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Streamlining Solar PV Interconnection, A PG&E Case Study

The Efficient Solar Market Partners of Northern California

ROOFTOP SOLAR CHALLENGE



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This work is prepared by the *Efficient Solar Market Partners of Northern California* RoofTop Challenge Team.



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Preface

The U.S. Department of Energy SunShot Initiative Rooftop Solar Challenge provides incentives to regional awardees to address the differing and expensive permitting, zoning, metering, and connection processes required to finance and install residential and commercial solar systems. The 22 diverse Rooftop Solar Challenge teams bring together city, county, and state officials, regulatory entities, private industry, universities, local utilities, and other regional stakeholders to clear a path for rapid expansion of the use of solar energy and serve as models for other communities across the nation.

Teams will implement step-by-step actions with the goal of cutting red tape to make it faster, easier, and less expensive for Americans to go solar. Teams are streamlining permit processes, updating planning and zoning codes, improving standards for connecting solar power to the electric grid, and increasing access to financing.

The Rooftop Solar Challenge is part of the SunShot Initiative, which strives to make solar energy cost-competitive with other forms of energy by the end of the decade, and part of the Department's larger effort to position the United States as a global leader in the rapidly-growing solar market.

For more information visit <http://www.eere.energy.gov/solarchallenge/>

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Introduction

Pacific Gas & Electric is one of the largest utility companies in the country, serving over five million electric customer accounts. Under California's progressive clean energy policies, PG&E receives more requests to interconnect rooftop solar systems than any utility in the US. To date 75,000 systems have been installed in PG&E's territory, which is 30% of nationwide rooftop solar systems, and PG&E receives an average of 1,800 applications per month.

Figure 1 shows how PG&E characterizes the different types of interconnection applications as well as the volumes on interconnections for each type on a monthly and total basis. The processes to interconnect projects in these different market segments are governed by a complex web of regulations spanning six orders-of-magnitude in system size.

For the purposes of this report and the Clean Coalition's work under the Rooftop Solar Challenge, process improvement focused on the interconnection process for the Standard Net Energy Metering (NEM) segment, which has the highest volume of applications. Additional significant improvements could be gained by looking at the linkages between the interconnection process, the incentive program, and building permit processes.

PG&E approached this process improvement initiative by starting with the general high-level objectives of:

- Ensure safe and reliable operations for the public and employees
- Minimize pressure on rates and provide fair treatment for all ratepayers
- Demonstrate leadership in satisfying all of the diverse requirements

The executive leading the initiative then layered in the core customer expectations for Standard NEM:

- Timely, simple and low cost interconnection complying with tariffs
- Easily understood and accessible guides to interconnecting their generator

Rather than having extensive interconnection experience, the executive instead brings a strong track record in process improvement. He has a proven talent for grasping the whole picture of an end-to-end process and then pragmatically simplifying it. He conducted a detailed review of the inefficient areas of the Standard NEM process and questioned the need for every requirement. He then developed an overall strategy to fix the process in multiple stages.

Understanding the Current Situation

The first step in the process improvement was to fully understand the current state of affairs. This required a mapping of the current processes in sufficient detail to identify pain points, bottlenecks, etc.

Figure 2 shows the high level flow for most Standard NEM Solar Projects. Note the number of different documents and the pages of paperwork involved in each step. Although the paperwork requirements are comparable in size to other parts of the process, interconnection, at times, caused the largest delay in getting to Permission to Operate (PTO).

Figure 3 shows the detailed interconnection process flow for PG&E prior to improvement efforts.

With these mappings, PG&E characterized the major problems with interconnection:

1. The Interconnection Application and Agreement was needlessly complex because it was adapted from larger scale projects.
2. There was too high a volume flowing into manual processes which then created bottlenecks.
3. The support systems needed for different steps of the process were not integrated, creating process disconnects and opportunities for efficiency enhancing coordination.

Examples of major breakdowns or bottlenecks include:

1. The interconnection application form, a nine page PDF, is static and prevents easily including guidance to cover all possible types of questions that an applicant may have. Instead of “dynamically helping applicants do it right the first time,” applicants’ face a learning curve by submitting their first applications with mistakes, which leads to multiple iterations of resubmittals with corrections by the applicant and reviews by the utility.
2. The existing application is completed and submitted to PG&E via email, mail, or fax. The application fields are then manually transcribed into the NEM application database. This process is not only slow, but prone to error.
3. The application review process required the utility staff to manually look up customer information and copy-paste customer account and line capacity information from separate databases into the NEM application database

As a result, PG&E was experiencing growing backlogs and high customer / installer frustration. Common complaints from customers and internal PG&E staff included:

1. (Customers) The overall length of time from application to Permission to Operate (PTO).
2. (Utility Staff) Too many applications improperly filled out.

3. (All) The increasing volume of applications created a long queue of applications in the processing stage, which triggered application status inquiries from Customers and installers.
4. (Installers) Customers became unhappy with the contractors, tarnishing the installer's reputation and potentially harming future business.

Designing a Better Process

The three main principles that PG&E adopted in designing process improvements were:

1. *Simplify* – Reduce the number of process steps down to the minimum necessary
2. *Optimize Order* – Once the steps are minimized, execute the steps in the most efficient order
3. *Automate* – Automate as much of the process as possible, from the customer-facing website back to the internal support systems

Applying these principles generated notable insights into what changes might achieve the greatest process benefits. Examples include:

- *Simplify*: The insurance question and requirement for 24/7 meter access added unnecessary complications to the overall process. Changing these requirements could eliminate useless steps.
- *Optimize Order*: The utility identified that there are often changes to the original equipment post-install, which requires a revised application to reflect the installed equipment. This creates another iteration of the review process. The root cause analysis discovered that solar contractors who submit applications prior to installation face changes to the equipment availability during procurement. Contrary to intuition, the utility would actually prefer that the customer build the system, so that the equipment is known, before applying for interconnection. The utility is developing a pre-install tool to provide customers and contractors a way to perform a preliminary line capacity check to determine if additional steps are needed to interconnect the system to the existing line.
- *Automate*: The utility is developing a dynamic online application that will improve the experience and streamline the process. The online application will simplify entering information by prepopulating customer information, reduce the number of fields requiring typing with dropdown lists, and adding logic to display only relevant information for the project.

Then, PG&E reached out to external stakeholders, primarily solar installers, to gather feedback on proposed improvements as well as solicit further ideas. The Clean Coalition facilitated one of these meetings with other organizations involved in the Rooftop Solar Challenge as well as partner installers.

From these efforts, PG&E identified the relatively easy improvements that could be done without external approval and would demonstrate early wins for the initiative.

- **Removed Insurance Question Review:** The insurance question was adopted from larger scaled projects and the Standard NEM application asked if the customer owned insurance or not. However, insurance was not required for interconnection. If the insurance question was not answered by the customer, the application was deemed incomplete and a revised application was required. PG&E stopped reviewing the insurance question, since owning insurance did not affect the application review.
- **Simplified Meter Number Look-up:** In some applications, the gas meter was listed instead of the electric meter and PG&E would then ask the customer to resubmit the application. PG&E changed its process so that, if there was only one electric meter on the account, PG&E would move forward with the correct electric meter, without asking for resubmission.
- **Modified 24/7 access:** PG&E required 24/7 access to the customer's meter and required the installation of lockboxes if the meter was behind a locked gate. This 24/7 access requirement developed from safety precautions in restoration situations; however, the current process does not require restoration personnel to remove the meters of NEM customers. Thus, PG&E's 24/7 access requirement was modified to only require access when requested.

These early improvements yielded impressive results in reducing the backlog and timelines involved in the interconnection process. Figure 4 shows the considerable improvements in backlog and cycle times from these changes. Figure 5 shows how PG&E went from one of the longest average times to PTO in the nation to now one of the shortest times in less than a year.

The following is a partial list of ideas for an improved customer experience that can be accomplished with the next generation online interface:

- Auto-fill customer information based on the customer Account Number and Meter Number entries
- Automatic, preliminary check of grid capacity based on the estimated size of the solar system
- Smarter process to only display applicable rates for customer segment, i.e. display only residential rates for a residential customer
- Simplifying the entry of equipment specifications by providing dropdown lists of certified equipment
- Allowing customer to select a template for their Single Line Diagram
- Online guides / wizards to help complete applications

Looking Forward

With the early success of the streamlining efforts, PG&E is looking forward to the next major steps that can already be identified.

1. Obtain regulatory approval for first set of changes
2. Put the Standard NEM application process completely online
3. Integrate the backend support systems with online application
4. The possibility of integrating the interconnection and incentive application process may then follow if warranted

In planning for the future changes, PG&E will keep in mind some core lessons and approaches that came from the early efforts. To start, quite a bit of improvement can be done relatively quickly as long as they focus sharply on process efficiency and a very strong customer service mindset. The most effective approach is to test out solutions on the customer segment where the system sizes are small and the volume of applications is large to achieve quick benefits for the most customers.

Thus, PG&E plans to prove out these solutions in the Standard NEM customer segment, focusing on what PG&E can control in the process. PG&E intends to proactively reach out to other utilities to share information and gather best practices. PG&E is open to conversations about a common portal where the customer, installer, and local jurisdiction could quickly and efficiently gather and validate all of the information needed for construction, inspection, and interconnection. See Figure 6 for the high level roadmap.

Figures

The following list of figures are referred to in the text and illustrate the problems, goals and accomplishments of PG&E for interconnection of solar PV.

Figure 1



Electric Generation Interconnection (EGI) Programs

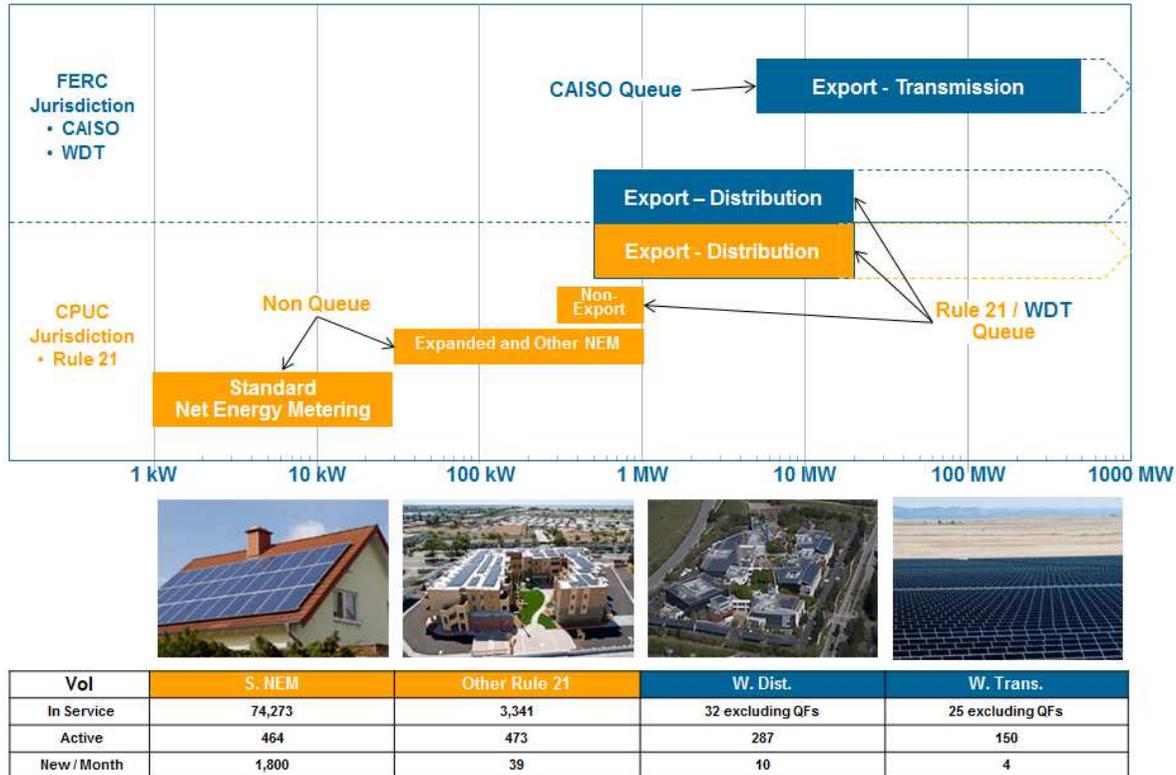


Figure 2



Solar Project Process Flow

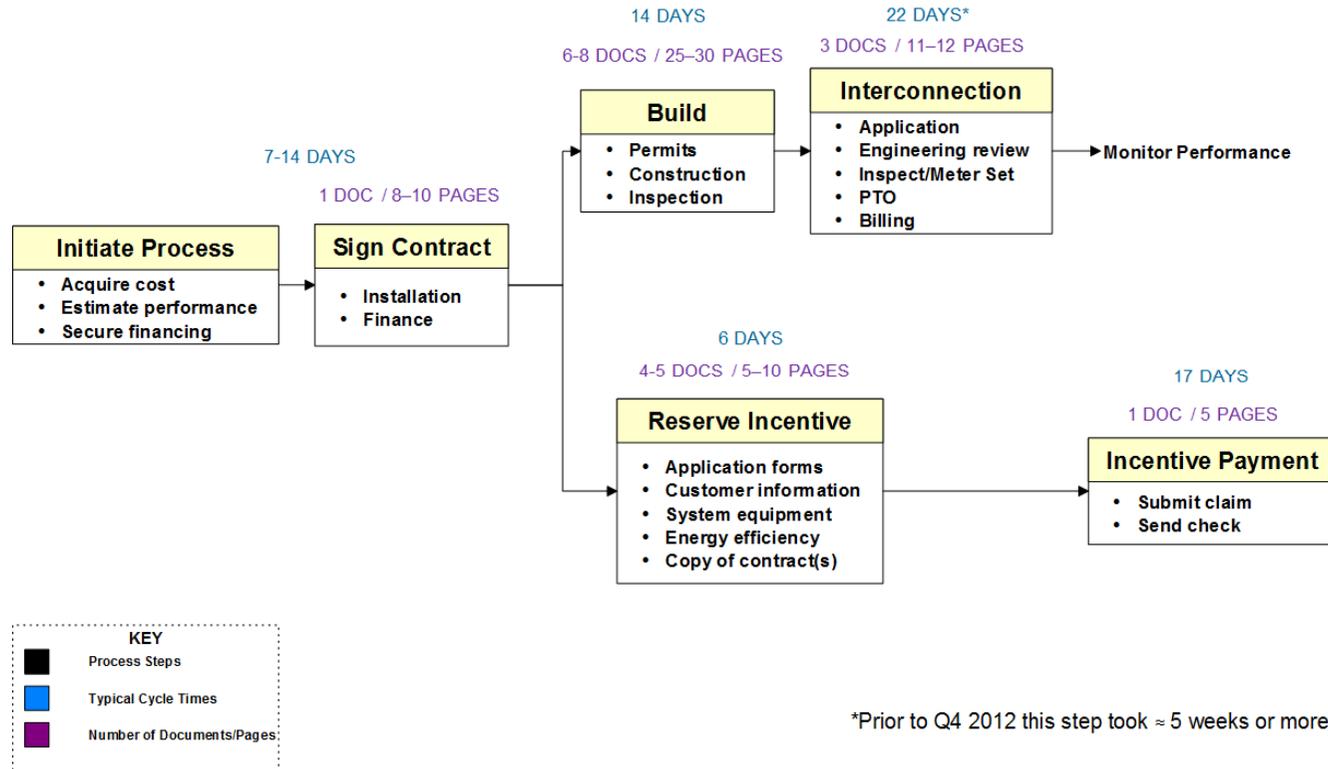


Figure 3



Solar Incentive “As Is” Process

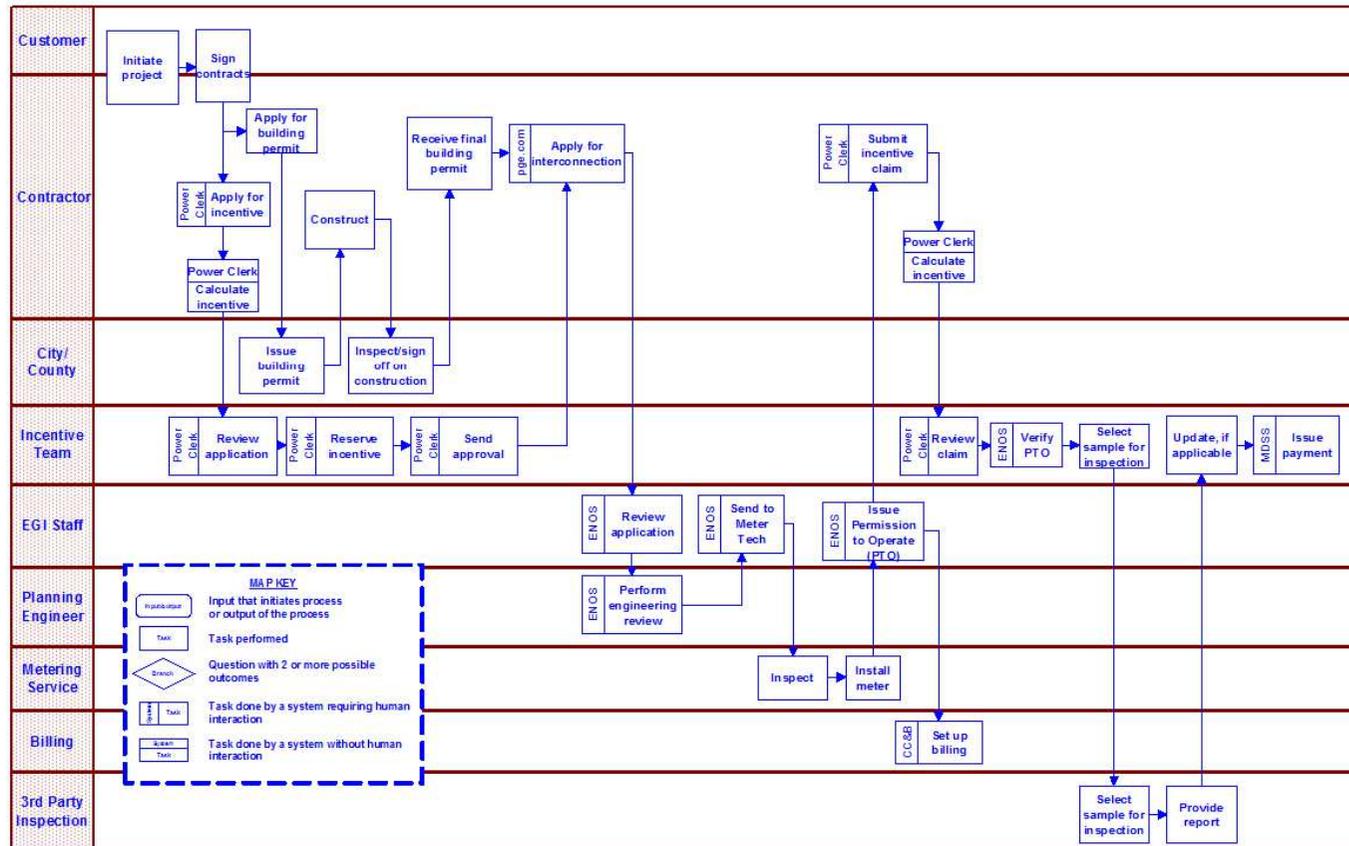
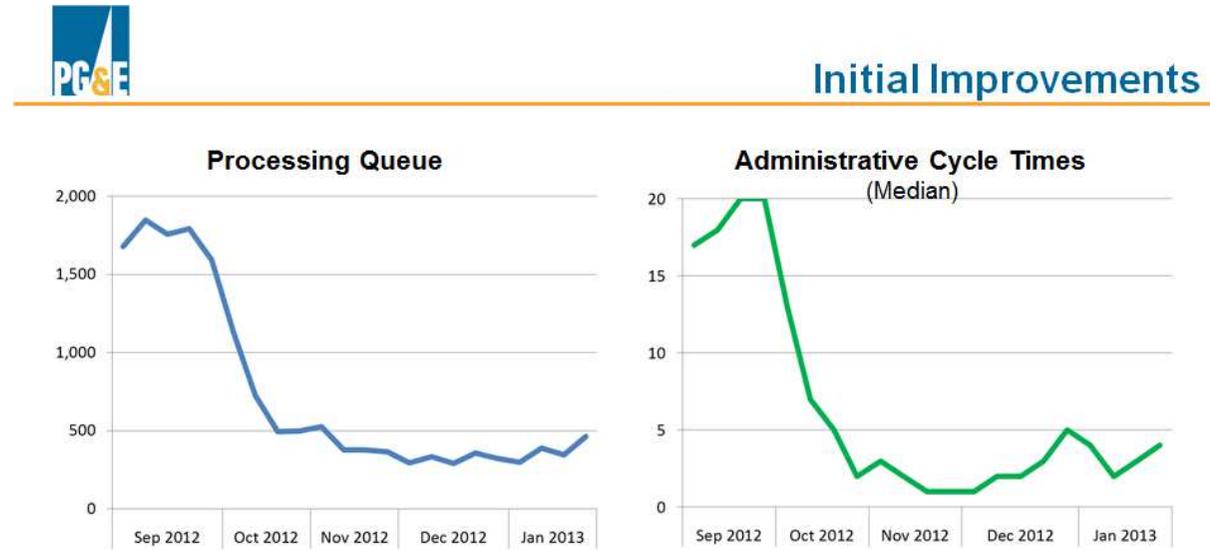


Figure 4



Key Changes

- Removed 24/7 access requirement
- Removed insurance question review
- Less restrictive meter number match
- Staff adjustments

Figure 5

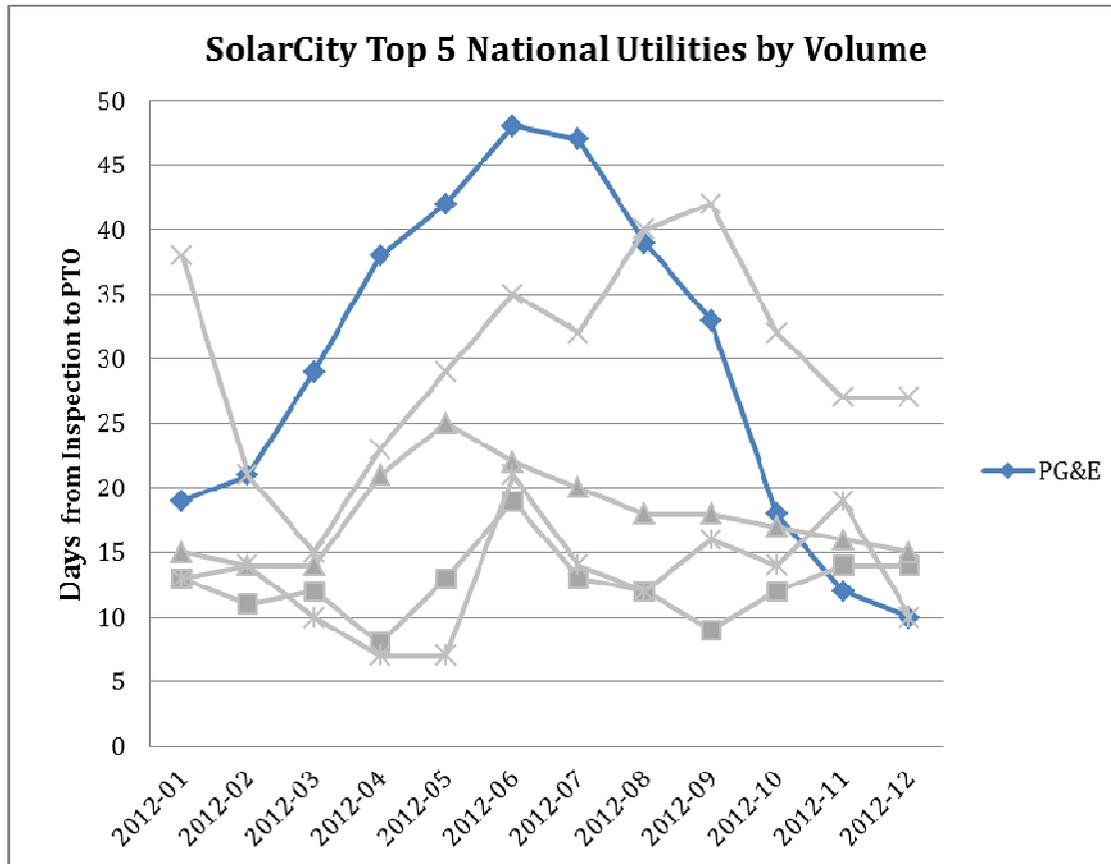


Figure 6

