# Renewable Energy Microgrid

# Aiming for carbon neutrality by 2030.

Deakin University is establishing a Renewable Energy Microgrid at its Geelong Waurn Ponds Campus, in partnership with AusNet Services and Mondo Power.



# Deakin's Renewable Energy Microgrid

The Microgrid is a 7.25 megawatt renewable energy system being established at Deakin University's Waurn Ponds Campus, in partnership with AusNet Services and Mondo Power.

The term 'microgrid' refers to various types or sources of energy generation coming together into one system. The Deakin Renewable Energy Microgrid consists of:

- 7 megawatt Solar Farm and central battery storage system on 14.5 hectares at the rear of the campus.
- 0.25 megawatt solar generation and battery storage systems installed on existing campus buildings.



• A Research, Teaching and Visualisation Centre in the Centre for Advanced Design in Engineering Training (CADET), Building KE. This Centre will create a focus for research and teaching, and assist in showcasing the system for industry and community education. Training our energy professionals of the future.



Artist's impression: overall plan

# Why is it needed?

The current global energy system is undergoing rapid transformation, with a focus on using renewable energy to improve sustainability and economic growth of our communities.

The Microgrid is an opportunity to undertake critical research in the field and provide guidance and leadership to industry and communities for future energy system development. It will deliver a broad range of benefits to Deakin, the energy industry and wider community:

#### Sustainability

- Supply around 54% of the Waurn Ponds Campus' current power consumption.
- Reduce 12,000 tonnes of greenhouse gas emissions at the campus per year.
- Assist Deakin to achieve its aspiration to be carbon neutral by 2030.
- Focus attention on energy efficiency measures across the campus.

#### Education

- Support education and training for our energy professionals of the future.
- Provide a touchpoint for community learning through the Research, Teaching and Visualisation Centre.

#### Research

• Build Deakin's research capacity through a long-term joint research program with AusNet Services, as well as other strategic research partnerships.

## Why Waurn Ponds Campus?

The Waurn Ponds Campus is the centre of Deakin's energy research and provides a diversity of research opportunities that can simulate broader community and city environments. The size of the Microgrid, combined with its potential impact on the substantial energy consumption at the campus, provides a unique opportunity to conduct research of high value and validity with scope for meaningful extrapolation to grid-scale operations.

The campus also has sufficient land available to support this initiative, and the Microgrid is aligned with current land development concepts and the overall vision for the campus.

The Microgrid system will also form part of the new Geelong Future Economy Precinct on the campus, which will be a key driver of the region's economic transition.

#### What is the Research, Teaching and Visualisation Centre?

The Research, Teaching and Visualisation Centre will create a focus for research and teaching, and assist in showcasing the system for industry and community education. It will provide a touchpoint for schools, other universities and community interest groups to learn more about renewal energy.

The Centre will be a new space of approximately 120m<sup>2</sup> built on Level 2 in the Centre for Advanced Design in Engineering Training (CADET), Building KE. This building is located in a highly visible and centralised space on the main part of campus, with easy access to parking and other visitor amenities.



Artist's impression: Research, Teaching and Visualisation Centre

## Where will it be?

The Solar Farm will be positioned on approximately 14.5 hectares of farmland at the rear of the Waurn Ponds Campus. This site has been specifically chosen for its north-facing slope, which suits solar installations, and lack of intrusion on campus.

Nicol Drive South, an internal Deakin road, will be extended 700m beyond Waurn Ponds Estate to the west, to provide controlled access to the Solar Farm for maintenance and emergency vehicles.

The rooftop solar panels will be installed on several buildings across campus that have been selected due to their position and different type of usage:

- Teaching Building KE
- Industry Building NP
- Residential Buildings FK, FJ, FL and FM (existing panels that will be connected into the system).

The Research, Teaching and Visualisation Centre will be located in the main part of campus and provide the touchpoint for researchers, students and visitors.



Artist's impression: Solar Farm

#### What will the Solar Farm look like?

The Solar Farm will consist of a matrix of single-axis tracking solar panels. It will use a mechanised mounting system that follows the sun's path during the day, from east to west, sweeping across approximately 120 degrees.

The number and design of panels is yet to be determined as this is subject to the panel supplier selected. The typical distance between each bank of panels is 6m. The panel frame is made of matt galvanised steel. When the panel is at maximum extension, the structure will not exceed 4m in height. The panel face is made of low reflective glass to minimise glare and absorb the greatest amount of sunlight.

While 14.5 hectares has been nominated to accommodate the Renewable Energy Microgrid, this space will not be entirely covered in solar panels. The row of scattered trees along the western side of the site area will be retained. Additional plantings along the west and southern sides of the Solar Farm will be of mature height. This will minimise visual impact from adjoining properties.



Artist's impression: solar array

# How visible will it be?

Lines of sight from a number of view points along the main public roads to the west and south of the site have been considered.

The proposed landscaping improvements have been designed to minimise visual impact where there's a direct line of sight.

The existing western tree line will be retained, with additional tree planting to infill gaps. This will minimise visual impact from adjoining properties. The new trees will be Eucalyptus cladocalyx (sugar gum) and be of a sizable nature.

A new southern screen tree line will be planted along the Renewable Energy Microgrid and access road. The new trees will be Corymbia citriodora (lemon scented gum) and be of a sizable nature to minimise visual impact.

# Will it be noisy?

No, the solar panels are silent when operational. The central battery storage near the Solar Farm may require low volume cooling units. The rooftop storage units are silent.

# What other infrastructure is required?

Other supporting infrastructure required for the Microgrid will reflect leading edge technology with sufficient in-built flexibility to accommodate research priorities. This includes:

- High voltage connection of the Microgrid to the campus electrical system via the existing Western Feeder. Underground routing will be chosen where practical.
- Designated underground fibre optic data connection from the Microgrid to the Research, Teaching and Visualisation Centre to support the operation of the centre and its activities.
- Civil works to create the Solar Farm, including an access road (Nicol Drive South extension), fencing, landscaping and security cameras.

This work will all be undertaken over the next twelve months.

## Who will use it?

Access to the Solar Farm is for maintenance, emergency and other authorised personnel only. Students and visitors to campus will not have open access to the area; the Research, Teaching and Visualisation Centre will be the interface.

#### Community

The Research, Teaching and Visualisation Centre will provide a touchpoint for community learning, with the opportunity for schools, other universities and community interest groups to learn more about renewable energy.

#### Research

A research workforce of Postdocs, Research Engineers, PhD students and other personnel will be engaged to carry out research under two broad headings:

- Network Research
- Non-Network Research.

AusNet Services will provide substantial funding to support research programs over the next five years. Deakin will provide matching in-kind support for associated research programs.

The research will be conducted by many teams within Deakin, with internationally recognised capabilities in battery materials and technology, electrical and power engineering, intelligent energy system development, commercial analysis and policy.

## Students

In addition to research, the Microgrid focuses on joint development and refinement of educational programs between Deakin and AusNet Services as well as other key industry partners.

It will seek to enhance work integrated learning and internship opportunities with industry partners to generate real world experience and development for Deakin students.

#### Industry

The Microgrid will support education and training for energy professionals of the future. Regulatory bodies, such as the Australian Energy Market Commission, are responding to technical and market pressures to develop rules for the evolving energy system. The Microgrid is sufficiently large and flexible to provide a safe environment in which to trial and refine these new rules.



Artist's impression: data display

## Who will manage it?

Deakin University will own and operate the Microgrid.

Electrical system control for the campus, including the Microgrid, will continue to be managed by Deakin's Facilities Services Division. This is to ensure critical issues such as energy security and performance are not compromised.

#### **About AusNet Services**

AusNet Services own and operate the Victorian electricity transmission network, one of five electricity distribution networks and one of three gas distribution networks in Victoria.

AusNet Services Commercial Energy Services group provides a range of energy and infrastructure services to business, government, communities and households. These services include asset intelligence and advanced energy management solutions enabling community energy hubs and solar mini grids.

They are assisting with the Microgrid infrastructure implementation and partnering with Deakin on several research projects.

#### About Mondo Power

Mondo Power specialises in advanced energy management solutions for both commercial and community partners, with a focus on distributed energy offerings.

Mondo Power has developed Mondo Ubi<sup>™</sup> – an advanced energy monitoring and management system that delivers accurate and timely energy consumption information. This will be used in Deakin's Renewable Energy Microgrid.

## When will it be built?

Construction of the various Microgrid components will be in a staged process from October 2018 through to late-2019.

## What planning approvals are in place?

Deakin is working with the City of Greater Geelong Planning Department to ensure the project meets the required approval process, as the proposed location of the Solar Farm sits within a combination of Farming Zone and Public Use – Education Zone.

#### Project timing

October 2018 Construction commences

Late-2019 Microgrid operational

#### Will there be construction impacts?

During construction there is potential for some disruption to Deakin students, staff and visitors, as well as neighbouring community members.

#### On-campus

#### **Traffic management**

There will be construction vehicles travelling along Nicol Drive South, which forms part of Deakin's internal road network.

#### Noise

Given its distance from other buildings on campus, noise generated from installation of the Solar Farm is not expected to cause disturbance.

#### **General disruption**

There is a potential for disruption to occupants in the CADET building (KE) during construction of the Research, Teaching and Visualisation Centre, as well as those buildings where new rooftop solar panels are being installed (buildings NP and KE).

While this cannot be avoided, very noisy or disruptive works will be programmed to minimise impact, particularly during key periods of the University timetable.

Further information will be provided to these building occupants closer to construction.

#### Off-campus

#### **Traffic management**

There will be an increase in construction vehicles entering and exiting the campus via Pigdons Road and Entrance 1 during the construction period.

#### Noise

Given its distance from neighbouring properties, noise generated from installation of the Solar Farm is not expected to cause disturbance.

Modern construction techniques enable rapid construction with minimal impact.

# Further information

Please direct any questions to:

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In partnership with:



# deakin.edu.au/microgrid

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