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 (12 Month)

Task 7

Prepared For
Hawaii Natural Energy Institute

Prepared By
Golden Gate National Parks Conservancy

July 2018

HNEI
Hawai'i Natural Energy Institute
University of Hawai'i at Mānoa

July 20, 2018

Crissy Field Center Wind Power Study Phase II, Report 4.3: Interim Operating Report (12 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 4.3: Interim Operating Report (12 Month)

As outlined in the Deliverables and Payment Schedule, Report 3 "Report shall summarize work performed to collect data per Task 2c above during months 9-12 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 (February through May 2018), the Data Acquisition System continued to work as designed, without interruption. The attached exhibit 1, prepared by Loisos & Ubbelohde, provides a high resolution view of the project data transfer during the reporting period. 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 February, 2018, observations taken from the monitoring system indicated an apparent disparity in power production between the North and South UGE turbines. Further investigation confirmed the proper functioning of the Data Acquisition System, suggesting that the difference in production was related to turbine functionality (See Figure 1 below). Site visits performed by Luminalt, in consultation with Castle Energy, revealed erratic behavior on the part of the automatic breaking unit for the Northern Unit (Tower 1). The automatic brake on the Northern UGE was manually overridden and locked on at the request of the Crissy Field Center staff after the turbine was observed to be overspinning in a hazardous fashion. UGE has been contacted and a new controller board for the automatic brake has been ordered. (See Luminalt's maintenance report, attached).

In March of 2018 it was observed that the Northern Omniflow unit's rotor was seized (although the unit's photovoltaic panels were still producing power). Omniflow was informed of the problem and the company delivered a new rotor and generator set. The new equipment was installed by Luminalt during their scheduled maintenance visit in June

2018, and the unit's functionality has been restored.

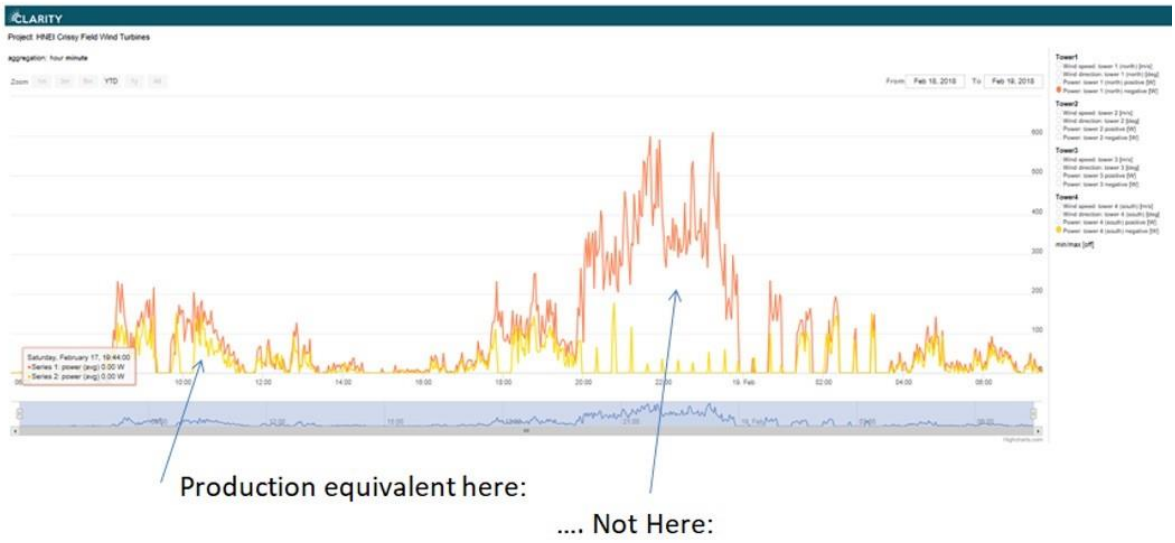


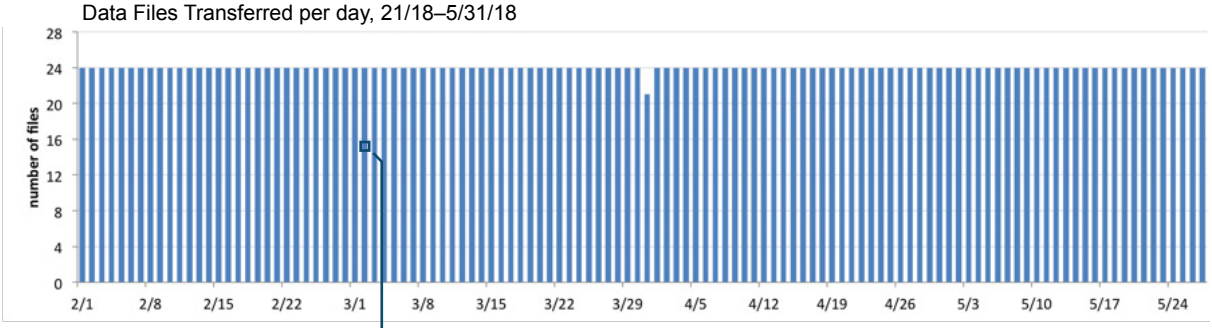
Figure 1

High Resolution Monitoring System Activity, February 2018 – May 2018

Total Lines of DataTransferred: **165,715,200**

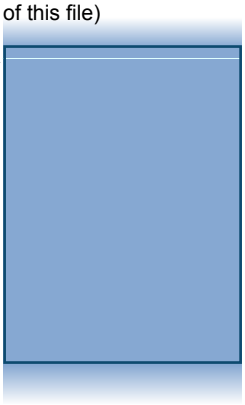
Data Files Transferred: **2877**

Data Files Transferred per day, 21/18–5/31/18



Timesteps per File: **3600**

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



Lines of Data per Timestep: **16**

Snapshot of Single Timestep in Raw Data File

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1520003204,1,3,52713,17185
```

wind speed and direction at tower 1
wind speed and direction at tower 2
wind speed and direction at tower 3
wind speed and direction at tower 4
power (pos. and neg.), turbine 1
power (pos. and neg.), turbine 2
power (pos. and neg.), turbine 3
power (pos. and neg.), turbine 4

Snapshot of Single Timestep in Converted Data File

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Converted Data File for March 2, 2017, 3:05 PM - 4:05 PM

(only the first 40 seconds—about 1%—of the file is shown here)

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Crissy Field Center Wind Turbine Maintenance Report

July 20, 2018

System includes two UGE Vision AIR3 turbines and two Omniflow OM1.2 turbines

Inspection Date:	6/13 - 6/14/2018
Time readings taken:	12 – 4pm 6/13/18
Name(s):	Noel Cotter, Jeremy Sims
Weather Conditions:	Partly clouded, high 69 - lows 50s, winds WNW 17mph

2 UGE

General notes: North UGE unit in brake mode when we arrived on site due to malfunction of control board. Part has been ordered. North UGE is in brake mode until part arrives and repair complete. There is some rust present on both units – mostly around bolts, generator housing and flange.

Recommendations:

The rust will become worse over time. Future maintenance should be scheduled to continually apply cold galvanizing compound or replace rusty fasteners and WD40 to moving parts.

- Continue weekly visual operation both at site (assure that rotation looks smooth) and online (check for production).
- Continue to monitor bearing sound, especially from Northern unit and call for service if the sound worsens.
- Continue monthly foundation bolt torque checks.

Inspections Performed:

Visually inspect for any damage. Check disconnect switches for proper operation. Visually inspect electrical connections at all units and wire integrity in LB condulet body under flooring in Crissy Field Center.

Checked bolts/nuts at base flange of units. 1/8” turn on (2) nuts on South UGE existing bolts.

Visually inspected units for any damage

Brake test on all units 6/13/18

WD40 applied to moving parts to reduce risk of future seizing.

- This will become part of annual inspection.

Figure 1. North UGE rust present at generator housing and flange

Figure 2. Rust on Blade bolts. We need to keep an eye on these. Consider replacing.

Figure 3. Tightened all base flange bolts

Figure 4. North UGE Unit checked for level issues.

Figure 5. South UGE Unit checked for level issues.

2 Omniflow turbines

General notes:

Met with the OmniFlow Representative on site. He supplied a replacement Power Generator due to North Omniflow seized. We replaced Power Generator and did Post install test – both OmniFlow functioning properly and left on.

- Very little rust on OmniFlows
- We left old power generator with Greg at Crissy Field Center

Recommendations:	Continue weekly visual operation on site (assure that rotation looks smooth) and online (check for production)
	Continue monthly foundation bolt torque checks

Inspections Performed:

Visually inspect for any damage. Check disconnect switches for proper operation. Visually inspected electrical connections at all units and wire integrity in LB condulet body under flooring in Crissy Field Center.

Checked bolts/nuts at base flange

WD40 applied to moving parts to reduce risk of future seizing.

- This will become part of annual inspection.

Figure 6. North Omniflow – replaced seized power generator.

Figure 7. New power generator installed

Figure 8. WD40 in moving parts to reduce risk of future seizing