



"State of DER Dashboard" Initiative

Last Updated for IEDR Use Case Submission

20 June 2021

Position Summary

1. It is becoming increasingly challenging to connect DER to the grid, which will only increase at an increasing rate, evidenced by many things, including "closed" substations in various regions.
2. The DER industry is concerned that we are going to effectively run out of hosting capacity far sooner than any meaningful upgrades can be made via CLCPA processes, putting thousands of jobs and hundreds of companies at risk.
3. Baseline metrics are essential to understanding basic state of affairs and making informed decisions. Presently no NYS regional/global benchmarks are available.
4. Presently there is no ability to assess the rate of change or trending over time. Using rates and trending we can create a timeline and estimates for when we expect major issues to arise, and can respond accordingly.
5. We therefore request a joint industry & utility effort to produce a "State of DER Dashboard" as soon as possible. Industry requests data collection start of Q4, 1 October 2021, published on 1 November 2021.
6. The dashboard will provide critical data to inform all stakeholders of key areas of concern, trends, rates of change, and indications whether current or planned efforts are having any objective positive benefits.
7. This information is essential for influencing how and where to focus our collective efforts as interconnection challenges become more and more frequent.

Key Dashboard Characteristics

1. Contains critical DER & grid metrics and benchmarks
2. Does not require login, allowing for ease of access for all types of stakeholders
3. Provides "snapshots" of metrics recorded on exact dates with same interval between dates, thus allowing for tracking over time
4. Many of the metrics can be calculated by downloading feeder level data from each utility's hosting capacity map. (Note that this only shows current information, not trending over time, hence the need for snapshot data.)

Sample Website, "State of DER Dashboard" Metrics & Output

Following is a sample webpage, hosted at a central location (ex the JU or DPS website), with the following data. [Note that blue text below is explanation text and would not be on the actual webpage.](#)

Introduction, Narrative, Definitions

- [\[Mathematical definition of penetration ratio\]](#)
- [\[Simple/clear definition of "hosting capacity" & links to same for how it is calculated\]](#)
- [\[Simple/clear definition of what it means to have a "closed" feeder or substation\]](#)
- [\[Link to definition of standard deviation\]](#)
- [\[Review or link to complete list of how each of the metrics is calculated\]](#)
- [\[etc.\]](#)

Summarized, Quarterly, Snapshot Data

DER State of the Grid as of 1 October 2021

[\(A new table is produced based on data as of the first day of every quarter.](#)

[Note that this is sample data, not representing actual conditions.\)](#)

Category	Metric	NYS Avg or Total	[Utility / Region 1]	[Utility / Region #...]
Feeder Data	Quantity of feeders	16,384	256	1,024
	Average feeder penetration ratio [& SD]	25% [9%]	13% [10%]	47% [5%]
	Average feeder hoisting capacity [& SD]	150 MW [21 MW]	108 MW [5 MW]	250 MW [13 MW]
	Percentage of feeders with PR > 90%	7%	3%	15%
	Quantity of feeders with special "closed" to DER conditions	5	0	3
	...etc
Substation Data	Quantity of substations
	...etc
Aggregate Data	Total Hosting Capacity	560 GW	450 GW	600 GW
	Total Solar Connected	11024 GW	160 GW	240 GW

(See [separate benchmarks list section](#) for a complete list, notes and discussion about metric)

Utility/Region Narrative (if submitted)

Utility / Region 1 Notes & Commentary

(If submitted, utility would provide the latest commentary to help describe any key metrics, reasons for closed substations, or anything else that would provide meaningful insight to their data.)

Utility / Region # Notes & Commentary

(same)

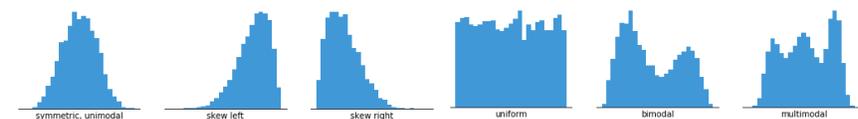
Detailed Data

Please proceed to the hosting capacity map (HCM) for each utility to download complete feeder or substation data. Much of this data can be used to reproduce various metrics above using spreadsheet analytical methods. Links to each utility HCM can be found here:

<https://www3.dps.ny.gov/W/PSCWeb.nsf/All/6143542BD0775DEC85257FF10056479C?OpenDocument>

Additionally, master interconnection queue data can be downloaded from the DPS website here: <https://www3.dps.ny.gov/W/PSCWeb.nsf/All/286D2C179E9A5A8385257FBF003F1F7E?OpenDocument>

(Ideally all of the feeder and substation data can be reproduced by downloading the full dataset from each utility's hosting capacity map. Beyond averages and standard deviation, developers and others can produce advanced population analysis. Ex.)



(Note that just providing access to this data is not the same as the snapshot summarized data. Among other reasons, this data will only provide information based on the last HCM refresh, and does not show trending over time.)

Benchmark Metrics List -- Definitions, Notes & Analysis of Each

General metric notes and considerations

- Each of the *italic red* items below would have a separate line in the official data table.
- There are, of course, many additional metrics that could be added and discussed.
- Each value should be reviewed carefully and all agree upon the exact formula or method to arrive at the published value.
- To consider would be the value of adding median metrics if there are large outliers which skew the data.
- This list is intended to evolve with time.

Metrics List

1. Feeder Data

- a. *Quantity of feeders*
- b. *Average feeder penetration ratio & SD*
 - i. Ex. Take PR for every feeder then take average of that dataset, instead of taking aggregate total of DER divided by aggregate total of thermal rating of transformers.
 - ii. Ex. NYS Avg or Total would be a weighted average using the quantity of feeders from each utility.
- c. *Average feeder hosting capacity & SD*
 - i. Ex. Average of individual HC per feeder, not aggregate totals.
 - ii. Ex. NYS Avg or Total would be a weighted average using the quantity of feeders from each utility.
- d. *Percentage of feeders with PR > 90%*
 - i. To discuss whether 90% is the right value. Goal is to understand how many feeders are near or already have a PR of >100%.
- e. *Quantity of feeders with special "closed" to DER conditions*
 - i. If any feeders restrict additional solar DER, or have any other special conditions, it would be part of this total. Then each utility can provide further information in their narrative section.

2. Substation Data

(apply same/similar notes as for feeders to each metric)

- a. *Quantity of substations*
- b. *Average penetration ratio & SD*
- c. *Average hosting capacity & SD*
- d. *Percentage of substations with PR > 90%*
- e. *Quantity of substations with special "closed" to DER conditions*

3. Aggregate DER Data

a. Hosting Capacity

- i. *Total Hosting Capacity Available*

1. Sum of total available hosting capacity across all feeders/substations in the given network

b. Solar Connected

- i. *Total Solar*

1. Sum of total connected solar across all feeders/substations in the given network

- ii. *0kW to 50kW*

- iii. *>50kW to 5MW*

- iv. *>5MW to 10MW*

- v. *>10 MW*

c. Non Solar Connected

- i. *Total Non-Solar*

- ii. *ESS*

- iii. *Wind*

- iv. *Etc*

4. (*see note) Interconnection Application & CESIR Fail Data

a. Solar or Solar+ESS

- i. Quantity of new applications in quarter*
- ii. Quantity of CESIR complete in quarter*
- iii. CESIR Analysis Failure Percentage for each*

b. Select app data for other

- i. ESS only*
- ii. Wind*
- iii. etc.*

(* NOTE: This is a closely related initiative, please see [CESIR Analysis Fail data](#) tracking section below. It would be beneficial to integrate this data on the same master dashboard tables given that it is directly related. Open topic for discussion.)

Hypothetical Quarterly Update Process

1. On the first day of the quarter each utility will download a copy of the current state of all its assets (aka make a database copy) in CSV form of relevant data
2. In an estimated 2 to 3 hours, or less, an engineer/analyst will run simple metrics to produce the data to be submitted as outlined previously. This data will be put into a standard format.
3. Said data will be sent to an aggregator/webmaster (for example, NYSEDA). Each utility has 2 weeks to send this data to the aggregator/webmaster.
4. Aggregator/webmaster will publish the data based on the format and subsections suggested above, and sum up total NYS information, which is the first column in each table. Aggregator/webmaster has 2 weeks to complete this task.

Analogy: The current state of affairs is like a business without metrics

Consider a large manufacturing company (NYS Electrical Grid). Management (DER stakeholders) has a goal of increasing new widget production (increasing DER penetration). There are many locations (territories, substations, feeders). And yet management is blind to the general state of their equipment.

1. There is no simple location to go to see total production across all factories
2. While you zoom in on each individual piece of equipment, of which there are literally thousands, there may be some additional capacity on each, but there is no way to know how much overall additional capacity may exist at a factory or regional level
3. Each piece of equipment is slowly losing its ability to produce widgets, but nobody is tracking how long it will be until widget production goes to zero
4. Some equipment is already shut down(!); it is unclear how many are shutdown and why
5. We are considering investment in upgrading equipment, but we cannot really tell what are the common trends
6. Presently the factory is acting purely reactive, and not in a preventive/proactive mode, largely because they have no good trending/tracking data

Dashboard Data Use-Cases, Actions, etc

1. What areas are changing most rapidly. Determine to what extent "loss of hosting capacity" concerns are valid. Spotlight this critical issue.

2. Observe common issues across utilities. Use this to identify critical areas of focus. (including technical, non-technical or policy, etc.)
3. Are efforts having an objective impact critical metrics?
4. See also sample data/analysis below.
5. Etc.

Integrated Energy Data Resource (IEDR) Initiative

Industry representatives were present for the latest NYSERDA IEDR kickoff presentation. Please know that we strongly feel that this DER Dashboard initiative should be considered wholly separate and independent from the IEDR initiative, at least at this time, including but not limited to the following reasons:

1. Each utility would be responsible for performing their own analysis and submitting to a coordinator (such as DPS) on a quarterly basis for publishing on their website.
2. The timeline for initial launch of the IEDR initiative is too distant, compared to the urgency the industry feels is appropriate for DER Dashboard data.

CESIR Analysis Fail Data

Although the source data is not from the hosting capacity database, a related initiative is the cataloging of CESIR analysis fail data.

The concept is, whenever a CESIR analysis is performed and one of the CESIR analysis fails and/or a system size is reduced, this data would be therefore tracked. By knowing the frequency of which screens & analysis fail, this provides insight into what are the core factors which limit new connections.

There are many reasons why incorporating this data in this same dashboard would be helpful, such as:

1. The failing of CESIR screens/analysis is an indicator of what key factors are limiting hosting capacity, which is the primary purpose of this dashboard
2. This data would ideally be published quarterly, just like the other grid data asked herein
3. This is a central location that interested stakeholders and members of the public will already be looking for data.

Implementation & Requested "Next Steps"

1. **Start date** - Industry requests a 1 November 2021 launching of the website, using 1 October 2021 data.
2. **Focus group** - Start a focus group as soon as possible that meets every other week to make decisions and track progress.
3. **Hosting location** - What is the preferred location to host the dashboard? Note that queue data is already published on the DPS website. What entity will take responsibility for (a) collection, (b) webmaster services.
4. **Frequency** - Industry believes quarterly is the appropriate frequency for this information.
5. **Metrics review** - Detailed discussion about each of the individual metrics, how they would be calculated, and which will be in this initial launch, vs rolled out at future dates.
6. etc.

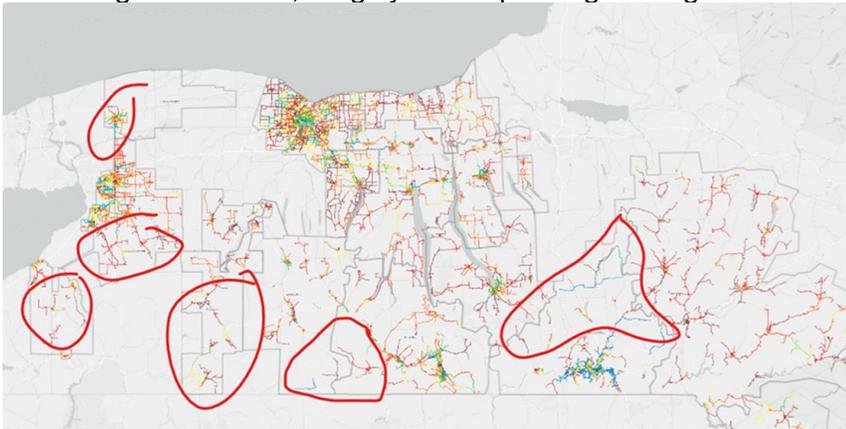
Sample/Reference Issue - "Closed Substations" in NYSG & NG Territories

How the dashboard would highlight this information

The dashboard would track the quantity of "closed" substations, for whatever, reason. And in the optional narrative section for each utility they would voluntarily describe the reasons why, along with any other considerations.

Detailed Information

1. It has become understood that [NYSEG has 'closed areas/substations'](#) as of 12 Jan 2021, locations where they cannot accept more DERs.
2. This list currently lists ~10% of NYSEG/RGE's substations, all rural substations that cover large land areas, roughly encompassing the regions marked as follows:



3. It is our understanding of the situation as follows:
 - a. These substations are closed due to transmission level constraints (Ex.. potential overloads during N-1 contingencies and overvoltage on transmission buses).
 - b. Many of the substations listed as closed do not have any DG connected, and a project location may be otherwise completely viable from a distribution perspective.
 - c. Unfortunately there's little to no visibility on what areas are impacted beyond the growing list on their DG page,
 - d. We understand NYSEG adds to the list only when they discover transmission issues during the course of performing CESIR studies and presently are not planning a full transmission system analysis to discover the extent of the problem.
 - e. Currently there is no immediate mechanism being considered to pay for upgrades, the Cost Sharing 2.0 and Capital Project Queue proposals that are under comment periods with DPS don't address transmission line issues, so for the foreseeable future these substations will remain closed indefinitely.
4. Understood that National Grid has "closed" substations as well.
 - a. Primarily due to oversubscription of hosting capacity rather than a specific transmission limitation
 - b. See NG exported metrics in separate section below

5. Industry related questions
 - a. Confirmation of what exact conditions cause a substation to be "closed"?
 - b. Is it all DER, or just DER above a certain size?
 - c. Was there backfeeding on this substation?
 - d. What is the current quantity of substations with this condition?
 - e. What specific upgrades are necessary to reopen these substations?
 - i. Are any of these upgrades currently in the work plan or forecasted?
 - f. What is the trending and how soon will other substations be considered "closed"?
6. Sample responses we should be discussing in ITWG
 - a. Controlled/Active curtailment
 - b. Hybrid PV/ES systems
 - c. ES at substation or on circuit working to increase the hosting capacity
 - d. Use of dynamic ratings be systems
 - e. List of planned upgrades to feeders and subs (Tx, subt, DG) or new facilities?
(Not those associated with a specific DG project but those that are in the general utility 5y plan)

Sample/Reference Info -- Sample Substation Analysis in NG Territory

Following is a quick analysis done by the ITWG industry for National Grid. This is included below as a helpful reference for the types of data and conclusions that can be drawn from these analyses.

1. The industry was able to download data for substations, but feeder data download function appeared to be broken
2. National Grid has 99 of their 630 or 15.7% of their substation transformers at a 90% or higher Penetration Ratio (PR) [DG installed and queued/Transformer Thermal Rating] (note that PR is may be defined differently, ex use of daytime loading)
3. IMPORTANT: We acknowledge that 90% PR does not necessarily mean that it is closed, rather that backfeeding is likely and the CESIR is more likely to reveal limitations.
4. The total PR across their entire system is 38.6% [Sum of all DG/Sum of all XFMR ratings]
5. We observe a potential "80/20 problem" similar to that observed in NYSEG territory whereby substations serving rural areas make up ~20% of the utilities assets, but closer to ~80% of their geographic territory. Said a different way, urban areas have a lot more substations, circuits, and transformers per square mile than the rest of the state.
6. While 15.7% of substations being closed doesn't seem like a significant number, once that number reaches ~20% and we've filled up all of the rural substations, ~80% of their territory will not be viable for future large scale DG, only heavily populated metropolitan areas will remain.
7. Note that the 15.7% only captures substations that are closed due to Hosting Capacity being exhausted, it doesn't show substations that are closed for other reasons, like transmission issues, downtown network systems, or any other reason that a substation may be closed.