Grid Data Sharing: Brief Summary of Current State Practices

A publication of the NARUC Grid Data Sharing Collaborative

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Review Draft, November 2022

NARUC
National Association of
Regulatory Utility Commissioners

Acknowledgments

This material is based upon work supported by the U.S. Department of Energy under Award Numbers DE-CR0000009 and DE-OE0000925. The authors would like to thank the following colleagues for their contributions and edits:

- Lynn Costantini, NARUC CPI
- Brandi Martin, U.S. Department of Energy
- Samir Succar, ICF International
- Christopher Villarreal, Plugged In Strategies
- Yochi Zakai, Shute, Mihaly & Weinberger LLP

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The National Association of Regulatory Utility Commissioners (NARUC) Center for Partnerships & Innovation is leading a new "Grid Data Sharing Collaborative" initiative focused on supporting states, utilities, and distributed energy resource (DER) providers in understanding options and tradeoffs related to sharing various types of grid data and information. The initiative is funded by the U.S. Department of Energy's Office of Electricity, Grid Deployment Office, and Office of Cybersecurity Energy Security and Emergency Response.

The NARUC Grid Data Sharing Collaborative began in 2022 to support states, utilities, and stakeholders in identifying areas of agreement / disagreement about grid data sharing and to devise a framework for grid data sharing that each state can later tailor to their goals and priorities. The Collaborative will publish a framework and playbook in 2023.

Public utility commissions (PUCs) are increasingly being asked to settle questions related to third-party access to power system[1] information or "grid data" that utilities use to plan and operate the electricity system. Fundamental to optimizing the design and operations of the electricity distribution system and its components is a shared understanding of the system itself. The data needed to fully understand distribution system limitations and potential is commonly held within the utility. DER developers, particularly, seek access to grid data to influence their siting and programming decisions.

Utility regulators are opening dockets and creating stakeholder conversations about appropriate ways to advance the sharing of grid data. Regulators leading grid data sharing initiatives are focused on understanding the benefits and risks of increased data access and transparency within their jurisdictions. In at least a dozen states, utilities have released host capacity maps (of varying granularity) that typically illustrate areas of the grid where siting new DERs or investing in demand-side management is viable from the grid perspective. Utilities, security experts, and DER developers have had a wide range of reactions to these emerging approaches.

In light of state and utility decarbonization targets, projected DER growth, customer preferences, resilience and security concerns, and more, questions about what data to share and how to share it will continue to arise across states in the coming years.

[1] Note: This initiative is not focused on customer data (e.g., electricity consumption, demographic information, program participation) behind-the-meter, but rather data related to the power system, up to and including the electricity meter. Personally Identifiable Information (PII) is out of scope.

This brief summary discusses general trends in regulatory approaches to grid data sharing and outlines key areas of alignment and divergence; an extended summary table at the end of the document outlines the approaches of different states and utilities.

Grid Data Sharing Policy Context and Practices

Dozens of states have considered grid data sharing in a variety of contexts, from advanced metering infrastructure deployment, electric vehicle charger siting, and DER interconnection requests. NARUC's research shows that approximately 14 states have considered whether and how utilities should be making hosting capacity data available to the public and / or DER developers. At least 35 utilities currently publish some type of hosting capacity information although they differ in the ways in which relevant data is shared. Far fewer state PUCs, utilities, and stakeholders have engaged in a comprehensive consideration of grid data sharing for a variety of use cases at once.

Below are summaries of trends within these types of proceedings, which are drivers for grid data sharing. **Table 1** includes a detailed summary of grid data sharing practices across states and utilities.

Interconnection

Interconnection standards specify important requirement for distributed resources connecting to the grid, including costs, timelines, and processes for DERs and utilities alike. Visibility into the electricity system and information sharing help utilities and interconnecting resources understand process issues and challenges. Data sharing practices are often embedded within interconnection and operations agreements. Tariffs for interconnecting resources may also impose certain data sharing requirements.

Many jurisdictions are leveraging industry standards to help manage system dynamics as more DERs are added. For example, more than 15 jurisdictions are adopting interconnection agreements consistent with IEEE 1547-2018 Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces.[2] This standard lays out technical rules of interconnection for DERs and specifies some degree of grid data sharing and related communications certification requirements.[3] Certification ensures products are tested and compliant with required grid functionality. In winter 2020, the NARUC Board of Directors passed a resolution recommending state commissions convene proceedings and engage stakeholders and make evidence-based decisions to adopt IEEE 1547 and align implementation of the standard with the availability of certified equipment.[4]

For jurisdictions adopting IEEE 1547-2018, different levels of implementation imply different types of data sharing practices. IEEE 1547 is a standard that establishes criteria for interconnection of DERs with electric power systems and associated interfaces, but does not prescribe cyber-physical

[2] For IEEE 1547-2018 resources for utility regulators, see: https://www.nrel.gov/grid/ieee-standard-1547/guide-to-updating-interconnection-rules.html.

[3] See: Cordova, J. & Boemer, J. (2021) Presentation: IEEE 1547-2018 and IEEE 1547a-2020 Opportunities, Adoption Methods & Stakeholder Coordination. Virtual Training on Bulk Power System Issues for State Energy Officials. Electric Power Research Institute. June 22, 2021. https://pubs.naruc.org/pub/42B4D292-1866-DAAC-99FB-BF1866A134F4 Accessed 8/3/2022

[4] Resolution passed by NARUC Board of Directors, 2020 Winter Policy Summit. Revised 2/12/2020 4C436369-155D-0A36-314F-8B6C4DE0F7C7 (naruc.org) pgs. 1-2.

security, planning, designing, or operating procedures. Some jurisdictions are developing inverter settings that may impact the communications requirements and expectations of data sharing between DER operators and utilities. For example, Massachusetts recently published Default IEEE 1547-2018 Setting Requirements for all DER projects with applications submitted on or after January 1, 2023.[5] For many regulators and utilities, the grid support functions and data exchanges are still an active area of investigation.

Hosting Capacity

Hosting Capacity Analysis (HCA) is the most common application of grid data sharing. HCA are used to establish a baseline of the maximum amount of DER, including portfolios of DERs, a distribution system can accommodate safely and reliably without requiring infrastructure upgrades.[6] More than a dozen jurisdictions currently require their regulated utilities to file hosting capacity information within regulatory proceedings. These data are not automatically made publicly available, depending on the data types and filing requirements. (See Table 1).

Three primary applications for an HCA are: (1) to support market-driven DER deployment; (2) to assist with streamlining DER interconnections; and (3) to enable more robust, long-term distribution system planning, which provides visibility into how much DER the grid can host in future years by identifying potential system constraints and potential upgrades.[7] The level of granularity, visibility, and update frequency of HCA information currently shared by utilities varies widely across the country and even within states.

Comprehensive Consideration

Very few state PUCs, utilities, and stakeholders have engaged in a comprehensive consideration of grid data sharing for a variety of use cases at once.

New York Public Service Commission has been facilitating a comprehensive proceeding regarding the "Strategic Use of Energy Related Data" since 2020 (20-00406/20-M-0082), which is informing the development of an Integrated Energy Data Resource (IEDR) Program and online platform to support a variety of data sharing use cases. See www.nyserda.ny.gov/All-Programs/Integrated-Energy-Data-Resource for schedule, participants, resources, and more.

Minnesota articulated in their 2021 open proceeding (Docket No. E999/CI-20-800) that the Commission will consider:

> "…what, if any, action by the Commission is needed to address electric distribution grid and customer security issues related to public display or access to grid data; including, but not limited to, distribution grid mapping, aggregated load data, and critical infrastructure…"

[5] Massachusetts Default IEEE 1547-2018 Setting Requirements published May 9, 2022, https://www.mass.gov/doc/inverter-source-requirements-document/download, Accessed 9/27/22.
[6] ICF (2016). Integrated Distribution Planning. Prepared for the Minnesota Public Utilities Commission. https://www.energy.gov/sites/prod/files/2016/09/f33/DOE%20MPUC%20Integrated%20Distribution%20Planning%208312016.pdf, Accessed 8/3/2022.
[7] Synapse Energy Economics (2021) Hosting Capacity Analysis and Distribution Grid Data Security. Prepared for Minnesota Department of Commerce. https://www.synapse-energy.com/sites/default/files/Hosting_Capacity_Analysis_and_Distribution_Grid_Data_Security_21-016.pdf, Accessed 8/2/2022.

Utility Data Sharing with Third Parties

Third-party vendors may contract with utilities to deliver various services; data access between utilities and contracted vendors varies across utility programs. Jurisdictions are not consistent in whether and to what extent utilities are required to communicate with regulators and stakeholders about any grid data sharing associated with utility programs.

Some limited grid-level data sharing is required for utility procurements of non-wires solutions to grid constraints (e.g., solicitations, requests for proposals). The grid data provided to potential vendors is often centered around a grid performance issue / solution for a given location and might or might not be available publicly.

Conclusion

State utility regulators recognize the need for sharing grid-level data between utilities, distributed energy resource (DER) providers, customers, and the broader public. Regulatory processes for accessing and sharing grid data can raise issues of privacy, cybersecurity, commercial exposure, and other issues. Differing state approaches to ensuring grid data is shared while addressing these issues are often based in jurisdiction-specific policy issues or use cases. In all instances, utility regulators will end up weighing the value of sharing the data and what those data will enable for customers and the grid compared with the costs and risks of data sharing.

The NARUC Grid Data Sharing Collaborative framework and playbook, forthcoming in 2023, should assist PUCs and their stakeholders in developing a state-specific process to balance these issues.

Please send additions and corrections to this brief to: Danielle Sass Byrnett, dbyrnett@naruc.org.

Table 1. Summary of State and Utility Grid Data Sharing Practices

Jurisdiction	Utilities	Select Grid Data Proceedings/Rules	Description	Link(s)
California	• Pacific Gas & Electric • San Diego Gas & Electric • Southern California Edison	R.14-08-013 Integration Capacity Analysis -The ICA map is designed to help contractors and developers find potential project sites for distributed energy resources (DERs). Decisions D.17-09-026 and D.18-02-004, as confirmed by ALJ rulings OIR R.21-06-017, July 2, 2021 Rule 21 - Interconnection the rules under which distributed energy resources, like solar power and energy storage, may interconnect to California's electric grid	The DRP Data Portals hosted by the three IOU utilities provide Integration Capacity Analysis, Locational Net Benefit Analysis, Grid Needs Assessment / Distribution Deferral Opportunity Report, and other data to the public. Integration Capacity Analysis maps include distribution lines, substations, transmission lines 576 hour, 24 hour peak load profile, 24 minute load profile for each month; requirements vary by size of utility customer base The California Energy Commission is currently gathering the following datasets (among others): Advanced Metering Infrastructure data in hourly (8760) or 15-minute intervals (kW, kWh) with Greenwich Mean Time timestamps; power flow modeling data; utility wildfire datasets; IOU hosting capacity information for each line segment, feeder, and substation; existing solar installation data from California Solar Initiative and Net Energy Metering interconnection datasets; existing Self-Generation Incentive Program projects data; existing demand response projects data; and DIDF filings data Feeder data aggregation is subject to a 15/15 threshold[8].	PG&E Distribution Resource Planning Data Access Portal (pge.com) Enhanced Integration Capacity Analysis (ICA) | San Diego Gas & Electric (sdge.com) Southern California Edison Distribution Resources Plan Extended Portal (DRPEP) (sce.com)
Colorado	• Xcel Energy • Distribution plans due 2023 for Black Hills	Proceeding No. 20R-0516E, Decision No. C21-0549	Utilities required to file Distribution System Plans every two years, beginning either Jan 2022 or 2023. Plans require a wide range of grid data, including hosting capacity map informed by a hosting capacity analysis that determines hosting capacity on a particular feeder, feeder section or substation at a given time under existing and forecasted grid conditions and operations without adversely impacting safety, power quality, reliability, or other operational criteria. The hosting capacity analysis shall be performed using a load flow analysis and forecasted distribution facilities and their capacity, configuration, loading, and voltage data gathered at the substation, feeder, and primary node levels where available. Hosting capacity analysis and related data posted to a publicly available web portal. Web portal also to include a wide variety of data in tabular form, including data for each substation and substation transformer, with the following data and more: • Maximum rated capacity of each substation transformer • Peak hourly demand on each substation transformer for the past three years • Capacity margin for each substation transformer • Advanced functionality capabilities of each substation transformer • Number of feeders served by each substation and substation transformer • Maximum rated capacity of each feeder • Peak hourly demand on each feeder for the past three years • Capacity margin for each feeder Utility to also provide a grid needs assessment that includes info on non-wires alternatives.	PSCo Hosting Capacity Map Overview (arcgis.com)
Connecticut	• Eversource • United Illuminating	17-12-03 PURA Investigation into Distribution System Planning of The Electric Distribution Companies	2017 PURA decisions approved grid modernization plans for utilities and initiated hosting capacity maps. Connecticut Distributed Generation Technical Working Group openly discusses hosting capacity maps. April 2021 held workshop and solicited developer feedback on utilities' approaches to map information and issues.	DG Hosting Capacity – External Map Viewer CT (arcgis.com) Hosting Capacity - UI (uinet.com)
DC	• Pepco	DCPSC Case No. 1130, Order 20286, Jan 24, 2020 DCPSC Case No. 1130, Order 20364, Jun 5, 2020	Hosting Capacity Maps available from Pepco (the only utility in the district): one for radial distribution feeders and one for network distribution feeders. In response to requirement to provide "A secure web portal to facilitate sharing of non-public, locationally	https://edocket.dcpsc.org/apis/api/Filing/download?attachId=100684&guidFileName=f9794777-ad3d-4f71-bda1-ba04f95db4ad.pdf

[8] Data aggregation technique intended to preserve anonymity. See Appendix B.

Jurisdiction	Utilities	Select Grid Data Proceedings/Rules	Description	Link(s)
		FC1130 In the Matter of The Investigation into Modernizing the Energy Delivery System for Increased Sustainability	specific system-level data between the utility and third parties responding to RFPs and with government agencies developing DER programs. (Order 20286)," the utility makes available: • Load forecast, reliability statistics, planned resiliency/reliability projects • Load data (requires NDA) • Existing DER capacity • Circuit design criteria and capacity; voltage profile, and other static Critical Energy Infrastructure Information (requires secure access)	https://edocket.dcpsc.org/apis/api/Filing/download?attachId=104691&guidFileName=9adc85df-6c7e-4aac-ba88-33461a51c75a.pdf
Hawaii	• Hawaiian Electric Company (HECO)	Docket 2014-0192 Decision and Order No. 34924	From 2017 Order: "HECO Companies' hosting capacity analysis should, to the extent practicable, reflect actual conditions. Given the pending and near-term development of DER and DER-related programs that are intended to provide grid-supportive services, the commission agrees with these Parties' proposals for the HECO Companies to update their hosting capacity methodology to better reflect reasonable assumptions about DERs, focusing not just on the effect of their energy exports, but also on the grid-supportive services they can provide."	Locational Value Maps | Hawaiian Electric
Illinois	• Commonwealth Edison • Ameren	Public Act 102-0662, the Climate and Environmental Jobs Act, (2021) includes requirement for Multi-Year Integrated Grid Plans (Section 16-105.17) 22-0486 Illinois Commerce Commission on Its Own Motion -Vs- Commonwealth Edison Company 22-0487 Illinois Commerce Commission on Its Own Motion -Vs- Ameren Illinois	Section 16-105.17(f) of the Illinois Public Utilities Act, 22o ILCS 5/16-105.17(f) Required Information to be Included in Multi-Year Integrated Grid Plan "(E) Hosting Capacity and Interconnection Requirements. (i) The utility shall make available on its website the hosting capacity analysis results that shall include mapping and GIS capability, as well as any other requirements requested by the Commission or determined through Commission rules. The plan shall identify where the hosting capacity analysis results shall be made publicly available. This shall also include an assessment of the impact of utility investments over the next 5 years on hosting capacity and a narrative discussion of how the hosting capacity analysis advances customer-sited distributed energy resources, including electric vehicles, energy storage systems, and photovoltaic resources, and how the identification of interconnection points on the distribution system will support the continued development of distributed energy resources. (ii) Discussion of the utility's interconnection requirements and how they comply with the Commission's applicable regulations"	DG Hosting Capacity – External Map Viewer CT (arcgis.com)
Maryland	• Baltimore Gas and Electric Company (BGE) • Delmarva Power & Light Company (DPL) • Potomac Electric Power Company (Pepco) • The Potomac Edison Company • Southern Maryland Electric Cooperative (SMECO)	PC 44 COMAR 20.50.09 governs the interconnection of small generators. In addition to providing general interconnection requirements, this section contains information about interconnection request processing fees, certified equipment, and the various levels of review. Sec. 20.50.04.01. Information for Customers A. System Maps or Records. Each utility shall maintain up-to-date maps, plans, or records of its entire transmission and distribution system, with such other information as may be necessary to enable the utility to advise prospective customers, and others entitled to the information, as to the facilities available for serving a locality.	Hosting capacity is defined in the Code of Maryland Regulations (COMAR) 20.50.09.02B(17) as the amount of aggregate generation that can be accommodated on the electric distribution system without requiring infrastructure upgrades. Hosting capacity maps are currently not available on a state-wide level, although two utilities in Maryland, Pepco and DPL, provide hosting capacity maps. Both are subsidiaries of Pepco Holdings, Inc. (PHI) which models hosting capacity across all its service territories. PHI states that hosting capacity modeling is not an exact science and that space on a feeder is subject to change with new interconnections. Therefore, the map may over- or under-state the actual hosting capacity of a distribution line. Several of Maryland's distribution utilities maintain restricted circuits maps, which show circuits that have limited (or no further) capacity for additional interconnections. These include BGE, Choptank Electric Cooperative, Pepco, and DPL. Each utility states that circuit restrictions are complex and constantly evolving, so the maps should only be used for discussion purposes. Under COMAR 20.50.09, the state's five largest utilities are required to file an annual report with the Maryland Public Service Commission (PSC) that provides the number of interconnection requests received, approved, and denied. The state's largest utilities are also required to provide an interconnection queue, updated monthly, with information about interconnection requests from all facilities with a nameplate capacity greater than 500 kW. These utilities collectively represent over 97% of the state's customer load.	Hosting Capacity FAQ (maryland.gov) Transforming Maryland's Electric Grid (PC44) - Maryland Public Service Commission (state.md.us)

Jurisdiction	Utilities	Select Grid Data Proceedings/Rules	Description	Link(s)
Massachusetts	• Eversource • National Grid • Unitil	The D.P.U. also asked the distribution companies to evaluate the potential for expanded mapping to include information about the need for upgrades at each circuit or substation, if necessary, to support DG applicants. D.P.U. 19-55-D Inquiry by The Department of Public Utilities on Its Own Motion into Distributed Generation Interconnection., Order 16 Sep 2020	The Department of Public Utilities (D.P.U.) directed each distribution company to produce a Hosting Capacity Map that includes, at a minimum, the following information by location, circuit, and/or substation: (1) operating voltage (kilovolt) (2) hosting capacity available (MW) (3) total nameplate interconnected DG (MW) (4) total nameplate pending DG (MW) (5) potential or ongoing ASO studies (6) the current jurisdiction of circuits, i.e., federal or state; and (7) date last updated	Map Series (nationalgrid.com) Hosting Capacity Map | Eversource Interconnection Hosting Capacity Map | Unitil
Michigan	• DTE Energy • Consumers Energy • Indiana & Michigan Power	U-21251 In the matter, on the Commission's own motion, to establish a workgroup to conduct an electric grid integration study and to make recommendations to improve the readiness of the distribution system for both distributed energy resources and electric vehicle infrastructure in response to Senate Resolution 143. U-20147 - IOU 5-year distribution plans	All IOUs are asked to file hosting capacity maps in distribution plans. An August 2020 Order requested DTE and Consumers submit first iterations of hosting capacity analysis in 2021 distribution plan filings, Indiana & Michigan asked to observe in preparation for HCA. Senate Resolution 143 encourages the Commission to "undertake a study on reliability, interconnection, and grid integration issues for distributed energy, including potential growth of distributed energy systems, changes to system design and operations, and system benefits, costs, and other impacts." Further, SR 143 encourages the Commission to coordinate with electric providers and other persons on "distribution circuit-level data collection, modeling, and analysis" to evaluate the available capacity and constraints on the interconnection of additional DG systems, and to submit its findings from the study to the Senate by December 31, 2022.	Case: U-21251 (force.com) DTE ArcGIS Web Application Consumers Energy
Minnesota	• Xcel Energy	Docket Nos. E999/CI-20-800 and E002/M-19-685 In the Matter of a Commission Investigation on Grid and Customer Security Issues Related to Public Display or Access to Electric Distribution Grid Data	State law requires utilities to identify DER interconnection points and necessary system upgrades, including location and capacity of individual distribution lines. Key aspects vary by size of utility customer base There have been recent expansions and changes to grid data sharing requirements: The Commission directed further exploration of privacy and security issues, requiring the utility to evaluate and justify each privacy and security concern and the basis for withholding information. The major IOUs in the state must, to the extent practicable, include a unique name or number for each line segment in the maps' pop-up boxes and show the actual locations of distribution system lines instead of broad blocks of color on the HCA map Initial requirement to provide data: Each public utility that files Biennial Transmission Projects Reports and that is operating under a multiyear rate plan approved under section 216B.16, subdivision 19, shall conduct a distribution study to identify interconnection points on its distribution system for small-scale distributed generation resources and shall identify necessary distribution upgrades to support the continued development of distributed generation resources, and shall include the study in its [Biennial Transmission Projects Report].	Xcel Energy - Hosting Capacity Map
Nevada	• Nevada Energy (NVE)	Distribution Resource Plan Process Docket 21-06 Docket No. 19-04- Joint application of Nevada Power Company d/b/a NV Energy and Sierra Pacific Power Company d/b/a NV Energy for approval of First Amendment to 2018 Joint IRP, a Distributed Resource Plan.	Nev. Admin. Code § 704.9102 "Hosting Capacity Analysis" defined: "Hosting capacity analysis" means the analysis to determine the amount of distributed resources that can be accommodated on a particular feeder section of the distribution system at a given time under existing and forecasted grid conditions and operations without adversely impacting safety, power quality, reliability or other operational criteria. Nevada Public Utilities Commission directed NVE to develop several new tools that make up the newly established DRP framework, including load/DER forecasting, hosting capacity analysis (HCA), grid needs assessment, and locational net benefits analysis to identify nontraditional solutions to grid constraints. In 2019, NV Energy was required to file three-year distribution plans on a triennial basis. Part of the requirement includes hosting capacity analysis (HCA) to identify the available capacity for DER at particular points on the distribution network. Data includes 576 hour (24-hour peak load profile, 24-minute load profile for each month)	NV Energy has Distribution Resources Plan Portal (not public) NV Energy DRP Login

Jurisdiction	Utilities	Select Grid Data Proceedings/Rules	Description	Link(s)
New Hampshire	• Until • New Hampshire Electric Cooperative • Eversource	15-296 Investigation into Grid Modernization DE 19-197 Development of a Statewide, Multi-Use Online Energy Data Platform Last Cost Integrated Resource Plans	Grid Mod Workgroup recommended Hosting Capacity maps	https://www.puc.nh.gov/Regulatory/Docketbk/2015/15-296/LETTERS-MEMOS-TARIFFS/15-296_2019-02-12_STAFF_REPORT_AND_RECOMMENDATION.PDF
New Jersey	• FirstEnergy • PSE&G • Atlantic City Electric • Orange & Rockland	QO21010085 - In the Matter of Modernizing New Jersey's Interconnection Rules, Processes, And Metrics Docket No. EO20110716 – Advanced Metering Infrastructure	PSE&G and FirstEnergy have maps searchable by address showing capacity available on each circuit with a low/medium/high rating. Atlantic City Electric is a Pepco utility; its map is more detailed than PSE&G and FirstEnergy	Pepco Hosting Capacity Solar Power Suitability Map - PSE&G (pseg.com) Orange & Rockland Maps Solar Accommodation Map (firstenergycorp.com)
New York	• Joint Utilities of New York	NY DPS Matter 16-M-0411, Order of March 9, 2017 NY DPS Matter 16-M-0411, Order of December 14, 2017 NY DPS Matter 16-M-0411, Order of April 20, 2018	The Commission considers and reviews five-year distribution system implementation plans (DSIPs). All utilities file reports with hosting capacity analysis for all circuits at and above 12kV The Joint Utilities, with guidance from stakeholders in the 2016 engagement group discussions, have developed a four stage Hosting Capacity implementation roadmap. Hosting Capacity Maps available for all utilities (National Grid, Con Edison, Orange & Rockland, Central Hudson, & NYSEG/RG&E) include: • Circuit name and local voltage; NYISO load zone • Local minimum and maximum hosting capacity • Anti-islanding hosting capacity • Connected and queued DER • Links to graphs of minimum load curve, historical and forecast 8760 load, and 5-year 24-hour peak load forecast PSC established access fees for aggregated community load data but found that aggregated data for the Utility Energy Registry (UER) doesn't (yet) meet privacy standards. 8760-hour load data Adopted a 4/50 whole-building data aggregation standard Orange & Rockland Utilities provides a Load Capacity Map to support Level 3 EVSE siting.	https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={F67F8860-0BD8-4D0F-80E7-A8F10563BBA2} https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={9BA6AD25-C4EE-4BF1-A08D-05C253670D1B} https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={4C4CE28E-54CC-4514-967D-B513678E3F37}
North Carolina	• Dominion	N/A	Voluntary; regulated utilities have articulated interconnection processes, but do not provide maps.	Hosting Capacity Tool | Dominion Energy Clean Energy Maps | North Carolina Sustainable Energy Association (energync.org)
Oregon	• PacifiCorp • Portland General Electric	UM 2197 - Portland Gas & Electric UM 2198 - PacifiCorp UM 2005 - Investigation into Distribution System Planning UM 2111 - Staff Investigation into Interconnection Processes and Policies	A recent legislatively required Distribution System Planning Report generated a Distributed Generation Evaluation Map that provides information on "DG that might be accommodated at a particular point." Clearly states that a hosting capacity analysis would be an "additional, more detailed" step in siting DG.	PacifiCorp OR Data and Distribution system planning FAQs Portland General Data Distributed Generation Evaluation Map (arcgis.com)
Rhode Island	• National Grid	Budget approval for the SDP included in Dockets 4755 & 4756, order of January 8, 2019.	National Grid maintains a System Data Portal, which contains distribution feeder and substation information in GIS, including: • Feeder ID and characteristics, such as geographic locations	National Grid - Rhode Island System Data Portal (arcgis.com)

Jurisdiction	Utilities	Select Grid Data Proceedings/Rules	Description	Link(s)
		Additional budget approved in Dockets 4770 & 4780, order of May 5, 2020	• Substation source • Planning area • Voltage information • Loading and available hosting capacity NOTE: National Grid has similar data portals for its New York and Massachusetts distribution systems. Load forecasts, area studies, and reliability reports are presented in report format.	
Vermont	• Green Mountain Power • Burlington Electric Department • Vermont Electric Cooperative	19-0856-RULE Proposed revisions to Vermont Public Utility Commission Rule 5.500 2022 Vermont Comprehensive Energy Plan	Green Mountain Power has an interactive hosting capacity map, with circuit-specific data on capacity, available capacity, and percentage remaining. Burlington Electric Department has an interactive map with qualitative data at the feeder level, characterizing DG capacity availability as low, moderate, or good. BED also provides a table summarizing existing DG installations by circuit. Vermont Electric Co-op has a static map with large areas shaded to indicate whether or not there are constraints to DG installation in that area. No quantitative data are presented. https://vermontelectric.coop/client_media/files/VEC_SystemsMap_GenerationConstraint_10_19_21.pdf	GMP Solar Map 2.0 (arcgis.com) Burlington Electric Department Vermont Electric Co-op
Virginia	• Dominion Energy	N/A	Voluntary hosting capacity maps	Hosting Capacity Tool | Dominion Energy

Appendix A: UK Framework for Grid Data Sharing

In the United Kingdom, an Energy Data Taskforce was established to "provide Government [Ofgem, the Office of Gas and Electricity Markets, which regulates all utilities in the country] and Industry with a set of recommendations on how data can assist with unlocking the opportunities provided by a modern, decarbonised and decentralised Energy System at the best value to consumers."[9] The Taskforce focused on defining and developing recommendations across five issues in a staged approach:

- **Data Visibility:** Understanding the data that exists, the data that is missing, which datasets are important, and making it easier to access and understand data.
- **Infrastructure and Asset Visibility:** Revealing system assets and infrastructure, where they are located and their capabilities, to inform system planning and management.
- **Operational Optimisation:** Enabling operational data to be layered across the assets to support system optimisation and facilitating multiple actors to participate at all levels across the system.
- **Open Markets:** Achieving much better price discovery, through unlocking new markets, informed by time, location and service value data.
- **Agile Regulation:** Enabling regulators to adopt a much more agile and risk reflective approach to regulation of the sector, by giving them access to more and better data.

In 2019, the Taskforce published a Data Openness Triage (see Figure 1) to consider risk factors and inform mitigation strategies related to sharing customer and grid data, focusing on four key risk areas:

- **Consumer Privacy:** Data that relates to a person who can be identified directly from the information in question or can be indirectly identified from the information in combination with other information.
- **Negative Consumer Impact:** Data that is likely to drive actions, intentional or otherwise, which will negatively impact the consumer.
- **Security:** Data that creates incremental or exacerbates existing security issues which cannot be mitigated via sensible security protocols such as physical site security, robust cyber security or buffer databases.
- **Commercial:** Data that relates to the private administration of a business or data which was not collected as part of an obligation / by a regulated monopoly and would not have been originated or capture without the activity of the organization.[10]

[9] Catapult Energy Systems (2019). A Strategy for a Modern Digitalised Energy System. Energy Data Taskforce report, sponsored by UK Department for Business, Energy, & Industrial Strategy, Office of Gas and Electricity Markets, Innovate UK. https://es.catapult.org.uk/report/energy-data-taskforce-report/

[10] Ibid, pg. 27.

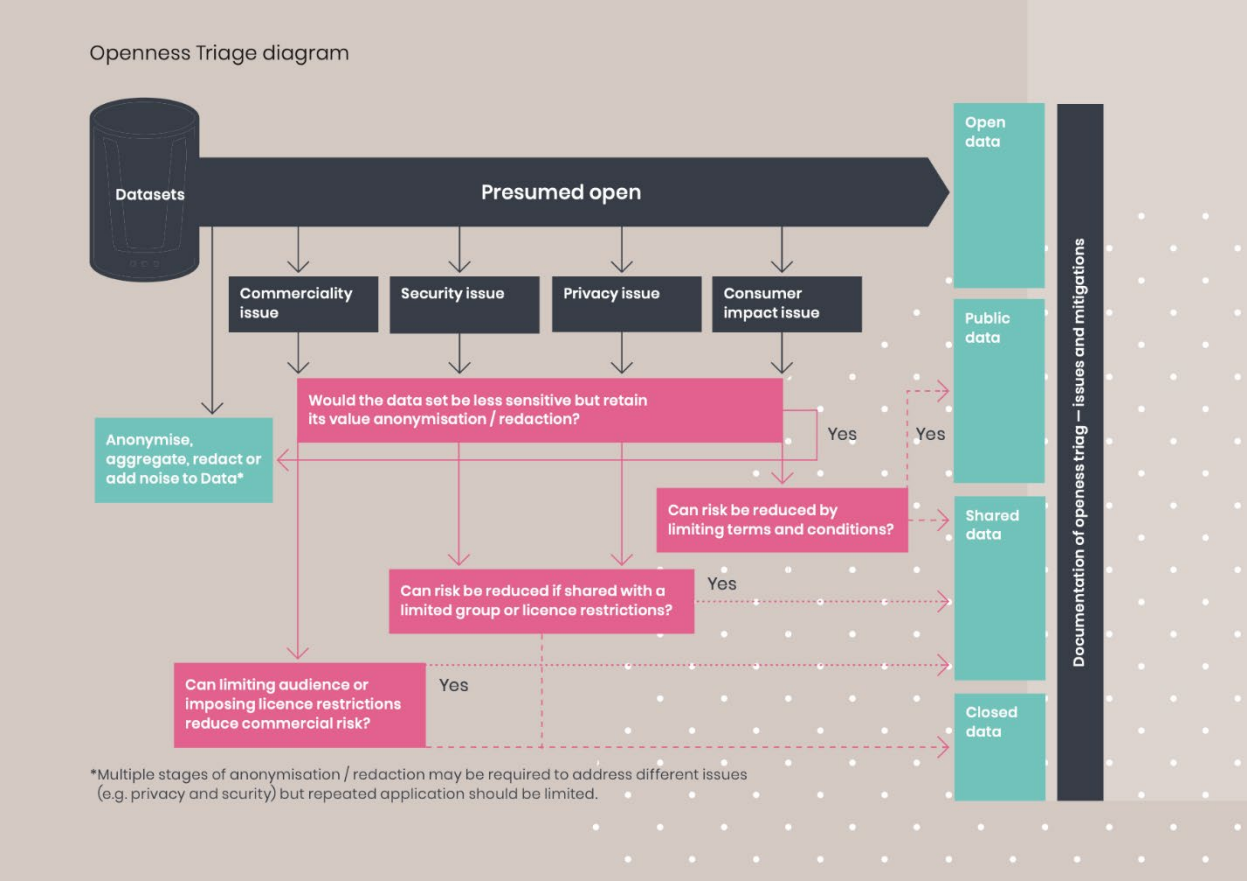

Figure 1: Grid data sharing triage. Source: United Kingdom Energy Data Taskforce (2019)

Appendix B: Aggregated Customer Consumption Data

Although customer energy consumption data is beyond the scope of the NARUC Grid Data Sharing Collaborative, state and utility approaches to sharing aggregated customer data might offer some starting points related to data transfer and can be helpful for identifying lessons learned.

Energy data related to individual customer electricity usage is usually only available with the customers' expressed consent. Obtaining this consent is a major barrier to data sharing; regulators in certain states have authorized the sharing of aggregated and/or anonymized customer data without customer consent in particular use cases and subject to certain conditions. Aggregation 'screens' typically allow the release of aggregated customer data as long as there is a minimum number of customers in the aggregation, and no more than a maximum portion of the aggregated load is attributable to a single customer. For example, a '15/15' or '4/50' screen means that aggregated data may be shared if there are at least 15 customers (or 4 customers) in the aggregation and no single customer's usage accounts for more than 15% (or 50%) of the aggregated load. If such conditions are not met, customer consent is usually required. See U.S. Department of Energy's Energy Data Accelerator[11] for tools, resources, examples, and options for aggregation and screening approaches that balance data access and customer confidentiality.

While this general approach is consistent across states with energy-related data sharing regulation, there is wide variation in the type of data that may be shared, the geographic granularity of aggregated data and the standards of aggregation/anonymization applied. In California, aggregated residential customer data is published per ZIP code with at least 100 customers; by contrast, Illinois allows third parties to request customer data at a much more granular ZIP+4 aggregation with a less stringent 15/15 aggregation screen. Some states, such as Colorado and Minnesota, have no restrictions on the geographic granularity of aggregation as long as screening requirements are met; other states, such as Michigan, have no explicit geographic nor screening requirements for customer data aggregations.

State regulation on aggregation screens has posed challenges for certain jurisdictions, and innovative approaches to tackle these have emerged. In Minnesota, the City of Minneapolis found that the requirement of written consent from tenants in residential buildings with less than four units was too burdensome to comply with a local rental property ordinance. The City contracted MN utilities to develop a statistical methodology that added noise to aggregated energy usage data in place of obtaining written customer consent; the Minnesota Public Utilities Commission approved the use of this methodology and extended the opportunity to use it to all other municipalities in the state. Similarly, researchers at the UC Berkeley Center for Law, Energy & the Environment have called for the use of more advanced privacy protection mechanisms such as differential privacy (a similar statistical methodology) to address the shortcomings of aggregation screening methods.[12] Common features of data aggregation proceedings include:

- Data aggregation standards

[11] U.S. Department of Energy Better Buildings Energy Data Accelerator available at: https://betterbuildingssolutioncenter.energy.gov/accelerators/energy-data; In particular, see: Guide to Data Access and Utility Customer Confidentiality (2016)

[12] Lamm, Ted and Ethan N. Elkind. Data Access for a Decarbonized Grid (2021), https://www.law.berkeley.edu/wp-content/uploads/2021/02/Data-Access-for-a-Decarbonized-Grid-February-2021.pdf. Accessed 9/27/22.

- Data delivery structures/procedures (i.e., upon request from authorized third parties or establishing centralized data-sharing platforms and/or procedures through which data is made accessible to the public or registered users)
- Authorized users of data
- Charges or fees associated with data access

In Illinois, third parties may only access aggregated customer usage data upon requesting such aggregated data from the utility; this data must pass the 15/15 screen and can only be requested once every six months for the same ZIP codes. Minnesota is similar, with utilities required to provide data upon request and to ensure the procedure to request data is 'convenient' and publicly available.

On the other hand, in New Hampshire utilities have developed a 'Multi-Use Energy Data Platform', a web portal and API that allows registered third parties to access aggregated customer data, as well as any individual customer data that customers elect to share. New York's 'Utility Energy Registry' compiles monthly aggregated electricity and gas consumption data, including C&I data, in a public online platform, and its new central Data Access Framework will support the creation of an 'Integrated Energy Data Resource', which will expand the scope of the Registry to include a diverse set of energy-related data, including hosting capacity maps.

Some states use a combination of methods. In Colorado, any third party can request an 'aggregated data report' with either standardized or specific data requests; however, each utility must also generate publicly available 'Community Energy Reports' for larger municipalities and counties which include aggregated annual usage data by customer class. California requires utilities to publish monthly customer usage data (including number of customers) by ZIP code and customer class on their website each quarter, and Californian utilities such as PG&E have developed sophisticated online data hubs for accessing these data. Authorized entities (such as research institutions) may also request specific energy usage and usage-related data via a streamlined process.

Often, states have different data-sharing requirements for different entities. While many do not, states such as Minnesota place restrictions on which third parties can access aggregated/anonymous data, with access limited to tax-exempt U.S. organizations, federal, state and local government entities, and entities providing DER services to a utility. Other states grant special permissions to certain entities – for example, in California local governments (and certain state and federal agencies) may request aggregated data at a higher geographic granularity than is generally accessible to third parties.

Some state building energy policies such as building benchmarking require aggregated, whole building data, which often does not meet general aggregation thresholds. States therefore often have specific, more lenient aggregate requirements for building benchmarking; for example, Colorado's typical '15/15' rule is relaxed to a '4/50' rule for benchmarking purposes.