NYC Installer Workshop

March 18th, 2019
Con Edison
Agenda

- Overview of progress to date
- Con Edison Grid 101
- ConnectDER
- Con Edison Interconnection Process
- Rates & Billing
- Key Takeaways and Resources
2018 Overview
Added 5,842 new DG installations
Solar accounted for 98% of installs
Uptick in RNM and CDG applications

DG Installations (as of 12/31/18)

<table>
<thead>
<tr>
<th>Units: # of installs</th>
<th>Con Ed Territory</th>
<th>NYC Only</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2018 only</td>
<td>Total</td>
</tr>
<tr>
<td>Battery Storage</td>
<td>12</td>
<td>30</td>
</tr>
<tr>
<td>Fuel Cells</td>
<td>1</td>
<td>31</td>
</tr>
<tr>
<td>CHP</td>
<td>20</td>
<td>301</td>
</tr>
<tr>
<td>Solar</td>
<td>5,809</td>
<td>23,588</td>
</tr>
<tr>
<td>TOTAL</td>
<td>5,842</td>
<td>23,956</td>
</tr>
</tbody>
</table>
Interconnection
DG Capacity Additions

- Added 55 MW new capacity
- Solar accounted for 50% of capacity
- Solar capacity is coming in on forecast – 2019 projected to reach 267 MW capacity

DG Capacity Installed (as of 12/31/18)

<table>
<thead>
<tr>
<th>Units: MW</th>
<th>Con Ed Territory</th>
<th>NYC Only</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2018 only</td>
<td>Total</td>
</tr>
<tr>
<td>Battery Storage</td>
<td>0.7</td>
<td>2.7</td>
</tr>
<tr>
<td>Fuel Cells</td>
<td>0.2</td>
<td>12.7</td>
</tr>
<tr>
<td>CHP</td>
<td>4.7</td>
<td>181</td>
</tr>
<tr>
<td>Solar</td>
<td>50</td>
<td>228</td>
</tr>
<tr>
<td>TOTAL</td>
<td>55</td>
<td>425</td>
</tr>
</tbody>
</table>
Integrating DERs into the Underground Network System
Purpose of Network Protectors (NWP)

Fault Isolation

Area Substation

Substation Breakers

Network Transformer

NWP

120/208 Volt Grid

13 kV Feeder
Network Protector Considerations
Solar Export w/ Low Network Load

Area Substation

Substation Breakers

Network Transformer

NWP

PV Customer

DG Customer

120/208 Volt Grid

13 kV Feeder
Network Protector Considerations
Isolated/Spot Networks

120/208 Volt Grid
13 kV Feeder

Area Substation
Substation Breakers

Network Transformer
NWP

PV Customer
DG Customer
DG Implications

Network Grid Service

• Export capability dependent upon multiple factors
  – PV size vs service capacity
  – Network loading
  – Nearby transformer loading
  – Network Protector operations

• Upgrades to service may require street work
  – Localized underground
  – Increased customer cost & timeline
DG Export Solutions for Network System

• Adaptive Trip (AT) or Insensitive (I):
  – Application: Network grid service
  – Description: Modifications to nearby network protectors to make operation more conducive to reverse power flow from solar export
  – Typical Cost: Up to $20K

• Communications Aided Tripping (CAT):
  – Application: Isolated/Spot Network
  – Description: Modifications to impacted network protectors and communication to customer inverters.
  – Typical Cost: $70-100K
ConnectDER
Smart ConnectDER

**Device**

**Description**
- DER meter collar for easy interconnection of all residential scale DER (<15kW)
- Integrated circuit breaker can be customized to each location – eliminates need for separate 89L
- No line side tap, no penetration into home, no panel upgrades.

**Benefits**
- Reduces DER installation time & lowers balance of system cost for Customers
- Removes risk from Installers, speeds up PTO by early net meter installation.
- Utility gains data from PV production for planning/operations/billing needs
- Easy to add battery to existing PV site.
- Sized for most residential EV Chargers.

**Ecosystem**

- Solar panels
- Inverter
- ConnectDER
- Power grid
- ConnectDER Cloud™ Services
- Cellular
- AMI
- Home
ConnectDER Roadmap

• Con Edison Pilot in Staten Island
  – 32 units installed by two pilot Installers
  – Installed first AMI meters in territory
  – Customers saved $500 on average
  – Fully funded by Con Edison R&D

• NYISO Pilot Expansion
  – Install on 200 additional homes on SI
  – Started June 2018 - 59 installations so far
  – Testing residential solar effect at NYISO
  – No cost to installer/customer to participate

• ConnectDER Innovation Initiative
  – Procurement of 500 units for all boroughs
  – Launching the initiative today!
  – Looking to expand to non-PV locations
  – Continue to provide units at no cost

• Looking forward…
  – 2019 – Integrate process into PowerClerk
  – Q1/2 2019 – Rollout units across territory
  – Look for more opportunities to install units
  – Incorporate data into grid planning
ConnectDER will help us understand SI duck curves.

91 Units installed as of 3/15/19
Interconnection Process
Interconnection “Trailer”

https://bcove.video/2yzYBbr
Prior to First Interconnection Request

- **Read the New York State Standard Interconnection Requirements (SIR)**
  - Application Process and Timelines
  - Technical and Operating Requirements
  - Required Contracts and Forms

- **Read Rider R**
  - Net Metering and Value Stack Tariff

- Register with Power Clerk
  - How you submit applications

- Contact us with any questions – dgexpert@coned.com
How You Submit: PowerClerk

Register for Small DG and/or Large DG program(s)

- Projects up to 50 kW
  conedsmalldg.powerclerk.com

- Projects 50 kW to 5 MW
  conedlargedg.powerclerk.com
Beginning an Application

* Indicates required field

? Indicates help, e.g. a link to a template
Application Form G: Rider R or Standby Service

- Latest version available in Con Ed Electric Tariff, Leaf 382
- Enhancement: **electronically complete Form G** to avoid errors that may result in delays in the interconnection process or billing
Enhancement: Rate Determination

• Based on the information entered, you will be able to view **Preliminary Rate Information** before submitting the application.

• Once the Design has been approved for Value Stack projects, the applicant will receive a Final Value Stack Summary document from Con Edison.

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**Preliminary Rate Information**

Based on the information you entered in this application, this project is eligible for Value Stack compensation. The information entered on this application has not yet been validated or tested, and therefore this eligibility is subject to change.

Installed Capacity Value: Based on the Distributed Generation Technology, this project’s default Installed Capacity (ICAP) rate would be Alternative 1. If you would like to elect Alternative 2 or 3, please fill out the "Installed Capacity Alternative Change Form - Optional" that will be available once the application is accepted. You are able to make this change at any time, but cannot go back to Alternative 1.

Environmental Value: By default, all Value Stack Customers will automatically transfer their Renewable Energy Credits (REC) from NYSERDA to Con Edison in order to receive the environmental credit exposure of the NYSERDA Value Stack. This is in line with the industrialized RE Option.
## Process for Energy Storage Systems (ESS)

<table>
<thead>
<tr>
<th>Technology</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>PV + Storage as Back-up (not grid parallel)</td>
<td>Emergency Back-up generator application in Project Center + Solar application in PowerClerk</td>
</tr>
<tr>
<td>Stand-Alone Storage in Parallel with Grid</td>
<td>Battery Energy Storage application</td>
</tr>
<tr>
<td>Hybrid System with ESS: DG + ESS</td>
<td>1 Hybrid Application combining DG and Energy Storage</td>
</tr>
<tr>
<td>Hybrid Systems without ESS: DG + DG</td>
<td>2 separate DG applications</td>
</tr>
</tbody>
</table>

### Where to start in PowerClerk

- New Interconnection Application >50kW
- New - All Other Requests, click here!

- New Interconnection Application >50kW
- New - All Other Requests, click here!

- New Interconnection Application >50kW
- X2 Other Requests, click here!
Application Forms for Energy Storage Systems (ESS): Form G

“Application for Rider R or Standby Service and/or Buy-Back Service”

- Request one type of service and compensation:
  - [ ] Grand Fathered Net Metering (Rider R)
  - [ ] Phase One Net Metering (Rider R)
  - [ ] Value Stack (Rider R)
  - [ ] Standby Service
  - [ ] Standby Service for Station Use
  - [ ] Buy-back Service (SC 11) with Payment for Energy
  - [ ] Buy-back Service (SC 11) with Value Stack compensation under Rider R
  - [ ] Standby Service and Buy-back Service (SC 11) with Payment for Energy
  - [ ] Standby Service and Buy-back Service (SC 11) with Value Stack compensation under Rider R

- Enter key information related to Standby and Buy-Back provisions
- Complete electronically* and then sign and attach in PowerClerk as part of initial application submittal

*Not available for Hybrid Application as of 3/18/2019
Application Forms for Energy Storage Systems (ESS): SIR Appendix K

“Energy Storage System (ESS) Application Requirements / System Operating Characteristics / Market Participation” (link)

• Enter all details on specs and planned operating parameters, for example:
  – How and when will it charge and discharge?
  – What is the Protection & Control scheme?
  – Will the system be compensated by the NYISO or a utility tariff?

• Complete electronically in PowerClerk as part of initial application submittal
Beginning a Hybrid DG + ESS Application

1. From the Home Screen, select “New – All Other Requests, click here!”

2. Select “Apply to interconnect a Hybrid System, i.e. a DG system that includes an Energy Storage System (ESS)” and click Submit. You will see new ‘LDG-####’


4. In the Available Forms section of the project screen, click Begin on the “Hybrid Technology Interconnection Application >50kW”

5. Complete this form, entering DG system info and ESS info on separate pages
## Configuration Options for Hybrid Applications (DG+ESS)

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td>ESS Exclusively Charged by DG</td>
</tr>
<tr>
<td></td>
<td>• ESS exclusively charged by eligible DG</td>
</tr>
<tr>
<td></td>
<td>• All export considered renewable</td>
</tr>
<tr>
<td></td>
<td>• No netting out of “brown” electrons</td>
</tr>
</tbody>
</table>

| **B**   | ESS Cannot Export to Grid                                                   |
|         | • ESS can charge from DG or from grid                                       |
|         | • All export considered renewable because ESS cannot export to grid, only   |
|         |   serves on-site load                                                       |
|         | • System controls or minimum import relay required                           |
|         | • No netting out of “brown” electrons                                       |

| **C, D**| Any Charging and Exporting Configuration with Netting                       |
|         | • ESS can charge from DG or from grid                                       |
|         | • Net out “brown” electrons                                                 |
|         | • Import to charge ESS is netted out from overall export to determine       |
|         |   renewable export                                                          |
|         | • Import to account overall is netted out from overall export to determine  |
|         |   renewable export – intended for Hybrid Systems without load (e.g. CDG)    |

*Note: Options A-D are defined by the NYS PSC in the 12/13/2018 “Order Implementing Hybrid Energy Storage Systems” ([link](#)), with effective date 2/1/2019*
Applicant Chooses Option on Appendix K

Hybrid Technology Interconnection Application

Contractor Information  DG System Information  ESS Information  Preliminary Rate Info  Documentation & Submittal

APPENDIX K: Energy Storage System (ESS) Application Requirements / System Operating Characteristics / Market Participation

READ: Please enter info for the ESS on this page. DG system information should be entered on the previous page. If equipment such as the inverter is for both the DG and the ESS, please enter that information on the previous page.

Application Requirements

a. & b. have been completed based on your previous entries

Where will the ESS be located? *

- Indoor
- Outdoor

c. Indicate the type of Energy Storage (ES) technology to be used *

Select...

d. Indicate how the ESS will be charged and/or act as a load *

- Charging from DG only
- Charging from electrical grid only
- Unrestricted charging from Electrical Grid and/or DG system
- Restricted charging from Electrical Grid and/or DG system

Please select your Hybrid configuration Option *

- Hybrid Option A - ESS is charged exclusively by the DG
- Hybrid Option B - ESS will not export to the grid, only DG will.
- Hybrid Option C - ESS may charge/discharge unrestricted, but grid consumption by ESS is netted out of grid exports
- Hybrid Option D - ESS may charge/discharge unrestricted, but any consumption on the account is netted out of grid exports
- N/A - not Valued Stack
## RNM and Community DG Conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Remote Net Metered (RNM)</th>
<th>Community Distributed Generation (CDG)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Host Rules</strong></td>
<td>Customer Type / Service Class</td>
<td>Any except residential (SC1)</td>
</tr>
<tr>
<td></td>
<td>DER Technology</td>
<td>Farm waste, PV, wind, micro-hydro, fuel cell</td>
</tr>
<tr>
<td><strong>Satellite Rules</strong></td>
<td>Customer Type / Service Class</td>
<td>Any</td>
</tr>
<tr>
<td></td>
<td>Account Ownership</td>
<td>Accounts owned in the same name as Host</td>
</tr>
<tr>
<td></td>
<td>Geographic and NYISO zone</td>
<td>Any NYISO zone served by the same utility as the Host</td>
</tr>
<tr>
<td></td>
<td>Minimum number of satellites</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Minimum yearly offtake</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Can a satellite also be a host?</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Can a satellite have multiple hosts?</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Can a satellite also be a net-metered customer-generator?</td>
<td>Yes, but not on Buy-back (SC11)</td>
</tr>
<tr>
<td><strong>Forms</strong></td>
<td>Application Forms</td>
<td>Form G</td>
</tr>
</tbody>
</table>
Community DG: Process

• Read the Community DG Procedural Requirements for Value Stack before starting an application

• Follow the SIR process facilitated by PowerClerk
  - Select “Community DG”
  - If new account for export only, apply for New Service via Project Center
  - Submit CDG Appendix A and B with interconnection application, instead of Form G
  - Submit CDG Appendix C spreadsheet “Initial Allocation Request” through PowerClerk (preferred) or via email to cdgdevelopers@coned.com:
    - At least 60 calendar days before commencing CDG program
    - If email, include case number (MC-XXXXXX) in subject line
Recent Improvement: Payment Summary Form

• Payment Summary form becomes available in the “Available Forms” section once a CESIR payment is made.

• Displays payments made and payments due for the CESIR study and interconnection upgrade costs.
Best Practices for Applications

✓ Have your Customer’s Account Number and Meter Number
  • Con Edison Meter Number is 7-digits; Account Number is 14 digits
  • For Remote Net Metered/CDG cases, use Host Account
  • For New Service, enter MC number for Project Center Service case

✓ Select the appropriate type of metering, e.g. “Net Metering” = Rider R (NEM or Value Stack)

✓ Complete forms electronically in PowerClerk whenever possible (Form G, Appendix K)

✓ Find the latest versions of forms in the Con Ed Electric Tariff

✓ Submit the proper application for combinations of different technologies on same premise:
  • One Hybrid Interconnection case for Hybrid projects  with DG and ESS
  • Separate cases for non-ESS projects (DG + DG)
What Happens After You Submit Your Interconnection Application

- Customer and contractor receive acknowledgment letters and a case number: MC-xxxxxx
- Case is assigned to a Customer Project Manager (CPM) in Energy Services
- Up to 50kW solar projects will follow expedited process (no engineering review, self-certification)
- 50kW - 5MW solar projects will follow SIR process including preliminary screens and engineering reviews
Energy Services Contacts

- You can reach Energy Services from 7 a.m. to 3:30 p.m. Mon-Fri
- If no response from your CPM within 2 business days, contact their Manager:

<table>
<thead>
<tr>
<th>Employee</th>
<th>Manager</th>
<th>Phone</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chris Mattina</td>
<td>Rob Klopf</td>
<td>212-460-3223</td>
<td><a href="mailto:klopf@coned.com">klopf@coned.com</a></td>
</tr>
<tr>
<td>Shashi Ramjattan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kevin Dekeris</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mike Brown</td>
<td>Richard Vitolo</td>
<td>914-925-6962</td>
<td><a href="mailto:vitolor@coned.com">vitolor@coned.com</a></td>
</tr>
<tr>
<td>Mike Tucci</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seretse Henry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gerald Thompson</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jack Chen</td>
<td>Zhen Shao</td>
<td>212-460-4230</td>
<td><a href="mailto:shaoz@coned.com">shaoz@coned.com</a></td>
</tr>
<tr>
<td>Antoine Adams</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peter Aufdemorte</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phyllis DelRe</td>
<td>Tracy Downing</td>
<td>646-341-2906</td>
<td><a href="mailto:downingt@coned.com">downingt@coned.com</a></td>
</tr>
</tbody>
</table>

If still no response within 2 business days, contact the Department Manager Directly:

Tom McAndrews
mcandrewst@coned.com
212-460-4490

- For emails, include the Job Number (MC-xxxxxxx) in the subject and the project address, your CPM’s name, and your contact information in the email body.

Note: All this information is also available on our website.
Rates & Billing
Common Service Classifications

Mass Market

SC 1: Residential/Religious

- Energy only (kWh)

SC 2: General – Small

- Energy and Fixed Demand Charge (kWh)
- Only for customers with demand < 10kW

Demand Billed

SC 8: Multiple Dwelling – Redistribution

- Energy and Demand Charges (kWh & kW)
- Highest 30 minutes of demand sets demand charge for entire month

SC 9: General – Large

## Compensation for DERs: Outcome of Value of DER Order

<table>
<thead>
<tr>
<th>Mass Market*</th>
<th>Demand Billed</th>
</tr>
</thead>
</table>
| **Systems in operation as of March 9, 2017** | Traditional **NEM** for life of system (no change)  
Can opt-in to **Value Stack** |
| **New residential & small commercial systems** installed through sooner of January 1, 2020 or Phase 2 Order | **Phase One NEM** for 20 years |
| **New Remote Net Metering (RNM) installations** | **Value Stack** without transition credit for 25 years |
| **New Community DG (CDG) projects** | Tranche 1-3: **Value Stack** for 25 years with transition credit (MTC) for mass market subscribers (declines by tranche)  
(Tranche 0: **Phase One NEM** for 20 years) |
| **New large commercial and industrial installations** | **Value Stack** without transition credit for 25 years |

* SC 1 accounts cannot be RNM or CDG hosts
VDER Value Stack Project Interconnection Milestones

Initial Application
Preliminary Rate Information displayed in PowerClerk

Design Approved – Pending Construction *
Final Value Stack Summary communication sent to developer; value stack rates and eligibility locked-in

Start of first billing cycle following Final Acceptance Value Stack credits start accruing

Application Submitted → Application Accepted → Preliminary Screen → CESIR Study → Pending Design Approval → Design Approved → Construction Complete → Verification Test → PTO

← Able to opt-out of Environmental Value →

← Able to change Installed Capacity Value Alternative →

* Occurs once 25% of interconnection upgrade costs are paid or SIR contract is executed if no payment is required
Demand Customer Value Stack Bill

Monthly Bill

Your account number: [Redacted]
Service delivered to: [Redacted]
Your electric rate; EL9 General Large
Next billing date: Wednesday, March 20, 2018

Your billing summary as of Feb 20, 2018
Remaining balance: None
Your new charges - details start on page 2
Billing period: Nov 17, 2017 to Dec 20, 2017
Electricity charges - for 33 days: $475.04
Adjustments: -$365.37
Total new charges: $109.67
Total amount due: $109.67
Payment is due upon receipt of this bill. To avoid a late payment charge of 1.5%, please pay the total amount due by Mar 13, 2018.

VDER Statement

Illustrative
Value Stack for Stand-Alone Storage

• Modified Value Stack

<table>
<thead>
<tr>
<th>Energy (LBMP)</th>
<th>Eligible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity (ICAP)</td>
<td>Eligible for Alternative 3</td>
</tr>
<tr>
<td>Environmental (REC)</td>
<td>Not Eligible</td>
</tr>
<tr>
<td>Demand Reduction Value (DRV)</td>
<td>Eligible</td>
</tr>
<tr>
<td>Market Transition Credit (MTC)</td>
<td>Not Eligible</td>
</tr>
<tr>
<td>Locational System Relief Value (LSRV)</td>
<td>Eligibility based on location</td>
</tr>
</tbody>
</table>

• Mandatory Hourly Pricing (MHP): to be eligible for Value Stack accounts must go on MHP for import (unless storage capacity < 115% of demand)
Standby Service & Standby Rates

- Standby Service is provided to backup and/or supplement the energy ordinarily generated by a generating facility on customer premises
- Customers receiving Standby Service are billed under Standby Service Rates unless exempt
- If exempt under Designated Technology or Targeted Exemptions, customers are billed under their corresponding standard rate
- As of 2017, Standby Service customers are eligible for Rider Q (Standby Pilot Rate)

**Standby Rate Components:**

- **Contract Demand**: based on the customer’s maximum potential demand on Con Edison’s system
- **As-Used Demand charges**: based on the customer’s maximum actual demand for each weekday from 8am-10pm.
- **Other misc. charges**: Customer charges, metering charges, associated MACs, SBC, and taxes
Electric Buy-Back (SC-11)

• Customer pays a customer charge and a contract demand charge based the generating facility’s ability to deliver energy to the grid

• As an alternative to Value Stack, customers may sell energy to Con Edison:
  – The payment rate for energy will be based on the applicable wholesale rate, which is the Locational Based Marginal Price (LBMP) set by the New York Independent System Operator (NYISO)
  – Customers delivering energy at the secondary distribution level will have the LBMP increased by a factor of 1.066 to account for line losses
Key Takeaways
Key Takeaways

• Con Edison is actively innovating to improve interconnection
  – Engineering solutions to allow export on a network grid
  – ConnectDER
  – Software enhancements: PowerClerk, Hosting Capacity Maps
• Follow the Best Practices for interconnection on Slide 32
• Review Energy Storage VDER compensation and Standby charges
• Review Hybrid options and compensation
Con Edison Resources

• Con Edison DG website: www.coned.com/dg
• Con Edison solar website: www.coned.com/solar
• Con Edison Guides: www.coned.com/privategenerationguides
• Con Edison Electric Tariff
• Billing questions
  – Residential customers: netmetering@coned.com or 212-780-6600
  – Large/commercial customers: dl-CCGNet-metering@coned.com
• Technical, process, or rate questions: dgexpert@coned.com
Open Discussion

Thank you!

dgexpert@coned.com
Navigating Resources on Con Edison website
Using Private Generation Energy Sources

www.coned.com/dg
Applying for Private Generation

• Interconnection Forms and Documentation
  – SIR Appendix F forms
  – Power Clerk web portal links
  – Customer Authorization
  – Contractor Certification for Verification Test

• Service and Rate Application Forms
  – Form G
  – CDG Procedural Requirements
  – Rider H
www.coned.com/privategenerationguides

**General Guides**

**Energy Storage Guide:** For customers considering installing or upgrading an Energy Storage System up to 5 MW.

**Fuel Cell Guide** for customers interconnecting fuel cell less than 5MW.

**Solar Photovoltaics Guide:** For customers who are considering installing or upgrading photovoltaic (solar) power generators less than 5 MW.
Green Button Download My Data

Customer tool to download energy use into a spreadsheet

Interconnection Process
Under 50kW: Project Review

- Submit application via PowerClerk
- Con Ed reviews and approves design
  - Fast Track: automatic approval for projects <25 kW for most developers
- Complete your construction
- Test inverter
- Submit self-certification form via PowerClerk
  - Available on our [website](#)
  - Signals to CPM that ready for final review and net meter order
- Con Ed issues formal letter of Final Acceptance
50 kW to 5 MW: CESIR study

- Upon customer choice and payment for study

- Distribution Engineering
  - Technical review of application
  - Three-line in-depth review
  - Review of PV output vs. load
  - Historical Usage
  - Transformer loading
  - Meets/does not meet NYS SIR
  - 60 business days (up to 2MW)
  - 80 business days (2MW – 5MW)
Key Components of Three Line Drawing

- Equipment Locations
- Service Characteristic Drawing Details
- Include any existing DG on the site

Con Edison has a System Diagram checklist for baseline requirements for the majority of cases.
Equipment Locations and Labeling

Include locations of:

- 89L
- Meter
- Inverters
Include:
- customer name and service address
- account and meter number
- revision number
- date of last revision.
DG System Drawing Details

Include:

- DG type clearly labeled
- AC kW nameplate clearly labeled
- 89L clearly labeled
- Make/model of inverter clearly labeled
Service Characteristics

Include:

- Service type and configuration
- Existing equipment
- Label grounding
- Show any existing DG
Post-CESIR Steps

• DE will present options to customer for interconnection with cost
• Customer chooses one option and pays for upgrades (if necessary)
• Con Edison issues Appendix A
  – Project advances to Design Approved – Pending Construction
  – Developer receives Value Stack Summary document with all locked-in Value Stack eligibility and rates
• Construction
NEM and VDER Value Stack
## Tariff updates

<table>
<thead>
<tr>
<th>Tariff</th>
<th>Update</th>
</tr>
</thead>
</table>
| Rider R (NEM & Value Stack) | • Interzonal crediting  
  • CDG any tech-type host  
  • Tier-1 technologies  
  • Standalone Storage (including MHP requirements)  
  • Standby |
| Rider T (CSRP/DLRP)     | • No DR reservation or performance credit for Value Stack customers |
| Rider M (Hourly pricing)| • Include provisions for storage customers size >115% demand  
  • Include application of MHP to SC 1 & 2 w/Storage |
| GR25 Form G             | • Expanded technologies  
  • Remove customer-type & tech-type limits for Value Stack  
  • Standby |
| SC 11                   | • Tier-1 technologies & standalone storage |
| GR 20 Standby           | 64 |
Grandfathered NEM and Phase One NEM: Residential energy-only (SC1)

- **Rider R** – Section G
- When Export > Import for the month:
  - Monthly energy (kwh) charges are zero.
  - Customer pays Basic Service Charge only.
  - Excess energy (kwh) is rolled over to the next month.
- Annual Reconciliation – Grandfathered NEM only
  - Customer can choose which month they want
  - Unused energy credited kwh are converted to $ at a rate based on Con Edison’s avoided cost.
  - If < $100, credit is applied to the bill
  - If ≥ $100, Con Edison will issue a check
- Phase One NEM has 20-year term from in-service date, then transition to the current structure in place at that time
- Customer will always get a bill
**Grandfathered NEM and Phase One NEM:**

**Small commercial energy-only (SC2)**

- When Export > Import for the month:
  - Monthly energy (kwh) charges are zero
  - Customer pays Basic Service Charge only
  - Excess energy (kwh) is rolled over to the next month

- No Annual Reconciliation for SC2
  - Excess energy (kwh) credits are applied to future usage

- Phase One NEM has 20-year term from in-service date, then transition to the current structure in place at that time

- SC2 accounts qualify for Remote Net Metering host sites
  - Receive Value Stack credits if RNM
SC-1 Net Metering Bills

conEdison

Your account number: [Redacted]
Service delivered to: [Redacted]
Your electric rate: EL1 Residential or Religious - Net Metering
Next meter reading date: Monday, Mar 21, 2016

Your billing summary as of Feb 22, 2016

Your previous charges and payments
Total charges from your last bill $145.07
Payments through Feb 18, thank you -$145.07
Remaining balance None

Your new charges - details start on page 2
Billing period: Jan 20, 2016 to Feb 19, 2016
Electricity charges - for 30 days $18.62
Total new charges $18.62
Total amount due $18.62

Direct Payment Plan - The amount of $18.62 will be automatically deducted from your bank on Mar 3, 2016.

Message Center

_bill information for the year_ Last year, Con Ed issued Electric bills for your account totaling $531.05.

Visit My Energy Calculator Visit www.coned.com/customer/central and select My Energy Calculator. Then, use the calculators to estimate your savings when you “go green” and conserve energy.

Contact us 24 hours a day, 7 days a week

Visit conEd.com
For payments, visit conEd.com or call 1-888-925-5016

Con Edision
Cooper Station
P.O. Box 138
New York, NY 10276-0138

For other information, call 1-212-732-6800
email netmetering.coned.com

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SC-1 Net Metering Bills

Your electricity charges

These charges are for the electricity you used (supply) and getting that electricity to you (delivery). Rates are based on a 30 day period. When your billing period is more or less than 30 days, we prorate your bill accordingly.

Electricity you used during this 30 day billing period from Jan 20, 2016 to Feb 19, 2016
Rate: EL1 Residential or Religious - Net Metering Meter#
We measure your electricity by how many kilowatt hours (kWh) you use.
One kWh will light a 100 watt bulb for 10 hours.
Feb 19, 16 actual reading 3993
Jan 20, 16 actual reading -4057
Your electricity use -64 kWh
kWh Billed 0 kWh
For details, see Your Net Meter Summary in this bill.

Customers will see actual meter readings
SC-1 Net Metering Bills

Your Net Meter Summary

<table>
<thead>
<tr>
<th>Billing period</th>
<th>Your electricity use</th>
<th>Cumulative net meter energy credit</th>
<th>kWh billed</th>
</tr>
</thead>
<tbody>
<tr>
<td>JAN 20, 2016 - FEB 19, 2016</td>
<td>-64</td>
<td>-64</td>
<td>0</td>
</tr>
</tbody>
</table>

Credit Carried Forward to Next Period

-64 kWh

Your electricity use
The electricity supplied to you by Con Edison or the electricity you generated back into the grid during this period. A negative number indicates a net meter energy credit for the period.

Cumulative net meter energy credit
-64 kWh
The sum of your net meter energy credit(s) you earned in the current billing period and any credits from prior billing periods.

kWh billed
0 kWh
The amount of kWh you were billed for in this billing period. If you generated more electricity than you consumed in this current period and/or have a cumulative net meter energy credit from prior period(s), that credit has been applied towards your kWh billed.

For more information on Net Metering please visit us at:
www.coned.com/dg/Net_Metering_Billing_FAQ.asp

Automated net metering summary page
Where customers will see information on annual cash out
# Historical per-kWh net metering rates

<table>
<thead>
<tr>
<th>ZONE J</th>
<th>ZONE H &amp; I</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC1</td>
<td>SC2</td>
</tr>
<tr>
<td>Feb-18</td>
<td>$0.2251</td>
</tr>
<tr>
<td>Jan-18</td>
<td>$0.1723</td>
</tr>
<tr>
<td>Dec-17</td>
<td>$0.1974</td>
</tr>
<tr>
<td>Nov-17</td>
<td>$0.1918</td>
</tr>
<tr>
<td>Oct-17</td>
<td>$0.2021</td>
</tr>
<tr>
<td>Sep-17</td>
<td>$0.2057</td>
</tr>
<tr>
<td>Aug-17</td>
<td>$0.2033</td>
</tr>
<tr>
<td>July-17</td>
<td>$0.2063</td>
</tr>
<tr>
<td>June-17</td>
<td>$0.2111</td>
</tr>
<tr>
<td>May-17</td>
<td>$0.2174</td>
</tr>
<tr>
<td>Apr-17</td>
<td>$0.1930</td>
</tr>
<tr>
<td>Mar-17</td>
<td>$0.2038</td>
</tr>
<tr>
<td>12-Mo Avg</td>
<td>$0.2025</td>
</tr>
</tbody>
</table>
What is the VDER Value Stack?

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
<th>Eligibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Value</td>
<td>Volumetric credit based on Day Ahead Hourly LBMP</td>
<td>All projects</td>
</tr>
<tr>
<td>Installed Capacity Value</td>
<td>Volumetric credit applied to production in all hours with option for higher credit in summer on-peak periods</td>
<td>All projects, solar gets Alternative 1</td>
</tr>
<tr>
<td>Environmental Value</td>
<td>Volumetric credit valued at NYSERDA REC or cost of carbon</td>
<td>Renewable technologies</td>
</tr>
<tr>
<td>Distribution Relief Value (DRV)</td>
<td>Monetary credit for performance during 10 peak distribution hours of previous year valued at Marginal Cost of Service (MCOS)</td>
<td>Applicable to customers not eligible for MTC (already built in to MTC)</td>
</tr>
<tr>
<td>Market Transition Credit (MTC)</td>
<td>Volumetric credit for mass market accounts to bring compensation close to NEM Declines for new projects as tranches fill</td>
<td>For mass market subscribers (SC1 &amp; SC2) to CDG projects with solar, micro- hydro, wind, and fuel cell</td>
</tr>
<tr>
<td>Locational System Relief Value (LSRV)</td>
<td>Additional incentive for DERs in high value areas Monetary credit determined same way as DRV</td>
<td>Customers in high value areas, until cap is reached</td>
</tr>
</tbody>
</table>
Value Stack component

Supply
- Energy
- Generating Capacity
- Renewable Energy Credit

Distribution
- Demand Reduction Value
- Market Transition Credit
- Locational System Relief Value

Rate Design

- **hourly pricing**
  - flat kWh, monthly per kW, or summer-incentive kWh

- **per kWh**
  - per kW coincident with distribution peak

- **Per kWh allocated to mass market subscribers**
  - per kW coincident with distribution peak
Value Stack: Demand Customers (SC8 & SC9)

- When solar is producing but not exporting to grid
  - Reduce energy usage, reduce bill (at retail rate)

- Whenever solar energy is exporting to the grid
  - Excess, grid exported kWh are valued at Value Stack rates
  - Value Stack credits can offset entire Electric bill, not just energy charges
  - If bill is completely offset, remaining credits carry over to the next month

- If eligible for DRV and/or LSRV, account receives the monthly credit regardless of kWh exported that month

- No Annual Reconciliation

- SC8 and SC9 accounts qualify for Remote Net Metering host sites

**Note:** The installation of solar does not always reduce a customer’s demand level.
Removal of Size Limits Based on Customer Type

• “Removal of Customer-Type Based Technology and Size Limits”
• Any type of customer – any Service Class – can install any technology from PSL 66-j or 66-l up to 5 MW

- VDER Value Stack: no size limitations for residential customers; SC1/EL1 can solar install >25 kW
- Phase One NEM: size limits remain at ≤25 kW for solar, wind, and hydro, and at ≤10 kW for fuel cells
Additional Standby Service Information
### Standby Exemptions

**Customers exempt from Standby Service Rates will be billed under standard rates:**

- Customers with on-site generation equipment of a total nameplate rating \(<=15\%\) of the Customer’s maximum potential demand
- SC 1, SC 2, or the energy-only rate of SC 12 Customers
- Customers with a Contract Demand \(< 50 \text{ kW}\)

<table>
<thead>
<tr>
<th>Designated Technologies Exemption:</th>
<th>Fuel cells, wind, solar thermal, photovoltaics, sustainably-managed biomass, tidal, geothermal, and/or methane waste that commences operation between July 29, 2003 and May 31, 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>billed under Standard rates</td>
<td>Uses Electric Energy Storage with maximum capability up to and including 1 MW</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Targeted Exemption: billed under Standard rates</th>
<th>New installs of battery storage no less than 50 kW on or after January 1, 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Submits a completed application for interconnection by December 31, 2019, and commences operation by December 31, 2021</td>
</tr>
<tr>
<td></td>
<td>Exempt from Standby Service rates for ten years from the date the battery storage project commences operation*</td>
</tr>
<tr>
<td></td>
<td>Total exemption limit of 25 MW of new battery energy storage projects across all customers</td>
</tr>
</tbody>
</table>

*Shadow billing will be provided, for informational purposes, at rates under Rider Q - Option B during the term of such rates, and at the then-effective Standby Service rates thereafter
Standby Exemptions
Additional Metering Requirements

• Customers with Targeted Exemptions must comply with these additional metering requirements:
  – The charging/discharge of the battery storage must be separately metered using an Output Meter that the customer arranges to be furnished and installed at their expense.
    • The Output Meter must consist of PSC-approved revenue grade metering equipment that can communicate with Con Edison metering data system and its associated IT infrastructure.
  – The customer, at its expense, must provide and maintain the communications service for the Output Meter
Standby Pilot Rate Program (Rider Q)

• Pilot rate program allows options for Standby Service customers to:
  – Option A: Choose their own contract demand with penalties
  – Option B: Select a different As-Used demand period*
  – Option C: Receive credits for consistent export of power via the buy-back (SC-11) rate

* Customers under Option B will also receive shadow billing, for informational purposes, at the applicable Standby Service rates
Process for Energy Storage Projects

• Residential PV + Storage as a Back-up (not grid parallel)
  – Select “SOLAR (Photovoltaic)” for Distributed Generation Type
  – The emergency back-up generator application (lead-acid, lithium ion, etc.) should be submitted in Project Center
  – Separate application for battery in Project Center as back-up generator

• Energy Storage in Parallel with Grid
  – Select “BATTERY ENERGY STORAGE” for Distributed Generation Type
  – Depending upon charging level, upgrades may be required
  – Inverter-based energy storage systems can export to the grid and receive compensation under buy-back service (SC11) or Value Stack
Process for Hybrid Energy Storage Projects (aka Paired Storage)

Hybrid systems – mix of technologies all parallel with grid

1. One installation of combined DG + Battery Energy Storage
   - Single hybrid application
   - Start this application by choosing “New – All Other Requests, click here!” from the PowerClerk home screen
   - A single combined system diagram will likely be required to enable engineering evaluation

2. Battery Energy Storage installation for customer with existing DG
   - One application only
   - Application should refer to the other (MC#) in the “Please Provide Project Overview” field and also highlight to your project manager

3. DG installation for customer with existing Battery Energy Storage: follow process from #2 except new DG application