

WindEEE: The World's First Wind Dome

Making global contributions to wind engineering and innovation



Be Extraordinary.

The Campaign for Western



Western

The World's First Wind Dome

Western is home to some of the most advanced wind research facilities in the world, transforming today's challenges and problems into tomorrow's opportunities and solutions. Western Engineering's newest facility, the Wind Engineering, Energy and Environment (WindEEE) Dome is joining forces with the Boundary Layer Wind Tunnel Laboratory and the Insurance Research Lab for Better Homes to improve our lives in the 21st century.

A New Approach to Wind Engineering

Disastrous weather extremes are costing lives, health and the economy. Over the past five years, deadly supercell thunderstorms have hit Europe, Africa and Asia, while record numbers of tornadoes have ripped across the United States. From 2012 to the first half of 2013, fatal tornadoes occurred in Poland, Japan, Indonesia, Turkey, and France.

Losses from such events have pushed the cost of weather disasters in 2011 to an estimated \$150 billion worldwide, a 25 per cent jump from 2010. In Canada, the total loss from downbursts, tornadoes, low-level currents, or thunderstorms exceed \$6 billion each year. Extreme weather events like Hurricanes Sandy and Katrina, tornadoes in Oklahoma and the supercell thunderstorms in Calgary and Toronto demonstrate the devastating impacts of inaction for managing risk, designing better communities and reducing global carbon emissions.

For communities, businesses and governments, the cost of doing nothing to assess and manage the risk, both of extreme weather events and reducing the global carbon footprint, is high. These extreme weather events demand a new approach to wind engineering; to date no facility has been able to replicate complex weather systems such as tornadoes and downbursts.

Western University's solution to these problems involves Western Engineering Professor Horia Hangan and a team of experts from around the world, who have built the world's first wind dome. The **WindEEE (Engineering, Energy & Environment) Dome** is poised to become the leading facility for wind research.

The WindEEE Dome offers unparalleled flexibility for researchers, industry and communities. It is the only facility in the world that can:

Engineering

- Create any type of wind system, including tornadoes, hurricanes, monsoons, downbursts
- Customize testing to specific regions for managing risk for severe weather

Energy (Sustainability)

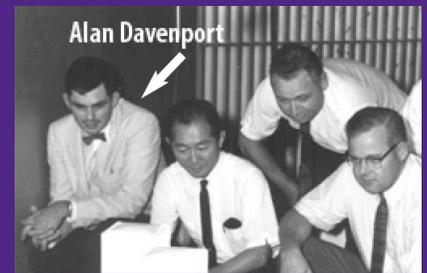
- Measure the wind energy potential of a structure, town or city
- Validate wind farm design with realistic atmospheric turbulence and shear conditions

Environment

- Become the world's most sophisticated weather machine to mimic rain, dust and ice storms, as well as testing patterns of airborne pollutants

World Leaders

Western has been the global centre of excellence for wind engineering for more than 45 years.



Western's Alan Davenport was commissioned to test New York's Twin Towers in 1964.



Since that time, hundreds of the world's tallest buildings and most complex bridges have been tested on campus by Western researchers.



As the lead investigator for the WindEEE Dome, Horia Hangan has spent the last 20 years studying how wind affects buildings, bridges, transmission lines, wind farms and urban landscapes.

Unique Design

The design of the Dome is unlike any other facility in the world. The matrix of fans gives researchers the ability to modify the wind patterns and change their direction during a simulation, something that has been impossible until now. The result is the creation of any type of complex wind systems—including hurricanes, tornadoes and downbursts. By recreating these systems, researchers will have the opportunity to test models of buildings, structures and fields in real-time and with the greatest accuracy to date.

Producing Any Type of Wind System

Current wind studies rely on conventional wind tunnels, which are essentially long rooms that use strong fans to blow the air in a straight line. The Dome is far more elaborate, and much larger; it is a six-sided structure that can recreate actual weather events like downbursts or tornadoes and thunderstorms, complete with rain and other particulates.



Louvres and openings for fans



Each fan is one metre in diameter



Ready for installation



Benefits of WindEEE

Although the Dome has been operational for a short time, the quality of the work of the researchers using the facility has led to the designation of the **WindEEE Research Institute**. The Institute will have a wide impact beyond the traditional boundaries of wind engineering, including:

- **Risk Mitigation**—for the first time in history, the impact of tornadoes can be studied, leading to better strategies for preserving life, building more resilient communities and managing risk
- **Better Buildings**—stronger building codes
- **Capital Cost Savings**—better testing means reduced emergency capital spending by electrical utilities due to damaged transmission systems
- **Sustainability**—lower cost, higher impact grouping of large-scale wind and solar energy systems
- **Commercialization**—link industry problems with potential solutions generated by world-class researchers
- **Training**—unparalleled educational opportunities for the next generation of wind engineers

Interface with Industry

The Dome's location at The Advanced Manufacturing Park in London, Ontario, Canada offers small, medium, and large enterprises with flexible access to a globally unique collection of facilities. We can offer both the people and the place to bring ideas to market.

A Global Centre of Excellence

The Dome is operational at The Advanced Manufacturing Park—a joint venture between Western University, the City of London and Fanshawe College—comprised of 25 acres of land, located minutes north of Highway 401 and east of Veterans Memorial Parkway. The Advanced Manufacturing Park is designed to foster collaboration between leading edge research, manufacturing, entrepreneurial and investment partners to rapidly generate high technology, manufacturing innovations and advanced solutions.

Advantages for Industrial Partners

- Zoned for full-scale manufacturing and large-scale research
- Growing list of contracts signed with leading, multinational manufacturers and advanced technology SMEs
- Support for technology commercialization that will allow the engagement and participation of multiple industry partners while ensuring the security of their IP and proprietary technology from competitive companies
- Location of the WindEEE Dome
- Home to the Fraunhofer Project Centre, North America's first full-sized production environment for the development, testing, and validation of lightweight materials and advanced manufacturing processes
- Convenient access to Toronto, Detroit, seven universities and 30% of Canada's population within a two-hour drive
- Served by rail and an international airport
- Many large industries nearby, including Hanwha, 3M Canada, Trojan Technologies, Cami Automotive, Toyota Manufacturing



The Advanced Manufacturing Park
2535 Advanced Avenue
London, ON N6M 0E2

Donor Benefits and Recognition

Naming the Dome

Western needs to raise \$3.2 million in support of the WindEEE Dome. We will be pleased to name the Dome in recognition of a generous gift. Private sector donations will leverage 4:1 matching funds from the Canada Foundation for Innovation and the Ontario Research Fund.

Helping to Shape the Future

Donors at \$250,000 and above will meet annually with researchers and graduate students and will be given detailed presentations of the Institute activities and its Annual Report. Moreover, these donors will have the opportunity to offer insights, suggestions and opinions to the Institute.

Proximity to Expertise

Industry support for the Dome will foster closer ties with the Western and affiliated research centres—creating opportunities for collaborative research projects.

Virginia Daugharty
Alumni & Development Officer
Western Engineering
t. 519.661.4209 e.vdaughar@uwo.ca
eng.uwo/windeee



Western

WindEEE Research Institute
Engineering, Energy & Environment