

# Asia Pacific Research Initiative for Sustainable Energy Systems 2012 (APRISES12)

Office of Naval Research  
Grant Award Number N00014-13-1-0463

## Crissy Field Center Wind Power Study Phase II: Interim Operating Report (4 Month)

### Task 7

Prepared For  
Hawaii Natural Energy Institute

Prepared By  
Golden Gate National Parks Conservancy

July 2018





July 20, 2018

# Crissy Field Center Wind Power Study Phase II, Report 4.1: Interim Operating Report (4 Month)

Prime Award No. N00014-13-1-0463, HNEI Subaward No. MA160014

## Background

Per the terms of the project contract between the Golden Gate National Parks Conservancy and the Hawaii Natural Energy Institute, dated May 6, 2016, and as outlined in the Statement of Work, The Golden Gate National Parks Conservancy (GGNPC) will plan, permit, install and operate four new vertical axis wind energy systems at the Crissy Field Center (CFC), an existing modular test platform manufactured by Project Frog. The GGNPC will modify existing infrastructure and the Data Acquisition System (DAS) from the prior wind study project to record wind speed, wind direction, and power generation for each wind energy system. Data from the DAS shall be made available to HNEI sufficient for industry standard analysis.

## Report 4.1: Interim Operating Report (4 Month)

As outlined in the Deliverables and Payment Schedule, Report 4.1 “Report shall summarize work performed to collect data per Task 2c above during months 1-4 of the project and shall include a log of maintenance work performed and a summary of issues potentially impacting performance of the wind turbine and data acquisition systems.”

During the period covered by this report (June through September, 2017), the wind turbines, associated electronics and Data Acquisition System functioned as designed, almost with interruption.

The attached exhibit, prepared by Loisos & Ubbelohde, provides a high resolution view of the project data transfer during the reporting period of June through September, 2017. The exhibit also provides a snapshot of an individual timestep in its raw form. The following pages provide 40 seconds of raw data collected during the period.

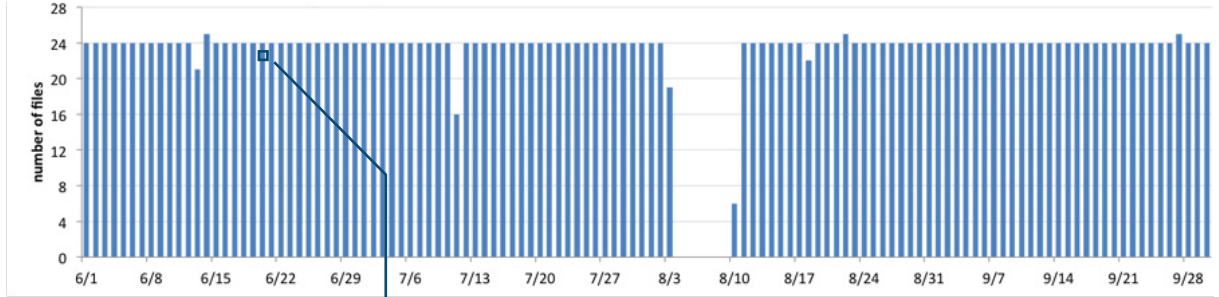
In the high resolution view of the data transfer, a gap is shown between August 3 and August 11, 2017. This gap in data collection was caused by unrelated electrical work being performed at the Crissy Field Center. Once power was restored and the controllers were re-set, data collection resumed and the DAS system performed as designed for the remainder of the reporting period.

High Resolution Monitoring System Activity, June 2017 – September 2017

Total Lines of Data Transferred: **158,457,600**

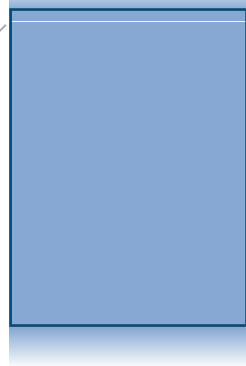
Data Files Transferred: **2751**

Data Files Transferred per day, 6/1/17–9/30/17



Example of Single Data File (see attached for the first 1% of this file)

Timesteps per File: **3600**



Snapshot of Single Timestep in Raw Data File

Lines of Data per Timestep: **16**

```
1498002642,10,6002,0~
1498002642,1,1,6816,16603~
1498002642,1,3,24245,17262~
1498002642,1,5,46138,16628~
1498002642,1,7,56320,17267~
1498002642,1,9,9961,16647~
1498002642,1,11,24245,17262~
1498002642,1,13,9961,16647~
1498002642,1,15,37254,17271~
1498002642,10,7002,121~
1498002642,11,6002,0~
1498002642,11,7002,31~
1498002642,12,6002,0~
1498002642,12,7002,23~
1498002642,13,6002,0~
1498002642,13,7002,122~
1498002643,10,6002,0~
1498002643,1,1,46138,16628~
1498002643,1,3,39690,17254~
1498002643,1,5,46138,16628~
1498002643,1,7,21049,17271~
1498002643,1,9,9961,16647~
1498002643,1,11,9181,17274~
1498002643,1,13,9961,16647~
1498002643,1,15,29994,17280~
1498002643,10,7002,105~
1498002643,11,6002,0~
1498002643,11,7002,30~
1498002643,12,6002,0~
1498002643,12,7002,22~
1498002643,13,6002,0~
1498002643,13,7002,126~
1498002644,10,6002,0~
1498002644,1,1,46138,16628~
1498002644,1,3,51178,17247~
```

Snapshot of Single Timestep in Converted Data File

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2017/06/20 23:50:42,1,1,6.84700012207~
2017/06/20 23:50:42,1,3,238.369949341~
2017/06/20 23:50:42,1,5,7.64700031281~
2017/06/20 23:50:42,1,7,243.859375~
2017/06/20 23:50:42,1,9,8.44699954987~
2017/06/20 23:50:42,1,11,238.369949341~
2017/06/20 23:50:42,1,13,8.44699954987~
2017/06/20 23:50:42,1,15,247.568450928~
2017/06/20 23:50:42,10,7002,121~
2017/06/20 23:50:42,11,6002,0~
2017/06/20 23:50:42,11,7002,31~
2017/06/20 23:50:42,12,6002,0~
2017/06/20 23:50:42,12,7002,23~
2017/06/20 23:50:42,13,6002,0~
2017/06/20 23:50:42,13,7002,122~
2017/06/20 23:50:43,10,6002,0~
2017/06/20 23:50:43,1,1,7.64700031281~
2017/06/20 23:50:43,1,3,230.605621338~
2017/06/20 23:50:43,1,5,7.64700031281~
2017/06/20 23:50:43,1,7,247.321182251~
2017/06/20 23:50:43,1,9,8.44699954987~
2017/06/20 23:50:43,1,11,250.140090942~
2017/06/20 23:50:43,1,13,8.44699954987~
2017/06/20 23:50:43,1,15,256.915344238~
2017/06/20 23:50:43,10,7002,105~
2017/06/20 23:50:43,11,6002,0~
2017/06/20 23:50:43,11,7002,30~
2017/06/20 23:50:43,12,6002,0~
2017/06/20 23:50:43,12,7002,22~
2017/06/20 23:50:43,13,6002,0~
2017/06/20 23:50:43,13,7002,126~
2017/06/20 23:50:44,10,6002,0~
2017/06/20 23:50:44,1,1,7.64700031281~
2017/06/20 23:50:44,1,3,223.780014307~
```

**Converted Data File for June 20, 2017, 11:50 PM - 12:50 AM**  
*(only the first 40 seconds—about 1%—of the file is shown here)*

Crissy Field Wind Power Study Phase 2 Report 4.1: Interim  
Operating Report  
Exhibit 1

2017/11/06 21:00:14,10,6002,4  
2017/11/06 21:00:14,1,1,3.64700007439  
2017/11/06 21:00:14,1,3,305.394378662  
2017/11/06 21:00:14,1,5,3.64700007439  
2017/11/06 21:00:14,1,7,308.509643555  
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2017/11/06 21:00:14,1,11,309.103027344  
2017/11/06 21:00:14,1,13,2.84700012207  
2017/11/06 21:00:14,1,15,304.454864502  
2017/11/06 21:00:14,10,7002,0  
2017/11/06 21:00:14,11,6002,0  
2017/11/06 21:00:14,11,7002,21  
2017/11/06 21:00:14,12,6002,0  
2017/11/06 21:00:14,12,7002,14  
2017/11/06 21:00:14,13,6002,8  
2017/11/06 21:00:14,13,7002,0  
2017/11/06 21:00:15,10,6002,4  
2017/11/06 21:00:15,1,1,3.64700007439  
2017/11/06 21:00:15,1,3,300.498962402  
2017/11/06 21:00:15,1,5,3.64700007439  
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2017/11/06 21:00:15,1,9,2.84700012207  
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2017/11/06 21:00:15,13,6002,7  
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2017/11/06 21:00:17,12,6002,0  
2017/11/06 21:00:17,12,7002,14  
2017/11/06 21:00:17,13,6002,7

Crissy Field Wind Power Study Phase 2 Report 4.1: Interim  
Operating Report  
Exhibit 1

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2017/11/06 21:00:21,12,7002,13  
2017/11/06 21:00:21,13,6002,5

Crissy Field Wind Power Study Phase 2 Report 4.1: Interim  
Operating Report  
Exhibit 1

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Crissy Field Wind Power Study Phase 2 Report 4.1: Interim  
Operating Report  
Exhibit 1

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2017/11/06 21:00:29,12,7002,11  
2017/11/06 21:00:29,13,6002,6

Crissy Field Wind Power Study Phase 2 Report 4.1: Interim  
Operating Report  
Exhibit 1

2017/11/06 21:00:29,13,7002,0  
2017/11/06 21:00:30,10,6002,4  
2017/11/06 21:00:30,1,1,3.64700007439  
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Crissy Field Wind Power Study Phase 2 Report 4.1: Interim  
Operating Report  
Exhibit 1

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Crissy Field Wind Power Study Phase 2 Report 4.1: Interim  
Operating Report  
Exhibit 1

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Crissy Field Wind Power Study Phase 2 Report 4.1: Interim  
Operating Report  
Exhibit 1

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Crissy Field Wind Power Study Phase 2 Report 4.1: Interim  
Operating Report  
Exhibit 1

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Crissy Field Wind Power Study Phase 2 Report 4.1: Interim  
Operating Report  
Exhibit 1

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