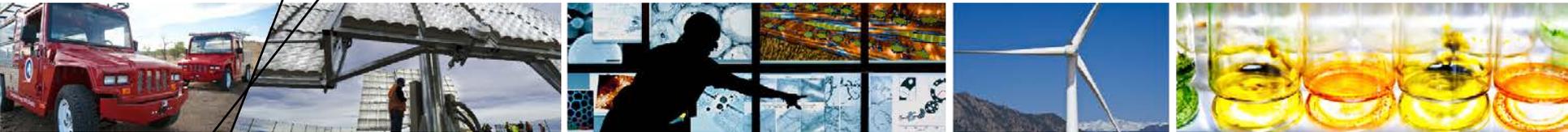




# Distributed Generation Interconnection Collaborative (DGIC)



**June 3, 2015**

**“Improving Data Transparency for the Distributed PV  
Interconnection Process: Emergent Utility Practices and  
State Requirements”**

Joslyn Sato, Hawaiian Electric Companies  
Michael Conway, Borrego Solar Systems, Inc.

Kristen Ardani and Emerson Reiter, National Renewable Energy Laboratory (NREL)

# Purpose of Today's Meeting

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- Learn how data reporting requirements for interconnection vary across States, how tracking and data reporting for interconnection requests is evolving with rising PV volumes, and the benefits of publically available interconnection queue data (Emerson Reiter, NREL)
- Overview of Hawaii's efforts to improve the interconnection process and make interconnection data publically available (IIQ) (Joslyn Sato, Hawaiian Electric Companies)
- Explanation of MA service quality metric for PV interconnection and how it is being implemented to drive faster interconnection times for PV (Michael Conway, Borrego Solar Systems)



# Speakers



**Emerson Reiter**  
Project Leader  
NREL



**Joslyn Sato**  
Interconnection Improvement Transformation Lead  
Hawaiian Electric Companies

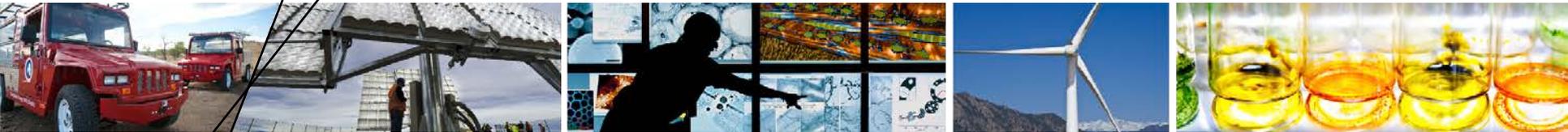


**Michael Conway**  
Director of Grid Integration  
Borrego Solar Systems, Inc.



**Kristen Ardani**  
Solar Analyst (DGIC moderator)  
NREL

# Distributed Generation Interconnection Collaborative (DGIC)



## Interconnection Performance Reporting: Benefits and Existing Programs

**Emerson Reiter**

**June 3, 2015**

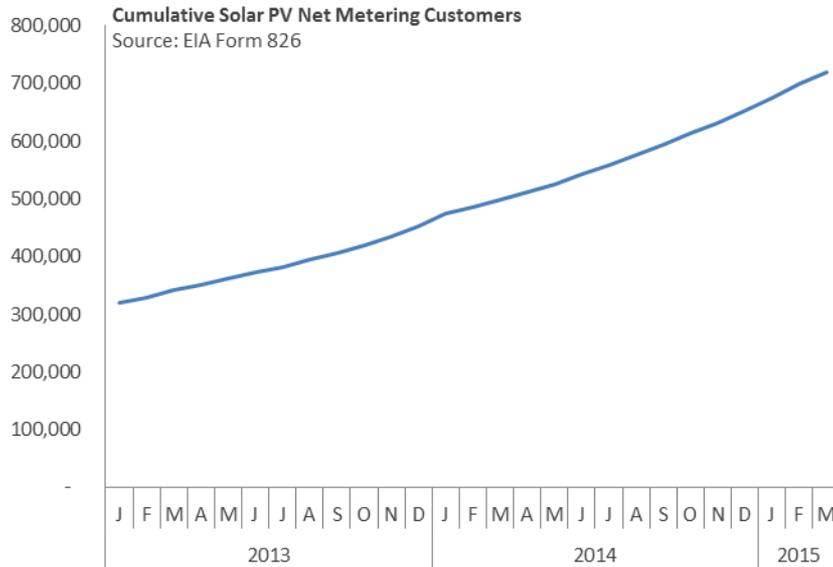
# Agenda

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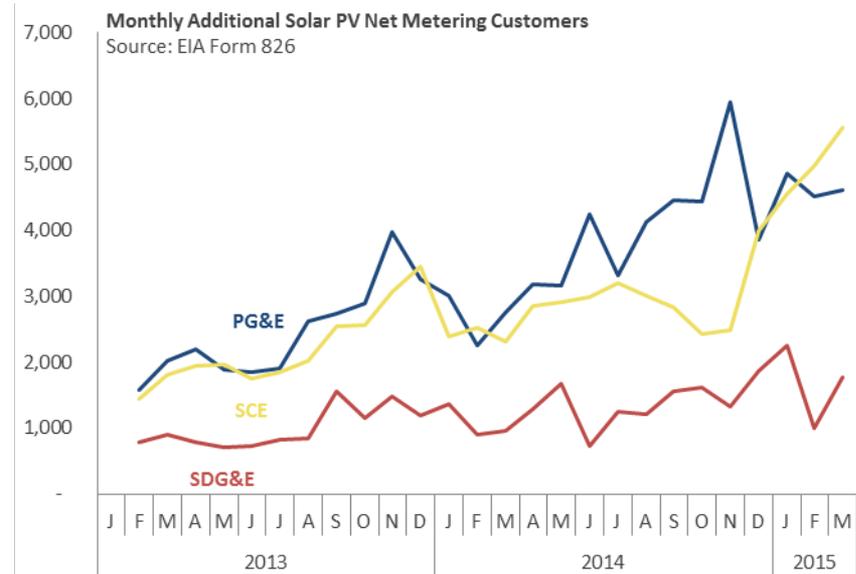
- **Distributed Generation Context**
- **Potential Benefits of Reporting**
- **Existing Reporting Programs**

# More Demand = More Interconnection Applications

National demand for net-metered distributed generation systems...



...is increasing the processing burden for a growing number of utilities



# More Applications = Longer Delays

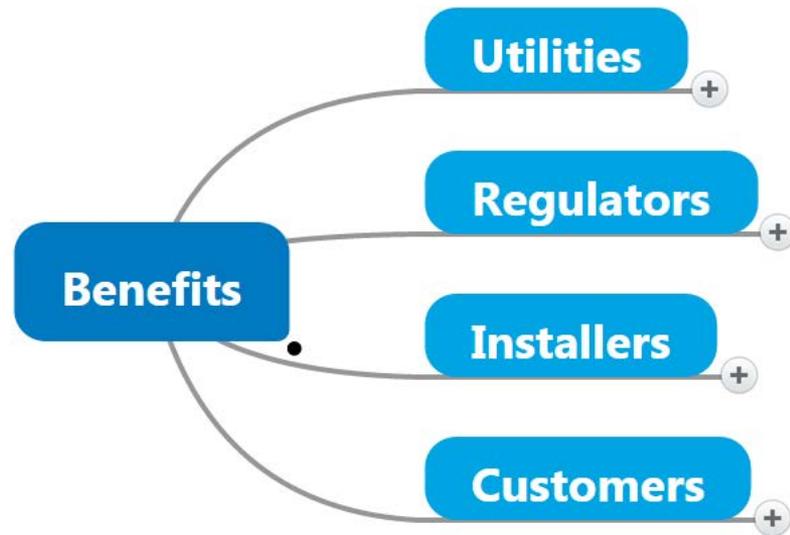
**Table 5. PV Projects that Exceeded Application Review and Approval Time Requirement, by State and Size**

	Residential (up to 10 kW)			Small Commercial (10–50 kW)		
State	Time Req. (business days)	Applications Exceeding Time Req. (%)	Median for Applications that Exceeded Time Req. (business days)	Time Req. (business days)	Applications Exceeding Time Req. (%)	Median for Applications that Exceeded Time Req. (business days)
CA	25	37%	38	25	47%	39
NY	15	38%	49	15	38%	60
NJ	13	52%	18	18	42%	27
CO	25	58%	50	30	45%	59
AZ	[20]*	53%	43	[20]*	54%	43

\* 20-day threshold is assumed for analytic purposes, because Arizona has no interconnection timeframe requirements.

Source: Ardani et al., “A State-Level Comparison of Processes and Timelines for Distributed Photovoltaic Interconnection in the United States,” <http://www.nrel.gov/docs/fy15osti/63556.pdf>

# Benefits of Interconnection Performance Reporting



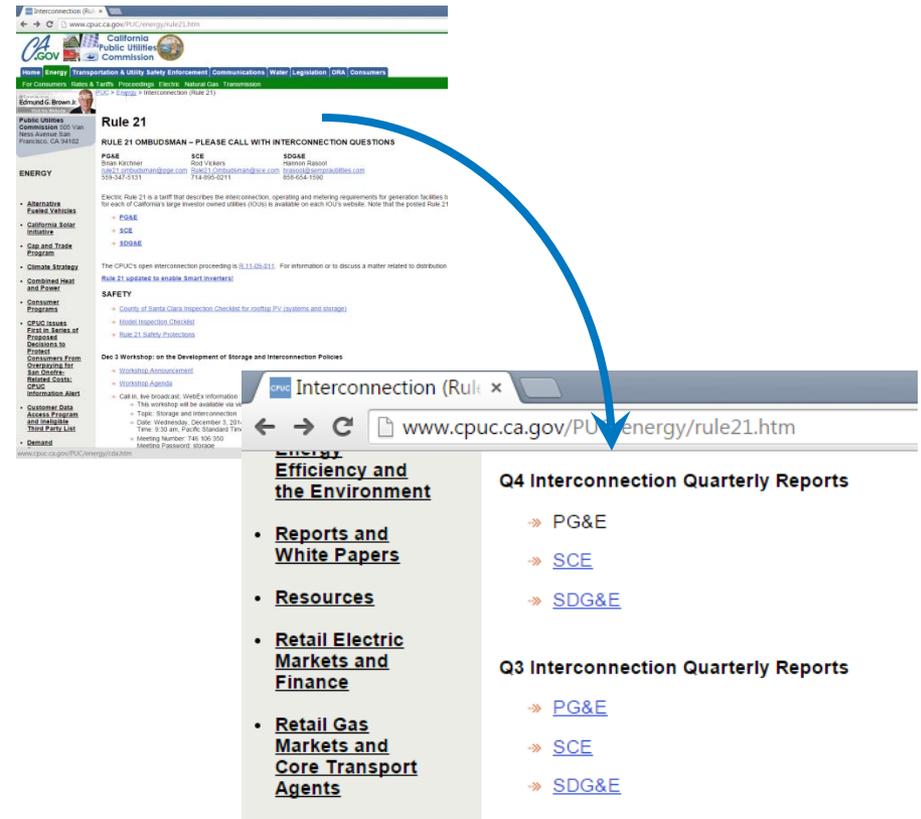
## Potential Benefits

- Improved customer relationships
- Identify barriers to policy success
- Increase asset/labor utilization
- Advocate for shared supply

Adapted From: [http://www.nrel.gov/tech\\_deployment/dgic\\_interconnection\\_insights\\_2015-03.html](http://www.nrel.gov/tech_deployment/dgic_interconnection_insights_2015-03.html)

# Existing Programs - California

- Text-based format
- Aggregated at the utility level
- Emphasis on screening process for applications
  - What screens are failed most often?
  - What are potential remedies?



The image shows a screenshot of the California Public Utilities Commission (CPUC) website. The main content area displays "Rule 21" with a sub-header "RULE 21 OMBUDSMAN - PLEASE CALL WITH INTERCONNECTION QUESTIONS". Below this, there are contact details for three ombudsmen: PG&E (Suzanne Kechner), SCE (Suzanne Kechner), and SDG&E (Mehmet Rapaci). A blue arrow points from the "Rule 21" heading to a navigation menu on the right side of the page. The menu is titled "Efficiency and the Environment" and lists several categories: "Reports and White Papers", "Resources", "Retail Electric Markets and Finance", and "Retail Gas Markets and Core Transport Agents". To the right of the menu, there are two sections for quarterly reports: "Q4 Interconnection Quarterly Reports" and "Q3 Interconnection Quarterly Reports". Each section lists the utilities PG&E, SCE, and SDG&E with arrows pointing to their respective links.

**Rule 21**  
**RULE 21 OMBUDSMAN - PLEASE CALL WITH INTERCONNECTION QUESTIONS**

PG&E	SCE	SDG&E
Suzanne Kechner suzanne.kechner@pge.com 714-995-9111	Suzanne Kechner suzanne.kechner@sce.com 714-995-9211	Mehmet Rapaci mehmet.rapaci@sdge.com 858-454-1590

**ENERGY**

- Alternative Energy Vehicles
- California Solar Initiative
- Cap and Trade Program
- Climate Strategy
- Combined Heat and Power
- Consumer Programs
  - CPUC Issues First in Service Process Decision to Proceed
  - Customers From San Diego Return to CPUC Information Alert
  - Customer Data Access Program and Initiative
  - Third Party List
- Demand

**Safety**

- County of Santa Clara Inspection Checklist for rooftop PV (systems and storage)
- Model Inspection Checklist
- Rule 21 Safety Protections

**Dec 3 Workshop: on the Development of Storage and Interconnection Policies**

- Workshop Announcement
- Workshop Agenda
- Call for Testimonials: Specific Information
- This workshop will be available via vti
- Topic: Storage and Interconnection
- Date: Wednesday, December 3, 2014
- Time: 9:30 am, Pacific Standard Time
- Meeting Number: 748-198-300
- Meeting Password: storage

**Efficiency and the Environment**

- **Reports and White Papers**
- **Resources**
- **Retail Electric Markets and Finance**
- **Retail Gas Markets and Core Transport Agents**

**Q4 Interconnection Quarterly Reports**

- PG&E
- SCE
- SDG&E

**Q3 Interconnection Quarterly Reports**

- PG&E
- SCE
- SDG&E

Access: <http://www.cpuc.ca.gov/PUC/energy/rule21.htm>

# Existing Programs - California

1 Southern California Edison Rule 21 and NEM Compliance Reporting Submitted January 30, 2015

**Part I:**

**Pre-Application Reports Reporting:**

<b>a- Total since Rule 21 Revision in September 2012 (9/13/12 – 12/31/14)</b>	<b>b- Total for Third Quarter of 2014 (10/1/14 - 12/31/14):</b>
153	19

- i. Number requested: 153
- ii. Number issued: 151
- iii. Number currently in process: 0
- iv. Number withdrawn (if any): 2

**Rule 21 Fast Track Reporting:**

<b>Rule 21 Fast Track applications received since 9/13/2012 – 12/31/14</b>	<b>Rule 21 Fast Track applications for First Quarter 2014 (7/1/14 - 12/31/14)</b>

**Initial Review**

- a. Number of Fast Track Applications received for **all** types of generating facilities:
 

<b>249<sup>a1</sup></b>	<b>62</b>
From Rule 21 Reform to 12/31/14	4Q 2014
- b. Number of Fast Track applications received for exporting generating facilities only (excluding Net Energy Metering and non-export):
 

<b>109</b>	<b>9</b>
From Rule 21 Reform to 12/31/14	4Q 2014
- c. Number of Fast Track applications for exporting generating facilities that successfully passed Initial Review, where success is defined by passing all Initial Review screens:
 

<b>18</b>	<b>1</b>



## Screening Information

- g. Please indicate the top three most frequently failed Initial Review screens in descending order.
  1. Screen M (Aggregate generation 15% larger than line section peak load)
  2. Screen N (Penetration Test)
  3. Screen F (Short Circuit Current Contribution)
- h. If possible, please write three recommendations describing how an interconnection customer might apply for Fast Track in a way that would avoid failing the top three most frequently failed screens:
  1. Use SCE's Interconnection maps and locate projects in green zones and in accordance with the available capacity as identified in the green zone;
  2. Submit a Pre-Application Report Request for the proposed generator project;
  3. Interconnect via non-export with certified technology.

# Existing Programs - Hawaii

- Longest-running program
- Individual installations
- Tracks dates of major process milestones:
  - Interconnection request
  - Application received
  - Technical review
  - Agreement signed

The screenshot shows the Hawaii Public Utilities Commission Document Management System interface. The main heading is "Dockets". Below it, there is a "Docket Queue Link" section with a "Docket No." of 2002-0051. The description reads: "APPLICATION TO MODIFY ITS RULE 14 TO ESTABLISH INTERCONNECTION STANDARDS AND TO REQUIRE AN INTERCONNECTION AGREEMENT FOR DISTRIBUTED GENERATING FACILITIES. (TRANSMITTAL NO. 02-01) (TRANSMITTAL NO. 0)". The "File Date" is 01/15/2002, the "Docket Title" is "00: TARIFF CHANGES", the "Status" is "Closed", and the "Industry Code" is "Electric". Below this, there is a "Docket Documents" section with a table listing documents.

Date	Document Title	No of Pages
01/15/2002	HECO TRANSMITTAL NO. 02-01; HECOL TRANSMITTAL NO. 02-02; HECO TRANSMITTAL NO. 02-03H, filed	156 pgs
01/31/2002	LI/HECO, submitting attachments 2, 3, and 4 of Rule No. 4 Standard Form Contract # Customer Retention between HECOL and Hilo- Waialeale Village, filed (CONFIDENTIAL-ENVELOPE)	
01/31/2002	LI/HECO, submitting attachments 2, 3, and 4 of Rule No. 4 Standard Form Contract # Customer Retention between HECOL and Hilo- Waialeale Village, filed (CONFIDENTIAL-ENVELOPE)	
02/12/2002	LI/HECO, HECOL, & HECO, requesting a 30-day extension until 3/15/02 to prepare for the CA to submit its Statement of Position, filed	
02/22/2002	CA's IRs to HECO, HECOL, and HECO, filed	
03/01/2002	CA's Second Submission of IRs to HECO, HECOL, and HECO, filed	
03/04/2002	ORDER NO. 02-031: HECO Transmittal No. 02-01; HECOL Transmittal No. 02-02H, and 3 Transmittal No. 02-03H, are consolidated into a single docket, etc. All future filings...at HECO in the inst.	
03/06/2002	LI/HECO, requesting an additional 30-day extension until 4/15/02 to permit additional the CA to submit its Statement of Position, filed	
03/21/2002	HECO/HECOL/HECO's responses to CA's IRs of 2/22/02, filed	
04/03/2002	LI/HECO, requesting an additional 30-day extension, until 5/15/02, for the effective date respective Rule 24, filed	

**DOCKET NO. 02-0051**  
**RULE 14 ANNUAL REPORT**  
**HAWAIIAN ELECTRIC COMPANY, INC.**

Access: <http://dms.puc.hawaii.gov/dms/>; Docket #02-0051

# Existing Programs - Hawaii

## Older Format (through 2011 data)

**Confidential Information Deleted Pursuant to Protective Order No. 20168**

3.A. Customer Name: [REDACTED] ("Customer 3") Customer Address: [REDACTED]

3.B. Date of Customer Request to Interconnect a Distributed Generation Facility and Operate in Parallel with HECO's System:

- Customer 3 had preliminary discussions with HECO about a CHP System beginning in the January 2002 timeframe. Customer 3 decided to proceed with a CHP System in March 2003. The CHP System is planned to be operational in the December 2004 timeframe.

3.C. Information on Customer's Distributed Generation Unit:

- CHP System includes one synthetic natural gas fueled Caterpillar Model G3408 300 kW CHP System. Additional details on the CHP System have not been provided to HECO at this time. The CHP System will not be owned and operated by HECO.

3.D. Interconnection Process Step 1:

Date Appendix I, II, and III transmitted to Customer: **March 26, 2003 – HECO provided Customer 3's consultant with Appendix I, II and III (effective March 21, 2003).**

Comments:

3.E. Interconnection Process Step 2:

Date completed Exhibit A and preliminary single-line diagram, relay list, trip scheme and settings, and three-line diagram (required in special circumstances), and other required information, provided to HECO: **See comments below.**

Comments:

- September 2003 – Customer 3's consultant provided HECO with preliminary technical information on the CHP System. Detailed information on the CHP System is still pending.

13

## Newer Format (from 2012)

DocId No. 02-0051  
July 14 Annual Report

Interconnection Number	A. Customer Information		B. Date			C. Information on Customer's Distributed Generation Unit		D. Interconnection Process Step 1:		E. Interconnection Process Step 2:	
	Customer Name	Customer Address	Date of Customer Request to Interconnect a Distributed Generation Facility and Operate in Parallel with HECO's System	Date of Appendix I, II, and III Transmitted to Customer	Comments	Date completed Exhibit A and preliminary single-line diagram, relay list, trip scheme and settings, and three-line diagram (required in specified circumstances), and other required information provided to HECO	Comments				
1	[REDACTED]	[REDACTED]	5/9/2013	345.6 kW STC	Photovoltaic System	NA	Contractor downloaded forms from website	10/6/2013	NA		
2	[REDACTED]	[REDACTED]	2/20/2010	277.2 kW STC	Photovoltaic System	previously provided	NA	4/18/2012	NA		
3	[REDACTED]	[REDACTED]	4/17/2013	134.16 kW STC	Photovoltaic System	previously provided	NA	4/18/12	NA		
4	[REDACTED]	[REDACTED]	9/5/2012	226.35 kW STC	Photovoltaic System	previously provided	NA	8/20/12	NA		
5	[REDACTED]	[REDACTED]	1/22/2013	287.28 kW STC	Photovoltaic System	previously provided	NA	11/22/2013	NA		
6	[REDACTED]	[REDACTED]	8/24/2012	474.24 kW STC	Photovoltaic System	8/24/2012	downloaded on HECO.com	4/1/12	NA		
7	[REDACTED]	[REDACTED]	1/14/2012	122.75 kW STC	Photovoltaic System on military residences	previously provided	NA	11/14/12 - 01/11/13	Worked with both PV developer and Customer to obtain all information		
8	[REDACTED]	[REDACTED]	1/14/2012	427.25 kW STC	Photovoltaic System on military residential rooftops	previously provided	NA	11/14/12 - 01/11/13	Worked with both PV developer and Customer to obtain all information		
9	[REDACTED]	[REDACTED]	4/17/2013	15735 kW STC	Photovoltaic System on military residential rooftops	NA	Contractor downloaded forms from website	4/17/2013 - 06/11/13	NA		
10	[REDACTED]	[REDACTED]	9/5/2013	18.00 kW STC	Photovoltaic System	previously provided	NA	4/14/12	NA		
11	[REDACTED]	[REDACTED]	7/25/2013	265 kW STC	Photovoltaic System	previously provided	NA	4/14/12	NA		
12	[REDACTED]	[REDACTED]	4/24/2013	138.32 kW STC	Photovoltaic System	downloaded on HECO.com	NA	4/1/12	NA		
13	[REDACTED]	[REDACTED]	9/3/2012	1227.6 kW STC	Photovoltaic System	downloaded on HECO.com	NA	4/1/12	NA		
14	[REDACTED]	[REDACTED]	4/1/2013	818.36 kW STC	Photovoltaic System	Previously Provided	NA	4/14/12	NA		
15	[REDACTED]	[REDACTED]	9/26/2013	263.34 kW STC	PV systems on residential rooftops	NA	Contractor downloaded forms from website	4/14/12	NA		
16	[REDACTED]	[REDACTED]	8/28/2013	1274.5 kW STC	PV systems on residential rooftops	NA	Contractor downloaded forms from website	4/1/12	NA		
17	[REDACTED]	[REDACTED]	8/22/2013	1320.67 kW STC	Photovoltaic System	previously provided	NA	4/1/12	NA		
18	[REDACTED]	[REDACTED]	8/28/2013	1203 kW STC	Photovoltaic System	previously provided	NA	8/28/2013	NA		
19	[REDACTED]	[REDACTED]	8/28/2013	175.32 kW STC	Photovoltaic System	previously provided	NA	4/1/12	NA		
20	[REDACTED]	[REDACTED]	8/9/2013	3385.024 kW STC	Photovoltaic System	previously provided	NA	10/5/2013; 10-24-2013	NA		

# Existing Programs – Massachusetts

- Spreadsheet format
- Specific geographies
- Detailed timeline info
- Differentiates between utility- and customer-driven time to complete stages

The image displays two screenshots of the Massachusetts Department of Energy Resources (DOER) website, specifically the 'Interconnection' page. The top screenshot shows the main navigation and introductory text. The bottom screenshot shows the 'Interconnection activity' section with charts and a table.

**DOER Massachusetts Department of Energy Resources**

**Interconnection**

Interconnection is the process of connecting a distributed generation system to the electric grid. Prior to connecting, the distributed generation system owner *must* obtain written approval from the local utility in the form of an Interconnection Service Agreement and subsequent Authorization to Connect. While emergency generators are not required to follow this process, customers installing emergency generation should contact their utility.

The interconnection process is necessary to protect the reliability and safety of the electric grid. The Massachusetts Department of Public Utilities (DPU) regulates this process by requiring utilities to have standardized interconnection tariffs.

**Additional Information**

- FAQs
- Dispute Resolution
- Workshops
- The Technical Standards Review Group
- The Distributed Generation Working Group
- Grid Modernization and Integration DGA

**Interconnection activity**

Massachusetts utilities provide monthly reporting on the status of all interconnection applications submitted since January 2009 that follow the expedited or standard review process. The charts below provide an overview of the type and quantity of distributed generation projects that have entered or completed the interconnection process **through March 2016 (NEW)**.

Note: The graphs and full data set provided below cover only applications that follow the expedited or standard review processes. They do not include those applications that follow the simplified review process for smaller systems.

**Aggregate Trends**    **Application Process Time**    **Utility Performance Summary**

\*\*\*Download the full data set through April 2015 (updated 4/17/15) to see data reported on a project-by-project basis. The link takes users to a preview screen on Google Drive. Choose "file" and "download" for the entire file. Notifications of monthly updates will be posted on the [MassGreening Twitter feed](#).

Since the DPU and DG Working Group members are utilizing this information for performance tracking DOER also provides an update on the status of reporting.

- [DOER Reporting Update \(6/4/13\)](#)
- [DOER Reporting Update \(6/2/13\)](#)
- [DOER Reporting Update \(3/19/13\)](#)

Access: <https://sites.google.com/site/massdgric/home/interconnection>

# Existing Programs – Massachusetts

DG Interconnection Tracking and Reporting Template												
Utility Timelines												
Reporting Period:		from	Jan-09	to	Feb-15							
Date Filed:		3/16/2015										
Application and Site Information							Application Receipt					
Company Name	City/Town	Facility ID (if any)	ZIP Code	Design Capacity (kW)	Fuel Type (Solar, Wind, etc)	Circuit Name	Date Application Received	Date Application Deemed Complete	Total Time Lapsed (Workdays) calculated value	Customer Time Lapsed (Workdays) enter workdays of "clock" stoppage by Customer	Utility Time Lapsed (Workdays) enter workdays without "clock" stoppage	
NSTAR	Chilmark	2466	02535-	42.00	Solar	4-91-220	11/8/2013	11/14/2013	5	1	4	
NSTAR	Dorchester	2466	02121-	27.00	Solar	483-H3	10/30/2013	11/22/2013	22	17	5	
NSTAR	Charlestown	2467	02129-	11.00	Solar	10-H2	10/29/2013	11/18/2013	15	12	3	
NSTAR	Dedham	2462	02026-	1750.00	Solar	20-H2, 20-H3	10/28/2013	11/13/2013	12	12	0	
NSTAR	Mattapoissett	2465	02739-	1000.00	Solar		10/25/2013	3/5/2014	93	90	3	
NSTAR	Mattapoissett	2464	02739-	1000.00	Solar		10/25/2013	3/5/2014	93	90	3	
NSTAR	Mattapoissett	2463	02739-	4000.00	Solar		10/25/2013	3/5/2014	93	90	3	
NSTAR	Sudbury	2461	01778-	225.00	Solar	342-H3	10/24/2013		Application Stage Still In Progress	0	0	
NSTAR	Canton	2460	02021-	60.00	Solar	269-1320H1	10/21/2013	11/1/2013	9	9	0	
NSTAR	Hopkinton	2458	01748-	85.00	Solar	126-H1	10/18/2013	10/28/2013	6	5	1	
NSTAR	Kingston	2457	02364-	19.00	Solar	3-17-910	10/18/2013	10/24/2013	41	3	38	
NSTAR	East Falmouth	2455	02536-	85.00	Solar	4-77A-450	10/18/2013	11/1/2013	10	10	0	
NSTAR	Hopkinton	2459	01748-	18.00	Solar	126-H1	10/18/2013	10/28/2013	6	5	1	
NSTAR	East Falmouth	2456	02536-	90.00	Solar		10/17/2013		Application Stage Still In Progress	0	1	
NSTAR	North Dartmouth	2454	02747-	25.00	Solar	2-531-531	10/16/2013	10/18/2013	3	0	3	
NSTAR	Westport	2453	02790-	100.00	Solar	2-532-532	10/15/2013	10/21/2013	4	3	1	
NSTAR	Dover	2452	02030-	20.00	Solar	456-H3	10/15/2013	10/23/2013	6	5	1	
NSTAR	Cambridge	2451	02138-	70.00	Solar	829-31	10/9/2013	10/16/2013	7	3	4	
NSTAR	Woburn	2450	01801-	50.00	Solar	211-H2	10/9/2013	10/15/2013	6	2	4	

Location Information

Allocation of time between parties

# Existing Programs – New York

- Mixed formats
- Individual installations
- Emphasis on costs:
  - Utility Interconnection
  - Cust. Interconnection
  - Utility System Upgrade
  - Cust. System Upgrade
  - CESIR

The image displays two screenshots from the New York State Department of Public Service website. The top screenshot shows a search results page for Matter # 13-00205, listing various documents such as 'New York State Electric & Gas Corporation, Nuclear, Gas and Electric Corporation' and 'Quarterly Net Metering Report No. 13-00205'. A blue arrow points from the 'Quarterly Net Metering Report No. 13-00205' entry to the bottom screenshot.

The bottom screenshot shows a detailed spreadsheet titled 'Q124' with columns for 'PROJECT INFORMATION', 'PROJECT STATUS', 'PROJECT COST', 'PROJECT TYPE', 'PROJECT LOCATION', 'PROJECT DESCRIPTION', 'PROJECT COMMENTS', and 'PROJECT STATUS'. The spreadsheet contains numerous rows of data, including project names like 'New York State Electric & Gas Corporation, Nuclear, Gas and Electric Corporation' and 'Quarterly Net Metering Report No. 13-00205'.

Access: <http://documents.dps.ny.gov/public/Common/AdvanceSearch.aspx>, Matter # 13-00205

# Existing Programs – New York

## SIR APPLICATION REVIEW PROCESS

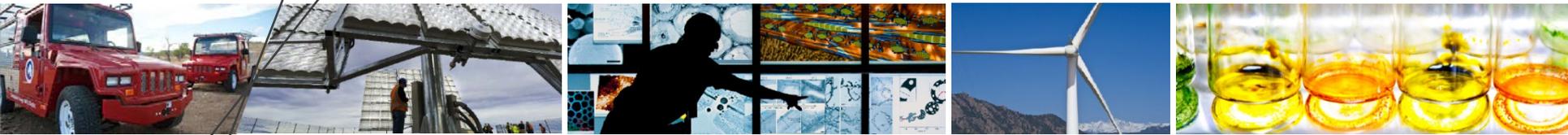
Special Report: 1 January 2015 - 13 March 2015

PROJECT INFORMATION						SIR COSTS					FINAL COMMENTS
Company	Case #	System Type	System Capacity (kW)	Net Metered	Protective Equipment	CESIR Cost to Customer	Utility Interconnection Cost	Customer Interconnection Cost	Utility System Upgrade Costs	Customer System Upgrade Costs	Comments
CENY-BX	1267640	MT	7.0	NO	Inverter	\$0	\$0	\$350	\$0	\$0	\$0 In Progress - Pending Documents from Cust
CENY-BX	1427113	PV	500.0	Yes	Inverter	\$0	\$0	\$127,740	\$0	\$0	\$0 IN PROGRESS - PENDING CUSTOMER PAYMENT (Work in conjunction with MC-16479)
CENY-BX	1427116	PV	500.0	Yes	Inverter	\$0	\$0	\$0	\$0	\$0	\$0 IN PROGRESS - PENDING CUSTOMER PAYMENT (Work in conjunction with MC-16478, see cost on that case)
CENY-BX	MC-100225	PV	84	Yes	Inverter	\$0	\$0	\$350	\$0	\$0	\$0 Installation of an 87.975 kw PV system - Installation of an 87.975 kw PV system
CENY-BX	MC-100619	PV	3.8	Yes	Inverter	\$0	\$0	\$0	\$0	\$0	\$0 Complete
CENY-BX	MC-100840	PV	3.2	Yes	Inverter	\$0	\$0	\$0	\$0	\$0	\$0 Complete
CENY-BX	MC-101868	PV	70	Yes	Inverter	\$0	\$0	\$0	\$0	\$0	\$0 Installation of a 85.68 kw solar pv system - Installation of a 85.68 kw solar pv system
CENY-BX	MC-101984	PV	2.4	Yes	Inverter	\$0	\$0	\$0	\$0	\$0	\$0 In Progress - PENDING FINAL DOCS
CENY-BX	MC-102811	PV	2.8	Yes	Inverter	\$0	\$0	\$0	\$0	\$0	\$0 In Progress - PENDING FINAL DOCS
CENY-BX	MC-102813	PV	3.0	Yes	Inverter	\$0	\$0	\$0	\$0	\$0	\$0 In Progress - PENDING FINAL DOCS
CENY-BX	MC-103017	PV	3.6	Yes	Inverter	\$0	\$0	\$0	\$0	\$0	\$0 Cancelled
CENY-BX	MC-104009	PV	250.0	Yes	Inverter	\$0	\$0	\$0	\$0	\$0	\$0 In Progress - Pend customer feedback
CENY-BX	MC-104617	PV	1.8	Yes	Inverter	\$0	\$0	\$0	\$0	\$0	\$0 In Progress - PENDING FINAL DOCS
CENY-BX	MC-105043	PV	2.8	Yes	Inverter	\$0	\$0	\$0	\$0	\$0	\$0 In Progress - PENDING FINAL DOCS
CENY-BX	MC-105054	PV	5.0	Yes	Inverter	\$0	\$0	\$0	\$0	\$0	\$0 In Progress - PENDING FINAL DOCS
CENY-BX	MC-105065	PV	2.6	Yes	Inverter	\$0	\$0	\$0	\$0	\$0	\$0 In Progress - PENDING FINAL DOCS
CENY-BX	MC-105193	MT	65.0	Yes	Inverter	\$0	\$0	\$0	\$0	\$0	\$0 Pending Final Documents -
CENY-BX	MC-105845	PV	4.2	Yes	Inverter	\$0	\$0	\$0	\$0	\$0	\$0 Complete
CENY-BX	MC-106348	PV	2.8	Yes	Inverter	\$0	\$0	\$0	\$0	\$0	\$0 In Progress - PENDING FINAL DOCS
CENY-BX	MC-106404	ICE	75.0	NO	Induction	\$0	\$0	\$350	\$0	\$0	\$0 In Progress - Pending customer to install system
CENY-BX	MC-106405	PV	3.0	Yes	Inverter	\$0	\$0	\$0	\$0	\$0	\$0 Complete
CENY-BX	MC-106425	PV	168.0	Yes	Inverter	\$0	\$0	\$350	\$0	\$0	\$0 In Progress - pending DE review
CENY-BX	MC-106427	PV	3.0	Yes	Inverter	\$0	\$0	\$0	\$0	\$0	\$0 In Progress - PENDING FINAL DOCS
CENY-BX	MC-106542	PV	2.8	Yes	Inverter	\$0	\$0	\$0	\$0	\$0	\$0 In Progress - PENDING FINAL DOCS
CENY-BX	MC-107148	PV	3.6	Yes	Inverter	\$0	\$0	\$0	\$0	\$0	\$0 In Progress - PENDING FINAL DOCS
CENY-BX	MC-107163	PV	3.0	Yes	Inverter	\$0	\$0	\$0	\$0	\$0	\$0 In Progress - PENDING FINAL DOCS
CENY-BX	MC-107907	PV	40.0	Yes	Inverter	\$0	\$0	\$0	\$0	\$0	\$0 In Progress - awaiting DE review
CENY-BX	MC-107908	PV	60.0	Yes	Inverter	\$0	\$0	\$350	\$0	\$0	\$0 In Progress - awaiting DE review
CENY-BX	MC-108154	PV	3.8	Yes	Inverter	\$0	\$0	\$0	\$0	\$0	\$0 In Progress - PENDING FINAL DOCS
CENY-BX	MC-108566	PV	5.0	Yes	Inverter	\$0	\$0	\$0	\$0	\$0	\$0 In Progress - PENDING CIS UPDATE
CENY-BX	MC-108972	PV	4.0	Yes	Inverter	\$0	\$0	\$0	\$0	\$0	\$0 In Progress - PENDING FINAL DOCS
CENY-BX	MC-109444	PV	6.0	Yes	Inverter	\$0	\$0	\$0	\$0	\$0	\$0 In Progress - PENDING FINAL DOCS
CENY-BX	MC-109472	ICE	200.0	Yes	Inverter	\$0	\$0	\$350	\$0	\$0	\$0 In Progress - awaiting DE review
CENY-BX	MC-109549	PV	7.6	Yes	Inverter	\$0	\$0	\$0	\$0	\$0	\$0 Complete
CENY-BX	MC-109612	PV	7.2	Yes	Inverter	\$0	\$0	\$0	\$0	\$0	\$0 In Progress - PENDING FINAL DOCS

# Existing Programs – Summary

	California	Hawaii	Massachusetts	New York
General Data	●	●●	●●●	●●
Cost Data				●●
Timeline Data		●●	●●●	●●
Process and Screen Data	●●●	●		●
Earliest Data Available	●	●●●	●●	●
Frequency of Updates	●●●	●	●●●	●●
Level of Aggregation	●	●●●	●●●	●●●
Data Standardization	●●●	●	●●●	●●
Data Accessibility	●●	●	●●●	●●

Adapted From: [http://www.nrel.gov/tech\\_deployment/dgic\\_interconnection\\_insights\\_2015-03.html](http://www.nrel.gov/tech_deployment/dgic_interconnection_insights_2015-03.html)



# Questions (in a bit)

Emerson Reiter

[emerson.reiter@nrel.gov](mailto:emerson.reiter@nrel.gov)

# Continuous Interconnection Improvement

Joslyn Sato

Transformation Lead,  
Interconnection  
Improvement,

Hawaiian  
Electric



Hawaiian Electric  
Maui Electric  
Hawai'i Electric Light

# Objectives

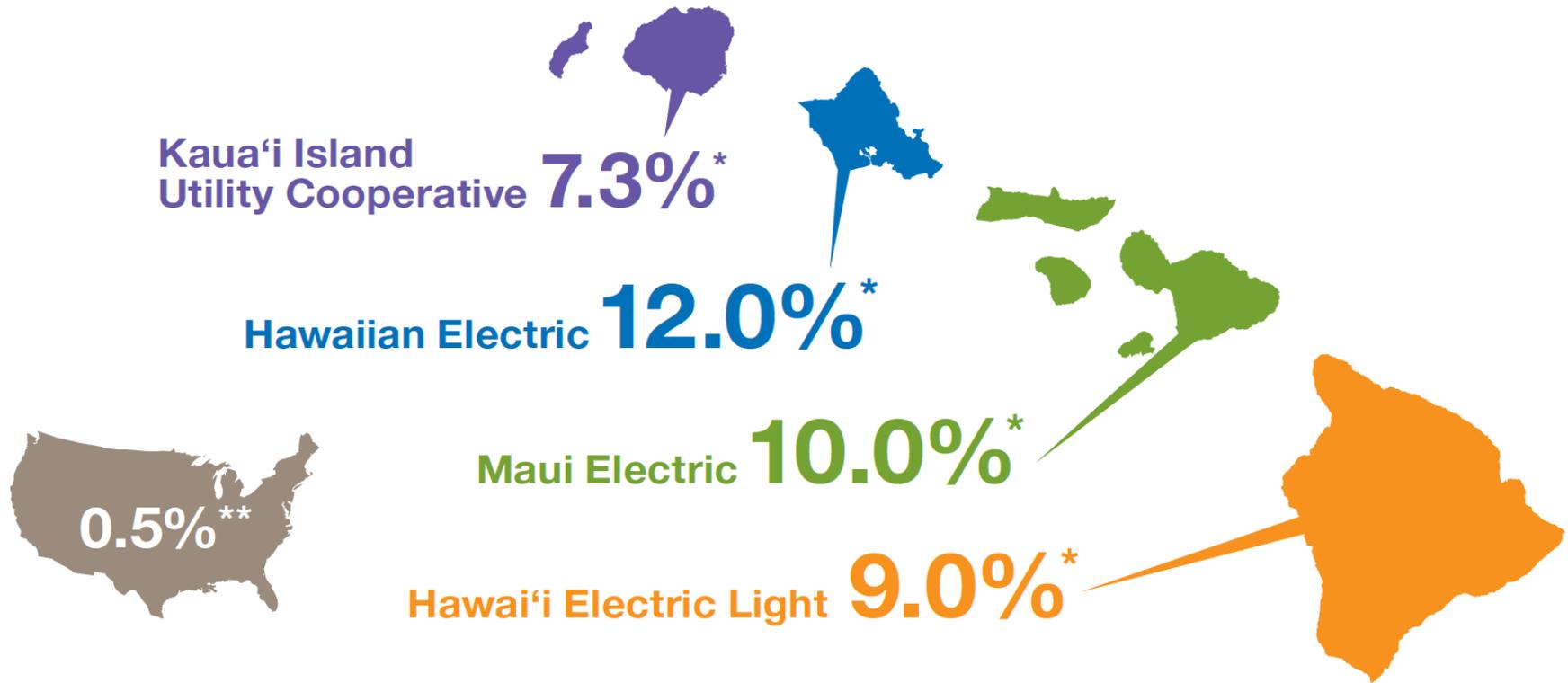
Share our efforts in:

- ◆ Development of the Integrated Interconnection Queue
- ◆ Current Interconnection Improvement Project



Hawaiian Electric  
Maui Electric  
Hawai'i Electric Light

# Hawai'i leads the way in rooftop PV installations



Percentage of customers with PV

\* As of 12/31/14

\*\* As of 12/31/13

National data courtesy of Solar Electric Power Association



# Integrated Interconnection Queue

- ◆ Unified distribution interconnection queue that combines all interconnection requests, regardless of the procurement program

## KEY BENEFITS

- ◆ Provides better external transparency of application status and position
- ◆ Allows for improved internal management of various procurement programs as well as understanding what's in the queue

The screenshot shows the Hawaiian Electric website's Integrated Interconnection Queue (IIQ) interface. At the top, there is a search bar and navigation links for ACCOUNT LOGIN and CONTACT US. Below the navigation menu, a welcome message states: "Welcome to the IIQ for Hawaiian Electric". A paragraph explains that the IIQ is a single queue for interconnection requests across all procurement programs. A table lists review statuses and their corresponding actions:

IC	Review Completed	CAH	Customer Action Required	ICS	Interconnection Requirements Study
IRK	Initial Technical Review	I/I	Pending Installation	IS	Representative Study
SIR	Supplemental Review	I/V	Pending Verification		
SIHC	Supplemental Review Complete	I/C	Pending Execution		

Below this, a table titled "Overall IIQ" displays a list of interconnection requests. The table includes columns for Queue Position, Agreement ID, Procurement, Project Developer ID, System Size, Circuit, Review Status, Date Interconnection Application Received, Date Determined Complete and Valid, ICS Start, ICS Complete, and Date Project Must Be Complete. The first few rows of data are as follows:

Queue Position	Agreement ID	Procurement	Project Developer ID	System Size	Circuit	Review Status	Date Interconnection Application Received	Date Determined Complete and Valid	ICS Start	ICS Complete	Date Project Must Be Complete
20080319140000	PN-07-00182	NEM	2280	0.9	WAILUPE	PI	03/19/2008	04/04/2008			
20080319140000	PN-12-02153	NEM	2280	0.81	PAIWA	CAR	03/19/2008				
20090219140000	PN-09-00092	NEM	3510	1.2	WAIALUA	PI	02/19/2009	03/09/2009			
20090815000000	PN-09-00261	NEM	1855	1.1	KUAPA 1	PI	08/19/2009	07/01/2009			
20090815140000	PN-09-00264	NEM	1855	1.1	OWA BEACH 4	CAR	08/19/2009				
20090703140000	PN-15-00835	NEM	1855	10.82	WAIKAWA 1	PI	08/12/2009	03/02/2010			
20091112140000	PN-09-00810	NEM	1855	0.4	PAUDA 1	PI	11/12/2009	11/03/2009			
20091117140000	PN-09-00818	NEM	0	1.7	AALAPAPA	PI	11/17/2009	12/03/2009			
20091119140000	PN-09-00826	NEM	1855	2.9	KAILUA 1	PI	11/19/2009	12/07/2009			
20091223000000	PN-10-00013	NEM	1855	1.85	KUNIA MAHAHA	PI	12/23/2009	01/08/2010			

At the bottom of the page, there is a pagination control showing "First", "Previous", "1", "2", "3", "4", "5", "6", "7", "8", "9", "Next", and "Last".



# Developing the IIQ

## CHALLENGES

---

- ◆ 3 Companies
- ◆ Multiple procurement programs
- ◆ Different processes and workflows
- ◆ Limited data sharing
- ◆ Manual tools and resources available

## HOW WE GOT THERE

---

- ◆ Leveraged existing processes, data, and reports
- ◆ Held joint-collaboration sessions
- ◆ Developed standards:
  - Queueing process
  - Status Codes
  - IIQ Data Content and Format
- ◆ Developed IIQ Reporting Process, Roles, Responsibilities
  - Communication
  - Training
  - Guides
  - Internal Awareness (Call Center)
  - External Awareness (Solar News Letter)



# IIQ Features

- ◆ Published every month on each Company’s website
- ◆ Provides searchable fields
- ◆ Identifies the Applicant’s queue position
- ◆ Developer can search for projects by their numeric ID

## IIQ Queue Position

Overall IIQ [Back to Main IIQ](#)

Filter    Items per page 10

Queue Position	Agreement ID	Procurement	Project Developer ID	System Size	Circuit	Review Status	Date Interconnection Application Received	Date Determined Complete and Valid	IRS Start	IRS Complete	Date Project Must Be Complete
20150330113942	PN-15-03176	NEM	2530	7.63	<a href="#">ENCHANTED LAKES</a>	ITR	03/30/2015	04/15/2015			
20150330114100	PN-15-03177	NEM	2570	3.05	<a href="#">MANOA 3</a>	ITR	03/30/2015	04/14/2015			
20150330114124	PN-15-03180	NEM	2700	3.84	<a href="#">EKEKELA</a>	ITR	03/30/2015	04/15/2015			
20150330114143	PN-15-03183	NEM	2720	5.7	<a href="#">MILILANI 1</a>	CAR	03/30/2015				
20150330114254	PN-15-03184	NEM	2820	7.6	<a href="#">WAIMEA 1</a>	PI	03/30/2015	04/15/2015			
20150330114320	PN-15-03186	NEM	2820	6.6	<a href="#">KUAPA 1</a>	ITR	03/30/2015	04/14/2015			
20150330114362	PN-15-01941	NEM	1175	8.6	<a href="#">PAWAINA</a>	ITR	03/02/2015	04/14/2015			
20150330114838	PN-15-03070	NEM	2670	4.08	<a href="#">PUOHALA 2</a>	CAR	03/25/2015				
20150330115443	PN-15-01790	NEM	1555	10.36	<a href="#">KAPOLEI 2</a>	ITR	03/02/2015	04/10/2015			
20150330115509	PN-15-02978	NEM	2065	19.48	<a href="#">KAALAKEI</a>	CAR	03/30/2015				

First Previous 1253 1254 1255 1256 1257 1258 1259 1260 1261 Next Last

## Circuit Queue Position

Circuit Queue - [KAPOLEI 2](#) [Back to Overall IIQ](#)

Filter    Items per page 10

Circuit Queue Number #	Queue Position	Agreement ID	Procurement	Project Developer ID	System Size	Review Status	Date Interconnection Application Received	Date Determined Complete and Valid	IRS Start	IRS Complete	Date Project Must Be Complete
51	20150213110036	PN-15-01082	NEM	2570	6	ITR	02/13/2015	02/26/2015			
52	20150227103422	PN-15-01855	NEM	2570	3.85	ITR	02/27/2015	03/10/2015			
53	20150227111136	PN-15-01832	NEM	1675	3.84	ITR	02/27/2015	03/09/2015			
54	20150302114945	PN-15-01968	NEM	1175	5.05	ITR	03/02/2015	03/13/2015			
55	20150302123234	PN-15-02141	NEM	1810	5.04	ITR	03/02/2015	03/14/2015			
56	20150316125637	PN-15-02756	NEM	1155	3.66	ITR	03/16/2015	03/27/2015			
57	20150317115903	PN-15-02786	NEM	2570	3.23	ITR	03/17/2015	03/27/2015			
58	20150320114332	PN-15-02863	NEM	1175	5.05	ITR	03/20/2015	04/01/2015			
59	20150326101213	PN-15-03090	NEM	1555	5.6	ITR	03/26/2015	04/10/2015			
60	20150330115443	PN-15-01790	NEM	1555	10.36	ITR	03/02/2015	04/10/2015			

First Previous 1 2 3 4 5 6 Next Last

# Interconnection Improvement Project

**Adaptability**  
**Flexibility**



- ◆ Improve the Customer Experience
  - Tri-company program consistencies and standards
  - Greater transparency, guidance, and education
  
- ◆ Implement an Enterprise End-to-End Tool
  - Online functionality and process efficiencies
  - Data integration and automation for application processing and technical assessment
  
- ◆ Improving data management
  - Value-added metrics, reporting, and planning
  
- ◆ Establishing joint problem solving and collaboration
  - Internal company departments and process areas
  - Utilities, Industry, Commission, and other stakeholder partnerships

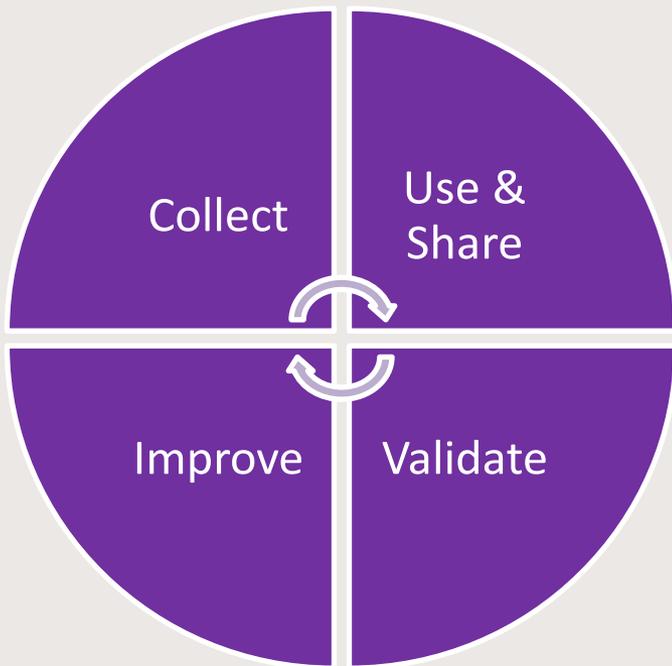


**Hawaiian Electric**  
**Maui Electric**  
**Hawai'i Electric Light**

# Future Interconnection Data Needs

## Real-Time Information

### Greater Details



- ◆ **Collect Data**
  - Various data sources
  - Meet program and technical requirements
- ◆ **Use & Share Data**
  - Real-time information on application status and progress
  - Automated sharing and integration between internal workflows and systems
  - Frequent reporting with greater detail
- ◆ **Validate**
  - Understand process performance and application progress
  - Make effective decisions
  - Establish baselines
  - Compare against metrics & KPIs
  - Set better expectations
- ◆ **Improve**
  - Continuous improvement of process, performance, and programs
  - Allow for proactive planning



# Interconnection Data Improvements

- ◆ Collect and manage data consistently
  - Select a single software tool
  - Develop data standards
- ◆ Share and integrate data across the companies
  - Automated workflows between various departments
  - Automated data sharing and validation
  - Data integration with other systems
- ◆ Improve Reporting
  - Collaborate with internal and external stakeholders
  - Consolidate and improve existing reports
  - Identify valuable and meaningful data
  - Determine Interconnection KPIs



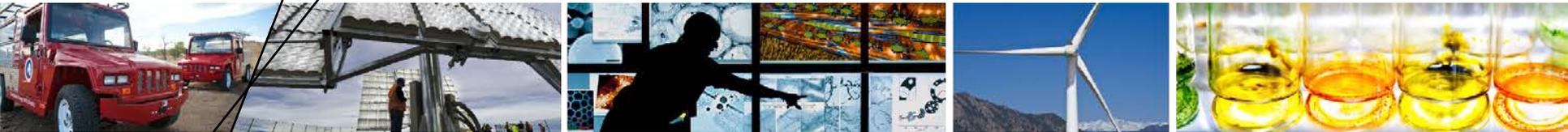
# Questions?

Please contact Joslyn Sato for further questions:  
[Joslyn.Sato@hawaiianelectric.com](mailto:Joslyn.Sato@hawaiianelectric.com)



**Hawaiian Electric**  
**Maui Electric**  
**Hawai'i Electric Light**

# Distributed Generation Interconnection Collaborative (DGIC)



## Interconnection Data Reporting Requirements in Massachusetts and the Service Quality

**Michael Conway**

**June 3, 2015**

# MA Interconnection Performance Reporting

## Overview

### Background

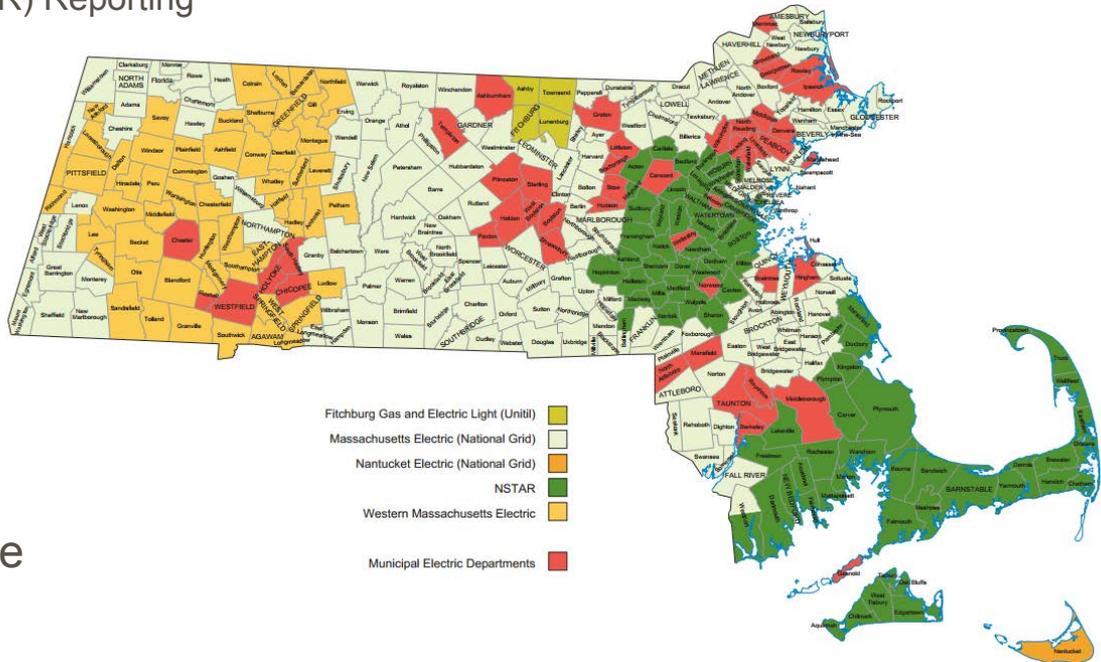
- Department of Energy Resources (DOER) Reporting
- DG Working Group Document (2012)
  - Negotiated document
- MA DPU Order 11-75-F (2014)

### How It Works

- Penalty/Offset Calculation
- Interconnection Data Validation

### Timeline Enforcement in Practice

- DOER tracking trends
- 2014 short-cycle results



# MA Interconnection Performance Reporting

## DPU 11-75-F Highlights

---

### ▸ Highlights

- Symmetrical penalties and offsets
- 5% deadband
- Metric based upon performance in mostly all project types;
- Peak penalty at 2X app fees in performance year;
- Weighting emphasizing EXP and STD projects;
- Any offsets retire after one year;
- Preserves the existing Refund Policy (w/ exclusion from metric)
- All penalties collected will be transferred to the Commonwealth's General Fund (may be refunded to rate-based)
- DPU review of mechanism and timelines after first year

### ▸ Exclusions

- Expedited applications w/ Supplemental Review
- Simplified spot and area networks
- Applications w/ timelines by mutual agreement
- Group Study
- *Projects excluded from TEM are still subject to reporting*

# MA Interconnection Performance Reporting

## DPU 11-75-F Tracking Weighting Example

- Performance in each track will be weighted as follows:

- (1) Simplified: 20 percent
- (2) Expedited: 40 percent
- (3) Standard: 40 percent

An illustrative example of the metric is presented below:

	Time Allowed (Days)	Average Time (Days)	Percent	Weighting	Weighted Allowed Time
Simplified w/no networks	25	26	104%	20%	21%
Expedited w/o supplemental review	45	54	120%	40%	48%
Standard (early ISA)	105		107%	40%	43%
Standard	135				
Standard complex A	155				
Standard complex B	180				
Standard complex C	200				
				100%	111.8%

# MA Interconnection Performance Reporting

## DPU 11-75-F Penalty/Offset Calculation

› Penalties/Offsets calculated to nearest 10<sup>th</sup> of a percent, around deadband

› Example 1:

- Weighted Avg Time: 111.8%
- Penalty/Offset = (Avg Time – Deadband)\*(Cap)
- $((.118)-(.5))*(1,412,000) = \$960,160$

› Example 2:

- Weighted Avg Time: 5.3%
- Penalty/Offset = (Avg Time – Deadband)\*(Cap)
- $((.053)-(.5))*(1,412,000) = \$42,360$

Performance (> Timelines)		% of penalty	Penalty
0.05	5%	0	0
0.06	6%	0.1	\$141,200.00
0.07	7%	0.2	\$282,400.00
0.08	8%	0.3	\$423,600.00
0.09	9%	0.4	\$564,800.00
0.1	10%	0.5	\$706,000.00
0.11	11%	0.6	\$847,200.00
0.12	12%	0.7	\$988,400.00
0.13	13%	0.8	\$1,129,600.00
0.14	14%	0.9	\$1,270,800.00
0.15	15%	1	\$1,412,000.00

# MA Interconnection Performance Reporting

## How It Works - Data Validation

Days allotted per Tariff

Date Received

Date ISA Delivered

Actual days elapsed

**nationalgrid**  
Distributed Generation

### Interconnection Data Validation

\*\*\*No response is required, unless the information provided below is incorrect.\*\*\*

Congratulations on your receipt of an interconnection service agreement ("ISA") for your signature for MA 17243546, 17243609, 17243633, 17243638. This is an important milestone for you and for National Grid.

To improve our process and comply with a directive from the Massachusetts Department of Public Utilities, we seek to verify and record our processing of your interconnection application and the amount of company time (in full business days) that it took for us to provide you with the ISA for your signature.

Based on the timeframes in the interconnection tariff, M.D.P.U. No. 1219 ("Tariff"), our records show that:

1. The interconnection application was reviewed as a Standard application. Pursuant to the Tariff, the allowable time to process this application is 105 business days.
2. We received your application on 06/10/2014.
3. National Grid sent you the ISA for your signature on 12/22/2014.
4. Accordingly, we calculate that National Grid processed your application with 132 business days. It is important to note that we are measuring only company processing time and not any time when your project was on a customer hold, including any time that you may have needed to complete or update your application with requested information, signatures, or payments.

If you agree with all of the above, no further action is required from you; however, if you disagree, then you have 10 business days (from the date of this email) to reply to this email, notifying us of your questions or disagreement about this data validation.

Regards,

**Distributed Generation**  
**nationalgrid**  
40 Sylvan Rd, Waltham, MA 02451-1120  
[Distributed\\_Generation@NationalGrid.com](mailto:Distributed_Generation@NationalGrid.com)

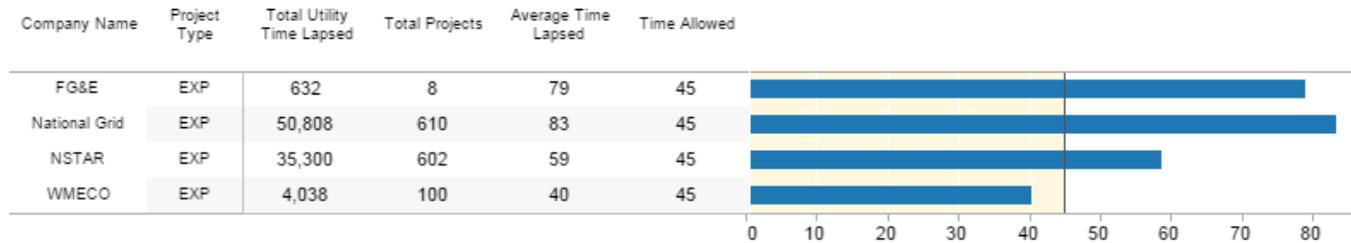
Please select the appropriate link below for the latest information on:  
Interconnection Standards - [MA](#), [RI](#)  
Net Metering - [MA](#), [RI](#)  
[Wholesale Energy Procurements](#)

# MA Interconnection Performance Reporting

## DOER Reporting, 2009-2013

### Utility Performance Summaries

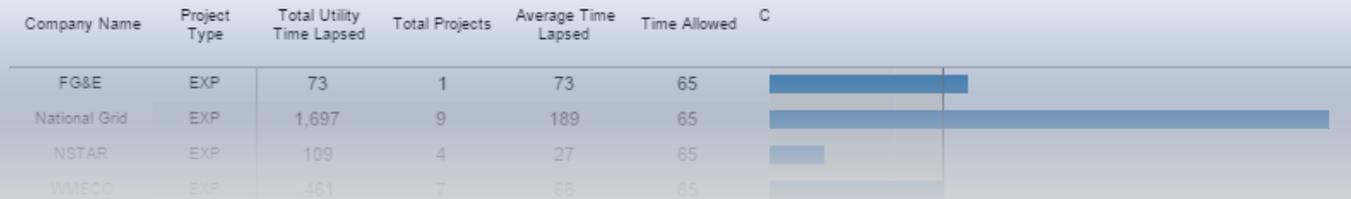
#### Expedited Projects without Supplemental Review



#### Company Name

- (All)
- FG&E
- National Grid
- NSTAR
- WMECO

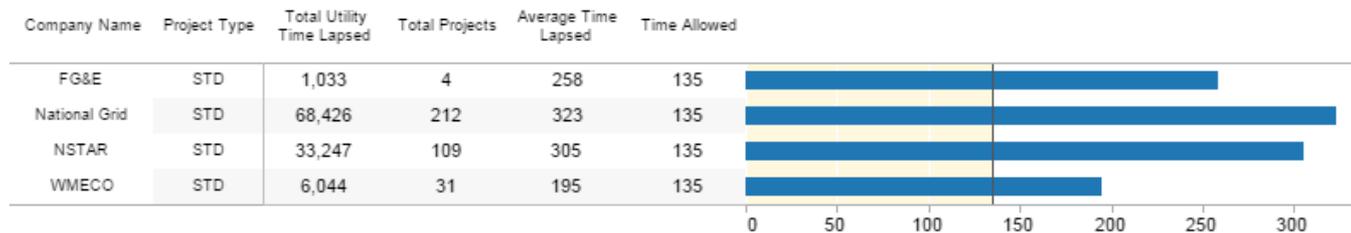
#### Expedited Projects with Supplemental Review



#### Year

- 2009
- 2010
- 2011
- 2012
- 2013
- 2014
- 2015

#### Standard Projects

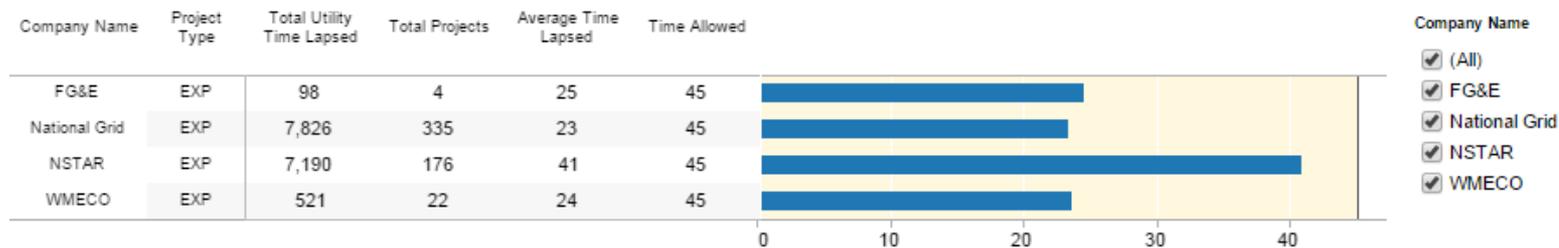


# MA Interconnection Performance Reporting

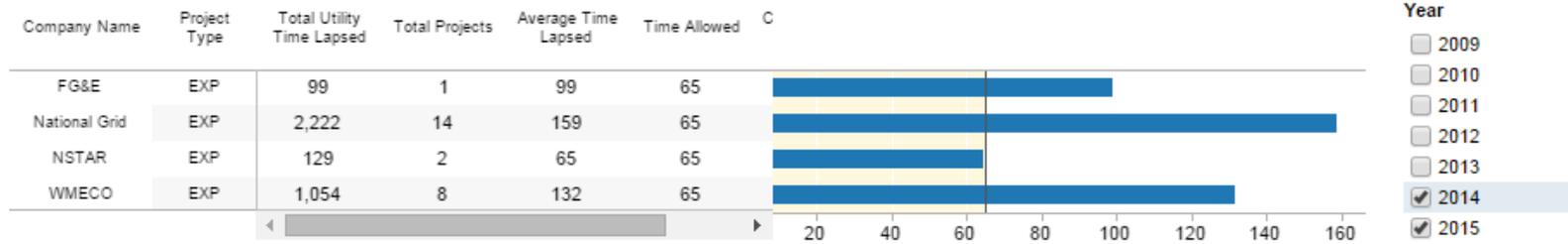
## DOER Reporting, 2014-2015

### Utility Performance Summaries

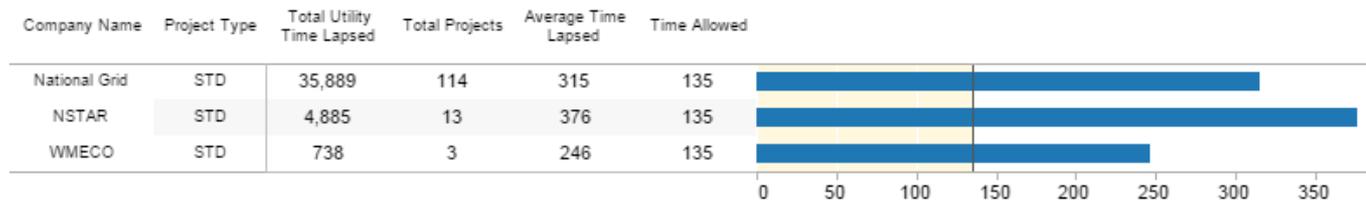
#### Expedited Projects without Supplemental Review



#### Expedited Projects with Supplemental Review



#### Standard Projects



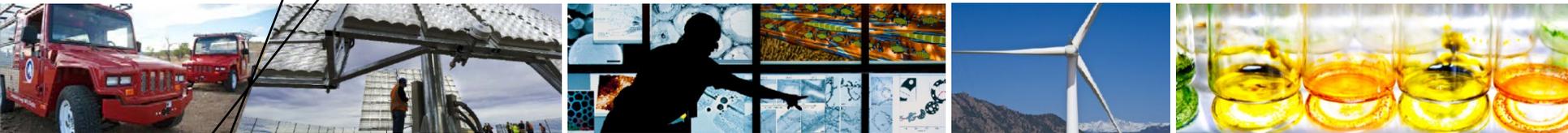
# MA Interconnection Performance Reporting

## Results, Reporting Year 2014

- › DPU 11-75-F approved 7/31/14
- › Gap between SREC-I and SREC-II regulations resulted in development lull
- › Short cycle, slow development resulted in small sample size
- › Longer utility timeframes in new Tariff
- › Each utility earned their maximum offset for the 2014 Reporting Year



# Thank You!



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