Ross Island Wind Diesel Project

engineering innovative power solutions for a better world.

Presented by:

Russell Cahill

powercorp

A couple of house keeping things first off:

My apologies for the strange accent but I have had it my whole life – So I hope you can understand me!

When I go to BBQ's and people ask me what I do….

50% Penetration

25% Penetration

10% Penetration

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Ross Island Wind/Diesel

meridian

powercorp

Raytheon Polar Services

Ross Island Wind/Diesel

Basic Facts:

- Coldest, windiest, highest continent
- 90% of World's ice
- 70% of World's fresh water
- Permanent Ice Cap up to 3km thick

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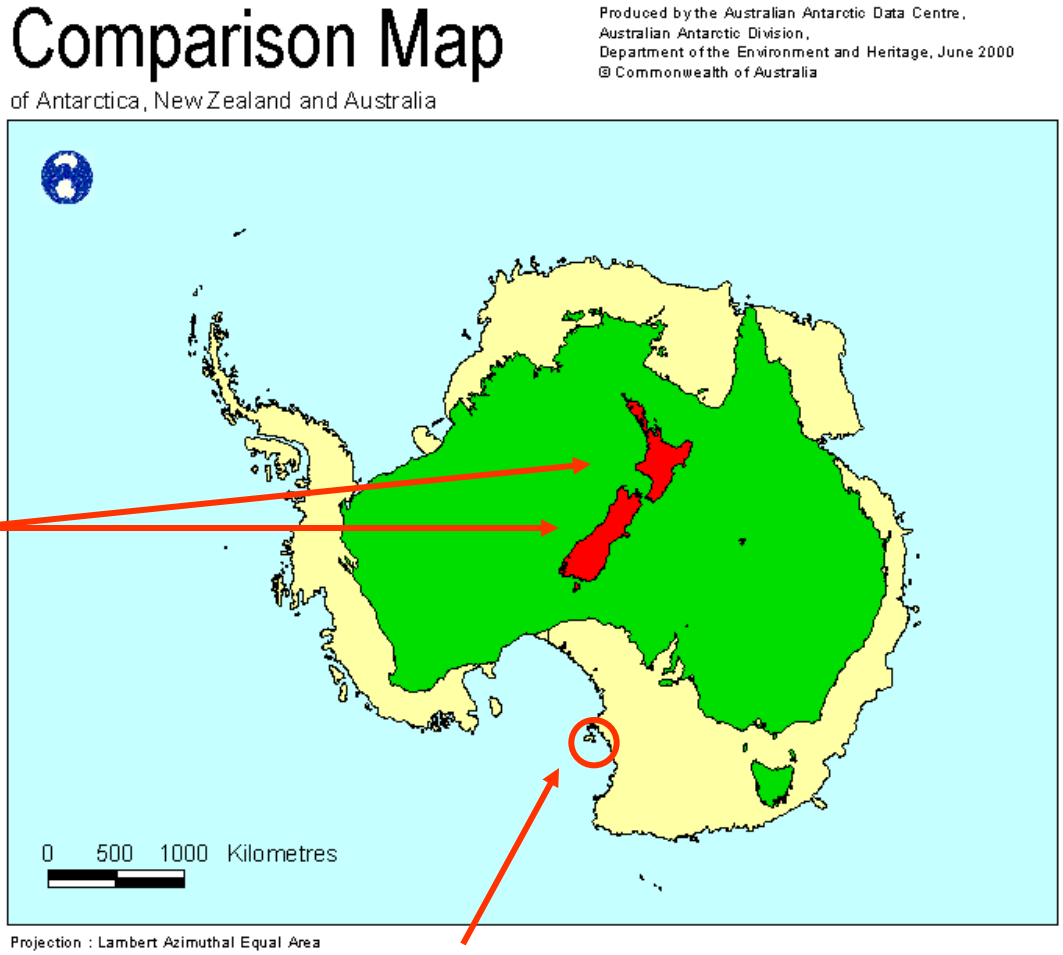

New Zealand

Ross Island

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- New Zealand's Scott Base houses up to 100 people, average load ≈ 150kW.

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- US McMurdo Station (3km from Scott Base) houses up to 1250 people. Average load ≈ 1.6 MW

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STAGE 1

Project to construct and integrate 3 wind turbines (1 MW total) on Crater Hill supplying power to, and linking the electrical grids of McMurdo Station (60Hz) and Scott Base (50Hz).

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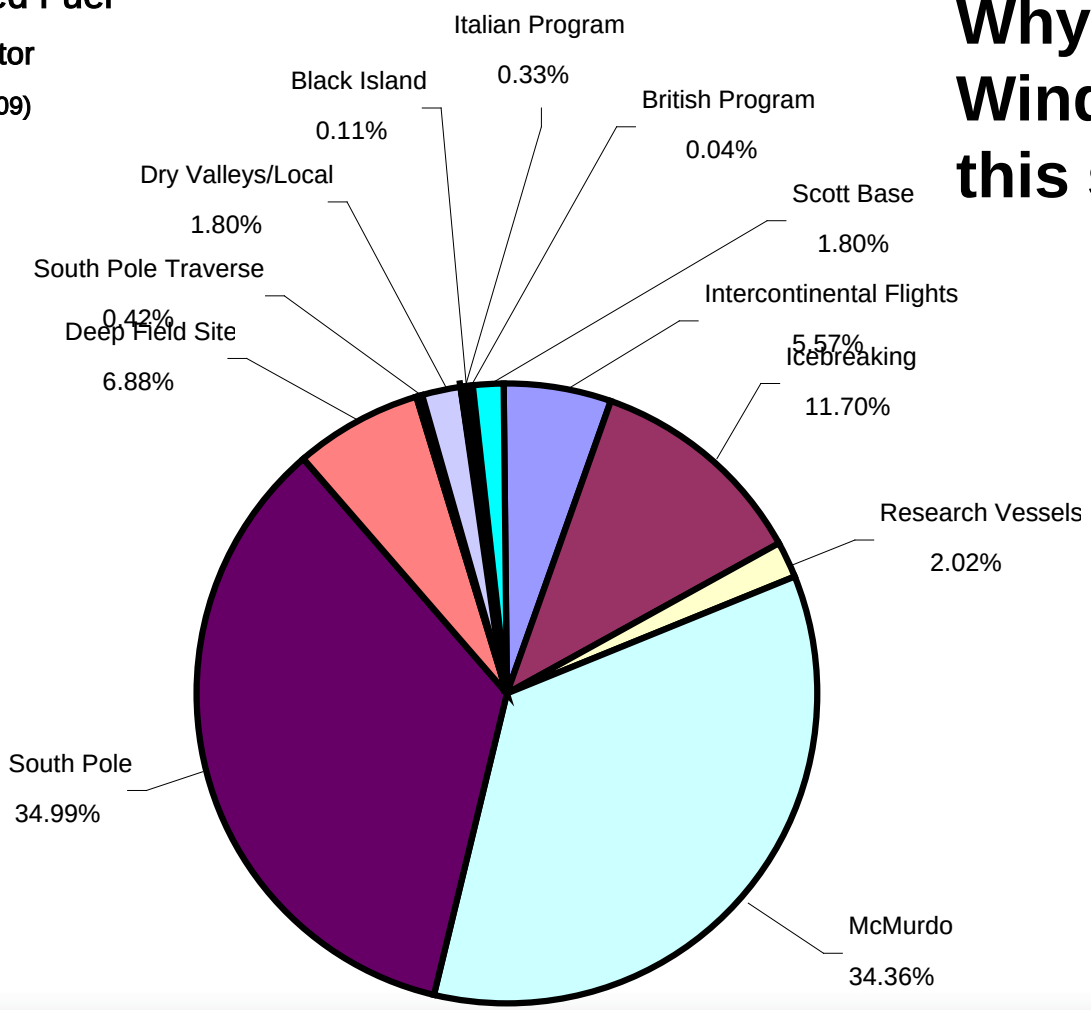
McMurdo-Based Fuel

Disposition by Sector

(27 Feb 2008 to 28 Feb 2009)



Why install Wind Diesel at this site?

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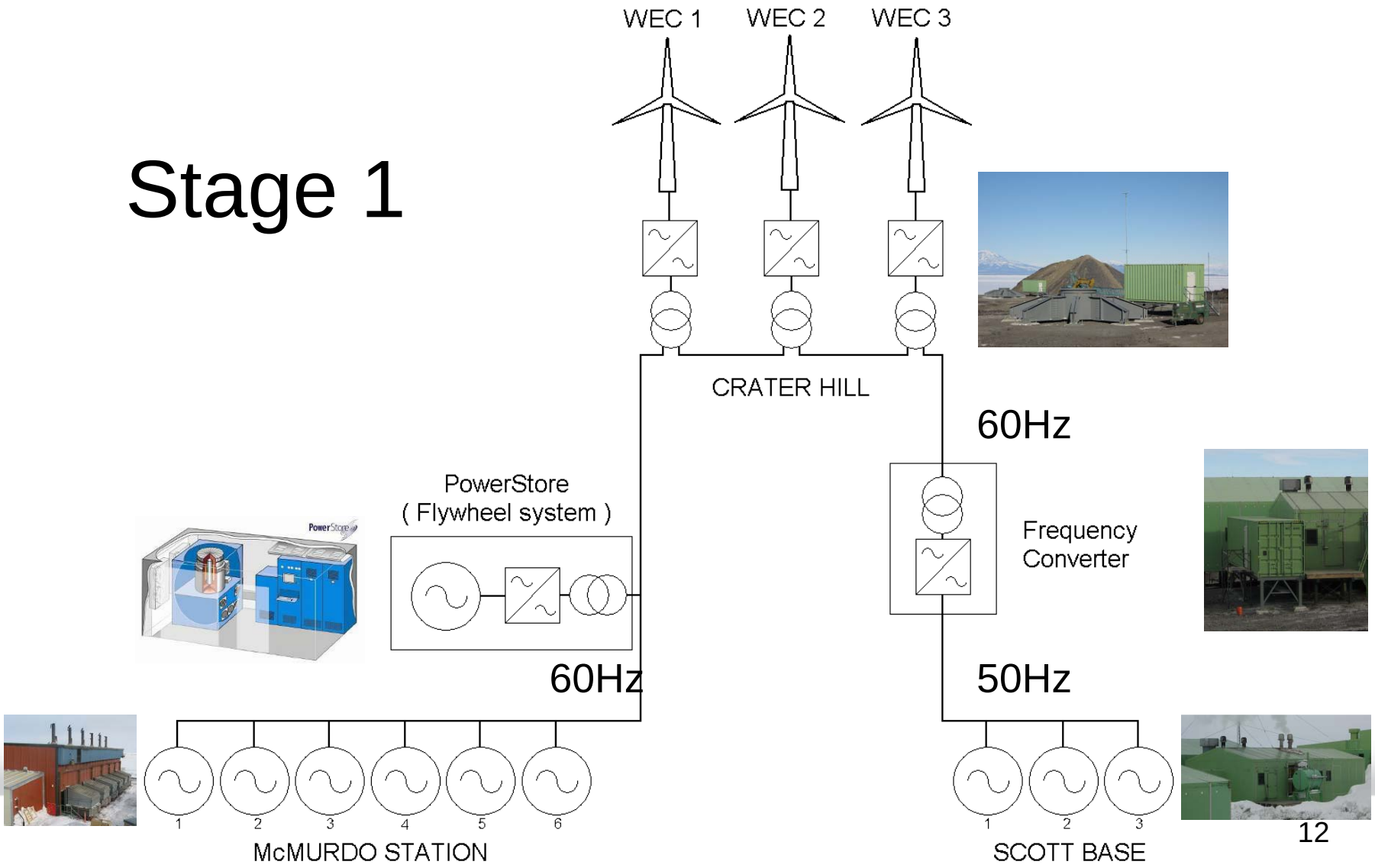
Stage 1



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Stage 1 Construction Schedule

• Installation of HV Bundle Cable between McMurdo Base and Scott Base (3km)	Complete
• Installation of Distributed Control System at both sites	Complete
• Installation of 300kW Frequency Convertor at Scott Base	Complete
• Installation of 500kW PowerStore	Complete
• System Commissioning	Complete

The Wind turbines will be installed in Nov 2009

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Summary of Stage 1

- Emissions reduced 1,243 t/CO_2 per yr.
- 11% fuel saving (463,000 litres/yr).
- 22% Annual Wind Contribution
- Up to 61% maximum penetration

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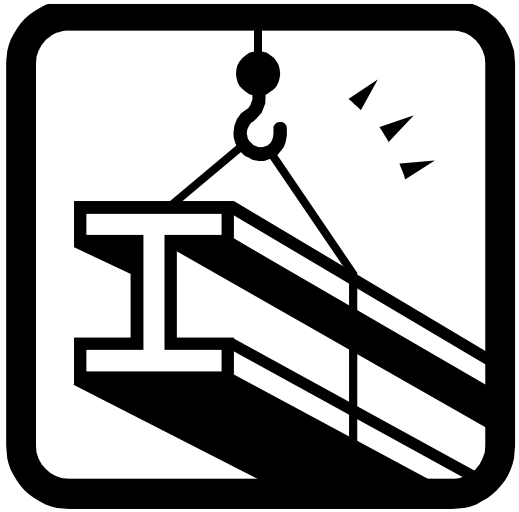
A bit about the equipment that was supplied and installed



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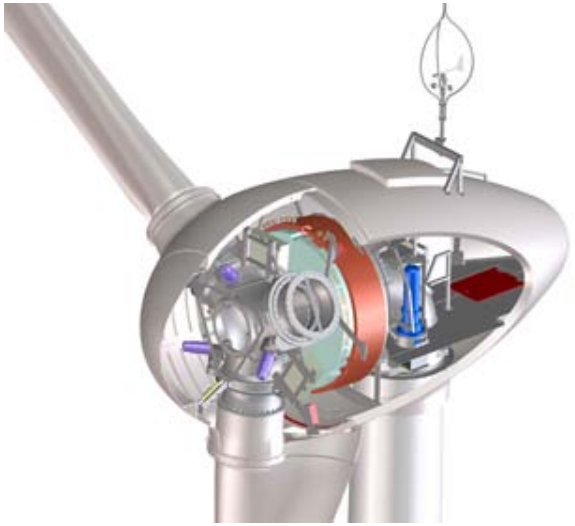
Wind Turbines: Enercon GmbH, Germany 3 x 330kW

- Components fitted into 40ft Containers – except blades.
- The E-30's installed into Antarctica 5 years ago with an earlier Powercorp System have proven to be excellent.



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300kW Frequency Converter

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PowerStore 500kW

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PowerStore 500kW

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- Manufactured by Piller GmbH
  - More than 1200+ units in service around the world incorporated in Piller's rotary UPS systems
    - 24x7x365 operation
    - UPS used by banks, data-centres, semi-conductor manufacturers
  - The PowerBridge flywheel has been in use since 1997.
  - The use of electromagnetic upper bearings to capture 90% of the weight increases bearing life out to 10 years
  - The use of helium reduces air-friction losses by more than 50%, whilst maintaining reliability

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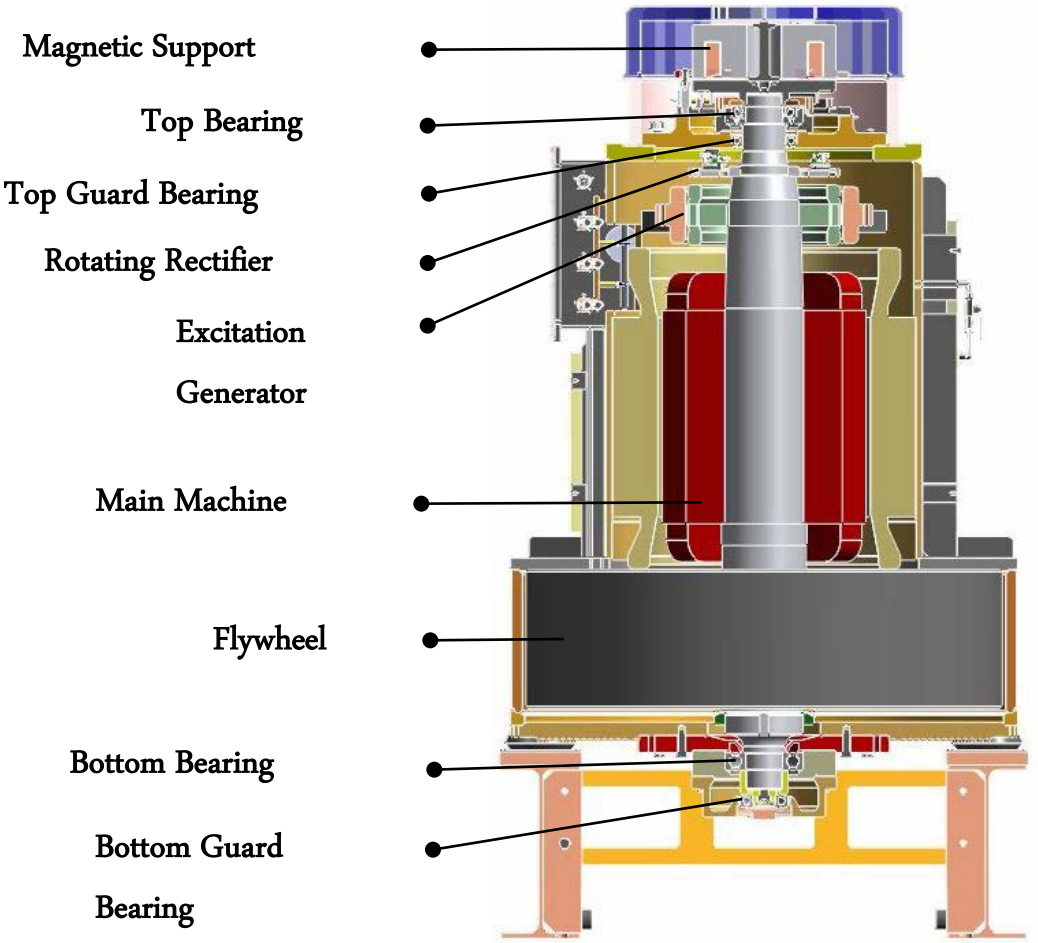

Performance Data:

Net. energy content	18 MWs
Max Input/output power	1650 kW
Speed range	1800 to 3600 rpm
Total weight	6000 kg
Rotor weight	2900 kg
Idling losses	10 kW
Greasing frequency	5 years
Bearing service life	8 years

Features:

- Helium filled
- Magnetic support
- Redundant bearings

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Three main Construction Challenges of Stage 1

1. Work Programme
2. Logistics
3. Site Temperatures

Something is not right here….

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Reliant on support from Antarctic New Zealand to house project workers at Scott Base and the USAP to transport plant & equipment.

Staff & some equipment flown on USAF C-17 (3 flights per week) & 1 annual Supply Ship for large equipment and fuel towards season end.
In February each year.

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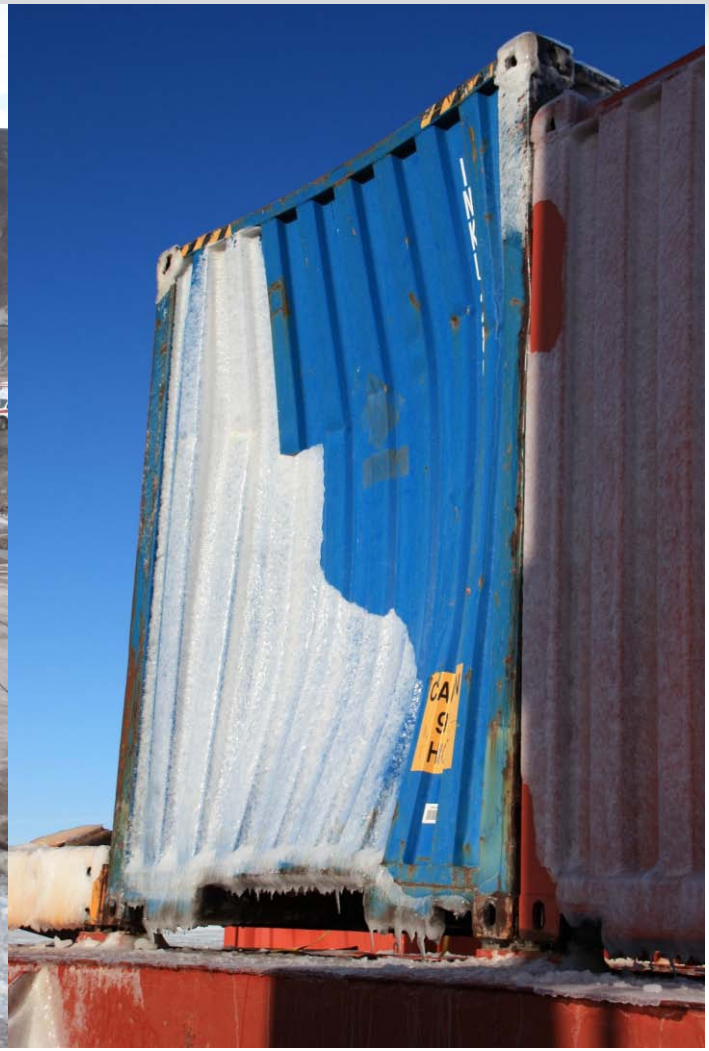

Damage to Project Container on MV American Tern from 10m waves during voyage storm

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Winter storage of the Wind Turbine Blades, Tower Sections & Containers in McMurdo Gap (Feb 2009)

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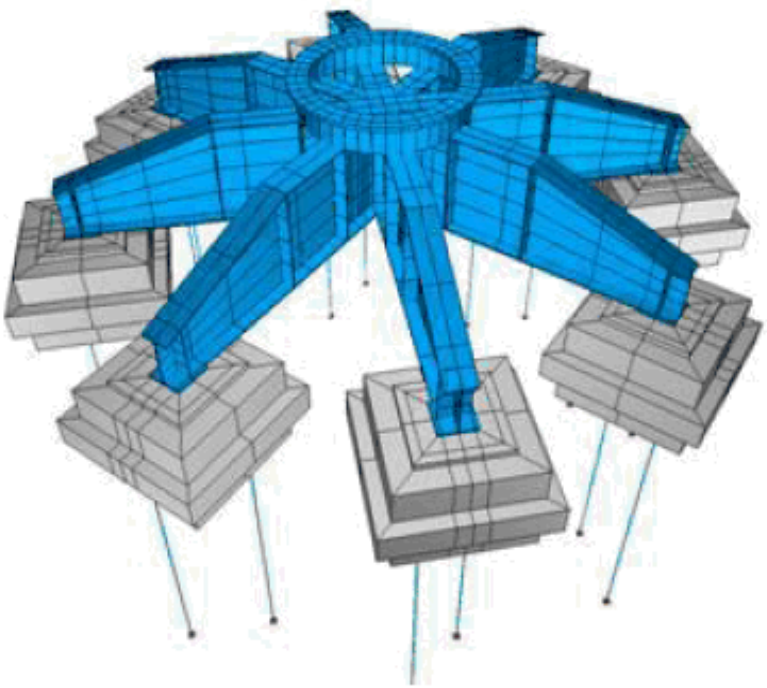
Summer Temperatures (-37°C to +7°C), Average Temp -20°C excluding wind chill.

Required unique & complex engineering solutions to equipment specifications & installation.

Engineering the Turbine Foundations



- Concrete gravity pads *not possible* due to temps, no batching plant, aggregate or fresh water.
- Solution is to pre-fabricate a transportable anchored structural steel foundation.
- Designed and built in Christchurch.

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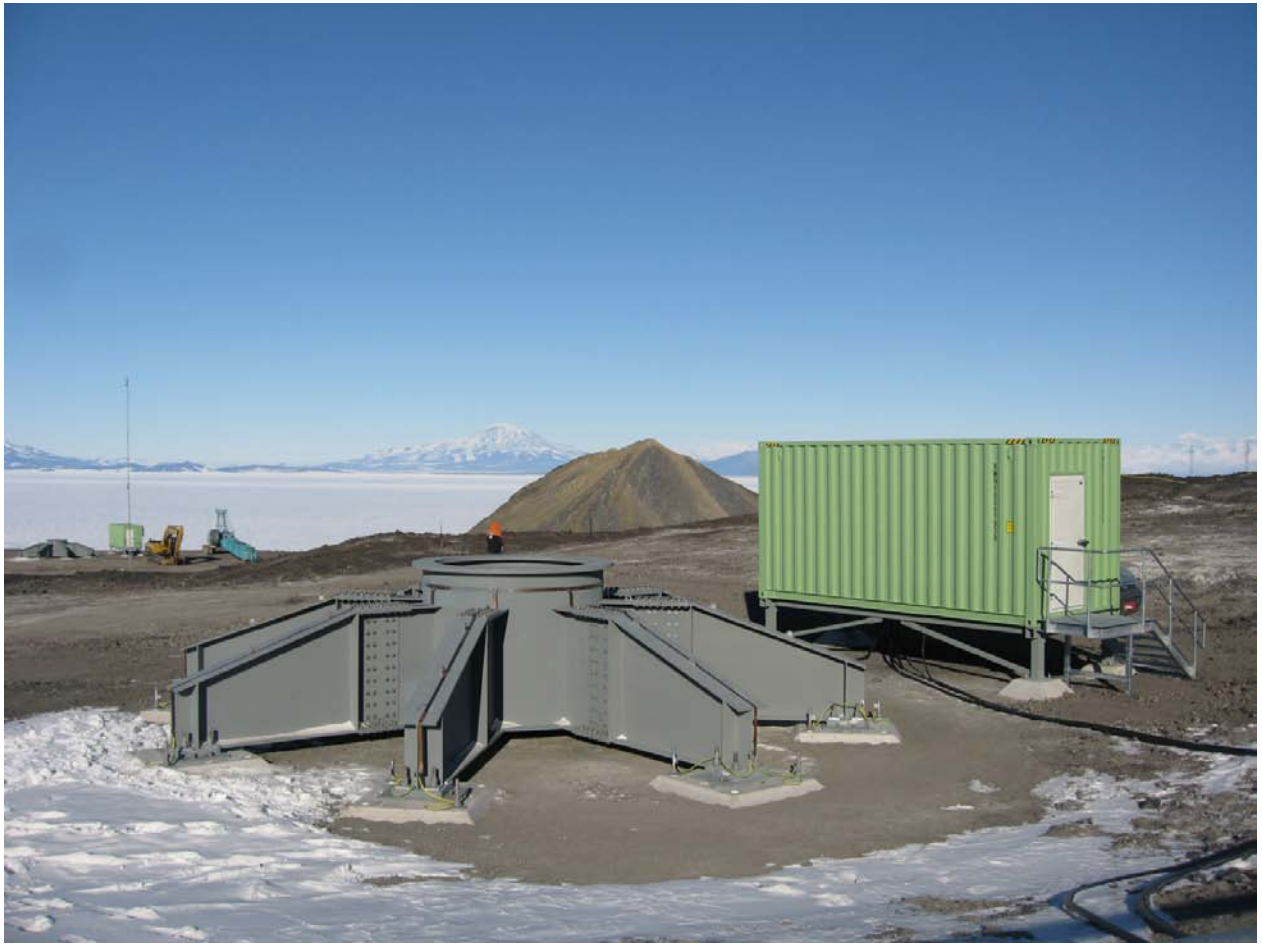

The Foundations are READY!

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The Worlds biggest, most Southern, Park Bench

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Stage 2 Summary - Summer 2010 and 2011

- 13 more WTG's (Approx 4000kW)
  (Total of 16 Machines – Approx 5000kW)
- 4 more 500kW PowerStore Units
  (Total of 5 Units – 2500kW)
- Multiple Distributed Electric Heat Loads at both McMurdo and Scott Base
  Approx 500 – 1000kW – Yet to be determined

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In Conclusion:

- Why do such a project? – it is pretty remote and with so many stake holders, and complexities?
- Because in 2007 the two sites consumed approx 1.3 Million Gallons of Diesel on Power Generation.
- Our customer has modelled fuel savings in excess of 60% per annum on completion of Stage II. (Approx 800 Thousand Gallons)


Thank You
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