

Renewable Energy Research at Western University

With escalating concerns about global energy shortages and the impact of human activity on ecosystems, a great deal of attention has been invested in the advancement of knowledge related to renewable forms of energy, including solar and wind power, and biofuels. Western University is taking a leadership role in research across disciplines that will reduce the world's dependence on fossil fuels.

Wind Energy

- *WindEEE Dome*: the world's first hexagonal wind tunnel builds on expertise established by 45 years of leadership at Western's *Boundary Layer Wind Tunnel Laboratory*
- Helps make cities sustainable through better design and retrofitting of individual buildings and city-wide infrastructure to maximize energy savings and production
- Reduces energy losses caused by model uncertainty due to wind farm siting, terrain effects and wake array effects
- Helps address multi-faceted energy problems, including grid connectivity and solar- and wind-distributed nodes, as well as green energy policy and implementation

Biofuels and Alternative Energy

- A novel class of fuel cell developed at Western is expected to produce electricity while consuming carbon dioxide, making it the most energy-efficient fuel cell yet
- *Power Systems Engineering Group*: working to restructure the electric industry and accelerate the growth of clean energy sources, such as fuel cells
- *Particle Technology Research Centre*: pioneering such alternative energy projects as biodiesel production, semiconductor photocatalysis to produce clean fuel, and manufacturing carbon nanotubes for solar energy
- *Chemical Reactor Engineering Centre*: developing such innovative green reactor technologies as the catalytic desulphurization of gasoline, design of novel fuel cells and treatment of toxic contaminants in air, water and soil through advanced oxidation processes
- *Ontario Bioindustrial Innovation Centre*: Western-led initiative advancing research and development of environmentally friendly alternatives to fossil fuels, and integration of the renewable bio-based and traditional petrochemical industries
- *Western Bioproducts Initiative*: promotes sustainable farming and renewable energy development through a biogas facility in Ilderton, Ontario and the *Institute for Chemicals and Fuels from Alternatives (ICFAR)*
- The biogas facility is equipped with a biodigester system to convert manure and wastewater into energy while reducing greenhouse gases
- *ICFAR*: generates functional biofuels that serve as alternate energy sources, while emphasizing green engineering and environmental sustainability
- *Agricultural Biorefinery Innovation Network for Green Energy, Fuels and Chemicals (ABIN)*: national research network of researchers, government and private sector partners developing integrated "biorefining" processes for the effective and economical conversion of renewable biomass into energy, fuels and green chemicals

Solar Energy

- *Surface Science Western*: Canada's most comprehensive surface analysis laboratory is advancing research related to solar cell materials and hydrogen storage
- Other multidisciplinary research efforts are optimizing solar thermal collectors, developing novel nanomaterials for energy storage and fuel cells, and improving the photoefficiency of organic semiconductors used in all-organic solar cells
- Home to a large-scale initiative integrating solar power with the grid, in coordination with faculty members at Western and the University of Waterloo, and supported by Hydro One, Optisolar Farms Canada, London Hydro and Bluewater Power, Sarnia



Researchers at Western are developing novel materials that enhance solar energy production and storage.

For more information, please visit: www.uwo.ca



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