Greenworks Tower Site – 447 N. Sacramento (near Humbolt Park), Chicago, IL: is comprised of a 50 foot tall wind tower supporting a 20 foot tall Aeroturbine (70 feet overall) providing power to the Christy Webber Landscape facility, a local horticulture business specializing in 'green roofs'. The Christy Webber facility has several LEEDs environmental and energy-conversion technologies including the Aerotecture Aeroturbine:

- Engineered and installed 10-panel solar hot water heating system designed by Solar Service, Inc. of Niles, IL.
- A unique solar-heated greenhouse addition used to raise plants and add winter heating and summer cooling to the facility designed by Farr Associates – architects.
- A large 'green roof' area that retains rainwater, adds insulation and helps cool the area
- A non-toxic approach to the design of building components and interior design elements
- A focus on the use of recycled and 'recyclable' materials in the building's general construction within a context of making the building as 'durable' as possible within current construction cost constraints

On April 10, 2007, Aerotecture International, Inc. and its certified dealer/installation team, Becker Renewable Energy, Inc., assembled to assist the welding company, Mechanical & Industrial Steel Services, Inc. of Joliet, IL to prepare components for the installation that had been planned over the preceding eight months. The installation was to be the first ever designed, of its kind, for a vertical axis wind turbine (VAWT) mounted on a tower in an enclosed 'cage'. Its goal was to demonstrate the viability of a "super-safe" vertical axis wind turbine designed for urban use by Bil Becker in collaboration with structural engineer MaryLynn Zajdel of Drucker Zajdel Structural Engineers of Naperville, IL. The criteria for designing the system, needed to successfully comply with a City of Chicago review for structure and building permit requiring that:

- The completed turbine and tower had to meet rigorous structural mandates required of a 'one-of-a-kind' tower installation capable of supporting its own weight plus the weight of a ½" thick covering of ice on ALL surfaces. This mandate demanded an extra stout tower structure custom welded with oversize tubular steel.
- The turbine had to be quiet in operation, with no discernable noise over "ambient".
- The turbine had to be completely safe in operation with no concerns for 'run away', ice throws, high vibration transfers to the tower and with minimum system maintenance.
- The turbine had to produce enough power to strongly impact the power use for the administrative offices at Christy Webber Landscaping.
- The turbine had to be durable (5-year warranty) with a 30-year expected life, and be simple enough that a facility management staff could become skilled in taking over maintenance after a one-year period of 'optimization' and onsite training.
- The turbine had to qualify as a LEEDs renewable energy addition and have low/no toxicity, be made with a majority of recyclable materials and be durable as compared to other exterior building materials.

Partial funding for the demonstration project had been received from the City of Chicago to be matched by Christy Webber Landscaping, Inc.. The design team was

led by Bil Becker of Aerotecture International (AI). The Becker Renewable Energy (BRE) engineering and installation team was led by Christian Becker. Significant contributors to the project were Lisa Becker, Michael Eviston, Oliver Popadic, Nelson Aguilar, James Magee, Kurt Holtz, Robbie Harris and Dean Wynne. The architects, Farr Associates were led by Doug Farr and Patrick Danaher. The general contractor, George Sollitt Construction, Inc. was led by Tom Baker and Lan Mills. The electrical engineers on the project were CCJM led by Anil Ahuja, and the electrical subcontractor was Title Electric led by Ron Obara and Mark Arunno**.**

- **Christy Webber Landscaping, Inc.** with its offices and greenhouse facilities is Leeds certified and is equipped with low-wattage fluorescent lighting, Energy Star appliances and the highest level of insulation compatible with this unique architectural Green design. Most of the hot water is provided by the large solar thermal array on the facility's south wall. The solar array, 'green roof, solar-heated greenhouse and integrated Aeroturbine add LEEDs features shared by no other commercial facilities in the U.S.

The Aeroturbine components for the facility involved the design, engineering and installation of the following systems:

1. A 620V Aeroturbine, rated at 1500 watts in 40 mph winds – producing variable 3-phase AC power from a 2500 watt alternator mounted between twin 'rotors'. The vertical Aeroturbine was mounted within a 6' x 20' welded and bolted 'cage' bolted to the top of a 50' welded and bolted steel tower. The tower is stoutly bolted to a circular concrete base anchored firmly 100 feet from the adjoining building. A buried power conduit connects the Aeroturbine to the nearby facility. Main wind access is from the SSW with secondary wind access from the NE. Due to the openness of the site, winds are quite strong year'round.
2. An Aurora 7200 Wind Interface unit from Magnetek, Inc. receives the incoming variable 3-phase AC power and converts it to variable DC. This same Interface protects the downstream inverter from high voltage 'surges' via a Diversion Load that is activated in very high wind conditions. It is expected that this Diversion Load will never be used due to the "self-regulation" inherent in the patented design of the Aeroturbine, making the entire installation the safest tower-based wind electric system ever installed.
1. An Aurora 3600 watt inverter converts the incoming DC power from the Interface unit into building-compatible 208 watt – 60 hz variable amperage power that is sent directly to the building's main panel. Most of the Aeroturbine power will be supporting lighting and office equipment.

The Magnetek 'battery-free' electronic control system requires a period of optimization and reprogramming of their Maximum Power Point (MPPT) settings in order for the Aeroturbine to operate a the specified 90% power conversion efficiency. Battery based systems typically operate at power conversion efficiencies one-half that rate. The single Aeroturbine is expected to produce over 2500 kWhs per year.

High-speed winds characterize the area (10-40 mph) in this open 'train yard' environment. Storm winds of over 70 mph have been recorded. The newly designed Aeroturbine has proved to be unique in meeting the need to supply sustainable and safe wind electric power within a variety of highly variable wind conditions in ways not currently available from any other wind power generating system.