Clean Coalition
Making Clean Local Energy Accessible Now

D-grid Siting Guidance

Introduction

Interconnection is often the most difficult, complex, and time-consuming aspect of the development process. This is particularly true for smaller developers, whose projects can easily be rendered uneconomic by large shifts in interconnection costs and timelines. For this reason, the Clean Coalition has been a strong advocate of increased provision by utilities of information and guidance on siting and cost containment, and access to interconnection data for applicants.

This generally includes some combination of advice sheets, circuit maps, circuit capacity and queue data, dedicated web pages, pre-application reports, and/or customer support from staff. The balance between these forms of support will be specific to individual utilities based on the level of customer demand and formats in which data is already accessed. For a smaller local utility with occasional requests, guidance can often be effectively provided by direct communication. Where demand is higher, published materials efficiently provide information before staff are needed to address questions.

Knowing "what can go where" with little or no modification to the existing grid early in the decision making process helps customers establish realistic expectations regarding interconnection at their property, or choose between locations to site new generation, and submit appropriate designs. Best practices will focus first on making relevant information accessible to applicants, including defining low cost areas and criteria for interconnection. This will elicit well-sited and scaled proposals, leading to both a high proportion proceeding to successful development and toward optimization of available grid capacities. Poorly informed applications result in revisions or withdrawn submissions that can significantly burden staff and frustrate customers.

Utilities should provide sufficient information about the interconnection queue for applicants to assess approximate timeframes for interconnection and to determine whether prior active interconnection requests may impact the local load available to be served by a new applicant. Utilities might also provide information to facilitate coordination between applicants.

Examples

In response to the level of activity in distributed generation interconnection in California, siting maps have been released by several of the state's major public and investor owned utilities in support of their CLEAN Solar Photovoltaic Programs (SPVP) and other distributed generation procurement including Sacramento Municipal (SMUD), SCE, PG&E, and SDG&E. These investor owned utilities are also required to publish their interconnection queues with the status and approximate location of all wholesale projects.[1] Local and state agencies have also pursued designating zones for allocation of guaranteed deliverability of full energy output, expedited permitting, planned capacity upgrades, and targeted locational incentives. Several examples of utility-created maps are shown below, ranging from printable static maps to Google Earth integrated system overlays with interactive embedded circuit data.

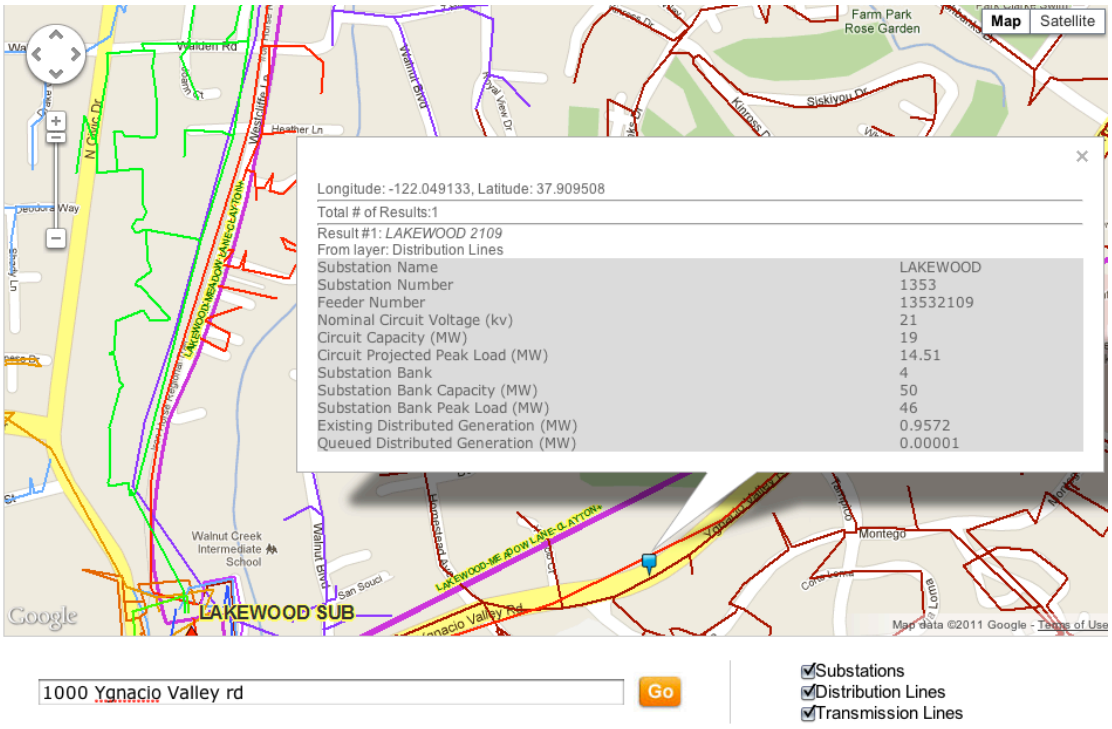
Pacific Gas & Electric (PG&E):

"Solar Photovoltaic (PV) and Renewable Auction Mechanism (RAM) Program Map," 2011, available at http://www.pge.com/b2b/energysupply/wholesaleelectricsuppliersolicitation/PVRFO/pvmap/ (note: requires establishing user name and password)

Comments:

- Excellent information available, but the relationship between the map and spreadsheet is awkward and almost backwards – the map provides no visual indication of where available DG capacity exists and doesn't give that info when you click on a circuit or substation, instead it refers you to the spreadsheet.

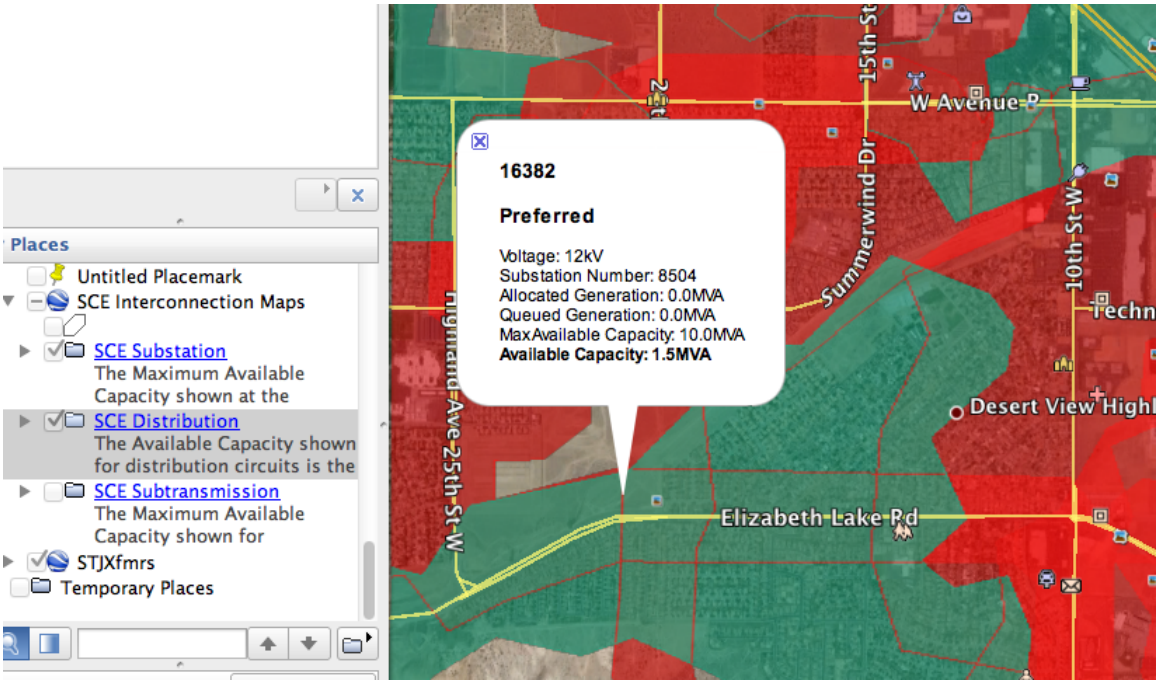
[1] http://www.pge.com/b2b/newgenerator/
http://www.sdge.com/generation-interconnections/wholesale-generator-transmission-interconnections
https://www.sce.com/wps/portal/home/regulatory/open-access-information



- The spreadsheet should be very useful assuming you can sort by available capacity (= peak load minus allocated capacity) and restrict by zip code etc.
- However, once you've identified the good circuits, finding them on the map is not clear.
    - One option would be to create a map searchable by circuit number (this info is already embedded in the map).
    - If the addresses of substations are listed, and all circuits include a listing of the substation they connect to, then it would be easy to look up the location on a map and compare this to the circuit maps proposed by PG&E.
- PG&E's map should be linked to the spreadsheet to allow viewers to sort for information (such as available capacity) and have that displayed on the map.
    - The current map already provides this for circuit voltage and substation transformer capacity, but not line segment capacity.
- Other improvements to PG&E's map include:
    - Detailed legend.
    - Indications of whether circuit/segment falls in a local capacity requirement area.
- Allocation capacity queue information has been added.

Southern California Edison (SCE):

Renewable & Alternative Power, "Renewable Auction Mechanism (RAM)," 2011, available at:http://www.sce.com/EnergyProcurement/renewables/spvp-ipp/spvp-ipp.htm (Note: requires Google Earth)



Analysis:

- SCE's original SPVP map shows all feeder circuit lines with between 1.0 and 2.0 MVA of "Generation Interconnection Potential", presumably 15 - 30 MVA circuits. If you know the "area number" (circuit ID number?), you can select for that area only, but no identifying information is available on the map by interacting with it.
- Their more recent RAM map based on a Google Earth overlay uses a similar red/green designation of circuits with greater or lesser ("preferred) DG capacity allocated and pop up information on each circuit and substation, mirroring the approach seen from PG&E.

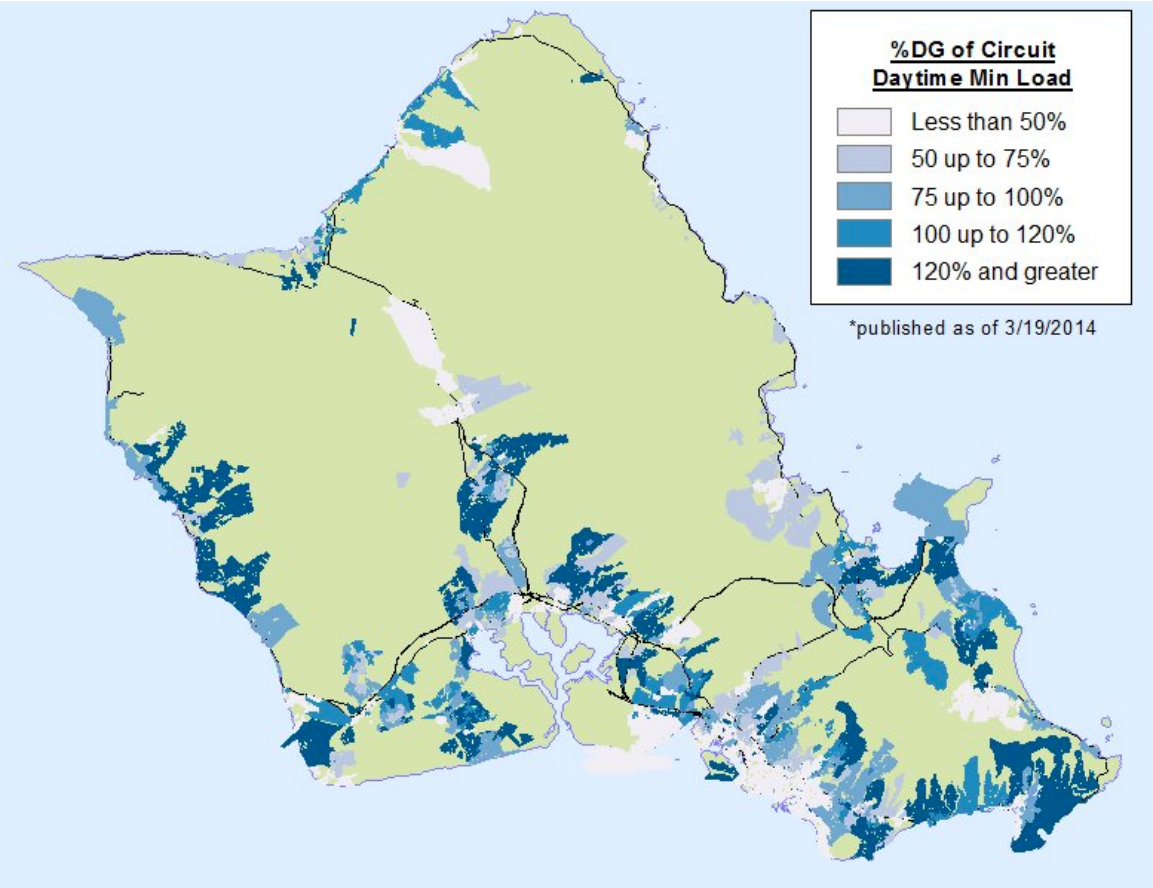
SDG&E:

http://sdge.com/builderservices/dgmap/ (access request required)

Hawaii Electric (HECO)

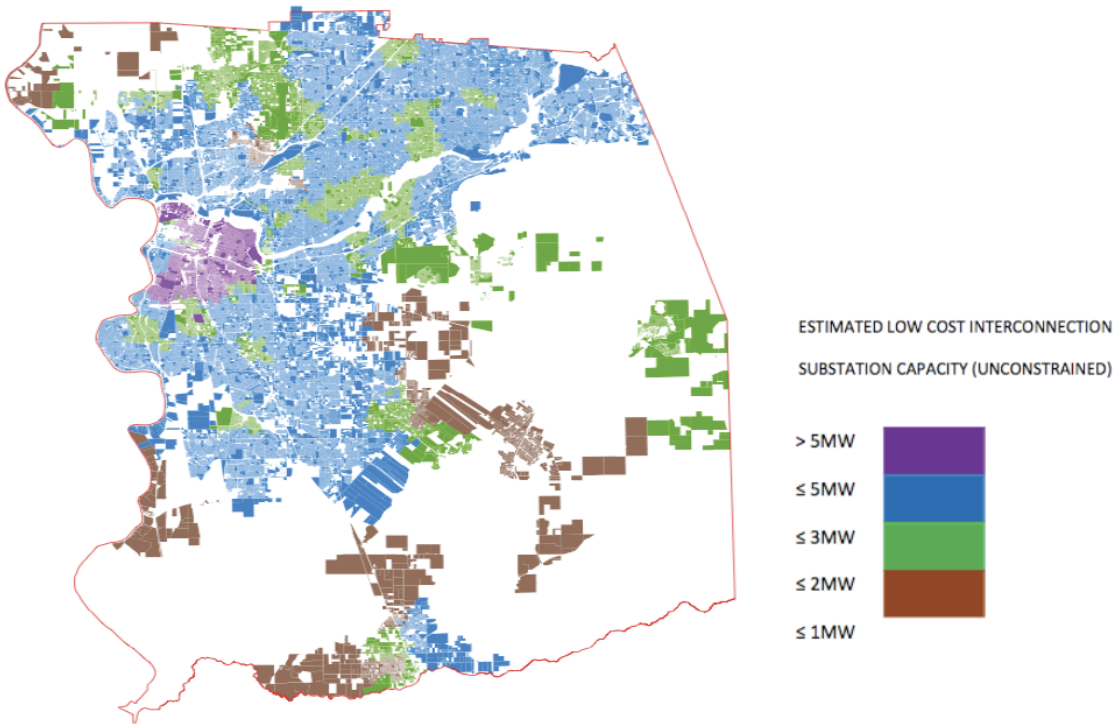
Hawaiian Electric Company provides a Locational Value Map / Address Search Tool to guide new solar installations. It is designed to show customers and solar contractors an estimate of the level of distributed generation (DG) penetration on distribution circuits as a percentage for both minimum daytime and peak circuit loads at a given point in time.

http://www.hawaiianelectric.com/portal/site/heco/lvmsearch



Sacramento Municipal Utility District (SMUD):

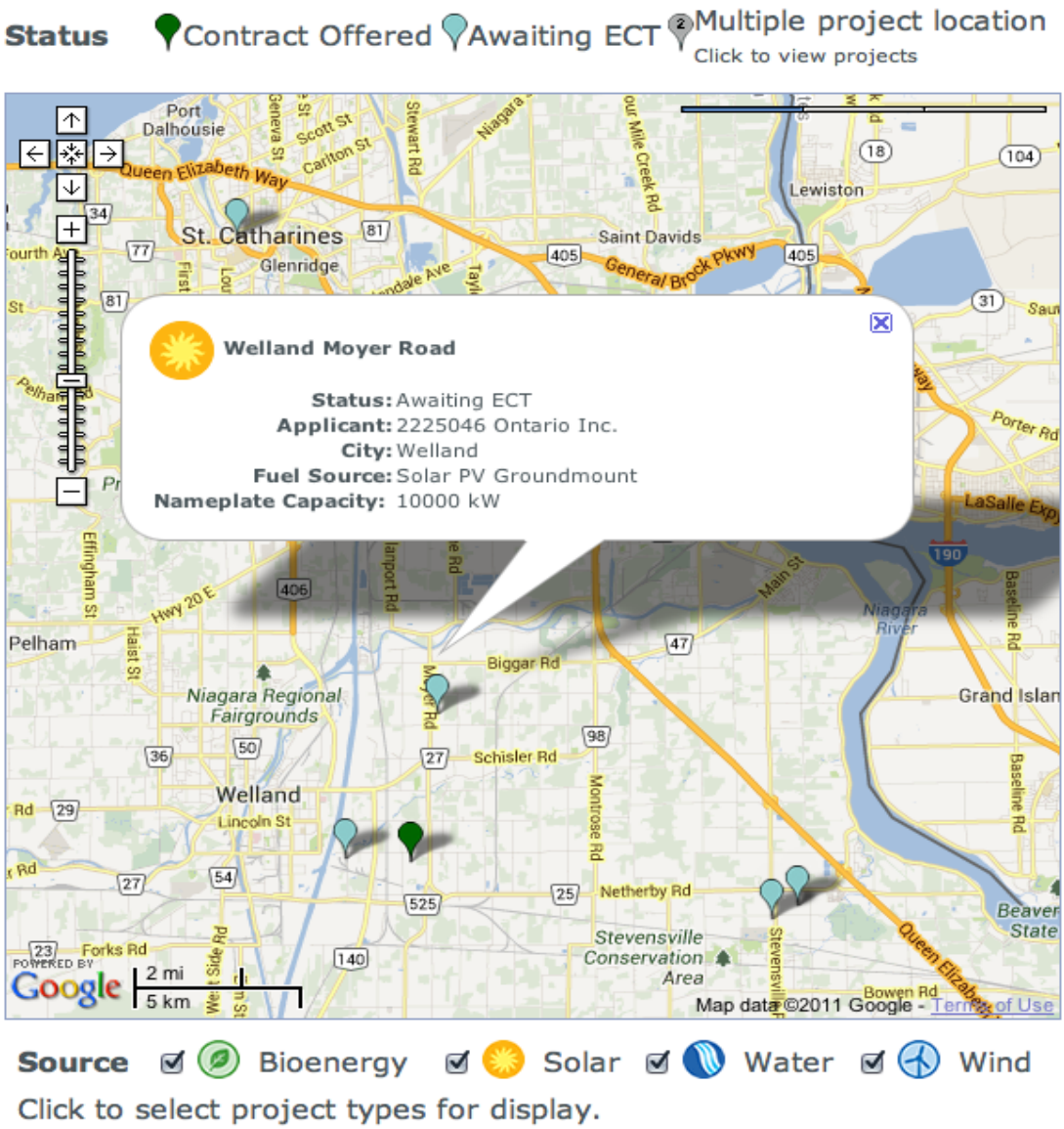
Released the following static map in PDF form in support of its feed-in tariff program: https://www.smud.org/en/business/customer-service/rates-requirements-interconnection/documents/InterconnectionMap.pdf



Ontario Power Authority (OPA):

Supported its feed-in tariff program with interactive Google maps.
The first shows in detail all the locations of renewable energy projects for which contracts have been awarded by the OPA under the FIT Program, as well as projects awaiting the economic connection test:
http://fit.powerauthority.on.ca/Page.asp?PageID=924&ContentID=10634
Another map shows regional transmission capacities in less detail:
http://www.powerauthority.on.ca/Page.asp?PageID=829&ContentID=4061&SiteNodeID=162
Planned new transmission lines:
http://fit.powerauthority.on.ca/Storage/101/11002_FITMap06.swf
OPA also provides access to a pair of spreadsheets with the following substation level information:

- Sheet 1 – Total capacity at all potential connection points.
- Sheet 2 – Allocated capacity at all potential connection points.
- By comparing Sheet 1 availability with the allocations in Sheet 2, a developer could determine how much remaining GIC was available on a substation level.



Recommendations:

As a result of developer-level conversations regarding the above solutions, the Clean Coalition believes that a well-designed data visibility program will have the following attributes:

- All IOUs should at least match the detail of PG&E's map, which currently allows developers to see line voltages and substation capacities as well as peak loads and existing/queued distributed generation.
- Developed in Google Maps (or similar program) in order to provide easy access to a detailed map that has sufficient geographic information to be useful to developers.
    - For example, although the SMUD map was detailed, it was seen as

far less useful than the PG&E map since roads were not identified.

- Regions should be divided by substation, and then each region should be color coded to identify how much interconnection capacity is available in that region.
    - Each color code should represent a range of MW interconnection availability.
        - The PG&E map does a good job of this, particularly with regard to the distinctions between 12KV and 21KV lines, although it is unclear if the unboxed regions of the map are areas with <10MW available and, if so, why the cutoff is so high.
    - If regions are created otherwise, provide detailed information on how they were created and why.
        - For example, it is unclear how the SCE SPVP map was created and whether it shows all available capacity or just selected areas/portions of capacity.
- Similar to the OPA Sheet 2 referenced above, color-coded regions should be updated regularly to reflect interconnection capacity that has been allocated to projects already in queue.
    - The value of this "allocated capacity" should be noted separately so that a developer knows how much of the capacity is available with and without allocated capacity.
- Where available, color-coded regions should reflect planned capacity that is expected to come online in the next [3 years] as a result of the utility's long-term planning budget.
    - For example, using the PG&E coding, a box could be split between yellow and light orange, indicating that there are currently 20-30MW available on a 12KV line, but that in the next 3 years availability is expected to increase to 30-45MW as a result of already budgeted capital expenditures.
    - Particularly important as the majority of utility capital expenditures are spent on the distribution grid, creating new interconnection opportunities that should be known in advance to developers as well as utilities.

Maps need to provide developers with the same information that is used to screen for inclusion in Fast Track and other interconnection processes.

- While as much information as possible should be in the maps, for large amounts of data such as line segment information, utilities could provide access to a searchable database.
    - It is our understanding that utilities can easily access this information through their own systems.
- Interconnection reform is moving towards changing the screens using percentage of minimum load rather than peak load. As a result, minimum load information would need to be provided on the maps as well.

While the map is useful for developers who have predetermined sites, it is also important to have maps and databases that a developer can use to search for circuits/line segments based on criteria such as available capacity (calculated as peak load minus allocated capacity).

- Providing these tools will increase the likelihood of rapid interconnections and maximize existing grid utilization.
- Data should be downloadable in a workable spreadsheet form.

Once a developer has identified a circuit/segment of interest, the developer should be able to get detailed interconnection information on that circuit/segment, including:

- Existing interconnection queue at that circuit/segment (as well as other projects that are in process of trying to connect on the circuit/segment).
- Results of previous studies (e.g. System Impact Studies) done for projects connecting to the circuit/segment (see: http://www.oasis.pacificorp.com/oasis/ppw/lgia/pacificorplgiaq.htm)
- Information on any planned upgrades to the circuit or substation.
- Existing telemetry (if any) that could be used to communicate with a new generation project.

As policies are developed with location specific value, data that affects that value should be provided and searchable on the map. Examples:

- Potential avoided transmission costs including network build-outs and congestion.
- Distribution system upgrade plans and credit.
- Any location affected by “value normalization” or otherwise adjusted to reflect differential public policy value.

*** see: INTERCONNECTING GENERATING FACILITIES TO THE ELECTRICAL DISTRIBUTION SYSTEM - MODEL PRACTICES AND PROCEDURES FOR PUBLICLY OWNED UTILITIES (Clean Coalition, 2013, Draft)

There is great value in potential applicants having the ability to understand and estimate when a proposed facility may necessitate upgrades on the grid. This will allow proposals to be designed to fit within any local constraints, make optimal use of existing capacity, and avoid submitting proposals which would prove non-viable or result in avoidable rounds of review by the utility staff and resubmission of modified proposals. Well-informed applicants reduce the time staff spends reviewing proposals and increased the likelihood that applications will lead to successful installations and happy customers.

Current grid information should be maintained and readily available to generation interconnection staff and customers in order to:

- Address qualification screens, predict costs, reduce potential redesign and restudy, and generally know "what can go where" early in the project development process
- Efficiently process interconnection requests
- Track the progress and outcomes of interconnection requests

Where warranted by demand, existing grid information should be made available in map and spreadsheet formats with viewer/user search and rank order ability enabled, and published on the utility's website for ease of access.[2]

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[2] Examples maps:

California investor owned utilities:
PG&E: http://www.pge.com/b2b/energysupply/wholesaleelectricsuppliersolicitation/PVRFO/pvmap/ (user account creation required)
SDG&E: http://sdge.com/builderservices/dgmap/ (registration required)
SCE: http://www.sce.com/EnergyProcurement/renewables/renewable-auction-mechanism.htm (download of Google Earth required)

Sacramento Municipal Utility District (SMUD): http://www.smud.org/en/community-environment/solar-renewables/Documents/InterconnectionMap.pdf

Ontario Power Authority (OPA):

1) http://fit.powerauthority.on.ca/Page.asp?PageID=924&ContentID=10634

This information will support conclusions regarding:

- What matching load limits exist at each line segment, circuit, and substation, including current and pending interconnections.
- What standard categories of upgrades exceeding these limits would trigger.
- What the approximate costs would be for each level of upgrades required.
- Expected capacity increases related to planned system upgrades and new loads.

For small systems well-matched to expected loads on the same line section and on circuits with lower DG installation levels, little information is called for. In other cases, useful information provided to prospective applicants may include:

1. Identification of "preferred" readily available interconnection areas (defined as distribution substations and circuits in areas of high load with low distributed generation penetration that, based on initial Utility screening, could potentially minimize interconnection costs and maximize the possibility of passing expedited review procedures).
2. Known power quality or stability issues on the circuit.
3. Load data, by month for each of the last twelve months, including day-time and night-time minimum loads and smaller time increments if available.
4. Line and line segment available capacity (subtracting any other applicants on the same line and segment).
5. Line and line segment voltage and peak capacity and limiting conductor rating.
6. Distance between substation and line section terminus.
7. Known electrical dependencies at requested locations related to currently pending applications or plans.
8. Substation voltage and capacity.
9. Existing short circuit interrupting capacity.
10. Location, type, and rating of protective and regulating equipment on circuit (including reclosers).

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2) http://www.powerauthority.on.ca/Page.asp?PageID=829&ContentID=4061&SiteNodeID=162
3) http://fit.powerauthority.on.ca/Storage/101/11002_FITMap06.swf

11. Location of secondary networks.

Informal conversation between potential applicants and staff is encouraged. If frequent or detailed consultations are requested, the utility may wish to formalize the process or include a reasonable consultation charge.

Simple records should be maintained in an accessible database for all distribution interconnection applications for easy review and tracking. Such records should include:

1. Submission date
2. Queue position
3. Application status
4. Study request type
5. Review deadlines and status
6. Location
7. Energy source
8. Prime mover
9. Seasonal peak capacities
10. Substation name
11. Requested in service date on application
12. Updated in service date
13. Actual in service date
14. Notes

Optional: Location Report – Prior to submitting an interconnection application, a customer may request information regarding interconnection constraints at a specific location to assist in appropriate system proposals. If a written response is requested, it shall be provided within ten (10) business days. Fixed fees may apply at the discretion of the Utility in compensation for staff time.

Optional: Pre-submittal meeting/phone call – A customer may request informal review or recommendations regarding a proposed interconnection application. Fixed or hourly fees may apply at the discretion of the utility in compensation for staff time.