# Hawai‘i Energy and Environmental Technologies (HEET) Initiative

**Office of Naval Research**
**Grant Award Number N0014-10-1-0310**

## TASK 4 ALTERNATIVE ENERGY SYSTEMS
## 4.5 Energy Test Platforms:
## Crissy Field Center Wind Power Study: Wind Turbine Commissioning and Interconnection

**Prepared by:**
**Golden Gate National Parks Conservancy**

**Prepared for:**
**University of Hawai‘i at Mānoa, Hawai‘i Natural Energy Institute**

September 2015

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

Deliverable 5
Wind Turbine Commissioning and Interconnection

# Crissy Field Center Wind Power Study

HNEI Subcontract, Prime Award No. N00014-10-1-0310

Golden Gate National Parks Conservancy
9/21/2015

# Background

Per the terms of the project contract between the Golden Gate National Parks Conservancy and the Hawaii Natural Energy Institute, dated October 14, 2011, and as outlined in the Statement of Work, the Golden Gate National Parks Conservancy (Parks Conservancy) will plan, permit, install and operate up to five wind energy systems at the Crissy Field Center (CFC), an existing modular test platform manufactured by Project Frog. The Parks Conservancy will develop a Data Acquisition System (DAS) that will 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.

Performance of the turbines on the site will be monitored for approximately five years, with full access by HNEI to monitoring equipment and data. Project FROG will assist the Conservancy with integrating the wind energy data into a monitoring system that will track overall building performance – the system will also include a simple dashboard interface for use by the Center's education programs.

# Deliverable 5: Wind Turbine Commissioning and Interconnection

The Deliverables and Payment Schedule in the Contract Statement of Work stipulates that for report 5: "Report shall include documented evidence of grid interconnection and operation of the wind turbine systems including photos and certification by Contractor."

Five vertical axis wind turbines were installed at the site in February of 2012:

(2) "Windspire" 1.2 kW, with integrated inverters
(2) "Venco Twister" 1000 with Power One 3.0 kW Inverters
(1) "Tangerie Gale" T2 with a Power One 3.6 kW Inverter

Each of the five units required varying amounts of diagnostics, field tuning and, in some cases, the replacement of specific components before they became operational. The purpose of this report is to document the installation and commissioning process; analysis of the operational performance of the turbines is discussed in the final section of this report.

# 1. Commissioning: Windspire (North and South Units)

"Wobbling"
The two Windspire T 1.2kW units were assembled and began operating in February 2012 and they showed pronounced wobbling at low speed. This effect was particularly evident with the Northern unit, and generated concern for the longevity of the turbines as well as public safety. Luminalt (the prime contractor) coordinated with Windspire product representatives to diagnose the wobbling problem.
The Windspire turbines are comprised of upper and lower shafts. Based on their first site visits in mid-February, the Windspire technicians assumed the observed problem was associated with the upper shafts and assemblies. These components were replaced and/or trued on site.
*(See email chain"FW Wobbling Windspire - Northern Unit 02-12-15")*

After the above described adjustments to the upper shaft assemblies were completed, the Northern unit continued to display exaggerated off centered rotation and wobbling, so an entire new base assembly and lower shaft were ordered and installed on March 28, 2012. After the base assembly was replaced on the North unit, the two Windspire turbines appeared to rotate on center without pronounced wobbling.
(*See email chain "Top Shaft Replaced Now Base Needs Replacing 02-22-15")*

On September 10, 2012, the North turbine was observed to be wobbling severely in high winds. Park police tied the unit off and Windspire representatives performed further maintenance on the unit on September 11. Since the anchor bolts were observed to have loosened (perhaps due to the compression of the main bushing at the base plate), a protocol was developed with maintenance staff to regularly check and tighten the anchor bolts with a torque wrench.
(*See email chain "CFC North Windspire Failure and tie down 09-10-15")*
*(See "Crissy Field Windspire Turbine Report" by RLM consulting dated 09-11-2012)*

After the September 11, 2012 maintenance was performed, the units performed without pronounced wobble until December 2014, when the North unit failed catastrophically during a wind storm. The North unit was de-commissioned and it was decided at that point that in order to ensure public safety, the South Windspire unit should be taken off line as well.
*(See email chain "Crissy Field Northern Windspire wind turbine failure report case #1543 12-31-14")*

Braking
The Windspire turbines are equipped with a braking feature that is set to engage when a certain rpm limit is reached. During the first few months of operation, it was observed that the North and South units did not brake consistently in response to similar wind conditions. The Southern unit tended to brake much more frequently.
During their visit to the site to service the Windspire turbines, RLM consulting accessed the on board data that was stored in the turbine inverters and it was determined that the

"overspeed" limit was set differently for the two units. RLM consulting adjusted the limit on the Southern unit from 1,300 watts to 1,700 watts – thereby matching the 1,700 watt limit of the Northern unit.
*(See RLM Consulting Field Report – September 11, 2012)*

Windspire Acquisition by Ark Alloy
On September 5, 2012, the Conservancy was informed that Windspires assets had been acquired by Ark Alloy. Subsequent conversations with Matt Kouba at Ark Alloy indicated that the acquiring company would not be honoring past warranty agreements, providing replacement parts or field support.
*(See email chain "Windspire Acquisition Notice September 11 2012")*

## 2. Commissioning: Venco (North and South Units)

Power One Inverter Compatibility
The Venco Twister 1000 TL units 1 and 2 were installed and began operating in April of 2012. The units were installed with Power One PVI-3.0 OUTD inverters per the recommendations of Castle Energy, the US distributor of Venco turbines. Although the Venco turbines are typically mated with SMA Windy Boy inverters, the Power One units were selected due to their potential ability to realize increased energy harvests. Per August Goers of Luminalt "the Power One units start generating power as low as 50 Volts and also have a high conversion efficiency. In comparison, the Windy Boy inverter won't start generating until the turbine rectifier reaches 150 Volts."
*(See the email chain ending June 11, 2012 "RE Venco Power One problem is RISO")*

With the installation complete, the Venco units appeared to be operating properly but the Power One inverters gave readings indicating a ground fault error.
Consultation with Venco's engineers suggested several possible reasons for the error, including incompatibility between the Vencos and Power One inverters (In fact, Windy Boy SMA inverters were ordered in anticipation of this eventuality).

The Venco engineers suspected a ground fault in the eddy current brake, and instructed the installer (Luminalt) to disconnect it and take insulation resistance readings. When the current brake was disconnected the error readings disappeared and the units started functioning properly. It was eventually established that the error reading was RISO. The disconnection of the integrated Venco current brake was deemed acceptable because the Power One units had the capacity to perform the braking function through programming of the power curve.

With the electrical error described above now solved, the Venco Units were fully operational by the end of May, 2012.
*(See the email chain ending June 11, 2012 "RE Venco Power One problem is RISO")*

Venco South Turbine Stops Rotating October 2012
In October of 2012 the Southern Venco unit was observed not rotating in moderate winds. Luminalt obtained lubrication specifications from Venco, but before the

maintenance visit was to occur the winds picked up and the unit began operating normally again.
*(See the email chain "Venco South Siezed October 1 2012")*

Both Venco Units Seize, March 2014
In March of 2014, both Venco units stopped rotating.
Luminalt was contracted for a maintenance visit at the site for all of the turbines, which was conducted on March 26, 2014. Lubricating grease was added to the Venco bearing assemblies and the units were cracked loose and rotated by hand. Although the units could be manually rotated, they would not rotate on their own in the wind.
Small stress cracks were observed in the blades at some locations where they attach to the struts.
*(See "Crissy Field Center Wind Turbine Maintenance Report" dated March 31, 2014)*

Subsequent visits and inspection of the Venco units revealed that the turbines were affected by significant interior corrosion, particularly at the brake magnets. The corrosion related expansion of the cast iron brake magnets inhibited the free rotation of the turbine heads.
Luminalt was instructed to develop a repair plan for the problem, and to contact Venco for assistance/warranty service.
*(See "Field Center Venco Twister 100 (sic) Wind Turbine Inspection Report" dated June 10, 2014)*

## 3. Commissioning: Tangarie Gale T2

The Tangarie Gale T2 was installed in March of 2012.
Despite what appeared to be a correct installation, the Tangarie turbine never turned freely in the wind and appeared to resist rotation. In higher winds, this resistance appeared to translate into the shaking of the entire turbine's tower.
Per the manufacturer and distributor's directions, various inverter curves were programmed without significant effect.
After more than a month, the operational Tangarie was incapable of consistently generating more than 50 Watts, even in 25 mph winds.
*(See email chain "Tangarie Inverter Curve and General Performance 05-01-2012")*

The performance described above persisted for the entire service life of the unit, despite repeated field adjustments made at the direction of the manufacturer.
In July, 2013, the Tangarie was inspected by Luminalt and showed "severe signs of failure and was removed from the tower for service or replacement".
*(See "Crissy Field Center Wind Turbine Report" dated July 5, 2013)*

# 4. Interconnection

The Wind turbines at the Crissy Field Center were inspected (along with the Center's photovoltaic system) and approved for interconnection with the PG&E grid in June of 2012.

(See "*Wind interconnection June 2012 Trust and PGE" dated 06/20/2012* )

(See "*FW: Final Permission to Parallel at Generating Facilty San Francisco, California*" dated 06/21/2012)

# ATTACHMENTS

RLM CONSULTING

# Crissy Field Windspire Turbine Report

## Visit date: September 11, 2012

**North Turbine**

Produced to date: 447 kWh
(From on-board data since March 5, 2012)
159 days, average daily production 2.8 kWh

Max Power[2]: 1700 W (ok)
Wire Length[3]: 235 ft (ok)
Wire Size[3]: 4 AWG (ok)

**South Turbine**

Produced to date[1]: 320 kWh
(From on-board data since April 23, 2012)
110 days, average daily production 2.9 kWh

Max Power[2]: 1300 W (changed to 1700 W)
Wire Length[3]: 100 ft (changed to 200 ft)
Wire Size[3]: 8 AWG (changed to 4 AWG)

On a per-day production basis, the data shows that the two turbines are running very close to one another.

Notes:

[1]Though the inverter on the South turbine reports the power produced to date as 368 kWh, the cumulative data graph shows that nearly 50 of those kWh were logged on the inverter prior to the consistent period over which data has accumulated, beginning on April 23, 2012. Therefore, for the purpose of calculating the average daily production, 48 kWh have been deducted from the current total reported as a best estimate of the power produced from April 23 through present.

[2]Max Power is the maximum wattage limit allowed to be produced through the inverter. A lower limit will result in higher rotor speeds, and with sufficient wind, increased frequency of the maximum rotor speed being reached and the brakes being applied. A higher limit will allow the production of electricity to resist higher rotor speeds, decreasing the frequency of the brakes being applied. However, the tradeoff is that heat generated in the inverter is proportional to the amount of electricity passing through the components; higher temperatures can lead to earlier electronic component failure. Since the average daily production on the South turbine is slightly *higher* than that of the North turbine, it suggests that the 1300 W limit on the South turbine is not having a significantly adverse effect on the power production.

[3]Wire Length and Wire Size are used to compute the line impedance between the grid disconnect location and the inverter. This impedance value is used to accurately comply with the UL1741 grid safety requirements and would not affect power production.

The graphs on the following pages are pulled from the on-board data stored in the inverter of each turbine.

To go beyond the conclusions presented on this and the following pages, additional data logging on an external computer (which captures far more parameters) is necessary for more detailed analysis.

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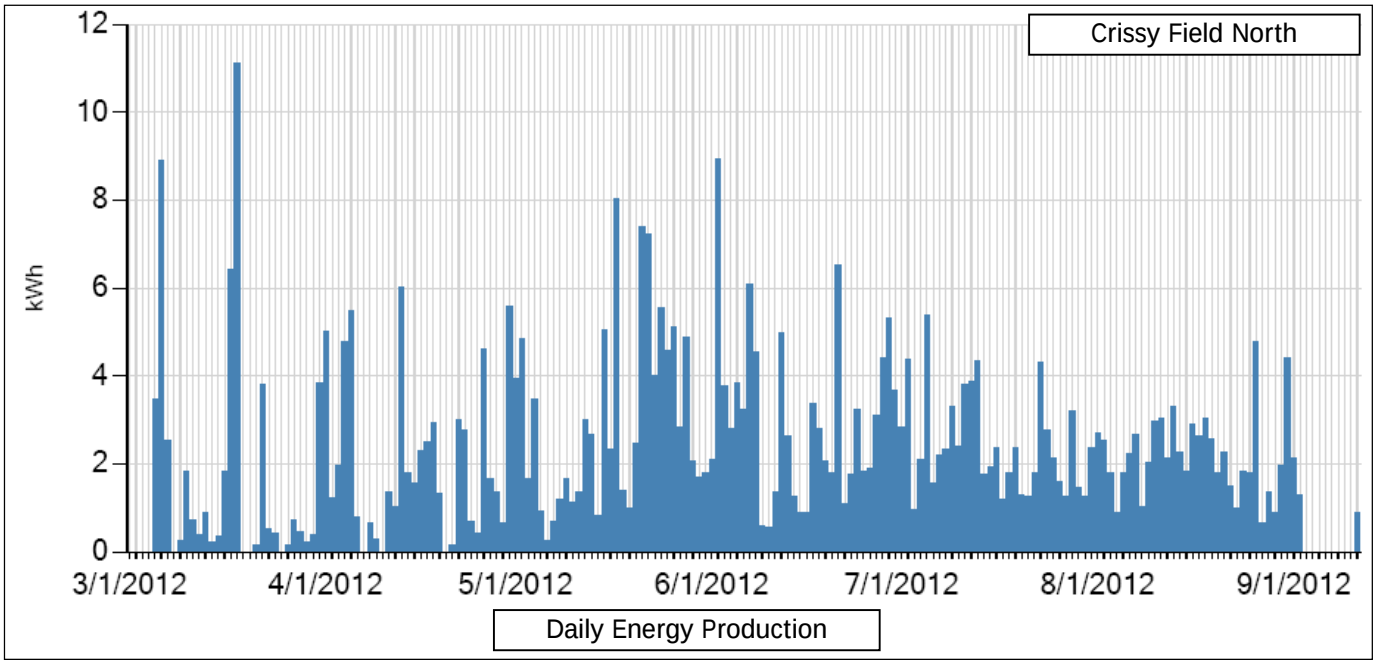


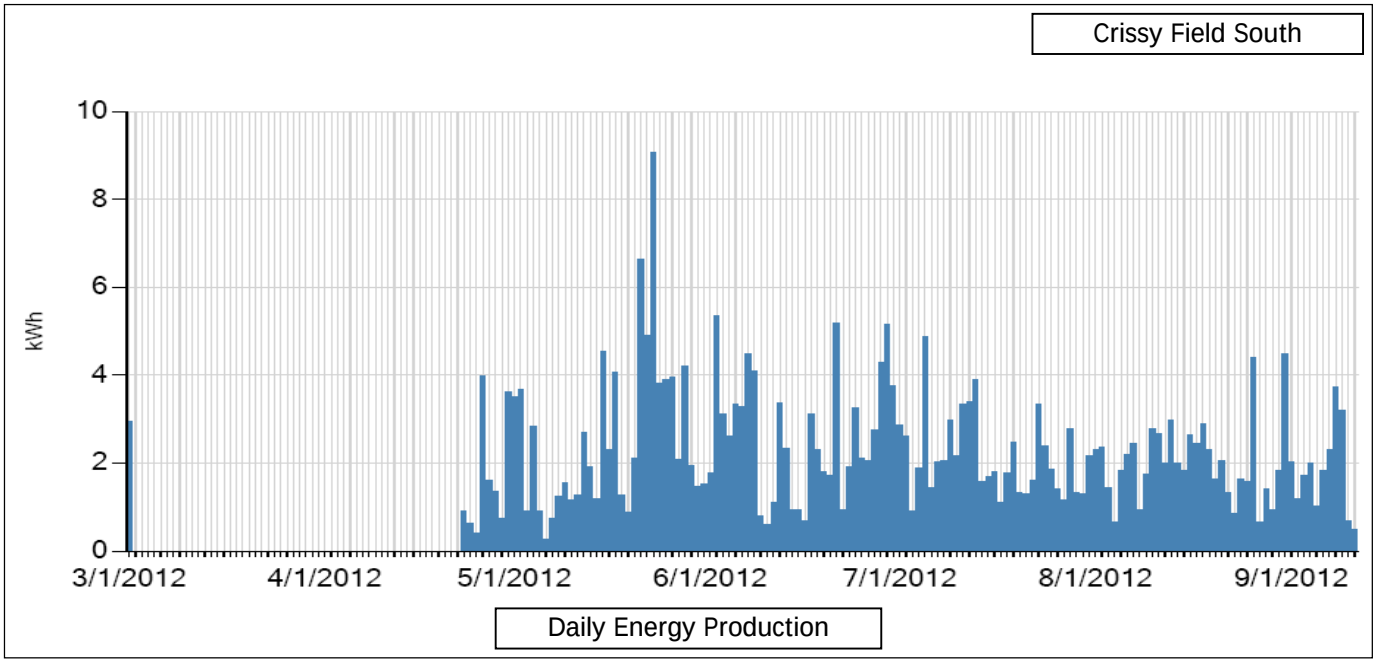


Trying to glean from these charts which turbine is producing more power is quite difficult. At a glance it would appear that the North turbine is producing more than the South turbine. However, this inference is contradictory to the data collected and presented on page 1, where in the North Therefore, the important inference to draw from comparing these graphs is that on a day-to-day basis, the two turbines seem to be operating consistently with one another.

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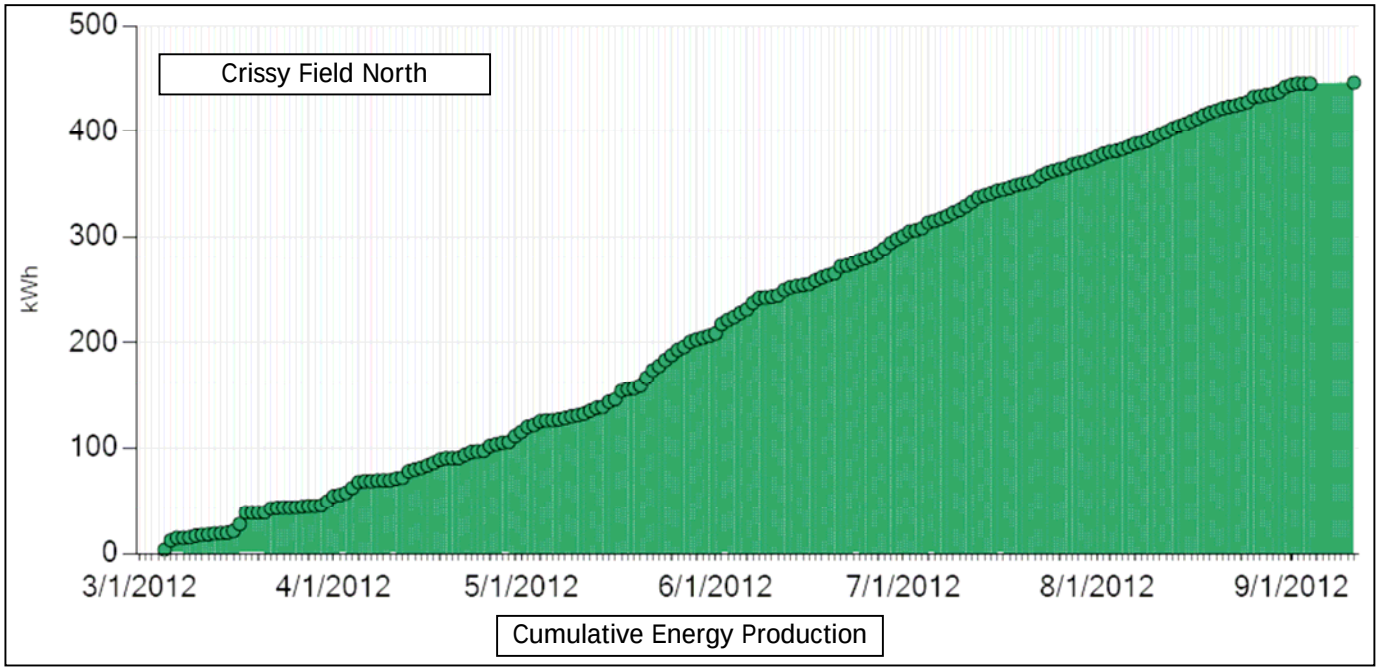


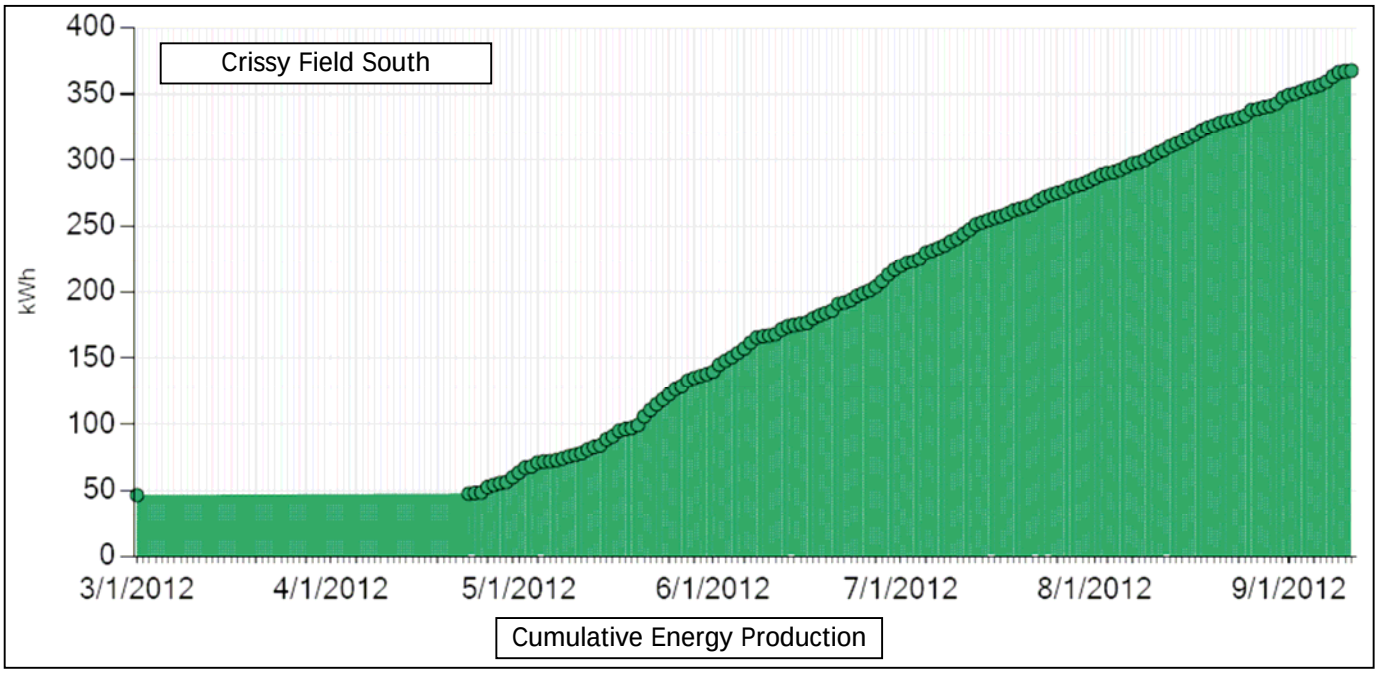


The steadily increasing slope of these two graphs suggests that each turbine is operating consistently as data is collected over time. A sharp change up or down in the slope would suggest that something significant has change, affecting the turbine performance.

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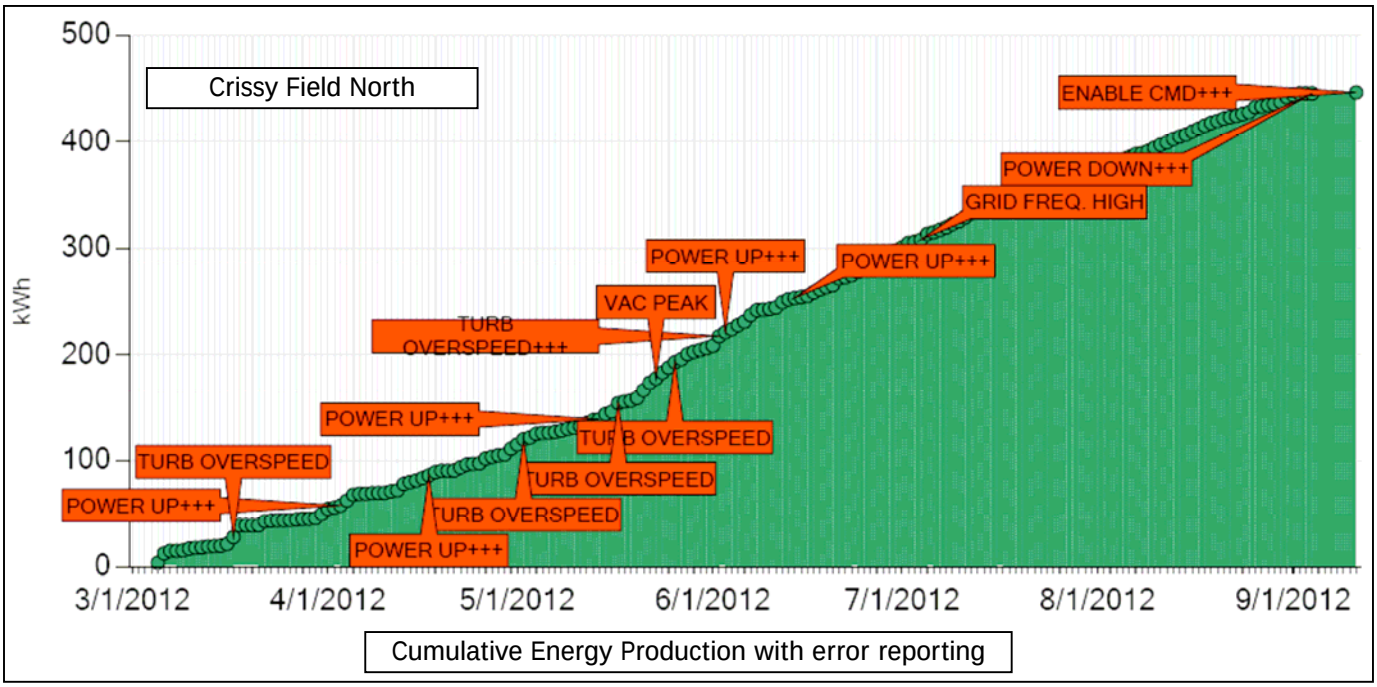


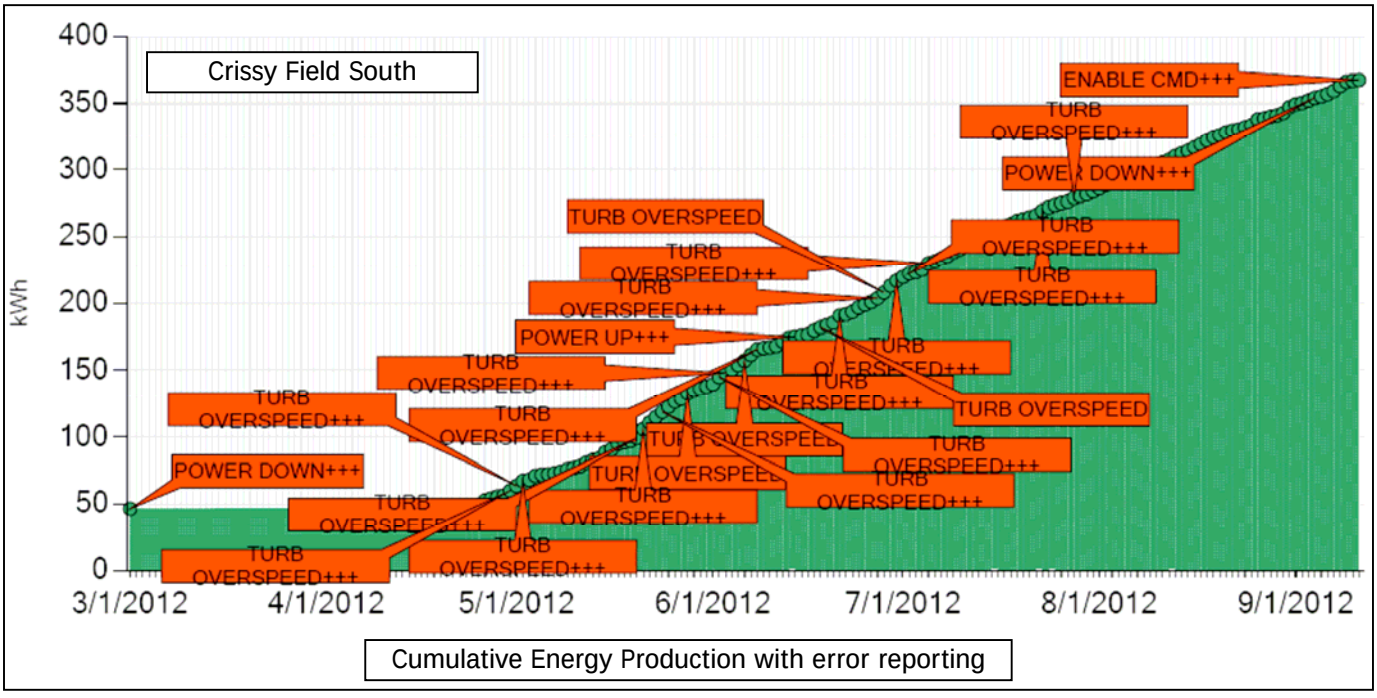


Significantly more “Turbine Overspeed” events have been recorded on the South turbine than on the North turbine. This is consistent with the explanation on page on of this report, and should be addressed by the Max Power limit on the South turbine now having been set to 1700 W, the same as the North turbine.

Again, because the average daily production is so close between the two turbines, this does not appear to have had a significant impact on energy production.

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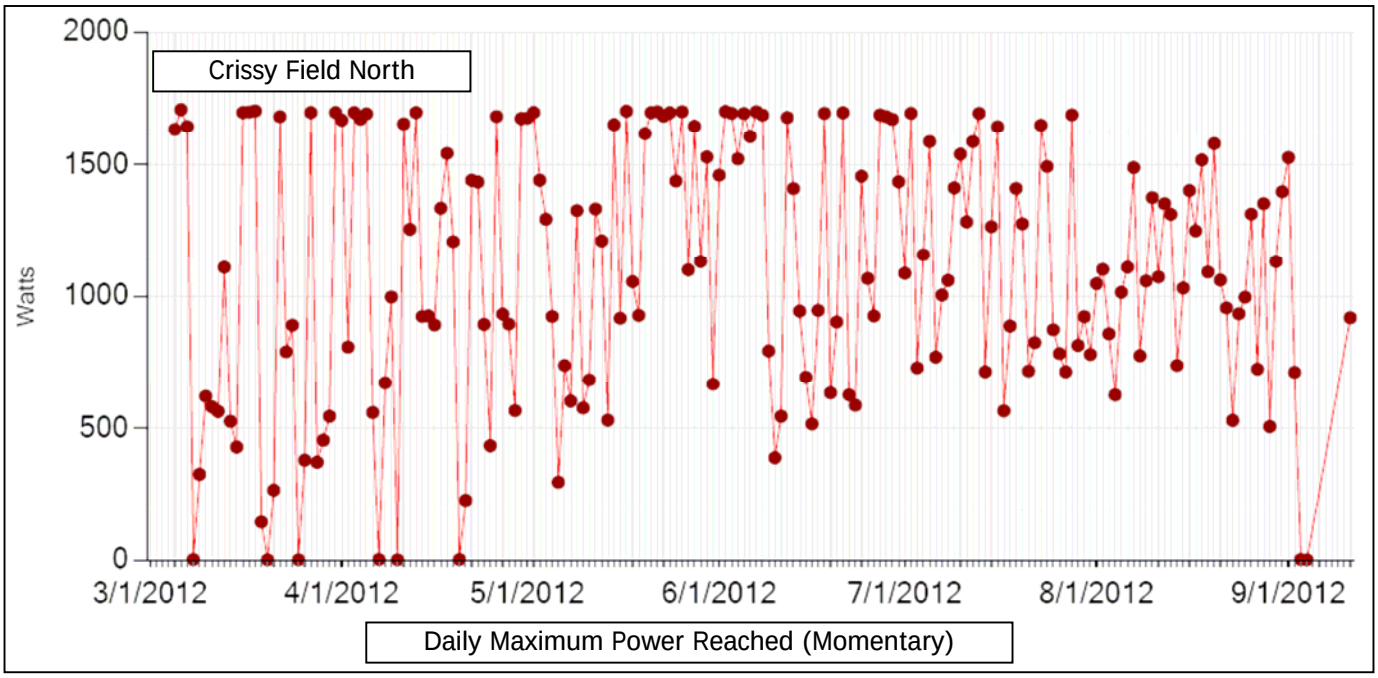


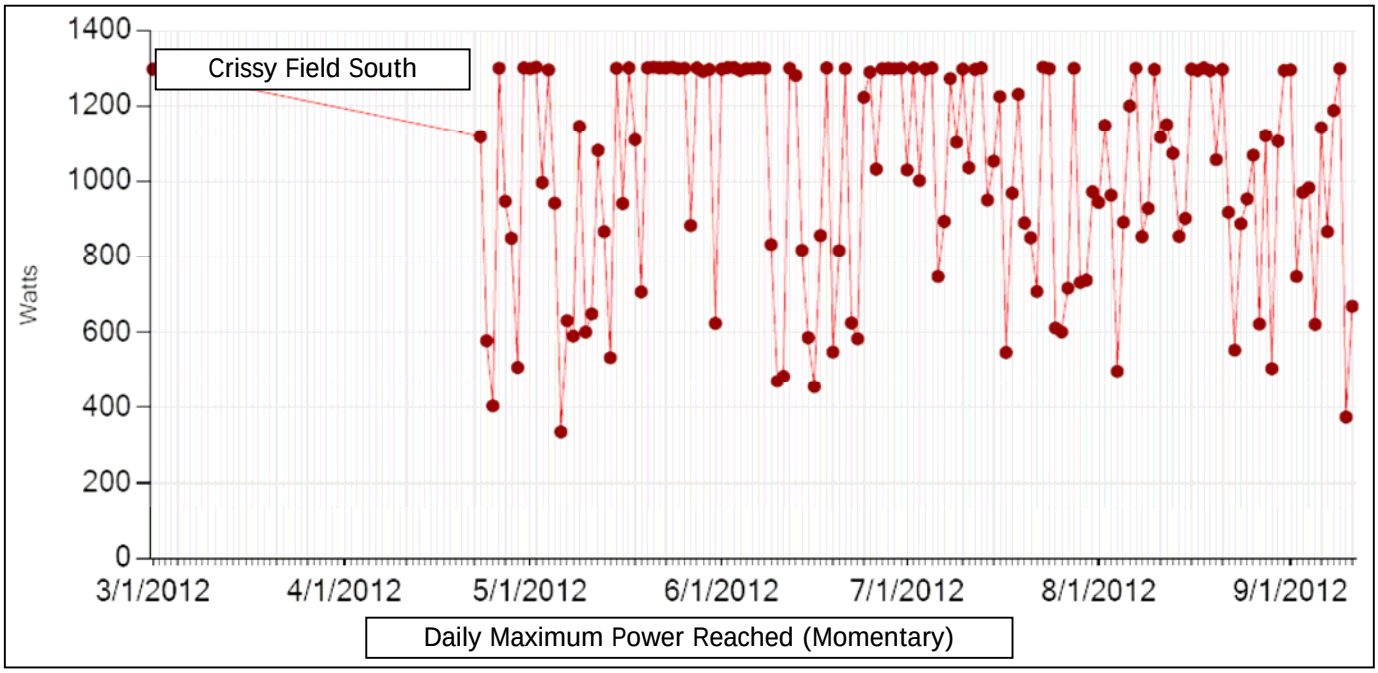


These graphs confirm that the Max Power limit as discussed on page 1 have been set to 1700 W North turbine and 1300 W on the South turbine for the entire period over which this data was collected.

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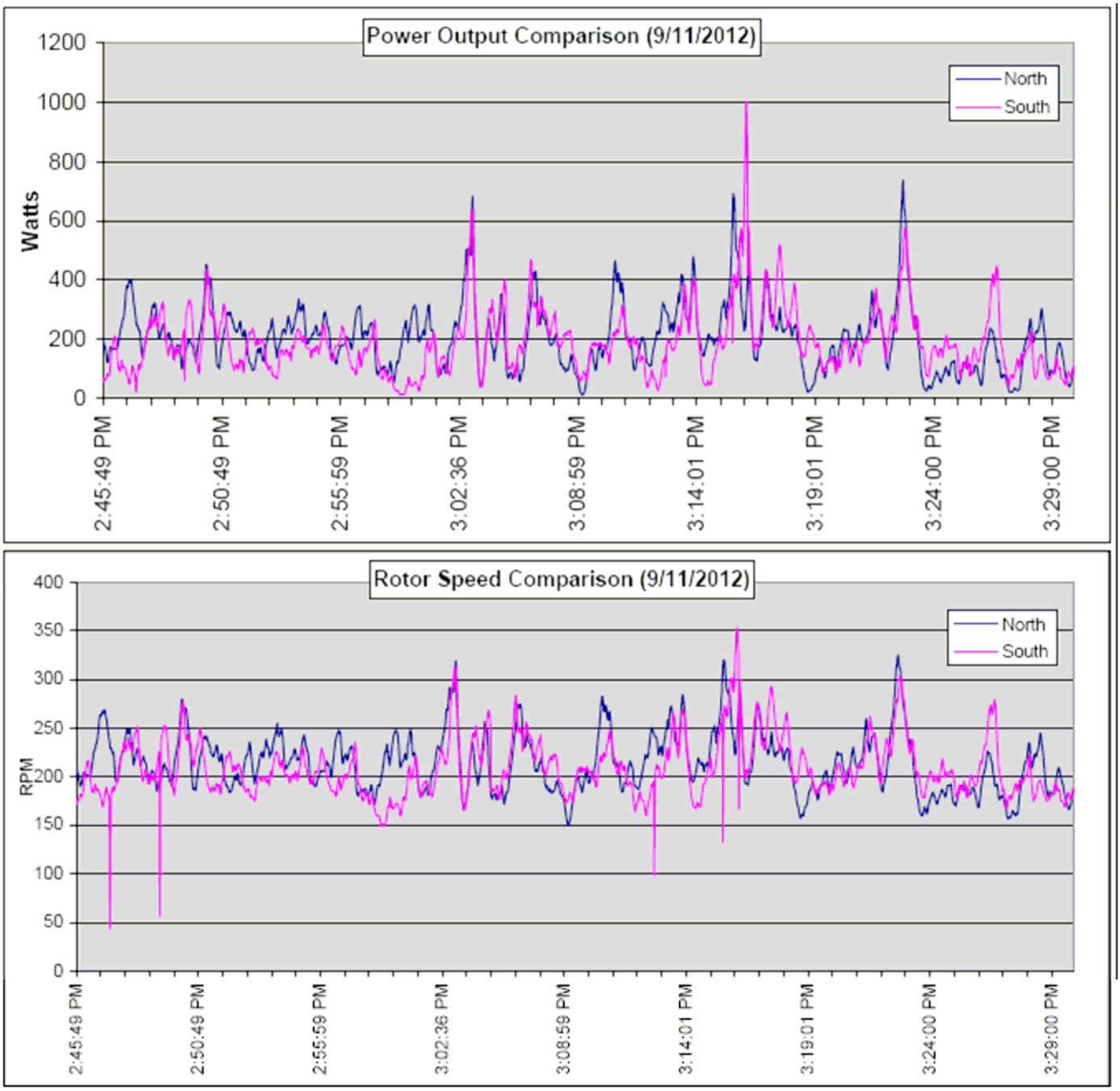


These graphs are a turbine versus turbine comparison of the data collected over a 45 minute period on September 11, 2012. The parameters displayed are power output in watts (top) and rotor speed in RPM (bottom). During this 45 minute period, the turbines were most often trending the same way and about the same measurements, but not exactly matching one another. At other moments the two turbines seem to be operating quite differently from one another.

This is normal operation and has been observed at other multi-unit installations. Slight aberrations in the wind flow have been observed to leave one turbine barely turning while another turbine as close as 15 feet away spins quite rapidly. This phenomenon can be observed by watching the way the wind blows the

plants growing on the nearby beach. The plant leaves are not always blown uniformly in the wind; rather, one plant will be pressed down by the wind while another a few yards away waves gently. While the two plants are both blowing in the "same" breeze, the observed movement of each plant will not exactly and constantly match another plant. The same is true for the turbines.

# Crissy Field Center Wind Turbine Maintenance Report

July 5, 2013

System includes two Windspire 1.2 kW, two Venco Twister-1000, and one Tangarie GALE T2 wind turbines.

| | |
|---|---|
| Inspection date: | 7/1/13 |
| Time readings taken: | 9:00 am – 3:30 pm |
| Name(s): | August Goers and Noel Cotter |
| Weather conditions: | Sunny with some fog, mid 60s °F with winds approximately 10 mph |

**2 Windspires**

General notes:

Both Windspire units are running well. We stopped and started the units and they seemed to start quickly in the wind and do not have a significant wobble once spinning. There is some rust present on both units – mostly in scratches around the painted surface and also on some of the galvanized hardware. We sprayed the rusty areas with cold galvanizing compound.

The Northern unit (closest to the Bay) has an audible hum when spinning which sounds like it is originating from the upper bearing/inverter location.

Refer to Figures 1 through 5 for related photos.

Recommendations:

The rust is likely to become worse over time. The CFC may opt to sand and paint the rusty areas if desired. Future maintenance should be scheduled to continually apply cold galvanizing compound or replace rusty fasteners.

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:

Check all hardware for proper fastening torque, top to bottom. Visually inspect for any damage. Check online monitoring for proper production. Check disconnect switches for proper operation. Visually inspect electrical connections.

Figure 1. Northern Windspire. Rust is occurring at bolted flange connections on the rotor. Cold galvanizing compound was applied.

Figure 2. Northern Windspire. Some galvanized bolts were starting to rust on rotor flange connections. Cold galvanizing compound was applied.

Figure 3. Northern Windspire. Rust present on inverter housing. Some cold galvanizing compound was applied but the rust will likely become worse.

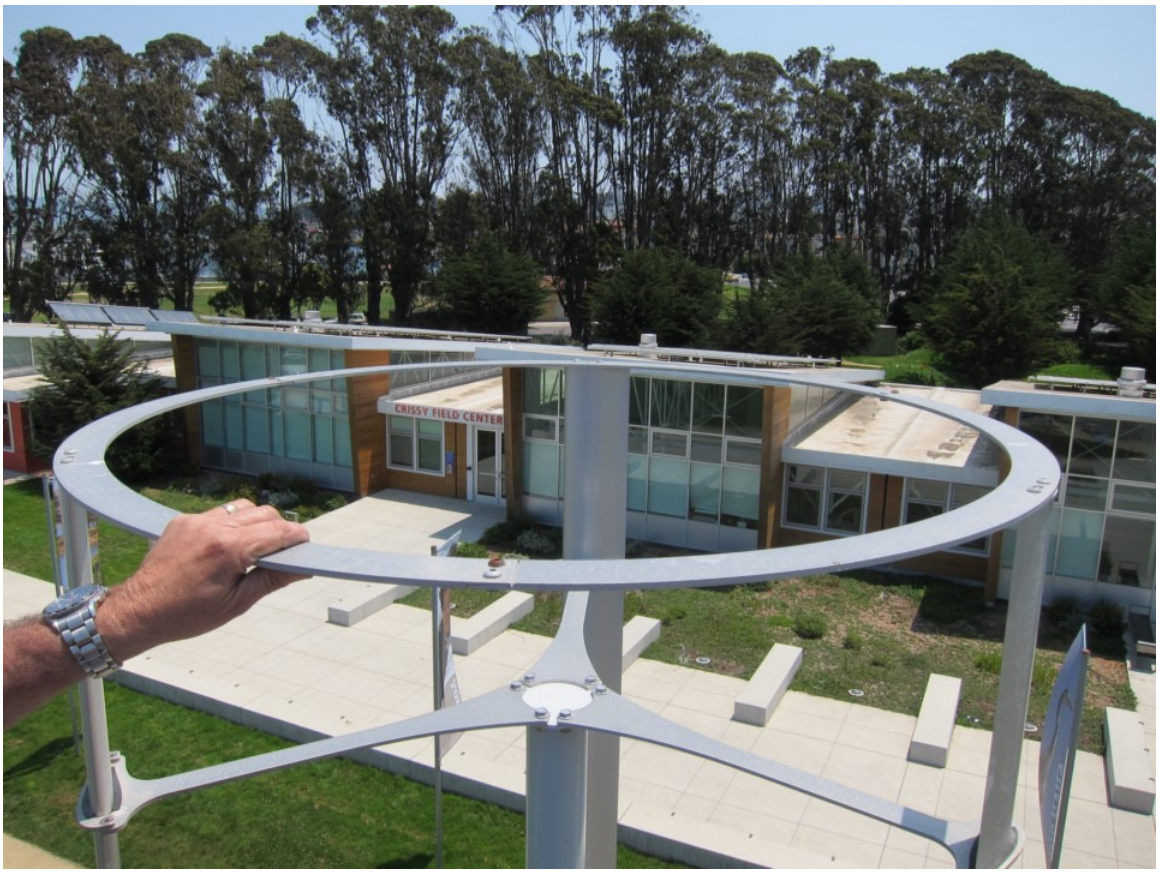


Figure 4. Southern Windspire. Rotor disc hardware rust. Cold galvanizing compound applied.

Figure 5. Southern Windspire. Sock found and removed.

**Tangarie**

General notes:

The Tangarie unit is showing severe signs of failure and was removed from the tower for service or replacement.

The aluminum blades are severely cracked at the strut locations. Two blade areas have completely severed from the struts. Refer to Figures 6 – 10.

Rust is present on several areas of the generator housing. Refer to Figures 11 – 12.

The generator unit has three windings. The voltage between these windings is inconsistent and voltage between winding 1-2 is higher than voltage between 1-2 and 2-3. Voltage readings with 10 mph wind:

L1-L2: 40 V
L1-L3: 20 V
L2-L3: 20 V
All three lines to ground measured approximately 75 V

The reason for the failure is unknown but is likely due to inherent design flaws.

Recommendations:

This unit needs to be completely be replaced. Luminalt does not recommend replacing it with another of the same design unless the manufacturer can prove that the design flaws have been repaired. The cracking in the blades could result in catastrophic failure where the blades come off possibly causing injury or death.

Inspections performed:

Visual inspection and removal of unit from tower. Capped electrical connections at top of tower for future use.

Figure 6. Tangarie. Lower blade crack.

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CSLB 845219

Figure 7. Tangarie. Upper portion of blade cracked and severed from strut.

Figure 8. Tangarie. Lower blade crack.

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CSLB 845219

Figure 9. Tangarie. Blade crack.

Figure 10. Tangarie. Blade crack.

Figure 11. Tangarie. Shaft bolt rust.

Figure 12. Generator housing rust.

**2 Vencos**

| | |
|---|---|
| General notes: | Both Venco units are running well although their power production is modest. Physically, these units appear in the best shape compared to the other two models. There is no rust present on the Venco units. A kite was found and removed from the Nothern unit and a kite string was found and removed from the Southern unit.<br><br>We greased the upper and lower bearings on both units which seemed to free their rotational resistance a bit.<br><br>Lifetime inverter production for the North Venco is 176 kWh and the South Venco is 148 kWh.<br><br>Refer to Figures 13 – 16. |
| Recommendations: | Continue weekly visual operation both at turbine (assure that rotation looks smooth) and at inverters behind Beach Hut Cafe (check for production). Continue to monitor that units start spinning in moderate wind.<br><br>Continue monthly foundation bolt torque checks. |
| Inspections performed: | Check all hardware for proper fastening torque, top to bottom. Visually inspect for any damage. Check inverter for proper production. Check disconnect switches for proper operation. Visually inspect electrical connections. |

Figure 13. Northern Venco. Tower flange connection in good condition.

Figure 14. Southern Venco. Alternator housing and struts in good condition.

Figure 15. Northern Venco. Blades and strut connection in good condition.


Figure 16. Southern Venco. Alternator housing and vibration dampers in good condition.

Luminalt
Solar Energy Solutions

# Field Center Venco Twister 100 Wind Turbine Inspection Report

June 10, 2014

Two Venco Twister-1000

| | |
|---|---|
| Inspection date: | 5/26/14-5/29/14 |
| Name(s): | Noel Cotter and Alan Coughlan |
| Weather conditions: | Sunny with some fog, mid 60s °F with winds approximately 10 mph |

**2 Vencos**

General notes:

Both Venco units were not spinning, even in significant wind. Both units were seized and required a reasonable amount of force to "crack" the units loose. The bearings in both units are in good condition and do not need replacement at this time. We ran electrical tests to assure that the electric brakes were not engaged. Further inspection revealed that the components of the braking mechanism are beginning to fail. The brake magnets seem to be made from cast-iron which has a metal plating. The plating is blistering on the magnets and is beginning to dislodge and restrict the movement of the turbine by wedging between the magnets and the brake disc rotor. Refer to Figure 1.

Figure 2 shows an example of plating that has detached.

It also appears that the plastic coating on the disc is separating, causing the disc to swell. See Figure 3.

Thorough cleaning between the disc and the magnets allowed the turbines to spin, however this is only a temporary fix. As the magnets continue to disintegrate, more debris will build up between the magnets and disc causing enough resistance which we believe will ultimately prevent the turbines from turning.

There are stress cracks on one of the blades on the South turbine. Refer to Figure 4.

There is water inside the blades on the South turbine. The weep holes on the bottom of the blade are clear and without blockage. Refer to Figure 5.

Recommendations:

Our initial recommendation is to request the manufacturer replace the units. If that is not an option, our recommendation would be to remove the units, open them and remove the plating, sand the magnets and recoat them with an epoxy-like coating.

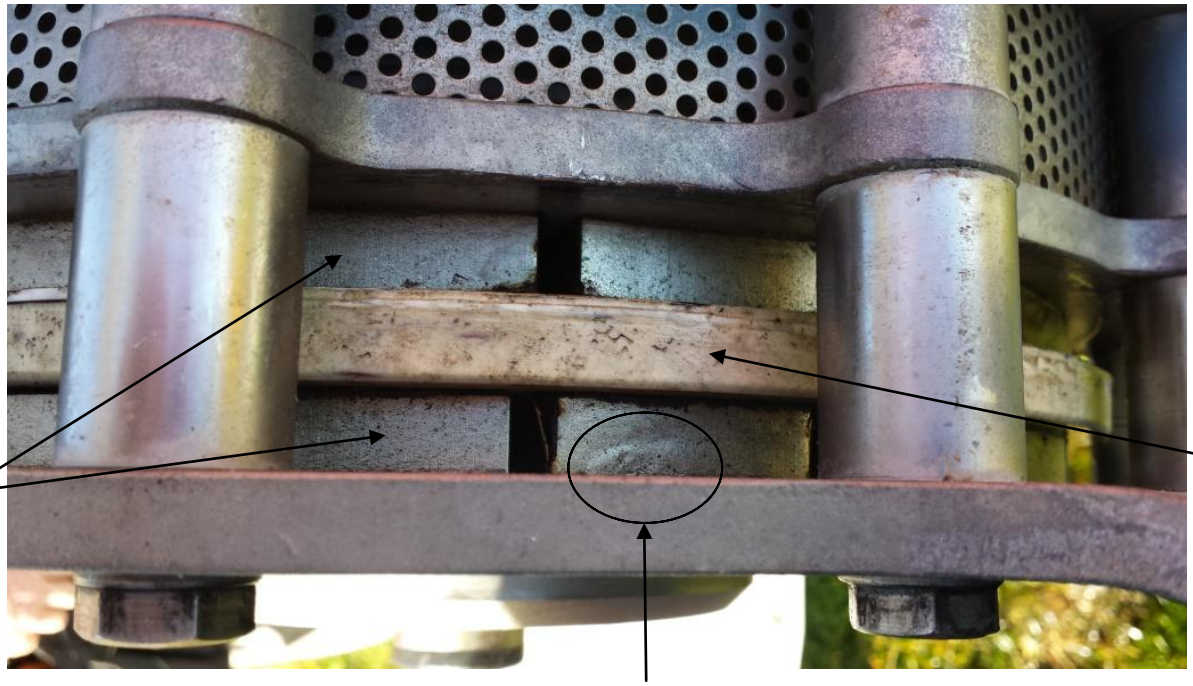


Figure 1: Plating Blistering on the Magnet

Figure 2: An example of the plating that has detached from the magnet

Figure 3: The plastic coating on the disc is becoming dislodged

Figure 4: Stress cracks on one of the blades of the South turbine

Figure 5: Water is lodged inside the blades on the South turbine even though weep holes on the bottom of the blade are clear.

## Tom Odgers

**From:** John Mattice <john@emsystems.net>
**Sent:** Sunday, February 12, 2012 7:30 PM
**To:** 'Robert Mosebar'
**Cc:** Tom Odgers; 'August Goers'
**Subject:** FW: Wobbling Windspire - Northern Unit

Please let me know asap the expedited schedule for delivery of the replacement shaft.

Thanks,

ems
John H. Mattice
Principal
Ph (916) 216-6742
Fax (916) 984-6392
john@emsystems.net

-----Original Message-----
From: Tom Odgers [mailto:TOdgers@ParksConservancy.org]
Sent: Sunday, February 12, 2012 6:32 PM
To: John Mattice
Cc: August Goers
Subject: Re: Wobbling Windspire - Northern Unit

Hello John and August.
First of all, thanks for the quick response on Friday evening and again on Saturday morning.
Now that it has been established that the turbine in question has a bent shaft, please coordinate with Windspire to arrange for the delivery of a replacement shaft as soon as possible. Let me know if there is a means to expedite the delivery of the required parts as well.
I will need to communicate this info to the Center staff and HNEI (the
funder) before the event this Wednesday.
Please give the above the immediate attention it requires - we will all benefit from this project's success.
Thanks,
Tom

Sent from my iPad

On Feb 10, 2012, at 5:31 PM, "John Mattice" <john@emsystems.net> wrote:

> As we discussed, August will secure the turban to the North this
> evening and we will be at the site at 9:00 AM tomorrow morning to
> lower the unit and determine the cause of the wobble.
>
> ems
> John H. Mattice
> Principal
> Ph (916) 216-6742
> Fax (916) 984-6392

> john@emsystems.net
>
> -----Original Message-----
> From: Tom Odgers [mailto:TOdgers@ParksConservancy.org]
> Sent: Friday, February 10, 2012 3:49 PM
> To: August Goers
> Cc: john@emsystems.net
> Subject: Re: Wobbling Windspire - Norther Unit
>
> Thanks for following up with this, August.
>
> John - we are very excited about the Windspire installation. They
> look great and we'll be proud to show them off next Wednesday, when
> Park and government representatives will be attending a press event
> and ribbon cutting for the project.
> I am very concerned, however, about the extent to which the units (the
> Northern one in particular) wobble in relatively low wind (5 to 7
> mph). Not only does the effect look bad, I am worried that the units
> might fail catastrophically in higher winds. Keep in mind that this
> is a heavily visited site, and that large groups of children visit on
> a
daily basis.
> Please send a representative as soon as possible. Luminalt is on site
> tomorrow, so I would request in the strongest terms that Windspire
> join us on site then.
> Please let me know what to expect ASAP.
> Thanks - Looking forward to a successful project for all of us.
> Tom
>
> Sent from my iPad
>
> On Feb 10, 2012, at 3:25 PM, "August Goers"
> <august@luminalt.com<mailto:august@luminalt.com>> wrote:
>
> John,
>
> I just got off the phone with the owner and CFC and he's been watching
> the wobble on the Northern-most Windspire unit and is very concerned.
> I agree with him that it is alarming.
>
> He would like a representative to come out to the site and verify that
> everything is ok today or tomorrow. Can you please let me know how
> your conversation with the Windspire rep is going and get back to me
> ASAP? We just want to make sure that everything is safe since this is
> a public location.
>
> Thanks for your quick attention.
>
> Thanks,
>
> August
>

>
> August Goers
>
> Luminalt Energy Corporation
> 1320 Potrero Avenue
> San Francisco, CA 94110
> m: 415.559.1525
> o: 415.641.4000
> <mailto:august@luminalt.com>august@luminalt.com<mailto:august@luminalt
> .com>
>
>
>
>

## Tom Odgers

**From:** John Mattice <john@emsystems.net>
**Sent:** Wednesday, February 22, 2012 6:44 PM
**To:** 'August Goers'
**Cc:** Tom Odgers
**Subject:** RE: Replacement shaft update

Do we want to postpone our meeting for next week until the second turbine is operational?

ems
**John H. Mattice**
Principal
Ph (916) 216-6742
Fax (916) 984-6392
john@emsystems.net

---

**From:** August Goers [mailto:august@luminalt.com]
**Sent:** Wednesday, February 22, 2012 4:10 PM
**To:** Robert Mosebar; Tom Odgers; James Horn
**Cc:** john@emsystems.net; Bailey Smith
**Subject:** RE: Replacement shaft update

Robert,

Thanks for the update and I can appreciate the hassle this is causing. Let me know if there is anything I can do and we look forward to hearing your update about the replacement base parts.

Best,

August

August Goers

Luminalt Energy Corporation
1320 Potrero Avenue
San Francisco, CA 94110
m: 415.559.1525
o: 415.641.4000
august@luminalt.com

---

**From:** Robert Mosebar [mailto:RMosebar@windspireenergy.com]
**Sent:** Wednesday, February 22, 2012 1:55 PM
**To:** Tom Odgers; James Horn; august@luminalt.com
**Cc:** john@emsystems.net; bailey@luminalt.com
**Subject:** RE: Replacement shaft update

I am afraid it is not good news. We replaced the top shaft today, and once raised the turbine exhibited the same wobble as before. The problem must be in the turbine base itself. I have notified the factory to arrange for a full new turbine

base. There are no other parts, so this has to solve the problem.

I'll advise when I have shipping info.
-Robert

---

**From:** Tom Odgers
**Sent:** 2/21/2012 6:01 PM
**To:** James Horn; Robert Mosebar; august@luminalt.com
**Cc:** john@emsystems.net; bailey@luminalt.com; Charity Maybury; Tung Chee
**Subject:** RE: Replacement shaft update

Thanks all for your efforts on this.
Looking forward to seeing both units spinning.
Have a good evening,
Tom

Tom Odgers
Project Manager
Golden Gate National Parks Conservancy
Building 37, Fort Mason, San Francisco CA 94123
Tel: (415) 561-3527
Cell: (415) 215-7821

---

**From:** James Horn [mailto:JHorn@windspireenergy.com]
**Sent:** Tuesday, February 21, 2012 5:57 PM
**To:** Robert Mosebar; august@luminalt.com; Tom Odgers
**Cc:** john@emsystems.net; bailey@luminalt.com
**Subject:** Re: Replacement shaft update

Just so everyone is aware, Robert spent the entire day at Crissy Field today waiting for the delivery.

Thank you, Robert.

James

---

**From**: Robert Mosebar
**Sent**: Tuesday, February 21, 2012 05:39 PM
**To**: August Goers <august@luminalt.com>; Tom Odgers <TOdgers@parksconservancy.org>
**Cc**: John Mattice <john@emsystems.net>; Bailey Smith <bailey@luminalt.com>
**Subject**: RE: Replacement shaft update

The shaft just arrived and is secured inside the fence. I will work with John for scheduling the installation.

-R

---

**From:** Robert Mosebar
**Sent:** 2/21/2012 10:56 AM
**To:** August Goers; Tom Odgers
**Cc:** John Mattice; Bailey Smith
**Subject:** RE: Replacement shaft update

Hi August-

I got word from the shipping company that the freight is "very long and didn't fit on the truck for delivery today".

Unfortunately, I am here at Crissy Field sitting in the Beach Hut waiting for the delivery. I've been on the phone with them trying to get it delivered today, because I drove 2 hours to get here. Assuming I can get them to deliver, I can get it unloaded on my own, no worries.

I saw your truck come and go but I was on the phone with the shipper and didn't catch you.

-R

---

**From:** August Goers
**Sent:** 2/20/2012 1:33 PM
**To:** Robert Mosebar; Tom Odgers
**Cc:** John Mattice; Bailey Smith
**Subject:** RE: Replacement shaft update

Robert,

Thanks for the update. Alan from Luminalt will be on site to help unload. I can call out some more help if necessary - can you notify me as soon as you have the one hour window?

John, do you want to get your crew down on Wednesday 2/22 to fix up the turbine?

Best,

August

August Goers

Luminalt Energy Corporation
1320 Potrero Avenue
San Francisco, CA 94110
m: 415.559.1525
o: 415.641.4000
august@luminalt.com

---

**From:** Robert Mosebar [mailto:RMosebar@windspireenergy.com]
**Sent:** Monday, February 20, 2012 1:22 PM
**To:** Tom Odgers; August Goers
**Cc:** John Mattice
**Subject:** RE: Replacement shaft update

Looks like the replacement shaft has arrived at the terminal in SF and should go out for delivery tomorrow. Unfortunately, large freight is not very predictable down to delivery windows. They said they would call me an hour before delivery, but since I am over an hour away, I intend to come in the morning and wait around. Tom, by any chance is there a free desk in the Crissy Field Center there where I could connect to the internet and work while I wait?

-R

---

**From:** Tom Odgers [TOdgers@ParksConservancy.org]
**Sent:** Tuesday, February 14, 2012 4:00 PM
**To:** August Goers

**Cc:** John Mattice; Robert Mosebar
**Subject:** RE: Replacement shaft update

Thanks All
This information is timely.
Let us know when a tracking number is issued.

Tom Odgers
Project Manager
Golden Gate National Parks Conservancy
Building 37, Fort Mason, San Francisco CA 94123
Tel: (415) 561-3527
Cell: (415) 215-7821

---

**From:** August Goers [mailto:august@luminalt.com]
**Sent:** Tuesday, February 14, 2012 1:10 PM
**To:** Tom Odgers
**Cc:** John Mattice; Robert Mosebar
**Subject:** Replacement shaft update

Tom,

I just spoke with John Mattice. The replacement shaft shipped today so it should arrive by early next week - we'll forward tracking information as soon as we have it. John's plan is to come down with his crew after the replacement shows up and get the unit fixed probably early to mid next week.

FYI, August

---

**From:** Robert Mosebar [mailto:RMosebar@windspireenergy.com]
**Sent:** Tuesday, February 14, 2012 8:31 AM
**To:** Tom Odgers
**Cc:** August Goers; John Mattice
**Subject:** RE: Wobbling Windspire - Northern Unit

Ok Tom, sounds good. I am hoping we can get paint cured, shaft packed, and picked up today. Transit time still puts us at next week delivery.

Can you confirm for me what address to use for the delivery? Do you want it to come to the Center, or one of the yards across the street? It can be unloaded without a forklift, though a forklift is best. I am hoping to be on site for the delivery, to make sure it isn't dropped off the truck and bent (again).

-R

---

**From:** Tom Odgers
**Sent:** 2/14/2012 6:52 AM
**To:** Robert Mosebar
**Cc:** August Goers; John Mattice
**Subject:** Re: Wobbling Windspire - Northern Unit

Thanks for the quick response here, Robert.
Please keep me apprised of any developments - I need to communicate these to the funder and Center staff. Do we have a rough ETA for the shaft?
With respect to the Windspire gin pole: Although it would make sense to ship this with the replacement top shaft, I will not be able to

secure approval from our controller quickly. The accounting department is going through it's annual audit and won't be available to sanction added costs on projects until they are done. Let's just get the replacement shaft out here and I'll work on the gin pole later this month.
Thanks again,
Tom

Sent from my iPad

On Feb 13, 2012, at 7:42 PM, "Robert Mosebar" <RMosebar@windspireenergy.com> wrote:

> Sorry, forgot the attachment. Realized it as soon as I hit send.
> -R
> _____
> From: Robert Mosebar
> Sent: Monday, February 13, 2012 7:38 PM
> To: 'Tom Odgers'
> Cc: 'August Goers'; John Mattice
> Subject: RE: Wobbling Windspire - Northern Unit
>
> Hi Tom-
>
> The top shaft is assembled and waiting for painting, hopefully that will be done tomorrow. I am also trying to get the factory to ship the top shaft in advance of me actually paying for it, as I am restricted to payment by snail mail, and we pre-pay our shipments.
>
> You mentioned you would be interested in purchasing a Gin Pole Kit. I would like to ship both the Gin Pole and the Replacement Shaft out at the same time. I have Gin Pole Kits packaged and ready to ship so that will not delay the top shaft shipment. If you wish to purchase the Gin Pole Kit please send a PO or just sign and send back the attached quote.
>
> Thanks,
> -Robert
>
> _____
> From: John Mattice [john@emsystems.net]
> Sent: Sunday, February 12, 2012 7:29 PM
> To: Robert Mosebar
> Cc: 'Tom Odgers'; 'August Goers'
> Subject: FW: Wobbling Windspire - Northern Unit
>
> Please let me know asap the expedited schedule for delivery of the
> replacement shaft.
>
> Thanks,
>
> ems
> John H. Mattice
> Principal
> Ph (916) 216-6742
> Fax (916) 984-6392
> john@emsystems.net
>
> -----Original Message-----
> From: Tom Odgers [mailto:TOdgers@ParksConservancy.org]
> Sent: Sunday, February 12, 2012 6:32 PM
> To: John Mattice
> Cc: August Goers
> Subject: Re: Wobbling Windspire - Northern Unit
>
> Hello John and August.
> First of all, thanks for the quick response on Friday evening and again on
> Saturday morning.
> Now that it has been established that the turbine in question has a bent

> shaft, please coordinate with Windspire to arrange for the delivery of a
> replacement shaft as soon as possible.  Let me know if there is a means to
> expedite the delivery of the required parts as well.
> I will need to communicate this info to the Center staff and HNEI (the
> funder) before the event this Wednesday.
> Please give the above the immediate attention it requires - we will all
> benefit from this project's success.
> Thanks,
> Tom
>
> Sent from my iPad
>
> On Feb 10, 2012, at 5:31 PM, "John Mattice" <john@emsystems.net> wrote:
>
>> As we discussed, August will secure the turban to the North this
>> evening and we will be at the site at 9:00 AM tomorrow morning to
>> lower the unit and determine the cause of the wobble.
>>
>> ems
>> John H. Mattice
>> Principal
>> Ph  (916) 216-6742
>> Fax (916) 984-6392
>> john@emsystems.net
>>
>> -----Original Message-----
>> From: Tom Odgers [mailto:TOdgers@ParksConservancy.org]
>> Sent: Friday, February 10, 2012 3:49 PM
>> To: August Goers
>> Cc: john@emsystems.net
>> Subject: Re: Wobbling Windspire - Norther Unit
>>
>> Thanks for following up with this, August.
>>
>> John - we are very excited about the Windspire installation.  They
>> look great and we'll be proud to show them off next Wednesday, when
>> Park and government representatives will be attending a press event
>> and ribbon cutting for the project.
>> I am very concerned, however, about the extent to which the units (the
>> Northern one in particular) wobble in relatively low wind (5 to 7
>> mph).  Not only does the effect look bad, I am worried that the units
>> might fail catastrophically in higher winds.  Keep in mind that this
>> is a heavily visited site, and that large groups of children visit on a
> daily basis.
>> Please send a representative as soon as possible.  Luminalt is on site
>> tomorrow, so I would request in the strongest terms that Windspire
>> join us on site then.
>> Please let me know what to expect ASAP.
>> Thanks - Looking forward to a successful project for all of us.
>> Tom
>>
>> Sent from my iPad
>>
>> On Feb 10, 2012, at 3:25 PM, "August Goers"
>> <august@luminalt.com<mailto:august@luminalt.com>> wrote:
>>
>> John,
>>
>> I just got off the phone with the owner and CFC and he's been watching
>> the wobble on the Northern-most Windspire unit and is very concerned.
>> I agree with him that it is alarming.

>>
>> He would like a representative to come out to the site and verify that
>> everything is ok today or tomorrow. Can you please let me know how
>> your conversation with the Windspire rep is going and get back to me
>> ASAP? We just want to make sure that everything is safe since this is
>> a public location.
>>
>> Thanks for your quick attention.
>>
>> Thanks,
>>
>> August
>>
>>
>> August Goers
>>
>> Luminalt Energy Corporation
>> 1320 Potrero Avenue
>> San Francisco, CA 94110
>> m: 415.559.1525
>> o: 415.641.4000
>> <mailto:august@luminalt.com>august@luminalt.com<mailto:august@luminalt
>> .com>
>>
>>
>>
>>
> <5021 - Golden Gate National Parks Conservancy - Gin Pole Kit.pdf>

## Tom Odgers

**From:** August Goers <august@luminalt.com>
**Sent:** Monday, September 10, 2012 10:35 AM
**To:** Tom Odgers
**Cc:** john@emsystems.net
**Subject:** FW: CFC North Windspire

**Importance:** High

Tom,

I just spoke with John Mattice. He's hoping to show up around 9:00 tomorrow 9/11 depending on traffic and is also planning on spending the better part of the day out there. He should also be available to meet with you after lunch time.

I'll be there at 10:00 and can stick around until about 1:00 pm.

Best,

August

August Goers

Luminalt Energy Corporation
1320 Potrero Avenue
San Francisco, CA 94110
m: 415.559.1525
o: 415.641.4000
august@luminalt.com

-----Original Message-----
From: August Goers [mailto:august@luminalt.com]
Sent: Wednesday, September 05, 2012 3:15 PM
To: 'john@emsystems.net'; 'Robert Mosebar'
Subject: FW: CFC North Windspire
Importance: High

Hi John and Robert,

Please see email below from Tom Odgers of the Crissy Field Center. There was a serious issue with the Northern Windspire unit earlier this week which we need to address. We went to the site yesterday and have the unit strapped off so it no longer spins.

We have tightened the base bolts to the specified torques on this unit several times. John Mattice's team also did this during the installation.
I believe the issue stems from an ongoing wobble in the unit under low rpms that progressively got worse. When we went to the site yesterday we noticed that the joint above the inverter unit and below the blades seems to be lopsided. Tom is recommending replacing the entire unit since you've already replaced individual parts which didn't seem to fix the problem.

Thanks for your attention on this and feel free to give me a call on my cell phone at 415.559.1525 if you'd like to discuss details and ideas.

Best Regards,

August

August Goers

Luminalt Energy Corporation
1320 Potrero Avenue
San Francisco, CA 94110
m: 415.559.1525
o: 415.641.4000
august@luminalt.com

-----Original Message-----
From: Tom Odgers [mailto:TOdgers@ParksConservancy.org]
Sent: Wednesday, September 05, 2012 2:50 PM
To: August Goers
Subject: CFC North Windspire

Hello August,
Per my email below:
-On Tuesday, the head of Park Maintenance informed me that Park Police and the Fire Department shut down the parking lot at the Crissy Field Center due to the dangerous performance of the North Windspire unit. They observed that the unit was wobbling more dramatically than ever and were receiving a repeated calls from the public alerting them to an emergency.

-The head of Park Service Maintenance accompanied the Fire Department and they observed that the anchor bolts had worked loose and the base plate of the unit was lifting off of the footing. They braked the unit using the disconnect switch and tightened the bolts back down.
-The same group said they observed stress cracks in the welds at the base plate. Park Service staff showed Noel and I the location of these welds when we visited yesterday. I am personally not able to verify whether any cracks are present and would like Windspire and Luminalt to inspect and verify the integrity of the welds. (I can contract with a third party inspection agency if necessary).
-It was also observed that the bolted collars that connect the lower shaft to the blade bearing shaft now show what appears to be an uneven gap between their mated surfaces. This needs to be inspected as well.
-On a possibly related note: This unit has never been seen, to my knowledge, to have employed its automatic brake, which should deploy when the unit exceeds 800 or so rpm.

Please contact Windspire ASAP to inform them of this latest development.
We will need to review this situation as a group and decide on a responsible path forward.
Since at this point Windspire has replaced the upper and lower shafts on this unit, as well as other components I may not be aware of, I would suggest that the wise course here would be to replace the entire unit.

We have been really pleased with the Windspire units on this project - When they are working properly. They produce the most power of the three types arrayed at the site and are, in some people's opinions, the most visually interesting.

Since the turbines are located on a site with tens of thousands of visitors every year, however, they must operate completely safely.

Thanks for your help with this matter.

Sincerely,

Tom Odgers
Project Manager
Golden Gate National Parks Conservancy
Building 37, Fort Mason, San Francisco CA 94123
Tel: (415) 561-3527
Cell: (415) 215-7821

-----Original Message-----
From: Tom Odgers
Sent: Tuesday, September 04, 2012 8:16 PM
To: Charity Maybury; Christy Rocca; Greg Babor; Laura_Castellini@nps.gov; Francis Taroc; Josh Gannis
Subject: CFC North Windspire

Hello All,
I was contacted today by Jeff Obireck, NPS, who informed me that concerns were voiced over the north Windspire unit's wobbling this weekend. I met on site with Jeff and Noel from Luminalt this afternoon - the unit is secured and we will investigate this matter further later this week.
Let me know if you have any questions.
Thanks,
Tom

Tom Odgers
Project Manager
Golden Gate National Parks Conservancy
Building 37, Fort Mason, San Francisco CA 94123
Tel: (415) 561-3527
Cell: (415) 215-7821

Sent from my iPad

## Tom Odgers

**From:** August Goers <august@luminalt.com>
**Sent:** Wednesday, December 31, 2014 5:50 PM
**To:** Tom Odgers; Chris Ramos; Greg Babor
**Cc:** Noel Cotter; Jeanine Cotter
**Subject:** Crissy Field Northern Windspire wind turbine failure report 12/31/14 case #1543
**Attachments:** Northern damaged Windspire (1) (Large).jpg; Northern damaged Windspire (2) (Large).jpg

**Categories:** Red Category

Tom, Chris, and Greg,

I was notified this morning 12/31/2014 at 9:20 am by Greg Babor that the Northern Windspire turbine had become damaged sometime yesterday or last night in the high winds.

Noel Cotter and an assistant from Luminalt went to Crissy Field Center (CFC) and arrived at approximately 10:30 am today to assess the situation and make repairs as possible. We were able to identify that the Northern Windspire turbine factory weld had failed at the base of the tower and the lower flange. The weld had partially cracked but the unit was still standing up at approximately 10 degrees off of its normal vertical axis. See attached photos. We lowered the turbine, removed it from the concrete pad, and took is back to our warehouse (address below) for safe keeping until a permanent solution is worked out. All in all, taking the turbine out of service today took from 10:30 am until 5:30 pm.

The remaining Southern Windspire was tied-off with a strap to prevent it from spinning. This turbine was functioning normally as far as we could assess but we wanted to take it out of service just to be safe. Also, the two remaining Venco turbines were previously tied-off to prevent spinning back in August 2014 due to blade cracks that we had found during routine maintenance. All turbines are currently out of service and we have turned off the electrical circuit breakers at the electrical service panel behind the Beach Hut Café so there is no live electricity to any of the turbines.

Please contact me if you have any questions and I wish you all a Happy New Year.

Best,

August

August Goers
Principal
Luminalt Energy Corporation
1320 Potrero Avenue
San Francisco, CA 94110
m: 415.559.1525
o:415.641.4000
august@luminalt.com

## Tom Odgers

**From:** August Goers <august@luminalt.com>
**Sent:** Tuesday, September 11, 2012 11:01 AM
**To:** Greg Babor; Tom Odgers
**Subject:** Fwd: Automatic reply: CFC North Windspire

Fyi

---------- Forwarded message ----------
From: "Robert Mosebar" <RMosebar@windspireenergy.com>
Date: Sep 5, 2012 3:15 PM
Subject: Automatic reply: CFC North Windspire
To: "August Goers" <august@luminalt.com>

The assets of Windspire Energy have been sold to Ark Alloy. You can contact Matt Kouba at Ark Alloy with the contact info below. I am no longer involved with Windspire Energy. If you need to reach me personally, my personal email address is RMosebar1@yahoo.com.

-R

Matthew L. Kouba, MBA

President

mkouba@arkalloy.com

Ark Alloy, LLC

325 S. Park St.

Reedsburg, WI 53959

P: 608-768-8508

F: 608-768-8433

www.arkalloy.com

## Tom Odgers

**From:** Tom Odgers
**Sent:** Tuesday, June 12, 2012 5:36 PM
**To:** Tom Odgers
**Subject:** FW: Re: Venco - Power One problem

Tom Odgers
Project Manager
Golden Gate National Parks Conservancy
Building 37, Fort Mason, San Francisco CA 94123
Tel: (415) 561-3527
Cell: (415) 215-7821

---

**From:** August Goers [mailto:august@luminalt.com]
**Sent:** Monday, June 11, 2012 2:32 PM
**To:** Tom Odgers
**Subject:** FW: Re: Venco - Power One problem

Tom,

For the records, I'm forwarding you the email below to update you on our plan for the two Venco wind turbines. My understanding is that the Power One inverters currently installed do not need manual brake switches in order to shut down in high wind conditions. We can program a curve into the inverters which will brake the turbines once they start hitting maximum speed which is right around 2500 Watts of output.

The main benefit of staying with the Power One inverters is increase energy harvest - the Power One units start generating power as low as 50 Volts and also have a high conversion efficiency. In comparison, the Windy Boy inverter won't start generating until the turbine rectifier reaches 150 Volts.

Let me know if you have any questions otherwise I'll start working on getting updated power curves with the automatic shutoff point enabled.

Best,

August

August Goers

Luminalt Energy Corporation
1320 Potrero Avenue
San Francisco, CA 94110
m: 415.559.1525
o: 415.641.4000
august@luminalt.com

**From:** Dave Walters [mailto:dlwalters@castlenrg.com]
**Sent:** Wednesday, May 23, 2012 6:27 AM
**To:** August Goers
**Subject:** Fw: Re: Venco - Power One problem

Dave Walters
Castle Energy
440-390-1340
www.castleNRG.com

-------- Original message --------
Subject: Re: Venco - Power One problem
From: Antje Hofmann <antje.hofmann@fiber-tech.de>
To: Dave Walters <dlwalters@castlenrg.com>
CC:

Dear Dave,

this is the reply of our engineer:

The degree of isolation of the eddy current coil is not high enough for Power-One, so the error is RISO.
That's not bad, because the Power One has more power reserves and the brake function can be realized through the power curve. For this, the power from 370V_DC is adjusted to ca.2500W, for example 370V_DC -> 1000W; 380V_DC -> 2500W. This corresponds about the braking performance of the eddy current brake.

For any other questions do not hesitate to contact me.

Best regards

i.A. Antje Hofmann

FIBER-TECH Products GmbH
Tuchschererstr. 10
09116 Chemnitz
Tel. 0371/84276-0
Fax 0371/8427628
HRB 13642 AG Chemnitz
Ust-IdNr. DE179604985

Geschäftsführer: Dr.-Ing. Matthias Pfalz

FIBER-TECH Construction GmbH
Tuchschererstr. 10
09116 Chemnitz
Tel. 0371/84276-0
Fax 0371/8427628
HRB 19791 AG Chemnitz
Geschäftsführer: Dr.-Ing. Matthias Pfalz

Am 23.05.2012 00:39, schrieb Dave Walters:
> Antje,
>
> Please ask your engineer about this and email me.
>
> Thanks
>
>
> Dave Walters
> Castle Energy
> 440-390-1340
> www.castleNRG.com
>
>
>
> -------- Original message --------
> Subject: RE: Re: FW: Venco - Power One problem
> From: August Goers <august@luminalt.com>
> To: Dave Walters <dlwalters@castlenrg.com>
> CC: todgers@parksconservancy.org
>
>
> Hi Dave,
>
> We removed and capped B, B1, B2, and B3 from the controller today and it
> appears that this has fixed the problem. The inverter is now running
> without error and was putting out about 150 Watts in moderate wind this
> morning. Can you forward this onto Venco and let me know what this means?
>
> Thanks,
>
> August
>
> August Goers
>
> Luminalt Energy Corporation
>
> 1320 Potrero Avenue
>

> San Francisco, CA 94110
>
> m: 415.559.1525
>
> o: 415.641.4000
>
> august@luminalt.com <mailto:august@luminalt.com>
>
> *From:*Dave Walters [mailto:dlwalters@castlenrg.com
> <mailto:dlwalters@castlenrg.com>]
> *Sent:* Tuesday, May 15, 2012 3:11 AM
> *To:* August Goers
> *Cc:* todgers@parksconservancy.org <mailto:todgers@parksconservancy.org>
> *Subject:* Fw: Re: FW: Venco - Power One problem
>
> August,
>
> I received this this morning.
>
> Dave Walters
> Castle Energy
> 440-390-1340
> www.castleNRG.com <http://www.castleNRG.com/>
>
>
>
>
> -------- Original message --------
> Subject: Re: FW: Venco - Power One problem
> From: Antje Hofmann <antje.hofmann@fiber-tech.de
> <mailto:antje.hofmann@fiber-tech.de>>
> To: David L Walters <dlwalters@castleNRG.com
> <mailto:dlwalters@castleNRG.com>>
> CC:
>
>
>
> Dear David,
>
> sorry for my late reply but i was not in the office for the last 3 days.
>
> Our engineer has a guess, where the error could be, but it still
> requires one statement.
>
> Please operate the turbine without eddy current brake - the cable B, B1,
> B2, B3 is not connected. Please checked if the error in the inverter is
> no longer displayed.
>
> Thank you for your help.
>
> Best regards

> 
> i.A. Antje Hofmann
> 
> 
> 
> FIBER-TECH Products GmbH
> Tuchschererstr. 10
> 09116 Chemnitz
> Tel. 0371/84276-0
> Fax 0371/8427628
> HRB 13642 AG Chemnitz
> Ust-IdNr. DE179604985
> Geschäftsführer: Dr.-Ing. Matthias Pfalz
> 
> 
> FIBER-TECH Construction GmbH
> Tuchschererstr. 10
> 09116 Chemnitz
> Tel. 0371/84276-0
> Fax 0371/8427628
> HRB 19791 AG Chemnitz
> Geschäftsführer: Dr.-Ing. Matthias Pfalz
> 
> 
> Am 09.05.2012 03:56, schrieb David L Walters:
> > Antje,
> > 
> > Here are the readings we received from the installer on the San
> > Francisco project. Please advise.
> > 
> > Kind Regards,
> > 
> > _David L Walters**___
> > Castle Energy, LLC.
> > 
> > Cleveland, Ohio 44133
> > 
> > *web:www.castleNRG.com <http://www.castleNRG.com/>
> <http://www.castlenrg.com/>
> > 
> > (phone: 440-390-1340
> > 
> > Logo high resolution
> > 
> > *From:*August Goers [mailto:august@luminalt.com]
> <mailto:[mailto:august@luminalt.com]>
> > *Sent:* Tuesday, May 08, 2012 8:11 PM
> > *To:* David L Walters
> > *Cc:* Tom Odgers
> > *Subject:* RE: Venco - Power One problem
> > 

> > David,
> >
> > We measured resistance today according to the recommendations below.
> > Here are the results:
> >
> > Venco Unit #1 (Southern) resistance to ground. Units were stopped,
> > measurements taken at rectifier with wires disconnected from terminal
> blocks
> >
> > B+ 3.4 kΩ (kilo ohm)
> >
> > B1 3.5 kΩ
> >
> > B2 4.5 kΩ
> >
> > B3 4.5 kΩ
> >
> > G1 ∞ (open)
> >
> > G2 ∞ (open)
> >
> > G3 ∞ (open)
> >
> > G4 ∞ (open)
> >
> > Venco Unit #2 (Northern)
> >
> > B+ 350 Ω
> >
> > B1 1.4 kΩ
> >
> > B2 0.6 kΩ
> >
> > B3 1.5 kΩ
> >
> > G1 ∞ (open)
> >
> > G2 ∞ (open)
> >
> > G3 ∞ (open)
> >
> > G4 ∞ (open)
> >
> > Both units are behaving the same and are giving a "low riso" error or
> > ground fault error on the inverter.
> >
> > Please pass this on to the engineers at Venco and I look forward to
> > their feedback. Also, they are welcome to call me on my cell phone at
> > any time at 415.559.1525.
> >
> > Thanks,

> >
> > August
> >
> > August Goers
> >
> > Luminalt Energy Corporation
> >
> > 1320 Potrero Avenue
> >
> > San Francisco, CA 94110
> >
> > m: 415.559.1525
> >
> > o: 415.641.4000
> >
> > august@luminalt.com <mailto:august@luminalt.com>
> <mailto:august@luminalt.com>
> >
> > -----Original Message-----
> >
> > From: Antje Hofmann [mailto:antje.hofmann@fiber-tech.de]
> <mailto:[mailto:antje.hofmann@fiber-tech.de]>
> > <mailto:[mailto:antje.hofmann@fiber-tech.de]>
> >
> > Sent: Friday, May 04, 2012 3:06 AM
> >
> > To: Dave Walters
> >
> > Subject: Re: Venco - Power One problem
> >
> > Dear David,
> >
> > here is the reply of our engineer:
> >
> > The eddy current brake disconnected in controller (terminals B+, B1, B2,
> >
> > B3) and then measure the resistance between the cable and mass (pole).
> >
> > On that occasion,please disconnect the generator (G1, G2, G3 and G4) and
> > measure the resistance between the cable and mass.
> >
> > For any other questions do not hesitate to contact us.
> >
> > Best regards
> >
> > i.A. Antje Hofmann
> >
> > FIBER-TECH Products GmbH
> >
> > Tuchschererstr. 10
> >

> > 09116 Chemnitz
> >
> > Tel. 0371/84276-0
> >
> > Fax 0371/8427628
> >
> > HRB 13642 AG Chemnitz
> >
> > Ust-IdNr. DE179604985
> >
> > Geschäftsführer: Dr.-Ing. Matthias Pfalz
> >
> > FIBER-TECH Construction GmbH
> >
> > Tuchschererstr. 10
> >
> > 09116 Chemnitz
> >
> > Tel. 0371/84276-0
> >
> > Fax 0371/8427628
> >
> > HRB 19791 AG Chemnitz
> >
> > Geschäftsführer: Dr.-Ing. Matthias Pfalz
> >
> > Am 03.05.2012 11:35, schrieb Dave Walters:
> >
> > > Antjr,
> >
> > >
> >
> > > We did measure the insulation resistance in all the external wiring
> >
> > > and it is good. I will have the use service tech disconnected the eddy
> >
> > > current break today. How do you suggest we do that? Can we just
> >
> > > disconnect it at the switch or do we need to disconnect it in the
> >
> > > rectifier box? Are there other tests we should try?
> >
> > >
> >
> > > The engineers at Power One wanted me to ask if Venco knows of a reason
> >
> > > why the units are not working with the Power One inverter. Do you know
> >
> > > what the problem is?
> >
> > >

> >
> > > Please reply shortly. Thanks!
> >
> > >
> >
> > >
> >
> > > Dave Walters
> >
> > > Castle Energy
> >
> > > 440-390-1340
> >
> > > www.castleNRG.com <http://www.castleNRG.com/>
> <http://www.castleNRG.com <http://www.castleNRG.com/>>
> >
> > >
> >
> > >
> >
> > > Antje Hofmann <antje.hofmann@fiber-tech.de
> <mailto:antje.hofmann@fiber-tech.de%0b>>
> <mailto:antje.hofmann@fiber-tech.de>> wrote:
> >
> > >
> >
> > >
> >
> > > Dear David,
> >
> > >
> >
> > > here is the reply of our engineer:
> >
> > >
> >
> > > The generator has a wye, the neutral position is not connected to
> ground.
> >
> > > He still suspects a ground fault in the eddy current brake. so do you
> >
> > > have sometimes measured the insulation resistance or disconnected the
> >
> > > eddy current brake?
> >
> > >
> >

> > > Best regards
> >
> > >
> >
> > > i.A. Antje Hofmann
> >
> > >
> >
> > >
> >
> > >
> >
> > > FIBER-TECH Products GmbH
> >
> > > Tuchschererstr. 10
> >
> > > 09116 Chemnitz
> >
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> >
> > > Ust-IdNr. DE179604985
> >
> > > Geschäftsführer: Dr.-Ing. Matthias Pfalz
> >
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> >
> > > Fax 0371/8427628
> >
> > > HRB 19791 AG Chemnitz
> >
> > > Geschäftsführer: Dr.-Ing. Matthias Pfalz
> >
> > >
> >
> > >
> >
> > > Am 26.04.2012 03:14, schrieb David L Walters:

> >
> > > > Antje,
> >
> > > >
> >
> > > > We are still trying to find the problem between the Venco and Power
> >
> > > One > Inverter. We are finding that because the Power One does not
> >
> > > use a > transformer, we are having a “ground fault” error. Can you
> >
> > > tell me, is > the generator a delta or wye configuration? And if it
> >
> > > is a wye > configuration, is the neutral position connected to ground?
> >
> > > >
> >
> > > > Also, can you please provide me with a schematic of the rectifier
> >
> > > so we > can determine if the fault is there.
> >
> > > >
> >
> > > > We are hoping to figure out how to get the Power One inverters to
> >
> > > work > with the Venco because of the low startup speed on the Power
> >
> > > One’s (50V) > instead of going to Windyboy (200V). Any other advice
> >
> > > from the engineers > would be helpful.
> >
> > > >
> >
> > > > Kind Regards,
> >
> > > >
> >
> > > > _David L Walters**___
> >
> > > > Castle Energy, LLC.
> >
> > > >
> >
> > > > Cleveland, Ohio 44133
> >
> > > >
> >
> > > > *web:www.castleNRG.com <http://www.castleNRG.com/>
> <http://www.castleNRG.com <http://www.castleNRG.com/>>
> > <http://www.castlenrg.com/> > > (phone:
> >

> > > 440-390-1340 > > Logo high resolution >
> >
> > >
> >
>

## Tom Odgers

**From:** August Goers <august@luminalt.com>
**Sent:** Wednesday, October 03, 2012 3:20 PM
**To:** Tom Odgers; Josh Gannis; Greg Babor
**Subject:** RE: October 1 Venco Performance

Tom,

No, it seems like the wind just finally picked up and they started spinning. I forwarded the issue onto the manufacturer earlier today to see if they have any recommendations. As previously mentioned, we might need to add some grease. I don't want to do this without getting specifications on the type of grease from the manufacturer.

I'll keep you posted.

Best,

August

August Goers

Luminalt Energy Corporation
1320 Potrero Avenue
San Francisco, CA 94110
m: 415.559.1525
o: 415.641.4000
august@luminalt.com

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**From:** Tom Odgers [mailto:TOdgers@ParksConservancy.org]
**Sent:** Wednesday, October 03, 2012 2:51 PM
**To:** Josh Gannis; August Goers; Greg Babor
**Subject:** RE: October 1 Venco Performance

Looks like we are all up and running now.
August – Did you need to perform any service out there?

Tom Odgers
Project Manager
Golden Gate National Parks Conservancy
Building 37, Fort Mason, San Francisco CA 94123
Tel: (415) 561-3527
Cell: (415) 215-7821

---

**From:** Josh Gannis
**Sent:** Wednesday, October 03, 2012 10:11 AM
**To:** August Goers; Tom Odgers; Greg Babor
**Subject:** RE: October 1 Venco Performance

So the Venco is essentially the Tin Man from the Wizard of Oz? Just a little oil under the arm.

Cheers,

Josh

Josh Gannis
Associate Director, Community Services
t. 415.561.7768
c.415.244.0957
f. 415.561.7695

**Crissy Field Center**
1199 East Beach, Presidio
San Francisco, CA 94129
www.crissyfieldcenter.org

***Crissy Field Center is a partnership project of the Golden Gate National Parks Conservancy, the National Park Service, and the Presidio Trust***

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**From:** August Goers [mailto:august@luminalt.com]
**Sent:** Wednesday, October 03, 2012 9:34 AM
**To:** Greg Babor; Tom Odgers
**Cc:** Charity Maybury; Josh Gannis
**Subject:** RE: October 1 Venco Performance

Hi All -

I see that the Southern Venco is still stationary as of 9:30 am this morning. I'm going to swing out there in a couple of hours to take a look and will be contacting the manufacturer to see if they have any ideas. We may need to lubricate the bearings.

I'll keep you posted.

Best,

August

---

**From:** Greg Babor [mailto:Gbabor@ParksConservancy.org]
**Sent:** Tuesday, October 02, 2012 4:48 PM
**To:** August Goers; Tom Odgers
**Cc:** Charity Maybury; Josh Gannis
**Subject:** RE: October 1 Venco Performance

Thanks, August.

Sincerely,
Greg

**Greg Babor**
Manager of Program and Facility Operations
Tel: 415.561.7773
Fax: 415.561.7695

**Crissy Field Center**

Golden Gate National Parks Conservancy
1199 East Beach Drive, Presidio
San Francisco, CA 94129

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**From:** August Goers [mailto:august@luminalt.com]
**Sent:** Tuesday, October 02, 2012 4:36 PM
**To:** Tom Odgers; Greg Babor
**Cc:** Charity Maybury; Josh Gannis
**Subject:** RE: October 1 Venco Performance

I'm looking at the webcam right now and I confirm what Greg is seeing. I'm guessing it either still isn't windy enough or there is some sort of friction holding it back. Once again, it looks like a really light breeze so I'm going to keep watching until a little more real wind comes. I'll then have to forward this on to the folks at Venco if it isn't spinning when it should. I'll keep in touch. Best, August

---

**From:** Tom Odgers [mailto:TOdgers@ParksConservancy.org]
**Sent:** Tuesday, October 02, 2012 4:24 PM
**To:** Greg Babor; August Goers
**Cc:** Charity Maybury; Josh Gannis
**Subject:** RE: October 1 Venco Performance

Thanks Greg.

Tom Odgers
Project Manager
Golden Gate National Parks Conservancy
Building 37, Fort Mason, San Francisco CA 94123
Tel: (415) 561-3527
Cell: (415) 215-7821

---

**From:** Greg Babor
**Sent:** Tuesday, October 02, 2012 3:05 PM
**To:** August Goers; Tom Odgers
**Cc:** Charity Maybury; Josh Gannis
**Subject:** RE: October 1 Venco Performance

Good afternoon,

The North Venco unit has been spinning today, but we have not seen the South unit move yet.

Sincerely,
Greg

**Greg Babor**
Manager of Program and Facility Operations
Tel: 415.561.7773
Fax: 415.561.7695

**Crissy Field Center**
Golden Gate National Parks Conservancy
1199 East Beach Drive, Presidio
San Francisco, CA 94129

**From:** August Goers [mailto:august@luminalt.com]
**Sent:** Tuesday, October 02, 2012 12:09 PM
**To:** Greg Babor; Tom Odgers
**Cc:** Charity Maybury; Josh Gannis
**Subject:** RE: October 1 Venco Performance

Got it. -August

---

**From:** Greg Babor [mailto:Gbabor@ParksConservancy.org]
**Sent:** Tuesday, October 02, 2012 12:03 PM
**To:** Tom Odgers
**Cc:** August Goers; Charity Maybury; Josh Gannis
**Subject:** RE: October 1 Venco Performance

Hi,

I'll put two loose keys in my office mailbox for Tom and August. You may take one in case I'm not around next time you're here. The key is also in the office keybox on tag #1.

Sincerely,
Greg

**Greg Babor**
Manager of Program and Facility Operations
Tel: 415.561.7773
Fax: 415.561.7695

**Crissy Field Center**
Golden Gate National Parks Conservancy
1199 East Beach Drive, Presidio
San Francisco, CA 94129

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**From:** Tom Odgers
**Sent:** Monday, October 01, 2012 5:41 PM
**To:** Greg Babor
**Cc:** August Goers; Charity Maybury; Josh Gannis
**Subject:** Re: October 1 Venco Performance

If you have an extra, I think it would be helpful for me to have one.
Thanks,
Tom

Tom Odgers
Project Manager
Golden Gate National Parks Conservancy
Building 37, Fort Mason, San Francisco CA 94123
Tel: (415) 561-3527
Cell: (415) 215-7821

Sent from my iPad

On Oct 1, 2012, at 3:14 PM, "Greg Babor" <Gbabor@ParksConservancy.org> wrote:

> Hi Tom,

We don't have any signs of an outage at The Center. The disconnect switches, for the Vencos, are in the on position.

The locks were in my mailbox when I arrived this morning. I have a key for August. Would you like one as well or will you use one kept in the office at CFC?

Sincerely,
Greg

**Greg Babor**
Manager of Program and Facility Operations
Tel: 415.561.7773
Fax: 415.561.7695

**Crissy Field Center**
Golden Gate National Parks Conservancy
1199 East Beach Drive, Presidio
San Francisco, CA 94129

---

**From:** Tom Odgers
**Sent:** Monday, October 01, 2012 2:41 PM
**To:** August Goers
**Cc:** Greg Babor; Charity Maybury; Josh Gannis; Laura_Castellini@nps.gov; Allison_Cryns@nps.gov
**Subject:** October 1 Venco Performance

Wind is registering at 7.5 mph and the Venco units are not operating right now.
Looks like electronic braking is engaged.
August – Any servicing going on right now? Any chance the disconnect switch might have been flipped and the brake engaged?

Greg – By chance was there a power outage this weekend? Also – do you have the breakaway locks yet?

Thanks,
Tom

(Laura/Allison I'll start cc'ing you on some of the renewable issues since you've expressed interest.)

Tom Odgers
Project Manager
Golden Gate National Parks Conservancy
Building 37, Fort Mason, San Francisco CA 94123
Tel: (415) 561-3527
Cell: (415) 215-7821

## Tom Odgers

**From:** August Goers <august@luminalt.com>
**Sent:** Tuesday, May 01, 2012 7:55 AM
**To:** jbesold.vernon@tangarie.com; jkeirouz@greengaia.com
**Cc:** Tom Odgers
**Subject:** FW: Tangerie Gale Performance

Hi John and J -

See below. The Tangarie has been running for over a month now and it's power output is really low. It's rare that it gets above 50 Watts even in 25+ mph winds. I've tried the stock curve you shipped with the inverter, the medium curve, and the light curve. Even with the light curve it still seems to spin very slowly which might just be the nature of savonius units. It also has a pretty significant wobble when it gets on the windier side at the site - luckily we have a very beefy pole and foundation otherwise it would be a major concern.

Let me know if there is anything we can try. We should have wind data soon to be able to compare output vs windspeed. Also, if any of you or members of your team will be in the Bay Area it would be great if you can stop by to check out the installation. The power output and wind data will be publicly available so I think it is in all of our best interests to maximize what the unit can do.

Best,

August

August Goers

Luminalt Energy Corporation
1320 Potrero Avenue
San Francisco, CA 94110
m: 415.559.1525
o: 415.641.4000
august@luminalt.com

---

**From:** Tom Odgers [mailto:TOdgers@ParksConservancy.org]
**Sent:** Monday, April 30, 2012 6:12 PM
**To:** August Goers
**Subject:** Tangerie Gale Performance

Hello August,
Feel free to forward to the Tangerie my concerns about the performance of the T2 we have installed at the Crissy Field Center. We understood that a savonious type unit was likely to perform less effectively than the darrieus units we installed, but the T2 is operating well below the specs provided in their own literature – and this is after Luminalt has input suggested improvements at the inverter.
Some assistance on their behalf would be beneficial to all parties - Tangerie should consider the fact that their product will be compared side to side with other units that are performing to spec. – and that those results will be reviewed by potentially hundreds of thousands of people. For at least five years.

Thanks,
Tom

Tom Odgers
Project Manager
Golden Gate National Parks Conservancy
Building 37, Fort Mason, San Francisco CA 94123
Tel: (415) 561-3527
Cell: (415) 215-7821

Luminalt
Solar Energy Solutions

December 20, 2012

August Goers
Luminalt Energy Corporation
1320 Potrero Avenue
San Francisco, CA 94110
(415) 641-4000

Tom Odgers
Golden Gate National Parks Conservancy
Building 37, Fort Mason
San Francisco, CA 94123

RE: Crissy Field Center Wind Turbine Project

This letter shall serve to certify that the five wind turbines described in Luminalt's contract with the Golden Gate National Parks Conservancy have been installed per contract and are operational.

If you have any questions about the wind turbine project please feel free to contact me.

Best Regards,

August Goers

Vice President, Engineering
415.559.1525
august@luminalt.com

Luminalt
Solar Energy Solutions

December 20, 2012

August Goers
Luminalt Energy Corporation
1320 Potrero Avenue
San Francisco, CA 94110
(415) 641-4000

Tom Odgers
Golden Gate National Parks Conservancy
Building 37, Fort Mason
San Francisco, CA 94123

RE: Crissy Field Center Wind Turbine Project

This letter shall serve to certify that the five wind turbines described in Luminalt's contract with the Golden Gate National Parks Conservancy have been installed per contract and are operational.

If you have any questions about the wind turbine project please feel free to contact me.

Best Regards,

August Goers

Vice President, Engineering
415.559.1525
august@luminalt.com

## Tom Odgers

**From:** Luminalt Admin <admin@luminalt.com>
**Sent:** Thursday, June 21, 2012 2:10 PM
**To:** Tom Odgers
**Cc:** August Goers
**Subject:** FW: Final Permission to Parallel at Generating Facilty San Francisco, California

Hi Tom,

We just received the updated permission to operate letter from PG&E listing both the PV and wind. Please find it below and let me know if you have any questions.

Best,
Izzy

**Luminalt Energy Corporation**
1320 Potrero Avenue
San Francisco, CA 94110

**T: (415)641-4000**
F: (650)244-9167
izzy@luminalt.com

---

**From:** Glidden, Josh (ET) [mailto:JGG6@pge.com]
**Sent:** Thursday, June 21, 2012 12:47 PM
**To:** 'admin@luminalt.com'
**Subject:** Final Permission to Parallel at Generating Facilty San Francisco, California

June 21, 2012

The Presidio Trust
Golden Gate National Parks Conservancy
Building 201 Fort Mason
San Francisco, CA 94123

Subject: Permission to Parallel Generating Facility

Dear The Presidio Trust:

On 06/20/2012 the generating system at Letterman Gen Hospital San Francisco , California successfully passed final inspection as witnessed by Pacific Gas and Electric Company (PG&E). The approved generating equipment consists of:

Inverters:
63 each Enphase Energy D380-72-208-S1x
1 each Power-One PVI-3.6-OUTD-US (208 V)
2 each Power-One PVI-3.0-OUTD-US (208 V)

PV Modules:
126 each Suntech Power, Inc. STP225-20/Wd

Wind Turbines:
1 each Tangerie Gale T2-R15
2 each Venco Twister 1000-T

Wind Turbine, Inverter Based:
2 each Windspire 800080

This letter constitutes "express written permission" to operate the above-referenced generator in parallel with PG&E's distribution system. "Express written permission" is required under PG&E's Electric Rule 21 and your Interconnection Agreement with PG&E.

PG&E's authorization for you to operate your facility is subject to all the terms and conditions of Rule 21, your Generating Facility Interconnection Agreement, and any other applicable rules, tariffs, laws and regulations. These include, but are not limited to, the following:

Pursuant to Rule 21, section B.5, PG&E's authorization to operate "shall not be construed as confirming or endorsing your design or as warranting the Generating and/or Interconnection Facilities' safety, durability, or reliability . . . [and] PG&E shall not . . . be responsible for the strength, adequacy, or capacity of such equipment."
You are also responsible to notify PG&E if you make material changes to your generating apparatus or equipment. This permission to parallel does not extend to any such materially changed generating facilities and applies only to the facilities described in your application for interconnection and your Generating Facility Interconnection Agreement.

I am available if you have questions or require additional information. I can be reached at 415-972-7051.

Sincerely,

Josh Glidden
Project Manager