

# THE COLLGAR WIND FARM PROJECT

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# Introduction

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- **Overview of the Collgar Wind Farm project**
- **Wind Turbine technology**
- **Global renewable energy landscape**
- **Western Australia's energy needs – the role of wind energy**
- **Funding development in WA**

# The Collgar Wind Farm project overview

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- **206 MW wind farm, consisting of 111 Vestas V90 turbines**
  - largest in WA and largest single stage development in southern hemisphere
- **Located ~250km east of Perth, ~20km south-east of Merredin**
  - located on 14 lots across 18,000 ha
- **Capacity factor ~50% pre-losses**
  - generating on average 792,000MWh per year
  - average wind speed ~ 8.1 m/s
- **Increases renewable generation in the SWIS from 5% to 9%**



# Location and grid connection

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- Connection via the 220kV line between Merredin and Kalgoorlie
- Run-back scheme via 132kV / 66kV line to Northam
- Majority of the time, electricity will flow east from the site

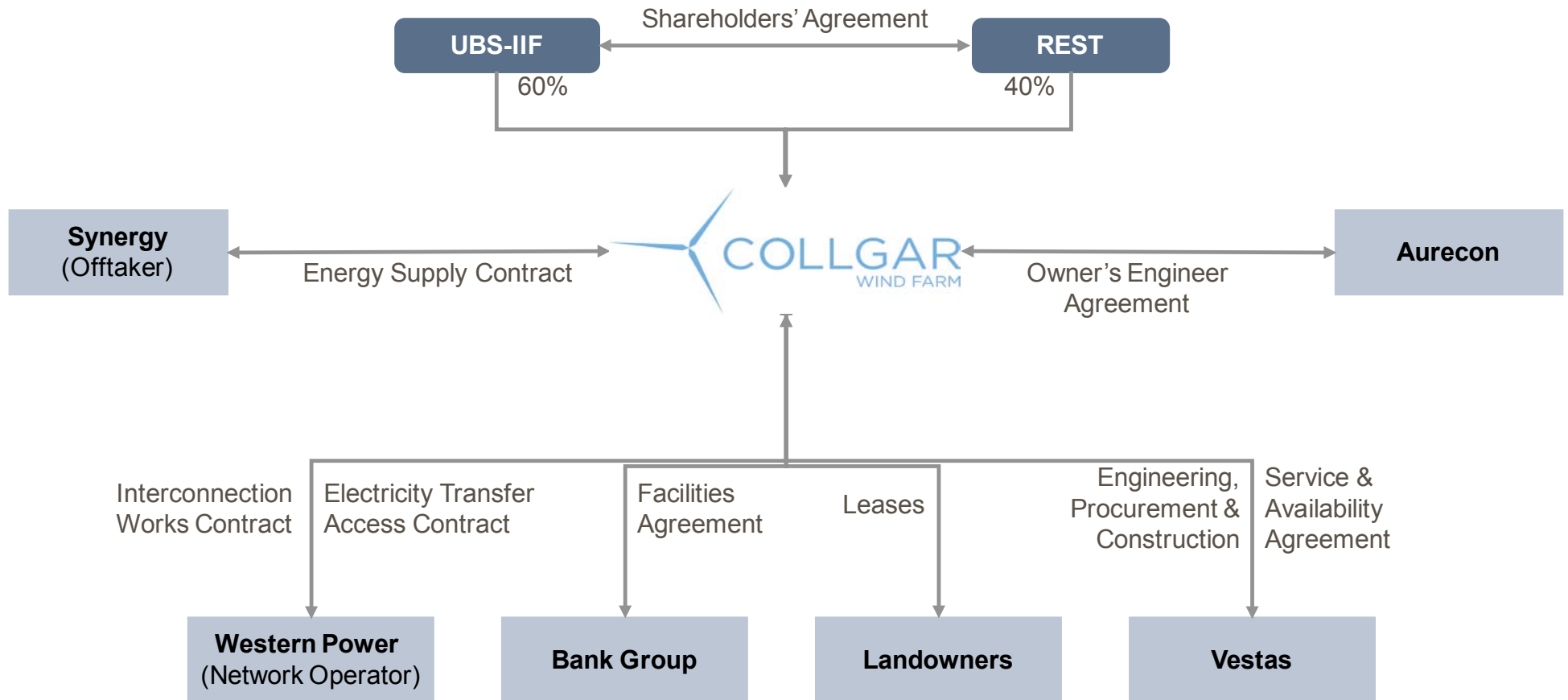


# Key investment metrics

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<b>Off-take</b>	<ul style="list-style-type: none"><li>• 100% off-take of energy and RECs with Synergy (A+ rated) for 15 years at an inflation linked tariff</li></ul>
<b>Wind resource</b>	<ul style="list-style-type: none"><li>• P50 wind capacity factor (post-losses) of c. 50%</li><li>• Data recorded for over 3 years before FID</li></ul>
<b>Construction</b>	<ul style="list-style-type: none"><li>• Fixed price, turn-key EPC with Vestas</li></ul>
<b>O&amp;M</b>	<ul style="list-style-type: none"><li>• Provided by Vestas for 10 years with two options to extend of five years each (25 yr design life)</li></ul>
<b>Financing</b>	<ul style="list-style-type: none"><li>• c. 70% geared via long term project financing provided</li></ul>
<b>Regulatory</b>	<ul style="list-style-type: none"><li>• Market rule changes likely to be introduced for intermittent generators</li></ul>
<b>Landowner leases</b>	<ul style="list-style-type: none"><li>• 30 year leases executed with landowners with option to extend. Strong community support</li></ul>
<b>Network</b>	<ul style="list-style-type: none"><li>• Stable network, robust run back scheme</li></ul>

# Project structure and key counterparties



# Construction progress

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- **100 of 111 turbines erected**

- erection expected to be completed by end June

- **22 generating turbines**

- ~5GWh already produced and fed into the SWIS
- full generation capability by end September

- **All civil works complete, electrical works nearly complete**

- **Currently 2-3 months ahead of schedule, expected to complete by December, 4-5 months ahead of schedule**

- **Potential expansion opportunity to add 16 turbines (~30MW)**

# Construction progress

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## Laying the foundations



Excavation of the foundation



Pouring the concrete



Completed foundation



Completed foundation (close-up)



Sheepfoot roller compacting around the foundation



Foundation compacted

# Construction progress

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## Substation works



Aerial view



From the ground

## Cabling works



Cable drum



Vemeer trenching machine in operation



Cable laying



Collgar Switchyard

# Construction progress

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# Construction progress

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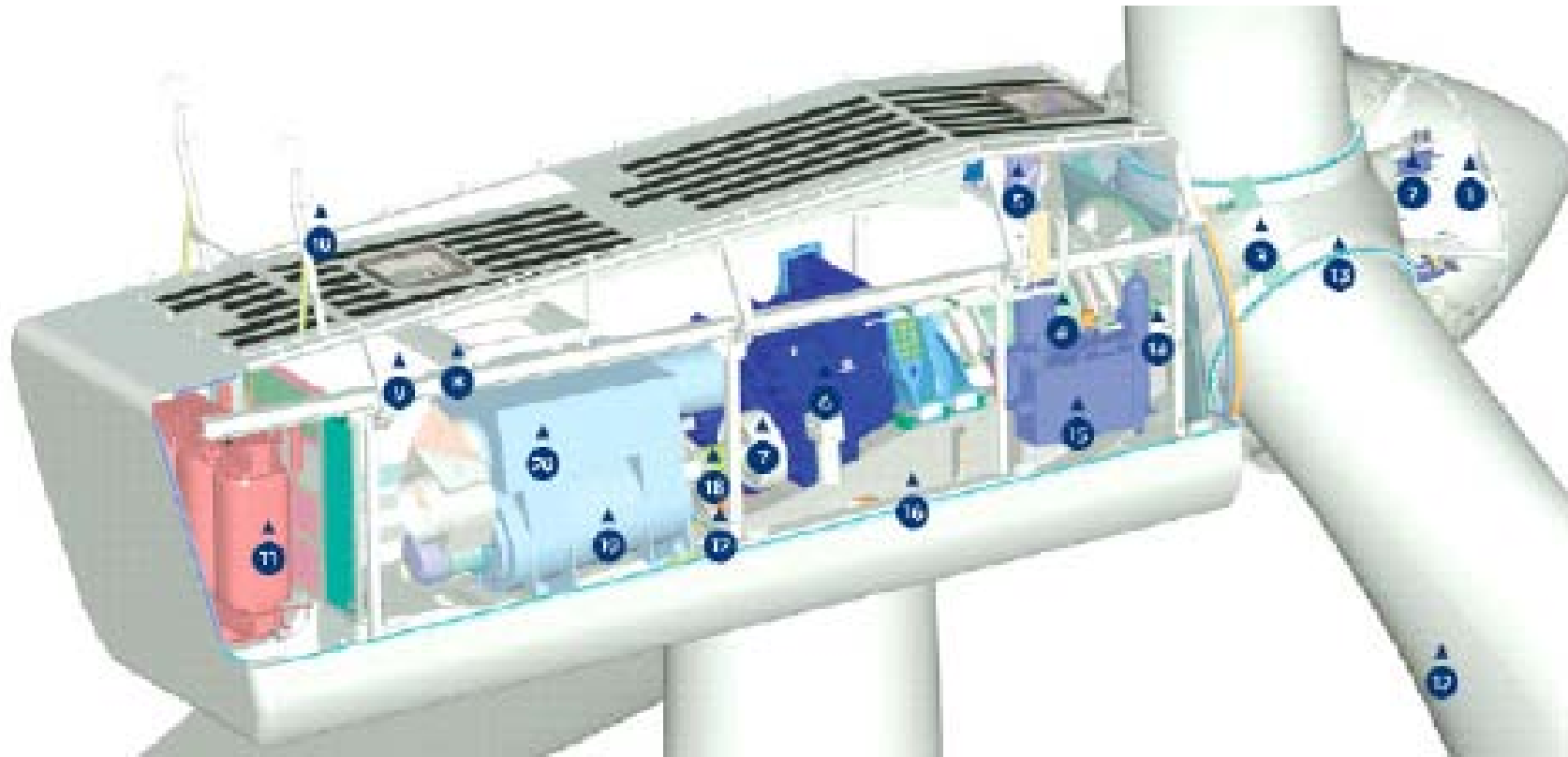
# Construction progress

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# Overview of wind turbine technology

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- |                   |                         |                             |                             |
|-------------------|-------------------------|-----------------------------|-----------------------------|
| 1 Hub controller  | 6 Gearbox               | 11 High voltage transformer | 16 Machine foundation       |
| 2 Pitch cylinders | 7 Mechanical disk brake | 12 Blade                    | 17 Yaw gears                |
| 3 Blade hub       | 8 Service crane         | 13 Blade bearing            | 18 Composite disk coupling  |
| 4 Main shaft      | 9 Top controller        | 14 Rotor lock system        | 19 Generator                |
| 5 Oil Cooler      | 10 Wind sensor          | 15 Hydraulic unit           | 20 Air cooler for generator |

# Global renewable energy landscape

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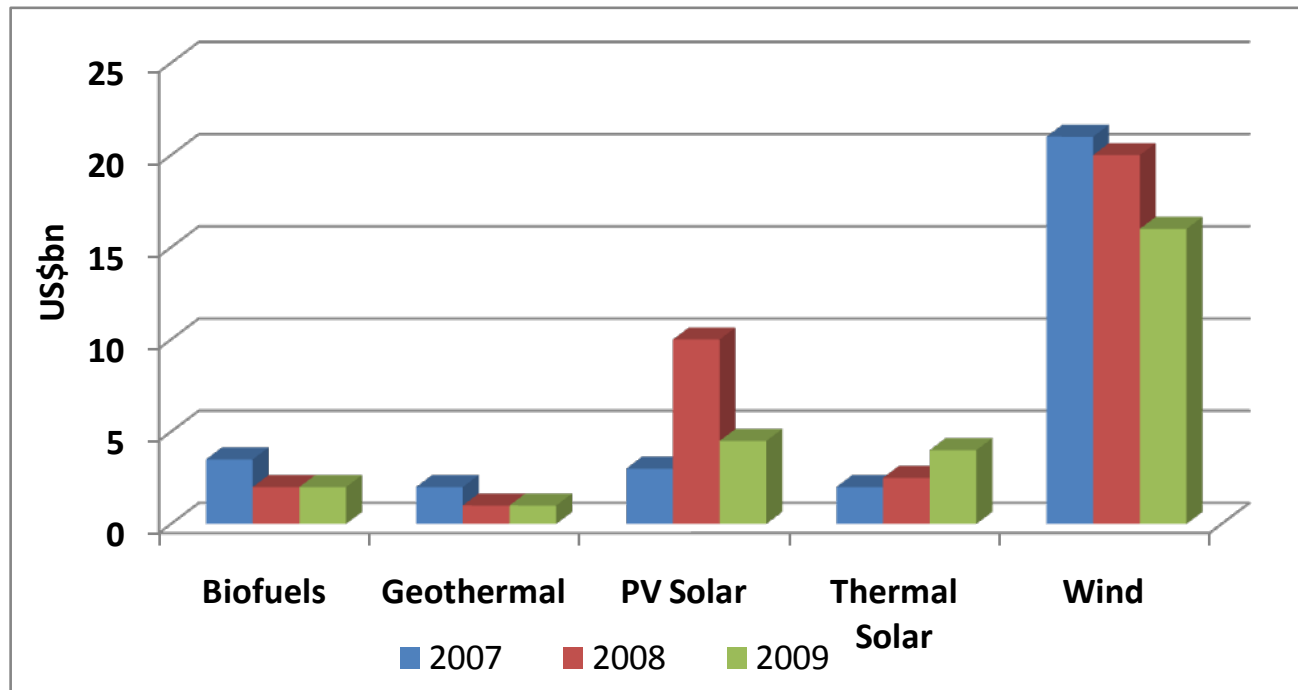
- **Global energy supply – one of the key global issues for the foreseeable future**
  - Increasing population
  - Urbanisation of developing countries
  - Climate change
- **Renewable energy to be a key plank in the global energy picture**
  - Establishment of global policies to support this growth
  - Investment in renewable energy to continue to grow rapidly
- **Changing landscape of investors into renewable energy**
  - From government / venture capital investors to Infrastructure, sovereign wealth, superannuation, private equity funds
- **Exponential growth in private sector renewable energy investment**
  - Renewable energy infrastructure now a major element of the alternative asset industry

# Renewables – an asset class in the spotlight

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- **Clean energy investment grown by c. 230% in the last 5 years**
  - Renewables investment in 2010 of US\$154bn (up 26% on 2009)
  - US, China, Germany, Spain, India
- **Wind is by far the major component of this investment**

Global investment in renewable energy



Source: Infrastructure Journal

# Western Australian energy landscape

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## ■ Strong demand growth

- Estimated 6,000 MW of new generation over next 20 years
- Increasing population
- Strong mining / industrial growth
- Sharp increase in residential demand
- Peak demand on SWIS to increase by 90% over next 20 years

## ■ Renewable targets

- 2020 targets of 20% renewable penetration (currently 9%)
- Federal uncertainty re carbon tax

## ■ Network upgrades / augmentation required

- Distribution and transmission systems

## ■ Increasing cost of electricity

- Global demand for fossil fuels increasing
- Record high gas prices

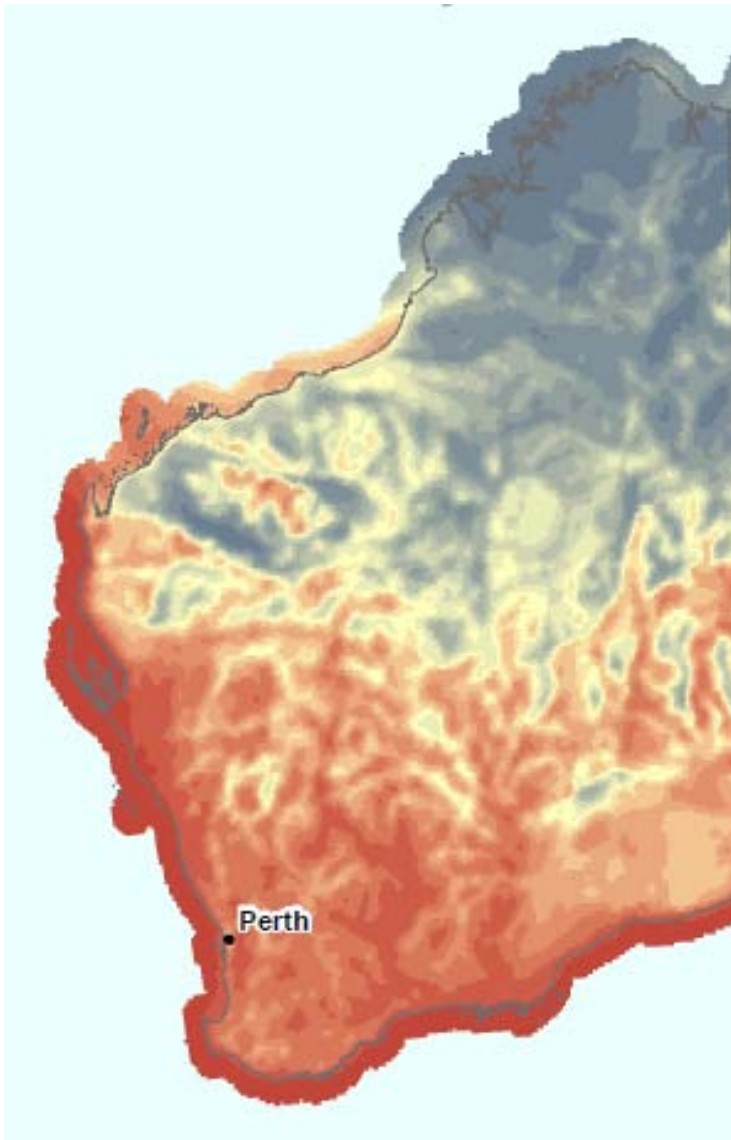
# Wind energy in WA

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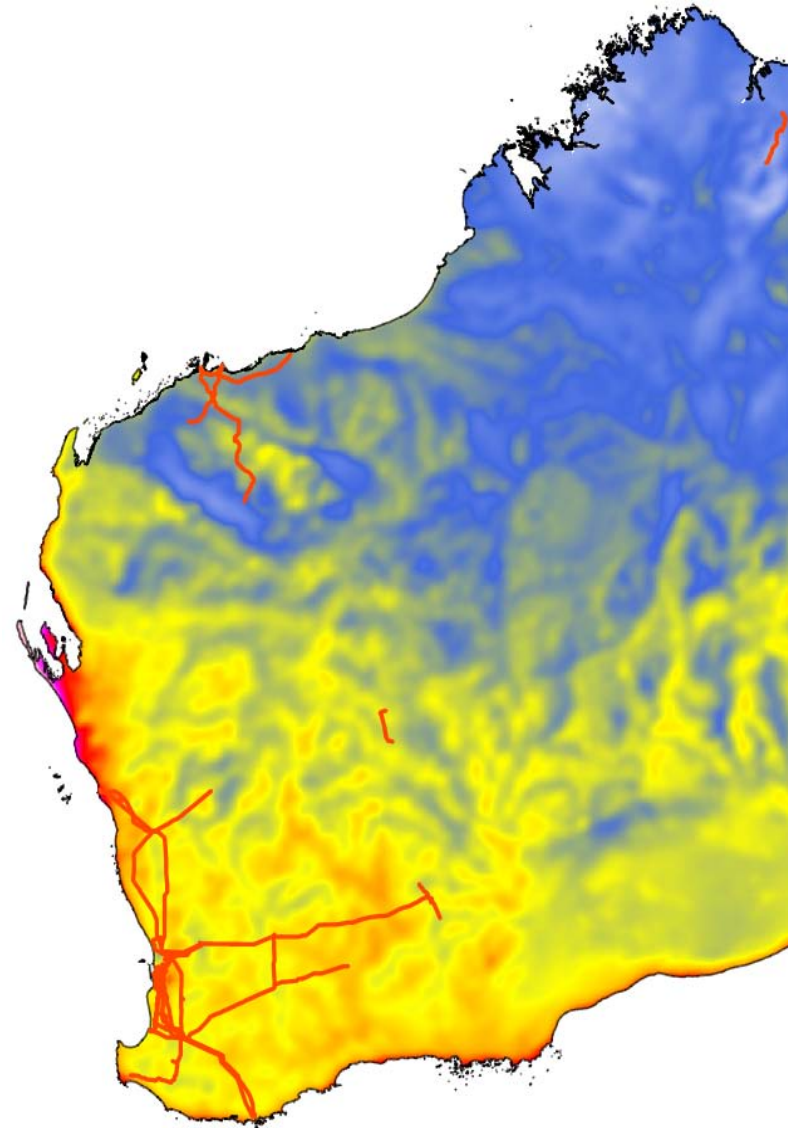
- **515 MW of operational and under construction wind farms**
  - 19 operational and 2 under construction
  - Only 4 greater than 5 MW (Albany, Collgar, Walkaway, Emu Downs)
- **Wind expected to play largest role in meeting 2020 targets**
  - Currently the most cost competitive of the renewables
  - Other technologies (solar, geothermal, wave) need to be supported
- **Issues with increasing wind penetration**
  - Electricity price cost
  - Time of day production
  - Network augmentation requirements
  - Balancing requirements
- **Thematic changes required to support renewable energy**
  - Smart grid technologies
  - Electric / hybrid cars
  - Time of day tariffs

# WA – wind energy map and network

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Source: [www.environment.gov.au](http://www.environment.gov.au)



Source: Windlab Systems

# Wind – a public or private sector initiative

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## ■ Unique market environment in WA

- strong government involvement
- ‘islanded’ network

## ■ Significant infrastructure funding required across state

- Net public sector debt to rise from \$13.4bn in 2011 to \$22.3bn by 2015
- \$12bn (real 2008 \$) of new generation assets required by 2020
- Network upgrades / new line build requirements
  - \$7.5bn on transmission / \$14bn on distribution
- Smart grid development

## ■ Private sector funding critical in WA energy market

- To ensure reliability of energy supply
- Superannuation fund money looking for long term home

## ■ Regulatory certainty required at both federal and state level

# **Thank you and Questions**

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