



The Windular Story

Windular's story began a few years ago when, confronted with the challenge to contain the ever-increasing energy and operating costs of communications towers, the concept of a tower-mounted alternative power system was hatched. From this early concept emerged a 10kw class horizontal axis wind turbine (HAWT) and a solar tracker application. The challenge, of course, was to design a viable method to mount the turbine and solar tracker to the tower in an easy-to-install package along any elevation of the tower. After much R&D, troubleshooting and testing, Windular's proprietary computer-controlled carriage and rail tracking system was born. This breakthrough development enabled substantial power generation from a renewable energy source, while using existing tower assets. Simply put, ingenious!

Innovative, clever design and application of Windular's proprietary carriage and rail tracking system allows operators to reliably power up their wireless plants around the globe, in urban and remote sites without reliance on grid or diesel generated power. Security of energy supply and the stabilization of energy costs are obvious benefits.

We are excited to partner with tower owners, operators and wireless carriers around the globe providing reliable, cost-efficient, alternative power generation. Windular's technologies will revolutionize the entire energy supply dynamic for the wireless industry.

Windular's Products

Tower Mounted Wind Turbines: Windular's flagship product is the 10kw class of tower-mounted wind turbine. This powerful turbine uses our proprietary computer-controlled carriage and rail tracking system. This system allows the turbine to be actively driven into (or out of) the wind to maximize power generation capacity. Windular's Tower Mounted turbine system has been expertly engineered to universally fit any type of tower structure, including self-supporters, guyed or monopoles.

Tower Mounted Solar Trackers: Windular's tower-mounted solar tracker system shares many technological similarities with our tower mounted wind turbine system. Panels are affixed to our proprietary computer-controlled carriage and rail system which allows the solar cells to be driven to the best location and angle in proximity to the sun. This design raises your solar plant above other equipment creating a zero footprint scenario in your tower compound.

Electronic Control and Monitoring Systems: Windular's hardware and software components have been designed specifically for our wind turbine and solar tracker applications and allow for remote power control and monitoring. Our components have been field-tested under extreme weather conditions.

Our People

The Windular team has years of experience and tremendous depth. Our management team members are all accomplished professionals with expertise in major wind and solar supply and management, tower installation and construction, wireless design and construction, manufacturing, media, law and finance.

Building Relationships

Windular has forged alliances with partners around the world to bring its state-of-the-art products to the marketplace. Trained personnel are available to advise your crews worldwide to facilitate installation and maintenance.

A Good Corporate Citizen

At Windular we believe in the importance of engaging our stakeholders to build a strong, successful company with a global commitment to the environment and a strong social conscience. Our core business utilizes renewable energy solutions fused with innovative design and process advancements to bring reliable, secure telecommunications services while reducing the global carbon footprint.

Website

www.windular.com



System Benefits:

Energy Security

Smart, Sustainable & Reliable

Fast and Easy to Install

Uses Existing Tower Assets

Offset Diesel and Grid Dependence

Buy and Lease Options Available

Hybrid Solar/Wind Systems

Tower Mount Applications



Windular’s Tower Mounted Turbine and Solar Tracker Systems have been expertly engineered and developed for tower owners, operators and wireless carriers. These units are specifically designed to mount very powerful Horizontal Axis Wind Turbines (HAWT), and Solar Trackers to existing cellular and broadcast towers.

These Tower Mounted Turbines are actively driven by powerful servomotors into the best and most productive wind. Robust, ruggedized electronics constantly monitor environmental conditions and adjust the turbines position and working state automatically. These state of the art systems are remotely controlled by your NOC, or if you prefer, by Windular.

Our Windular systems enable the tower owner or operator to generate electrical power from existing tower assets. The power generated by our systems can substantially offset your power needs and, in some instances, may completely eliminate the need for grid and/or diesel generated power as your primary electrical source. Alternatively, the wind and solar power generated may be sold back to tower tenants or used by individual Carriers to offset their grid/diesel electrical consumption.

System Benefits:

- Energy Security
- Smart, Sustainable & Reliable
- Fast and Easy to Install
- Uses Existing Tower Assets
- Offset Diesel and Grid Dependence
- Buy and Lease Options Available
- Hybrid Solar/Wind Systems

Technology Comparisons:

Competitive Analysis	Windular Turbine	Competing System A	Competing System B	Competing System C	
					Comments
System Type	MP-G310KW Turbine & Rail System	10kw VAWT on new 9m pole & pier	10kw HAWT on new 100' pole & pier	10kw HAWT on new 12m pole & pier	
Turbine Rated Output	10kw	10kw	10kw	10kw	
Requires new dedicated tower construction?	No	Yes	Yes	Yes	Most competitors units will require a new tower to accommodate their turbine systems. Zoning a possible issue.
Mount to existing cell towers?	Yes	No	No	No	Windular is specifically engineered to fit onto existing cellular towers at any available elevation.
Multiple turbines on a single tower?	Yes	No	No	No	Utilize underloaded towers to 100% of their structural capability. Maximize existing towers earning potential.
Combined hybrid system for Wind and Solar generation?	Yes	No	No	No	Single tightly integrated motion and electrical controllers provide cutting edge autonomous action and global control.
Integrated Solar Trackers on same existing structure?	Yes	No	No	No	Windular Tower Mounted Solar Trackers mount just above your existing compound equipment. Zero compound footprint for your solar plant.
Requires new concrete foundation?	No	Yes	Yes	Yes	Most competitors require new piers and foundations. Often these new foundations are located outside of the compound perimeter on new real estate.
Requires special real estate considerations?	No	Yes	Yes	Yes	New construction on foundations require permits and zoning approval. Minimize this exposure by adding devices to your existing tower.
Generate new revenue from existing tower assets?	Yes	No	No	No	Yes. Existing unused tower space can now generate new and unrealized streams of revenue. Maximize unused tower structural capability.
Mount to intermediate unused portions of existing towers?	Yes	No	No	No	Windular systems universally mount to any face width, on any style tower, at any elevation your structure can handle.
Typical Install Time	3 days	7-14 days	7-14 days	7-14 days	A competent 3 man to tower crew with proper training can install a unit in about a day. No crane required for typical installation.
Located on separate footprint outside of existing compound?	No	Yes	Yes	Yes	In most cases, this is the reality of the competing systems. Windular systems require no additional real estate to install.
New compound perimeter fencing?	No	Yes	Yes	Yes	Our systems install within the existing compound boundaries.

Independent □ Powerful □ Reliable □ Sustainable □ Secure

Existing Tower Energy Platforms Where WRT's System can be Beneficial to Cut Operational Costs

No Grid Power No Grid Power Grid Power Grid Power



Diesel Backup

Diesel Backup



Rural/Remote

Urban

Rural/ Remote

Urban



Fully reliant on costly diesel and located in a remote/ rural location. Diesel transport, theft, service and replacement are costly.

Fully reliant on costly diesel and located in urban location. Theft of diesel fuel and diesel service and replacement are costly.

Grid tied with diesel backup in rural or remote location. Power outage issues and cost to keep diesel backup operational.

Grid tied with diesel backup in urban location. Power outage and theft issues and cost to keep diesel backup operational.

Mass and Area Comparisons:



Mass and Areas of LTE vs Windular 10KW	Windular 10kw Turbine @120'	Typical LTE Installation @120'
Up-tower Equipment Mass	2400	2500
Feed Line Mass	95	1100
Total Mass	2495	3600
Equipment Wind Load Area	41 ft ² square plate 8 ft ² cylinder	45 ft ² square plate 7.5 ft ² cylinder
Feed Line Wind Load Area	4.8 ft ² cylinder	120 ft ² cylinder
Total Wind Load Area	41 ft ² square plate 12.8 ft ² cylinder	41 ft ² square plate 127.5 ft ² cylinder
Tower Crew Time	90 hrs.	150 hrs.

These figures are estimates for illustrative purposes only. Windular will provide specific engineering info for each unique installation. Feet and pounds are used.

Common Questions:

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- Will the Windular 10KW Turbine system induce RF interference into existing radio setups?
 - No. All feed cables are shielded.
- Does the 10KW Turbine system introduce any adverse vibration into the tower?
 - No. The propeller assembly is factory balanced.
- How should I calculate the wind loading of a 10KW Turbine system vs. a typical antenna installation?
 - Exactly the same as you would calculate any other antenna loading scenario such as an LTE array.
- How long does it take to install a 10KW Turbine system?
 - A properly trained 3 man crew can complete a typical installation in 3 days.
- Who conducts the installation of these systems?
 - Your very own trusted tower contractors are more than qualified to install these systems. Windular provides on-site factory help for the training of personnel.
- How much vertical tower space would a 10KW Turbine system require?
 - 20'.
- What is the availability of Windular factory based support?
 - 24hours a day - 365 days a year
- Can we control our turbines and solar plants remotely?
 - You can control your turbines with any Windows, Android or iOS device.
- How much maintenance does a 10KW Turbine system require?
 - Annual factory trained inspections are advised.
- Can our regular tower crews perform this maintenance?
 - Yes, with our factory training program.