



Research in Energy and Power

The world is facing enormous challenges in providing long-term sustainable energy resources. Murdoch University has exceptional researchers working in areas essential to addressing these challenges. Through the cross cutting-edge research on sustainable energy and power, the Murdoch University Energy Research and Innovation (MUERI) group creates a synergistic effort capable of tackling the tough problems in power systems planning and stability; renewable energy based electrification; future electricity networks; energy related technologies, efficiency, management, economics, and policy; and the water-energy nexus. The team has developed innovative technologies and systems in partnership with industry to drive local, national and international communities and industries towards new market opportunities in the power, energy and water sectors.

Research Facilities

The renewable energy indoor and outdoor facilities including; sophisticated testing, modelling, and analysis tools allow the researchers and students to conduct comprehensive research in the power and energy domain. Murdoch University hosts a Renewable Energy Outdoor Testing Area (ROTA) and a test laboratory suitable for research and development of solar PV, solar systems, energy storage, mini grids, solar thermal, wind turbines, and hybrid systems. Researchers also have access to the Algae R&D Centre which is an integrated indoor and outdoor algae culture facility.

The majority of practical experiments and exposure to renewable energy systems are facilitated through :

- Fully-monitored Renewable Energy Power System (REPS) training facility which comprises of a 1.4 kW wind turbine (WT), a 1.2 kW PV array, a 6 KVA diesel generator, a programmable load bank and a 5 kW off-grid inverter
- In addition to the REPS, ROTA contains 3 WT (1 kW, 5 kW and 30 kW), sun simulator, concentrated solar trough systems, solar thermal hot water system and 30 m meteorological mast
- Test laboratory equipped with a 25 kW PV array simulator, 45 kVA AC source, 27kVA diesel generator, environmental chamber, a battery charge controller test facility, a 4.5 kW configurable PV array and power quality assessment equipment
- Fully-monitored 8 kW roof-top PV training facility
- Sky camera network for short term solar forecasting
- Thermal test facilities for energy storage
- Two solar module flash testers and a PV array simulator
- Plasma Enhanced Chemical Vapour Deposition (PECVD) system
- Algae R&D Centre equipped with outdoor ponds, bioreactors, controlled environmental chambers, basic and analytical equipment (i.e. lipid, hydrocarbon, protein, carbohydrate)

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Collaborations in research programs with industry and other appropriate disciplines are welcomed.

For further information

<http://murdoch.edu.au/SEIT>



Testimonials from students



"Studying my PhD at Murdoch has been incredibly rewarding and exciting. The learning environment is fantastic with very supportive and encouraging supervisors, other staff and postgraduate students. My professional network has been extended beyond what I could have imagined through presenting at international conferences, participating in overseas workshops, and carrying out fieldwork abroad with trips to Ethiopia, Hong Kong, Germany and Rwanda."

Gloria Rupf



"As a person passionate about renewable energy, doing a PhD at Murdoch University was a fantastic opportunity for me to share my knowledge and experiences with others; listen to others, and enhance my skills and experiences in the renewable energy field."

Amir Bashirzadeh Tabrizi

Research collaboration

MUERI has collaborated with the following organisations:

Asian Development Bank (ADB), Australian PV Institute, Australian Synchrotron, AMPC, ANSTO, Bunnings Group Pty. Ltd., Defence Housing Australia, Department of Water (WA), Direct Energy, EMC Solar, Enerbi Pty Ltd., Foundation Housing Australia, Harvey Beef, Horizon Power, International Energy Agency, Landcorp, Master Builders, Next Energy, Regen Power, Solar Matrix, WA Department of Development, Western Power, Wise Earth Pty. Ltd., Wheatbelt Commission.

Research areas

ENERGY EFFICIENCY

- Energy efficiency in building and industry
- Lifecycle analysis
- Energy management
- Control strategies of appliances

ENERGY SYSTEMS ENGINEERING

- Energy system modelling, control and optimisation
- Energy planning
- Energy water nexus studies

ENERGY POLICY

- Energy policy in developing countries
- Human behaviour and resource use
- Transaction costs and benefit–cost analysis
- Energy policy effectiveness

SUSTAINABLE DEVELOPMENT

- Energy and water sustainability
- Rural electrification using sustainable energy

BIOMASS, BIOFUEL AND ALGAE

- Advanced bioenergy production technologies
- Integration of wastewater treatment and bioenergy production
- Sustainable transport fuels production
- Effective utilisation of light in the growth of microalgae
- Saline algae for biofuel production
- Non-destructive hydrocarbon extraction

SOLAR PHOTOVOLTAIC

- Novel materials
- Selective surfaces
- Safety and performance
- Solar cell diagnostic and testing
- Balance of system

SOLAR THERMAL

- Energy for desalination
- Concentrating solar thermal power
- Solar hot water

WIND

- Safety and performance
- Wind resource studies
- Turbulence
- Loads and fatigue
- Small wind turbines

ENERGY STORAGE

- Novel materials
- Electric vehicle applications
- Alkaline, lithium and sodium-ion batteries for renewable energy storage

RENEWABLE ENERGY BASED ELECTRIFICATIONS

- Grid-connected systems
- Off-grid systems
- Energy storage systems

POWER SYSTEMS ANALYSIS

- Power system modelling
- Reliability and resiliency
- Stability and Protection

DISTRIBUTION SYSTEMS PLANNING

- Optimisation of network and non-network solutions
- Electric vehicle
- Battery storage

POWER ELECTRONICS

- Application and control
- Power quality improvements
- Reactive power compensation

FUTURE ELECTRICITY NETWORKS

- Smart Grid
- Microgrid
- Active distribution network

Want to know more?

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