October 10, 2024

Re: Comments on Draft DER Interconnection Roadmap (RFI DE-FOA-0003463)

To the Department of Energy Office of Energy Efficiency & Renewable Energy and i2X program,

My name is Ben Schwartz, Policy Manager for the Clean Coalition. Please contact me by email at ben@clean-coalition.org or by phone at (626) 232-7573. The Clean Coalition is a nonprofit organization whose mission is to accelerate the transition to renewable energy and a modern grid through technical, policy, and project development expertise. The Clean Coalition drives policy innovation to remove barriers to procurement and interconnection of distributed energy resources ("DER") — such as local renewables, demand response, and energy storage — and we establish market mechanisms that realize the full potential of integrating these solutions for optimized economic, environmental, and resilience benefits. The Clean Coalition also collaborates with utilities, municipalities, property owners, and other stakeholders to create near-term deployment opportunities that prove the unparalleled benefits of local renewables and other DER.

Clean Coalition's comments will mainly seek to address question 3, "Please provide feedback on the proposed solutions and key actions in the roadmap. Are there any missing solutions or key actions? Are the timelines for implementing solutions correctly categorized (e.g., short-term, medium-term)?" Our most extensive work on distribution-level interconnection has occurred in California, where we have worked at the California Public Utilities Commission (CPUC) for over a decade to streamline the Rule 21 interconnection process and with the investor-owned utilities (IOUs) on their Wholesale Distribution Access Tariffs (WDAT). Clean Coalition is also currently engaging at the Federal Energy Regulatory Commission (FERC) on San Diego Gas & Electric's recent proposal to update its WDAT in order to be in compliance with FERC Order 2023.

Goal 1 – Increase Data Access, Transparency, and Security for Interconnection

Overall, streamlining DER interconnection should be done for two main purposes, (1) increasing efficiency to reduce the time it takes to complete the interconnection process from the submission of an application to the commercial operation date, and (2) increasing developer certainty. One pervasive problem occurring with requests for distribution and transmission-level interconnections is that a lack of accurate grid data, a lack of cost certainty, and long waiting periods are leading to substantial percentages of application attrition. In some cases, developers are submitting applications just to get up-to-date and accurate information about the grid in a certain location, with no intention of ever moving forward with the application process. The increasing number of applications submitted is straining the resources of utilities and grid operators, adding to a cycle of project taking longer to study and larger queues that lead to high rates of withdrawn applications. The availability of granular tools with accurate and actionable data can help to alleviate the burden when an application is submitted and developers submitting applications with more certainty will save money for both the utility and developer.

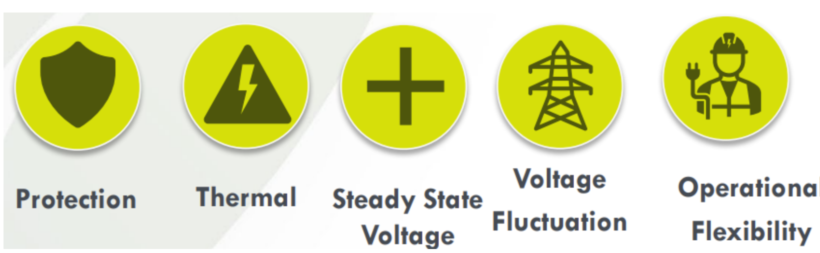
In other cases, the disparity in cost and time between submitting a behind-the-meter (BTM) versus front-of-meter (FOM) application is limiting the ability to make project economics work. For example, in California, a FOM interconnection for a 1 MW rooftop project costs 8 times as much and takes twice as long as the interconnection of a 1 MW BTM rooftop project.

Factor	BTM 1 MW rooftop project	FOM 1 MW rooftop Fast Track project
Typical cost	$37,500	$312,450
Typical timeframe	302.5 business days	723 business days

Solution 1.1 – Establishing guidelines for collecting and sharing grid data

The development of a hosting capacity tool is of critical importance for providing accurate and granular information for those seeking to site a generation resource or load. Hosting capacity tools, such as California's Integrated Capacity Analysis (ICA) tool and maps can assist in both the siting and interconnection processes. However, usefulness is incumbent on the accuracy of the data provided, the actionability of the results in the interconnection process, and the design of the tool. First, providing a map with inaccurate data is counterproductive and wastes resources for all parties involved. The modeling must be tested rigorously to ensure that the inputs and model itself are sound and the results must be validated. This has been a challenge in California amongst the IOUs. In the last two years Southern California Edison's (SCE) ICA tool had a bug that resulted in inaccurate results for 67% of feeders and separately, a criterion that led to 33% of all feeders being completely excluded (e.g., no results provided at all). Both SCE and SDG&E have Load ICA circuits erroneously showing 0 MW of available capacity, though SDG&E has whittled down the number from 33.9% to 13.8% of feeders in 2024.[1] Beyond a precise hosting capacity tool, regularly updating the data is necessary as well. The hosting capacity available on a feeder will change over the course of a year or more, from increased load to any distribution upgrades that are conducted. Additionally, newly operational DER and applications being studied should also be considered factored into a hosting capacity tool, ensuring that a potential applicant can rely on data that is recent. In California, the IOUs are required to update circuits where an interconnection or upgrade has occurred monthly and in 15 days when prompted by a Rule 21 interconnection request, along with an annual refresh.[2] These update requirements are intended to move the ICA toward the goal of being actionable: quality data that is useable in the interconnection process so utility engineers are not required to duplicate studies on grid conditions.

The design of a hosting capacity tool has a large impact of the likelihood of developers relying on it to site/interconnect DER. For example, California's ICA tool considers five limiting constraints: steady state voltage, voltage fluctuation, thermal, protection, and operational flexibility.



Only recently has the CPUC agreed to allow a user of the ICA to determine which limiting criteria have been triggered on the tool without having to download a full data set first. Once a

[1] https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M542/K247/542247710.PDF (See p. 12)
[2] R. 21-06-017 Clean Coalition Comments on Proposed Decision, at p. 2.

tool is accurate and the data granular, small cosmetic changes can significantly increase the workability. Another example is ensuring that bulk data is downloadable in multiple formats, ideally, formats that do not require major data cleaning. The next step up to increase the functionality of a hosting capacity tool is to actually add a cost estimate so a developer can determine—within a reasonable margin—the expected burden of required grid upgrades associated with deploying a project at a specific location on the distribution grid.

Developing a hosting capacity tool and conducting regular updates and refinements requires resources from a dedicated utility and a diverse group of stakeholders. Having a process that is both transparent and includes accountability measures is important. For example, having regular workshops, reports, and/or working group meetings promotes the consistent sharing of information and guarantees that issues with the tool can be raised in a timely manner. Once an issue is raised, a process must be in place to identify the root cause of the issue, develop a solution, and verify that the solution has been implemented systemwide via QA/QC. The presence of a stern regulator may be beneficial to ensure that a solution is implemented in a timely manner. A hosting capacity tool requires resources from many involved parties, but is essential for the sharing of accurate data which can enable efficient interconnections of clean energy resources and deployment of electrification measures.

Solution 1.2 – Expand and standardize reporting or interconnection data

Clean Coalition is strongly supportive of increased transparency surrounding the interconnection process as a way to develop lessons learned and lessen the amount of applicant attrition. While one of the main assumptions for application withdrawals are high costs, specifically high upgrade costs, the truth is that no regularly collected data exists. Data is kept confidential automatically, usually without the ability for a developer to opt-out. As a result, there is no way for a developer to avoid repeating the mistake of a previous applicant that attempted to site a project in the exact same location on the distribution grid or who may have used the exact same technology. We believe that the final report should recommend that states consider an opt-in feature for applicants' data, so that those who wish for information to be kept confidential have the freedom to do so. Obviously, not all applicant data should be made public—any identifying data should continue to be redacted—but having data on why an application was withdrawn rather than making assumptions or understanding the cost burden presented to an applicant of a project on a specific feeder is an important tool to help streamline the interconnection process and reduce application attrition.

Collecting data for each individual step of the interconnection process is another important way to enable refinement that increases efficiency. Utilities often do not collect data or may not necessarily make it public if data is collected. For example, screens that take longer than others may be candidates for automation or at least an increased allocation of resources to reduce waiting times. Or if there is a trend that the point of budgetary certainty is consistently occurring late in the interconnection process amongst withdrawn applications, reason exists to make changes and ensure that a developer has certainty as early as possible.

Solution 1.3 – Standardize and clarify technical data for large DER projects

Clean Coalition recommends that the report should specifically address requirements for affected systems in the context of this solution. This is especially important for areas where there are numerous transmission providers in a close proximity. Developers for large FOM DER projects that are likely to have an impact on the transmission grid should be aware of situations where a project may become an affected system and what the procedure/remedies are in such a circumstance. In the worst case, time and money will be wasted if a utility responds by rejecting application or remove it from the queue until the deficiency is cured. FERC's Order 2023 provides specific language in the *pro forma* SGIP and LGIP meaning that issue can potentially impact applicants across the United States once utilities and independent systems operators are in compliance with the Order.

Solution 1.4 – Establish and maintain frequently update capacity analysis tools

See the response to Solution 1.1

To increase the usability of a hosting capacity tool for siting and interconnecting DER, the final report should mention that enabling flexibility is a valuable use case. DER with sufficient software controls are capable of decreasing or increasing demand in response to grid signals or pre-determined patterns. Generation and load flexibility can maximize the use of the existing grid and limit the need for costly grid upgrades, reducing the cost burden for an applicant and the resources that a utility needs to allocate to a project (e.g., to conduct an upgrade). California's Limited Generation Profile (LGP) pilot is an example that can be cited. In a recent Proposed Decision, the CPUC is choosing to require the IOUs to incorporate flexibility into the ICA maps, both including applications that impact hosting capacity and enabling the creation of a LGP.[3]

Solution 1.5 – Broaden the use of hosting capacity analysis

The Clean Coalition strongly supports this goal. The clearest missing aspect of this goal in the draft report is having hosting capacity tools capable of modeling battery energy storage and hybrid generation+storage projects. Because storage can act as both generation and load, properly deployed (and operated) projects have the potential to reduce the hosting capacity on a congested feeder in addition to the system peak. A California Energy Commission grant-funded FOM storage project the Clean Coalition worked on was designed to do just that, increase the hosting capacity on the feeder where the storage was deployed by as much as 25%.[4] Developing a way to model the hosting capacity on a feeder based on the operational profile of a storage deployment or generation+storage project will significantly increase the value to users and utilities. Given the increase in hybrid projects,[5] ensuring that hosting capacity tools are capable of managing co-located generation and storage deployment is important.

Goal 2 – Improve Interconnection Process and Timeline

Increased timeline and cost certainty are critical to streamlining interconnection of DER. Many tariffs provide no timelines or maximum timelines, while some focus on timelines for small BTM projects under 50 kW. In California, significant effort has gone into streamlining BTM interconnections via Rule 21, but the same lessons learned have not been applied to interconnections for FOM projects. Clean Coalition supports instituting binding timelines for all projects under 1 MW, and where possible, up to 5 MW. This should be particularly feasible for any project that is eligible for a Fast Track interconnection process.

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[3] https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M539/K999/539999224.PDF See p. 149.
[4] https://clean-coalition.org/community-microgrids/valencia-gardens-energy-storage-project/
[5] https://www.utilitydive.com/news/grid-interconnection-queue-berkeley-lab-lbnl/712926/

In addition to streamlined timelines, many small BTM projects pay fixed interconnection costs. For Net Energy Metering projects in SCE's service territory, the current cost is $93 for projects under 1 MW.[6] In comparison, the costs for a FOM interconnection are far higher. A Clean Coalition analysis of Fast Track FOM projects in California IOU service territories found that costs can range from $42,900-$594,800, with an average cost of $312,450. Clean Coalition has a proposal to extend the treatment of fixed costs to FOM systems, called Fixed Fee & Utility Pays, or FixUP. Key features of FixUP include:

- The Fixed Fee is estimated at $10,000. See the image below for FixUP cost components.
- All FOM projects that are no larger than 1 MW will avoid the bureaucratically complex and unnecessary process of having to pay for grid upgrades and then legally deed those upgrades to the utility, as well as avoiding the need for an escrow account, which eliminates further complexities and costs.
- For FOM projects that are no larger than 1 MW and that do not meet all of the other Fixed Fee eligibility criteria, the utility will still directly pay for any interconnection costs to streamline the interconnection process for these small FOM projects and then recover those costs based on standardized unit costs, which each utility already publishes annually.
- The Clean Coalition estimates that FixUP will yield an average of at least **$25,000 in bureaucratic savings alone** per FOM project.

Description	Fees
Pre-application report	$600
Application submittal / Scoping meeting (Fast Track and standardized interconnection fee approval)	$800
Technical study / Supplemental Review	$2,500
Results review meetings	$750
Pre-construction meetings, final construction drawings, engineering costing, site visits for inspection, and actual interconnection	$5,350
Total:	**$10,000**

[6] https://www.sce.com/residential/generating-your-own-power/net-energy-metering

Cost components of the Clean Coalition's FixUP proposal

The Clean Coalition also advocatess that the final report include a recommendation that utilities should allow verified third parties to conduct distribution grid upgrades. One of the slowest part of the interconnection process can be waiting for the utility to conduct grid upgrades and then deeding the infrastructure equipment to the utility (e.g., the cost of ownership and deeding process). This waiting period can be exacerbated if the incumbent utility is already bogged down conducting other grid upgrades or is short-staffed. In California, Rule 21 currently permits third-party construction on interconnection facilities, subject to approval by the distribution provider.[7] Using a third-party contractor may not necessarily result in lower costs, but it **does** result in faster completion of any necessary construction.

Streamlining interconnection must mean applying lessons learned to FOM interconnections as well as BTM interconnections, including through the implementation of fixed fees and ideally, binding timelines.

Solution 2.1 – Provide pre-application educational materials and self-service options for smaller DER projects

The Clean Coalition strongly supports this goal, including the recommendation to address upgrade-related costs. In California, the IOUs offer a Unit Cost Guide for Rule 21 projects,[8] which details a non-binding cost estimate for each type of infrastructure upgrade that may be required to interconnect a project to the distribution grid. SDG&E's Unit Cost Guide, referenced in footnote 7, includes 7 categories: 12/16kV 480-volt transformers, overhead to underground poles and cables, overhead service, underground to underground cables, metering, telemetry, and system equipment. While the costs may be similar, ideally a WDAT Unit Cost Guide would be valuable to applicants seeking to interconnect a FOM project.

[7] See D. 20-09-035, at p. 102. https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M347/K953/347953769.PDF
[8] https://www.sdge.com/sites/default/files/documents/SDGE%20Updated%20Rule21%20Unit%20Cost%20guide%20-%202023_0.pdf

The report should note the importance of having a pre-application report that a developer can utilize before submitting a full application. In California, a pre-application report costing $300 provides the following information:[9]

1) Total substation/area bus or bank & circuit capacity (MW) likely to serve proposed site.
2) Allocated Capacity (MW) of substation/area bus or bank and circuit likely to serve proposed site.
3) Queued Capacity (MW) of substation/area bus or bank and circuit likely to serve proposed site.
4) Available Capacity (MW) of substation/area bus or bank and circuit most likely to serve proposed site.
5) Substation nominal distribution voltage or transmission nominal voltage if applicable.
6) Nominal distribution circuit voltage at the proposed site.
7) Approximate circuit distance between the proposed site and the substation.
8) Relevant Line Section(s) peak load estimate, and minimum load data, when available.
9) Number of protective devices and number of voltage regulating devices between the proposed site and the substation/area.
10) Whether or not three-phase power is available at the site.
11) Limiting conductor rating from proposed POI[10] to distribution substation.
12) Based on proposed Point of Interconnection, existing or known constraints such as, but not limited to, electrical dependencies at that location, short circuit interrupting capacity issues, power quality or stability issues.

Ensuring that a developer has the ability to request a pre-application report for both BTM and FOM projects is important. The fee for a FOM project may be higher given the ability to interconnect a substantially higher capacity project.

Solution 2.3 – Implement and enforce appropriate DER interconnection study timelines and consider penalties for delays in completing studies

FERC Order 2023 requires the implementation of study delay penalties for projects utilizing the *pro forma* SGIP and LGIP. The roadmap should include the recommendation that all utilities include penalties in compliance filings.

Solution 2.4 – Continue automating the DER interconnection process & Solution 2.5 – Automate parts of the DER interconnection study process

9 https://clean-coalition.org/wp-content/uploads/2019/01/PAEC-Task-4.2_Final-Interconnection-Best-Practices-Report-04_wb-13-Sep-2017-1.pdf

10 Point of Interconnection

The Clean Coalition strongly supports automating portions of the interconnection process to increase efficiency and has been advocating for automation in California for more than six years. See the report authored by the Clean Coalition and Green Power Institute on ways to automate the Rule 21 interconnection process in California, attached a separate attachment to the email submitting these comments. The report mainly includes recommendations for automating the interconnection process for projects sized over 500 kW, aimed to:

1) Saving as much as 10-40 business days in the application and completeness review stage;
2) Saving as much as 10-30 business days in the Initial Review and Supplemental Review;
3) Saving as much as 30-60 calendar days in the Generator Interconnection Agreement (GIA) review and negotiation process.

Automating the application process and completeness review, automating (at least partially) Initial Review, automating (at least partially) Supplemental Review, combining Initial Review and Supplemental Review, and frontloading and automating the GIA are a few steps that should be considered. These automation proposals for California's Rule 21 should also be applied to FOM interconnections. More recent improvements in AI/ML will increase the possibility for further process efficiencies.

<u>In addition, the report misses an important recommendation that utilities should automate the intra-utility process of managing each interconnection application.</u> A single application may jump between multiple departments within a utility (which may be siloed and not communicating frequently), and certainly to different staff members. Applications that take a long time to complete may also lead to numerous case managers, leading to needless restudies or changing positions on equipment requirements. Ensuring that the entire process within the utility for managing an application is digitized and automated to ensure that each step is tracked via software will improve efficiency and conserve utility resources on a per-application basis.

Solution 2.6 – Enable flexible interconnection

See the response to Solution 1.4.

Solution 2.7 – Use a group study process to address existing queue backlogs or avoid anticipated queue backlogs

While the Clean Coalition supports an option for group studies, especially for projects sited in a similar geographic location, we continue to support having an option for DER to be studied in a serial process. Depending on the number of DER applications and the size of proposed projects, a cluster study process may not necessarily result in faster interconnections.

Goal 3 – Promote Economic Efficiency in Interconnection

High upgrade costs result in a significant number of withdrawn applications or developers avoiding siting projects in certain locations on the distribution grid altogether. This trend also has equity implications, as the distribution grid tends to have far less available hosting capacity (and undergoes fewer upgrades) in disadvantaged communities than wealthier communities.[11] Updating the cost-causer model in favor of a more equitable cost sharing model is an important way to increase development all across the distribution grid, rather than solely in certain areas.

Solution 3.1 – Reform the existing "cost-causer-pays" model

Given the rising cost of upgrades for DER projects and the need to upgrade an increasing number of feeders, reforming the cost causer model has the potential to promote DER deployments and reduce application withdrawals. Different options are being tested throughout the United States. Maryland is discussing a model that will allow utilities to recover upgrade costs for smaller DER and charge a proportional fee for larger projects. Maine has determined that installing new transformers—for projects under 25 kW—benefits the ratepayers and the costs should be rate based. Projects under 25 kW will pay a flat fee of $150 for upgrade costs not exceeding $5,000 and projects from 25 kW to 250 kW will pay a per kW fee for upgrades not exceeding $10,000. Minnesota now allows upgrade costs below $15,000 for projects under 40 kW to be covered via a $200 fee, and Massachusetts has implemented an option where ratepayers will be assessed a nonbypassable charge to recover the costs of capital investment projects will be like distribution substation replacements and reconductoring distribution feeders.[12] These examples should be

[11] https://escholarship.org/uc/item/6pc2k2tv

[12] https://www.powermag.com/interconnection-cost-causer-pays-model-is-it-fair-or-antiquated-in-the-era-of-grid-modernization/

included in the final report, in addition to referencing New York, so regulators across the country can understand that this is not just an out-of-the-box solution, reforming the cost-causer model has been done in multiple states. In addition, the report should note that the research community can aid the process by studying the results in locations where a cost-sharing model has been implemented to determine the savings and/or increase efficiency. Finally, utilities can take the onus by proposing pilots to help regulatory agencies determine the feasibility of adopting a cost sharing model.

Conclusion

The Clean Coalition appreciates the opportunity to provide comments on the draft report. We applaud the i2X program for all the work that has gone into the development of such an in-depth document and look forward to seeing a final document that can be cited when discussing ways to reform DER interconnections.

Sincerely,

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