



engineering innovative **power** solutions for a better world.

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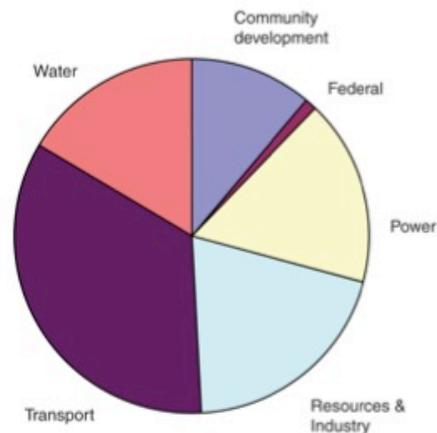
***PB New Zealand Ltd and
Flywheels in Wind-Diesel***

Dustin Murdock
PB New Zealand Ltd

- Founded in 1885, Parsons Brinckerhoff (PB) provides program management, engineering, planning, environmental, and construction management services for:
 - transportation,
 - power,
 - buildings and
 - telecommunications projects
- PB employs: more than 14,000 people worldwide
over 2,000 in Australia and New Zealand
- PB combines core capabilities in design, planning and management with new approaches to project delivery.
- PB's strengths
 - Offer a comprehensive range of services
 - Provide total project delivery on projects of any scale
 - Deliver practical solutions
 - Build lasting relationships with our clients
 - Most of our work comes from repeat purchase,
 - Our clients consistently rate us 'best practice' for technical delivery and client service
- With experience in various financing arrangements, including PPPs, alliances and design-build-finance, we can respond effectively and flexibly to project challenges.

- PB has been working on infrastructure and environmental projects in Australia and New Zealand for more than 40 years
- Our multidisciplinary team includes drafters, specialists in every branch of engineering, economists, consultation experts, environmental scientists, planners, geospatial information system specialists, project and program managers, construction managers and management consultants.
- We provide total services delivery across six key market areas:
 - Energy / Power
 - Resources & Industry (Mining, Oil & Gas, Industrial)
 - Transport
 - Water
 - Community development
 - Defence

FY07 revenue breakdown by market area (%)



- Design Power in New Zealand was formed when ECNZ became an SOE in 1988
- Parsons Brinckerhoff bought Design Power in 1998
- October 1998 name changed to PB Power (NZ) Ltd
- Staff in Auckland, Wellington, Christchurch, Melbourne, Sydney, Brisbane, Adelaide
- Total Power staff 113 (Australasia)

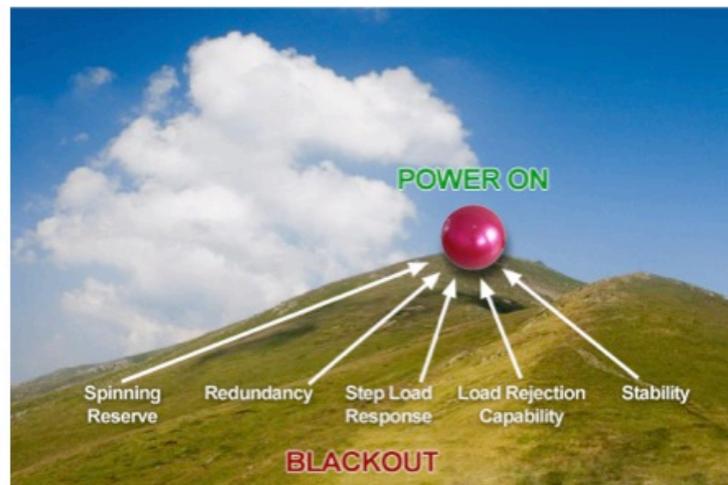
- Power Capability
 - Power Generation
 - Geothermal
 - Hydro
 - Thermal
 - Wind
 - Transmission and distribution

- Provide consulting services
 - Resource assessment
 - System design

- Example project planned in Antarctica
 - Cable studies for distribution upgrade
 - PSSE power system modeling
 - Protection design for upgrade
 - Transformer specification



Keeping the Lights On

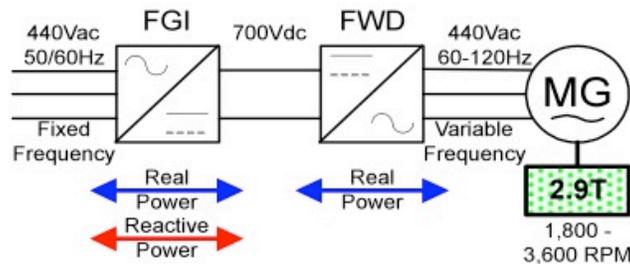


What Is PowerStore?

- PowerStore is a kinetic energy storage device
- PowerStore holds a small amount of energy for use at high power rates
 - 18MWs / 5kWh
 - +/-1,000kW per unit
- PowerStore is scalable
- PowerStore is modular
- PowerStore is transportable



PowerStore Concept



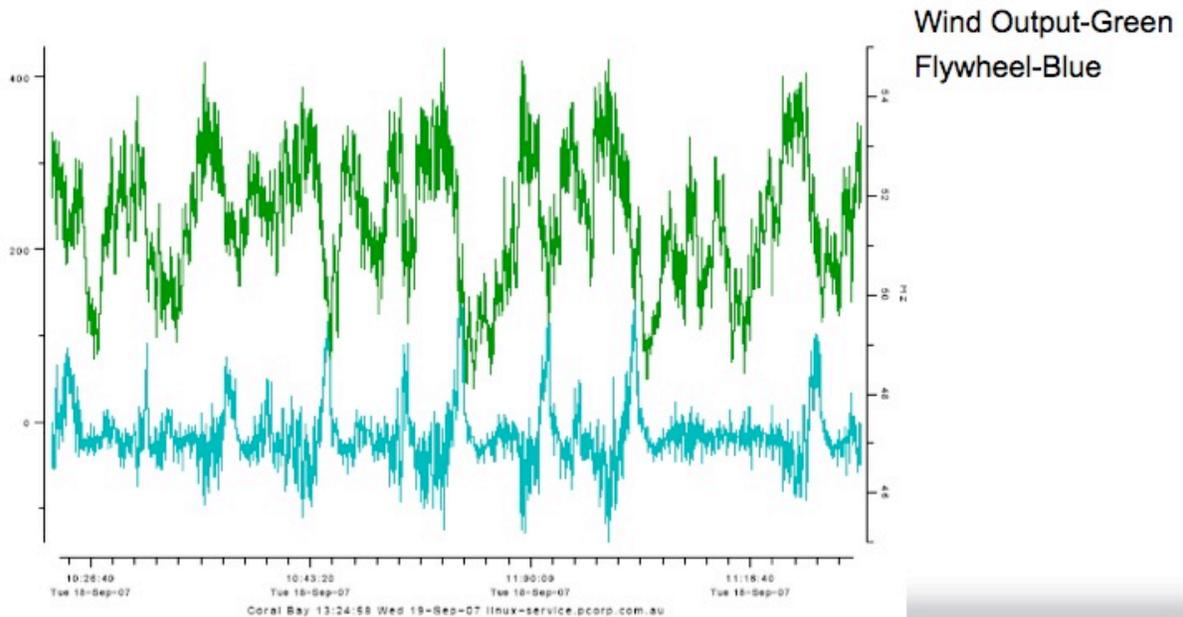
- Modular Inverter Design to change kW rating
- Fully Integrated with local or grid generation
- Highly dynamic performance with large power ratings
 - 500kW and 1,000kW with sub-cycle performance
 - 100% of power available at any charge level

What PowerStore is not?

- PowerStore is not a battery!
- PowerStore is not suitable for storing energy for hours



Flywheel Response

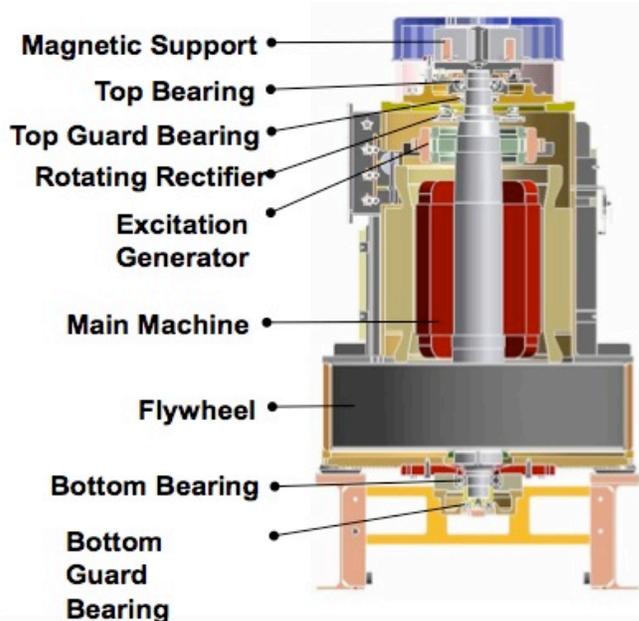


PowerStore Flywheel

- Manufactured by Piller GmbH
 - More than 700 units in service
 - 24x7 operation
 - used by banks, data-centres, semi-conductor manufacturers
 - In use since 1997
 - The use of electromagnet increases bearing life out to 8 years
 - The use of helium environment reduces friction losses



PowerStore Flywheel



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

PowerStore Sizes

- **PowerStore is Scalable**
- **PowerStore 500**
 - - 20' shipping container size building
 - - Rated Power $\pm 500\text{kVA}$
- **PowerStore 1000**
 - - 40' shipping container size building
 - - Rated Power $\pm 1,000\text{kVA}$
- **PowerStore 1800**
 - - 40' shipping container size building
 - - Rated Power $\pm 1,800\text{kVA}$



PowerStore Installations

Customer	Site	Unit	Year Installed
EDA	Flores Portugal	PowerStore 500	2005
EDA	Graciosa Portugal	PowerStore 500	2005
Powercorp	Darwin	PowerStore 500	2005
BHP Billiton	Leinster Nickel Mine Australia	PowerStore 1000	2006
Verve Energy	Coral Bay Australia	PowerStore 500	2007
Verve Energy	Kalbarri Australia	PowerStore 1000	2007

