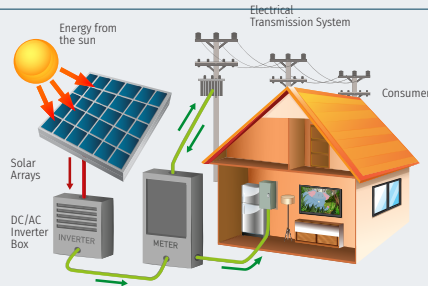


SOLAR FARM PROJECT

HOW DOES SOLAR POWER WORK?

Solar electric panels create electricity directly from sunlight. When sunlight hits the panels, semiconductors inside the solar panels are activated to produce usable electricity. In a solar farm, many individual solar panels are grouped together to produce a lot of electricity.

The equipment in a solar farm includes solar panels, racking, cables, inverters, transformers, and a power line or substation to deliver the power to the electric transmission grid.



Source: Vector Powersmart location Aitutaki, Cook Islands, commissioned June 2019, 737 kWp.

HOW MUCH SOLAR IS GENERATED IN NZ COMPARED TO OTHER FORMS OF ELECTRICITY GENERATION?

Most of New Zealand's electricity is generated by hydro, geothermal, wind, coal and gas.

The Government has committed to reaching net zero emissions of long-lived gases by 2050. The Climate Change Commission's advice to the government is that meeting these targets is possible – and can lead to a thriving, climate-resilient and low emissions Aotearoa. However, work must start now!

Our path requires rapid expansion of renewable wind and solar generation to meet increased electricity demand as electric vehicles are widely adopted, industrial process heat is electrified, and renewables displace coal and gas generation.

Hawke's Bay currently has 6.5 MW of installed solar generation capacity across 1,346 ICP connections (as at Nov 2019).

Location	Solar Radiation (kWh/m ²)
Blenheim	1,519
Tauranga	1,502
New Plymouth	1,501
Gisborne	1,498
Napier	1,495

Source: Transpower Report Te Mauri Hiko – the sun rises, January 2019

WHAT ARE HAWKE'S BAY AIRPORT AND MANAWA ENERGY PROPOSING?

Project description

In March 2022, Hawke's Bay Airport Ltd and Manawa Energy signed a joint venture agreement to confirm the viability of, and then establish and construct, a solar farm at Hawke's Bay Airport.

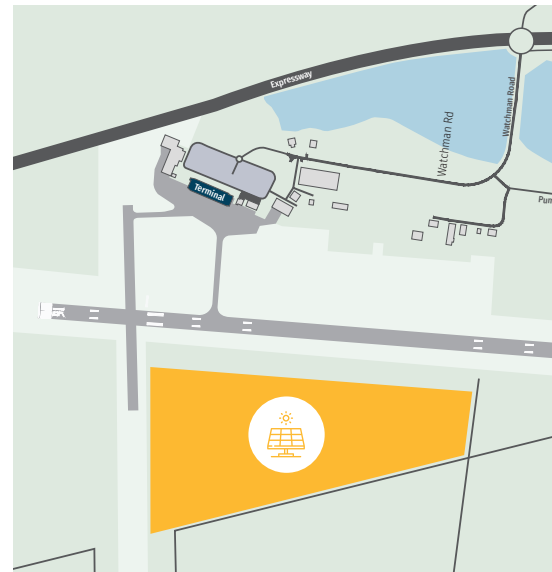
The project goal is to be the first large scale solar photovoltaic installation located on "airside" land in New Zealand, enabling Hawke's Bay Airport to be the first in New Zealand to be powered by solar energy. It will also provide significant renewable energy to export back into the local network and supply other local homes and businesses.

Project details

The proposed project is approximately 24 MW output

- 52,000 solar panels, 25 degree fixed tilt mounting system, due north orientation
- Five containerised 4400 MVPS inverters
- 1,515 kWh/kWp/year annual generation output
- Connection into Unison's network at the Tamatea sub-station
- 30.8 hectares of land on the western side of the Hawke's Bay Airport runway

Map showing proposed location



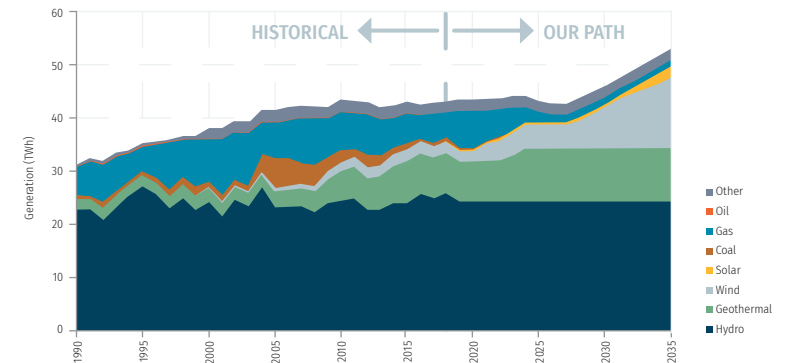
What will this supply? My home or only commercial businesses?

The proposed development will generate 36,000 MWh of electricity per year. This would be enough to power the equivalent of approximately 5000 – 6000 households a year.



Artists impression of Hawke's Bay Airports proposed solar farm

Electricity generation by fuel in our path



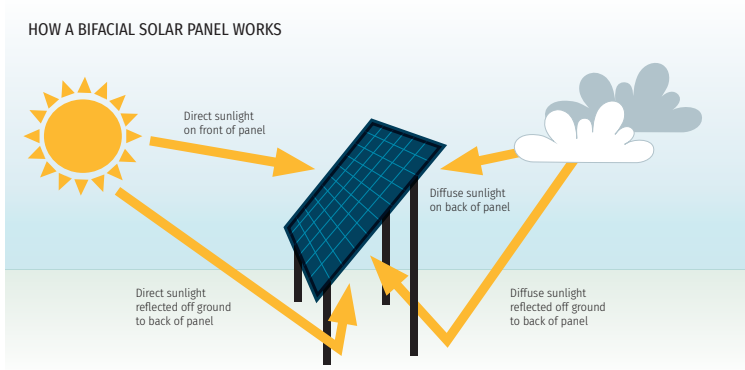
Source: Climate Change Commission Report, January 2021

New Zealand already has over 136 MW of distributed solar installed, with more than half of that installed over the past three years. While wind is still currently recognised as having the lowest levelized cost of energy in New Zealand, Hawke's Bay is more suitable for solar due to its high irradiance levels and low wind resource.

HOW EFFICIENT ARE SOLAR PANELS AND WHAT ARE BIFACIAL PANELS?

Solar panel efficiency is a measurement of a solar panel's ability to convert sunlight into usable electricity. Most solar panels are between 15% and 20% efficient at converting sunlight to electricity.

Bifacial panels have solar cells on both sides. The front captures incident sunlight while the back absorbs reflected light. More captured sunlight means greater solar cell efficiency compared with traditional solar arrays with only frontside solar cells. Bifacial panels can increase energy efficiency by 11% compared to a conventional solar panel system.



PROCESS

Oct 2019	Hawke's Bay Airport Sustainability Policy approved
Jan 2020	Airport Carbon Accreditation - Level 1 achieved
Nov 2019 – Feb 2020	Preliminary investigations
Jun 2020	Expressions of Interest for technical partner called for
Sep 2020	Technical Partner appointed – Vector Powermart
Sep 2020 – mid 2021	Feasibility Study
Feb 2021	Airport Carbon Accreditation - Level 2 achieved
Mar 2022	Partnership announced with Manawa Energy
Late 2022 – mid 2023	Consultation and resource consent process
2024	Construction
2025	Operation

WHICH OTHER AIRPORTS HAVE LARGE SCALE SOLAR INSTALLATIONS?

More than 100 airports around the world have large scale solar projects.



At Melbourne Airport, Australia, construction is underway on a 12.4 MW solar farm, large enough to power all four passenger terminals. Due to complete in 2021.



Darwin International Airport has a 5.5 MW system installed in two stages. It delivers 25% of the overall demand and meets peak daily demand. It is also Australia's most northern multi-megawatt PV array and the largest behind the meter system designed and built for a single building.



Cochin International Airport, in India is the world's first airport powered wholly by solar energy. They have 45 acres with 46,150 solar panels, completed over three phases (1.1 MW, 12MW, 13.4MW).

Below is a list of other airports across the world with solar installations:

- Gatwick (50kW 150m from runway)
- Heathrow – floating array on Thames QEII reservoir (6.3MW under flightpath)
- Belfast International (4.8MW adjacent to airport)
- Stanstead (2.5MW)
- Photon - Birmingham (50kW on terminal)
- Southend (120kW on terminal and 5MW under landing flightpath)
- Birmingham (50kW terminal roof)
- East Lanford, Cornwall (5MW)
- Dunsfold Aerodrome, Surrey (2MW)
- Cornwall Newquay (5MW)
- Prestwick (50kW)
- Manston (large solar farm 1.2km from runway 28 threshold)
- San Francisco (0.5MW on terminal)
- Oakland (6000 panels on terminal)
- Denver (11MW)
- Boston
- Indianapolis (12.5MW)
- Fresno Yosemite (2MW on site)
- Las Vegas
- Los Angeles
- Chattanooga, USA (5 acre array on aerodrome)
- Nellis Air Base Nevada (15MW)
- Kramer Junction, Victorville, CA, USA
- Blythe, CA, USA
- Pena Boulevard, Colorado, USA
- Bakersfield, CA, USA
- Oakland, CA, USA
- Albuquerque, NM, USA
- Boston Logan, MA, USA
- San Jose, CA, USA
- Houston, TX, USA
- Prescott, AZ, USA
- Yuma, AZ, USA
- Ben Gurion, Israel
- Adelaide, Australia
- Ancona Falconara, Italy (45kW on roof surrounding control tower)
- Athens International, Athens, Greece (8MW on aerodrome)
- Cochin International, India (12MW)
- Munich
- Saarbrücken, Germany (1.4MW)
- Zurich
- Changi
- Stuttgart