

EPECentre Research Update

EEA Asset Management Forum
June 2019



Our mission



Research & Innovation



The EPECentre is a world-class power industry research incubator that attracts academics and students from around the world.

Education & Outreach



We educate power engineers who will ignite innovation and work with their communities to provide electricity in smart and sustainable ways.



Major research projects to date



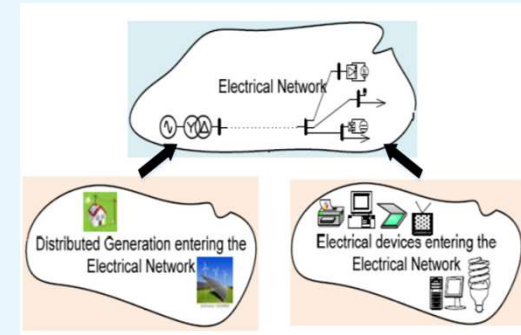
GREEN Grid (2012 - 2019)

- Managing Supply Variability of Renewable Energy in the network
- Cost effective functional and safe distribution network



Joule Heating Technology (2007-)

- Phytosanitary Treatment of Export Logs
- Timber processing
- Ancillary technologies for forestry industry



Power Quality (2008 - 2012)

- Interaction of loads and sources (particularly converter interfaced) within the power system

What do we have to offer?



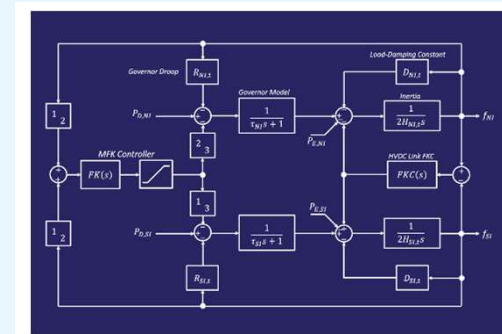
Power system engineering

- HV testing and partial discharge analysis
- Power quality and mitigation measures
- Modelling assets and interaction



Renewable energy design & integration

- EECA energywise™ solar calculator
- DGHost™
- Contribution to AS/NZS 4777.2
- Testing of Inverter technology



Analysis optimisation & control

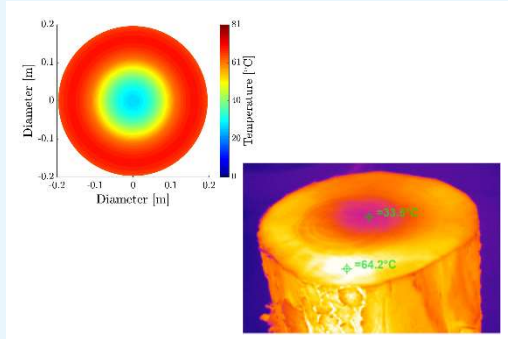
- State estimation from limited measurements
- Harmonic power flows, cross-coupling and state space analysis
- Statistical characterization
 - Impact on power quality
 - Management of energy sources, storage and ancillary services

What do we have to offer?



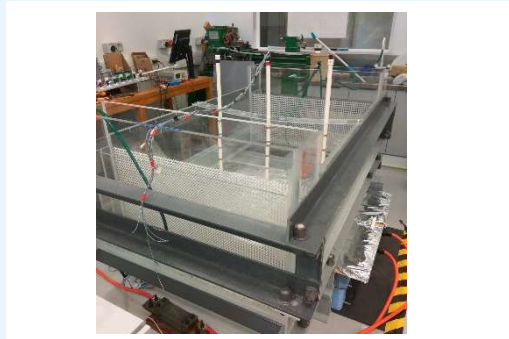
Electrical machines and electro-magnetic devices

- Ultra high temperature brushless motor design
- Large scale magnetic levitation for seismic base isolation



Finite element & volume modelling

- Electro-magnetic – motor and transformer design, characterisation of partial conducting material
- Thermal – simulating Joule heating in anisotropic heterogeneous materials, such as timber and food

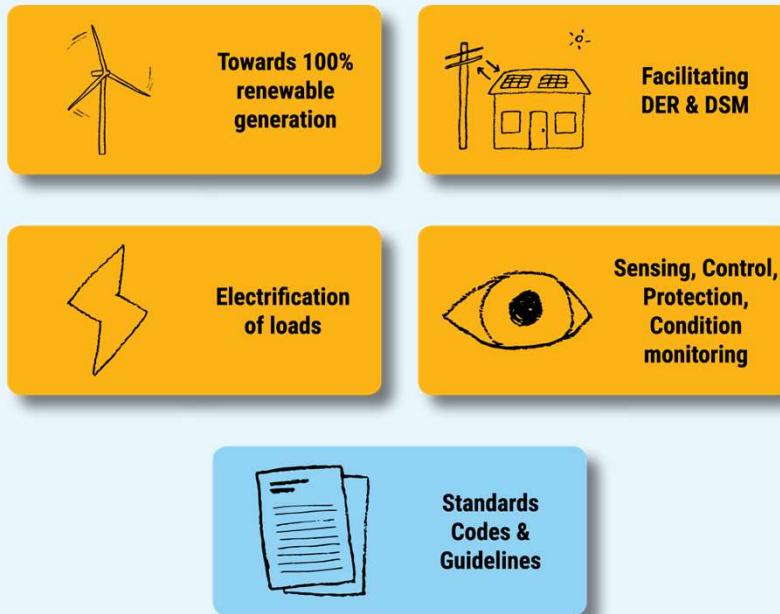


Power electronics and sensor technology

- High power excitation circuit for electro magnetic flow metering of aquifers
- Wide band width current measurement, minimising phase delays

Collaboration for the next generation of electricity infrastructure

EPECentre



UC Collaborators

Wireless Research Centre



Chemical & Process Engineering



UC Business School



Potential projects identified through Industry workshops

Distributed Technology (DT):eg PV, EV, BESS, variable loads

- Energy modelling
- Ancillary services
- Management and control design

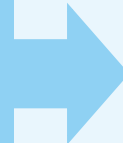


- DT hosting
- Emergency services infrastructure
- Grid connected PV+BESS system
- Commercial and residential systems
- Power electronics tap-changer: development and coordinated control

Potential projects identified through Industry workshops

Electricity infrastructure planning & operation

- Models and limitations
- Determination of the essential data set for decision making



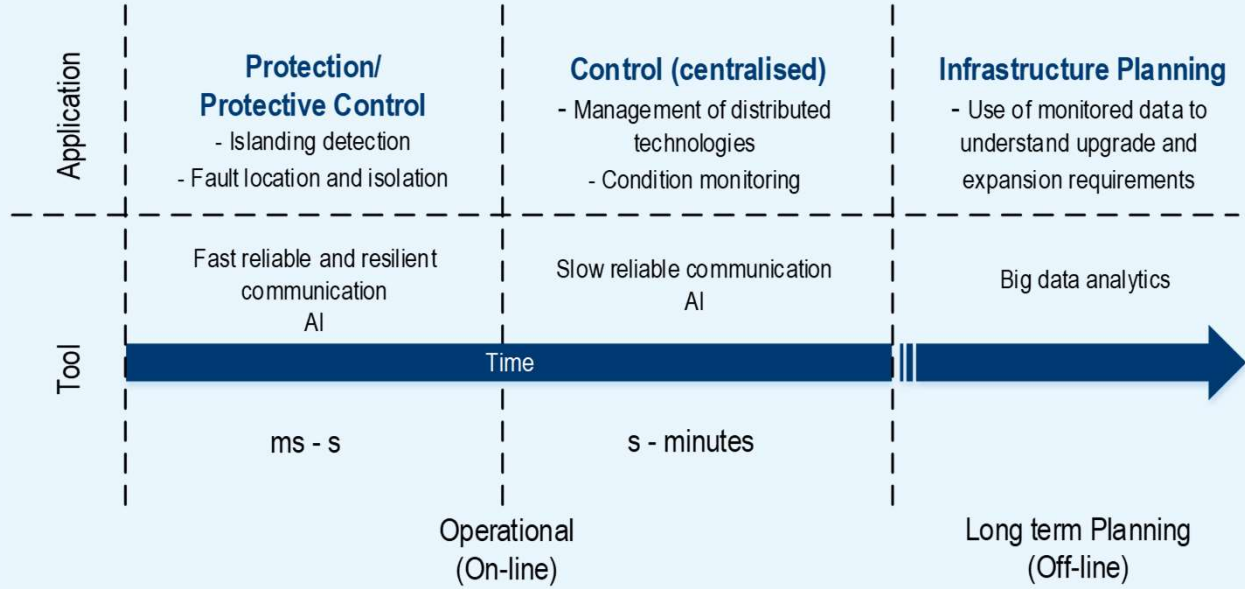
- DT, Storage
- Overlap – dynamic modelling and planning models
- Condition monitoring

**Power System
Stability**



Potential projects identified through Industry workshops

Communication, AI and Big data analytics



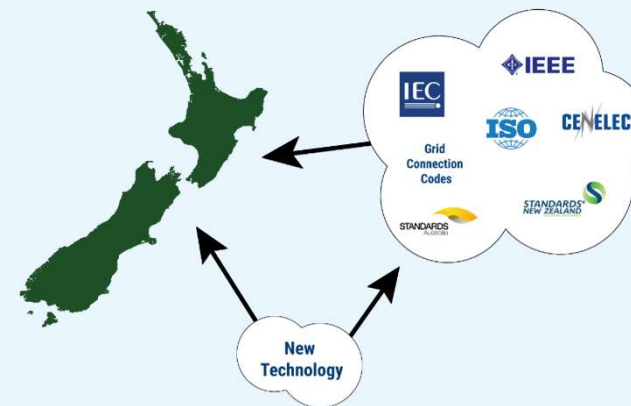
Potential projects identified through Industry workshops

Vehicle to grid technology evaluation



International standards, grid codes & guidelines:

- Assessment
- Alignment
- Determining gaps



Value of collaboration and co-ordinated research activities

