NEW YORK STATE OF OPPORTUNITY. | NYSERDA

Value Stack Calculator Overview

Joint Utilities Stakeholder Conference

Luke Forster, NY-Sun
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Section 1

Brief Overview of Value Stack

The Value Stack

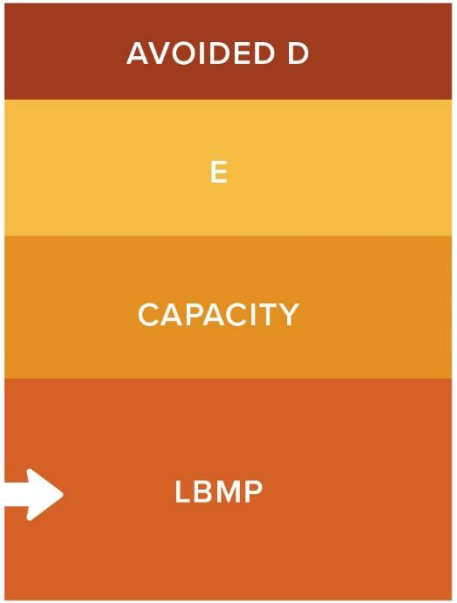
- As part of VDER, the Value Stack is gradually replacing Net Metering.
- Compensates energy producers with monetary credits, not volumetric credits. Customers will see a dollar credit on their bill
- While net metering allowed customers to “bank” kWh credits that are injected to the grid for later use, the value stack converts the credits to dollars.
- The value of a kWh is related to when and where it is generated: greater compensation in congested parts of the electric grid, during periods of high demand

On-site consumption Vs Grid Injections

- Energy that is “injected” or pushed into the distribution grid will be compensated through the value stack
- PV production that is immediately consumed onsite never goes to the grid, so it is not compensated through the value stack
- Example:
  - A PV system produces 1000kWh in a given month. 600kWh are immediately consumed on-site by the customer, and the other 400kWh are sent to the grid
  - On his monthly bill, the customer sees a monetary credit, based on the 400kWh. The customer’s monthly electric consumption is reduced by the 600kWh he consumed on-site: he is simply not billed for those 600kWh

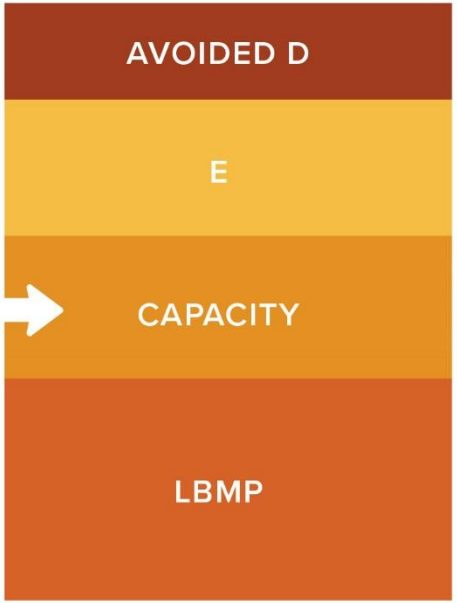
LBMP – Wholesale Cost of Energy

- Day-ahead hourly locational-based marginal pricing (LBMP), inclusive of electrical losses
- Based on NYISO zonal prices
- Fluctuates based on demand for electricity and fuel prices



ICAP - Capacity

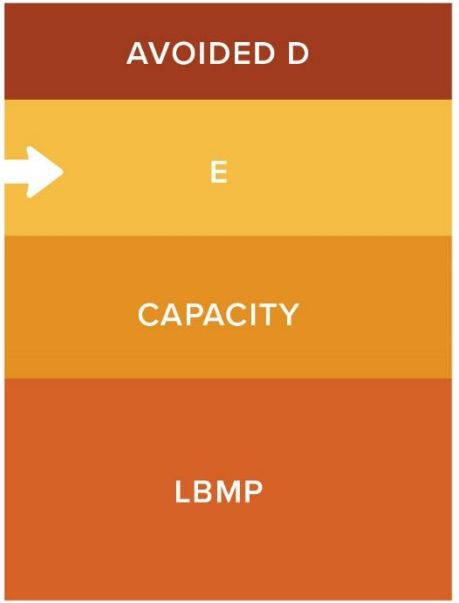
- Compensation per kWh, based on the capacity portion of the utility's full service market supply charges (similar value as NEM)*
- Alternative 1 (default)– spread across all hours of the year
- Alternative 2 – a higher rate, but paid only on injection during 460 summer hours (2-7PM, June-Aug). Projects with storage may want to opt into this option
- Alternative 3 – tied to grid injections during single highest annual hour of peak grid demand



*For intermittent technologies

E- Environmental Value

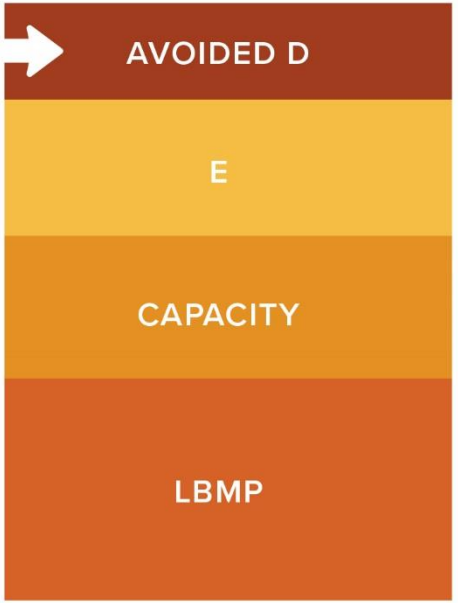
- Environmental compensation is the higher of:
  - The applicable Tier 1 REC price per kWh generated delivered (currently $0.02424 per kWh)
  - The social cost of carbon (SCC) per kWh value minus Regional Greenhouse Gas Initiative
- E value is locked in for 25 year project term when a project executes its SIR contract, or makes 25% payment on interconnection costs



DRV – Demand Reduction Value

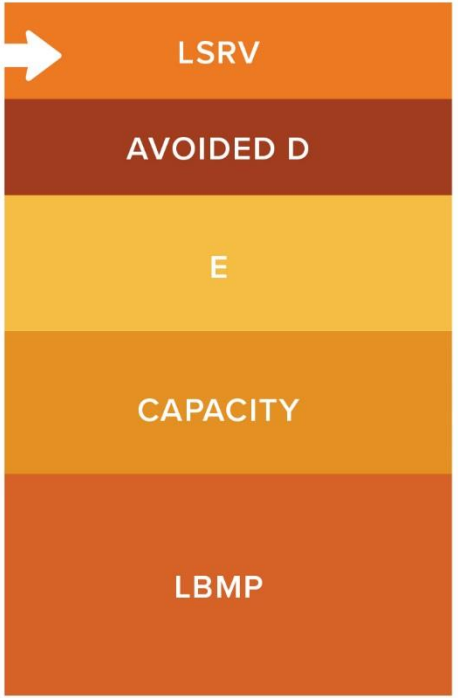
Value of PV System's Reduction of Peak Grid Distribution Demand

- For projects, or portions of projects, that do not receive MTC
- Compensation is tied to PV system grid injections over the grid's 10 highest usage hours per year
- DRV rate is locked for 3 years when a project executes its SIR contract, or makes 25% payment on interconnection costs



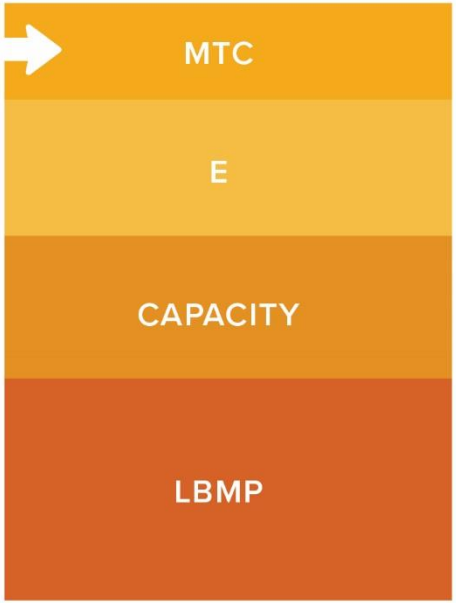
LSRV – Locational Adder

- LSRV is paid for projects located on sections of the grid that are badly in need of DG. Each utility has provided maps and MW limits
- Like DRV, LSRV payments tied to PV system output during year's 10 peak hours of utility demand (modeled in Year 1)
- Paid for first 10 years of project term
- LSRV rate is locked in when project pays 25% of interconnection upgrade costs or executes SIR

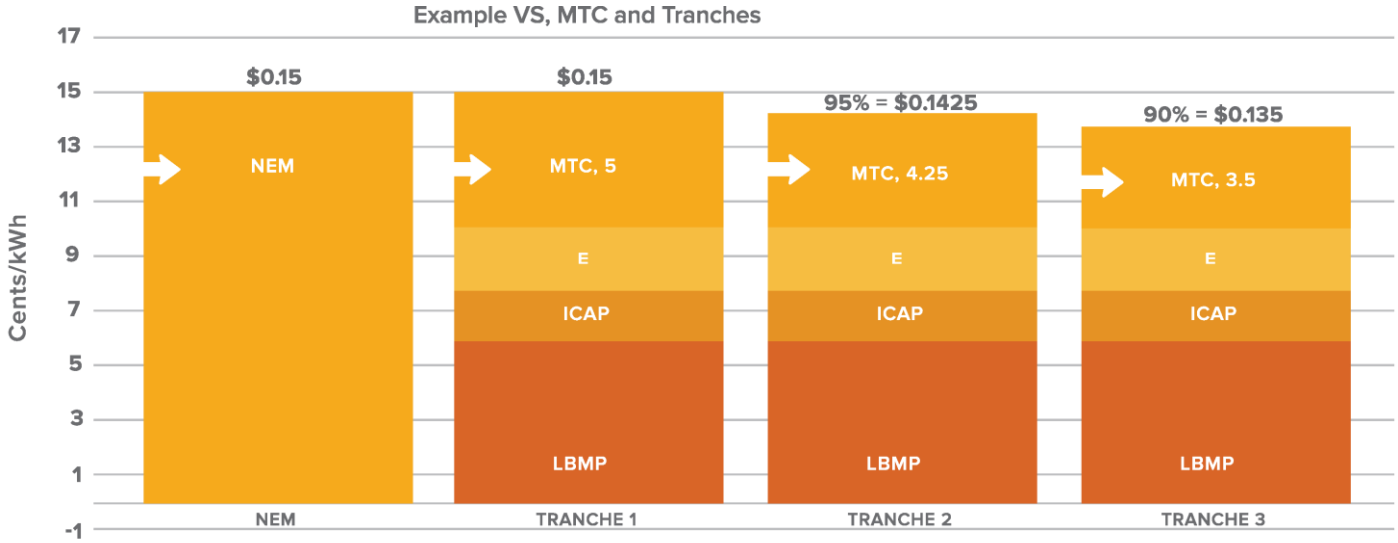


MTC – Market Transition Credit

- For CDG only: MTC is applied to CDG mass market membership proportion
  - Ex., if a project has 70% mass market (nondemand) off-takers and 30% large commercial off-takers, the project will receive MTC on 70% of generation, and DRV on 30% of generation
- MTC is also available for Mass Market and non-CDG projects that opt-in to the Value Stack
- The MTC is fixed and applies to a project's 25-year VDER term
- Projects are locked into MTC tranche when they pay 25% interconnection upgrade costs, or execute SIR



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

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Section 2

The Value Stack Calculator

Purpose of the Calculator

GOAL - To allow PV contractors to easily estimate project compensation under the value stack

- Developed by NY-Sun and E3
- We have received and incorporated feedback from utilities and a number of PV developers
- Available for free at nyserda.ny.gov/vder

The Value Stack Calculator DOES

- Provide a reasonably accurate calculation of the $ value of a PV system's production
- Allow users to input their own forecast data
- Undergo revisions and updates

The Value Stack Calculator DOES NOT

- Provide a 100% perfect guarantee of project revenue. Weather, future energy prices, forecast assumptions, and project-specific project's performance are unknowns
- Calculate project costs, return on investment, etc. This is outside the calculator's scope
    - However, users can port the calculator's outputs into their own financial models

Additional Notes

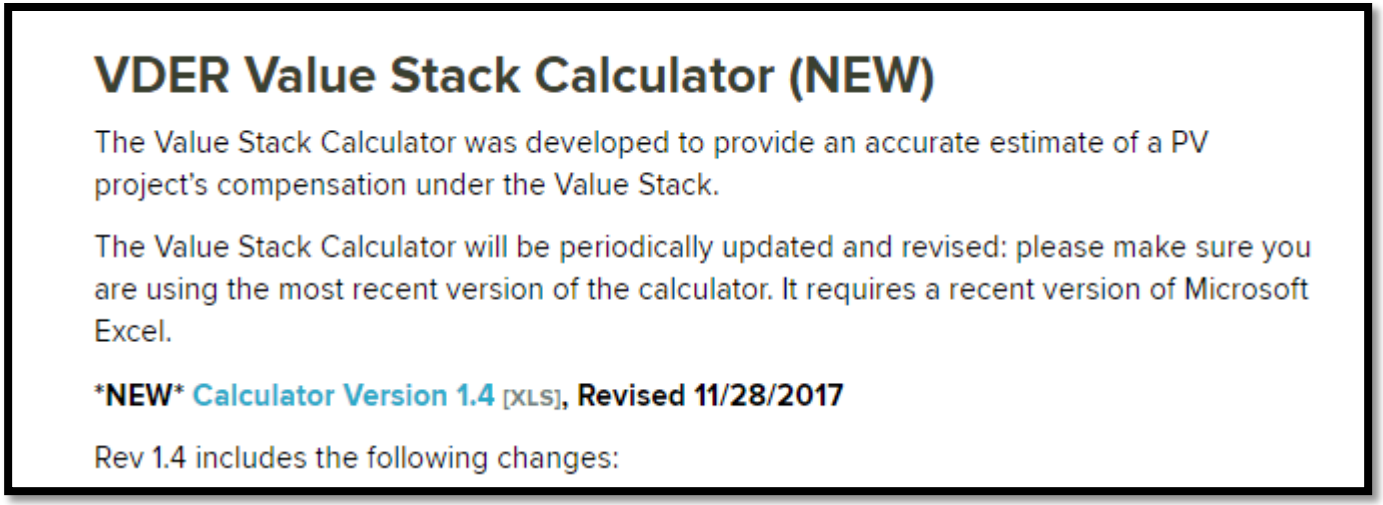
- The Calculator is a large Excel file (33MB). It may take a minute to run, and is too large to attach to most emails
- If you use incorrect/inappropriate inputs, the results will not be accurate
- Questions? VDER@nyserda.ny.gov or contact Luke Forster

Calculator Next Steps

- Continue to make adjustments – developer input
- Keep pace with changing source data
- Finesse storage section
- Expand to include other technologies (anaerobic digesters, small wind, etc)
- Add Long Island when LI adopts VDER

Demo of Calculator

Nyserda.ny.gov/vder



VDER Value Stack Calculator (NEW)

The Value Stack Calculator was developed to provide an accurate estimate of a PV project's compensation under the Value Stack.

The Value Stack Calculator will be periodically updated and revised: please make sure you are using the most recent version of the calculator. It requires a recent version of Microsoft Excel.

NEW **Calculator Version 1.4** [XLS], **Revised 11/28/2017**

Rev 1.4 includes the following changes:

Also VDER FAQs, links, CDG Tranche capacity, etc

Inputs

Solar Project Inputs

Project Category	Community distributed generation
Community distributed generation characteristics	
% of output serving demand-based commercial customers	40%
% of output serving mass market offtakers	60%
Of this 60%, share that were on SC-1 rate	*20%*
versus Share that were on SC-2 rate	*80%*
Tranche	3
Solar characteristics	
Solar generation	
Source for solar generation shape (kWh AC)	Calculated based on inputs below
Nearest location (weather file)	New York City
Azimuth	180° (S)
Mount	Fixed (open rack)
Solar system size (kW DC)	120
Inverter size (kW)	100
Inverter losses (% of DC energy)	4%
System losses (% of DC energy)	14%
On-site loads	
Source for on-site load shape (kWh)	Built-in DOE Commercial Reference Buildings
Building type (for on-site load shape)	Large hotel
Annual electric usage at host site (kWh)	100,000
	Solar project serves 42% of annual on-site load [note that this figure w
Annual solar export degradation rate	0.5%
Solar Local Distribution System Impact	
Weighted average solar output during top 10 DRV hours (kW)	*0.00*
User Override of average output during DRV and LSRV top hours (kW)	

Inputs – PV+Storage

Storage	
Paired with storage?	Yes
Maximum charge in 1 hour (kW)	*80*
Maximum capacity (kWh)	*150*
Maximum discharge in 1 hour (kW)	60
Roundtrip efficiency (%)	80%
Dispatch and charging assumptions	Dispatch for Full Value Stack
~~Average output over utility top 10 hours~~	~~25%~~
Financial Analysis Specifications	
Project start year	2017
Analysis lifetime (years)	25
Annual inflation rate	2%
Project discount rate	10%

Inputs

Compensation Inputs

Utility	Orange & Rockland
LSRV and DRV	
LSRV location?	None
~~CSRP zone~~	~~11am - 3pm~~
~~LSRV rate basis~~	~~Current LSRV rate~~
DRV rate basis	Current DRV rate
Energy value	
Locational-Based Marginal Price (LBMP) Basis	24-month average LBMPs
NYISO zone	G-Hudson
Annual LBMP escalator (real)	2.0%
Capacity value	
Capacity value basis	Current Alternative 1 Rate
Annual ICAP escalation rate (real)	2.0%
Environmental	
REC price ($/MWh)	$24.24
Customer Bill Savings	
Energy rate avoided by on-site consumption of solar ($2017/kWh)	$0.0900
Assumed energy rate annual escalator (real)	2%
Annual demand charges avoided by storage ($ per kW of storage capacity)	$100.00

CALCULATE

Once you have filled all rows above, click the Calculate button to the left (or at the top of this tab)

Summary Outputs

TOTAL PROJECT VALUE ($2017), BY YEAR:

	2017	2018	2019	2020
Compensation for solar exports	$ 17,990	$ 18,080	$ 18,172	$ 18,266
Compensation for storage	$ -	$ -	$ -	$ -
Total Value Stack Compensation ($2017)	**$ 17,990**	**$ 18,080**	**$ 18,172**	**$ 18,266**
Value of kWh consumed on site, at retail rate	$ -	$ -	$ -	$ -
(Retail rate is taken from User Inputs Row 70)				
Total Project Value ($2017)	**$ 17,990**	**$ 18,080**	**$ 18,172**	**$ 18,266**

TOTAL PROJECT VALUE ($2017 / kWh), BY YEAR:

	2017	2018	2019	2020
Solar generation immediately exported (kWh)	162,198	161,387	160,580	159,777
Discharge from storage system (kWh)	-	-	-	-
On-site energy consumption served by solar (kWh)	-	-	-	-
Average compensation for solar, per kWh	$ 0.1109	$ 0.1120	$ 0.1132	$ 0.1143
Average compensation for storage, per kWh	$ -	$ -	$ -	$ -
Average Compensation, $2017 per kWh	**$ 0.1109**	**$ 0.1120**	**$ 0.1132**	**$ 0.1143**
Retail rate for each kWh consumed on site	-	-	-	-
(Retail rate is taken from User Inputs Row 60)				
Average Project Value, $2017 per kWh	**$ 0.1109**	**$ 0.1120**	**$ 0.1132**	**$ 0.1143**

Detailed Outputs

MONTHLY COMPENSATION FOR EXPORTS - SOLAR:

		Jan-17	Feb-17	Mar-17
Exports				
Solar generation immediately exported by solar system (kWh)		9,948	11,157	13,336
Value stack compensation from solar - Total project value ($2017)				
Energy value	$	518	$ 884	$ 535
Capacity value (Current Alternative 1 Rate selected)	$	83	$ 93	$ 111
Environmental value	$	241	$ 270	$ 323
Demand reduction value	$	6	$ 6	$ 6
Locational system relief value	$	-	$ -	$ -
MTC	$	307	$ 344	$ 411
Total Value Stack compensation from solar generation immediately exported	$	1,155	$ 1,597	$ 1,386
Average Value Stack compensation from solar - Per kWh exported ($2017/kWh)				
Energy value	$	0.0521	$ 0.0792	$ 0.0401
Capacity value (Current Alternative 1 Rate selected)	$	0.0083	$ 0.0083	$ 0.0083
Environmental value	$	0.0242	$ 0.0242	$ 0.0242
Demand reduction value	$	0.0006	$ 0.0005	$ 0.0004
Locational system relief value	$	-	$ -	$ -
MTC	$	0.0309	$ 0.0309	$ 0.0309
Average Value Stack compensation, per kWh immediately exported	$	0.1161	$ 0.1431	$ 0.1039

Additional Resources

1. See the Documentation tab on the Calculator
2. VDER resources at nyserda.ny.gov/vder
3. Questions? Email vder@nyserda.ny.gov