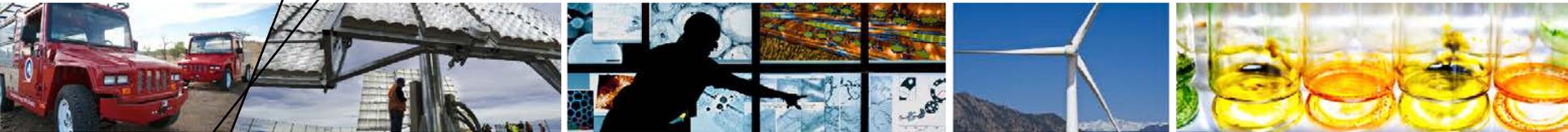




Distributed Generation Interconnection Collaborative (DGIC)



**“Innovation in the Interconnection
Application Process”**

Ken Parks, SDG&E and Bob Woerner, PG&E

April 2, 2014

Purpose of Today's Meeting

- **Learn about recent innovations in the distributed PV interconnection process**
- **Examine how certain challenges related to increased demand for distributed PV can be addressed through revised application processes and procedures**
- **Hear specific examples from electric utilities in mature solar markets (SDG&E and PG&E)**



Speakers



Ken Parks

Customer Generation Manager
for the Distribution System
SDG&E



Bob Woerner

Senior Director in
Electric Operations
PG&E



Kristen Ardani

Solar Analyst,
(today's moderator)
NREL

DISTRIBUTION INTERCONNECTION INFORMATION SYSTEM

Net Energy Metering



Net Energy Metering 2013 Highlights

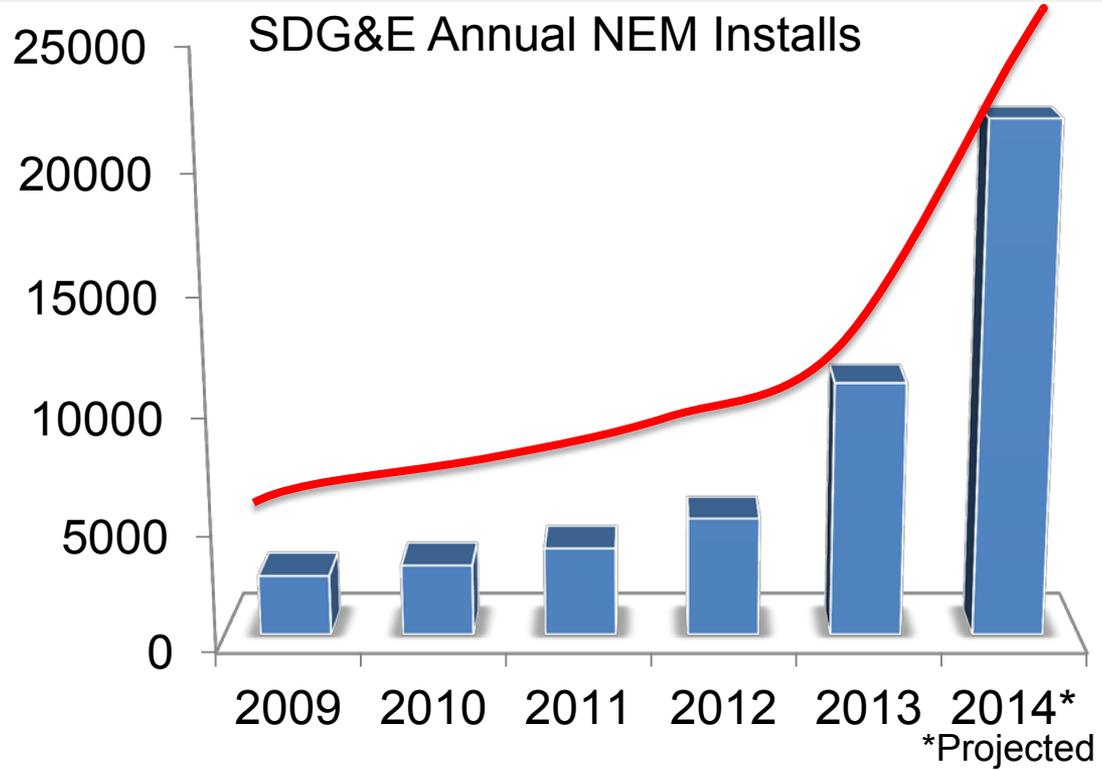


- 108% increase in authorizations from 2012
- Approximately 11,000 total projects installed
- On average, it took five (5) calendar days for SDG&E to authorize parallel operation
- 13,100 NEM Applications Processed
- 1,173 NEM “Fast Track” Applications Processed
- 10,710 successful remote meter changes

GROWTH OF NEM INSTALLS

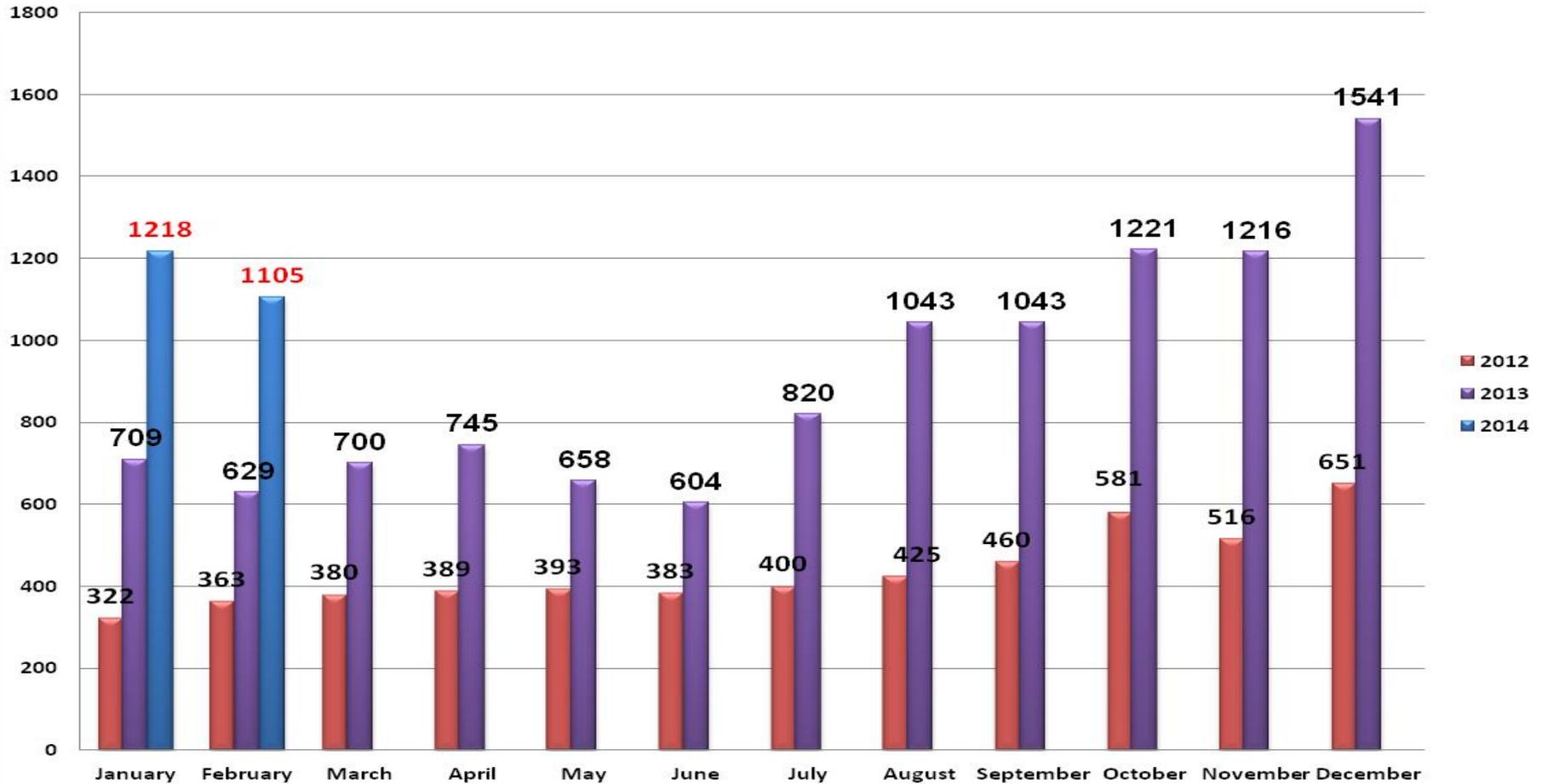


- 108% increase in authorizations in 2013 compared to 2012
- Total projects installed in 2013 – Approximately 11,000
- Time to authorize dropped to 5 calendar days
- Headcount pressure reduced
- Reduced contractor costs and time



GROWTH OF NEM INSTALLS

Net Energy Metering (NEM) Installations Monthly Growth 2012-2014



NEM GROWTH CHALLENGES

- Strain on internal teams and processes
- Meter shop unable to meet demand
- Increase in authorization time
- Bottleneck at SDG&E
- Pressure to increase headcount
- Skyrocketing costs
- No off the shelf solution

DIIS Functionality Overview

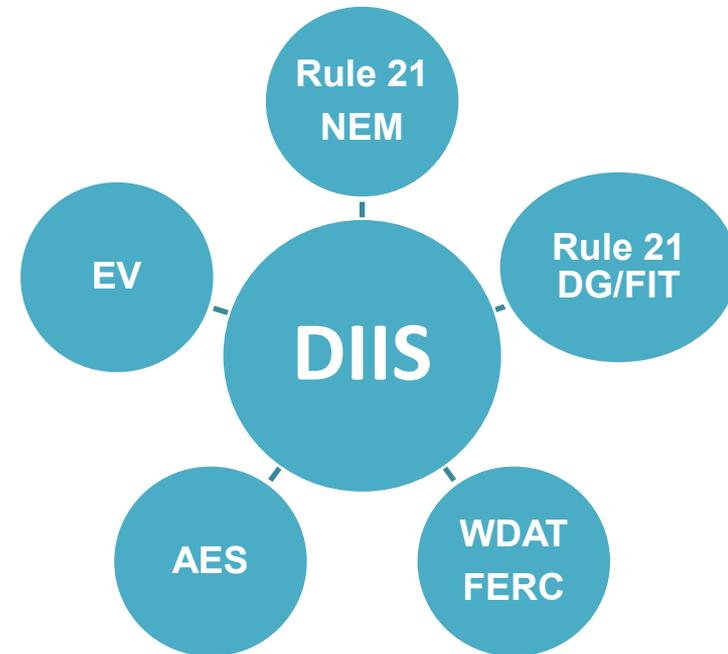
Global database of all forms of customer generation for internal departments

Automated application tracking

Automated status update notifications for the customers (emails)

Integration with Customer System, Data Warehouse, and GIS

Empowers contractors to manage their own business through self-service tools and monitor every milestone within the utility's control



DIIS FACTS

Capital project approval,
funding and team kickoff
on Jan 2012

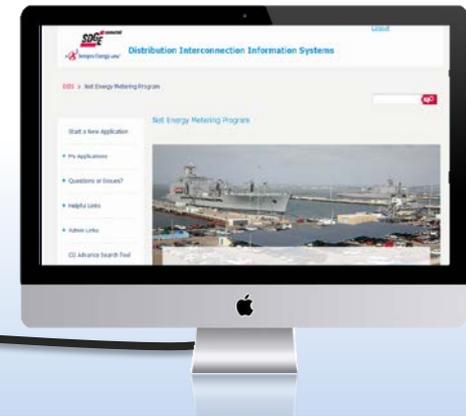
Launched on
February 19, 2013

Over **18,000** people
hours invested to date

13 releases to date

~ **12 FTEs** dedicated
to the project

~ **2.1 M** invested in
development

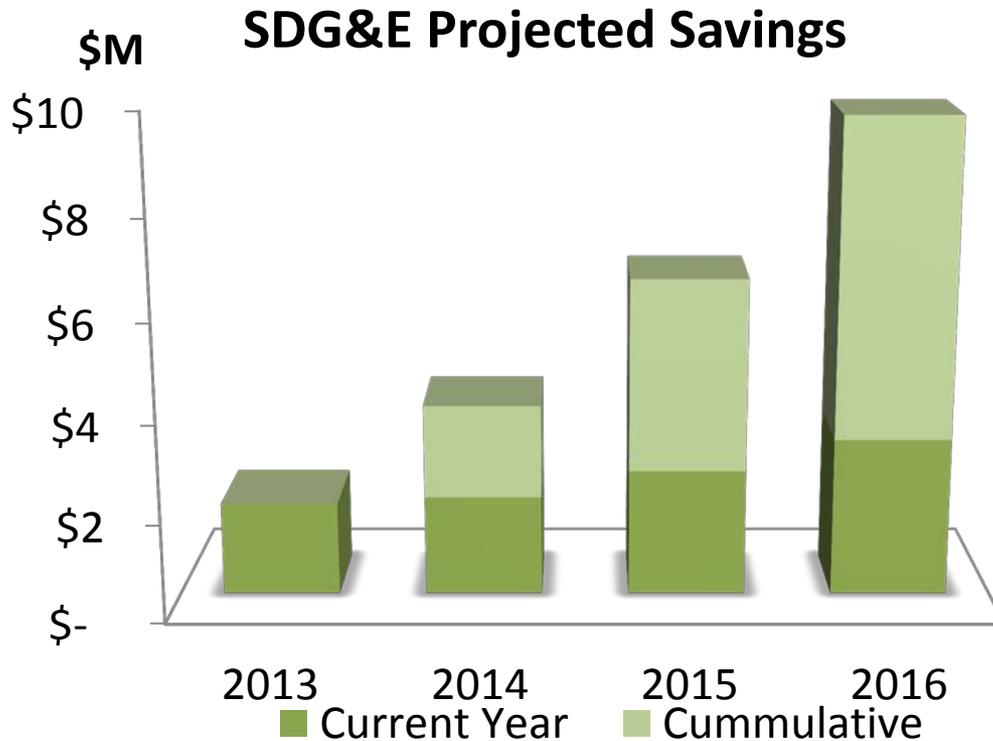


DIIS BUSINESS IMPACT AFTER ONE YEAR



Component	Avoided Costs	Comment
Net Energy Metering Application Process	\$1,090,000	13,100 Applications Processed
Net Energy Metering FastTrack Process	\$100,500	1,763 FastTrack Applications Processed
Remote Meter Configuration (RMC)	\$1,145,970	10,710 Successful Meter Program Change-outs
Total	\$2,336,470	

ANNUALIZED SDG&E SAVINGS



OTHER BENEFITS

- Doubled processed applications in 2013
- Time to authorize dropped to 5 calendar days
- Headcount pressure reduced
- Reduced contractor costs and time

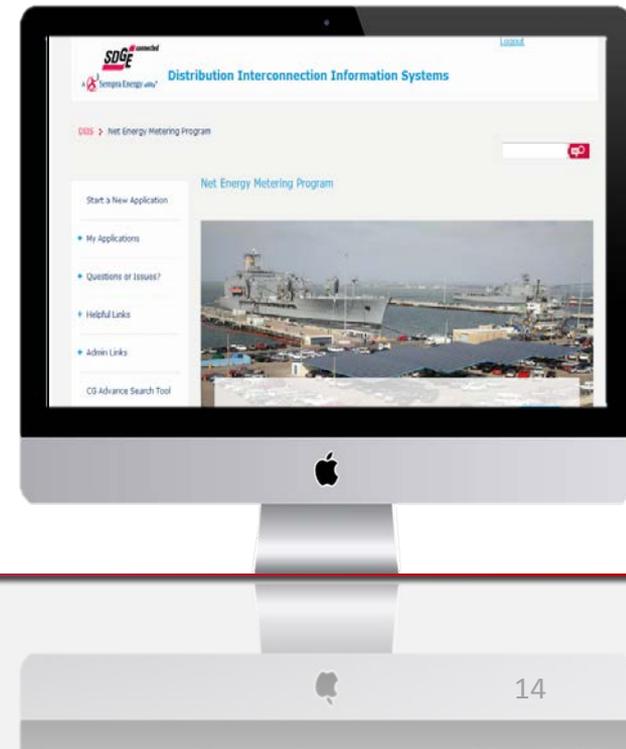
* Does not include contractor savings or other soft benefits

DIIS OBJECTIVES

- Be connected with our customers
- Be transparent within every milestone under SDG&E control
- Reduced timeframe for authorization
- Authority having jurisdiction inspections will automatically update DIIS database
- DIIS Remote Meter Configuration
- Future Business Opportunities

DIIS OVERVIEW

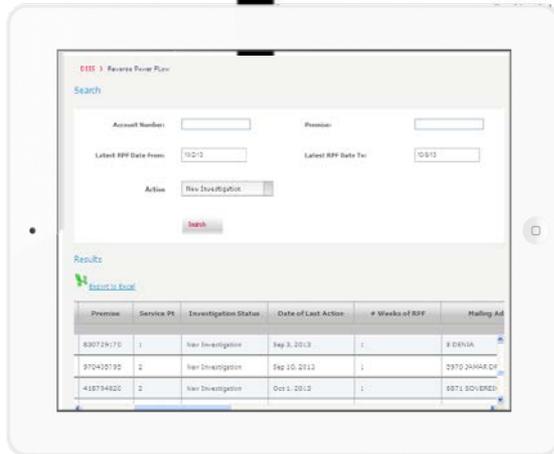
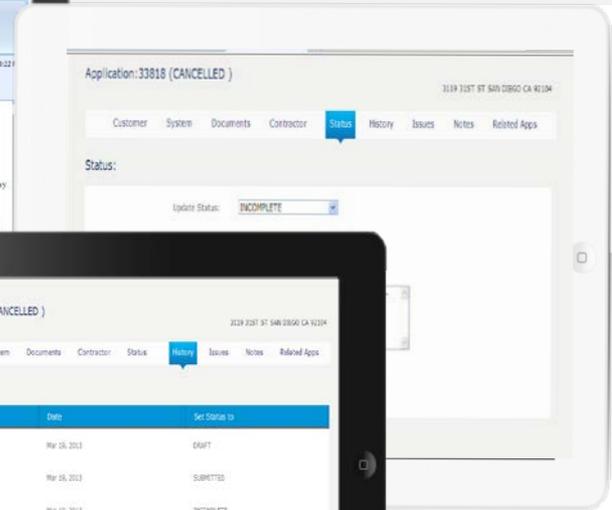
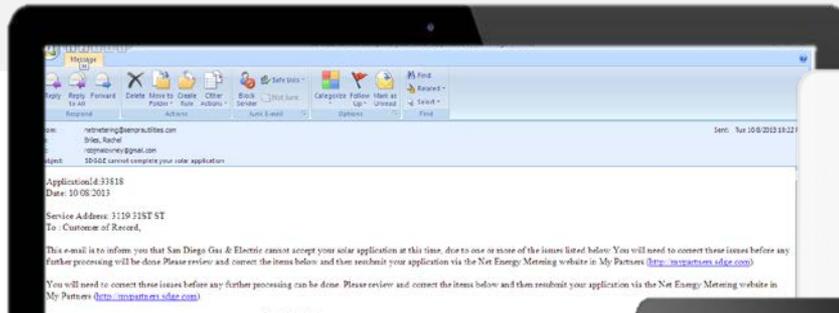
- Automated application process and online tool for contractors and customers to manage interconnections
- Real time status updates and notifications
- Self Service management portal for contractors
- Rich reporting and analytics
- Tools to manage internal workflow of inspectors, distribution analysts and GIS
- Remote Meter Configuration, RPF management, and FastTrack
- Accessible from web, tablet and smart phones
- Extensible and scalable architecture



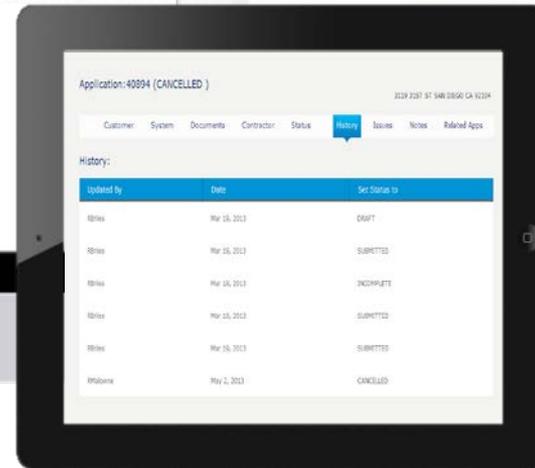
DIIS CAPABILITIES OVERVIEW

Automated notifications

Auto save



Correct the discrepancy and resubmit.



Reverse Power Flow

History tracking

FUTURE PRODUCT ROADMAP

- Advanced search functionality
- Automated email enhancements
- System sizing
- Authority having jurisdiction integration
- Solar statistics capture
- Advanced energy storage, electric vehicles and other Rule 21
- Future applications for FERC process

THANK YOU



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Customer Generation Manager
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San Diego, CA 92123
Office: (858) 636-5581
www.sdge.com/nem
KParks@semprautilities.com



Electric Generation Interconnection

April 2, 2014

- California Drivers
- PG&E Volumes
- Standard NEM Process Improvements

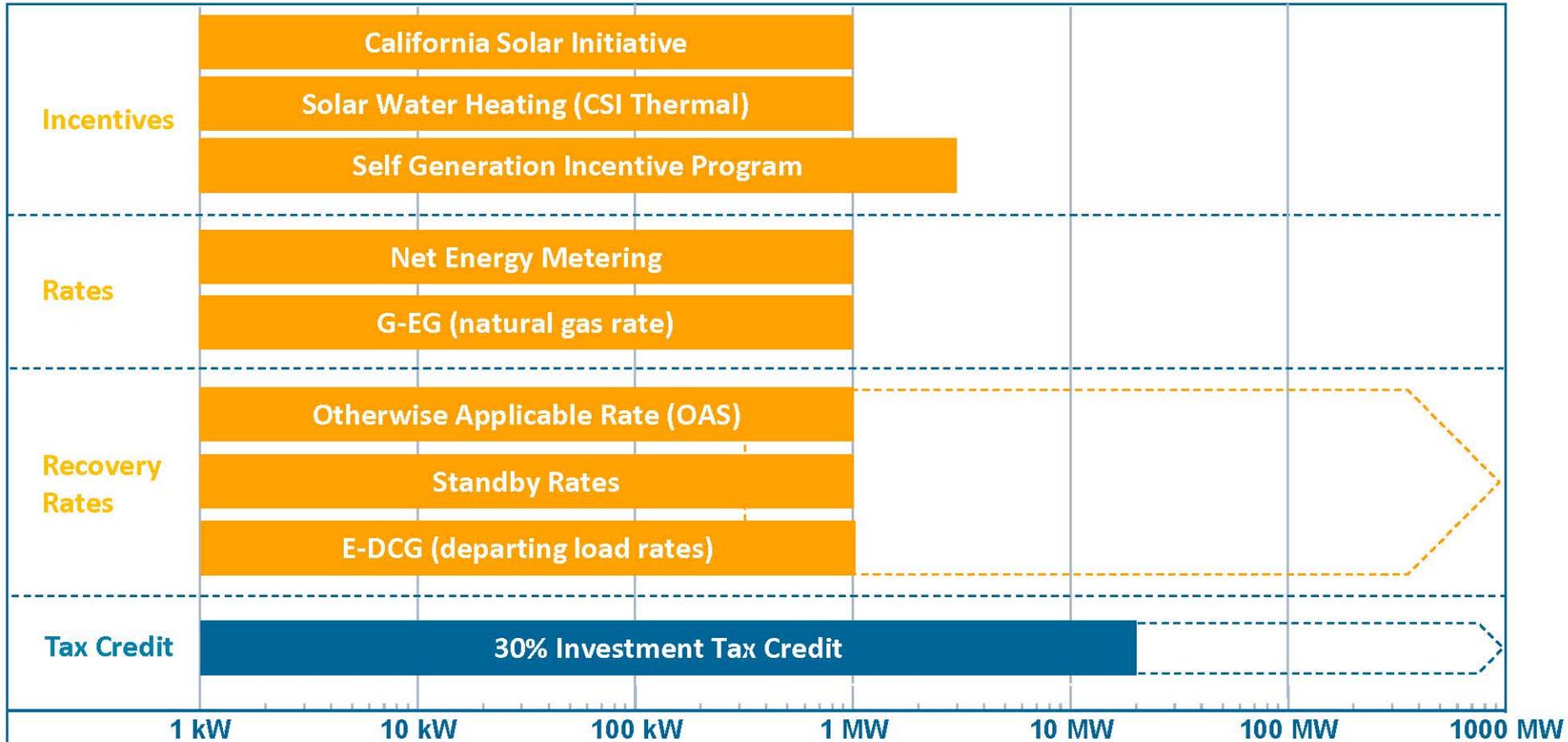


- Pacific Gas and Electric Company (PG&E) is one of the largest combination natural gas and electric utility in the U.S.
- Serving 15 million people in a 70,000 square-mile service area in Northern and Central California
- Customer Accounts:
 - 5.1 million electric
 - 4.3 million natural gas

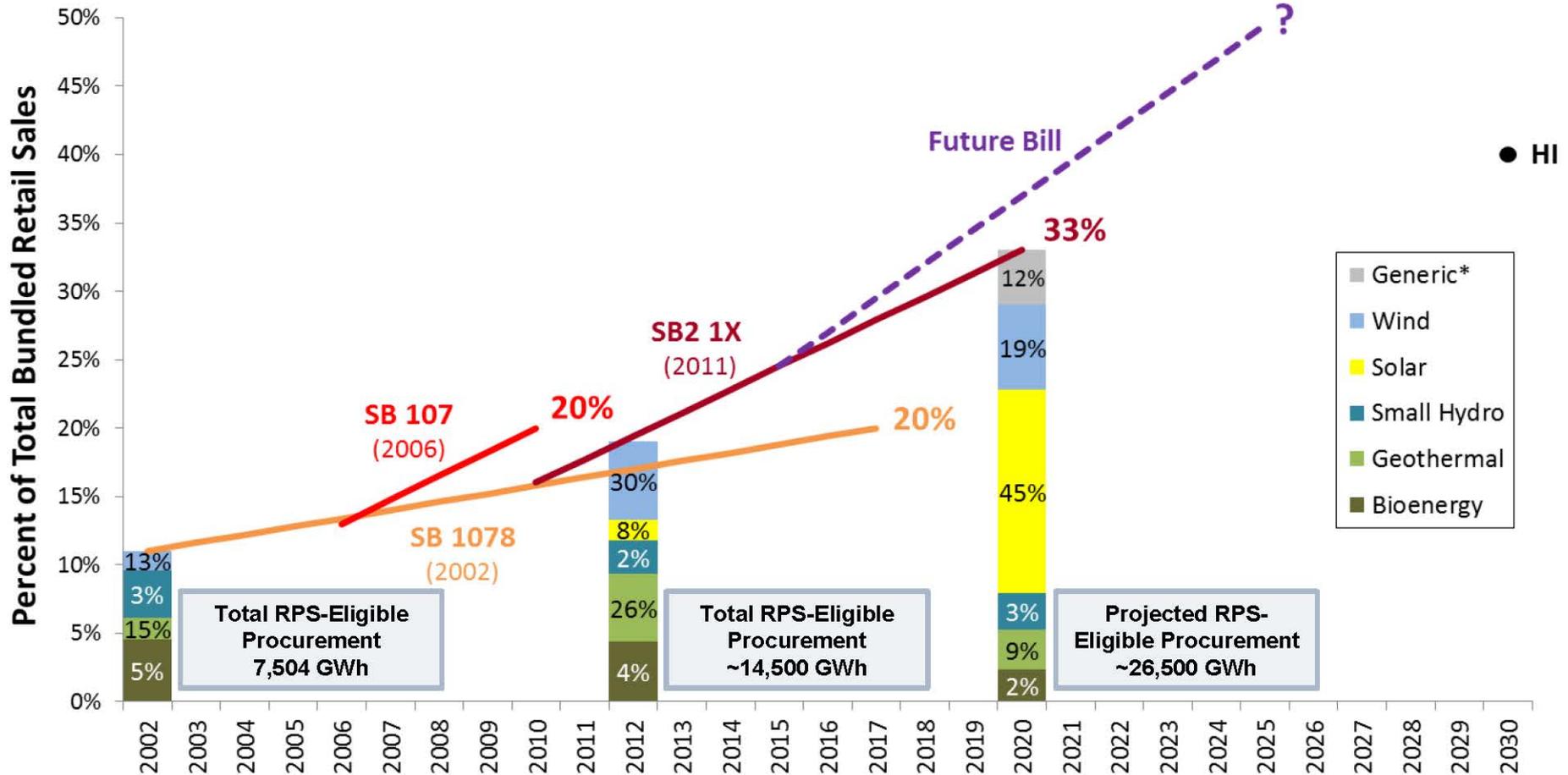
- Encouraging regulatory environment
 - De-coupling 1982
 - Deregulation 1986
 - High tier rates
 - Renewable goals 2002
 - Incentives

- Favorable natural conditions
 - Sun, wind, water, land
 - Resource extraction operations

- Willing market participants
 - Environmentalists
 - Early adopters
 - Inventors
 - Entrepreneurs



Renewable Portfolio: Past, Present and Future

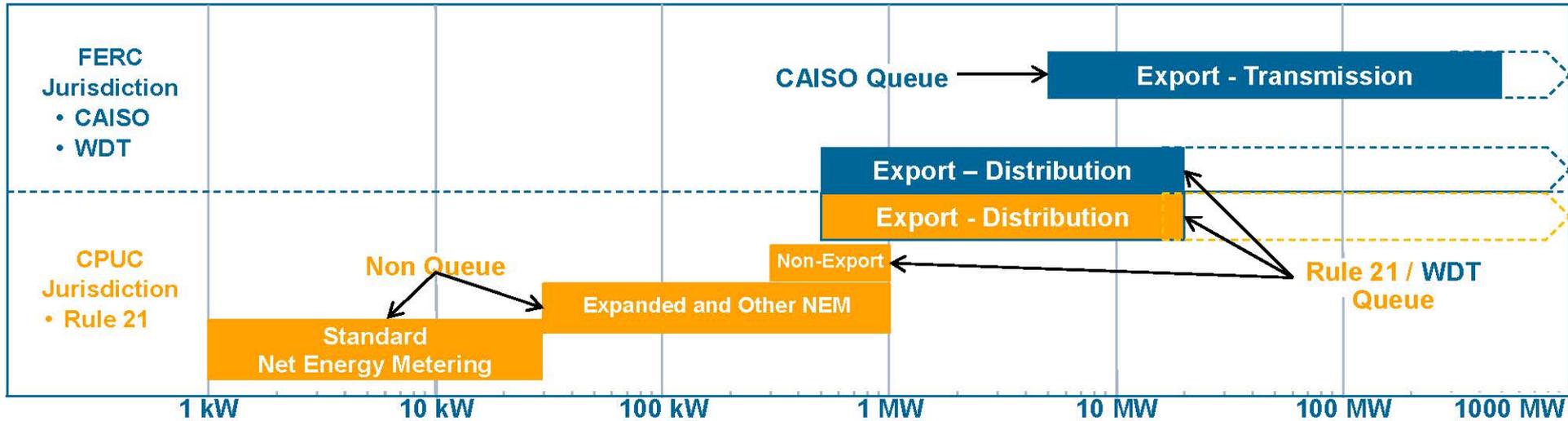


California has the most aggressive RPS goal in the U.S.

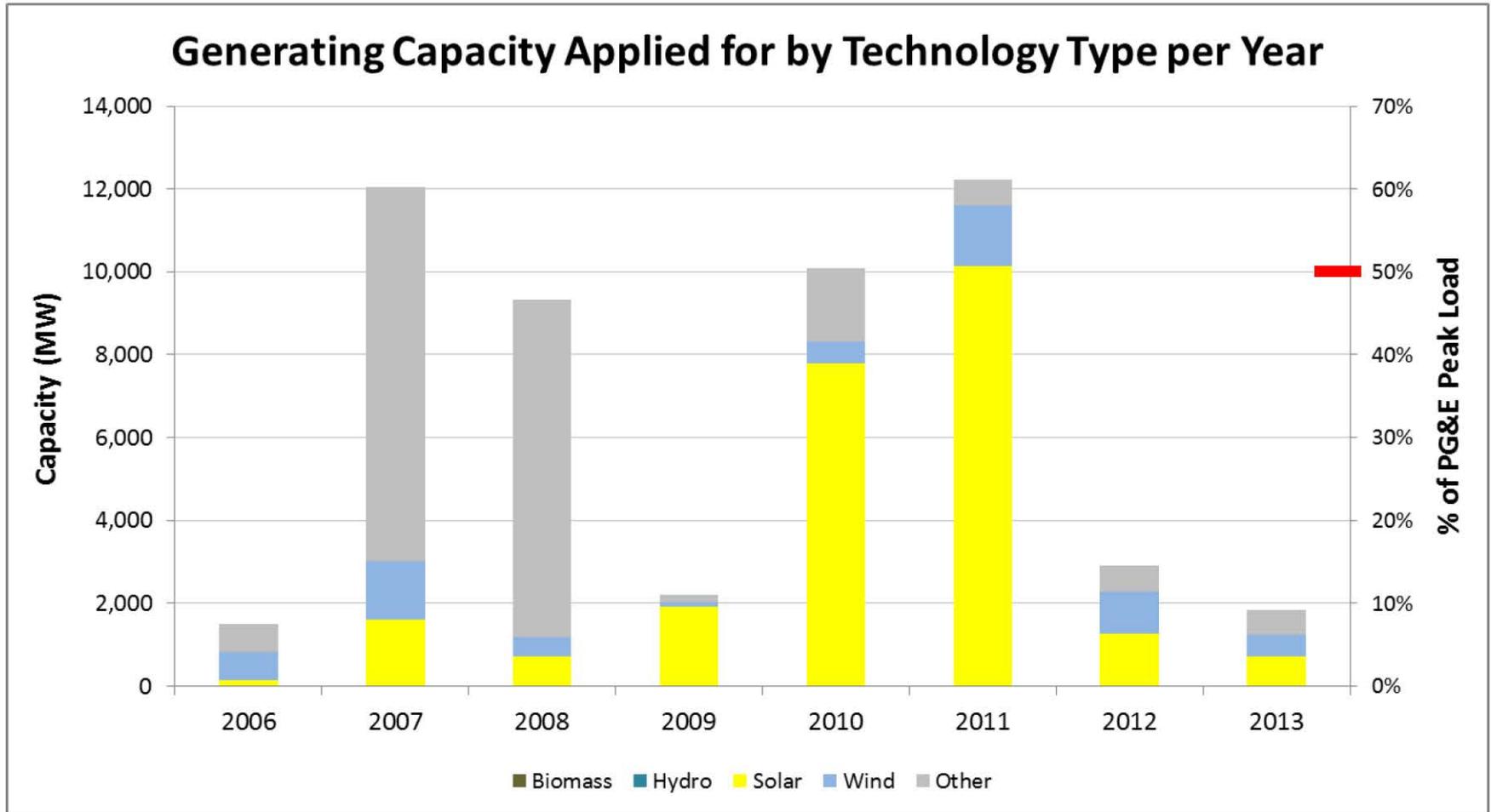
Note: Generic means PG&E will procure from to be determined resources. Some of these resources will be procured through mandated programs such as: RAM, AB 1969, and ReMAT.
 Data Sources: PG&E's 2002 Corporate Environmental Report, PG&E's Preliminary 2012 RPS Volumes Report and PG&E's 2013 IEPR Forecast. Last updated June, 2013.



Electric Generation Interconnection (EGI) Scope

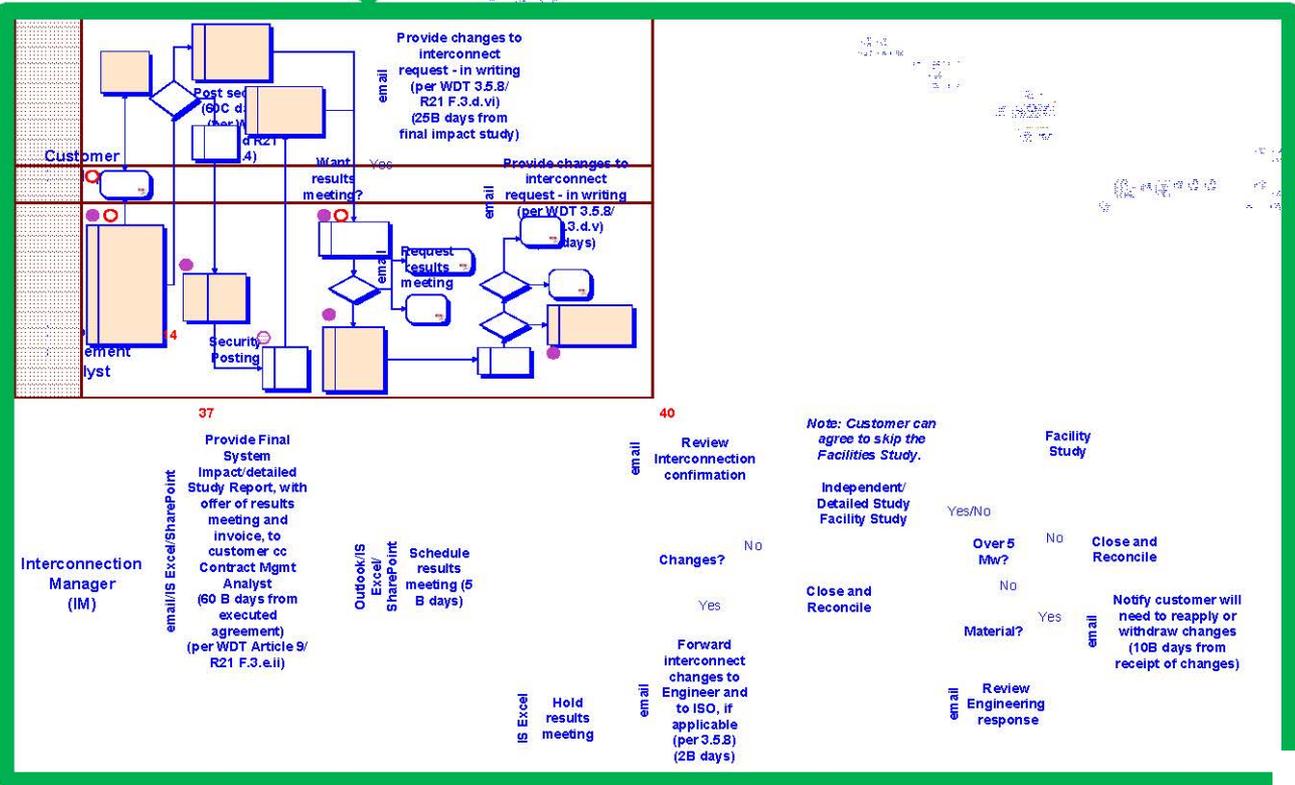
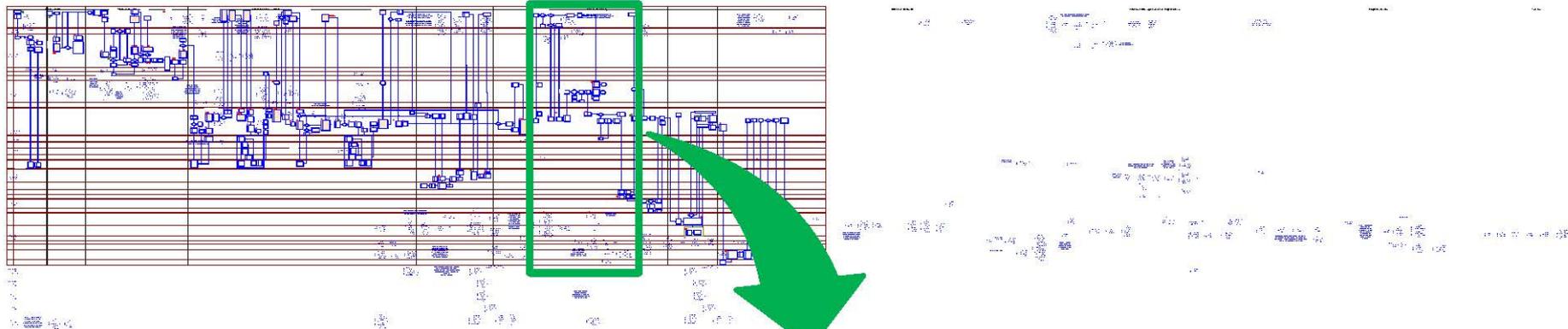


Data as of 02/28/14	S. NEM	Other Rule 21	W. Dist.	W. Trans.
In Service	107,680 sites/ 557 MW	4,738 sites / 1,133 MW	96 sites / 322 MW	46 sites / 5,400 MW
Active	3,410 sites/ 16 MW	661 sites / 694 MW	90 sites / 389 MW	98 sites / 7,500 MW
Monthly	2,790	79	6	2



Applications submitted exceed PG&E's peak load

Highly Complex Interconnection Process



Extensive compliance

- ~ 2000 requirements across 4 work streams
- ~ 135 milestones for Wholesale Distribution process alone
- Must retain 40+ documents for each interconnection project

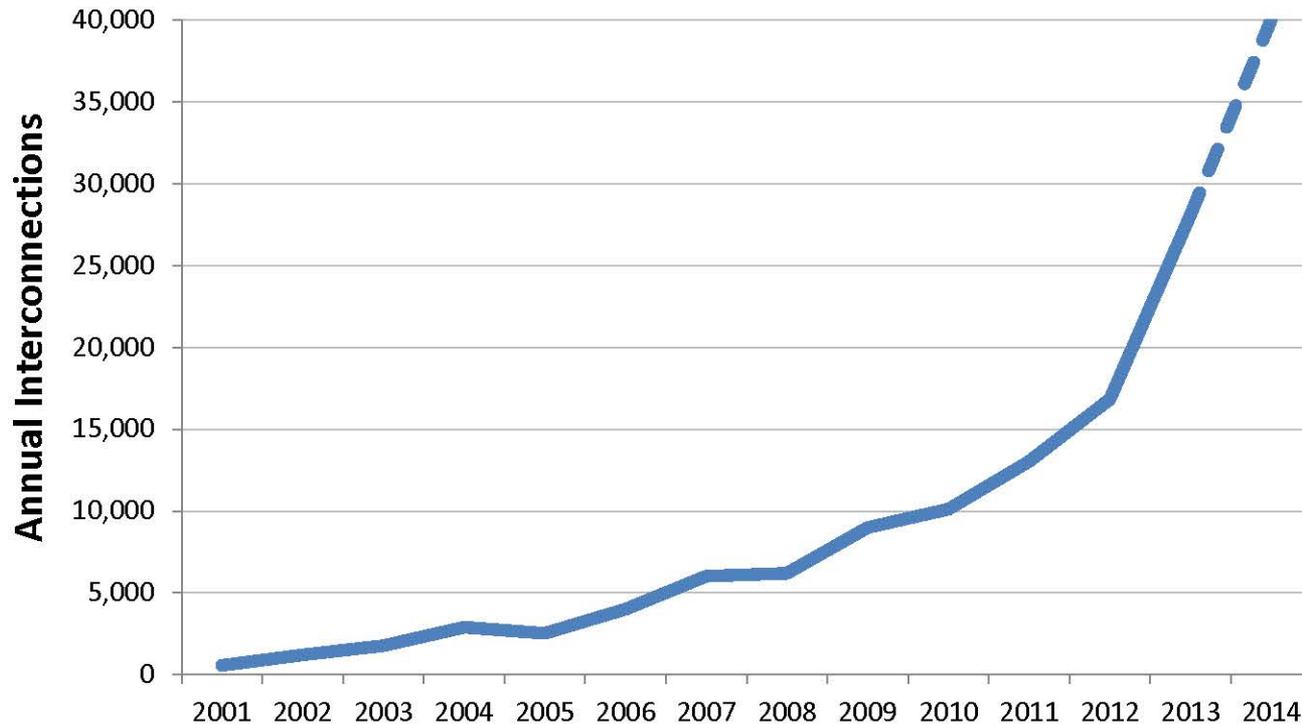
Generation Volume (MW) by County

2013



- New solar generation concentrated in Central Valley
 - Lower land cost and higher solar intensity
 - The T&D infrastructure undersized
 - Long lead times for upgrades
- New generation is located far from load center
 - Reverses the typical power flow
 - Need upgrades to the 230 kV and 500 kV backbone systems
- Biofuel distribution generation typically remotely located
 - Unable to see end-of-line faults
 - Direct Transfer Trip protection required

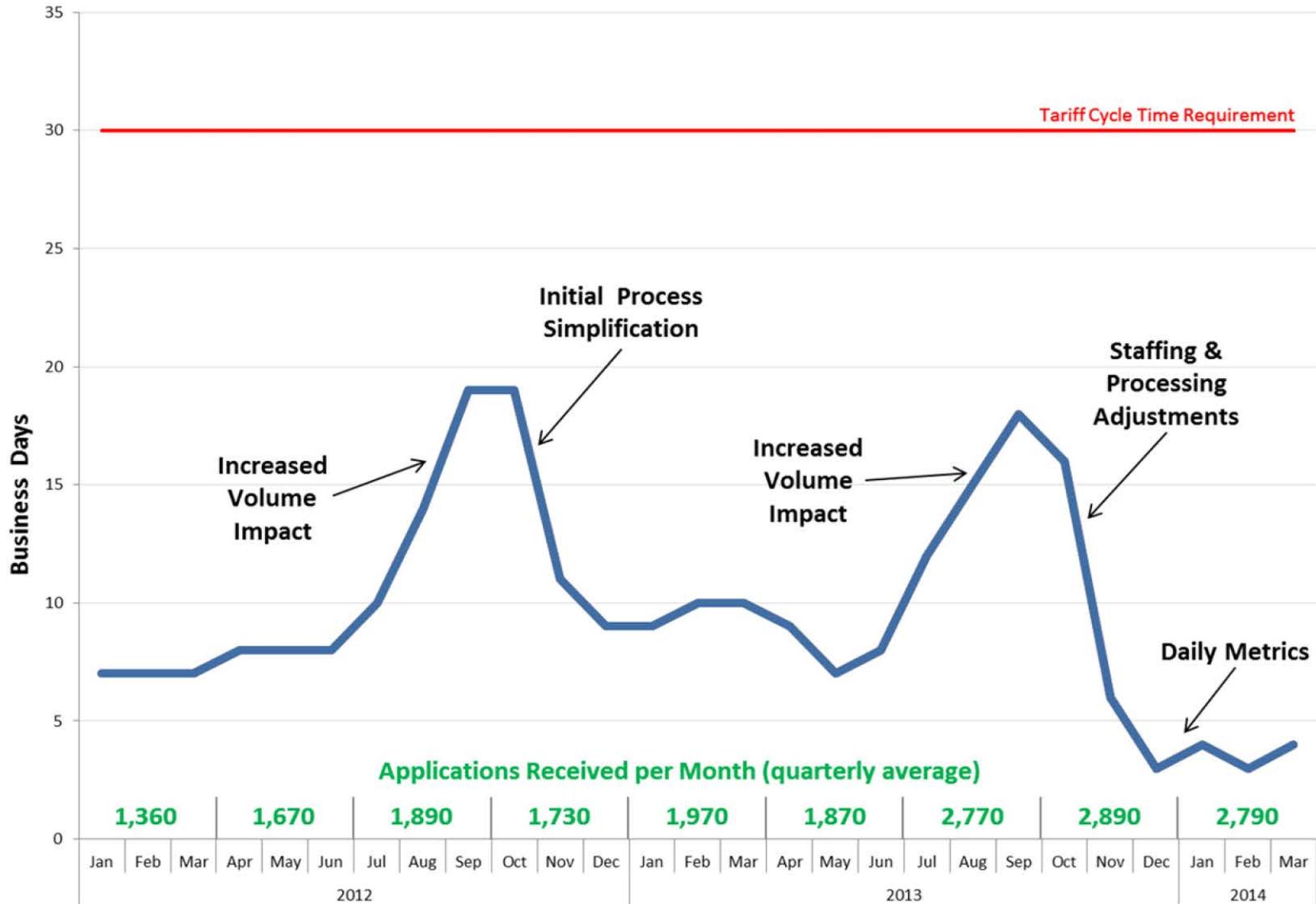
Standard NEM in PG&E's Service Area



Statistics

- ~ 107,680 systems installed to date
- ~ 25% of nationwide rooftop systems
- ~ 2,790 applications per month in 2014
- ~ 557 MW of customer installed

Standard NEM Cycle Time





**Hallways full
of file cabinets**



**Cabinets gone,
paper on its way**



All gone!

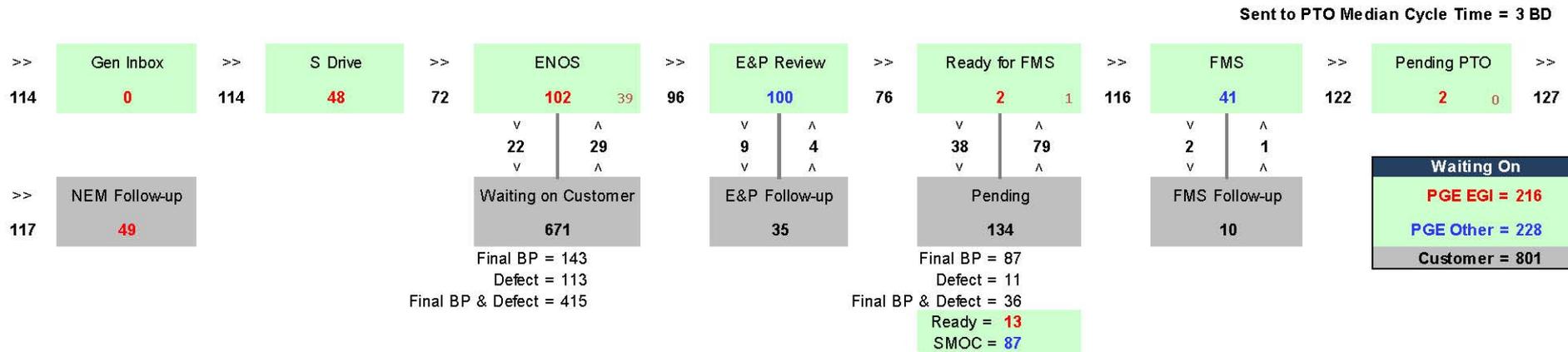
Initial Process Changes

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



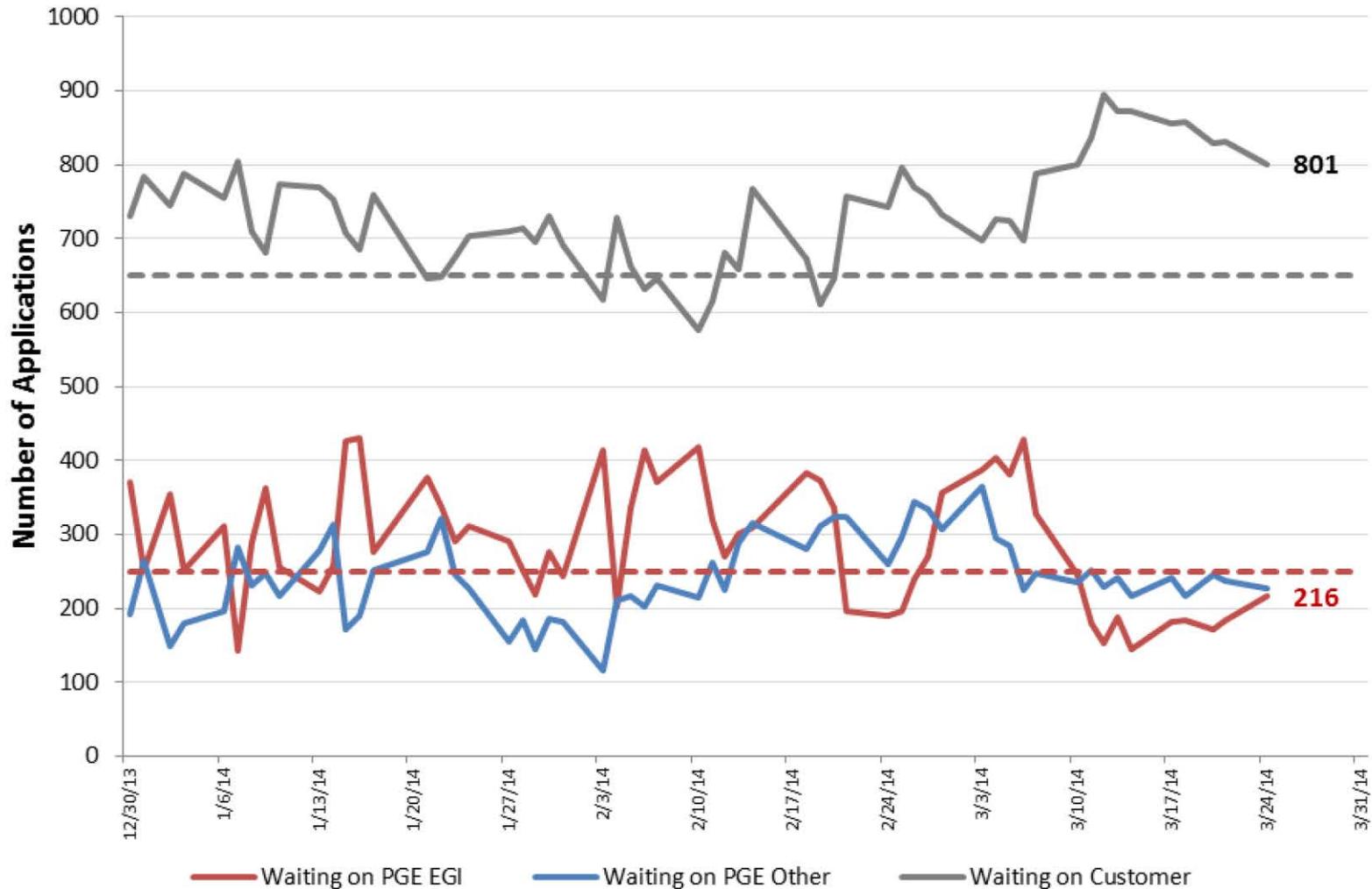
Daily NEM Process Flow Metrics

As of Midnight
Monday 3/24/14



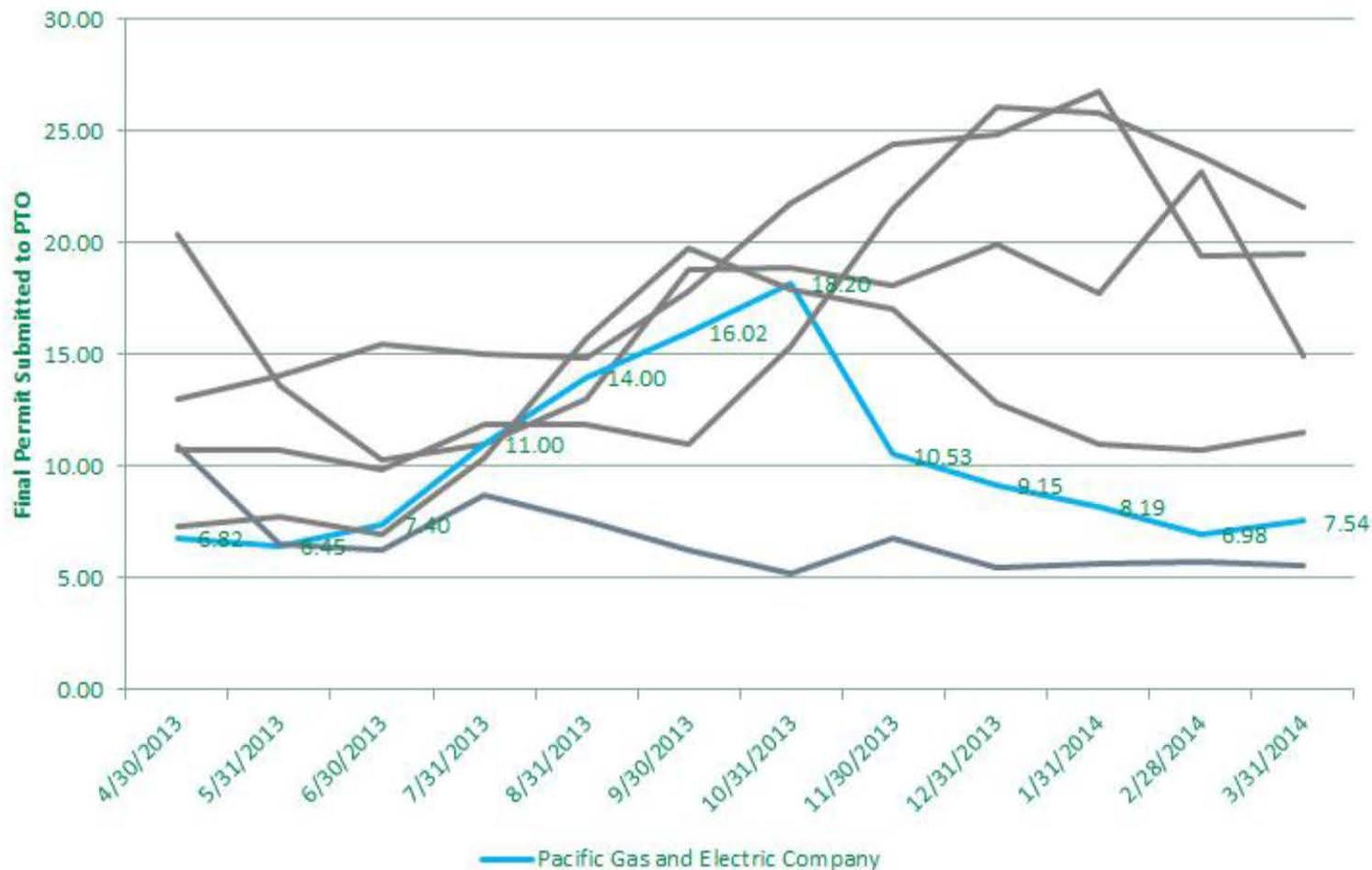
Monitoring both flows and ending balances for each stage of the processing

Standard NEM Processing Volumes



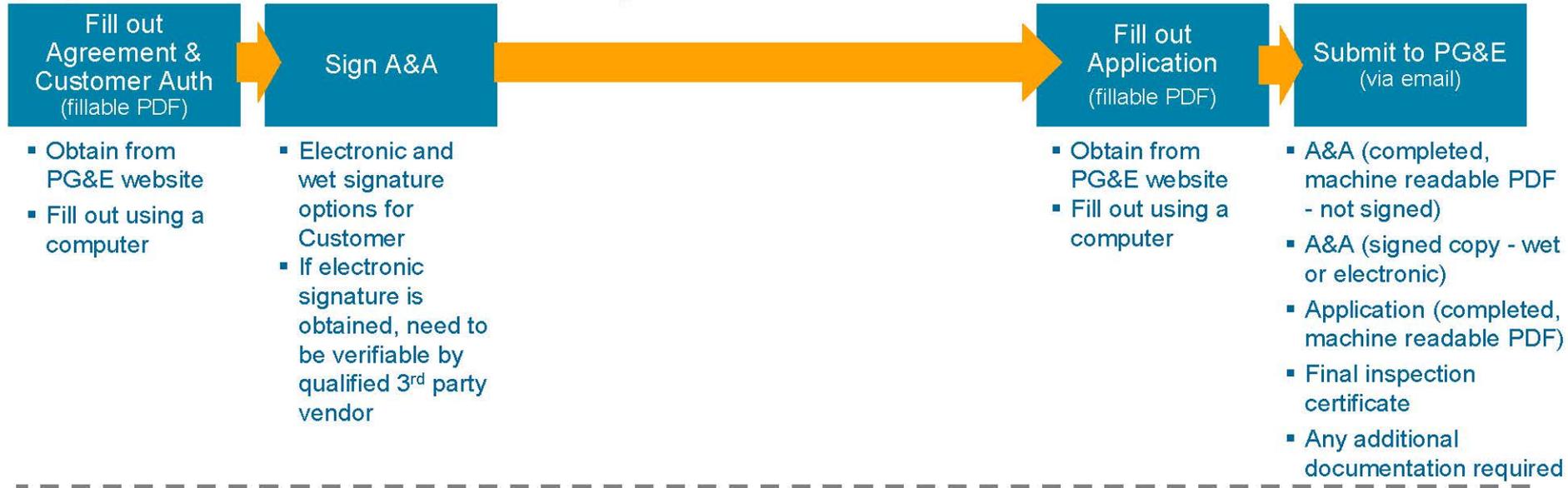
Baselines set to match daily input volumes to avoid building backlogs

Average PTO Timelines (Business Days)

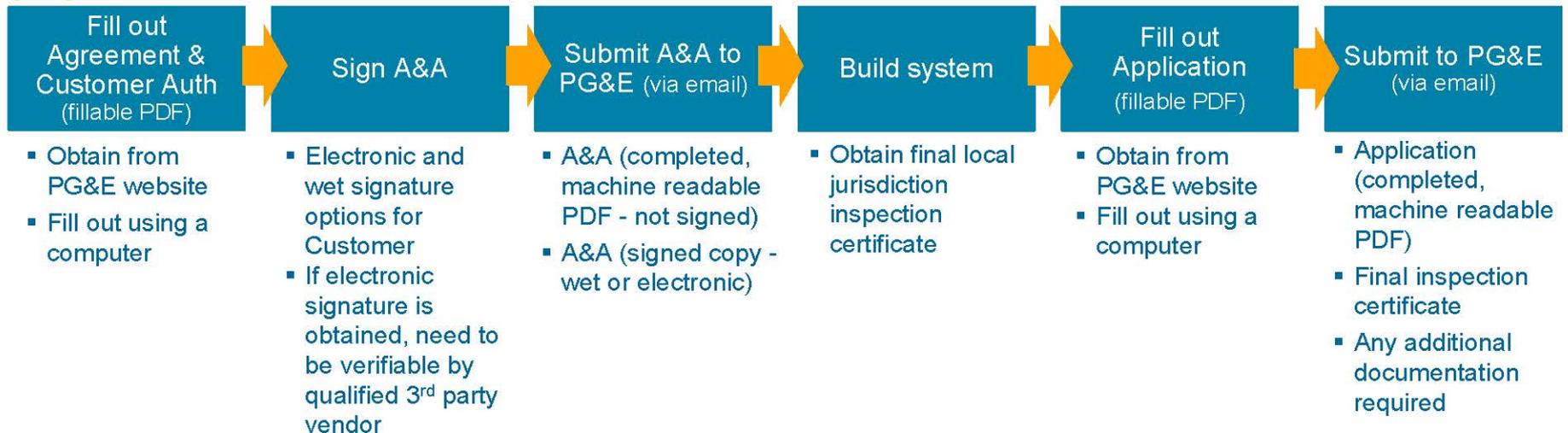


Standard NEM Application Options

1) System Built and Passed Final Inspection



2) System Not Yet Built





Fillable PDF forms are located on the PG&E website: <http://www.pge.com/standardnem/>

Agreement & Customer Authorization (79-1151A)

Application (79-1151B)

AGREEMENT AND CUSTOMER AUTHORIZATION
Net Energy Metering Interconnection
For Solar And/Or Wind Electric Generating
Facilities Of 30 Kilowatts Or Less

Pacific Gas and Electric Company

Customers may not operate their Generating Facility while interconnected to the PG&E system until they receive written permission from PG&E.
City and County of San Francisco ("CCSF") owned generating facilities seeking Schedule NEMCCSF and participants in the Demand Response Programs below are not eligible to participate in NEM
o Peak Day Pricing (PDP) o Scheduled Load Reduction Program (SLRP) o SmartRate

Part I – Generating Facility Information and Responsible Parties

A. Customer and Generating Facility Information (*as it appears on the PG&E bill):
 Please check this box if you intend to participate in NEM aggregation and continue to fill out Parts I, III, IV and the separate NEM Load Aggregation Appendix (Form 79-1153)
Please check the applicable box: Individual Company

Account Holder Name* (Individual or Company) _____ Electric Service Agreement ID* _____ Meter Number* _____
CA
Generating Facility Street Address* _____ City* _____ State _____ Zip* _____
Customer Phone Number _____ Email (if blank, Permission to Operate (PTO) letter will be mailed to mailing address on record)

B. Meter Access Issues (if applicable, check all that apply and provide contact information to request access):
 Meter in building or behind locked gate Unrestrained animal at meter or AC Disconnect Switch Other: _____
Contact Name to Request Access (if access issues exist) _____ Contact Phone _____

C. Energy Service Provider (ESP) Customers, who have an ESP other than PG&E, must contact their ESP directly regarding the ESP's NEM program. (If applicable, check one):
 Interconnection under Direct Access (DA) Interconnection under Community Choice Aggregation (CCA)

D. Application Contact Information (required if Customer is authorizing a third party to act on Customer's behalf):
Company Name _____ Contact Person _____
Contact Phone Number _____ Email _____

By checking this box and signing this Agreement, I (Customer) authorize PG&E to release my PG&E Electric Account information to the Company above limited to kilowatt hour (kWh) usage, operational characteristics, and other information related to my Generating Facility application. Company is also authorized to submit Application Form 79-1151B and act on my behalf with regard to the interconnection and receive copies of this executed Interconnection Agreement and the Permission to Operate Letter when issued.

By checking this box, I (Customer) voluntarily agree to provide PG&E the System Cost Paid by Customer (optional, not required.) I understand this information may also be provided to the CPUC and other third parties. \$ _____

APPLICATION
Net Energy Metering Interconnection
For Solar And/Or Wind Electric Generating
Facilities Of 30 Kilowatts Or Less

Pacific Gas and Electric Company

Customers may not operate their Generating Facility while interconnected to the PG&E system until they receive written permission from PG&E.
For a non-exporting Generating Facility, RES-BCT facility, or NEM Generating technologies other than 30 kW or less solar or wind, Customers must submit the online Form 79-974 available at www.pge.com/gen.

Part I – Generating Facility Information and Responsible Parties

A. Date of signature on accompanying Interconnection Agreement and Customer Authorization Form 79-1151A
Date: _____

B. Customer and Generating Facility Information (*as it appears on the PG&E bill):
Please check the applicable box: Individual Company

Account Holder Name* (Individual or Company) _____ Electric Service Agreement ID* _____ Meter Number* _____
CA
Generating Facility Street Address* _____ City* _____ State _____ Zip* _____
 The project is completed and the final, signed, jurisdiction approval (building permit) is attached.

C. Interconnection Application Type (check one):
 New NEM Generating Facility interconnection at an existing PG&E service.
 Modify existing PG&E approved Generating Facility interconnection (adding/removing/replacing equipment).
▪ Must provide a Custom Single-Line Drawing (SLD) showing the original system and the modified system.
 New interconnection in combination with a new service.
▪ An Application for Service must be completed. Additional fees may be required if a service or line extension is required in accordance with PG&E Electric Rules 15 and 16. Please contact PG&E at 1-800-PGE-5000.
▪ If this account will be established in a new subdivision, attach a list of lots/addresses and provide the following:
Developer Name _____ Development Name _____

D. System Owner (check one):
 PG&E Customer owned Third Party ownership
List the third party's name if they own the renewable energy credits (RECs):

E. Contractor Information (List who is installing the system. Write "Self-Installed" if installed by Customer):
Company Name _____ California Contractors State License Number _____

F. Preparer of this Application (if not the PG&E Customer, the Preparer must be authorized to act on behalf of the Customer on the Interconnection Agreement and Customer Authorization Form 79-1151A):
Company Name _____ Preparer Name _____ Date Prepared _____

Two new forms replace the previous version (79-1101)

- Agreement and Customer Authorization (79-1151A)
 - Customer, contractor and facility location and size information
 - Sign-off on rate selection, agreement terms and third party authorization
 - Submitted alone, or at the same time as the Application
- Application for Interconnection (79-1151B)
 - Generating facility equipment and configuration details
 - Submitted only after final inspection

Why the Changes Were Made

- Simplify the process and forms
- Make it easier for customers and installers to fill out the forms
- Facilitate customers to sign properly completed forms
- Improve equipment data quality in the PG&E asset registry
- Enable machine reading to reduce errors and processing costs
- Further shorten the time needed to issue a Permission to Operate (PTO) letter

79-1151B: Application Form Details

Part II – Description of the Generating Facilities

D. AC Disconnect Switch (Write "None" if not applicable. See Part III Section C for requirements):

AC Disconnect Manufacturer	Model Number	Rating (amps)	Distance from Meter (ft.)*

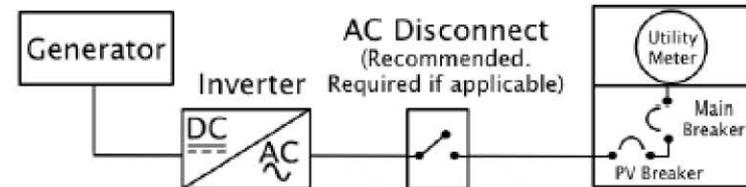
*Note: PG&E's Electric and Gas Service Requirements, also known as the "Greenbook" requires the AC Disconnect Switch to be located 10 feet or less from PG&E's electric revenue meter at the point of common coupling or interconnection and easily seen from the panel. If the AC Disconnect Switch is greater than 10 feet, a variance request must be submitted as outlined in Part II, Section A.

E. Basic Single-Line Diagram (SLD) for Solar Projects (check one):

- I certify that the SLD below and the PV equipment information in Part II accurately represent the Customer's service, the Generating Facility (there are no other Generator Facility(ies) connected to the service, and the project does not require a Variance Request.

Utility Service: (if using the SLD to the right)

Panel Voltage	Main Breaker	PV Breaker Size

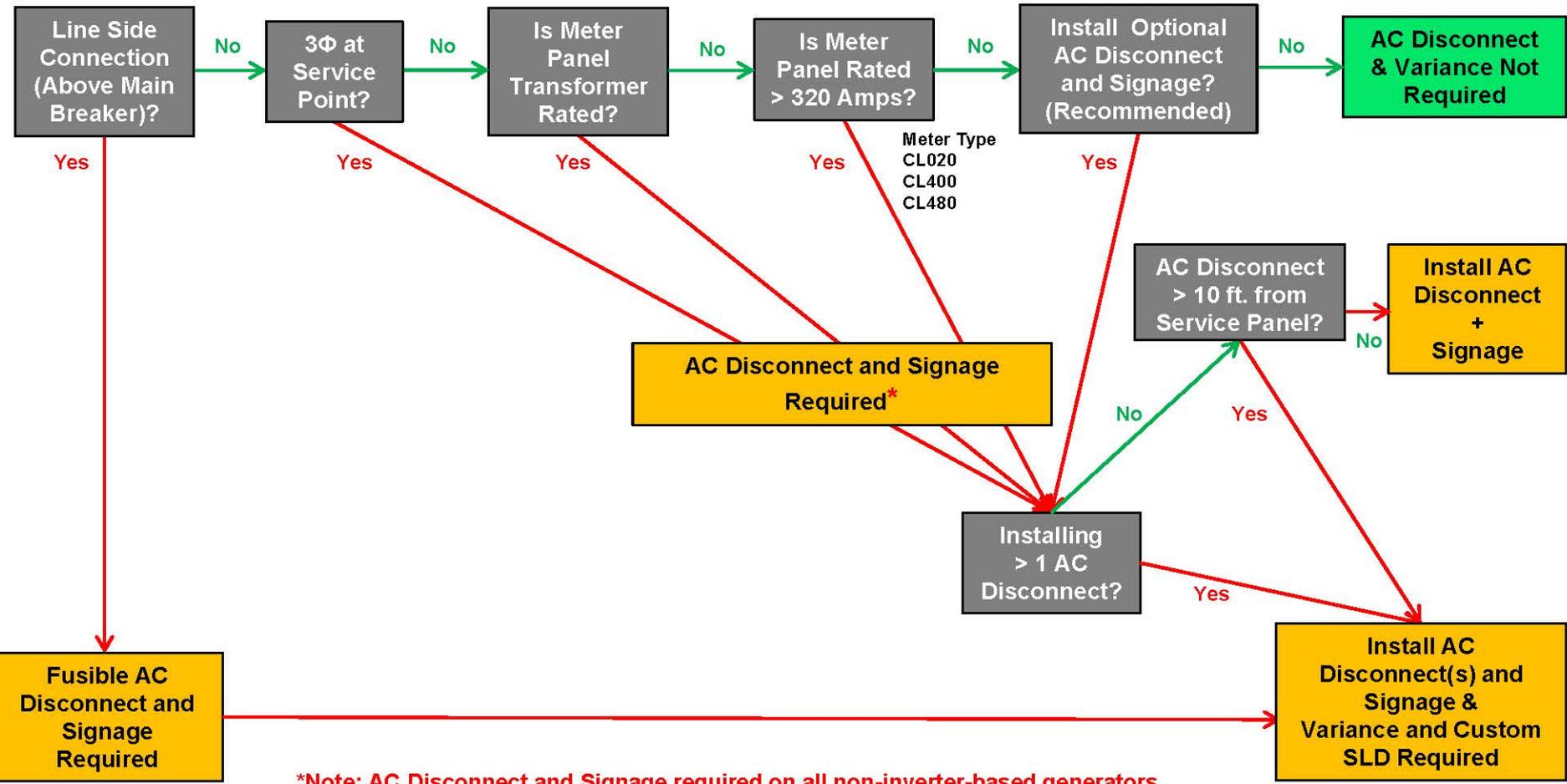


- I will submit a custom SLD for one or more of the following reasons: there is/are existing Generating Facility(ies) connected to the service, I am modifying an existing Generating Facility, the Basic SLD does not accurately reflect the project, or I am submitting a Variance Request.
(See Part III Section D for Custom SLD details.)

F. Service Panel Short Circuit Interrupting Rating (SCIR) (for systems larger than 11 kW):

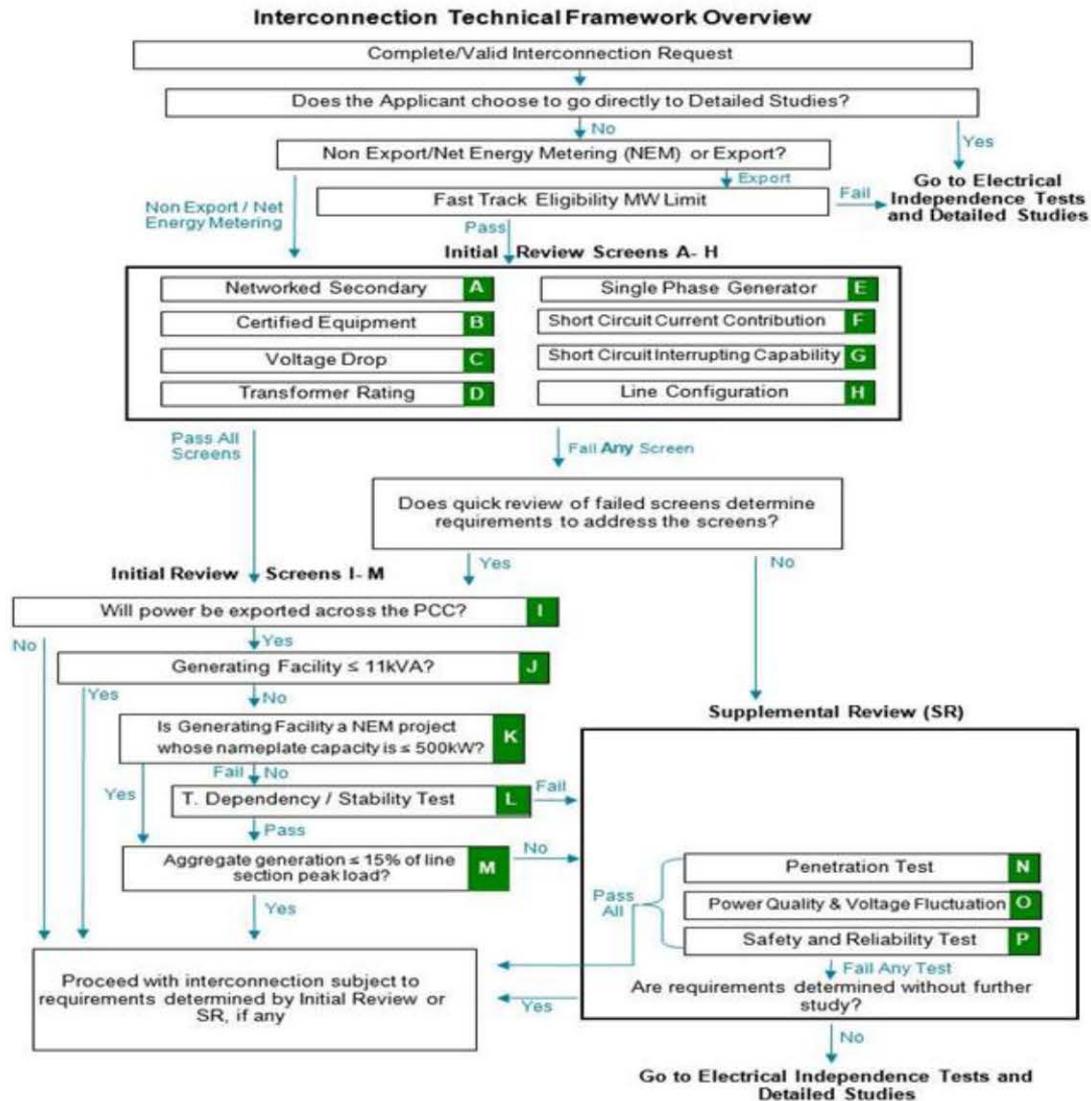
SCIR of the service panel connected to this Generating Facility: _____

AC Disconnect and Variance Logic Standard NEM



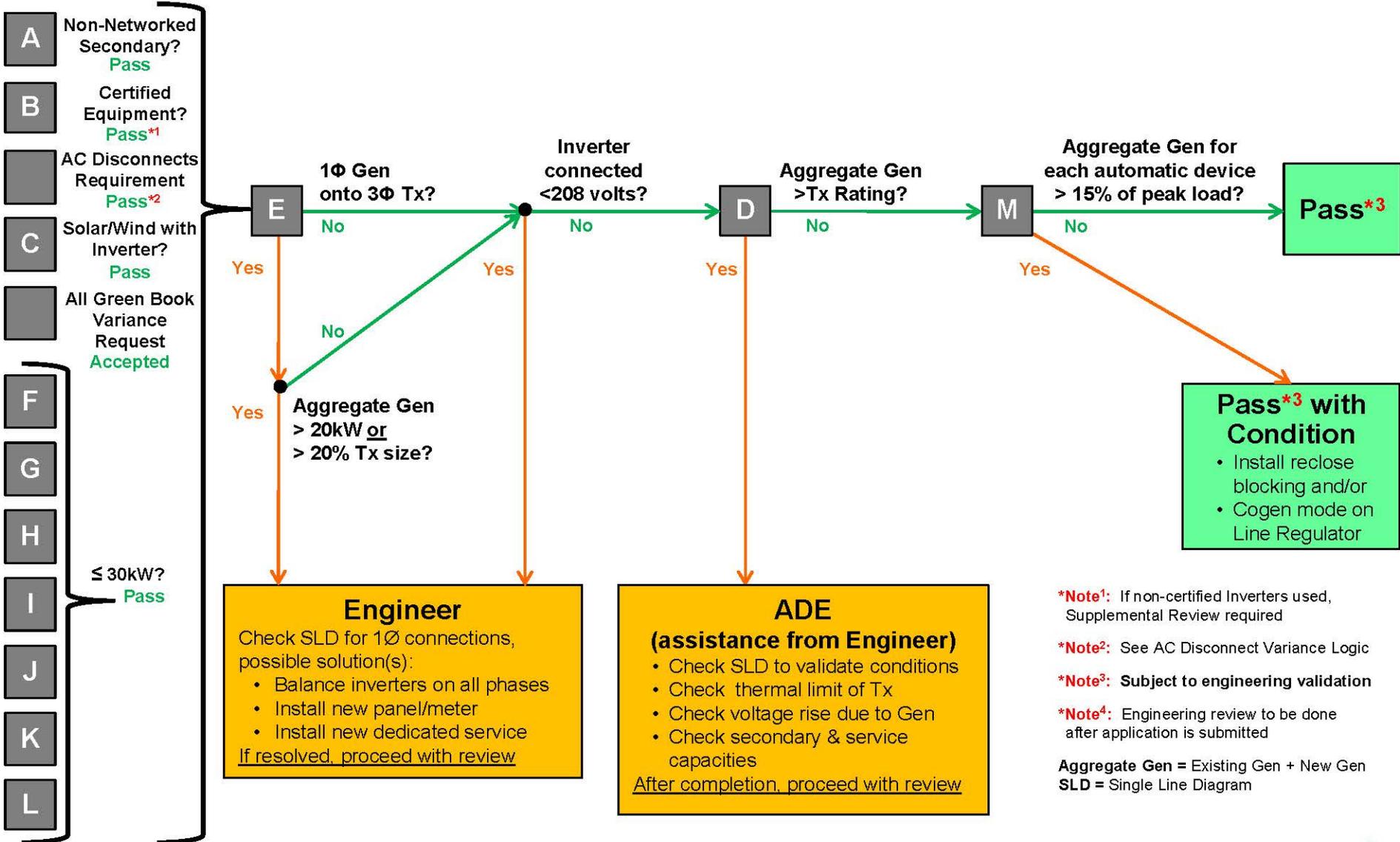
G. ENGINEERING REVIEW DETAILS

(N)



(N)

Standard NEM Engineering Review



***Note¹:** If non-certified Inverters used, Supplemental Review required

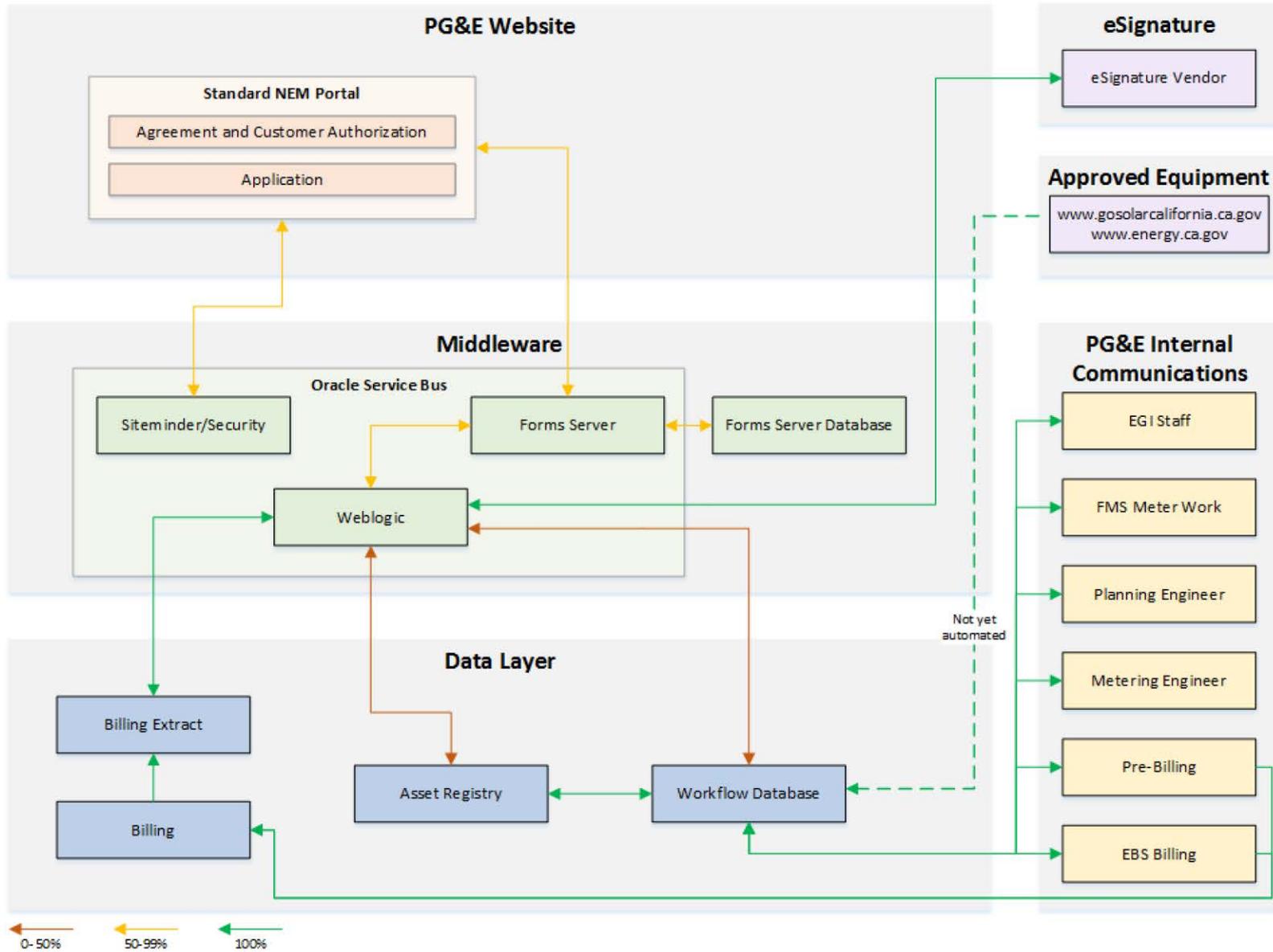
***Note²:** See AC Disconnect Variance Logic

***Note³:** Subject to engineering validation

***Note⁴:** Engineering review to be done after application is submitted

Aggregate Gen = Existing Gen + New Gen
SLD = Single Line Diagram

- Some modifications to the current forms shown today
 - Minor wording changes
 - Battery storage options
 - Incorporate closed rate relinquishment acknowledgement
- Standard NEM Web Portal Features
 - Real-time data entry or completed form upload
 - Auto populated fields from billing and asset registry databases once Customer is identified
 - Automated engineering review
 - Drop down equipment lists matching the Go Solar California website
 - Front-end error checking
 - On screen help
 - Electronic signature option





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Electric Generation
Interconnection

▼ Wholesale Generation

Distributed Generation

► Net Energy Metering

Qualifying Facilities
Converting to Merchant
Status

Local Government
Renewables Energy Self
Generation Program

AC Disconnect Switches for
Inverted-Based Generation

Retail Generation

Standard Net Energy Metering Interconnection

Welcome to the Standard Net Energy Metering (NEM) interconnection tool for photovoltaic (PV) solar and wind generating facilities 30 kW or less interconnecting with PG&E. For an overview of the program and to download forms, refer to the [Standard Net Energy Metering](#) page for Frequently Asked Questions.

I am here to:*

Start by completing an Agreement and Customer Authorization

- Online
- Upload form

Add a signature to a pending Agreement and Customer Authorization

- E-sign now
- Upload a signature [?](#)

Complete a Net Energy Metering Application (after submittal of a signed Agreement and Customer Authorization)

- Online
- Upload form

- Questions -

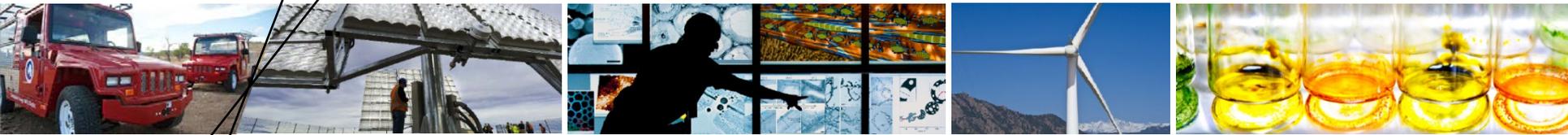
- For further information or questions, Bob Woerner can be reached at:
 - Email: Bob.Woerner@pge.com
 - Office: 415-973-2300

Register for Next DGIC Webinar: April 30th

Minimum Day Time Load Calculation and Screening

The “Minimum Day Time Load Calculation and Screening,” webinar will feature speakers Babak Enayati, Senior Protection Engineer at National Grid, Dora Nakafuji, Director of Renewable Energy Planning at Hawaiian Electric Company (HECO), and Anthony Hong, Director of Principal Distribution Planning at HECO. The webinar will explain the Massachusetts Technical Standards Review Group’s recommendation to adopt 100% minimum day time load screen and provide an example of how minimum day time load data is gathered and incorporated into the screening process.

<https://www3.gotomeeting.com/register/170442518>



Thank you!