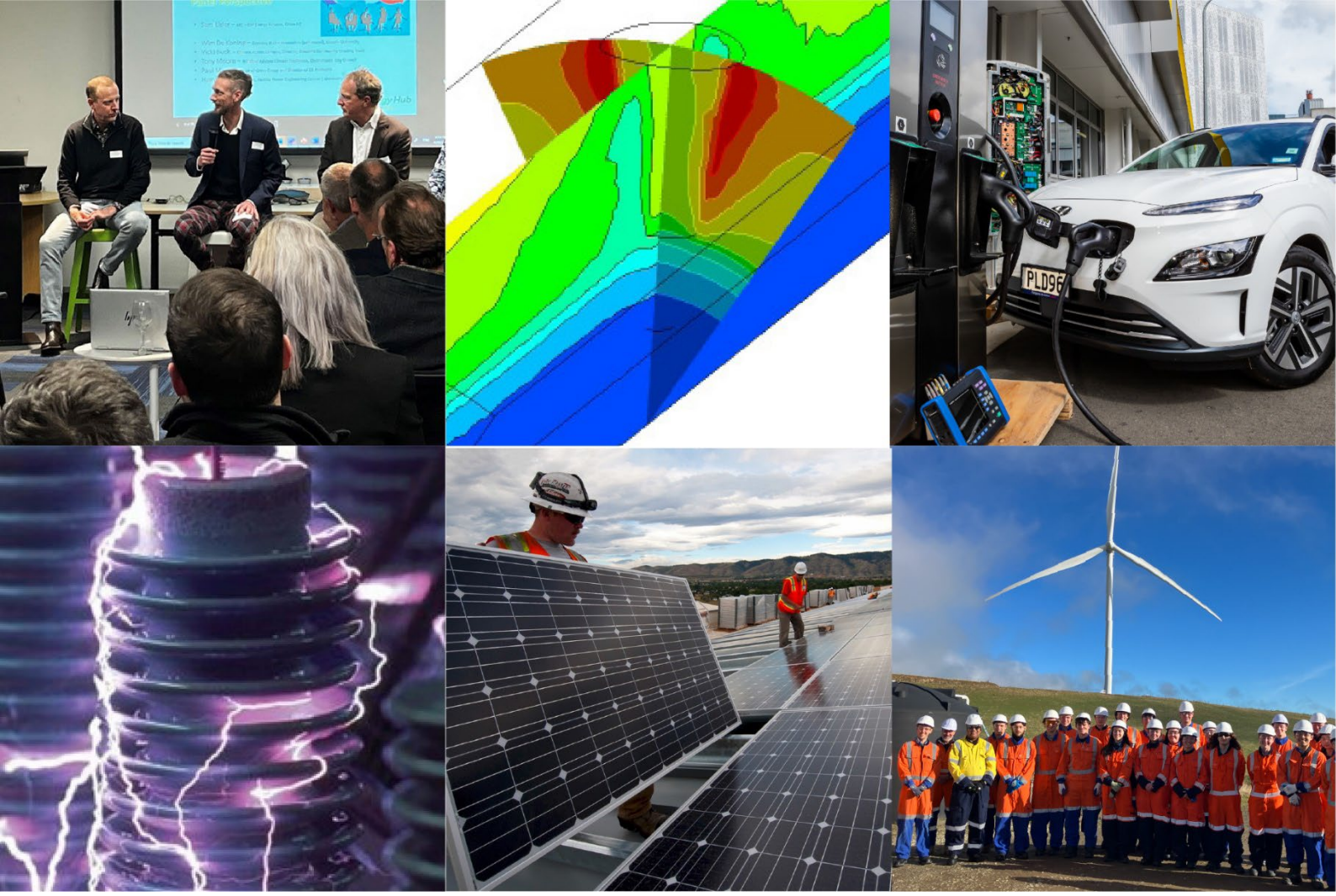
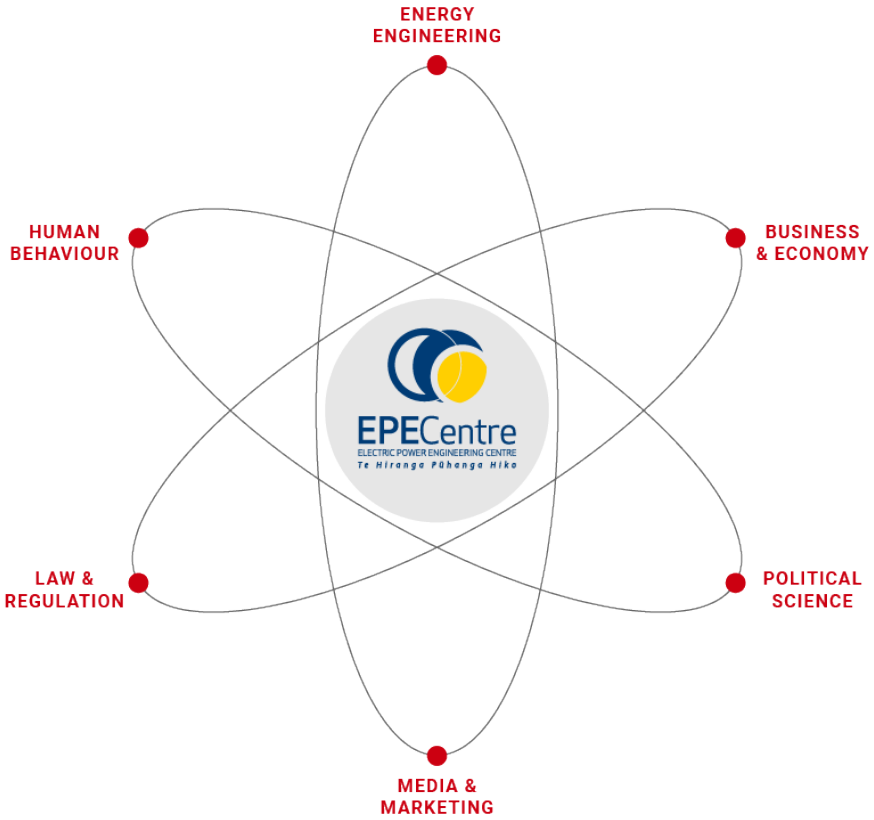


Capabilities & Experience

EPECentre
ELECTRIC POWER ENGINEERING CENTRE
Te Hiranga Pūhanga Hiko

UC
UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND



EPECentre is partnered across industry, community, and academia to drive the transformation to a clean energy future.

The EPECentre is the nation's only transdisciplinary team dedicated to accelerating the energy transition through research, industry partnership, and community collaboration.

Contact us

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New Zealand

Capabilities

The following is an inexhaustive summary of the capabilities of the EPECentre researchers.

Oversight
Interdisciplinary research dedicated to accelerating the energy transition
Project planning and management
Technical and academic supervision
Environmental and natural resources law in transnational, interdisciplinary contexts
Transnational law and policy framework on Indigenous water rights

Energy Transition
Energy supply and demand modelling
Cross-sectoral systems analysis
Transition pathways analysis
Resilience and sustainability assessment
Sustainable transitions

Adoption
Techno-commercial analysis; financial, operational performance (losses, RAM)
Risk identification, mitigation and management
Market analysis; user barriers and enablers to adoption of energy innovation

People and Communities
Community engagement and participatory methods
Social and behavioural systems analysis
Identifying triggers for change

Developing and evaluating interventions / strategies for change
Integration of Indigenous knowledge and perspectives
Tailoring and targeting communications for distinct audience groups
Public communication, including communication networks/relationships and analysis of language

Power System Engineering
Steady state, harmonic, dynamic and transient AC and DC power system modelling, design and analysis
High voltage and high current design
High voltage and high-power testing
EMC, EMI, RFI testing and solution design
Protection design, co-ordination, implementation
Insulation co-ordination
System integration studies

Modelling & Analysis
Software tools - MATLAB, SINCAL, COMSOL, Ansys, Open DSS, PSCAD/EMTDC, Python, R, SPICE, Altium, C, C++, ArcGIS, Anylogic
Algorithm development
Data science and statistical modelling
Thermal modelling
Fluid dynamics modelling
Mixed integer linear programming
Energy modelling and system optimisation
Finite Element and Finite Volume Modelling
Near-field optical analysis and electromagnetic simulations
Optimisation - linear, quadratic etc.

Electronics, electro-magnetic, power electronic and power system modelling and analysis
Hierarchical control design and implementation
System/process modelling
“Big data” and data processing
Transport Modelling
Microsimulation
Agent-based modelling
Machine learning (supervised/unsupervised)
Geospatial analysis (GIS)

Electro-magnetics
Motor, drive and actuator - design, construction and testing
High frequency power transformer, current transformer and inductor design, construction and testing (ferrite, amorphous metal and powder-iron cored)

Electronics & Power Electronics
Signal processing, including precision analogue and digital circuit design
Electron beam lithography
Developing nano-tech fabrication processes and process integration
PCB design
Switching circuit topology design, analysis, synthesis and implementation
IOT systems

Others
Scoping and requirement capture
Component and system testing
Chemical analysis and testing

Experience

Find below an extensive experience list for EPECentre researchers.

Project	Client(s), Funder(s) and/or Supplier(s)	Programme
Renewable Energy /Energy Transition		
NZ-German Platform for Green Hydrogen Integration (HINT)	Catalyst Funding	
Evaluation the opportunity to engineering transition to a low-carbon freight transport system in NZ	Swire Shipping	
Optimisation of a multiple tilt angle Solar system	DARC Technology	
Solar calculator	EECA	GREEN Grid
DGHost	Electricity Utilities and MBIE	GREEN Grid
Distributed generation (PV) connection guidelines	EEA and MBIE	GREEN Grid
Modelling NZ PV uptake	MBIE	GREEN Grid
Optimising power system reserve for contingencies while considering response times	MBIE	GREEN Grid
Fault location in distribution networks	Tait Electronics	
Modelling controlled hot water systems	EECA	
High resolution spatial and temporal solar, wind and wave power data series for New Zealand	MBIE	GREEN Grid
Design and execution of the solution to integrate off-shore windpark into an onshore grid	Tennet, GE	
Design and control of half-bridge DC connected dynamic braking system	Solution development, GE	
Develop Vehicle Integrated Photovoltaic solutions	Horizon Europe	SOLAR-MOVE

Project	Client(s), Funder(s) and/or Supplier(s)	Programme
People and Communities		
Empowering environmental stewardship and Kaitiakitanga	National Science Challenge	
Enhancing climate change communication: Strategies for profiling and targeting Australian interpretive communities	National Climate Change Adaptation Research Facility (NCCARF)	
Reducing wood smoke pollution through effective education: A social norms approach	New South Wales Environmental Trust	
Combining community-based social marketing and technological innovation to combat wood-smoke pollution in regional Australia	Australian Research Council Linkage Grant	
Community led action for managing invasive animals	Invasive Animals Cooperative Research Centre	
Behaviourally effective communications and engagement for managing in invasive animals and weeds	Centre for Invasive Species Solutions	
Increasing stakeholder participation in biosecurity management	Western Australia Biosecurity Research and Development Fund	
Environmental and Natural Resources		
Blue carbon futures in Aotearoa New Zealand: Law, climate, resilience	Rutherford Discovery Fellowship	
Policy and legislation for ecosystem-based management	Sustainable Seas National Science Challenge	
Legal innovations recognising the rights of rivers	Riverine Rights Norwegian Research Council project	
Power System Engineering		
Network Waitaki - Probabilistic EV Hosting Study	Network Waitaki	
EV charger testing	EECA	

Project	Client(s), Funder(s) and/or Supplier(s)	Programme
International HVDC Consulting services and special study project	Industry consulting	
Architecture of the Future Low Carbon, Resilient, Electrical Power System (FAN)	MBIE SSIF - AETP	FAN
EV hosting study	Orion	
Investigation of low voltage distribution pedestals	Unison	
Repurposing EV batteries for stationary energy applications in NZ - Techno-commercial evaluation	DARC Technology	
High power testing (as a test engineer)	DNV-GL (formerly KEMA), STIMBR	Smart Electrode
High voltage testing	STIMBR	Smart Electrode
HVDC and FACTS system design, power system integration studies, protection and control design	Utilities world wide, GE	
Instrumentation & Sensors		
Design and implementation of electric and magnetic field measurement array to measure spatial current distribution in and potential distribution across isotropic or anisotropic media with electrical excitation	STIMBR	Smart Electrode
Design of wide range of signal conditioners and converters for thermo-couples and other sensors	Industrial Interface (UK)	
Novel cascaded CT-based current sensors, with bilateral depletion FET switches for measuring current distribution in and voltage distribution across novel (patented) segmented electrodes	STIMBR	Smart Electrode
Industrial Systems		
Cabinet testing	Industry consulting	
Smart Electrodes for log grading	Research grant	Smart Electrode
Reducing wood drying defects by increasing permeability though Joule heating	Research Grant	Smart Electrode

Project	Client(s), Funder(s) and/or Supplier(s)	Programme
Model-based predictive control of heating of anisotropic materials such as wood	STIMBR	Smart Electrode
Development of one dimensional model to predict the heating of anisotropic materials such as wood	STIMBR	Smart Electrode
Three dimensional modelling of Joule heating in heterogeneous, anisotropic media, such as wood	STIMBR	Smart Electrode
Process heat and energy modelling	IPL NZ, Boise-Cascade (USA)	
Process flow design, optimisation and instrumentation	Petrofac LLC	
Design of pneumatic scheme for log heating rig	STIMBR	Smart Electrode
Optimisation of CAPEX and OPEX (including RAM) as a part of solution design	GE Tenders and contracts	
Electromagnetic Solutions		
Electrical motor prototype development	Heroux-Devtek	
A new electromagnetic imaging method for advanced food process optimization	MBIE	Food Imaging
High magnetic field electric propulsion for space	MBIE	Electrification of Transport
High efficiency, lightweight propulsion systems for electrification of transport	MBIE SSIF - AETP	Electrification of Transport
Testing of FET Switching Thermal Performance	Industry consulting	
Ultra-high temperature brushless motors for geothermal industry, deployed internationally	MB Century Ltd	
Novel single phase permanent magnet motor custom-designed for volume production	Wellington Drive Technologies Ltd, Grundfos Management A/S	
Motor design consultancy	UBCO Ltd, AuCom Ltd	

Project	Client(s), Funder(s) and/or Supplier(s)	Programme
Actuator design consultancy	PulseData/Humanware Ltd	
Three-dimensional modelling of electromagnetic field distribution in heterogeneous, anisotropic media, such as wood	STIMBR	Smart Electrode
Patented magnetic components with optimally interleaved windings	Weir Electronics	
Electronics & Power Electronics Systems		
FET education tool	Energy Education Trust NZ	
Near-field optical lithography using evanescent waves	IBM	
Photonic crystal devices including a slow light device	IBM	
World's smallest SRAM cell (circa 2004)	IBM	
Battery Go-Cart synchronous MOSFET chopper with regenerative braking driving PM 24V motor	University of Canterbury	
Novel fluorescent tube replacement system with 3 LED strings (White, Cyan-Blue, Red-Orange) driven by single modified dual-mode buck/flyback-converter	Solar Bright - LED lighting	
Development of trapezoidal current driver for large electromagnet - resulting in the invention of a novel BH-bridge	SfTI National Science Challenge	Inverting Electromagnetics
Design and fabrication of a new generation of off-line switch-mode power supplies	Weir Electronics	Inverting Electromagnetics
Design and implementation of SCADA system implemented using Zigbee, MODBUS Ethernet and LabVIEW	STIMBR	Smart Electrode
Refrigerator fan motor drive COB update	Wellington Drives	
Performance evaluation of household technologies such as LED bulbs, heat-pumps and PV inverters	MBIE	Power Quality

Project	Client(s), Funder(s) and/or Supplier(s)	Programme
HVDC valve performance, rating and control	Utilities world wide, GE	
Design guideline package for LCC and VSC HVDC solutions	GE	