



Hydro
Tasmania

The power of natural thinking

Flinders Island Hybrid Energy Hub

Simon Gamble

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Hydro Tasmania

Hybrid off-grid power systems capability



- Government Business – owned by State of Tasmania
- Australia's largest clean energy producer
- Responsible for generation, distribution and retail in the Bass Strait islands (King and Flinders Islands)
- Developer, owner and operator of leading hybrid off-grid system on King Island – our test bed.
- Leading consultant to aid agencies and utilities, including: Yap, Pitcairn, Chatham Islands, Cook Islands, Rottneest Island, Coober Pedy

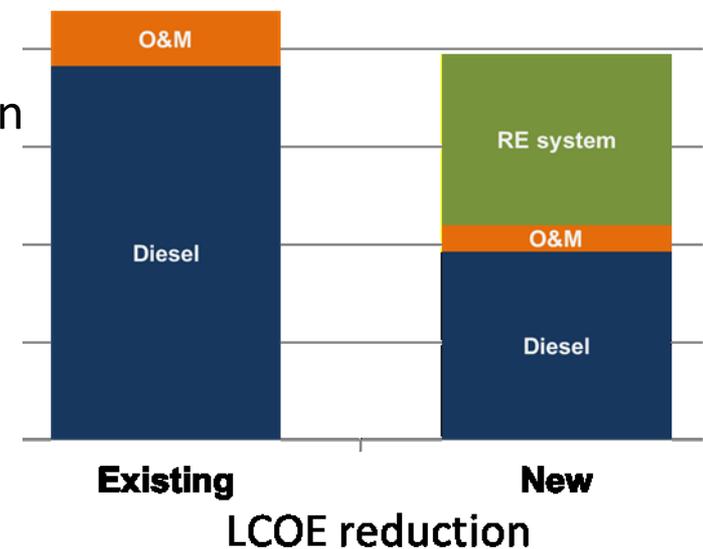
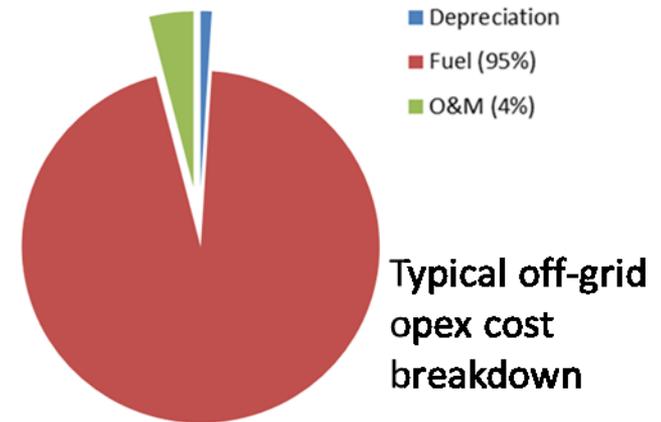


The power of natural thinking

Hybrid off-grid power systems

Benefits and challenges

- Off-grid power supply :
 - Typically diesel generation – simple, reliable
 - High cost – scale, fuel, logistics
- Renewable energy can offer cost and performance benefits
- Renewable energy can also introduce issues:
 - Variable output requires management
 - Displaces traditional (synchronous) generation
- RE deployment requires planning & integration
 - Renewable + enabling technology → hybrids



King Island hybrid power system

Example of planned, integrated development

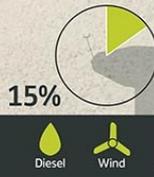
Huxley Hill Wind Farm

Opened by
the Hon Tony Rundle MHA,
Premier of Tasmania
Tuesday 17 March 1998

*First wind farm
in Australia to
receive Renewable
Energy Certificates,
providing
renewable energy
for King Island.*



RENEWABLE ENERGY



1998

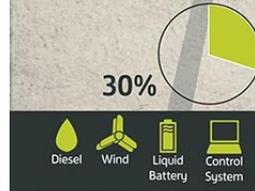
King Island Renewable Energy Expansion

Opened by the Hon Dr David Kemp, Federal
Minister for Environment and Heritage, with
the Hon Bryan Green, Tasmanian Minister
for Infrastructure, Energy and Resources
Thursday 26 February 2004

*More renewable
energy for
King Island with
control system
and energy
storage to
maximise its use.*



RENEWABLE ENERGY



2004

King Island hybrid power system

Example of planned, integrated development

King Island Renewable Energy Integration Project **Stage One**

Opened by the Hon Martin Ferguson AM MP, Federal Minister for Resources and Energy, with the Hon Lara Giddings MHA, Premier of Tasmania.

Friday 26 October 2012

World-leading demonstration project: a power system able to operate solely on renewable energy.



RENEWABLE ENERGY

>45%



2012

King Island Renewable Energy Integration Project **Stage Two**

Opened by the Hon Ian McFarlane, Minister for Industry, Tuesday 9 May 2014

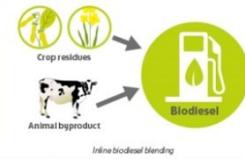
The world's most advanced off-grid power system.



Australia's largest battery stores renewable energy and supports the power system

RENEWABLE ENERGY

>65%



Inline biodiesel blending



Fast acting demand side management increasing reliability and renewable energy contribution

2014

King Island power system

Innovative enablers to support renewables
World first 100% renewable operation at MW scale
>\$2m savings p.a. >3,800 diesel-off operation

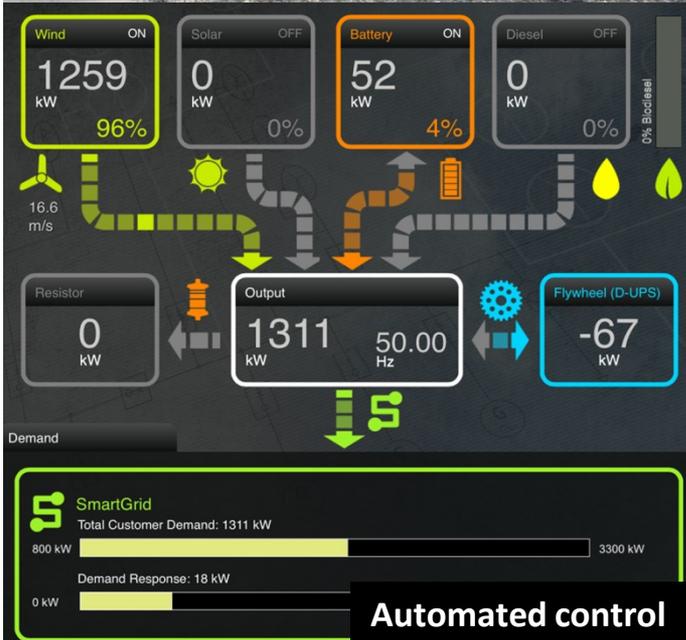
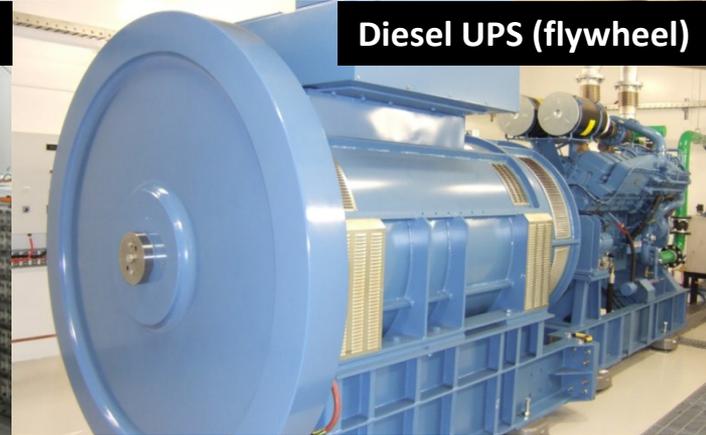
Dynamic resistor



Battery Storage



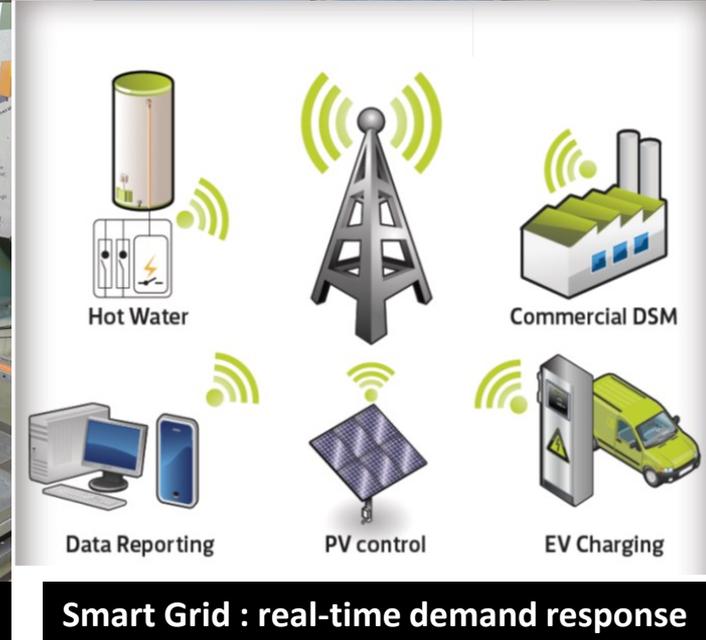
Diesel UPS (flywheel)



Automated control



Biodiesel blending



Smart Grid : real-time demand response



King Island - 18 year journey

- Significant R&D
- Proof of Concept
- “Test bed” for technologies

Flinders Island “Hub” – 18 month project

- Product Development
 - Customer / Market focus
- Scalable & Modular solutions
 - Easier / quicker / lower cost implementation
 - Temporary or permanent installations
- Commercialisation – market ready

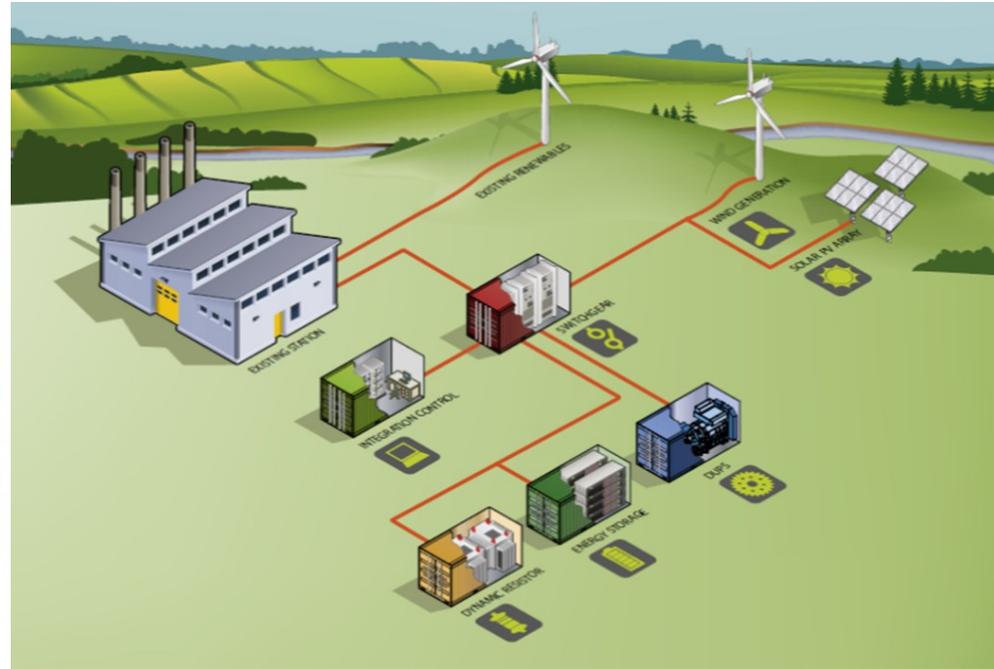


Scalable modular hybrid solutions

Rapid, lower cost deployments



King Island:
On site construction was time consuming,
disruptive and difficult to resource, quality
control harder to achieve on site



Flinders Island Hybrid Energy Hub:
Utilises containerised
enabling systems requiring minimal site works
for deployment, pre-factory tested



	Generation	Enablers	RE %	Arrangement
Current	 2.95 MW Diesel	None	25%	RE third party owned and constrained
	 0.3 MW Wind (privately owned)			
Hub project	 Additional wind	 Flywheel	60+%	<ul style="list-style-type: none">• 900 kW wind• 200 kW solar• 1.5MW dynamic resistor• 850kVA DUPS flywheel• 750kW /300kWh battery
	 New Solar	 Resistor  Energy Storage  Control		

Project underpins Flinders Island community vision for 100% RE Future



\$12.88m budget including up to \$5.5m support from ARENA

Flinders Hub

Enercon E44 900kW wind turbine

Lowest cost renewable energy available



Flinders Hub

200kW fix tilt Solar PV

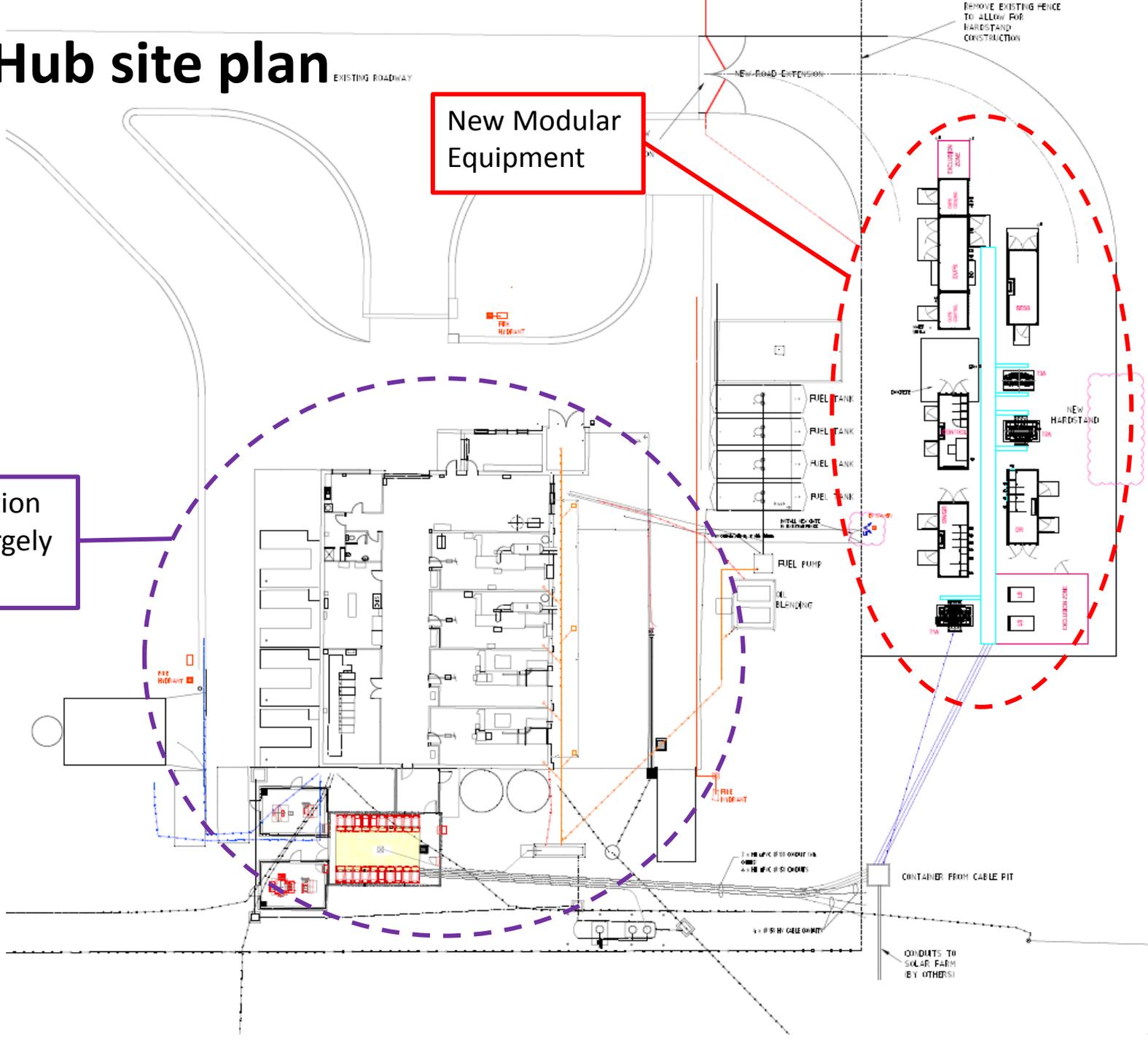
Offered diversity of renewable generation



Flinders Hub site plan

Existing Station Remains Largely Unchanged

New Modular Equipment



Flinders Hub enablers

Flywheel module (Diesel UPS)

Manufactured and tested off-site



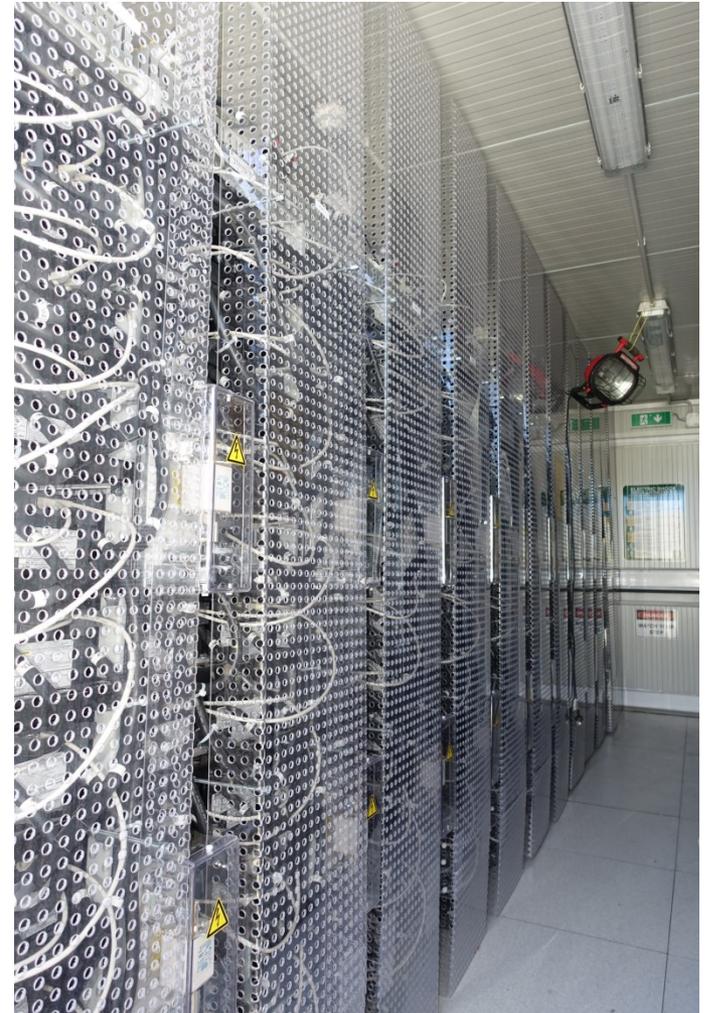
Container modules are custom built – certified for shipping with equipment installed

Flinders Hub enablers

Battery module

Toshiba battery module:

- 750kW / 300kWh
- Lithium ion titanate – wide SOC operation
- Fully factory tested



Flinders Hub Construction overview

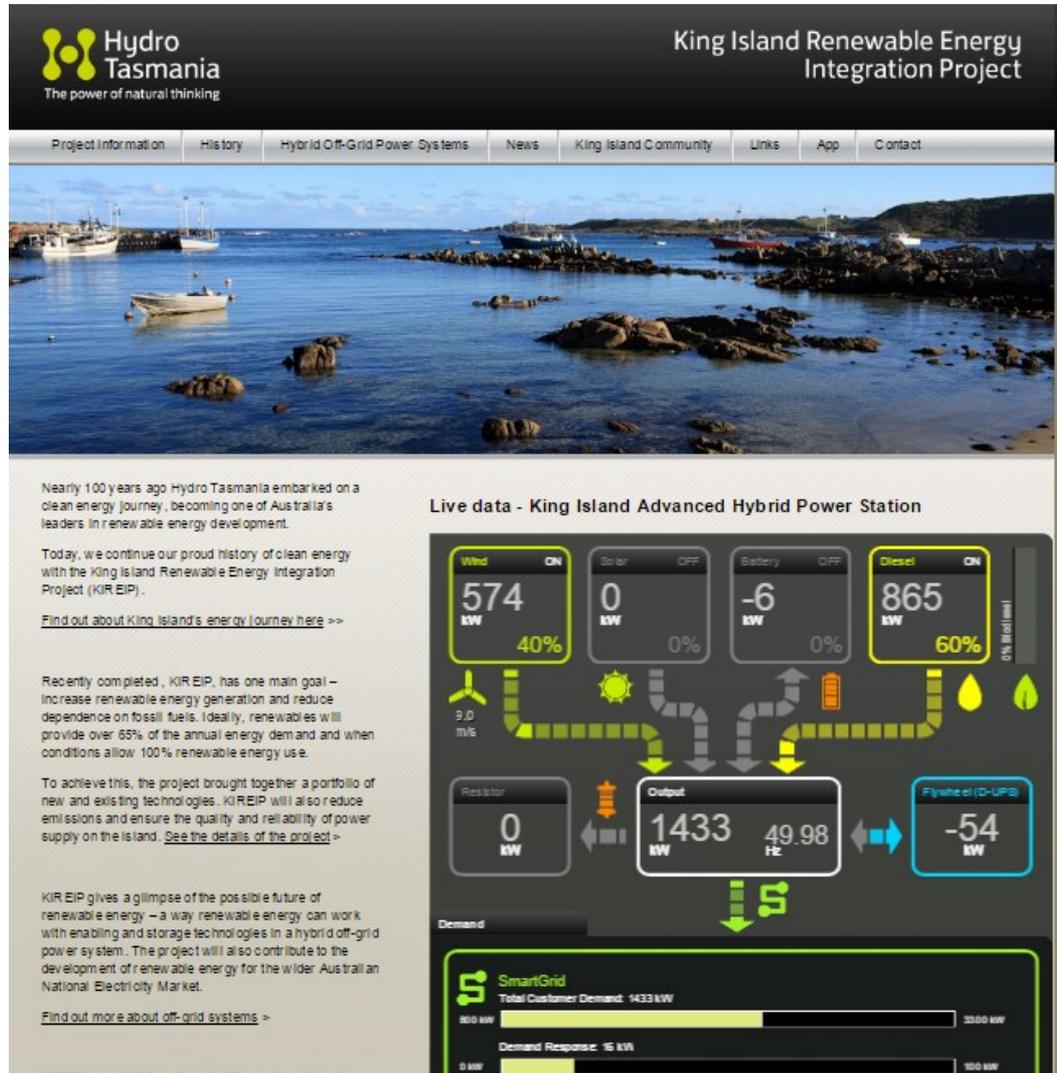




- Committed to providing market with knowledge to assist in wider hybrid project development
 - Web site
 - Smart Phone Apps
 - Case study documents for ARENA web site
 - Lessons learned
- Should result in easier project finance and greater risk appetite for other developers

Example of real-time information

See iOS smart phone app & web site
www.kireip.com.au





Hydro Tasmania Hybrid off-grid solutions

Summary

- King Island proved ground breaking technical concepts
 - MW scale 100% renewable operation
- King Island also identified opportunities to de-risk implementation
- Flinders Hub has developed standard designs for modular scalable hybrid system deployment
 - demonstrates lower cost, rapid and non-intrusive implementation of equipment on site
 - provides suite of building blocks for low, medium, high renewable penetration systems
- Now implementing systems for clients on Rottnest Island and Coober Pedy
- Seeking opportunities in Australia, Pacific and South East Asia

ROTTNEST IS

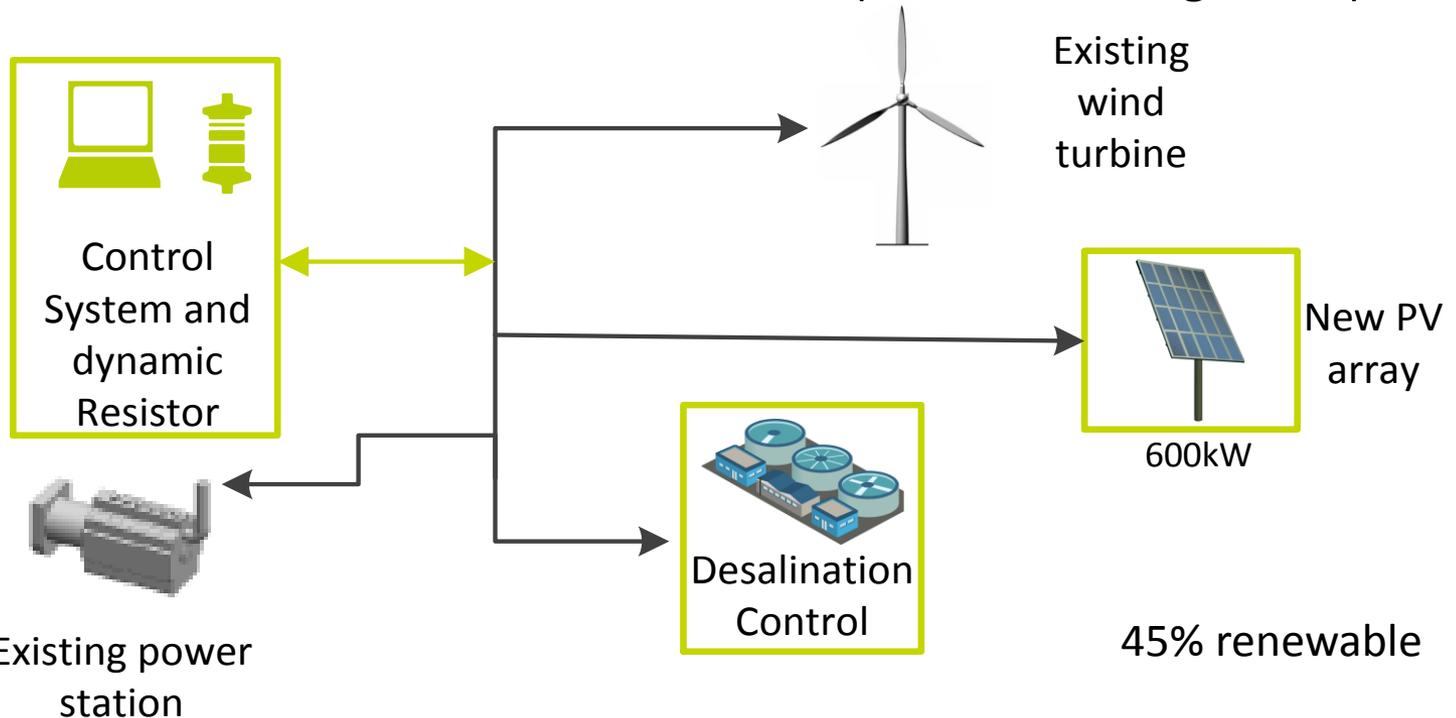
renewable energy

ARENA



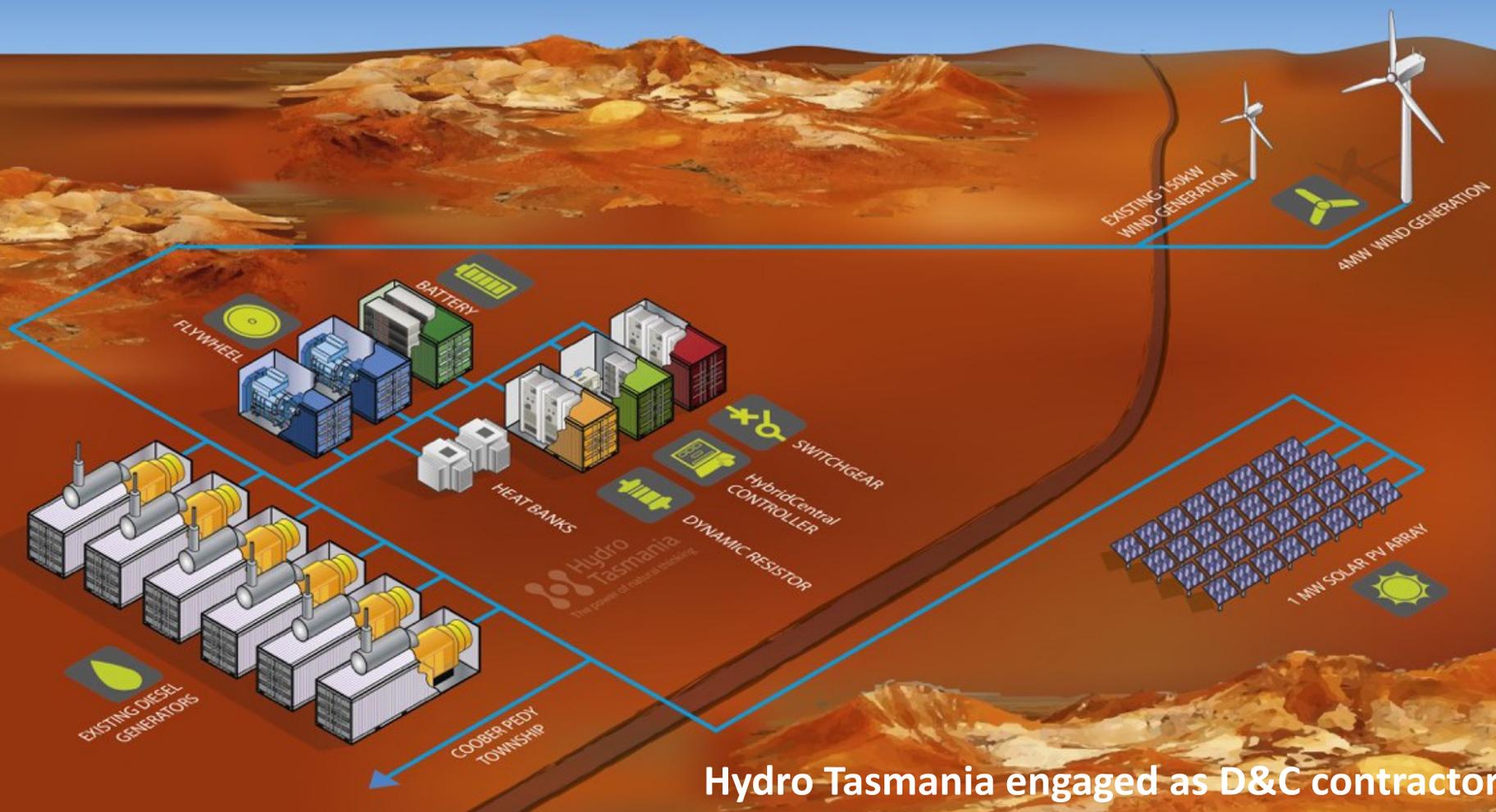
ROTTNEST ISLAND WATER RENEWABLE ENERGY NEXUS PROJECT

Supplying cleaner, lower cost energy and water services in remote communities
Integrate wind and solar PV with water desalination (demand management)



Cooper Pedy Renewable Hybrid Project

70% renewable energy “island” system



Hydro Tasmania engaged as D&C contractor

Thank you

Further information:

Hybrid Off-Grid Solutions

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www.kireip.com.au

“KIREIP” iPhone app