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Clean Coalition Comments on May 4th and 9th Workshops on Interconnection

Additional submitted attachment is included below.

23 May 2023

California Energy
Commission
715 P Street, Sacramento,
CA 9581
Via Electronic Filing

CEC Docket 23-IEPR-05: Clean Coalition Comments on May 4th and 9th Workshops on Interconnection

Dear Chair Monahan, Vice Chair Gunda, California Energy Commission Members, and Staff,

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.

The presenters at the workshop did a good job explaining what the existing interconnection process looks like and showcasing success stories, particularly with smaller projects. The relatively short timelines and low costs for interconnecting small projects, especially Net Energy Metering (NEM) rooftop solar and paired solar+storage, represents the collective work that has been done to streamline Rule 21 interconnection. Similarly, the presentation on Distribution Planning and Distribution Resources Planning showed the complicated nature of the process and demonstrated why California is on the forefront when it comes to integrating DER onto the distribution grid, albeit the next step of including DER in the Integrated Resources Planning (IRP) has not yet been achieved. These aspects of grid planning and functionality have enabled grid operations and project deployments that have put the state on track to meet interim renewable energy goals thus far.

With that being said, achieving building and transportation electrification along with ensuring the grid is resilient enough to combat threats from climate change will require an unprecedented transition, in terms of the scope of the change and the relatively short period of time it will need to occur in. Each aspect of the procurement process must be further streamlined to handle the required buildout of grid infrastructure and efficient deployment of clean energy resources to ensure that the pace of progress will keep the state on track to meet the mandated climate and energy goals that. Currently the CPUC is considering potential reforms to the Distribution Planning Process (DPP) in the High DER proceeding (R. 21-06-017) and the Clean Coalition appreciates that this IEPR is addressing interconnection and the ways that resource deployment relies on an efficient process for locating/conducting distribution upgrades. In the case of both interconnection and distribution planning, the pace of implementing process improvements needs to increase to enable sustained historic rates of deployment; existing deficiencies, even those that may result in small delays at present, could very easily be exacerbated into significant system flaws.

Therefore, the Clean Coalition's comments reiterate the need for significant reform of the utility's WDAT tariffs. Part of the concept of the CPUC proceedings that have focused on streamlining interconnection under Rule 21 is to apply those lessons learned to WDAT, which has unfortunately not occurred thus far. The last time the investor-owned utilities (IOUs) had WDAT approved at the Federal Energy Regulatory Commission (FERC) was SDG&E in 2015, SCE in 2019, and PG&E in 2021.[1] The lack of focus on WDAT interconnection reform is part of the reason that CPUC-sponsored wholesale distributed generation (WDG) programs have not had more success. Unlike larger transmission-interconnected projects that are studied in a cluster study and usually have interconnection costs that are only but a fraction of the total project cost (or have the cost of upgrades socialized), developers of smaller WDG projects need information about the interconnection experience early in the process, since expensive upgrades—represent a high fraction of the project cost, and—can be devastating for project economics.

WDAT interconnection reform is necessary:
Streamlined WDAT interconnection that reduces the length of the process, reduces costs, or leads to a cost estimate being presented earlier in the process will reduce the amount of attrition by giving developers a greater amount of certainty. ICA data and grid maps to help with these issues do exist, but utility engineers have the final say about any required infrastructure upgrades, potentially pushing the point of budgetary certainty for a project as far back as years into the interconnection process.[2] Developers will often submit an application just to get a position in the queue or to receive accurate information about the cost allocation for potential upgrades, despite having no intention of completing the interconnection process if the information is unfavorable. This practice, which occurs because of a lack of clear information presented up-front and an interconnection process that is not determinative, wastes time and resources for both the developer and the utility. Improving the efficiency of the process will help reduce the strain caused by massive CAISO cluster studies and an influx of new distributed generation projects.

First, the Clean Coalition recommends a Fixed Fee, Utility Pays (FixUP) proposal for eligible WDAT projects. The proposal, which will significantly streamline the interconnection process and reduce costs, was initially mentioned in our comments on the IEPR Scoping Memo. Key facets of the proposal include:

- FixUP will allow front-of-meter (FOM) projects to determine whether they qualify for Fixed Fee interconnection based on publicly accessible eligibility criteria. The Fixed Fee is estimated at $10,000.
- All FOM projects that are 1 MW or smaller will avoid the bureaucratically complex 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 1 MW or smaller and that do not meet all other Fixed Fee eligibility criteria, the utility will still directly pay for any interconnection costs to streamline the

[1] The last significant WDAT amendments were in 2015 (SDG&E), 2019 (SCE), and 2015 (PG&E).
[2] For the Clean Coalition's EPIC-funded Valencia Gardens Energy Storage (VGES) project, the point of budgetary certainty was expected at 6.5 months due to use of the Fast Track WDAT interconnection process but ended up at 25 months.

interconnection process for these small FOM projects and then recover those costs based on standardized unit costs guides, which each utility publishes annually.

The Clean Coalition estimates that FixUP will yield an average of at least $25,000 in bureaucratic savings alone per FOM project.

Second, regulators can help shift some of the burden associated with interconnection away from the IOUs by allowing qualified third parties to conduct certain aspects of the process. For example, the Rule 21 interconnection process now allows third parties that have been vetted in advance by the utilities to complete technical engineering studies and take responsibility for the construction of infrastructure upgrades.[3] The process of conducting upgrades can take a lot of time, as can the cost-of-ownership and deeding processes, where the developer pays for the infrastructure upgrades and then gifts the infrastructure to the utility once the upgrades are complete. Allowing third parties to conduct the upgrade and ideally, to also avoid the onerous deeding process, will significantly reduce WDAT timelines.

Better data collection is needed:

In their presentations, each of the IOUs had at least one slide showing the number of applications received (either this year or historically) or showed the number of projects to receive permission-to-operate (PTO) status. This type of information is representative of the amount of progress in streamlining interconnection that has occurred thus far but ignores the fact that there is still progress to be made. Increasing the spotlight on what the interconnection experience is like for developers will help ensure that data-driven reforms are being implemented. The first question that should be answered is what percentage of applicants—for both Rule 21 and WDAT interconnection—submit an application that receives PTO. Understanding what percentage of applicants are successful will show how easy or difficult the existing processes are to navigate. However, the basic numbers do not provide the level of detail about attrition rates that is necessary to streamline the process by themselves. The utilities should also collect data about which step of the interconnection process led the applicant to drop out of the queue and why the decision to drop out was made. This type of data collection is easily done through an online survey or one that is proctored by the utility point of contact with the applicant and will not require a large expenditure to implement.

The existing interconnection processes do not have a mechanism that allows developers to share lessons learned after going through the interconnection process, creating a situation where developers are forced to proverbially reinvent the wheel for each unique project. This might not pose an issue for small rooftop solar projects that are relatively cookie-cutter in nature, with the only major difference being whether a main service panel upgrade is necessary, but it certainly does for larger or more complicated projects.

Increased automation will streamline the interconnection process:

The Clean Coalition and Green Power Institute published a report in 2018 on the benefits that increased automation in the interconnection process would have. Most of the recommendations in the report are intended to apply to behind-the-meter projects over 500 kW as well as FOM projects of any size, because these projects don't currently enjoy the benefits of automation or low/no-cost interconnection that BTM

[3] See Sheet 131 of SDG&E's Electric Rule 21 https://www.sdge.com/sites/default/files/elec_elec-rules_erule21.pdf

projects enjoy.[4] The report is attached as Attachment A to this document. Given the strain of the most recent CAISO cluster studies on the IOUs resources, any opportunity to streamline interconnection via automation should be considered.

ICA maps are essential for interconnection and distribution planning:
ICA Maps will be essential to unlock the full value of DER and ensure that distributed generation projects can be sited in a way that reduces the need for grid upgrades and capitalizes on streamlined interconnection procedures. However, the existing ICA data is not granular/accurate enough to be used consistently by developers when making project siting decisions or in the ways envisioned by the Commission early in the Distribution Resources Planning (DRP) proceeding (R. 14-08-013). While ICA information is used as an input in the interconnection process, a study process conducted by a utility engineer must be completed before an applicant gets an accurate estimate for the cost of required upgrades to interconnect the proposed project. Even PG&E, who has the most advanced maps of the three IOUs has a disclaimer on its DRP website that states, "While the ICA and DIDF maps include the best information currently available, PG&E makes no representation as to the accuracy or quality of the data provided, its fitness for the purpose intended, or its usability by the recipient; PG&E cannot be held liable for inaccuracies or the impact of decisions made on this information."16 As a result, the interconnection queues are still clogged with applicants that are seeking basic site/grid information, spending private money and using utility resources that would not otherwise need to be tied up if the ICA maps had reached the level of viability the Commission envisioned.[5] Both Generation and Load ICA data needs to be validated for quality and fully integrated in the interconnection process so that developers can have actionable information prior to submitting an interconnection application.

Conclusion
The Clean Coalition appreciates the opportunity to submit these comments in response to the two workshops on the interconnection process and we look forward to continuing the dialogue on interconnection reform.

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May 23, 2023

[4] Interconnection Automation and Streamlining Opportunities: Preliminary findings and recommendations
Tam Hunt, GPI and Sahm White, Clean Coalition, 2018 on p. 2.
[5] https://www.pge.com/en_US/for-our-business-partners/distribution-resource-planning/distribution-resource-planning-data-portal.page

Attachment A

Interconnection Automation and Streamlining Opportunities:
Preliminary findings and recommendations

Tam Hunt, GPI
Sahm White, Clean Coalition
With review and assistance by Smarter Grid Solutions, Inc.

This document was drafted as part of the R.17-07-007 Working Group 2, to be included as an appendix to the working group's final report. It is the working group's intention that this document, with further deliberation and cost-benefit analysis, be used as guidance in consideration of an actionable "roadmap" for adoption by the Commission in a later phase of the current proceeding.

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Proposal 8.v for Commission action in relation to this report:

That the Commission review this document and provide guidance on further action within this proceeding regarding:

1) how the Working Group can best schedule additional discussion of the automation and streamlining opportunities identified;

2) review of the likely costs and benefits of implementing the Working Group's automation and streamlining recommendations;

3) coordination of IOU automation investments in line with the Commission's Distribution Resources Plan (DRP) precedent, the DER Action Plan, and consideration of including automation goals in a new DER Action Plan or a separate automation "roadmap."

I. Summary of recommendations and background

The Green Power Institute and the Clean Coalition presented, on April 25, 2018, to Working Group 2 a preliminary review of opportunities for either full or partial automation of the various aspects of the Rule 21 interconnection process in support of the Commission's goal of dramatic interconnection streamlining. After significant dialogue between various Working Group parties, this report describes the initial findings and recommendations for the most promising automation and streamlining opportunities.

The automation engineering firm Smarter Grid Solutions was engaged by GPI to provide feedback to the working group on the proposed recommendations included, and provided broad cost-benefit review of the report's key recommendations.

<u>Most of the recommendations in this report are intended to apply to behind-the-meter projects over 500 kW as well as front-of-meter projects of any size, because these projects don't currently enjoy the benefits of automation or low/no-cost interconnection that small behind-the-meter projects do enjoy.</u>

In terms of the benefits of the recommendations below, the authors of this report see three major time savings opportunities, as follows: 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 GIA review and negotiation process. These potential savings add up to as much as six months savings for each Fast Track interconnection application.

Time savings are significant wherever projects are operating under a restricted schedule, such as in solicitations for DER to meet location-specific needs, compliance mandates, or funding opportunities. These savings can also be substantial because many developers, particularly for front-of-meter projects, must go through an interconnection process <u>multiple times</u> before a viable location is found. While ICA and Pre-application Reports (PAR) help with this, the ICA only addresses some factors, and the PAR require $1,100 and 40 days each for detailed information, and PAR information is not definitive (only interconnection studies are definitive). As such, time savings for going through the interconnection process each time can add up quickly and lead to substantially reduced overall development timelines and related costs. These cost savings will be passed on to ratepayers.

It is also important to note the distinction between behind-the-meter and front-of-meter projects in terms of development timelines and prioritization. For front-of-meter projects, completing interconnection studies early in the development process is imperative, in order to test project viability in light of the expected interconnection costs. Smaller wholesale projects (ReMAT and RAM, for example) are particularly sensitive to project costs because profit margins are thin. Moreover, utilities are increasingly requiring Fast Track studies (phase 2 studies or their equivalent like Fast Track) to be completed <u>before</u> bids may be submitted into RFPs.

A summary of key opportunities for automation and streamlining follows, with information about each utility's status with respect to each automation:

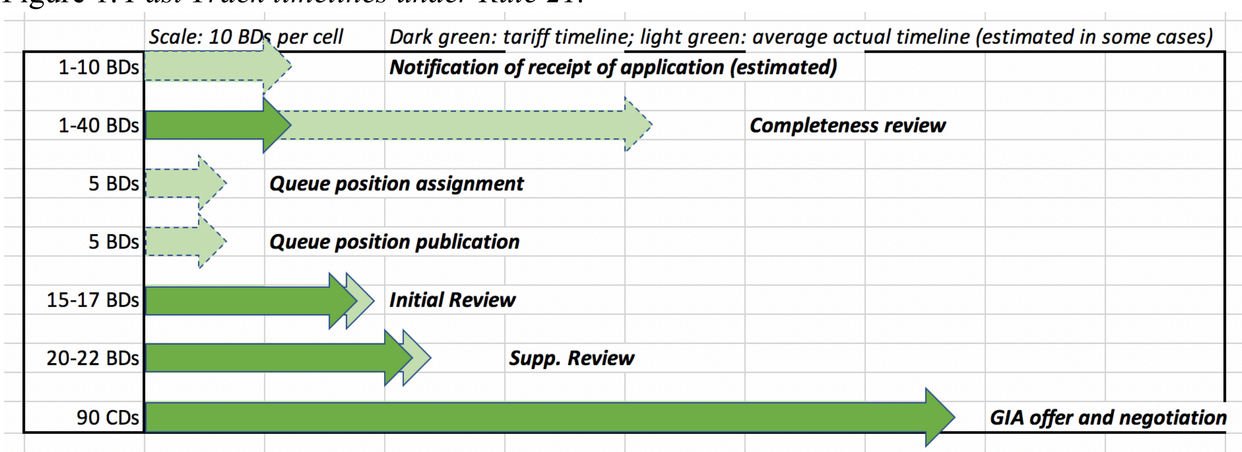
- **Automating the application process and completeness review**. Utilities must inform the applicant whether the application is deemed complete, or must be corrected, within 10 business days (BDs) after receipt of the Interconnection Request (E.5.a). In practice, this step can take two months or longer if multiple corrections are required (as is common for larger projects). Automation of the interconnection portal and application processing could reduce this step to one day for those projects that don't need corrections, as well as dramatically reduce the time required for each round of corrections, and can build upon existing on-line application portals for net-metered projects, which already significantly reduce application processing times through partial automation. PG&E states that it has already planned for the work required to automate the application portal and its small NEM application review is already automated. SCE has gone out to bid for similar work to update and partially automate its interconnection portal, but the full extent of this effort is not known at this time. SDG&E's DIIS portal is already partially automated but SDG&E has no plans to further automate its portal.
- **Automating (at least partially) Initial Review**. Initial Review must be delivered within 15 BDs of the application being deemed complete (F.2.a). If applicable screens can be cleared automatically through use of data from the online application inputs and ICA data, it may be feasible to reduce the Initial Review to 1 BD. This report identifies feasible ways for achieving this level of automation. PG&E agrees with the merits of automating IR, and notes that all screens except F and G are already automated, but considers it necessary to maintain the 15 BD review in order to allow engineers to study mitigation options for projects that fail IR.[1]
- **Automating (at least partially) Supplemental Review**. Supplemental Review must be completed within 20 BDs (F.2.c). Parts of SR may already be automated with the existing ICA (screens N and O are already automated with the current ICA). Under the currently-defined SR screens, this leaves only screen P, a "catch all" safety and reliability screen, to be completed in SR. PG&E agrees that parts of SR can be automated but note that a cost/benefit analysis should be completed before a decision on full automation is made by the Commission.
- **Frontloading Supplemental Review screens N and O into Initial Review.** Projects that are less than or equal to displayed ICA value, or otherwise expect to interconnect without need for Supplemental Review, may be susceptible to largely automated initial review. Frontloading screens N and O into IR will allow an easier automation of Initial Review because screen N makes screen M redundant and screen O renders some IR screens, or at least part of those screens, redundant. (This recommendation may be mooted by changes contemplated in the Issue 8 draft proposal for changes to screens M and N)
- **Combining Initial Review and Supplemental Review**. Only applies to projects that select this option, which will generally be 500 kW and larger behind-the-meter and front-of-meter projects of any size. Combined review could either be a serial study process, skipping the IR results meeting, or a concurrent study process. Revised timelines and fees for the combined IR/SR to be determined as part of the working group process.

[1] GPI notes that the utilities don't generally offer mitigation options until Supplemental Review is completed, so it is not clear that a 15 BD timeline for IR is necessary if this is the case, even for projects that fail IR. In GPI's experience, IR results in a short report stating which screens, if any, are failed, with information about the applicant's choices for how to proceed.

- **Frontloading and automating the Generator Interconnection Agreement** (GIA) generation and offer process. A GIA currently must be offered to most applicants within 15 BDs of passing Initial Review or 15 BDs of applicant's request after passing Supplemental Review (F.2.c.iv). This step could be "frontloaded" by offering a fully or partially populated provisional GIA once an application is deemed complete, allowing the applicant to begin detailed review of the draft GIA much earlier than under the existing process. Execution of the final GIA may be streamlined by such frontloading and also by including the key IR or SR results in a second, automatically-generated, GIA, such that the fully populated draft GIA generation process takes only 1 BD for the large majority of projects instead of the 15 BDs currently allowed in the tariff. Frontloading of the initial GIA should also reduce the 90 CD negotiation period. PG&E is already planning this work but notes that it will be difficult to automate inclusion of mitigation options into the GIA. SCE has recently completed a behind-the-meter energy storage interconnection pilot that included frontloading the GIA; SCE has no plans currently to expand this pilot approach to additional technologies.

Figure 1 illustrates the Rule 21 Fast Track tariff-specified timelines (darker green arrows) and average actual timelines (lighter green arrows), with estimates in dashed arrows, for projects over 500 kW. Where there is no dark arrow there is no tariff-specified timeline.[2]

Figure 1. *Fast Track timelines under Rule 21.*



The utilities have already significantly and effectively leveraged automation to streamline the application submission process and some additional aspects of application management and review, as described below. <u>Existing utility automation efforts have, however, focused on smaller net-metered systems</u>, but those existing efforts can in many cases be expanded to include over 500 kW behind-the-meter <u>and</u> front-of-meter projects of any size seeking to interconnect under Rule 21. Costs and benefits of expanding these existing procedures is discussed at the end of this report.

[2] Sources: IREC R.17-07-007 2018 data requests and responses from PG&E and SCE (SDG&E is excluded because data set was so small); interconnection experience by GPI attorney Tam Hunt working with his private clients over the last decade; and other developers such as Tesla working with thousands of C&I solar projects.

There are also a number of pilot projects that will be useful for automation and streamlining efforts in this proceeding, including the DOE and CEC-funded EASE pilot project that is hosted by SCE, and the Interconnection Online Application Portal (IOAP) pilot being developed by AVANGRID in New York. These efforts are described further below.

We describe below how many aspects of the interconnection process could be automated for the large majority of projects. While achieving such automation sounds ambitious, we want to stress the phrase "for the large majority of projects." Reaching full automation of interconnection for all projects is a longer-term goal that may not be warranted given the costs of achieving such wide-scale automation—if, for example, only a small number of projects per year would benefit from these improvements. But increasingly robust automation, or even full automation of review for the large majority of projects, is an attainable and probably cost-effective task (more work will be required in examining costs for some aspects of automation)[3] at this time.

We must also consider the intent of AB 327 and the Commission to encourage DER, rather than only reacting to DER interconnection issues, by proactively creating a dramatically streamlined interconnection process.[4]

II. How does the existing Rule 21 interconnection process work?

It is helpful to consider the following Figures 2 and 3 showing the full timeline for Fast Track interconnection for both front-of-meter projects and a 1 MW behind-the-meter project, including pre-application items and post Interconnection Agreement items.

[3] We include some considerations on cost-effectiveness at the end of this report.

[4] D.17-09-026 in the DRP proceeding, created by AB 327, echoes the DRP's Final Guidance document in calling for "dramatic streamlining" of the interconnection process as a key step for helping DERs (p. 26)."

Figure 2. *Interconnection costs and timelines for Rule 21 Fast Track 1 MW front-of-meter.*[5] [6]

Wholesale DG timelines and costs

Clean Coalition

WDG Rooftop 1 MW Fast Track Project Development (Project where ICA map indicates sufficient capacity)	Timeframe (BD) Max	Timeframe (BD) Min	Timeframe (BD) Typical	Fees Max	Fees Min	Fees Typical	Costs Max	Costs Min	Costs Typical
PRELIMINARY WORK AND SITE CONTROL	371	113	216						
Site Selection	2	1	1	$-	$-	$-	$600	$200	$300
Preliminary site evaluation and project screening	2	1	2	$-	$-	$-	$600	$150	$300
Preliminary layouts and performance models	7	1	3	$-	$-	$-	$4,000	$1,000	$2,000
Site control (Lease Option Agreeement)	180	60	100	$-	$-	$-	$40,000	$15,000	$25,000
Preapplication reports	60	30	35	$600	$300	$600	$1,500	$500	$1,000
Other site research and selection	120	20	75	$5,000	$500	$1,500	$15,000	$3,000	$9,000
INTERCONNECTION REQUEST AND INITIAL REVIEW	50	23	37						
Prepare and submit interconnection application	10	3	5	$800	$800	$800	$20,000	$5,000	$10,000
Utility deems application complete	10	5	7	$0	$0	$0	$0	$0	$0
Initial review results	15	15	15	$0	$0	$0	$4,000	$2,000	$3,000
Developer requests initial review results meeting or proceeds to supplemental review	10	0	5	$0	$0	$0	$0	$0	$0
Initial review results meeting (if clear, go to GIA cost estimate or GIA)	5	0	5	$0	$0	$0	$1,000	$500	$750
INTERCONNECTION SUPPLEMENTAL REVIEW	110	50	70						
Decide to proceed to Supplemental Review	15	0	5	$2,500	$2,500	$2,500	$600	$150	$300
Supplemental review results	60	20	30	$0	$0	$0	$4,500	$2,100	$3,300
Developer requests supplemental review results meeting	15	0	5	$0	$0	$0	$0	$0	$0
Supplemental review results meeting	5	0	5	$0	$0	$0	$1,000	$300	$500
Decide to proceed to GIA draft	30	30	30	$0	$0	$0	$0	$0	$0
POWER SALES CONTRACT	340	100	180						
Review power sales options	100	20	60	$0	$0	$0	$5,000	$2,000	$3,500
Obtain Power Purchase Agreement	240	80	120	$2,000	$0	$1,000	$20,000	$5,000	$12,500
Negotiate GC/EPC and engineering contracts	30	10	20	$-	$-	$-	$10,000	$1,000	$5,000
GENERATOR INTERCONNECTION AGREEMENT (GIA)	60	1	30						
GIA negotiations and signatures (90 Calendar Day max time allowed)	60	1	30	$0	$0	$0	$5,000	$2,000	$3,500
GRID UPGRADES CONSTRUCTION**	250	0	190						
Grid upgrade costs				$0	$0	$0	$300,000	$0	$150,000
O&M costs (Cost of Ownership or COO)***				$0	$0	$0	$150,000	$0	$75,000
Coordinate upgrade construction with utility, deed transfers				$0	$0	$0	$10,000	$2,000	$6,000
PTO				$0	$0	$0	$1,000	$500	$750
COD				$0	$0	$0	$1,000	$500	$750
Totals (accounting for overlapping times)	1181	287	723	$10,900	$4,100	$6,400	$594,800	**$42,900**	$312,450
"Typical" Totals			**723**			**$6,400**			**$312,450**

[5] These charts are meant to show comparison data for real-world experience developing front-of-meter and behind-the-meter projects, not idealized timelines based only on tariff-required timelines. For example, PAR costs and timelines cover 1-2 PARs per project b/c it's almost never "one and done" in terms of finding a site that works.

[6] Tesla offers the following comments on Figure 2:

> Timelines can be longer if there is a line-side tap or AC Disconnect variance review is required, or non-standard equipment is utilized for the functionality of the design. Extensive NEM-A arrangement causes longer than normal land review (sometimes this can take 20 to 40 business days). Additional delays in timelines are incurred when PV is paired with battery energy storage systems (BESS).

Figure 3. *Interconnection costs and timelines for 1 MW NEM projects.*

Net Energy Metering (NEM) timelines and costs

Clean Coalition

NEM Rooftop 1 MW Project Development (TPO)	Timeframe (BD)			Fees			Costs		
	Max	Min	Typical	Max	Min	Typical	Max	Min	Typical
PRELIMINARY WORK	245	30	45						
Customer acquisition and site selection	75	5	20	$-	$-	$-	$10,000	$2,500	$5,000
Preliminary site evaluation, Preapplication Reports, and project screening	60	5	10	$2,500	$600	$1,600	$10,000	$2,500	$5,000
Preliminary layouts and performance models	30	5	5	$-	$-	$-	$4,000	$1,000	$2,000
Avoided cost and project models	20	5	5	$-	$-	$-	$3,000	$1,000	$1,000
Proposal and LOI	60	10	5	$-	$-	$-	$3,000	$1,000	$1,000
POWER SALES CONTRACT	140	40	50						
PPA/lease negotiation	60	10	20	$-	$-	$-	$3,000	$1,000	$1,000
Site due diligence (structural, roof condition, soils, electrical/services, etc)	50	20	20	$-	$-	$-	$10,000	$1,000	$5,000
Negotiate GC/EPC and engineering contracts	30	10	10	$-	$-	$-	$10,000	$1,000	$5,000
INTERCONNECTION REQUEST AND GENERATOR INTERCONNECTION AGREEMENT	150	50	105						
Prepare and submit interconnection application; receive response from IOU	90	20	60	$145	$145	$145	$20,000	$5,000	$10,000
Negotiate NEMEXP IA (Form 79-978, for 1,000 watts or less)	60	30	45	$-	$-	$-	$3,000	$250	$500
GRID UPGRADES CONSTRUCTION**	200	0	180						
Grid upgrade costs				$0	$0	$0	$0	$0	$0
Coordinate upgrade construction with utility				$0	$0	$0	$5,000	$500	$1,000
PTO				$0	$0	$0	$1,000	$250	$500
COD				$0	$0	$0	$1,000	$250	$500
Totals (accounting for overlapping times)	590	75	302.5	$2,745	$745	$1,745	$83,000	$17,250	$37,500
"Typical" Totals			**302.5**			**$1,745**			**$37,500**

III. What is automation?

For the purposes of this report, partial automation is defined as follows:

> Partial automation of the Rule 21 interconnection process constitutes automation of various sub-components of the process in the near-term (1-2 years) and mid-term (3-4 years).

Full automation is defined as follows:

> Full automation of the Rule 21 interconnection process would be a procedure that requires *de minimis* human intervention for the large majority of applications from receipt of application through final review and draft Interconnection Agreement (for Fast Track).

It should be stressed that full automation efforts will likely apply to the "large majority" of projects, not all projects, since issues will very likely arise for some projects that may always require some human intervention.

Our intention is not to pursue automation and streamlining for its own sake but in order to improve rates, to increase the delivery of renewable energy, and to help the state meet its energy and climate change goals. Accordingly, this document outlines efforts that will help to meet these objectives.

IV. The DRP and automation: DRP ICA Working Group Final Report

The DRP's ICA Working Group Final Report (R.14-08-013) adopted a number of recommendations with respect to automation. Perhaps the key passage states, with respect to automation:

> As a long-term vision, and not part of the ACR's [six-month] scope, some members of the WG envision that the ICA should be updated on a real-time or daily basis to the extent possible to allow the reflecting values to be used in **an automated interconnection process**. Future enhancement should work towards this goal, while considering issues such as the following in coordination with the Rule 21 proceeding:
>
> - **Development of automated interconnection studies which considers specific application information that cannot be known ahead of time to be reflected in ICA**. Generation queuing, commercial operation dates, and planned work/transfers can all have a unique impact on certain locations in the system and currently must be considered application-by-application with manual engineering review.

Automation is mentioned over 20 times in the Final Report; some examples are as follows:

- "PG&E notes that if full automation is desired, then focus must shift to automating more of the interconnection process versus the proactive ICA, which can only improve portions of the interconnection review."
- "SCE reiterates that it would incorporate significant changes to new circuit models on a monthly basis. SCE is currently developing automated processes to maintain the accuracy of network models and data as changes on the distribution system occur, as part of full system-wide deployment of ICA."
- "SDG&E currently automatically updates its models daily, but those are not currently validated for ICA purposes. SDG&E would need to validate those models that have monthly changes for the ICA update."

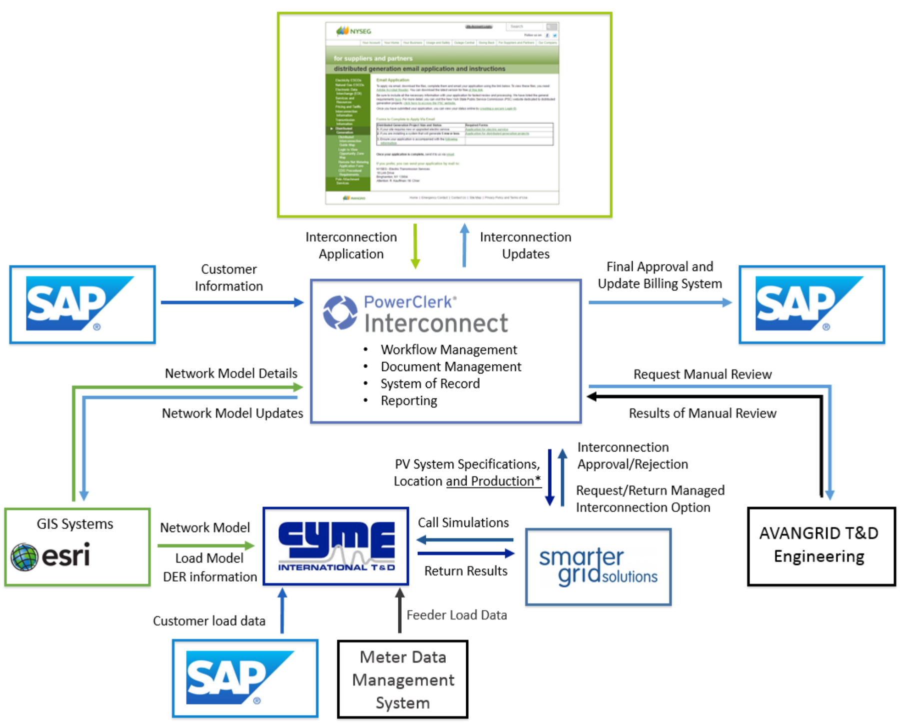
The DRP proceeding (R.14-08-013) Track 1 decision (D.17-09-026) adopts the Final Report and also the DRP Final Guidance language with respect to the need to "dramatically streamline" interconnection (p. 26): "[O]ne of the key purposes of the DRP is to dramatically streamline the interconnection process."

V. Similar automation efforts

There are a number of similar efforts that we can look to for guidance in this proceeding. Specifically, the following efforts are helpful as guidance (arranged chronologically):

- EnergyNet 2011 and 2013 (final report) >> this is a precursor to the ICA; funded by CEC
- SP Energy Networks in the UK "Utility Map Viewer" (the model for IOAP)

- AVANGRID's (NY) Interconnection Online Application Portal (IOAP), is a partnership between Clean Power Research, Eaton (provider of the distribution simulation software CYME), and Smarter Grid Solutions. The proof of concept is finalized, with final product rollout expected in 2018/2019, pending regulatory approvals and funding. Relevant program details are as follows:
  - Clean Power Research to automate the administrative side of the interconnection process
  - CYME to automate the technical screening/power flow analysis
  - Smarter Grid Solutions (SGS) to automate its Flexible Interconnection analysis
  - Objectives:
    - Fully-automated interconnection processes
    - Hosting capacity maps – Static and Flexible hosting capacity
    - Data transparency for developers
  - IOAP intends to automate the full range of screens within the NY Standard Interconnection Requirements in the final product rollout, and has successfully demonstrated automation for a number of screens within the proof of concept:
    - Screen A: Anti-Islanding
    - Screen B: Fault Duty Contribution
    - Screen C: Primary Distribution Interconnection
    - Screen D: Transmission Interconnection Adjudication
    - Screen H: Distribution Equipment
    - Screen K: Voltage Rise
    - Screen L: Voltage
  - The schematic for the IOAP automation effort is as follows:



- New York State has created functional requirements for an Interconnection Online Application Portal. Each of the utilities in the state must submit plans for its implementation as part of their distribution system integration plan (DSIP) filings.

- DOE/CEC-funded EASE project, hosted by SCE
  - This is a broad-ranging effort to automate much of the interconnection process for all DER, as well as a management system (DERMS) for interconnected projects
  - EASE is focused on, *inter alia*, reducing interconnection time for >100 kW DER to five days or less (as described by the Smarter Grid Solutions program brochure)
  - This effort is also underway in 2018, with the project design basically complete, according to Smarter Grid Solutions, and testing set to begin in 2019, with field trial beginning in late 2019

VI. What is already automated in Rule 21?

A number of different aspects of Rule 21 have already been automated to varying degrees, including the following:

- NEM application acceptance and review for projects under 30 kW is partially automated for some utilities, starting in 2013 for PG&E and 2012 for SDG&E
- SCE, e.g., has at least partially automated the following:
  - Power Clerk Interconnect (PCI) for Online Application for NEM and Rule 21-non-export projects
    - While the intake process is through PCI, several internal handoffs are still required to process certain type of projects (New services NEM-aggregation, Meter adopters, NGO, etc.)
  - Customers are able to see the project status and can provide documents via the tool until PTO is issued
    - Limited integration with back-office systems which requires data from multiples sources gathered for technical review
    - Not all projects go through PCI, requiring additional handoffs and thus delays
    - Tesla notes that C&I projects have 3-5 changes to applications over their lifespan. This results in 4-12 weeks of avoidable delay on average per project when waiting for a simple update in the portal to resubmit and/or submittal of documentation in a timely manner
- Planned future efforts for SCE:
  - PCI or a similar tool is envisioned to support all projects seeking to interconnect to the distribution grid
  - Envisioned to integrate with existing and future back-office systems
  - Envisioned to streamline the DER Interconnection process through business process Optimization and Automation

    - Funding review is underway and although initial funding for limited scope was authorized, additional funding may be required at a future date and functionality may be contingent on funding allowances
    - Final scoping and related timelines remain under review
- PG&E has also automated standard NEM under 30 kW
    - PG&E is also undertaking several initiatives to further enhance its automation. This would include expanding its online invoicing, to projects submitted through the ACE-IT portal greater than 30 kW and less than 1 MW.
    - PG&E has partially automated the Preapplication Report process
    - Has already partially automated a number of Initial Review screens: A, B, F, G, J, K, M
- The ICA value generation process is automated and the final ICA is to be completed by late 2018 (pushed back from July 2018)

VII. How can Rule 21 interconnection be automated?

This section looks at the various aspects of the Rule 21 interconnection process and identifies opportunities, at a high level, for partial or full automation.

A. Automating the application portals

- IOUs already have online portals for submitting NEM solar interconnection applications, representing partial automation of this aspect of the interconnection process. Much more can be done, however, to further automate these portals, particularly expanding the automated process above the 30 kW limit to all distribution-connected DERs (behind-the-meter and front-of-meter)
    - E.g. PG&E "standard NEM interconnection" is mostly automated
    - SCE here
    - SDG&E here
- Potential revisions to utility interconnection portals is scoped as Issue 22 in the R.17-07-007 Scoping Memo, but this scoping item does not specify automation or "dramatic streamlining," which is the focus of the present report.
- Automation of front-of-meter DER and over 500 kW behind-the-meter should be map-interactive, with ICA values displayed on the interconnection maps plus a link to the application portal
    - This is the beginning of the "Click n Claim" process that GPI has advocated in the present proceeding
- NY's IOAP (Interconnection Online Application Portal) is a good model to emulate for the "nuts and bolts" of a comprehensive automated application portal, as discussed above. The IOAP will be a fully automated application portal and interconnection process, similar to the Click n Claim proposal, once completed

B. Automating application processing and the "deemed complete" determination

- An application must be processed by the utility within 10 Business Days (BDs), applicant notified of receipt, and if the Interconnection Request is deemed complete or not (E.5)
- If the online portal application is populated correctly, this is automatable in two different ways:
    1. Provide template single-line diagrams (SLDs), that can be modified as required, for simpler projects. SDG&E's DIIS system has largely automated this process for NEM projects, including an automated SLD process template that applies to many straightforward projects by allowing the customer to select a generic generator configuration from the DIIS tool instead of supplying a project-specific SLD, and that generic configuration then serves as the SLD
    2. Larger behind-the-meter and front-of-meter projects require more complex SLDs and for this type of project dialogue windows should specify the needed information in order to safely interconnect such projects without requiring individualized SLD review
- If deemed complete, applicant is notified automatically by email that Initial Review will be completed within 15 BDs (E.5.a, F.2.a)
- If not deemed complete, applicant is notified automatically of the deficiencies and that it will have 10 BDs (per the tariff) to cure (E.5.b). Deficiencies will often result in multiple rounds of corrections, with each round requiring 10 BDs by the IOU. With an automated application portal, the need for corrections should be significantly diminished and the turnaround time for notifying applicants of deficiencies may also be significantly diminished.

C. Automating the queue position assignment

- Applies to all front-of-meter applicants; queue position assigned based on date application received if no deficiencies were found, but otherwise assigned when "deemed complete" (E.5.c)
- This can be automated by linking the required databases

D. Automating queue publication

- Queue is published monthly by each utility (E.5.d)
- Updates to the queue can be automated by linking databases, and then published in real-time or defined time periods
- Should be linked to ICA updates, eventually in real-time. Tesla and GPI note that "the key word here is actionability." That is, ICA results should not be stale and developers should be able to consider ICA figures to be reliable.

E. Automating ICA

- ICA was intended to be a highly automated process from the outset.
- SCE, for example, describes their process for automating ICA: "Three software suites are being developed to support the ICA system-wide implementation. The Grid Connectivity

Model (GCM) develops and orchestrates interfaces to provide various data (e.g., substation capacity results, fault duty calculation, circuit configuration, load profiles, line regulator settings, etc.) to the System Modeling Tool (SMT) which utilizes the data from GCM to automate the ICA calculations. The scope of SMT also includes license fees for software like the Power System Analysis Tool. The Distribution Resources Plan External Portal (DRPEP) integrates with modeling and calculation tools that provide ICA results and publishes those results externally on the web map interface known as DERiM." (SCE ICA Interim Report Jan. 2018)

- Final ICA results are set to be produced in late 2018 (originally set for mid-2018 but delayed)

F. Automating ICA updates

- The frequency of updates to the grid-wide ICA has been set by the Commission as monthly for now, but with the admonition that the frequency of such updates will be improved once the utilities gain some experience with monthly updates (D.17-09-026, pp. 29-30). In order to ensure actionability (and avoid stale ICA values), IOUs will need to move quickly to real-time automated ICA value updates
- ICA updates should occur in real-time, as new applications are submitted and processed, in order to eliminate stale data issues. Computational resource issues are implicated with real-time updates, but it is our view that updating the model in real-time, based on automatic inclusion of new interconnection applications, should be automatable with the use of CYME or other power flow software that is already being integrated by IOUs. As discussed below, there are questions about timing and costs that need to be addressed before automated queue updates can occur.
- IOUs are already planning to automate ICA updates, however, as described in the DRP ICA Working Group Final Report (emphases added):
    - "PG&E has a gateway tool for incorporating circuit updates into its circuit models on a weekly basis. PG&E also creates yearly planning models from a snapshot of the gateway model which contains specific modifications and planned worked on the circuits. Recommendations from the WG would require additional work to merge the planning models with the gateway models." PG&E reiterated in response to the present report that automating ICA updates is already planned work.
    - "SCE reiterates that it would incorporate significant changes to new circuit models on a monthly basis. SCE is currently developing automated processes to maintain the accuracy of network models and data as changes on the distribution system occur, as part of full system-wide deployment of ICA."
    - "SDG&E currently automatically updates its models daily, but those are not currently validated for ICA purposes. SDG&E would need to validate those models that have monthly changes for the ICA update."

G. Automating screens not included in ICA

The Fast Track review screens are divided into Initial Review (A through M) and Supplemental Review (N, O, P)

IREC provided comments on the potential for automation the Fast Track screens in informal comments to the working group on March 26, 2018. IREC identified possible software automation for screens A, B, H, J, K, and L, and also identified ways in which screens other than the ICA screens could be deemed inapplicable or otherwise resolved. We include IREC's full comments on the Fast Track screens as Attachment A. GPI and Clean Coalition comments below, with additional suggestions from SGS, consulting engineers retained by GPI for this purpose, reflect and incorporate IREC's comments on potential automation and streamlining.

This section reviews the potential for automation of the screens but doesn't include any cost-benefit analysis of doing so. The authors of this report have made clear that our High-level cost-benefit considerations are included in the last section of this report.

The following abbreviations are used in the below discussion:

- **OK/NA**: automation already completed or not applicable for inverter-based systems
- **ST**: Short Term (1-3 years)
- **MT**: Medium Term (3-5 years)
- **LT**: Long Term (>5 years)

Power simulation software providers are beginning to incorporate automated screen functionality (e.g. Eaton – CYME). The application processing software should be designed to connect easily to the specific power simulation software package to access this functionality. Triggering the updates for projects based upon relevant changes should also be relatively easy to incorporate within the application processing software.

Suggestions for automation or streamlining of each of the screens follows below. The net result of the recommendations is at least a partial, and potentially a fully, automated Initial Review and Supplemental Review process, if the identified issues can be resolved for each screen:

- **Screen A: Networked Secondary**
  - This is a screen that should be automatable through software as it only requires verification of whether the applicant's POI is on a Networked Secondary System. These networks should be clearly mapped and also indicated on the ICA maps. (ST)
- **Screen B: Certified Equipment**
  - This only requires verification against a database and could be automated through the application process, no engineering time should be required. (ST)
- **Screen C: Voltage Drop**
  - This only applies to motoring generators and thus will be automatically passed by most DERs today. (OK/NA)
- **Screen D: Transformer Rating**
  - Projects with a primary connection are covered by ICA. (OK/NA)

- Since the secondaries were not included in the ICA this screen will still require verification for projects connecting to a secondary (which isn't the case for 500 kW and over behind-the-meter or for front-of-meter projects). (MT)

- **Screen E: Does the Single-Phase Generator Cause Unacceptable Imbalance?**
  - Projects with a three-phase connection will not go through this screen. (OK/NA)
  - Projects with inverters connect across 240V will require some verification but this will rarely be associated with the larger behind-the-meter/front-of-meter customers targeted in this roadmap, which will tend to be connected to three-phase. (MT)
  - Since single-phase secondaries were not included in the ICA this screen will still require verification for projects connecting to a single phase secondary. (MT)
- **Screen F: Is the Short Circuit Current Contribution Ratio w/in Acceptable Limits?**
  - As long as the generator model is added correctly, fault simulation functionality already exists in the distribution simulation software (ST)
  - Protection is analyzed in the ICA. Coordination is not modeled in the ICA currently, but may be able to ID the substations where this is an issue.
- **Screen G: Is the Short Circuit Interrupting Capability Exceeded?**
  - As long as the generator model is added correctly, fault simulation functionality already exists in the distribution simulation software. Substantial database development and maintenance may be required. (MT)
  - ICA partially covers, substation needs to be reviewed. <1 MW may pass, or can utilities use a modified version of the PG&E automated screening tool?
- **Screen H: Line Configuration**
  - Should be able to be addressed quickly through software or manual verification if the information about wire configurations on the system is available. (MT)
- **Screen I: Will Power Be Exported Across the PCC?**
  - This is allowed to fail for larger projects which will be analyzed further in screens N and O.
  - This screen should be automated through the export/non-export selection on the IOU application portals– Filtering screen only (ST)
- **Screen J: Is the Gross Rating of the Generating Facility 11 kVA or less?**
  - Not applicable to the larger projects considered here
  - This screen can be automated – Filtering screen only (ST)
- **Screen K: Is the Generating Facility a NEM Generating Facility with nameplate capacity less than or equal to 500 kW?**
  - Not applicable to the larger projects considered here
  - This screen can be automated – Filtering screen only (ST)
- **Screen L: Transmission Dependency and Transmission Stability Test**
  - This may require IOUs to ID and flag those substations with either transient stability limitations or interdependencies with earlier queued generation. (ST)
- **Screen M: Aggregate Generation ≤15% of Line Section Peak Load**
  - Uses available data automated as part of ICA for existing and proposed modified screen M as part of Working Group 2 Issue 8 proposals. (ST)
- **Screen N: Penetration Test (100% of Min. Load)**
  - Pass if within ICA value; readily automatable if over ICA value or ICA not available (OK/ST)

- **Screen O: Power Quality and Voltage Fluctuation**
  - Pass if within ICA value; readily automatable if over ICA value or ICA not available (OK/ST)
- **Screen P: Safety and Reliability Test**
  - Used in Supplemental Review as a "catch all" applied only when one of the earlier Initial Review screens is failed, so we are not proposing at this time to automate screen P. (LT/NA, "safety valve")

We summarize in the below chart SGS' conclusions with respect to the feasibility of automating the Fast Track screens, as described above. Power simulation software providers are beginning to incorporate this functionality (e.g. Eaton – CYME). The application processing software should be able to connect easily to the power simulation software and access this functionality.

As mentioned previously for the ICA and initially discussed in the application processing automation section, relevant changes to projects could automatically trigger updates to projects lower in the queue. Relevant changes to all projects affected could trigger automated communication of the changes with the applicant.

Assumptions:

- Applies mostly to behind-the-meter over 500 kW and front-of-meter projects of any size
- Online interconnection portals supported by business administration process software are being used.
- The interconnection portals contain the automation functionality required as described in relevant 'Required Effort(s)' in the table below, or a separate software application is developed that integrates the interconnection portals with the required utility systems and databases.
- The circuit model has been updated to include the application of interest. If it is too difficult for the POI to be automated for inclusion in the circuit model, the operator would need to perform this task manually after successful application submission through the online interconnection portals.

Screen	***Required Effort(s)***	***Automation Feasibility***
A – Networked Secondary	POI links to utility system with GPS to identify if it is a networked secondary.	High -- if this attribute exists in utility database
B – Certified Equipment	Can be incorporated into Interconnection Portal with list of certified equipment types when specifying system details.	Very High – already demonstrated in other tools
C – Voltage Drop	Only applies to motoring generators. Can be skipped for solar PV applications.	N/A -- only applies to motoring generators
D- Transformer Rating	Interface with appropriate utility database. Large projects will only connect to the primary, so irrelevant to this study case.	N/A – large projects would have their own dedicated voltage transformation
E – Single-Phase Generator Causing Unacceptable Imbalance?	Large projects will only connect to the primary, so irrelevant to this study case.	N/A – same as above
F – Short Circuit Current Contribution Ratio within Acceptable Limits?	Requires integration with the utility distribution simulation software. Easily automated using fault simulation.	Medium – As long as the generator model is added correctly, fault simulation functionality already exists in the distribution simulation software
G – Short Circuit Interrupting Capability Exceeded?	Requires integration with the utility distribution simulation software. Easily automated using fault simulation.	Medium – similar to Screen F
H –Line Configuration	Reference appropriate database indicating type of line at the POI.	High – assumes the database for line types and parameters exists.
I – Will Power be Exported Across PCC?	This is allowed to fail for larger projects which will be analyzed further in N and O.	N/A -- for larger and wholesale projects
J – Gross Rating of the Generating Facility 11 kVA or less?	This is allowed to fail for larger projects which will be analyzed further in N and O.	N/A -- for larger and wholesale projects
K – Is the Generating Facility a NEM Generating Facility with Nameplate Capacity less than or equal to 500 kW?	Not applicable to the application types being considered (larger and exporting projects), but easily referenced with the application data within the interconnection portal.	N/A -- for larger and wholesale projects
L – Transmission Dependency and Transmission Stability Test	Based on the Rule 21 description, this would probably require IOUs to flag those substations with either transient stability limitations or interdependencies with earlier queued generation.	Low – variability associated with the analysis used to support this screen makes it difficult to automate the exact efforts on an individual case basis.
M – Aggregate Generation ≤15% of Line Section Peak Load	Could be difficult if CIM not included in modelling software – i.e. need to detect if there is a switch upstream of PCC. Or, a database kept of data on all line sections.	Easy if IR/SR are combined. Medium to Low if not combined – automating the detection of relevant line sectionalizers simple with CIM, otherwise a database identifying line sections is required.
N – Penetration Test (100% of Min Load)	Automated as part of ICA, rendering screen M redundant for combined IR/SR	Already completed
O – Power Quality and Voltage Fluctuation	Automated as part of ICA	Already completed

H. Frontloading Supplemental Review screens N and O into Initial Review

- Projects that are less than or equal to the displayed ICA value, or otherwise expect to interconnect without need for Supplemental Review, may be susceptible to largely automated review. Frontloading screens N and O into IR will allow an easier automation of Initial Review because screen N makes screen M redundant and screen O may render some IR screens at least partially redundant.
- Given the automation of Screen N and Screen O as part of the ICA tool and the ability to apply this functionality to meet the analysis requirements for a specific project, minimal effort would be required to assess the complete fast track potential for a given application that passes all IR screens.
- Moving all automatable screens to the IR would be beneficial as a whole while providing as much information as possible up front to the customer with minimal effort.
- A single review from the utility engineer and reduced communication requirement to the customer offer significant process time and reduced fee improvements.

I. Frontloading and automating offer of Generator Interconnection Agreement

- A standard Generator Interconnection Agreement (GIA) must be offered within 15 BDs of passing Initial Review (F.2.a), or 15 BDs from applicant's request after passing Supp. Review (F.2.e)[7]
- 90 Calendar Days are allowed for negotiation and signing of the GIA (F.2.e)
- Utilities could instead "frontload" a partially populated draft GIA offer immediately after the application is deemed complete, allowing the agreement to be reviewed by the applicant before IR and SR are complete
- Or utilities could offer the option to generate this document auto-filled from the application portals, as is currently available with the SCE Power Clerk portal.
- Once Fast Track Review is completed, the draft GIA will be fully populated with the relevant results and this second draft will be sent automatically to the applicant, within one BD

VIII. Cost/benefit analysis initial considerations

This section offers preliminary cost-benefit analysis of the top recommendations from this report, as described in the summary above, along with related considerations about costs and

[7] Tesla notes that PG&E is inconsistent with when it provides this form and how complete it is when received. Some utility reps fill it out and some leave it blank and request that the contractor fill it out. There are also inconsistent practices in how this form is prepped by specific utility reps. For SDG&E, depending on the type of agreement needed for the application Tesla is sometimes required to fill out a template rather than have a filled out agreement drafted and provided for customer signature by the u tility rep.

benefits more generally. Most of this section was provided by SGS, automation engineers retained by the Green Power Institute to assist with this report.

TURN stressed the need for cost-benefit analysis prior to further action on automation opportunities. Parties generally agreed that cost-benefit analysis is important but that the Commission regularly conducts analysis of opportunities for policy improvements, prior to any cost-benefit analysis. The middle ground in this case was for GPI to retain SGS as consulting engineers to both vet this report's analysis and recommendations and to complete a preliminary cost-benefit analysis, which is described below.

PG&E notes with respect to costs and benefits: "We continue to support automation and note the importance to highlight the cost benefit analysis on all automation efforts. Ratepayer funding should focus on benefitting the largest populations and then move into targeting smaller areas, with the benefit to rate payers as the deciding factor. Efficiency gains and automation are what we strive for but not infallible solutions, and Rule 21 Compliance timelines should reflect the manual process of performing the task, as needed, until the benefits of automation are determined."

A. General cost-benefit considerations

The general cost and benefit elements associated with implementing the various automation options are as follows:

Utility Perspective (in the experience of SGS):

- Single source of interconnection information provides greater internal efficiencies.
- Significantly reduces manual effort (see above timeline reductions) both for initial project screening and updates based upon changes to applications ahead in the queue. This includes automated communication with the applicant.
- Power system simulation software, such as CYME, already demonstrate functionality for the automation of relevant screens. Further messaging to CYME, Synergi around what screens are required would ensure that functionality finds its way into the software.
- Integration of systems requires effort where needed.
- If administrative software, e.g. Power Clerk, does not possess the functionality to access required systems and process information accessed for screens, some form of custom software wrapper must be developed to do so; this may or may not include results from the power simulation software.
- Interconnection application processes can be modified to leverage automation efforts to significantly reduce processing times and required customer interaction.
- Maintaining an up-to-date published ICA map will greatly reduce the number of nonviable interconnection applications and consequently the processing time for those that are feasible. Once automation is developed for the screening, keeping maps up-to-date simply requires translation to a map service assuming that the processing of hosting capacity across the nodes on the network does not require significant processing requirements (e.g. this is not possible with flexible hosting capacity). The benefit of

directing developers towards circuits with greater headroom has already been witnessed in SP Networks pilot, avoiding applications with a low probability of going to construction.
- Accurate positioning of generation within the associated power simulation model could be difficult and require engineer confirmation (as noted during conversations with AVANGRID).
- Scoping, development and implementation of such IT tools will require time and funding. CPUC authorization for additional funding will be required to accomplish many of the aspects of the Report. Such funding approval is typically addressed in a utility's General Rate Case but may be addressed in this case independently.

Developer Perspective (in the experience of SGS):

- Lower project development costs means lower barriers to entry
- Reduced application time means realizing project revenue sooner – time value of money
- Increased automation should also lead to significantly lower application and study costs
- Lower risk of losing project funding, land rights, etc.
- Lower project risk can be passed on to ratepayers due to lower project cost and thus lower bids for front-of-meter/wholesale RFPs
- Can survey best opportunities for project development at very low cost

B. Cost-benefit considerations specific to top automation recommendations

The following sections discuss how these benefits relate to the automation efforts listed above:

a. Automating the Application Portals and Application Processing with Queue Management and Updating Publicly Available Interconnection Queue

This is the first task that should be accomplished while offering the best returns and providing the basis for other automation efforts to grow upon. Instead of having multiple resources in separate locations, there is a single "one-stop shop" for interconnection applications.

Interconnection portal software should be able to be modified to handle alterations to a given application, while also being the resource that maintains the interconnection queue.

It should be easy to implement alerts that indicate those projects affected by a change to a project ahead in the interconnection queue. The automatic updating of screens to accommodate the project change, including those projects affected, is discussed later on.

b. High-level cost-benefit considerations for opportunities identified in this report

SGS developed the following information for Working Group discussion and to provide a basis for identifying the best near-term automation and streamlining opportunities. Again, this analysis applies mostly to behind-the-meter projects over 500 kW and front-of-meter projects of any size. Costs are evaluated on a per project basis, considering a default 1 MW project size.

Automation Action	Estimated process streamlining (days)[1]	Utility savings (person days)[2]	Type of investment needed (labor, license, other)	Relative cost / complexity	Relative benefit-cost ratio
Application Portal, Queue Mgmt, Queue publishing	5+	5+	• SaaS license • IT (labor) • Design of UI (labor)	Medium	High
ICA and ICA updates	n/a	5+	• Power system analysis tool license (toolbox) • Dist Planning (labor) • IT (labor)	Medium to Hard	Medium
Automating screens not in ICA	2-5 days	2-5 days	• Dist. Planning (labor) • IT (labor)	Medium	Medium
Frontloading SR screens N and O into IR[3]	5+	1-2 days	• Process design (labor)	Easy but contingent of previous steps	High but depends on stakeholder
Frontloading and automation of GIA	5+	n/a	Process design (labor)	Easy once process management tool implemented	High, particularly for projects w/o upgrades

1- Here we estimate savings as being 1-2 days, 2-5, or greater than 5 days.
2- Savings here reflect the reduction in time due to meetings, analysis, and administration (emails, documentation, other)
3- Assumes that screens N and O have been automated, whether through ICA (as is currently planned) or independently.

Attachment A: IREC informal comments on Working Group 2 Issue 8, May 26, 2018, on automation and streamlining of Rule 21 Fast Track screens

- Evaluate Initial and Supplemental Review Screens and determine which screens are addressed directly by the ICA results and which may further be streamlined using software or other methods.
  - The ICA Working Group report found that the ICA results would be able to replace or make the determinations for screens F, G, M, N & O.[8] An initial assessment of the screens and the discussion of them follows:

    Initial Review

    - <u>Screen A: Networked Secondary</u> – This is a screen that should be able to be addressed automatically through software as it just requires verification of whether the applicants POI is on a Networked Secondary System. These networks should be clearly mapped and also be able to be indicated on an ICA map at some point.
    - <u>Screen B: Certified Equipment</u> – This is also something that requires verification but could be automated through software potentially, no engineering time should be required.
    - <u>Screen C: Voltage Drop</u> – This only applies to motoring generators and thus will be skipped by most DERs today.
    - <u>Screen D: Transformer Rating</u> – Since the secondaries were not included in the ICA this screen will still require verification for projects connecting to a secondary. Projects with a primary connection do not go through this screen however.
    - <u>Screen E: Does the Single-Phase Generator Cause Unacceptable Imbalance</u> – Since single-phase secondaries were not included in the ICA this screen will still require verification for projects connecting to a single phase secondary. Projects with a connection to a three phase primary should not go through this screen however.
    - <u>Screen F: Is the Short Circuit Current Contribution Ration w/in Acceptable Limits?</u> – Per the WG report this screen should be addressed by the ICA.
    - <u>Screen G: Is the Short Circuit Interrupting Capability Exceeded?</u> – Per the WG report this screen should be addressed by the ICA.
    - <u>Screen H: Line Configuration</u> – This screen was not directly addressed by the ICA but should be able to be addressed automatically through software/ manual verification if the information about wire configurations on the system is available.
    - <u>Screen I: Will Power Be Exported Across the PCC?</u> – This screen is not addressed by the ICA. It is essentially a yes or no question based upon information provided in the application form, however, it likely requires utility verification (automatic or manual tbd) to make sure the facility correctly meets one of the non-export configurations. *However, for purposes of expediting review it is not clear whether this question retains its importance in the review process if the ICA results are in place.*
    - <u>Screen J: Is the Gross Rating of the Generating Facility 11 KVA or less?</u> – This screen can be automated and is likely no longer relevant with the ICA in place.

[8] There was an oversight on this in the final report as the approved ICA methodology does not fully account for screens F & G, as came to light early in the Working Group 2 process in the first half of 2018.

- Screen K: Is the Generating Facility a behind-the-meter Generating Facility with nameplate capacity less than or equal to 500 kW? – This screen can be automated and is likely no longer relevant with the ICA in place.
- Screen L: Transmission Dependency and Transmission Stability Test – It is possible that this screen may be able to be automated. We should have a thorough discussion of how this screen is really being used (if at all) and what information is required to apply it.
- Screen M: Aggregate Generation ≤15% of Line Section Peak Load – This screen is addressed by the ICA.

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- Screen N: Penetration Test (100% of Min. Load) – This screen is addressed by the ICA
- Screen O: Power Quality and Voltage Fluctuation – This screen is addressed by the ICA
- Screen P: Safety and Reliability Test – This screen is not directly addressed by the ICA, however it is also used in Supplemental Review as a "catch all" that should only be applied when one of the earlier Initial Review screens is applied. It may make sense to discuss how it will be used and structured with the ICA in place and what evaluation will be done under this screen.