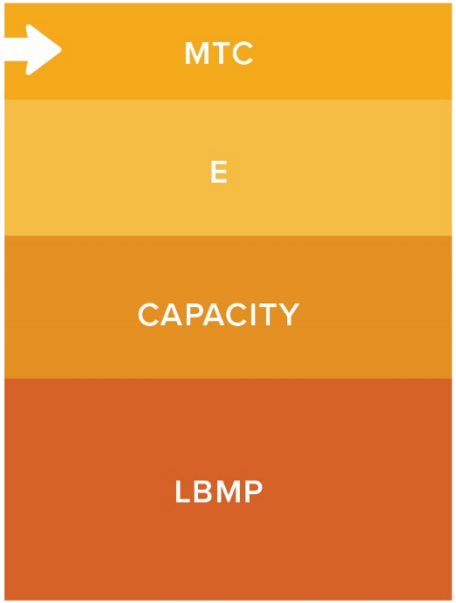


Phase One Value Stack Components –

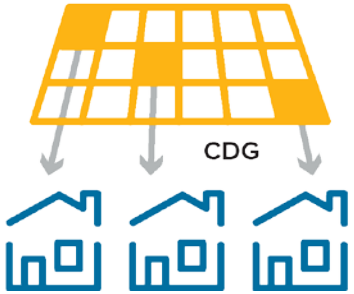
Market Transition Credit (MTC)

Additional Value Stack component for CDG

- Provided to avoid market disturbances in the transition away from NEM
- MTC is also available for Mass Market and CDG NEM projects that opt-in to the Value Stack
- MTC is applied to CDG mass market membership proportion
  - If a project has 70% mass market (residential or nondemand commercial) offtakers and 30% large commercial offtakers, project gets MTC on 70% of capacity, and “D” on 30% of capacity
- The MTC will be calculated by each utility and set once following the Phase One Order, applies for full 25 years

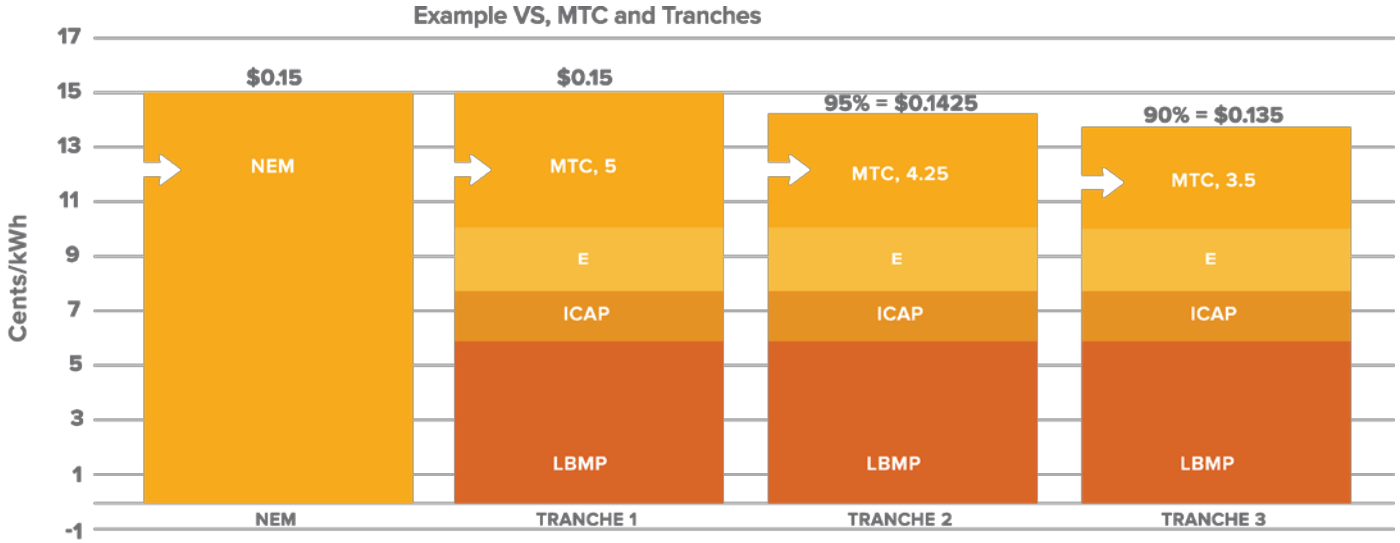


CDG Tranche Design



- Tranche design applies to CDG projects only
- Phase 1 NEM projects (Tranche 0) receive 20-year NEM compensation (volumetric)
  - Open for 90 business days after the order, or until capacity full
  - Any remaining capacity moves into Tranche 1
- Tranche 1: 25-year, NEM equivalent, incorporates Value Stack (monetary)
- Tranche 2: 25-year, 95% NEM equivalent, incorporates Value Stack (monetary)
- Tranche 3: 25-year, 90% NEM equivalent, incorporates Value Stack (monetary)
- To enter a tranche, 25% utility upgrade payment **or** an executed utility interconnection agreement is required

CDG Tranche Design



- MTC = Difference between *Base Retail Rate* and *Estimated Value Stack*
- Intended to make estimated CDG compensation…
  - equal to *Base Retail Rates* (NEM) in Tranche 1
  - 5% less than NEM in Tranche 2
  - 10% less than NEM in Tranche 3
- MTC reflects values not yet identified or calculable, especially value of D

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CDG Tranche Design – MW Allocation By Utility

	CHGE	O&R	NGRID	NYSEG	ConEd	RG&E
Total Incremental CDG MWs	77	47	474	223	548	111
Tranche 0/1	39	23	119	56	137	28
Tranche 2	19	12	178	84	206	42
Tranche 3	19	12	177	83	205	41

DPS staff will provide available tranche capacity updates on the 1st and 15th of every month at http://www.dps.ny.gov/VDER

Energy Storage

- Storage is included in Phase One when paired with an eligible technology. Details on compensation will be determined in future orders
- Storage is also permitted under NEM and Phase One NEM
- NYSERDA is in the process of developing a solar + storage solicitation
- Stand-alone storage and other storage valuation will be taken up in Phase Two

Renewable Energy Certificates (RECs)

Central Concept: *No projects receiving Phase 1 NEM or the Value Stack will receive monetizable RECs*

Details:

- Renewable Energy Standard (RES) Tier 1 differentiates between transferrable (monetizable) and nontransferable (non-monetizable) Renewable Energy Credits (RECs)
- RECs are tracked in NY Generation Attribute Tracking System (NYGATS) database, administered by NYSERDA
- 1 MWh = 1 REC
- NEM customers without an RPS (Renewable Portfolio Standard) or RES contract may still receive non-transferrable RECs
- Phase 1 NEM projects will not be eligible for Tier 1 solicitations or tradable RECs, but can receive non-transferrable RECs
- All rights to any environmental claims, credits, certificates, or attributes for energy produced by any system funded by Customer-Sited Tier or NY-Sun programs have been relinquished by NYSERDA

Renewable Energy Certificates *cont'd*

- Any VDER project receiving the value stack is ineligible for Tier 1 solicitations or transferrable RECs, but will receive one of two options:
  A. Default *Interconnecting-LSE-Option*: Utility (LSE) receives non-transferrable RECs, and customers receive environmental value component in Value Stack ("E")
  B. Customers may permanently opt into *Customer-Retention-Option* at time of interconnection. The customers forfeit "E" in the Value Stack but receive non-transferrable RECs (not redeemable for monetary value)
- NYGATS can create RECs retroactively to 1/1/16, but only if the system owner completes the registration process and provides the associated generation data by 5/31/17.
- Questions? Email attributes@nyserda.ny.gov

VDER Order Timeline

03/09/17	Phase 1 VDER Order issued and effective
03/16/17	Utilities report on CDG projects that have already met milestone to lock into a tranche
03/31/17	Utilities report final capacity of MW interconnected/grandfathered under NEM
04/01/17	Utilities amend their tariffs to bring them in line with Phase 1 (extended to April 27)
04/05/17	VDER Technical Conference
05/01/17	Utilities file Implimentation Proposals, including value stack calculations
May 2017	Phase Two procedural conference begins
05/31/17	Deadline to register in NYGATS for retroactive generation from January 1, 2016
Summer 2017	PSC to issue Value Stack Implimentation Order
07/17/17	Deadline to submit 25% construction payment or interconnection agreement to receive Phase 1 NEM. Dependent on Trache 0 capacity
09/01/17	Staff to file Low-Income CDG Proposal
12/31/17	Grandfathered RNM projects must be completed
01/01/20	Phase 1 NEM no longer availible for new Mass Market projects

Implications for PV Contractors

- Mass Market – projects installed before 2020 will receive 20-year NEM. No more annual true-up
- Remote Net Metering
  - Projects that met grandfathering deadline for monetary RNM will still receive it, but must be completed by end of 2017.
  - Other RNM projects will receive NEM if they pay 25% utility upgrade cost or execute SIR within 90 days of order. If not, they will receive value stack
- CDG projects will receive Phase 1 NEM (Tranche 0), or Tranches 1-3 depending on tranche capacity and when they pay for 25% utility upgrade cost or execute SIR. Check available Tranche capacity on DPS website http://www.dps.ny.gov/VDER
- Exact values for value stack components will be set this summer

Glossary

- CDG/Community Distributed Generation/Community Solar/Shared Solar: A PV project that remotely supplies energy to multiple off-takers
- Distributed Energy Resources (DER): Non-centralized energy generators, such as PV
- LSE (Load Serving Entity): One of the electric utility companies
- Net Energy Metering (NEM): Net metering
- NYGATS (New York Generation Attribute Tracking System): Used to track RECs
- MTC (Market Transition Credit): An element of the value stack, available for CDG projects only
- REC: A renewable energy credit. Sometimes redeemable or tradable for monetary value, but not under Phase One order
- **Tier 1:** The Clean Energy Standard mandate on Load Serving Entities to procure RECs
- MCOS: Marginal costs of services

Links and Resources

- PSC order and related documents: http://www.dps.ny.gov/VDER
- REC questions: attributes@nyserda.ny.gov