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Independent System Operator

Quantifying BTM PV: Reconciling the NYSERDA/NY-Sun and the SIR Datasets

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Agenda

- Survey of the two available datasets, NY-SUN and NY Standardized Interconnection Requirements (SIR) accounting for behind-the-meter (BTM) solar PV installations (compare & contrast)
- What is the business value of reconciling the two datasets for NYISO System and Resource Planning?
- Methodology used to align the datasets
- Summary of analysis and results

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Accounting for BTM PV Capacity: 2014 - 2019

- NYISO's long-term load forecasts began incorporating the impact of BTM-PV on grid load in 2013-14
- For the last six years, the primary source of data on BTM-PV has been data compiled by NYSERDA related to New York's incentive program
- With the roll-out of the NY-Sun initiative, the State began posting a dataset* recording each BTM-PV installation that received incentive payments for Residential and Commercial/Industrial sites. This dataset is updated monthly

* https://data.ny.gov/Energy-Environment/Solar-Electric-Programs-Reported-by-NYSERDA-Beginn/3x8r-34rs

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Details on NYSERDA's NY-Sun Dataset

- Includes details on each project – Completed or forthcoming/project "pipeline";
- Each record (row) in this dataset includes:
  - Location (city, town or village), zip-code, county and the GIS coordinates of the centroid of the place where the installation is sited
  - The pertinent utility service territory
  - Cost of the project and incentive amount
  - kWDC capacity
  - Relevant application and project in-service dates
  - Manufacturers and model numbers of both the inverter(s) and panels
  - Flags for whether the project was complete or in the pipeline, and
  - An indicator for whether installation is a Community Distributed Generation (CDG) project

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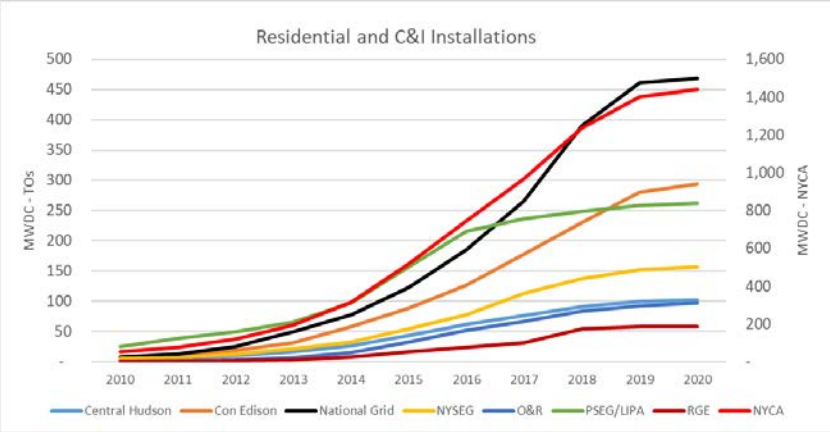
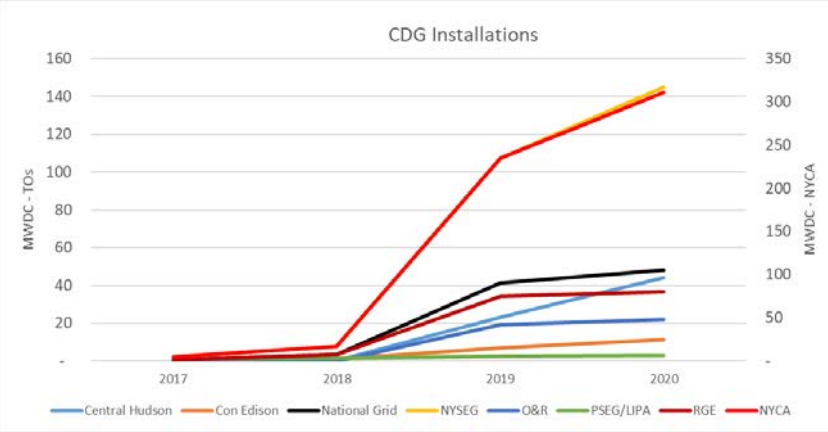
NY-Sun Dataset Summary as of March 2020





- Aggregate of 1,750 MW DC through March 2020
- Flattening of LIPA's trend coincided with exhaustion of NY-Sun incentive allocation
- CDG is fastest growing component (18% of existing capacity; 88% of pipeline)
  - Bulk of CDG is Upstate, NYSEG dominating

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Details on Utilities' SIR Datasets

- With the onset of net-metering and subsequent REV-related policy changes, each TO makes monthly filings with DPS* on all BTM-PV connected to their distribution systems
- These monthly filings are called Standard Interconnection Request (SIR) reports
- Each record (row) in this dataset includes:
  - Location (city, town or village) and zipcode of the site
  - The pertinent utility territory
  - kWAC capacity
  - The circuit and sub-station it is connected to
  - Relevant application and project in-service dates
  - Whether or not it is part of a hybrid-installation
  - Flags for whether the project was complete or in the pipeline, and
  - An indicator for whether/not installation is a CDG project

* http://www3.dps.ny.gov/W/PSCWeb.nsf/All/286D2C179E9A5A8385257FBF003F1F7E

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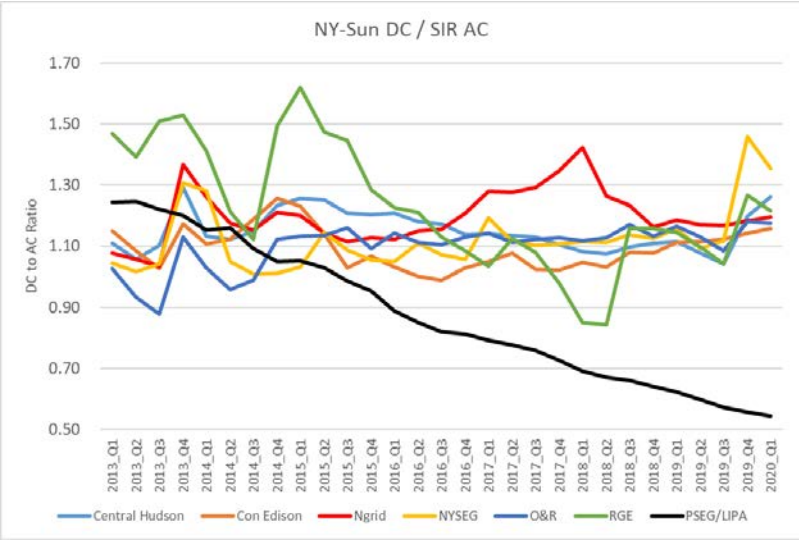
Ratios of DC (Dataset 1) to AC (Dataset 2) as of March 2020

- The AC-denominated Panel PTC (PVUSA Test Conditions) rating converts to a lower Standard Test Condition (STC) or nameplate DC rating - implying that AC < DC
- The following shows quarterly ratios of each TO's DC capacity to its AC capacity:



- Relative to NYSERDA, noisiness in data suggests
  - Inaccuracies (approximations)
  - Varying temporal fidelity of reporting
- Despite volatility, general patterns suggest a decline in over-sizing and convergence of DC-to-AC ratios across the TOs
- The consistent decline in LIPA's ratio points to a steady growth of BTM-PV not captured by NY-Sun – *i.e.* incentivized installations

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NY-Sun vs. SIR: Compare & Contrast

	Unit of Measurement	Data Integrity	Beneficial Attributes
NY-Sun	kWDC	Needs Location clean-up/edits due to typos, finger-fumbles, abbreviations, errors	- kWDC & dates are reliable due to ratepayer funding; - Hardware specs are critically important; - Predictable and reliable updates
SIR	kWAC	Strong suggestions of kWAC approximations; missing sub-stations, etc.	- Substations allow for precise electrical location; - Trends are consistent with NY-Sun; - Provides valuable insight into hybrid systems

- While both datasets allow for the flexibility of analysis at the sub-zonal level, the SIR offers the valuable ability to map solar PV resources to PSSE locations
- Clearly the two datasets are complementary and the joint intelligence is more valuable than each alone
- Hence, it is necessary to align the two datasets by translating them to the same unit of measurement – kWDC

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Dataset Alignment: Methodology

- California Energy Commission (CEC) maintains a regularly updated catalog of PV panels in use with manufacturer, model name/# & technical specifications like STC (DC) and PTC (AC) ratings
- A comparison of panel models in the NY-Sun dataset against the CEC list allows for a translation of kWDC capacity into AC equivalents. A first pass yielded a 72% hit-rate; second pass with edits for typos and abbreviations yielded a 96% match – except for LIPA due to reporting gaps
- The BTM-PV sector has evolved over the last six years – technological improvements, hardware efficiency gains, decline in per-watt-DC incentives, awareness and personnel development by utilities leading to standardization/formalization of practices
- A review of annual DC-to-AC ratios for each TO revealed common patterns, consistent with analysis of SIR data. With presumably more accurate conversion, there is confirmation of a gradual decline in oversizing and a convergence of DC-to-AC ratios across the TOs

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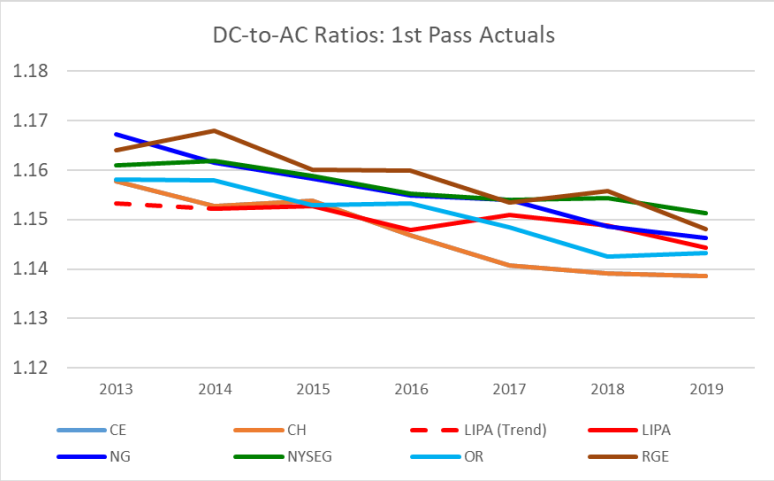
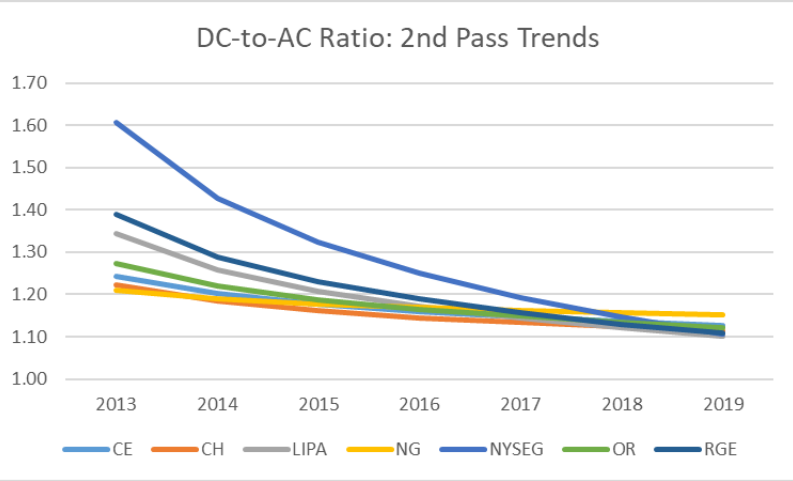
Imputed DC-to-AC Ratios





- Relative stability of patterns hints at improved accuracy of conversion
- Decline and convergence consistent with the standardization of Inverters used by utilities
- The two methods provide a 'High' and a 'Low' estimate
- System-wide, the average DC-to-AC ratio seems to be stabilizing at around 1.12

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Summary of Results (Low Case)

NY-Sun MWDC

	CH	CE	NG	NYSEG	OR	LIPA	RGE	NYCA
2014	27	58	78	33	16	97	9	317
2015	44	89	123	54	33	157	17	517
2016	62	127	186	78	52	215	24	744
2017	76	178	266	115	67	238	32	973
2018	91	232	393	146	84	250	58	1,254
2019	145	291	501	265	79	258	99	1,638

Estimated 'Outside'/Un-incentivized MWDC

	CH	CE	NG	NYSEG	OR	LIPA	RGE	NYCA
2014	1	7	9	6	1	18	0	43
2015	1	7	9	6	1	46	0	70
2016	1	13	12	9	2	92	3	132
2017	1	13	12	9	2	143	3	184
2018	3	13	12	11	2	192	3	236
2019	3	13	12	11	2	268	3	312

The 'High' case estimate is 358 MWDC of Un-incentivized BTM-PV

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Implications of Results

- Using the DC/AC ratio analysis, the results indicate that between 312 MW (low case) and 358 MW (high case) of DC-PV is present on the New York power system
- In additional to other data, which include the two datasets and updates from the TOs, these results will help the NYISO to more accurately model PV as a behind-the-meter resource in its forecasts (both long term and in real-time) and/or as a resource in its planning studies

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- Planning the power system for the future
- Providing factual information to policymakers, stakeholders and investors in the power system

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Questions?