



JOINT UTILITIES OF NEW YORK

Hosting Capacity Training Session – Advanced

(November 21, 2025)



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Welcome to the HC Stakeholder Training Session!

Thank you for joining!

- We're excited to have you here as we walk through today's training materials.
- A few housekeeping items:
 - This session will be recorded for reference and for those unable to attend live.
 - Slides and materials will be shared following the session.
 - Please stay muted unless speaking to minimize background noise.
 - Please send your questions through the chat. We will address all submitted questions during the Q&A at the end of the training.

Disclaimer: *This training reflects the status of the hosting capacity maps and related processes as of **November 21, 2025**. Content is subject to change as the maps continue to evolve in response to regulatory updates, utility refinements, and stakeholder feedback.*



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Agenda

- Introduction
- Survey
- Network vs. Nonnetwork
- Use-cases
- Map Calculations
- Criteria
- Integrating Maps with Other Tools
- Live Demo
- Q&A



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Review of Utility Data Portals



Each utility provides links to a publicly-available data portal which includes hosting capacity map data.

Hosting capacity tools support the advancement of DER integration and DER market growth by guiding the DER investment to grid locations where the cost of interconnection is potentially lower.



These portals provide three maps: a PV Hosting Capacity Map, a Storage Hosting Capacity Map, and an Electrification Capacity Map.

Each map type provides the location and specific information for selected electric distribution lines and associated substations within the utility electric service areas. Users can access information such as:

- feeder-level data values showing the minimum and maximum hosting capacity value,
- queued generation, and
- connected generation.



Additional data layers exist to assist developers in the application of DER in a service territory.

These layers incorporate system data like peak and minimum load duration curves, locational system relief values (LSRVs), forecasted 8760 load data, and maps for network and non-network sections of service territories.

Others offer features such as the REST API interface to enable developers to integrate utility data with their own GIS systems and mapping tools.



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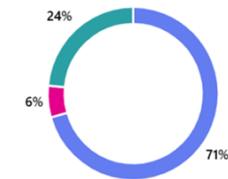


Training Survey – Responses Summary

- Drawing from survey feedback, the JU created beginner and advanced hosting capacity trainings.
- These trainings focus on hosting capacity for PV, energy storage systems, and electric vehicles, showcasing the functionalities in these maps and how they can help direct DER investments to grid locations with potentially lower interconnection costs.
- The sessions are designed to help users interpret the various data layers on utility maps and navigate their functionalities effectively.

Would you be interested in separate sessions for beginner and advanced users?

● Yes	12
● No	1
● No Preference	4



Prioritize the aspects of the maps you would like the training to cover, (1 being the most important, 6 being the least).



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Training Survey – Responses Summary

Prioritize the aspects of the maps you would like the training to cover, (1 being the most important, 6 being the least).



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Training Survey – Responses Summary

- **Developers:** seek practical, actionable insights
- **Regulators:** prioritize consistency and process alignment
- **Advocacy groups:** focus on stakeholder education
- **Education/Consulting:** emphasize advanced, detailed analyses

Prioritize the aspects of the maps you would like the training to cover, (1 being the most important, 6 being the least).



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Training Survey – Responses Summary

Which aspect of the hosting capacity maps do you find most challenging to understand or use?

Data Interpretation and Clarity

- Difficulties interpreting data fields.
- Unclear or shifting attribute labels and meanings in pop-up fields.
- Non-functional or confusing map legends.

Data Completeness and Relevance

- Limited availability or insufficient detail for sub-transmission system data.
- Understanding distinctions between nighttime storage (ESS) capacity and daytime PV generation capacity.

Alignment and Updates

- Misalignment between hosting capacity data and interconnection screening/study processes.
- Concerns over data update frequency and timeliness.



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Training Survey – Responses Summary

How do you (plan to) use which maps in your work?

- Solar Project Siting (most frequently cited):
 - Identifying viable locations and substations for solar projects.
 - Advocating for larger-scale solar installations.
 - Assisting local stakeholders in selecting least-conflict sites.
 - Educating municipal officials and landowners on local capacity for solar.
- Combined Solar and Storage Facilities:
 - Evaluating sites suitable for combined PV and energy storage systems.
- Early-Stage Planning and Development:
 - Conducting initial feasibility assessments and evaluations for new projects.
 - Guiding customer discussions around project viability.
- Training and Outreach:
 - Integrating HC maps into training programs with municipalities and stakeholders.

Con Edison's Network vs. Non-Network Views

Con Edison's map distinguishes between Network (underground grids in dense urban areas like Manhattan) and Non-Network (overhead radial systems).

- Network View
 - Displays availability at an underground distribution transformer.
- Non-Network View
 - Shows individual feeder lines with color-coded hosting capacity.
 - Tip: Use the *Network* tab for Manhattan and other underground areas; use *Non-Network* for outer boroughs and overhead feeders.

Use-Case Overview

Understanding and using the Joint Utilities' Hosting Capacity and Electrification Maps enables smarter, faster, and more strategic decisions across New York's clean energy transition.

Use Case 1: Siting Solar Projects

- Identify feeders or segments with **available hosting capacity** for PV.
- Avoid costly delays or upgrades by targeting **grid-ready** locations.
- Accelerate interconnection with data-informed proposals.

Use Case 2: Siting Energy Storage

- Assess where the grid can support **battery systems** for charging *and* discharging.
- Support reliability, time-shifting, and clean energy goals with minimal grid impact.
- Compare sites to find **optimal value and feasibility**.

Use Case 3: Electrification Planning

- Pinpoint areas with **available capacity for new load**, such as:
 - Electric vehicle charging hubs
 - Building electrification (heat pumps, electric stoves, etc.)
- Compare **summer vs. winter capacity** to align with seasonal needs.
- Inform municipal planning, program targeting, and equitable infrastructure expansion.



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More PV HC Map Use-Cases

- Shows where solar PV can interconnect without exceeding voltage, flicker, or thermal limits.
- Highlights feeders nearing capacity to inform upgrades or voltage improvements.
- Supports developer screening for feasible interconnection sites.
- Provides planners insight into DER hosting trends and policy design.
- Helps prioritize feeder modernization and hosting capacity enhancements.
- Serves as a baseline for tracking CLCPA and DER integration progress.

More BESS HC Map Use-Cases

Charging

- Shows where batteries may be able to safely draw energy without exceeding thermal or voltage limits.
- Highlights feeders that may have available load margin for charging.
- Supports peak-demand planning and identifies circuits that may need upgrades.
- Reveals opportunities for off-peak load growth (e.g., EV hubs, renewables).
- Aids analysis of transformer and feeder loading.

Discharging

- Shows where batteries may be able to export power without over-voltage or flicker.
- Highlights feeders with limited backfeed capability for voltage control planning.
- Reveals potential available export headroom for interconnection and policy planning.
- Flags circuits at risk of reverse-flow instability, guiding upgrade priorities.
- Informs hosting capacity and grid modernization strategies.



More Electrification Map Use-Cases

- **Pre-screen siting for large new loads:** DCFC hubs & depots, fleets, campuses, multifamily electrification, heat-pump conversions.
- **Targeting & phasing:** steer incentives and outreach toward feeders with headroom; defer or phase projects where headroom is tight.
- **Upgrade planning:** flag feeders/banks likely to need reconductoring, transformer upsizing, or sectionalizing as electrification grows.
- **Seasonal risk view:** quickly see winter- vs summer-constrained areas to plan heat-pump adoption and managed charging.
- **Community & resilience:** site resilience hubs and public charging where capacity exists, align with equity overlays.
- **Permitting/interconnection prep:** help large customers get realistic timelines and avoid applications on clearly constrained feeders.



Approach to PV HC Calculations

	Process	Description
1	DRIVE Simulation (Daytime Minimum Load Case)	Uses off-peak daytime feeder load profiles to model PV generation as added export at each node.
2	Evaluate Criteria Violations	DRIVE increases PV output incrementally until a violation occurs under each of the following: <ul style="list-style-type: none"> ▪ Primary Over-Voltage (≥ 1.05 pu) ▪ Primary Voltage Deviation ($\geq 3\%$) ▪ Regulator Deviation ($\geq 50\%$ of bandwidth) ▪ Thermal from Generation ($\geq 100\%$ of normal rating) ▪ Flicker (per IEEE 1453)
3	Apply Anti-Islanding Check (Feeder Head Only)	PV size $\leq 67\%$ of minimum loading, used as protection proxy for SIR Sandia Screens. (Displayed in pop-ups but not used to color map.)
4	Determine Section Hosting Capacity (HC)	The minimum PV size at which any one criterion is violated becomes the node's Section HC.
5	Map Display	Map color represents the <i>minimum of the violation criteria</i> (Section HC). Pop-ups show detailed MW limits by criterion.



Approach to PV HC Calculations – Cheat Sheet

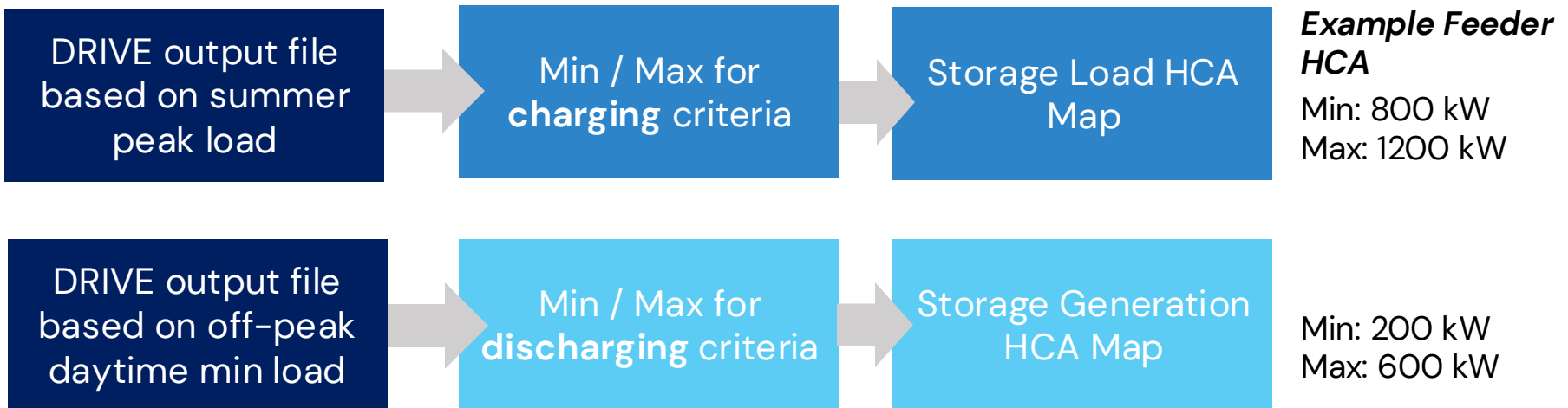
	PV HC Map (Distributed Generation)
Purpose	Identifies where and how much solar PV can interconnect without exceeding voltage, thermal, or flicker limits. Used to guide siting and sizing of new PV projects.
Practical Use	<ul style="list-style-type: none"> ▪ Screen feasible interconnection locations. ▪ Identify circuits near capacity or trending toward upgrades. ▪ Track DER hosting trends across service territories.
Load Case Used	Daytime minimum load (represents conditions when the grid is most vulnerable to voltage rise from PV export).
Grid Conditions Modeled	Feeder conditions with existing DER included (queued DER excluded). Assumes current configurations, before any planned upgrades.
Typical Constraints That Bind	Over-voltage, voltage deviation, regulator deviation, thermal, or flicker; whichever limit is reached first.
Typical Patterns Observed	<ul style="list-style-type: none"> ▪ Higher HC in urban networks with robust voltage regulation. ▪ Lower HC in rural or lightly loaded feeders prone to voltage rise and flicker.



Approach to BESS HC Calculations – Overview

Providing separate displays for load and generation hosting capacity should help initially address requests for greater transparency on the analysis criteria violation.

Color is based on maximum feeder HC with more granularity available at the subfeeder level within popups.



Note: The min/max generation criteria will be specific to storage and not solar PV. This includes changes in fault current contribution and potential voltage changes.



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Approach to BESS HC Calculations – Charging

	Process	Description
1	DRIVE Simulation (Summer Peak Load Case)	Uses summer peak feeder load profiles to model BESS charging as added demand at each node.
2	Evaluate Charging Criteria Violations	DRIVE increases charging power incrementally until a violation occurs under any of the following: <ul style="list-style-type: none"> ▪ Primary Under-Voltage (≤ 0.95 pu) ▪ Primary Voltage Deviation (≥ 3 %) ▪ Regulator Deviation (≥ 50 % of bandwidth) ▪ Thermal from Charging (Demand) (≥ 100 % of normal rating)
4	Determine Section Hosting Capacity (HC)	The minimum charging power at which any criterion is violated becomes that node's Section HC (Charging).
5	Map Display	Map color = minimum of violation criteria. Pop-ups show MW limits by criterion.

Approach to BESS HC Calculations – Discharging

	Process	Description
1	DRIVE Simulation (Minimum Load Case)	Uses off-peak daytime feeder profiles to model BESS discharging as generation export at each node.
2	Evaluate Discharging Criteria Violations	DRIVE increases export incrementally until a violation occurs under each of the following: <ul style="list-style-type: none"> ▪ Primary Over-Voltage (≥ 1.05 pu) ▪ Primary Voltage Deviation (≥ 3 %) ▪ Regulator Deviation (≥ 50 % of bandwidth) ▪ Thermal from Generation (≥ 100 % of normal rating) ▪ Flicker (per IEEE 1453)
3	Apply Anti-Islanding Check (Feeder Head Only)	Evaluates DER ≤ 67 % of minimum loading as a protection proxy (SIR Sandia Screen). Displayed in pop-ups but not used to color the map.
4	Determine Section Hosting Capacity (HC)	The minimum discharging power at which any criterion is violated becomes that node's Section HC (Discharging).
5	Map Display (Storage Generation HC Map)	Map color = minimum of violation criteria. Pop-ups show MW limits by criterion.



BESS HC – Cheat Sheet

	Charging HC Map	Discharging HC Map
Purpose	Shows how much load (charging power) can be added before violating system limits.	Shows how much generation (discharging/export) can be injected before violating limits.
Load Case Used	Summer peak load (system is already heavily loaded).	Minimum load (system is lightly loaded).
Power Flow Direction	Out of the grid (BESS pushing power to feeder).	Into the grid (BESS pulling power from feeder).
Typical Constraints That Bind	Usually thermal or under-voltage (too much load → voltage drop, conductor overload).	Usually over-voltage or flicker (too much export → voltage rise, instability).
DRIVE Model Setup	Adds incremental <i>load</i> at each node until one limit (voltage/thermal) is exceeded.	Adds incremental <i>generation</i> at each node until one limit (voltage/flicker/thermal) is exceeded.
Color Coding	Min of all “charging” violations (thermal, under-voltage, deviation, regulator).	Min of all “discharging” violations (thermal, over-voltage, deviation, regulator, flicker).
Typical Result (Qualitative)	Often higher HC in areas with strong feeders and lower voltage drop margin.	Often lower HC, especially on long rural feeders prone to voltage rise.



Approach to Calculating Electrification Map Headroom

What's Calculated

- Remaining Load Capacity (“Headroom”) = Feeder or Substation Rating – Seasonal Peak Load
 - For both feeder and substation bank rating
 - **Summer Headroom (MW)** = summer rating – summer peak load
 - **Winter Headroom (MW)** = winter rating – winter peak load
- Ratings and peak loads are defined per season using utility data (typically based on last year's recorded peak)

Key Assumptions

- Ratings are thermal (MVA or MW) and reflect normal operating limits
- No overload margin: maps assume 100% rating = max allowed load
- Peak loads are seasonal maxes, not averages or forecast curves
- Maps show both summer and winter headroom; users must plan to stay within the more constrained season

Why Two Seasons?

- Summer constraints dominate in urban areas with high A/C demand
- Winter constraints dominate in rural areas with growing heat pump adoption
- Seasonal headroom ensures infrastructure won't overload under seasonal extremes



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PV HC Map Criterion Definitions – Not Exhaustive

Criterion	Technical Definition	Purpose / Physical Meaning	When It's Evaluated
Thermal from Generation (MW)	The DER export (MW) that causes any line, transformer, or bank to reach 100% of its continuous thermal rating.	Protects against overheating of feeders, transformers, or conductor segments.	Always evaluated; typically binding on low load feeders
Primary Over-Voltage (MW)	The DER export level that raises the node voltage above 1.05 pu (105% of nominal).	Ensures voltage rise from PV generation stays within ANSI limits.	Light-load, daytime conditions (when PV export is high and demand is low).
Voltage Deviation / Flicker (MW)	The DER size that produces a change >3% in node voltage between no-DER and full-DER cases (IEEE 1453 standard).	Limits rapid or excessive voltage swings from variable solar production (e.g., passing clouds).	Evaluated under variable irradiance; often binding on long, lightly regulated feeders.
Regulator Deviation (MW)	DER output level that causes voltage regulators to operate beyond 50% of their tap range or bandwidth.	Protects against excessive regulator tap changes and maintains stable voltage regulation.	Evaluated continuously; may bind on feeders with many regulators.
Anti-Islanding / (MW)	Maximum DER export \leq 67% of minimum daytime load on the feeder or section	Prevents DER from energizing a feeder during outages (unintentional islanding).	Evaluated under minimum load
3V0 Protection	Maximum DER export \leq 67% of minimum load on substation bank	Prevents overvoltage on transmission system due to reverse power flow.	When 3v0 backfeed protection is not installed



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BESS HC Map Criterion Definitions (Charging)

– Not Exhaustive

Criterion	Technical Definition	Purpose / Physical Meaning	When It's Evaluated
Thermal from Load (MW)	The added battery charging demand that causes feeder or substation equipment (lines, transformers, regulators) to reach 100% of normal ampacity.	Prevents equipment overheating or excessive loading when batteries charge during peak demand.	At peak feeder loading conditions, with the battery charging (adding load).
Primary Under-Voltage (MW)	The additional load that drops feeder voltage below 0.95 pu at any point along the circuit.	Ensures voltage stability and prevents excessive voltage sag during charging.	At peak feeder loading conditions, with the battery charging (adding load).
Voltage Deviation / Step Change (MW)	The change in voltage exceeding 3% between no-charge and full-charge scenarios.	Controls voltage fluctuations and rapid voltage changes from large or fast charging events.	Evaluated by imposing a step change from no BESS charging to full BESS charging at any node. The worst-case instantaneous voltage drop from zero to full charge is assessed.
Regulator Deviation (MW)	The level of charging load that forces voltage regulators to exceed 50% of tap bandwidth.	Protects regulator tap operation and ensures sufficient voltage control margin.	Evaluated at regulated voltage points (e.g. at a line regulator or substation LTC) when the BESS goes from off to full charging. The voltage change at the regulator due to the battery's sudden full charging is checked.



BESS HC Map Criterion Definitions (Discharging) – Not Exhaustive

Criterion	Technical Definition	Purpose / Physical Meaning	When It's Evaluated
Thermal from Generation (MW)	The export (MW) from battery discharge that causes any line, transformer, or bank to reach 100% of its continuous thermal rating.	Protects against overheating of feeders, transformers, or conductor segments.	Always evaluated; typically binding on low load feeders
Primary Over-Voltage (MW)	Export level that raises the node voltage above 1.05 pu (105% of nominal).	Ensures voltage rise stays within ANSI limits.	Light-load, daytime conditions (when battery export is high and demand is low).
Voltage Deviation / Flicker (MW)	The export that produces a change >3% in node voltage between no-DER and full-DER cases (IEEE 1453 standard).	Limits rapid or excessive voltage swings	Evaluated under variable irradiance; often binding on long, lightly regulated feeders.
Regulator Deviation (MW)	Export level that causes voltage regulators to operate beyond 50% of their tap range or bandwidth.	Protects against excessive regulator tap changes and maintains stable voltage regulation.	Evaluated continuously; may bind on feeders with many regulators.
Anti-Islanding / (MW)	Maximum export \leq 67% of minimum daytime load on the feeder or section	Prevents battery from energizing a feeder during outages (unintentional islanding).	Evaluated under minimum load
3V0 Protection	Maximum DER export \leq 67% of minimum load on substation bank	Prevents overvoltage on transmission system due to reverse power flow.	When 3v0 backfeed protection is not installed

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Electrification Map Criterion Definitions – Not Exhaustive

Criterion / Layer	Technical Definition	Purpose / Physical Meaning	When It's Evaluated
Feeder Thermal Rating (MVA)	The maximum continuous ampacity of the feeder for each season.	Defines baseline thermal capacity for summer/winter headroom.	Used in both summer and winter calculations.
Substation / Bank Rating (MVA)	The thermal capacity of the substation transformer feeding the circuit.	Captures upstream thermal limit; used for “upstream constraint” flags.	Continuous.
Summer Peak Load (MVA)	Historical feeder/transformer peak during summer.	Baseline for summer headroom calculation.	Derived from SCADA or metering data.
Winter Peak Load (MVA)	Historical feeder/transformer peak during winter.	Baseline for winter headroom calculation (key for heating electrification).	Derived from SCADA or metering data.
Remaining Load Capacity (MW) at Transformer	Headroom before thermal violation at transformer.	Defines how much new load (EVs, electrification) can be added safely at transformer level.	Evaluated at seasonal peak conditions at transformer.
Remaining Load Capacity (MW) at Feeder	Headroom before thermal violated at the feeder level.	Defines how much new load (EVs, electrification) can be added safely at feeder level.	Evaluated at seasonal peak conditions for all feeders.
DAC / EV Target Zone Overlays	GIS layers showing disadvantaged or EV-priority areas.	For policy and equity planning; not part of HC calculation.	Once the capacity calculations are done, the map simply highlights whether a given transformer or feeder segment lies within a DAC or an EV charging target zone

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Integrating Maps with Other Tools

1	Download Data. There are two ways to do this. <ul style="list-style-type: none">▪ Utilize the REST URL to Add a live map layer into GIS platforms (like ArcGIS or QGIS)▪ Download the CSV Attribute Table for use in Excel, Google Sheets, or custom GIS Use
2	Open Your External Tool. This could be: <ul style="list-style-type: none">▪ A GIS platform (ArcGIS, QGIS, Mapbox)▪ A planning or solar siting tool (like Scenic Hudson's Solar Mapping Tool)▪ A municipal energy dashboard or spreadsheet
3	Import the JU Map Layer. This depends on your tool. For example: <ul style="list-style-type: none">▪ GIS Tools: Use the REST URL to add the map as a live layer, or upload the CSV and geo-match by feeder or section▪ Planning Dashboards: Join the CSV data to parcels or ZIPs using feeder IDs or spatial proximity
4	Once imported, you can overlay and combine with other data , such as: <ul style="list-style-type: none">▪ Zoning and land use maps▪ Environmental constraints (e.g., wetlands, flood zones)▪ Solar suitability (irradiance, slope)▪ Equity and resilience overlays▪ Load forecasts or community needs
5	Finally, apply any relevant filters!

