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SolarMill® a Smart HYBRID Technology

TowerMill™ Application

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Who we are

Windstream Technologies Inc is established in 2008

2009

R&D begins at The Purdue Research Center in New Albany, Indiana with an Academic alliance with Purdue University

2010

Pilot units deployed in 2010 and 2011

2011

Manufacturing facility established in North Vernon, Indiana, September 2011

2012

Patents approved, First products shipped 2012

2013

300% Growth in Sales Year over Year, 2012 - 2013

2014

India Manufacturing Facility Breaks ground
Sales Orders in Hand - $23,000,000

2015

India Manufacturing at Hyderabad
U.S. Sales Launch
TowerMill for Telecom Towers Launched in Bahamas
Installed MW scale project in Argentina

2016

Signed 22MW PPA projects in Africa

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WindStream Technologies
Who we are

- Head Quarters: North Vernon, Indiana, USA
- Manufacturer of the SolarMill®
- The SolarMill® is a patented hybrid renewable energy device
- Factories in North Vernon & **Hyderabad**, **India**
- Sold where energy is expensive, unavailable, or unreliable
- Exported to more than 30 countries
- Pricing is competitive and in line with solar installations
- Residential & Commercial Rooftop Applications & Custom Built
- Website: www.windstream-inc.com

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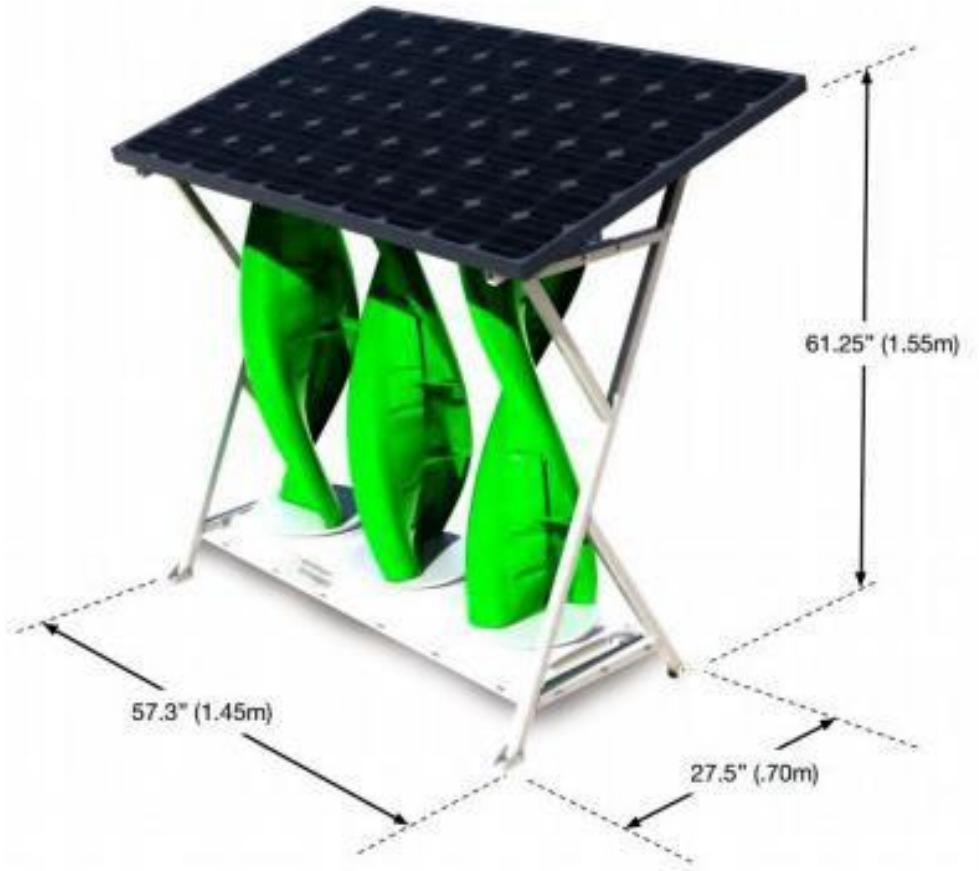
SolarMill® Hybrid Energy Generation

System Specifications



WIND COMPONENT	
Turbine Rated Power Output	143 W @ 11 m/s
Wind Component Maximum Power Output	500 W @ 17 m/s
Maximum Voltage	56 VDC
Maximum Current	30 Amps
Rotor Diameter	13 in |0.33 m
Cut-In Wind Speed	4.5 mph |2 m/s
Cut-Out Wind Speed	38 mph |18.5 m/s
Swept Area	1,519 in^2 |0.980 m^2
Turbine Material	Galvanized G-90 Steel
SOLAR COMPONENT	
Maximum Power (Pmpp)	250 W
Voltage at Nominal Power (Vmpp)	29.65 V
Current at Nominal Power (Impp)	8.47 A
Open Circuit Voltage (Uoc)	37.98 V
Short Circuit Current (Isc)	8.80 A
*Reduction in module efficiency with decrease in irradiation level from 1000 W/m^2 to 200 W/m^2 (at 25 degrees C).	
Maximum System Voltage	1000 V
Solar Cells	Monocrystalline
No. of Cells	60
ENTIRE SYSTEM	
SolarMill Dimensions	1460 mm (L) x 850 mm (W) x 1900 mm (H)
Weight	185 lbs | 83.91 kgs
Cover Material	UV Resistant HDPE
Frame	Galvanized G-90 Steel and Aluminum
Electronics Enclosure Rating	IP53
Electrical Connection	On-Board Battery Charge Controller Grid-Tied Inverter (Optional)

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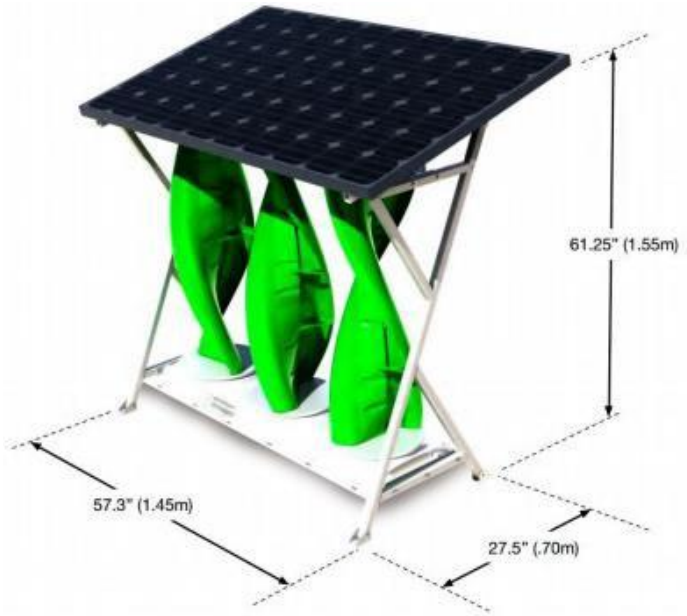
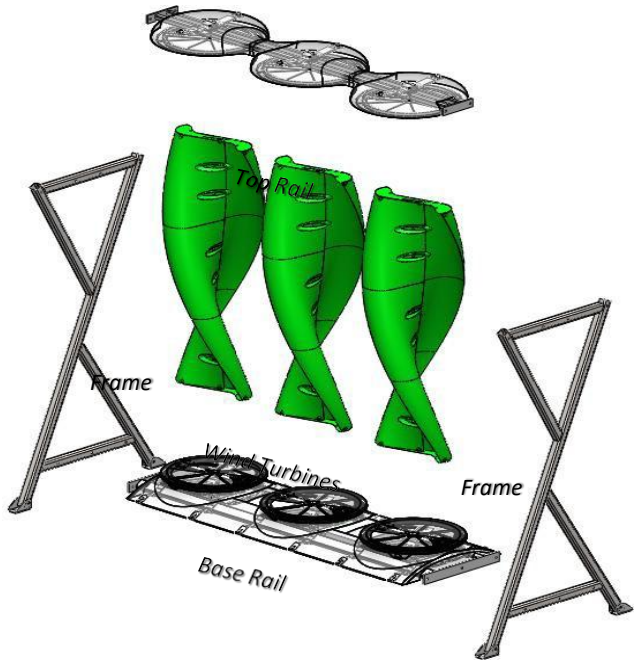
SolarMill® Hybrid Energy Generation

System Specifications





Performance Advantages

- Performance of wind and solar combined
- 24hr power production opportunity
- Higher power density per sq. ft.
- Scalable power generation
- Power generation starts at 2m/s
- Mechanical braking system >41mph/18.5m/s
- Appropriate for grid tied or Off Grid
- Better daytime peaks
- Night-time production
- Stabilizes production on cloudy days
- Enhances battery charging and battery cycle life

Benefits

- Visually engaging
- Silent Operation /Environmentally Friendly
- Omni-directional

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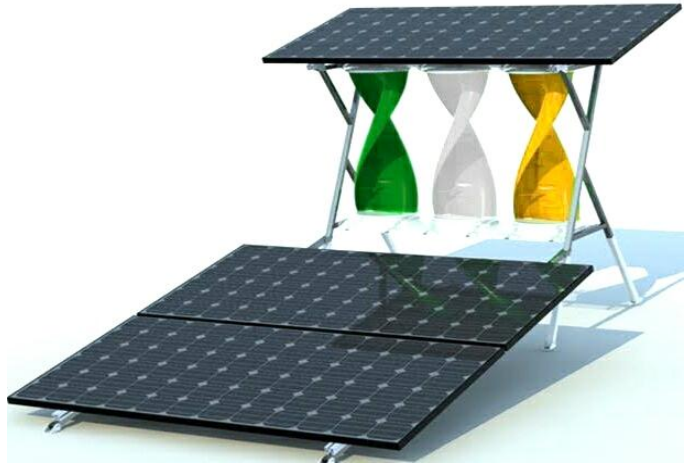
SolarMill Models – Scalable & Modular

SM1-1P (750W)

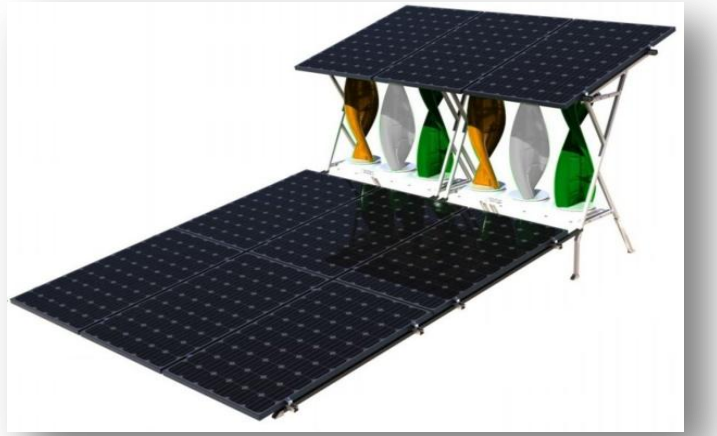
SM1-2P (1 kW)



SM1-3P (1.25 kW)

SM2-3P (1.75kW)

SM2-6P (2.5 kW)



SM2-9P (3.25 kW)

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SolarMill® vs Solar Only
28 day Performance Summary

March 30-April 26, 2015
1KW side by side Test Units
Kingston, Jamaica

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SolarMill® vs Solar Only

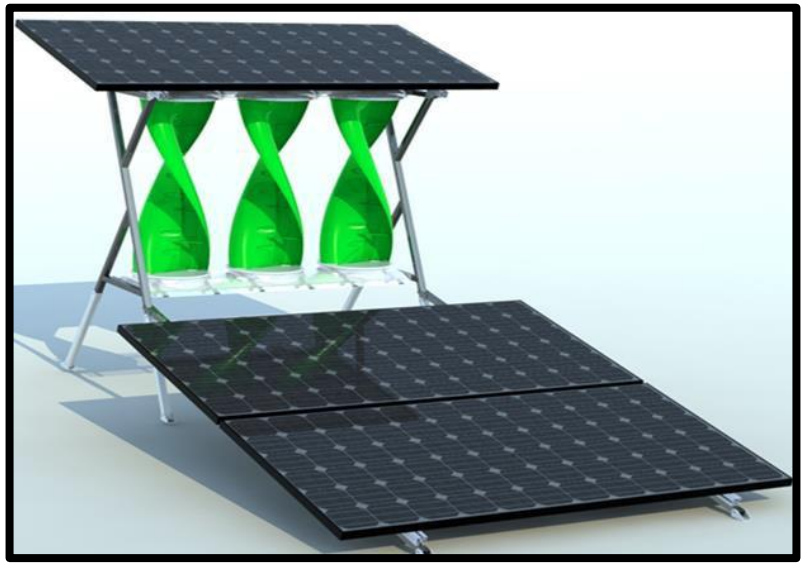
28 day Performance Summary
March 30-April 26, 2015
1KW - Side by Side Performance 28 day Review

Site Location

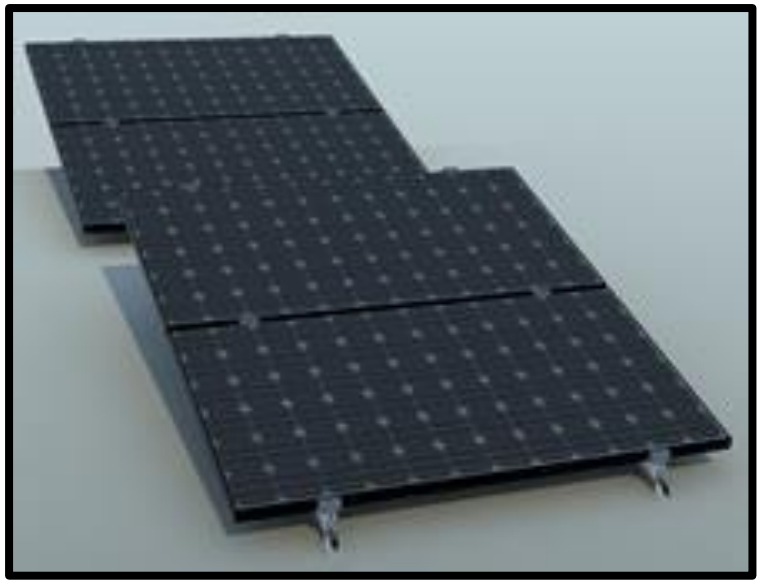
East Street Kingston, Jamaica, 4 Story Commercial Building. Prevailing winds are partially obstructed by more than 3 adjacent buildings, and cause occasional turbulence with wind gusts greater than 5m/s.

Overview: 2 Systems

A 1KW SolarMill® Hybrid, and a 1KW Solar Only installed side by side. Identical Inverters (Cap. 1.2KW). Date Commissioned: March 18, 2015



Capacity: 1 KW Hybrid
Configuration: SolarMill® SM1-3P



Capacity: 1KW Solar Only
Configuration: 4 X 250W SOLAR PANELS

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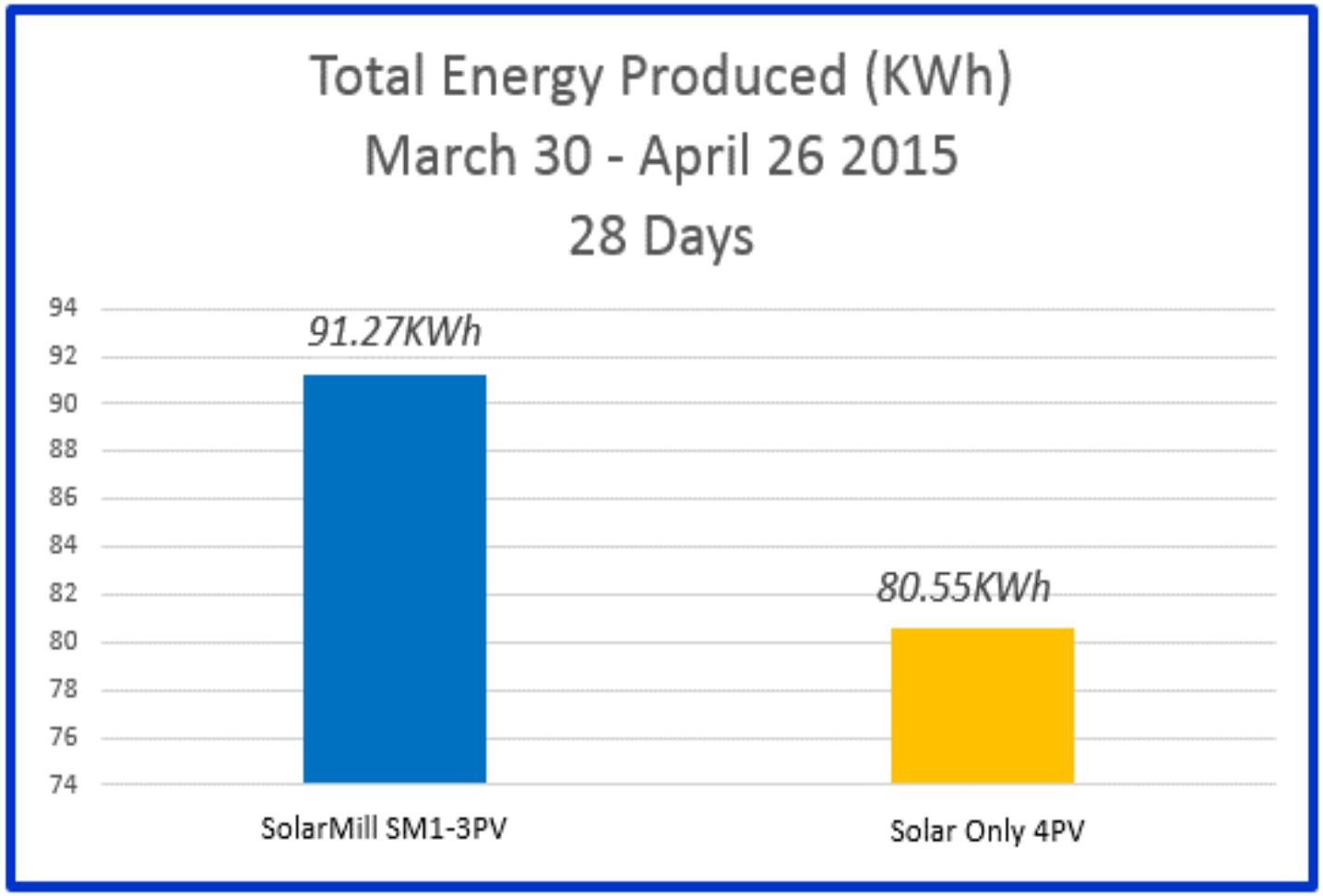
SolarMill® vs Solar Only

28 day Performance Summary
March 30-April 26, 2015
1KW - Side by Side Performance 28 day Review

- ✓ SolarMill® produced 13% **MORE** total energy
- ✓ Wind system outperformed the 4th solar panel
- ✓ April is historically the 2nd highest month for solar irradiance
- ✓ April is historically the 2nd lowest month for wind speed



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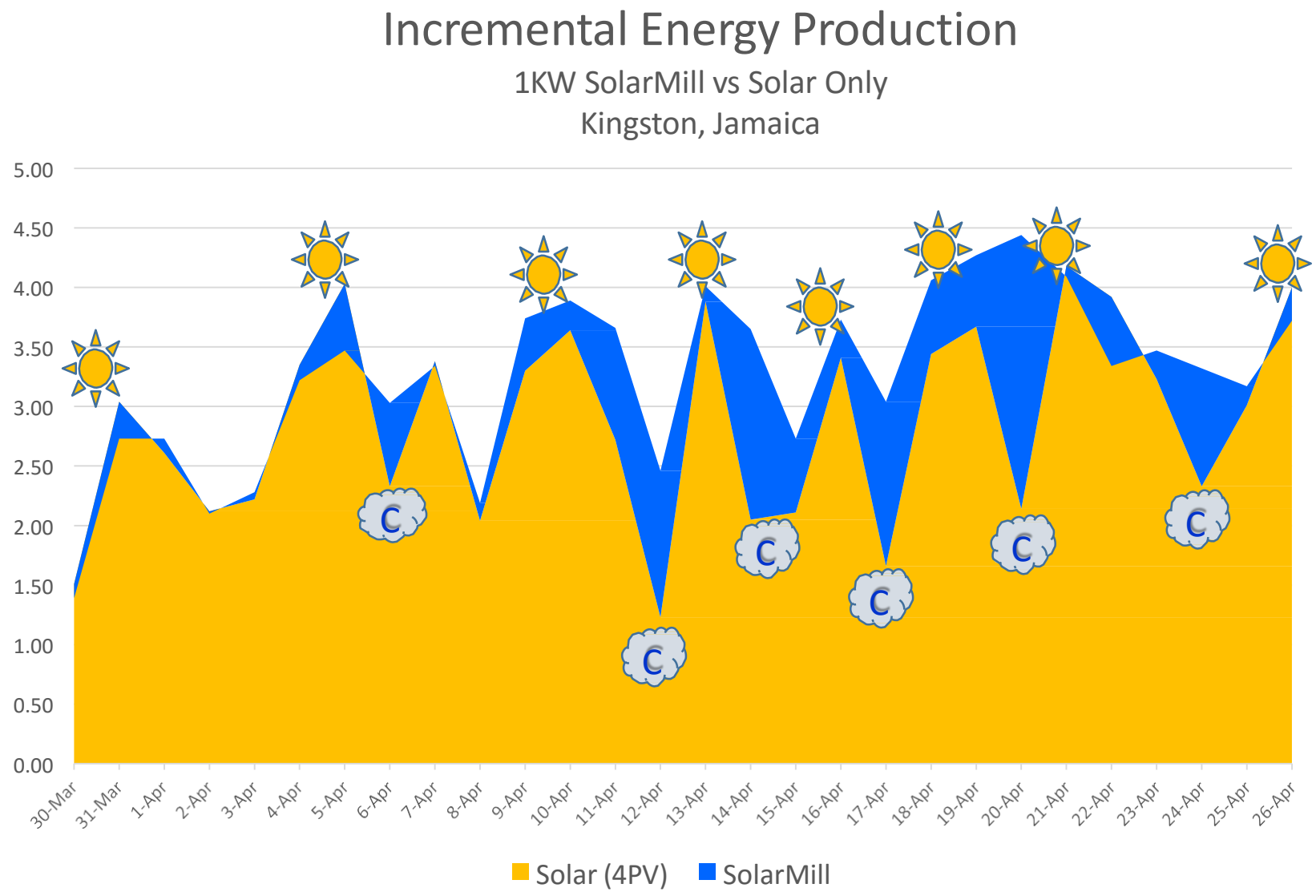
SolarMill® vs Solar Only

28 day Performance Summary
March 30-April 26, 2015
1KW - Side by Side Performance 28 day Review

With 25% /250w LESS Solar capacity

SolarMill® produced MORE energy on SUNNY days

SolarMill® produced MORE energy on CLOUDY days



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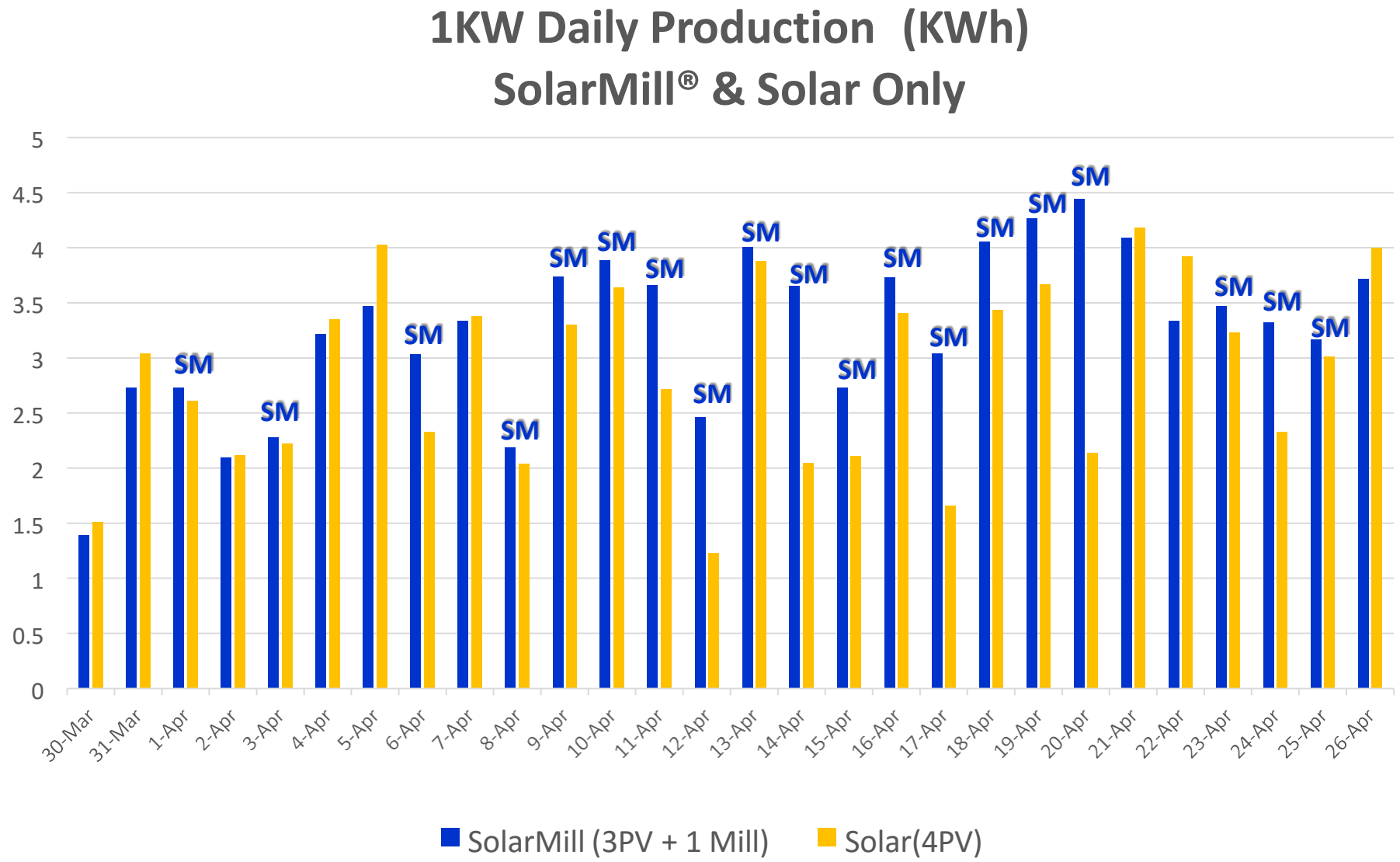
SolarMill® vs Solar Only

28 day Performance Summary
March 30-April 26, 2015
1KW - Side by Side Performance 28 day Review

SolarMill® created more energy 19 out of 28days.



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1KW SolarMill Vs. 1KW Only Solar Observations Made at R.K Beach, Visakhapatnam Site.

System Model: SM1-3P

Panel Wattage: 250W – 3 no's

System Capacity: 1 KW

System Type: Off-Grid

Battery Capacity: 48V, 100 Ah

Inverter Rating: 1.25 KVA

System Model: 4P

Panel Wattage: 250W – 4 no's

System Capacity: 1 KW

System Type: Off-Grid

Battery Capacity: 48V, 100 Ah

Inverter Rating: 1.25 KVA

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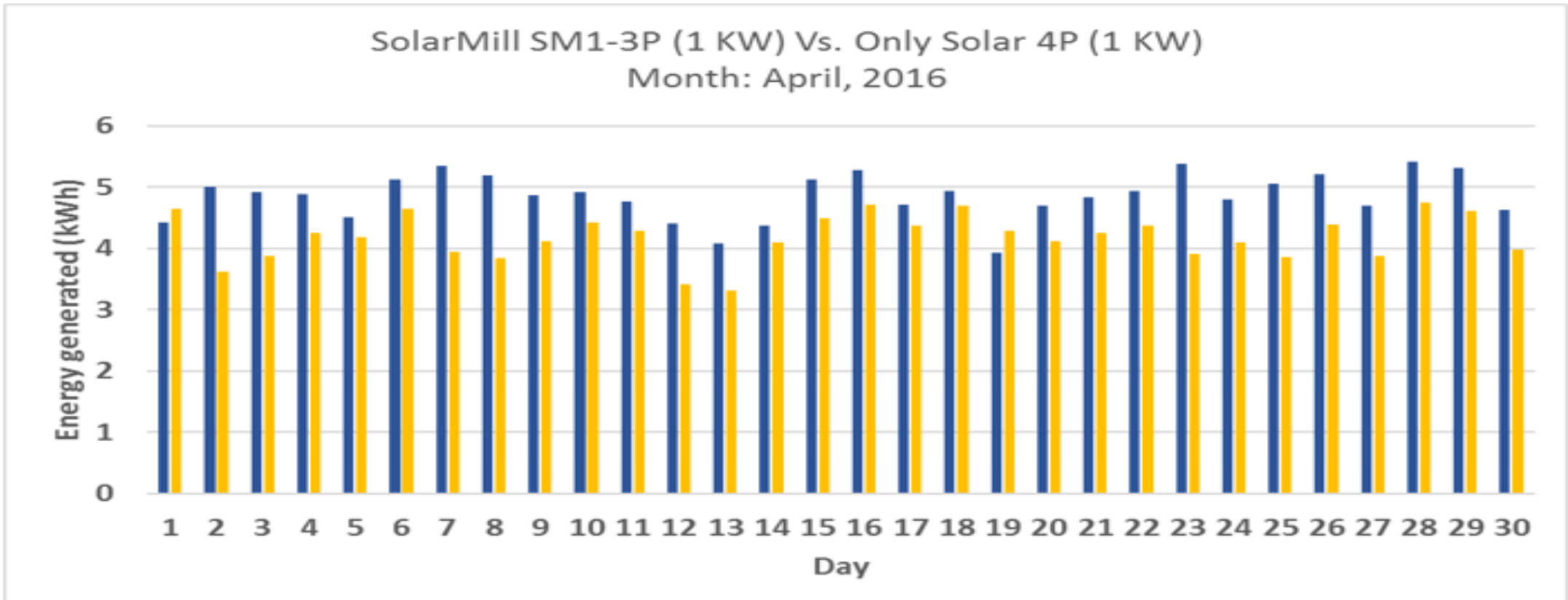
Month: April, 2016

Month	SolarMill	Only Solar	% of More Energy
March	152.54	136.43	11.80
April	**145.73**	**125.44**	**16.17**



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SolarMill® Application
TowerMill™

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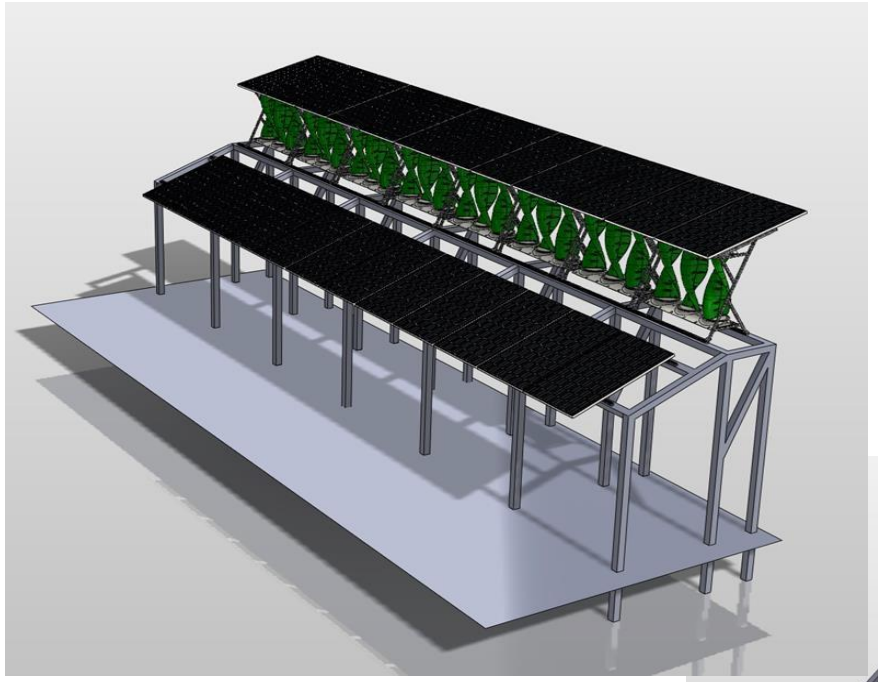
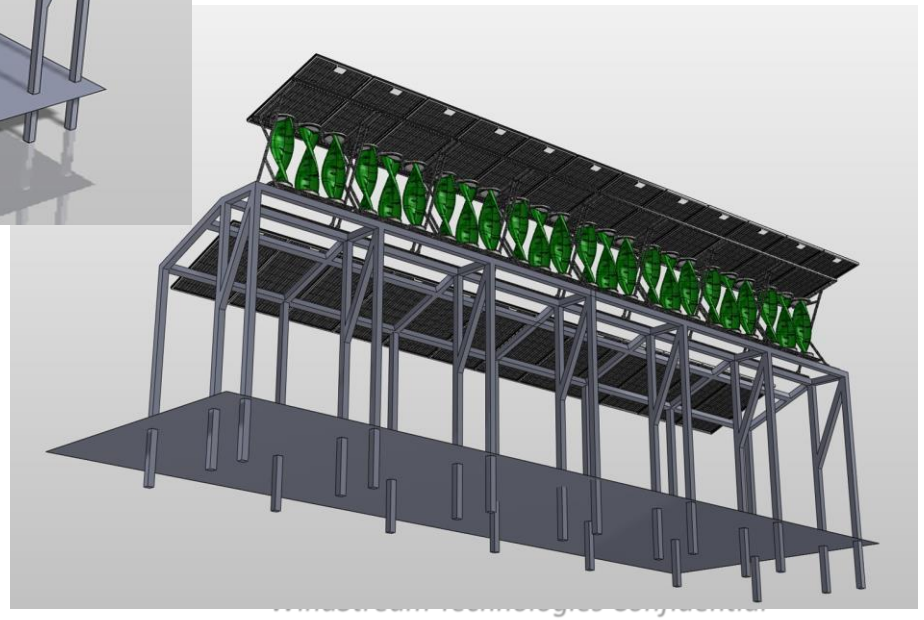
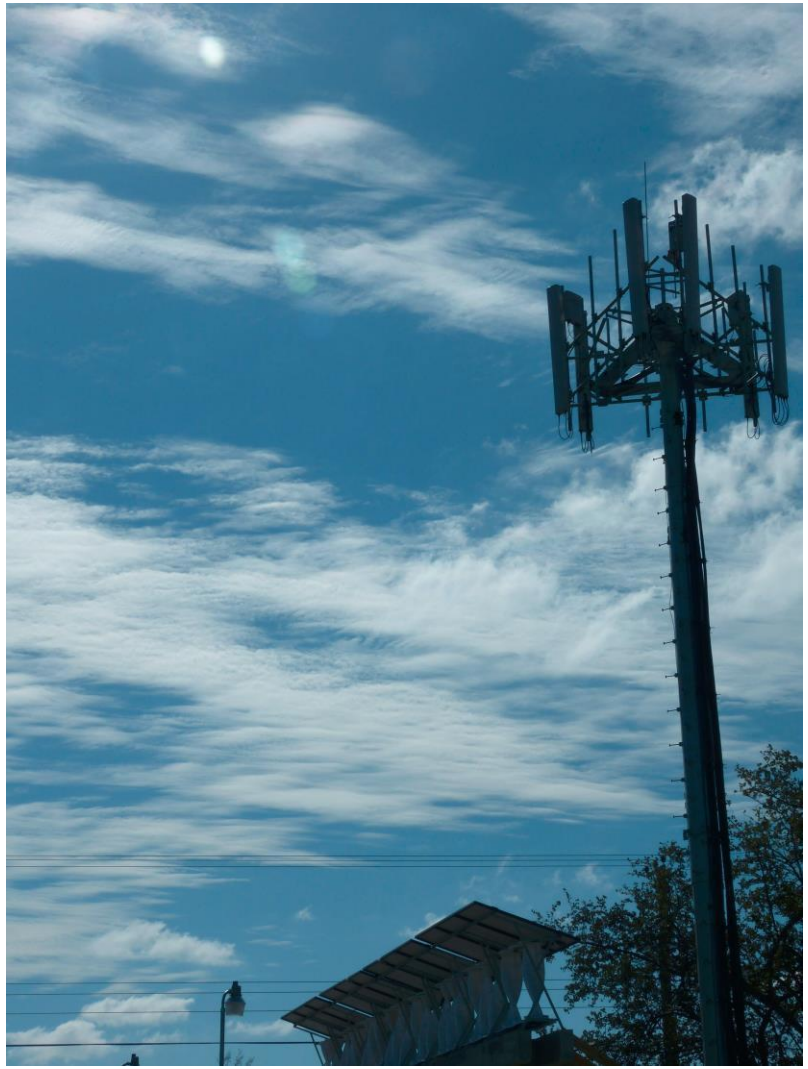
TOWERMILL ™ Options
Basic Retrofit



Features

- Scalable based on 24 hr. requirement
- Provides on or off-grid power
- Reliable battery charging
- Raised structure profile
  - *Above existing equipment*
  - *Minimizes space*





Proof of Concept-Nassau, Bahamas

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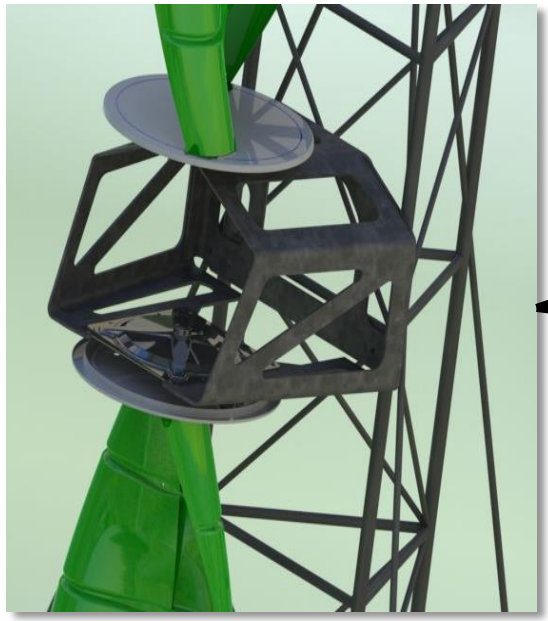
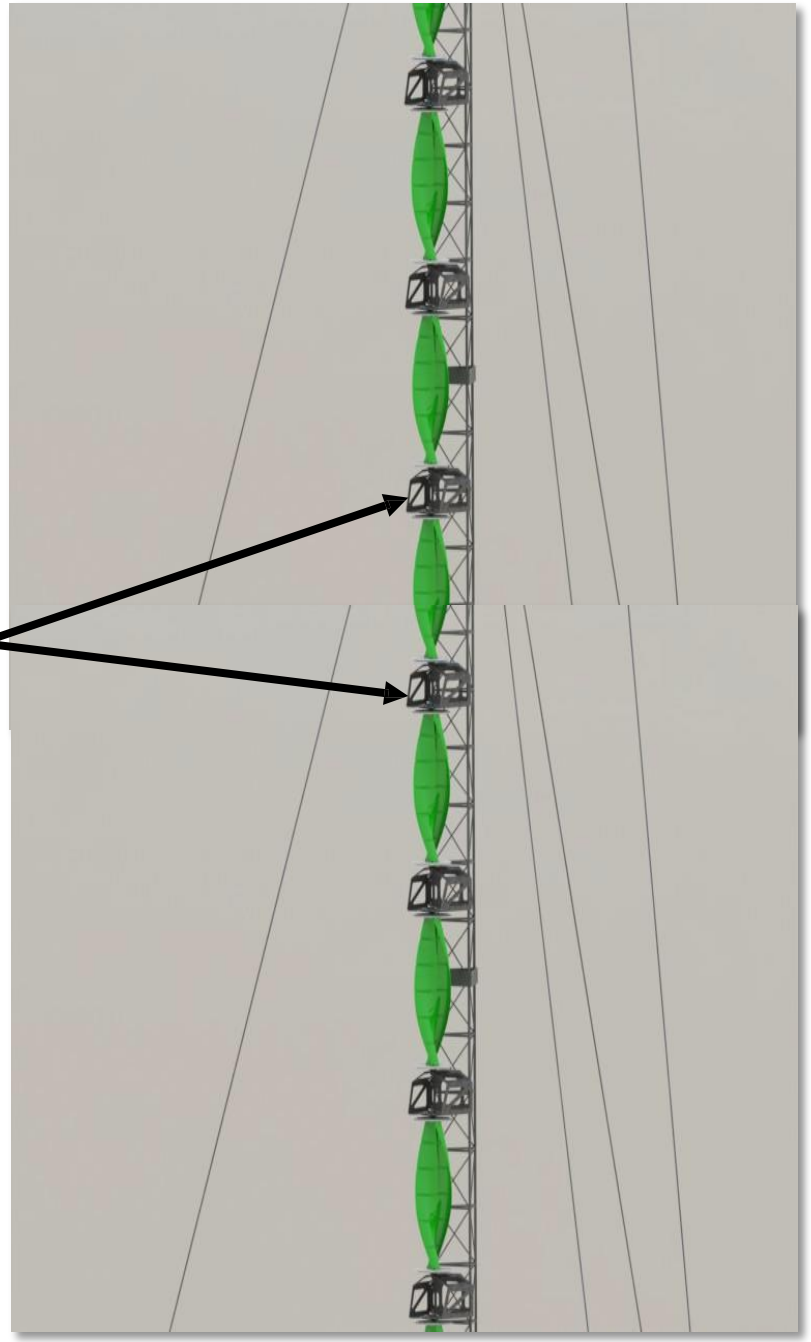
TOWERMILL™ Options
New Build – "TowerMill™ ONE"

- Enables TELCO's and Operators to dramatically lower their OPEX, increase coverage areas (rural, off-grid) and improve network reliability and up-time
- 100,000's of towers worldwide are subject to unstable grid connections or are powered by fossil fuels
- Leverages current technology for communication tower back-up
- Uninterrupted connectivity during black-outs, fuel shortages, and other failures
- Vertically mounted turbines easily retrofit to existing tower structure





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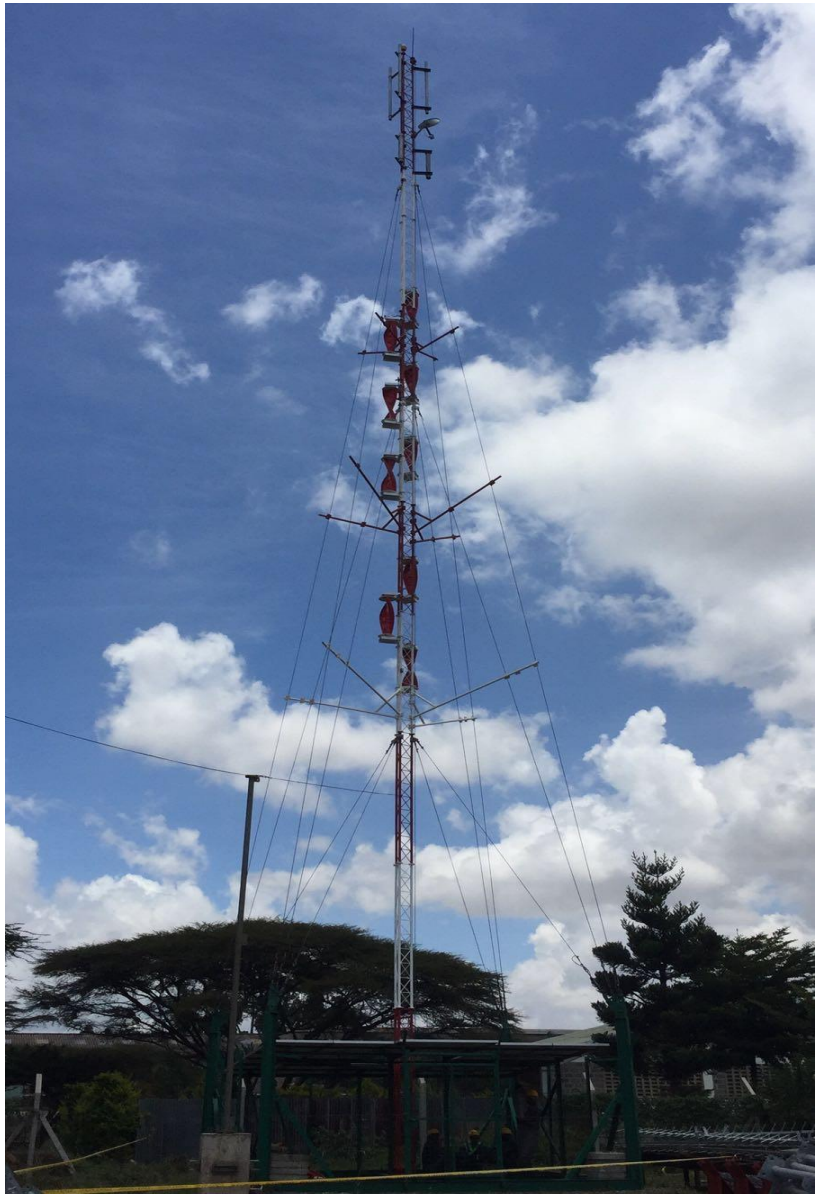
Tower Mill

M/s.Eaton Towers , Nairobi, Kenya
5 kw Kw systems Hybrid



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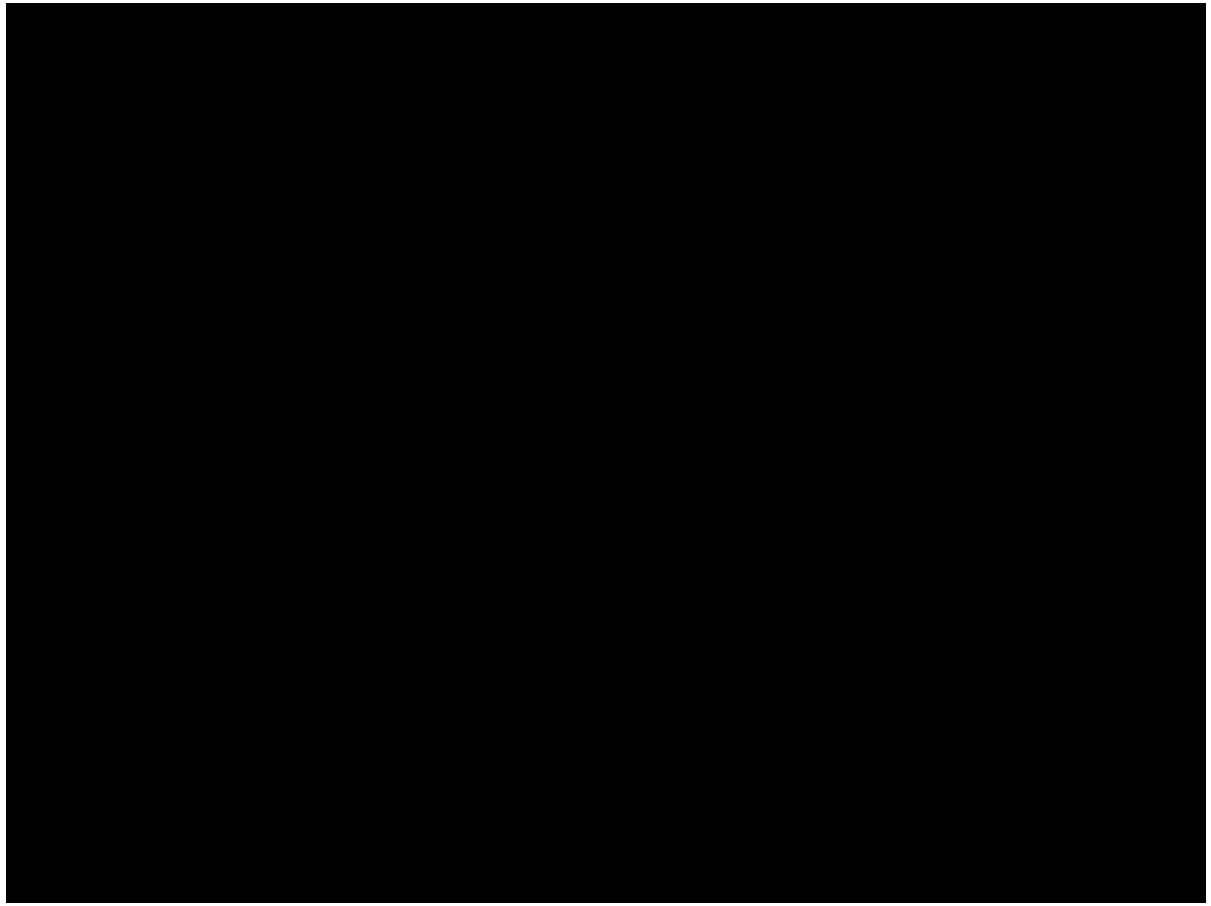
Tower Mill

M/s.Eaton Towers , Nairobi, Kenya
5Kw systems Hybrid



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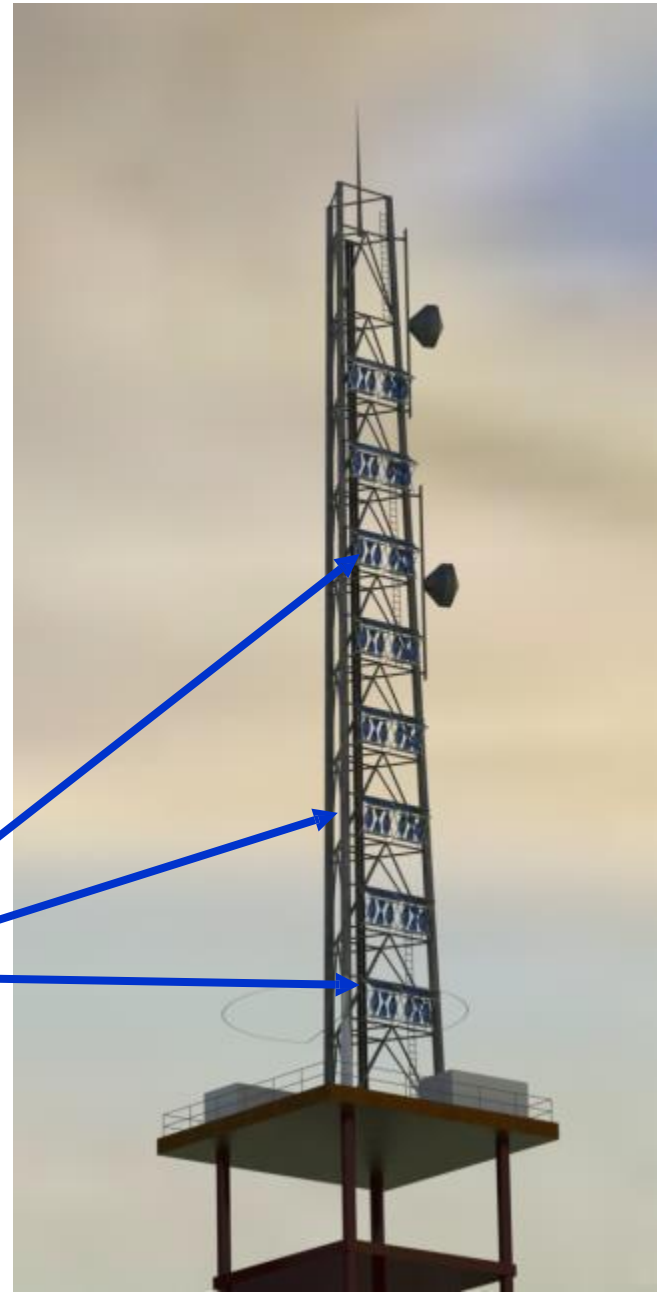
TOWERMILL™ Options
New Build – “TowerMill™ XL”

- On-Grid cell towers subject to reliability issues
- Off-grid cell tower run off of diesel, propane, etc. fuel sources that:
  - Needs to be trucked in
  - Are subject to theft
  - Carries high maintenance cost of equipment
  - Creates pollution
  - Large carbon footprint



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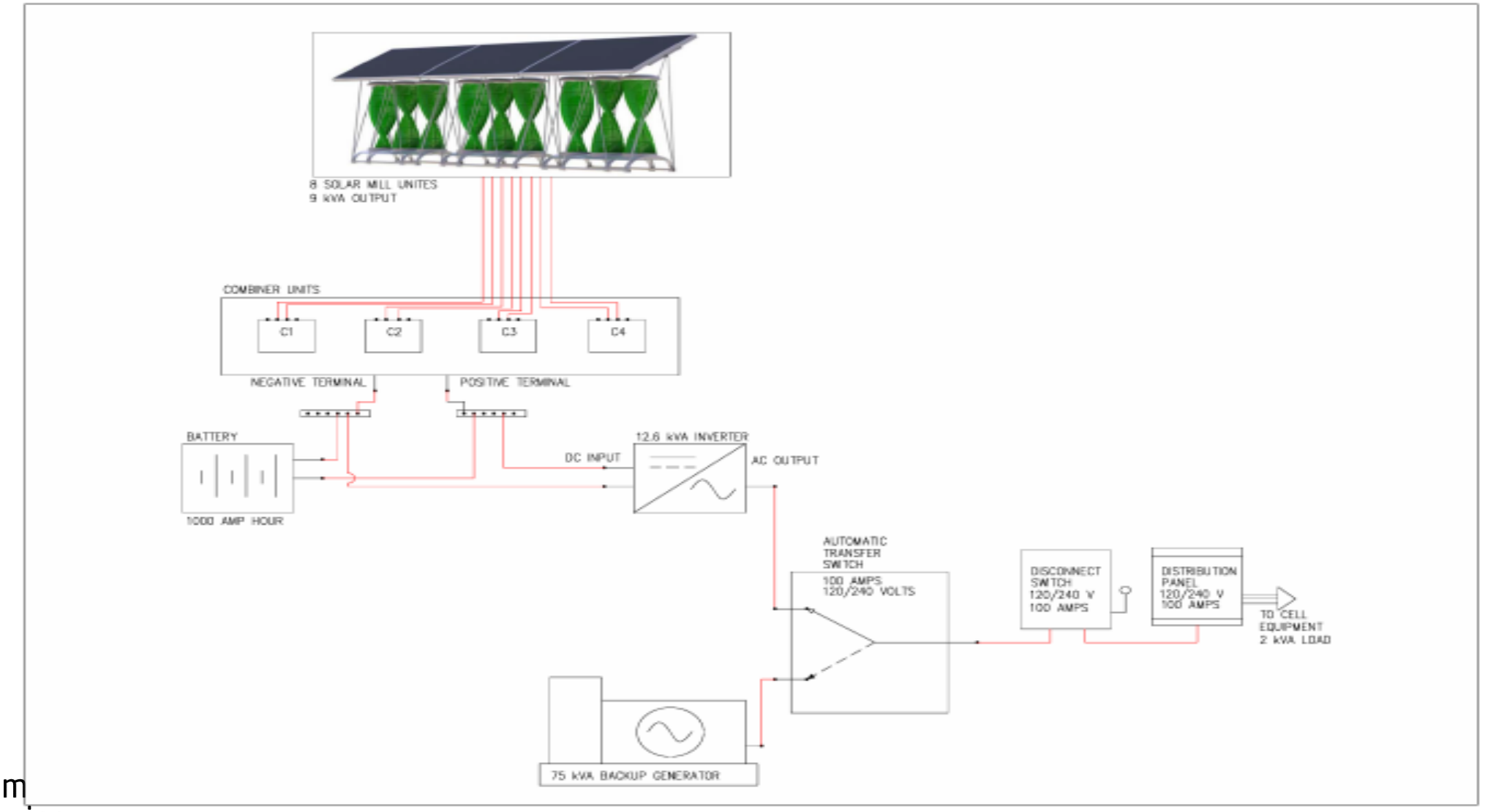
TOWERMILL™ Pilot Nassau, Bahamas

Wiring Schematic with Back-up Generator Option (Off Grid)



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TOWERMILL™ Pilot Nassau, Bahamas
Off Grid Inverter

- Scalable Modular Architecture up to 102 kW.
- The one solution for grid-interactive and off-grid.
- Adaptable single-phase and three-phase hybrid inverter.
- System monitor ,battery runtime, battery string imbalance, system status input/output.
- Monitoring Interface.

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TOWERMILL™ Nassau, Bahamas
Automatic Transfer Switch

- Kholer RDT-CFNC-200A
- Double throw inherently interlocked design.
- LED indication of system faults.
- Single-phase voltage sensing on both sources.
- Contactor manually operable for maintenance.
- Line-to-line frequency sensing.

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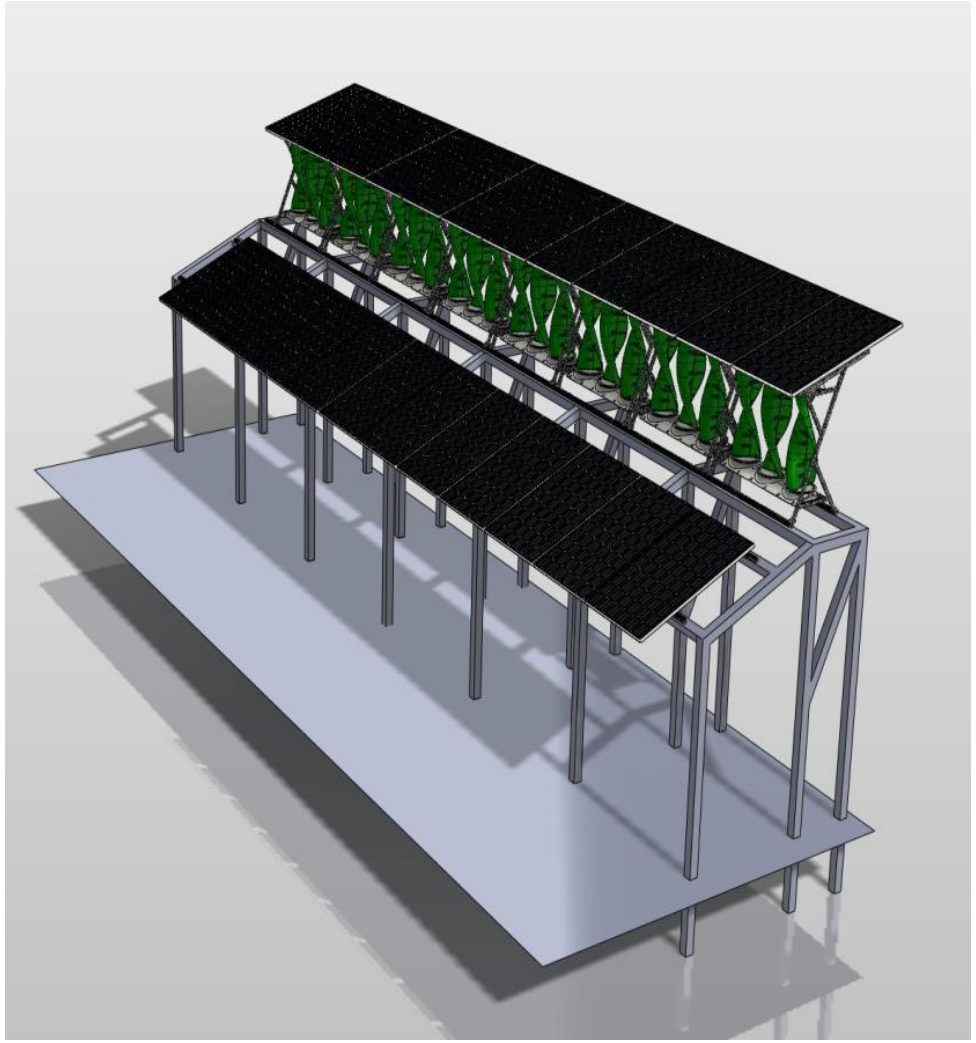
TOWERMILL™ Nassau, Bahamas
Support Base/Frame

- Solid, treated wood concrete or steel frame.
- Flexible to relieve stress.
- Easily duplicated.
- Easily repaired.
- Environmentally friendly.



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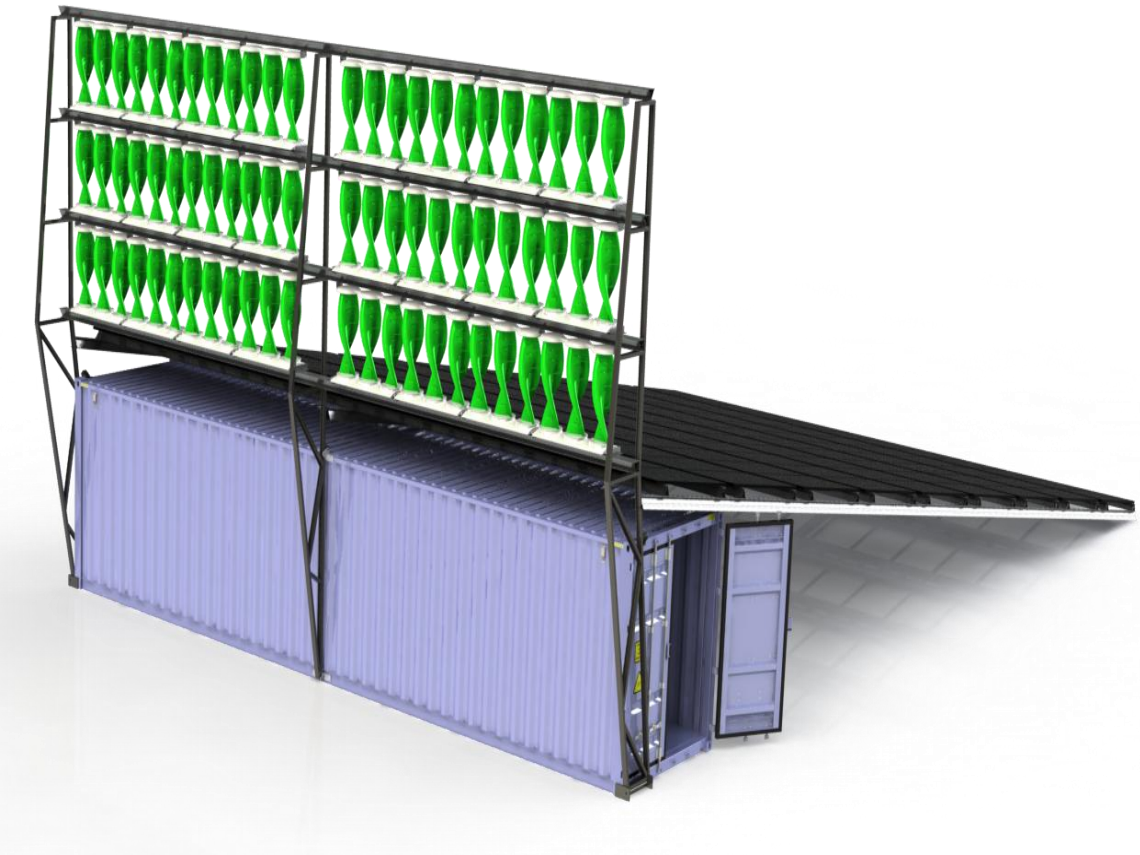
PowerMill™ Application

Scalable with changing needs



System Specifications Per Section	
Wind Component	24 mills
Solar Component 250W/300W panels, 60/72 Cells	108 panels
Capacity	33kW – 45kW
Total Weight	4971.37 kgs
Dimensions	12.4 meters (W) x 16 meters (D) x 11 meters (H) (as pictured above)
Installation Equipment	Recommended: Crane, bucket truck, backhoe including hydraulic auger attachment
Inversion	240-280V Inverters (approved by WindStream)

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Power Mill

It is a scalable system from 20 kw to MW

Designed to meet demands for Micro grids, Mini grids to Grid export MW scale plants.

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- **HYDERABAD FACTORY**
- Facility Certified with ISO 9001:2015 QMS
- CE Certified Product.
- MNRE (Ministry for New and Renewable Energy) Channel Partner with SP2C Rating.
- CII Award for most innovative product-2015.
- 100 Hp Connected Load.
- Uninterrupted Power Supply.
- State-of-the Art In-house Paint Booth.
- Design team-Experienced with AutoCAD, ProE, and Solid Works software's.
- Production facility with fixtures and Test Equipment.
- Remote monitoring equipment for Off-grid.

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Customer Base

- Distributor network across PAN India , South East Asia and Africa.
- Sales and Service through Dealer network.
- Distributors as on Date-12.
- Dealers as on Date-40.
- Market Segments:
    - Educational Institutions.
    - Hospitals.
    - Industries (Banking, Power, Oil –Retail & off shore, Pipe line , Engineering…)
    - Railways & Defence
    - Telecommunications.
    - Ports & Highways.
    - Roof tops- Off grid, on grid with Net metering.

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Awards and Accolades

Geotek Global Certification Pvt. Ltd. CE Conformity

Certificate Of Conformity

Geotek Global Certification Pvt. Ltd.

Applicant	:	WindStream Energy Technologies India Pvt. Ltd.
Office & Manufacturing Site	:	Plot No. 26/A, HCL Hardware Park, Kancha Imarath, Raviryal (Village), Maheshwaram (Mandal), Ranga Reddy District, Pin 500005, Telangana, India
CE Mark Directive	:	Low Voltage Directive 2006/95/EC (LVD) Electromagnetic Compatibility 2004/108/EC (EMC)
Certificate No.	:	15GGCSIN 150229
Certification Date	:	11th December 2015 Valid Till : 10th December 2018
Product Category	:	Solar Mill (Off Grid & On Grid)
Model Nos.	:	SM 1 - 1P (Turbine rated power 143 W @ 11 m/s) SM 1 - 2P (Turbine rated power 143 W @ 11 m/s) SM 2 - 3P (Turbine rated power 286 W @ 11 m/s) SM 2 - 6P (Turbine rated power 286 W @ 11 m/s)
Maximum Voltage	:	12 Volts to 100 DC (Wind Component) 60 Volts to 1000 AC (Generator Component)
Output Rated Power	:	300 W- 300 KW DC/AC
Output Rated Frequency	:	50 Hz & 60 Hz
Test Standards	:	ASTM E 415 : 2008 ASTM E 1251:2007 ASTM E 1019:2011 IS 513:2008 Gr. CR-1 SB 209 Gr. Alloy 6061 AISI 305 IEC 61400-2:2013 IEC61400-12-1:2005

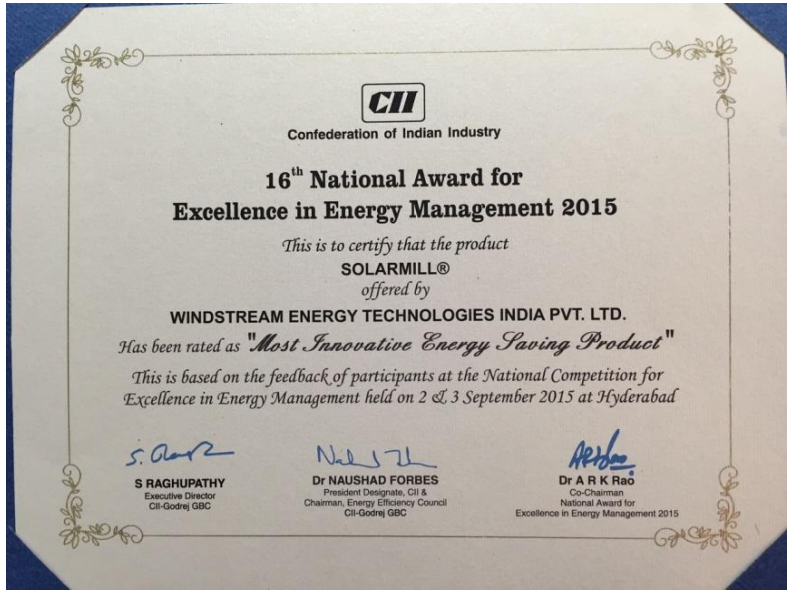
Chief Executive Officer
Geotek Global Certification Pvt. Ltd.
102, Raj Legacy, Near Bramhand Phase 5, Off. GB Road,
Thane (West), Pin 400 607, Maharashtra, India

CE

Geotek Global Certification Pvt. Ltd.

Geotek Global Certification Pvt. Ltd. is accredited by International Management Accreditation Board (Singapore)
Level 25, One Raffles Quay North Tower, Raffles Place, Singapore 048583, Phone No. +65 6232 2442, Fax No. +65 6232 2888

The CE mark as shown above can be used under the responsibility of the manufacturer after completion of an EC Declaration Of Conformity and compliance with all relevant EC Directives. Geotek Global Certification Pvt. Ltd. is non-notified body therefore this certificate falls under non notified certification. The continual validity of the certificate is conditional to compliance with the terms and the conditions of Geotek Global Certification Pvt. Ltd. Validity of the certificate may be verified on following websites : www.geotek.co.in and accreditation body's website : www.imacb.com



CII
Confederation of Indian Industry

16th National Award for Excellence in Energy Management 2015

This is to certify that the product
SOLARMILL®
offered by
WINDSTREAM ENERGY TECHNOLOGIES INDIA PVT. LTD.
Has been rated as "Most Innovative Energy Saving Product"
This is based on the feedback of participants at the National Competition for Excellence in Energy Management held on 2 & 3 September 2015 at Hyderabad

S RAGHUPATHY
Executive Director
CII-Godrej GBC

Dr NAUSHAD FORBES
President Designate, CII &
Chairman, Energy Efficiency Council
CII-Godrej GBC

Dr A R K Rao
Co-Chairman
National Award for
Excellence in Energy Management 2015

ISO 9001:2015 Quality Management System

Certificate Of Registration

Geotek Global Certification Pvt. Ltd.

hereby certify that the organization

WindStream Energy Technologies India Pvt. Ltd.

Address : Plot No. 26/A, HCL Hardware Park, Kancha Imarath, Raviryal (Village), Maheshwaram (Mandal), Ranga Reddy District, Pin 500005, Telangana, India

has implemented and maintains a **Quality Management System** for

Scope :

Design, Manufacture, Supply, Installation and Service of Renewable Energy - Hybrid Systems and Components

An audit was performed and proof has been furnished that the management system fulfils the requirements of International standard detailed below ...

Standard	: ISO 9001:2015
Certificate No.	: 15/GGCS/09/576
Certification Date	: 25th March 2016
Cert. Expiry Date	: 24th March 2019

Geotek Global Certification Pvt. Ltd.

imab International Management Accreditation Board

Reg. No. IN/QMS22/0511

Chief Executive Officer
Geotek Global Certification Pvt. Ltd.
102, Raj Legacy, Near Bramhand Phase 5, Off. GB Road,
Thane (West), Pin 400 607, Maharashtra, India

Geotek Global Certification Pvt. Ltd. is accredited by International Management Accreditation Board (Singapore)
Level 25, One Raffles Quay North Tower, Raffles Place, Singapore 048583, Phone No. +65 6232 2442, Fax No. +65 6232 2888

The continual validity of the certificate is conditional to compliance with the terms and the conditions of Geotek Global Certification Pvt. Ltd. - Certification Scheme Regulation. Validity of the certificate may be verified on following websites : www.geotek.co.in and accreditation body's website : www.imacb.com

Technologies
economical energy

WindStream Technologies

Inc.

One of the "Three Hottest Clean Tech Companies on the Planet"

treehugger

"This small-scale hybrid energy device harvests both sun and wind"

ENERGY DIGITAL

"WindStream's SolarMill, A New Kind Of Hybrid"

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Contact Information

To view installations from around the world and to get more information on our Company, please visit our website at:

www.windstream-inc.com

Sales /Distribution

Contact : Venkat Kumar Tangirala ,

President, ASIA PACIFIC,

HYDERABAD, INDIA

vktangirala@windstream@inc.com

+91 40 23548779,.

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