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2017 MAY 19 P 3: 22

The Honorable Chair and Members of the Hawai'i Public Utilities Commission Kekuanaoa Building, 1st Floor 465 South King Street Honolulu, Hawai'i 96813

PUBLIC UTILITIES COMMISSION

Dear Commissioners:

Subject: Docket No. 2011-0206

Reliability Standards Working Group

Monthly Report

Pursuant to Ordering Paragraph 3 of the Commission's Order No. 30371, filed on May 4, 2012, in the above subject proceeding, enclosed as Exhibit A is the Hawaiian Electric Companies' monthly report for April 2017 on (1) system frequency control performance during month; (2) significant system events during month; and (3) curtailment of non-dispatchable renewable resources.

In addition, an electronic copy of each report is also included with this filing. These files are voluminous, and therefore, the Companies are providing a compact disc ("CD") containing the electronic files to both the Commission and the Consumer Advocate. Copies of the CD will be available to any Party to this proceeding. Interested Parties should email Marisa Chun at <a href="marisa.chun@hawaiianelectric.com">marisa.chun@hawaiianelectric.com</a> to request a copy.

If you have any questions on this matter, please contact Marisa Chun at (808) 543-4723.

Sincerely,

Daniel G. Brown

Manager

Regulatory Non-Rate Proceedings

Enclosure

c: Service List

<sup>&</sup>lt;sup>1</sup> Hawaiian Electric Company, Inc., Hawai'i Electric Light Company, Inc., and Maui Electric Company, Limited are collectively referred to as the "Hawaiian Electric Companies" or "Companies".

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The Commission's Order No. 30371 (Docket No 2011-0206 – Relating To Various Matters in RSWG Process), filed May 4, 2012, ordered the following information for each island grid:

- (1) System frequency control performance during month:
  - a) Frequency duration plot based on the highest resolution SCADA data available for the month detailing how many seconds each power system operated at frequencies above 60 hertz and at frequencies below 60 Hz.
  - b) Tabulation of the number, magnitude and duration of frequency excursions (high and low) outside normal frequency control range (59.95 to 60.05 Hz).

The following provides information with respect to items 1a) through 1b) – (all statements are current as of the month ending April 30, 2017):

# 1a) Frequency duration plot based on the highest resolution SCADA data available for the month detailing how many seconds each power system operated at frequencies above 60 hertz and at frequencies below 60 Hz:

The frequency duration plots for Hawaiian Electric, Maui Electric (Maui Division) and Hawai'i Electric Light based on two-second data are provided in Attachment 1, and the enclosed Excel files. Refer to the electronic files for the individual data points because the information is voluminous and does not translate well to a hard copy.

### 1b) Tabulation of the number, magnitude and duration of frequency excursions (high and low) outside normal frequency control range (59.95 to 60.05 Hz):

Tabulation of the number, magnitude and duration of frequency excursions outside of the frequency range of 59.95 Hz to 60.05 Hz for Hawaiian Electric, Maui Electric (Maui Division) and Hawai'i Electric Light are provided in Attachment 2, and the enclosed Excel files. Refer to the electronic files for the individual data points because the information is voluminous and does not translate well to a hard copy.

- (2) Significant system events during month:
  - a) Tabulation of contingency reserve activations including date and time, MW magnitude, duration, and triggering event.
  - b) Tabulation of under frequency load shed activations including date and time, triggering frequency, MW magnitude, duration, and triggering event.
  - c) Tabulation of demand response activations for system events, including date and time, MW magnitude, duration, and triggering event, (excluding demand response utilization for unit commitment deferral or system operations economics.)

The following provides information with respect to items 2a) through 2c) – (all statements are current as of the month ending April 30, 2017):

## 2a) Tabulation of contingency reserve activations including date and time, MW magnitude, duration, and triggering event:

Hawaiian Electric's contingency reserve activations are provided in Attachment 3. Maui Electric and Hawai'i Electric Light do not operate with contingency reserve requirements.

## 2b) Tabulation of under frequency load shed activations including date and time, triggering frequency, MW magnitude, duration, and triggering event:

Hawaiian Electric, Maui Electric, and Hawai'i Electric Light did not have any under frequency load shed activations for the month of April. Therefore, Attachment 4 is not being provided for this reporting period.

# 2c) Tabulation of demand response activations for system events, including date and time, MW magnitude, duration, and triggering event, (excluding demand response utilization for unit commitment deferral or system operations economics.)

Hawaiian Electric's demand response activations for system events are provided in Attachment 5. Hawai'i Electric Light currently does not have a demand response program. Maui Electric has implemented the Fast Demand Response pilot program on a limited basis. Hawai'i Electric Light plans to use the findings of Maui Electric's pilot program to help in the evaluation and development of future demand response programs. Maui Electric executes a weekly testing protocol which measures customer participation. This program is not currently used in response to actual system events.

- (3) Curtailment of non-dispatchable renewable resources:
  - (a) Tabulation of each curtailment event for each resource including the starting date and time, duration, megawatt hours curtailed, peak MW curtailed, and reason for curtailment.
  - (b) Total MWh of non-dispatchable renewable resources curtailed for the month.

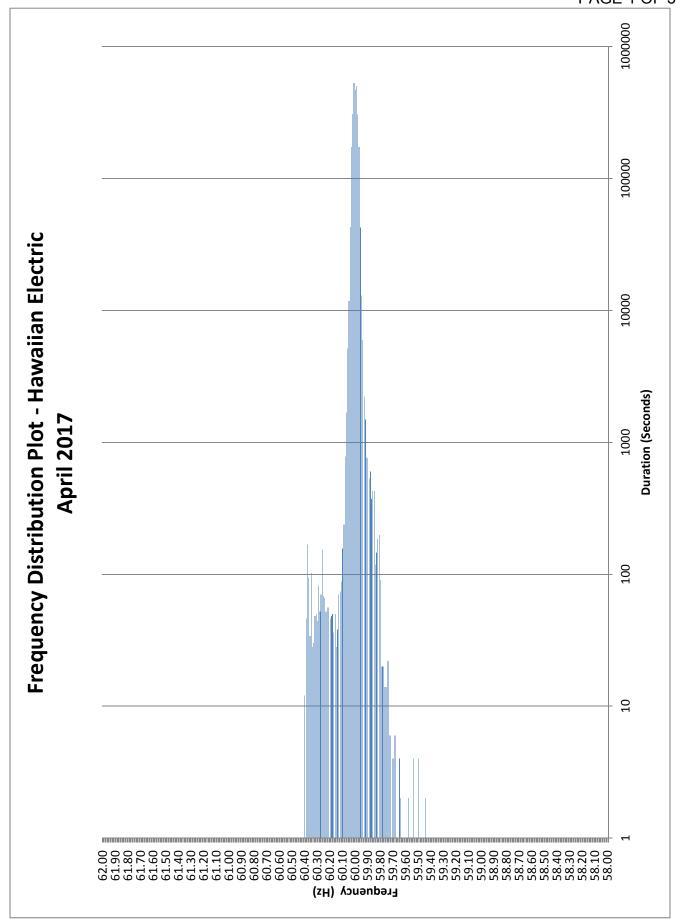
The following provides information with respect to items 3a) through 3b) – (all statements are current as of the month ending April 30, 2017):

# 3a) Tabulation of each curtailment event for each resource including the starting date and time, duration, megawatt hours curtailed, peak MW curtailed, and reason for curtailment:

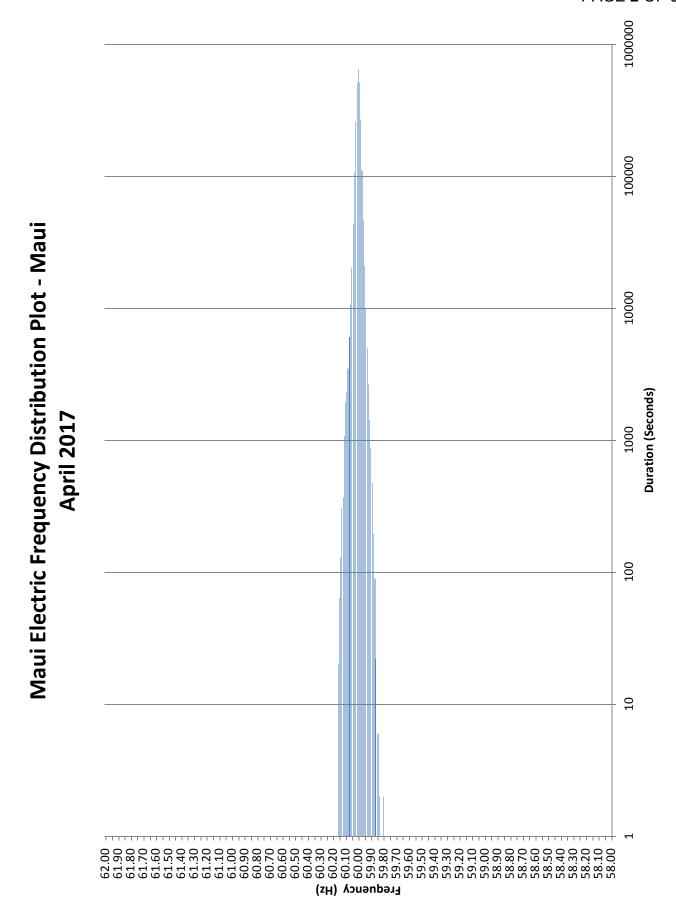
The tabulation of each curtailment event for each resource is provided in Attachment 6.

#### 3b) Total MWh of non-dispatchable renewable resources curtailed for the month:

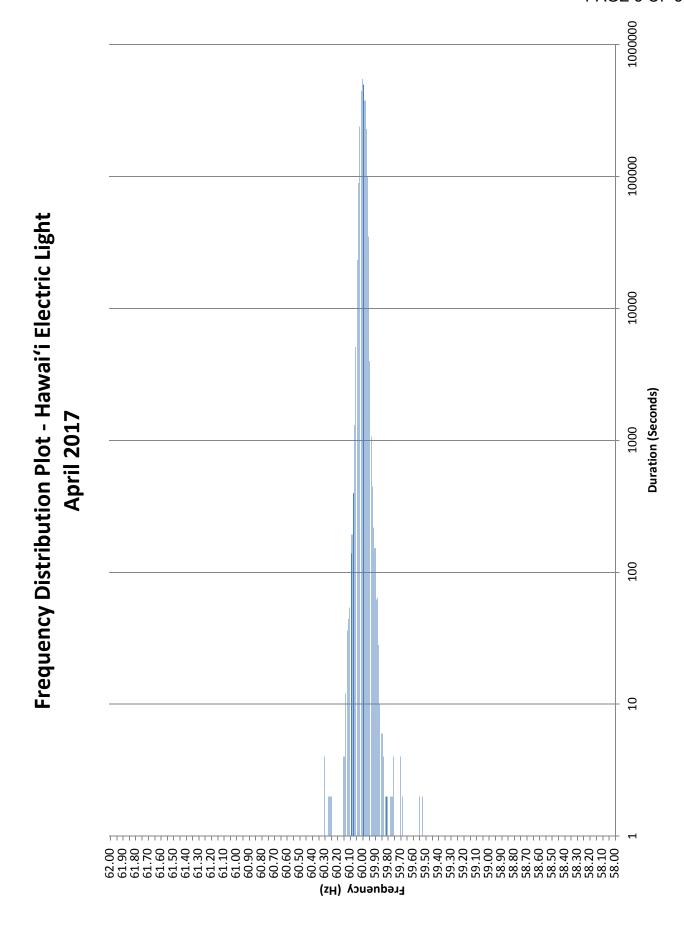
Curtailed MWH from non-dispatchable resources are difficult to determine due to the variability of the resource during curtailment periods. In some cases, the curtailed MWH estimates were provided by the IPPs under curtailment. The Hawaiian Electric Companies do not make any representations as to the accuracy of the curtailed MWH. The estimated MWH of non-dispatchable resources curtailed for the month are provided in Attachment 6, corresponding to each curtailment event.



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DOCKET NO. 2011-0206 ORDER NO. 30371 I.C.(1)(a) ATTACHMENT 1 PAGE 3 OF 3



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Hawaiian Electric Frequency Excursion Statistics							
April 2017							
Data Rounded to the nearest	<59.95 Hz	>60.05 Hz					
Number of Excursions	1070	1154					
Maximum Duration (sec)	1732	1340					
Maximum Deviation (Hz)	59.444	60.398					
Total Duration of Excursions (sec)	18542	13546					

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Maui Electric Frequency Excursion Statistics						
April 2017						
	<59.95 Hz	>60.05 Hz				
Number of Excursions	6585	6603				
Maximum Duration (sec)	664	1306				
Maximum Deviation (Hz)	59.7988	60.1636				
Total Duration of Excursions (sec)	29152	34630				

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Hawai'i Electric Light Frequency Excursion Statistics April 2017						
	<59.95 Hz	>60.05 Hz				
Number of Excursions	4565	790				
Maximum Duration (sec)	204	58				
Maximum Deviation (Hz)	59.515	60.302				
Total Duration of Excursions (sec)	21152	3858				

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#### HAWAIIAN ELECTRIC COMPANY, INC. CONTINGENCY RESERVE ACTIVATION EVENTS APRIL 2017

		F	requency (H	z)			
Event #	Date & Time	Prior to Event	Nadir	Trigger	Spinning Reserve Shortfall (MW)	Duration (HH:MM)	Description
1	04/09/17 16:59	59.99	59.54	NA	-8.00	0:16	K2 tripped offline while generating ~65 MW. W9 and CIP called online for spinning reserve.
2	04/10/17 16:50	59.98	59.44	NA	-133.00	0:27	KPLP CT1 tripped offline while generating ~68 MW.
3	04/23/17 19:21	59.98	59.65	NA	-30.00	0:15	W9 tripped offline while generating ~44 MW. W10 called online for spinning reserve.

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DOCKET NO. 2011-0206 ORDER NO. 30371 I.C.(2)(c) ATTACHMENT 5 PAGE 1 OF 1

#### HAWAIIAN ELECTRIC COMPANY, INC. DEMAND RESPONSE EVENTS APRIL 2017

		Frequency (Hz)					
Event #	Date & Time	Prior to Event	Nadir	Trigger	Load Shed (MW)	Duration (HH:MM)	Description
1	04/09/17 17:00	59.99	59.54	59.7	NA	0:02	K2 tripped offline while generating ~65 MW. RDLC activated.
2	04/10/17 16:52	59.98	59.44	59.7	NA	0:02	KPLP CT1 tripped offline while generating ~68 MW. RDLC and CIDLC activated.
3	04/23/17 19:21	59.98	59.65	59.7	NA	0:02	W9 tripped offline while generating ~44 MW. RDLC activated.

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#### Hawaiian Electric Curtailment Report April 2017

					ment neport /		
					Estimated		
				MW output	MWh of		
		MW output		after	curtailed		
	Curtailment	prior to start		curtailment	energy during		
Start Date/Time	Set Point	of curtailment	End Date/Time	released	event (1)	IPP	Reason for Curtailment
04/11/17 06:30	0.0	17.10	04/11/17 07:19	0	*	KWF	System constraints
04/11/17 06:32	0.0	2.00	04/11/17 07:21	0	*	Makai	System constraints
04/11/17 14:42	0.0	14.00	04/11/17 15:20	0	*	KWF	System constraints
04/11/17 14:45	0.0	6.30	04/11/17 15:21	0	*	Makai	System constraints
04/12/17 02:44	0.0	1.90	04/12/17 03:21	0	*	KWF	System constraints
04/12/17 15:26	0.0	7.20	04/12/17 16:03	0	*	KWF	System constraints
04/12/17 15:28	0.0	7.20	04/12/17 16:04	0	*	Makai	System constraints
04/13/17 08:27	0.0	1.30	04/13/17 09:51	0	*	KREP	System constraints
04/13/17 13:15	0.0	4.70	04/13/17 13:45	0	*	KREP	System constraints
04/24/17 05:24	0.0	0.00	04/24/17 06:04	0	*	Waianae	System constraints
04/24/17 05:31	0.0	0.00	04/24/17 05:53	0	*	Aloha	System constraints
04/24/17 14:43	0.0	4.10	04/24/17 15:22	0	*	Aloha	System constraints
04/24/17 14:46	0.0	5.60	04/24/17 15:21	0	*	Waianae	System constraints

Aloha = Aloha Solar PV Farm

KLS2 = Kalaeloa Solar 2 PV Farm

KREP = Kalaeloa Renewable Energy Park

KWF = Kahuku Wind Farm

Makai = Kawailoa Makai Wind Farm

Mauka = Kawailoa Mauka Wind Farm

North = Waihonu North PV Farm

South = Waihonu South PV Farm

Waianae = Waianae Solar PV Farm

<sup>(1)</sup> The estimated MWh of energy curtailed during the event is supplied by Kahuku Wind Farm and/or Kawailoa Wind Farm, and HECO does not make any representations as to its accuracy.

<sup>\*</sup> Data has not been provided by IPP.



#### Maui Curtailment Report

	Γime	Duration	IPP Curtailed	Estimated Curtailed MWH	Peak MW Curtailed	Reasons for Curtailment
	17 0:04	6:22	KWPII	78.841	20.708	Oversupply
4/1/201		0:04	KWPII	0.235		Oversupply
4/1/201 4/1/201		0:02 0:23	KWPII KWPII	0.075 1.512		System constraint Oversupply
4/1/201		0:04	KWPII	0.170		Oversupply
4/1/201		0:03	KWPII	0.122	12.713	System constraint
4/1/201		2:55	KWPII	44.628	19.972	Oversupply
4/1/2017		0:53	AWE	6.146		Oversupply
4/1/2017 4/1/2017		0:08 0:23	AWE KWPII	0.242 3.004	20.873	System constraint Oversupply
4/1/2017		1:26	KWPII	9.586		Oversupply
4/1/2017		0:03	KWPII	0.089		System constraint
4/1/2017	7 15:00	0:13	KWPII	1.182	20.333	Oversupply
4/1/2017		6:06	KWPII	80.152		Oversupply
4/2/201		0:21	KWPII	0.978		Oversupply Oversupply
4/2/201 4/2/201		6:57 4:05	KWPII AWE	112.016 41.399		Oversupply
4/2/2017		0:27	KWPII	4.666		Oversupply
4/3/201		1:10	KWPII	5.487		Oversupply
4/3/201		4:07	KWPII	39.504		Oversupply
4/3/2017		0:42	KWPII	5.129		Oversupply
4/4/201		2:58 0:49	KWPII	30.406		Oversupply
4/4/201 4/4/201		0:49	KWPII KWPII	3.786 0.441		Oversupply System constraint
4/4/2017		0:09	KWPII	0.393		Oversupply
4/4/2017		0:07	KWPII	0.495	13.532	Oversupply
4/4/2017		0:18	KWPII	1.381	16.924	Oversupply
4/4/2017		0:04	KWPII	0.253		Oversupply
4/5/201		1:13 2:49	KWPII	6.727	20.488	Oversupply Oversupply
4/5/201 4/5/201		0:13	KWPII KWPII	23.790 0.523		System constraint System constraint
4/5/2017		0:16	AWE	0.160		System constraint  System constraint
4/5/2017		0:16	KWP	3.740	17.024	Oversupply
4/5/2017	18:24	0:16	KWPII	0.090	10.339	System constraint
4/5/2017		0:08	KWP	1.873		Oversupply
4/5/2017 4/5/2017		0:07 0:07	KWPII	0.094 0.034		System constraint System constraint
4/5/2017		0:07	KWPII	1.515		System constraint System constraint
4/6/201		1:39	KWPII	3.661	20.707	System constraint System constraint
4/6/201	7 8:21	0:03	KWPII	0.163	19.215	Oversupply
4/6/201		0:02	KWPII	0.016		System constraint
4/6/201		1:49	BS250	Data is not available	Data is not available	Oversupply
4/6/201 4/6/2017		1:49 0:06	KWPII	6.601 0.180		Oversupply Supply Suppl
4/6/2017		0:06	KWPII	0.180	10.421	System constraint Oversupply
4/9/201		0:01	AWE	0.000		System constraint
4/9/201		0:01	AWE	0.000		System constraint
4/9/2017		0:01	AWE	0.000	0.010	System constraint
4/9/2017		0:01	AWE	0.000		System constraint
4/9/2017 4/9/2017		0:01 0:01	AWE	0.000		System constraint
4/9/2017		0:01	AWE	0.000		System constraint System constraint
4/9/2017		0:01	AWE	0.000		System constraint
4/9/2017	20:01	0:01	AWE	0.000	0.007	System constraint
4/10/201		0:01	AWE	0.000	0.007	System constraint System constraint
4/10/2017		0:17 0:14	KWPII	1.021	20.304	Oversupply
4/11/201			KWPII	1.344		Oversupply Supply Suppl
4/11/201			KWPII		11 500	
4/11/201 4/11/201	17 1:46	0:04	KWPII	0.149 0.027		System constraint System constraint
4/11/201 4/11/201	17 1:46 17 2:05 17 2:11	0:04 0:01 0:05	KWPII KWPII	0.027 0.128	11.159 12.587	System constraint System constraint
4/11/201 4/11/201 4/11/201	17 1:46 17 2:05 17 2:11 17 2:46	0:04 0:01 0:05 0:30	KWPII KWPII KWPII	0.027 0.128 2.237	11.159 12.587 9.321	System constraint System constraint Oversupply
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4/11/201 4/11/201 4/11/201 4/11/201 4/11/201 4/11/201 4/11/201 4/11/201	7 1:46 17 2:05 17 2:11 17 2:46 17 3:09 17 3:17 17 3:19 17 4:52 17 6:15	0:04 0:01 0:05 0:30 0:02 0:06	KWPII KWPII KWPII AWE AWE	0.027 0.128 2.237 0.051 0.174	11.159 12.587 9.321 19.170 18.100 7.528 20.080	System constraint System constraint Oversupply System constraint System constraint
4/11/201 4/11/201 4/11/201 4/11/201 4/11/201 4/11/201 4/11/201 4/11/201 4/12/201	7 1:46 7 2:05 17 2:11 17 2:46 17 3:09 17 3:17 7 3:19 17 4:52 17 6:15 17 2:39	0:04 0:01 0:05 0:30 0:02 0:06 0:07 1:17 0:11	KWPII KWPII KWPII AWE AWE KWPII KWPII KWPII	0.027 0.128 2.237 0.051 0.1774 0.528 9.079 0.386 6.690	11.159 12.587 9.321 19.170 18.100 7.528 20.080 20.701 14.242	System constraint System constraint Oversupply System constraint System constraint Oversupply Oversupply Oversupply Oversupply Oversupply Oversupply Oversupply Oversupply
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#### DOCKET NO. 2011-0206 ORDER NO. 30371 I.C.(3)(a)&(b) **ATTACHMENT 6** PAGE 3 OF 6



#### Maui Curtailment Report

April 2017

Start Date and Time	Duration	IPP Curtailed	Estimated Curtailed MWH	Peak MW Curtailed	Reasons for Curtailment
4/23/2017 0:27	1:08	KWPII	6.068		Oversupply
4/23/2017 2:52	0:42	KWPII	3.249		Oversupply
4/23/2017 9:34	0:07	AWE	0.259	19.490	System constraint
4/23/2017 9:38	0:03	KWPII	0.003	0.089	System constraint
4/23/2017 9:49	0:01	KWPII	0.003	5.648	System constraint
4/23/2017 9:51	0:07	KWPII	0.291		System constraint
4/23/2017 11:12	0:13	KWPII	1.077	10.935	Oversupply
4/23/2017 11:28	0:11	KWPII	0.799	13.727	Oversupply
4/23/2017 12:20	0:10	AWE	0.182	20.457	System constraint
4/23/2017 12:21	0:10	KWPII	0.081		System constraint
4/24/2017 4:52	1:16	KWPII	10.579	18.662	Oversupply
4/24/2017 9:48	1:38	KWPII	21.523		Oversupply
4/24/2017 10:49	0:31	AWE	1.558	20.577	Oversupply
4/24/2017 11:28	0:58	KWPII	10.472	16.349	Oversupply
4/24/2017 12:00	0:21	AWE	0.630		System constraint
4/24/2017 12:28	0:12	KWPII	1.156	13.229	Oversupply
4/24/2017 12:41	0:02	KWPII	0.032	9.502	System constraint
4/24/2017 12:47	0:02	KWPII	0.008	11.327	System constraint
4/24/2017 12:52	0:06	KWPII	0.240	13.299	System constraint
4/24/2017 13:06	0:06	KWPII	0.101		System constraint
4/24/2017 13:24	0:07	KWPII	0.135		System constraint
4/24/2017 23:19	0:11	KWPII	0.948	17.261	Oversupply
4/24/2017 23:52	1:09	KWPII	3.182	17.294	Oversupply
4/25/2017 1:37	3:36	KWPII	23.319		Oversupply
4/25/2017 8:47	3:46	KWPII	45.971		Oversupply
4/25/2017 9:57	0:54	AWE	2.336		Oversupply
4/25/2017 11:40	0:48	AWE	3.863		Oversupply
4/25/2017 14:40	0:02	AWE	0.007		System constraint
4/26/2017 5:21	0:12	AWE	0.333		System constraint
4/26/2017 5:21	0:42	KWPII	4.864		Oversupply
4/26/2017 8:54	0:23	KWPII	0.389		System constraint
4/26/2017 9:28	1:24	KWPII	18.485		Oversupply
4/26/2017 10:06	0:39	AWE	3.420		Oversupply
4/26/2017 10:54	1:02	KWPII	15.202		Oversupply
4/26/2017 11:30	0:17	AWE	0.539		System constraint
4/26/2017 11:58	0:23	KWPII	1.391		Oversupply
4/28/2017 22:01	0:01	AWE	0.000		System constraint
4/28/2017 22:04	0:01	AWE	0.000		System constraint
4/29/2017 11:25	0:01	AWE	0.000		System constraint
4/29/2017 15:48	0:01	KWPII	0.000		System constraint
4/30/2017 0:12	0:01	AWE	0.000		System constraint
4/30/2017 6:25	0:01	AWE	0.000		System constraint
4/30/2017 11:44	0:01	KWPII	0.001	0.032	System constraint
4/30/2017 14:30 Notes:	0:04	KWPII	0.148	18.519	System constraint

4/30/2017 14:30 | 0:04 | KWPI | 0.148 | 18.519 | System constraint

Notes:

- Curtailment for Kaheawa Wind Power ("KWP"), Makila Hydroelectric ("MH"), AAAA Rent-A-Space Maui LTD ("5A"), Bioreal Solar, LLC ("BS"), Auwahi Wind Energy ("AWE"), Kaheawa Wind Power II ("KWPII") Bioreal Solar 250, LLC ("BS") may now be controlled by Maui Electric or Automatic Generation control System ("AGC") or a Maui Electric operator-entered curtailment limit. The AGC curtailment control automatically calculates the amount of Maximum Allowable Variable Generation ("MAVG") that Maui Electric can accept into the Maui system, based on the system current available variable generation ("CAVG"), regulating reserve down requirement ("RRDR"), and available regulating reserve down ("ARRD"). Thus, the AGC MAVG - calculated is equal to CAVG less (RRDR less ARRD). Additionally, the AGC curtailment control allows the Maui Electric operator to enter an AGC MAVG value. The AGC curtailment people the lesser of the AGC MAVG - calculated and AGC MAVG - entered values in the control logic.

- The Estimated Curtailed MWH and Peak MW Curtailed are calculated with information provided by AWE, KVIVP, and KVIPII. Maui Electric does not make any representation as to its accuracy.

- The data to calculate the Estimated Curtailed MWH and Peak MW Curtailed is not provided by 5A MB, 58 250 or MH.

- Curtailment signals sent to 5A, BS, or BS250 during nighttime hours are not recorded as curtailment events because no energy generation is possible during that time.

- The curtailment reasons have been modified to oversupply, system constraints, and facility requested, to provide continuity with HPUC Docket No. 2013-0141 Decoupling for HECO companies metrics.

#### DOCKET NO. 2011-0206 ORDER NO. 30371 I.C.(3)(a)&(b) ATTACHMENT 6 PAGE 4 OF 6



Lanai Curtailment Report

April 2017

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Start Date and Time 4/1/2017 8:00	Duration 0:27	IPP Curtailed	Estimated MWh Curtailed Data is not available	Peak MW Curtailed Data is not available	Reasons for Curtailment Oversupply
4/1/2017 8:30	0:27	LSR LSR	Data is not available	Data is not available	Oversupply
4/1/2017 8:46	0:03	LSR	Data is not available	Data is not available	Oversupply
4/1/2017 8:51	1:23	LSR	Data is not available	Data is not available	Oversupply
4/1/2017 13:05	0:01	LSR	Data is not available	Data is not available	Oversupply
4/1/2017 13:52	0:08	LSR	Data is not available	Data is not available	Oversupply
4/1/2017 14:09	0:02	LSR	Data is not available	Data is not available	Oversupply
4/1/2017 14:24 4/1/2017 14:28	0:03 0:02	LSR LSR	Data is not available  Data is not available	Data is not available  Data is not available	Oversupply Oversupply
4/1/2017 14:33	0:05	LSR	Data is not available	Data is not available	Oversupply
4/1/2017 14:42	0:01	LSR	Data is not available	Data is not available	Oversupply
4/1/2017 14:47	0:06	LSR	Data is not available	Data is not available	Oversupply
4/1/2017 14:59	0:08	LSR	Data is not available	Data is not available	Oversupply
4/4/2017 8:09 4/4/2017 8:47	0:37	LSR LSR	Data is not available  Data is not available	Data is not available	Oversupply
4/4/2017 8:57	0:03 0:04	LSR	Data is not available	Data is not available  Data is not available	Oversupply Oversupply
4/4/2017 9:04	0:06	LSR	Data is not available	Data is not available	Oversupply
4/6/2017 6:45	0:05	LSR	Data is not available	Data is not available	Oversupply
4/6/2017 7:05	0:16	LSR	Data is not available	Data is not available	Oversupply
4/6/2017 7:22	0:57	LSR	Data is not available	Data is not available	Oversupply
4/6/2017 8:20 4/6/2017 8:32	0:02 0:34	LSR LSR	Data is not available  Data is not available	Data is not available	Oversupply
4/6/2017 9:07	0:06	LSR	Data is not available	Data is not available  Data is not available	Oversupply Oversupply
4/6/2017 9:25	0:04	LSR	Data is not available	Data is not available	Oversupply
4/6/2017 9:31	0:35	LSR	Data is not available	Data is not available	Oversupply
4/6/2017 10:18	0:03	LSR	Data is not available	Data is not available	Oversupply
4/6/2017 10:26	0:11	LSR	Data is not available	Data is not available	Oversupply
4/6/2017 10:38	0:02	LSR	Data is not available	Data is not available	Oversupply
4/6/2017 10:45 4/6/2017 11:25	0:04 0:06	LSR LSR	Data is not available  Data is not available	Data is not available  Data is not available	Oversupply Oversupply
4/6/2017 11:25	0:06	LSR	Data is not available  Data is not available	Data is not available  Data is not available	Oversupply
4/6/2017 11:53	0:05	LSR	Data is not available	Data is not available	Oversupply
4/6/2017 11:59	0:04	LSR	Data is not available	Data is not available	Oversupply
4/6/2017 12:06	0:56	LSR	Data is not available	Data is not available	Oversupply
4/6/2017 13:06	0:03	LSR	Data is not available	Data is not available	Oversupply
4/6/2017 13:11 4/6/2017 13:14	0:01 0:03	LSR LSR	Data is not available  Data is not available	Data is not available  Data is not available	Oversupply Oversupply
4/7/2017 13:14	0:03	LSR	Data is not available	Data is not available	Oversupply
4/7/2017 12:14	0:01	LSR	Data is not available	Data is not available	Oversupply
4/7/2017 12:19	0:01	LSR	Data is not available	Data is not available	Oversupply
4/7/2017 12:23	0:02	LSR	Data is not available	Data is not available	Oversupply
4/7/2017 12:28	0:03	LSR	Data is not available	Data is not available	Oversupply
4/7/2017 12:33	0:07	LSR	Data is not available	Data is not available	Oversupply
4/7/2017 12:41 4/7/2017 12:49	0:05 0:02	LSR LSR	Data is not available  Data is not available	Data is not available  Data is not available	Oversupply Oversupply
4/7/2017 12:54	0:03	LSR	Data is not available	Data is not available	Oversupply
4/7/2017 13:11	0:03	LSR	Data is not available	Data is not available	Oversupply
4/7/2017 13:15	0:04	LSR	Data is not available	Data is not available	Oversupply
4/7/2017 13:23	0:02	LSR	Data is not available	Data is not available	Oversupply
4/7/2017 13:43	0:01	LSR	Data is not available	Data is not available	Oversupply
4/7/2017 13:50 4/7/2017 13:59	0:07 0:01	LSR LSR	Data is not available  Data is not available	Data is not available  Data is not available	Oversupply Oversupply
4/7/2017 13:39	0:01	LSR	Data is not available	Data is not available	Oversupply
4/7/2017 14:25	0:01	LSR	Data is not available	Data is not available	Oversupply
4/8/2017 8:52	0:01	LSR	Data is not available	Data is not available	Oversupply
4/8/2017 8:58	0:02	LSR	Data is not available	Data is not available	Oversupply
4/8/2017 9:01	0:04	LSR	Data is not available	Data is not available	Oversupply
4/8/2017 9:08 4/12/2017 8:02	0:01 0:10	LSR LSR	Data is not available  Data is not available	Data is not available  Data is not available	Oversupply Oversupply
4/12/2017 8:28	0:05	LSR	Data is not available	Data is not available	Oversupply
4/12/2017 8:34	0:01	LSR	Data is not available	Data is not available	Oversupply
4/12/2017 8:37	0:04	LSR	Data is not available	Data is not available	Oversupply
4/12/2017 8:44	0:03	LSR	Data is not available	Data is not available	Oversupply
4/12/2017 8:48	0:04	LSR	Data is not available	Data is not available	Oversupply
4/12/2017 8:57 4/12/2017 9:04	0:04 0:08	LSR LSR	Data is not available  Data is not available	Data is not available  Data is not available	Oversupply Oversupply
4/12/2017 9:04	0:03	LSR	Data is not available	Data is not available	Oversupply
4/12/2017 9:17	1:28	LSR	Data is not available	Data is not available	Oversupply
4/12/2017 12:25	0:01	LSR	Data is not available	Data is not available	Oversupply
4/12/2017 12:27	0:12	LSR	Data is not available	Data is not available	Oversupply
4/12/2017 12:40	0:03	LSR	Data is not available	Data is not available	Oversupply
4/14/2017 7:25 4/14/2017 7:41	0:15 0:03	LSR LSR	Data is not available  Data is not available	Data is not available  Data is not available	Oversupply Oversupply
4/14/2017 7:47	0:12	LSR	Data is not available	Data is not available	Oversupply
4/14/2017 8:06	0:09	LSR	Data is not available	Data is not available	Oversupply
4/14/2017 8:16	0:05	LSR	Data is not available	Data is not available	Oversupply
4/14/2017 8:23	0:24	LSR	Data is not available	Data is not available	Oversupply
4/14/2017 8:51 4/14/2017 10:33	0:07 0:02	LSR LSR	Data is not available  Data is not available	Data is not available  Data is not available	Oversupply
4/14/2017 10:53	0:02	LSR	Data is not available  Data is not available	Data is not available  Data is not available	Oversupply Oversupply
4/14/2017 10:33	0:03	LSR	Data is not available	Data is not available	Oversupply
4/14/2017 11:25	0:09	LSR	Data is not available	Data is not available	Oversupply
4/14/2017 11:38	0:01	LSR	Data is not available	Data is not available	Oversupply
4/14/2017 11:42	0:02	LSR	Data is not available	Data is not available	Oversupply
4/14/2017 11:45	0:02	LSR	Data is not available	Data is not available	Oversupply
4/14/2017 11:53 4/14/2017 13:55	0:01 0:12	LSR LSR	Data is not available  Data is not available	Data is not available  Data is not available	Oversupply Oversupply
4/14/2017 15:14	0:12	LSR	Data is not available	Data is not available	Oversupply
4/14/2017 16:12	0:01	LSR	Data is not available	Data is not available	Oversupply
4/14/2017 16:14	0:01	LSR	Data is not available	Data is not available	Oversupply
4/14/2017 17:46	0:01	LSR	Data is not available	Data is not available	Oversupply
4/15/2017 7:00	2:06	LSR	Data is not available	Data is not available	Oversupply
4/15/2017 9:28 4/15/2017 9:41	0:08 0:04	LSR LSR	Data is not available  Data is not available	Data is not available  Data is not available	Oversupply Oversupply
4/15/2017 9:41	0:04	LSR	Data is not available  Data is not available	Data is not available	Oversupply
4/15/2017 14:25	0:01	LSR	Data is not available	Data is not available	Oversupply
4/15/2017 14:33	0:02	LSR	Data is not available	Data is not available	Oversupply

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Lanai Curtailment Report

April 2017

Start Date and Time	Duration	IPP Curtailed	Estimated MWh Curtailed	Peak MW Curtailed	Reasons for Curtailment
4/16/2017 6:57	2:09	LSR		Data is not available	Oversupply
4/16/2017 16:24	0:03	LSR		Data is not available	Oversupply
4/16/2017 16:28 4/16/2017 16:48	0:12 0:01	LSR LSR		Data is not available  Data is not available	Oversupply Oversupply
4/16/2017 17:23	0:03	LSR		Data is not available	Oversupply
4/17/2017 7:11	0:02	LSR		Data is not available	Oversupply
4/17/2017 7:15	0:14	LSR		Data is not available	Oversupply
4/17/2017 7:30	0:01	LSR		Data is not available	Oversupply
4/17/2017 7:52 4/17/2017 8:01	0:06 0:29	LSR LSR		Data is not available  Data is not available	Oversupply Oversupply
4/17/2017 8:34	0:41	LSR		Data is not available	Oversupply
4/17/2017 9:20	0:03	LSR		Data is not available	Oversupply
4/17/2017 9:24	0:02	LSR		Data is not available	Oversupply
4/17/2017 9:36	2:19	LSR		Data is not available	Oversupply
4/17/2017 11:59 4/17/2017 12:05	0:04 0:56	LSR LSR		Data is not available Data is not available	Oversupply Oversupply
4/17/2017 13:06	0:20	LSR		Data is not available	Oversupply
4/17/2017 13:31	0:21	LSR		Data is not available	Oversupply
4/17/2017 13:57	0:19	LSR		Data is not available	Oversupply
4/17/2017 14:32 4/17/2017 14:35	0:01	LSR		Data is not available	Oversupply
4/17/2017 14:52	0:01 0:02	LSR LSR		Data is not available  Data is not available	Oversupply Oversupply
4/17/2017 15:02	0:01	LSR	Data is not available	Data is not available	Oversupply
4/17/2017 15:13	0:01	LSR	Data is not available	Data is not available	Oversupply
4/17/2017 15:17	0:01	LSR		Data is not available	Oversupply
4/17/2017 15:19 4/17/2017 15:25	0:01 0:01	LSR LSR		Data is not available  Data is not available	Oversupply
4/17/2017 15:28	0:01	LSR		Data is not available	Oversupply Oversupply
4/17/2017 15:31	0:01	LSR		Data is not available	Oversupply
4/17/2017 15:37	0:02	LSR		Data is not available	Oversupply
4/17/2017 15:40	0:17	LSR		Data is not available	Oversupply
4/17/2017 16:03 4/17/2017 16:17	0:13 0:01	LSR LSR	Data is not available  Data is not available	Data is not available Data is not available	Oversupply Oversupply
4/17/2017 17:07	0:12	LSR	Data is not available	Data is not available	Oversupply
4/20/2017 17:15	0:01	LSR	Data is not available	Data is not available	Oversupply
4/21/2017 10:08	0:02	LSR		Data is not available	Oversupply
4/22/2017 16:24 4/22/2017 16:31	0:01 0:02	LSR LSR	Data is not available  Data is not available	Data is not available  Data is not available	Oversupply Oversupply
4/22/2017 16:35	0:02	LSR	Data is not available	Data is not available	Oversupply
4/25/2017 13:17	0:02	LSR	Data is not available	Data is not available	Oversupply
4/25/2017 13:20	0:01	LSR		Data is not available	Oversupply
4/25/2017 13:29 4/25/2017 15:30	0:02 0:01	LSR	Data is not available	Data is not available	Oversupply
4/26/2017 15.30	0:01	LSR LSR		Data is not available  Data is not available	Oversupply Oversupply
4/26/2017 8:42	0:01	LSR	Data is not available	Data is not available	Oversupply
4/26/2017 8:45	0:08	LSR		Data is not available	Oversupply
4/26/2017 8:57	0:03	LSR		Data is not available	Oversupply
4/26/2017 9:37 4/26/2017 9:56	0:03 0:10	LSR LSR		Data is not available  Data is not available	Oversupply Oversupply
4/26/2017 9.56	0:10	LSR		Data is not available	Oversupply
4/26/2017 11:53	0:03	LSR	Data is not available	Data is not available	Oversupply
4/26/2017 12:05	0:08	LSR		Data is not available	Oversupply
4/26/2017 12:30 4/26/2017 12:36	0:01 0:11	LSR LSR		Data is not available  Data is not available	Oversupply Oversupply
4/26/2017 12:36	0:11	LSR		Data is not available	Oversupply
4/26/2017 12:51	0:04	LSR	Data is not available	Data is not available	Oversupply
4/26/2017 13:19	0:01	LSR	Data is not available	Data is not available	Oversupply
4/26/2017 14:17	0:08	LSR		Data is not available	Oversupply
4/26/2017 14:26 4/26/2017 14:33	0:05 0:01	LSR LSR		Data is not available  Data is not available	Oversupply Oversupply
4/26/2017 14:48	0:01	LSR		Data is not available	Oversupply
4/26/2017 15:11	0:07	LSR	Data is not available	Data is not available	Oversupply
4/26/2017 16:07	0:06	LSR		Data is not available	Oversupply
4/27/2017 6:44 4/27/2017 8:44	1:57 0:10	LSR LSR		Data is not available  Data is not available	Oversupply Oversupply
4/27/2017 8:44	0:10	LSR		Data is not available  Data is not available	Oversupply
4/27/2017 9:18	0:26	LSR		Data is not available	Oversupply
4/27/2017 9:48	0:06	LSR	Data is not available	Data is not available	Oversupply
4/27/2017 10:02	0:03	LSR		Data is not available	Oversupply
4/27/2017 10:11 4/27/2017 10:19	0:01 0:01	LSR LSR		Data is not available  Data is not available	Oversupply Oversupply
4/29/2017 10:19	0:07	LSR		Data is not available	Oversupply
4/30/2017 14:00	0:02	LSR		Data is not available	Oversupply
Notes:			-	-	

Notes:

On June 27, 2012, Maui Electric notified LSR that although LSR has not operated in compliance with the revised ramp rate of 360 kW/minute, Maui Electric would conditionally allow LSR to operate at the allowed capacity of 1.2 MW while the Maui Electric-Lanai Diesel Operator was in the control room.

LSR possible output data is not available. Therefore, Maui Electric assumes LSR is curtailed if the LSR curtailment set point is less than 1,200 kW and LSR's output is within 50 kW of the curtailment set point.

The curtailment reasons have been modified to oversupply, system constraints, and facility requested, to provide continuity with HPUC Docket No. 2013-0141 Decoupling for HECO companies metrics.

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#### Hawai`i Electric Light Company Curtailment Report April 2017

Start Date/Time	MW Output Prior to Start of Curtailment	End Date/Time	MW Output After Curtailment Released <sup>1</sup>	IPP	Reason for Curtailment
04/07/17 06:58	10.4 MW	04/07/17 12:37	10.4 MW	Tawhiri	Facility requested
04/25/17 09:08	15.7 MW	04/25/17 09:37	15.5 MW	Tawhiri	System constraint
04/26/17 09:59	15.7 MW	04/26/17 13:58	5.7 MW	Tawhiri	Facility requested

<sup>&</sup>lt;sup>1</sup> The MW output values are taken soon after curtailment is released by Hawai'i Electric Light and may not reflect their full output depending on ramp rate for the facility. The wind farms generally return immediately to full available levels, whereas PGV and Wailuku may take longer to return to scheduled or full available output levels.