



Victoria, Australia
Renewable Energy & Energy Storage
Investment Opportunities
Munich, 18 November 2015

Australia Overview

FIGURE 1

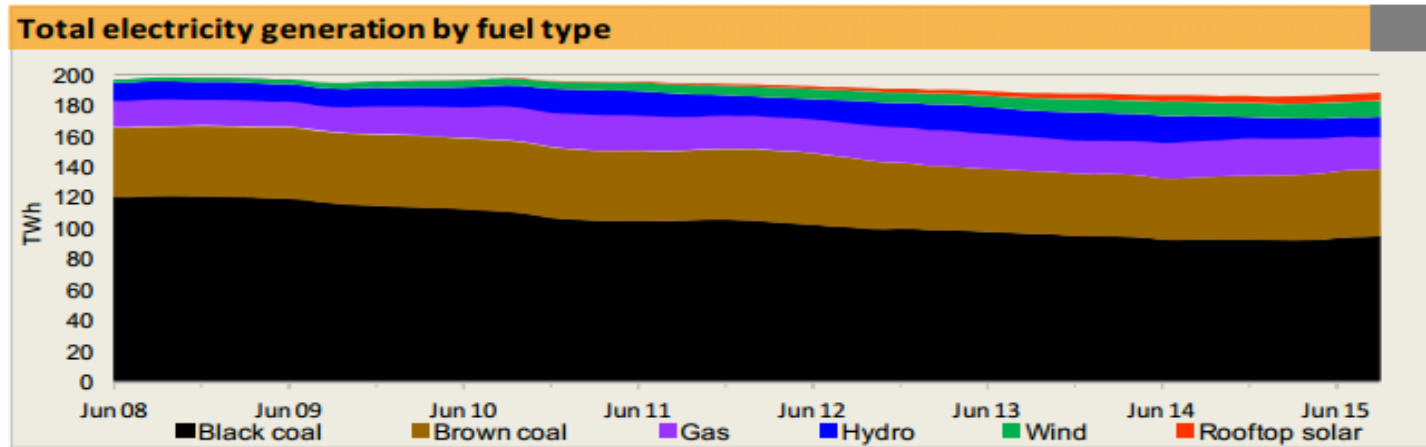
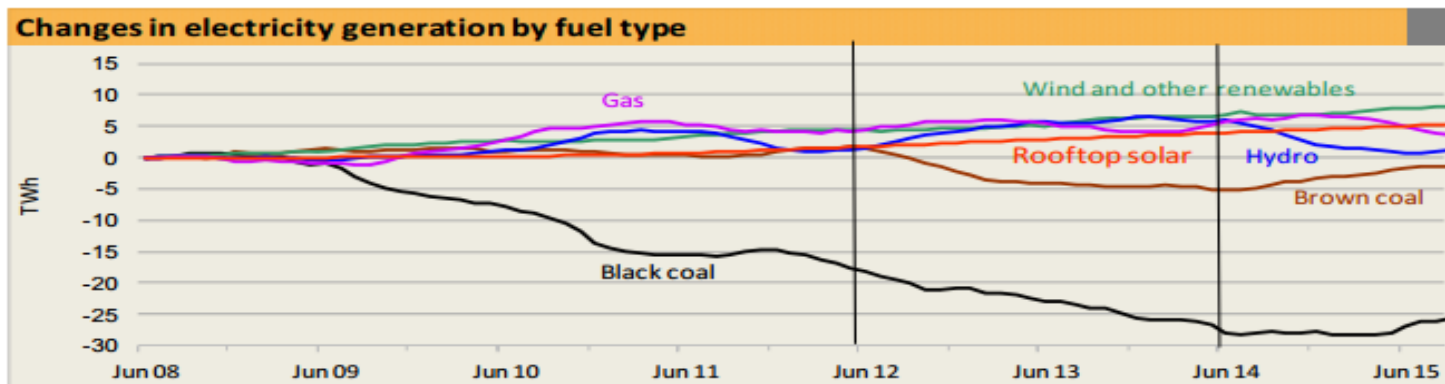


FIGURE 2

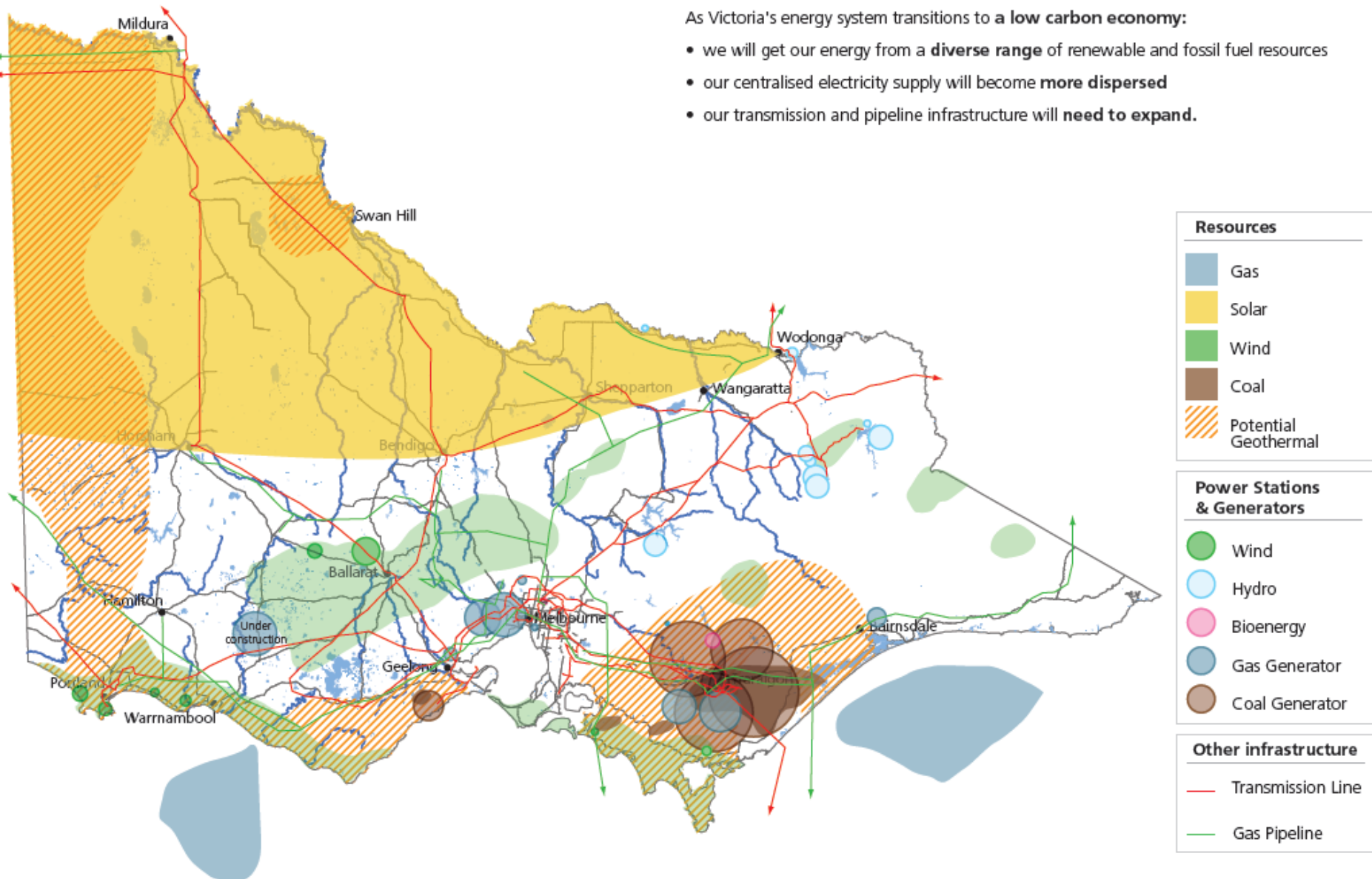


<http://www.pittsh.com.au/assets/files/Cedex/CEDEX%20Electricity%20update%20Oct%202015.pdf>

Victoria – Unique Energy Market

- Large Reserves of Brown Coal – 500 years
 - No Black Coal
- Offshore Natural Gas ~ 25 years
- Excellent wind / wave resources
- Good solar resources
- Privatised Energy Market
- Most Assets Owned by International companies
 - Generation, Transmission, Distribution, Retailers

Victoria's stationary energy sector



Electricity prices

Graph 3: International electricity price with package of Australian changes (USD cents / kWh)

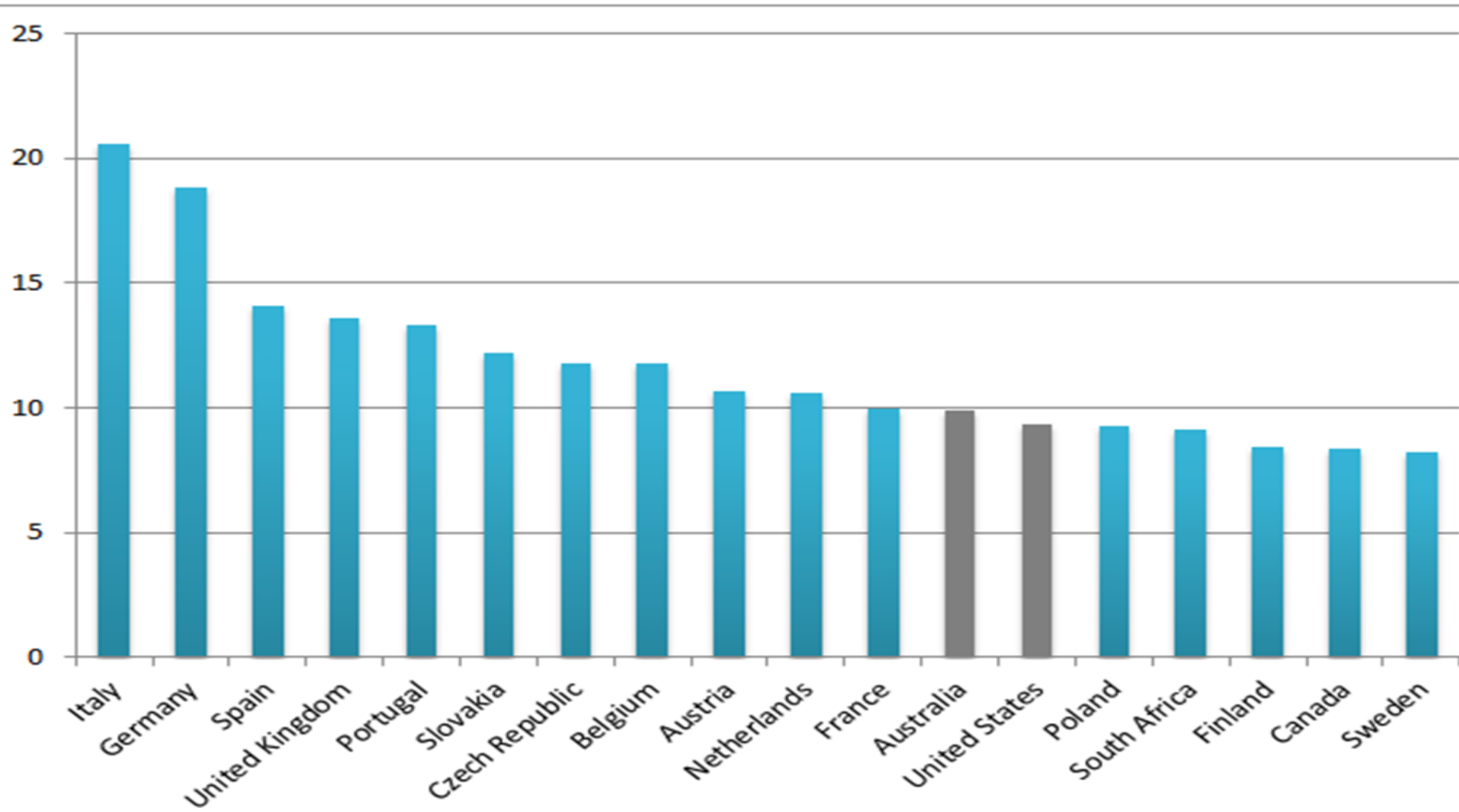
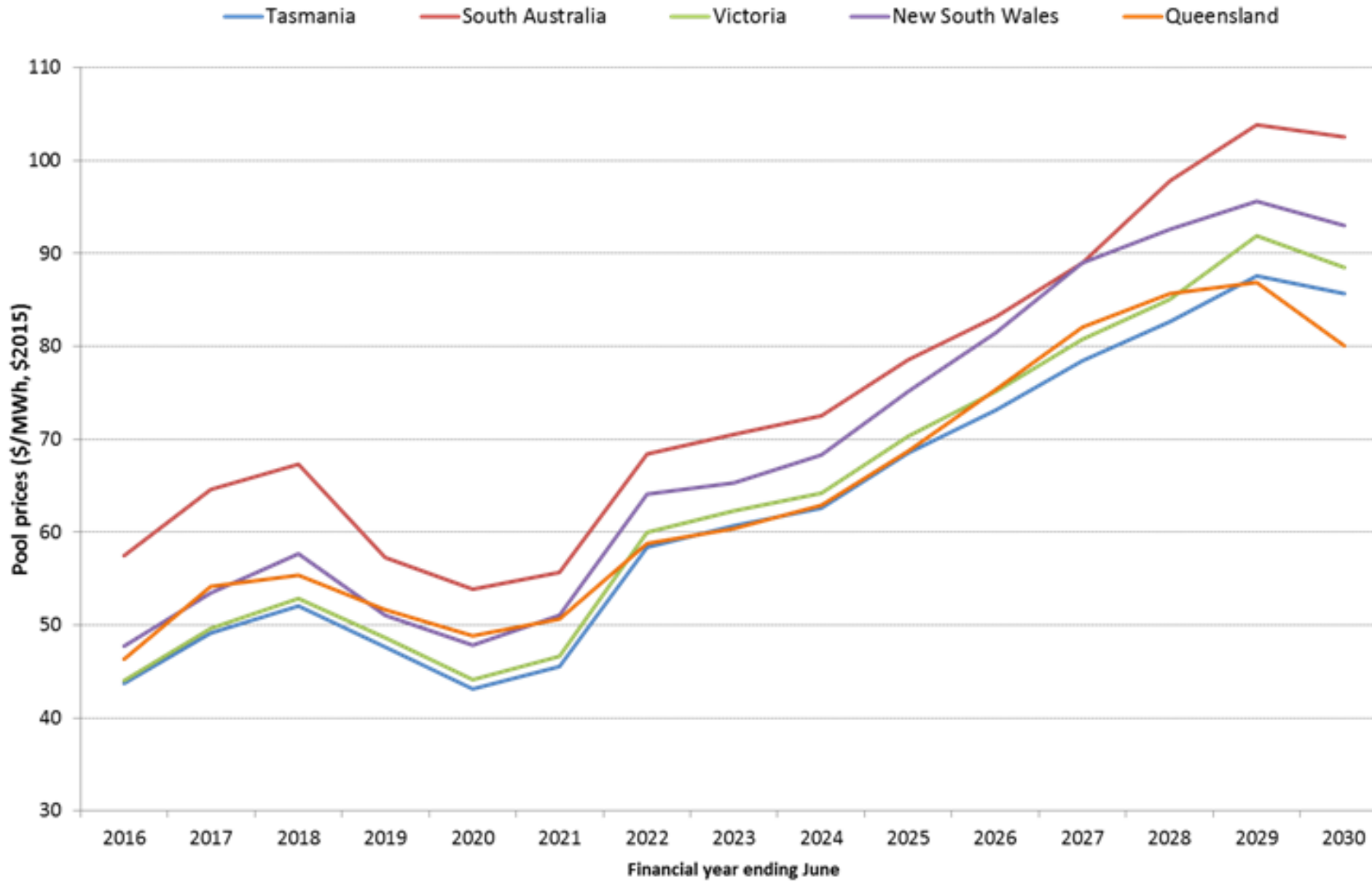
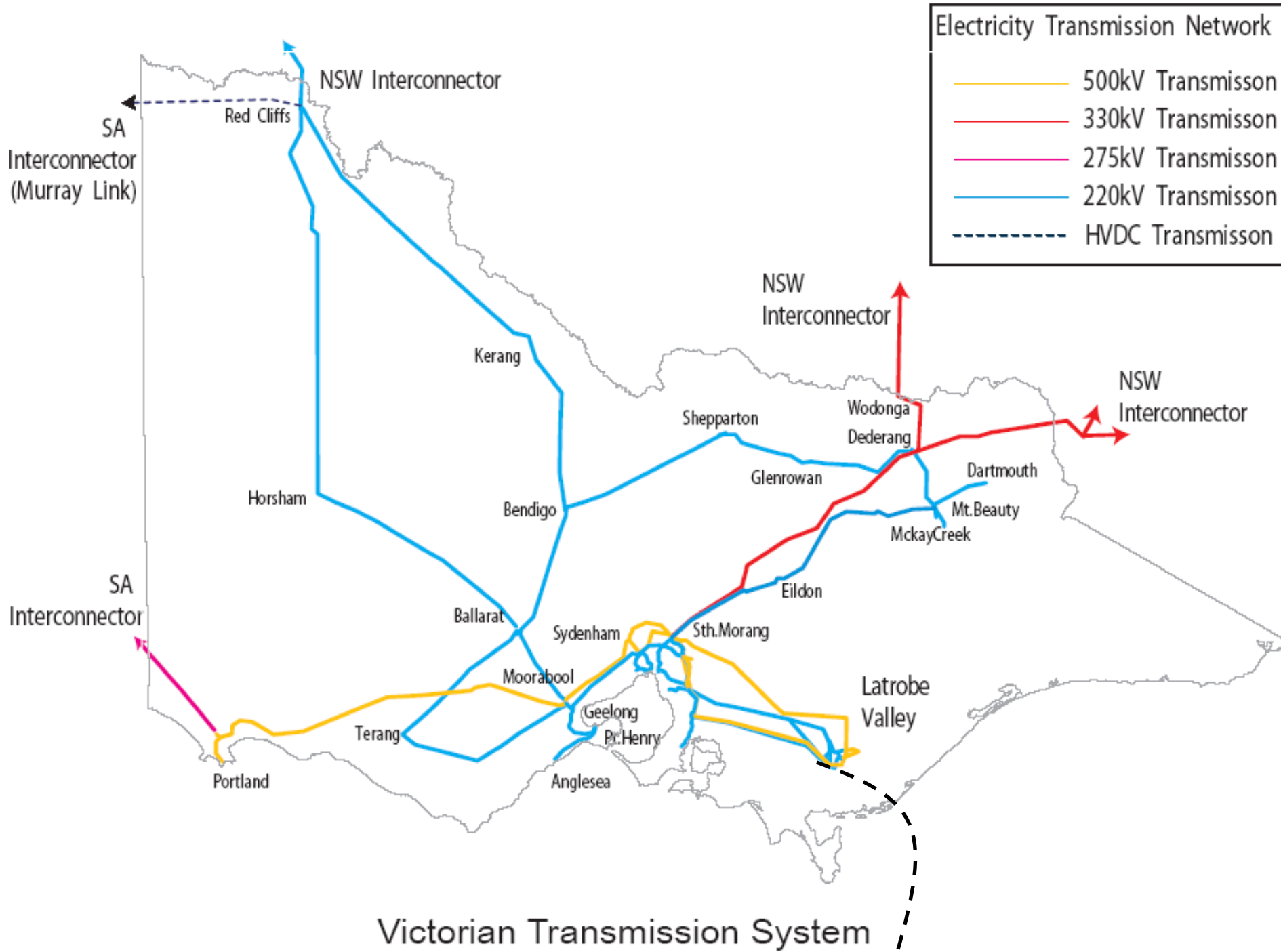


Figure 35 Projected electricity pool prices by region



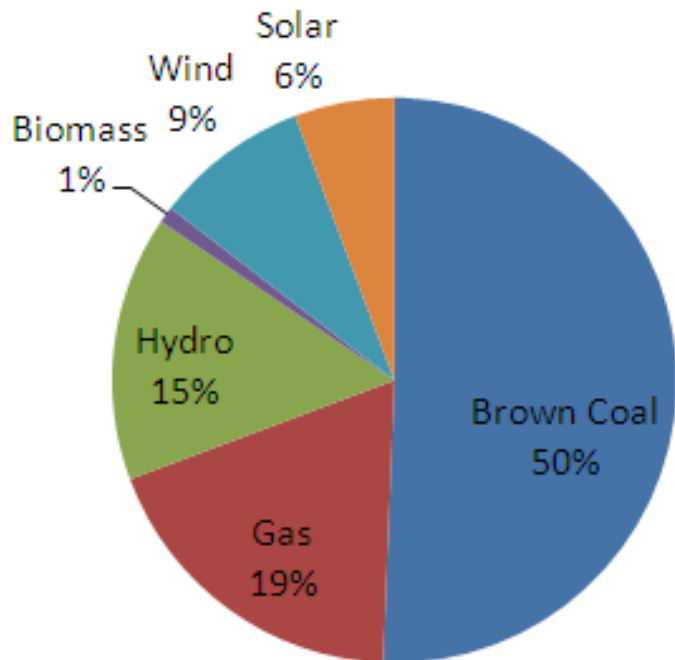
Source: Jacobs analysis



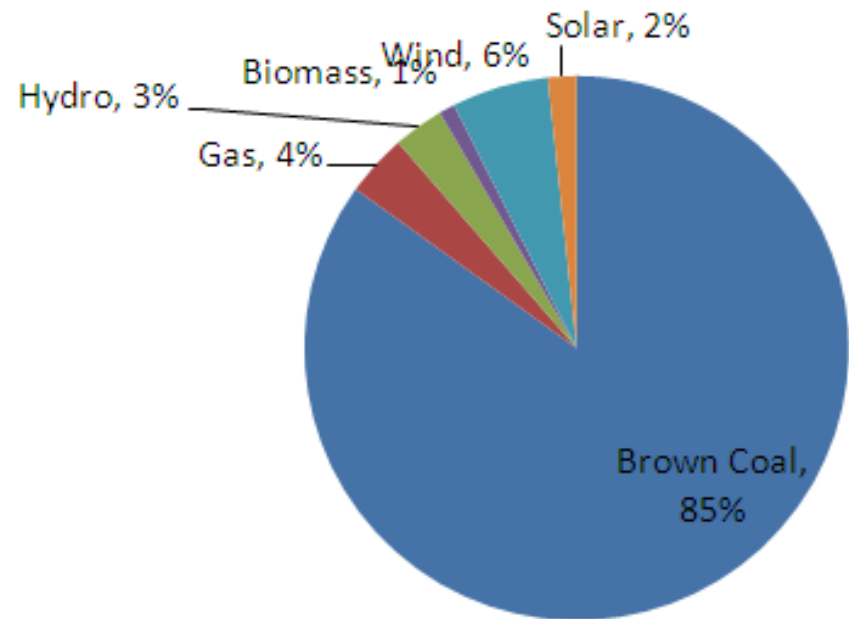
Electricity generation in Victoria

Brown coal makes up 50% of about 12,000MW of installed capacity in Victoria, but contributes over 85% of total generation.

Victorian Generation Capacity



Actual Generation in GWh



CLEAN ENERGY AUSTRALIA 2014

CLEAN ENERGY IN 2014



BIOENERGY
7.6%
OF TOTAL CLEAN
ENERGY GENERATION



GEOTHERMAL
0.002%
OF TOTAL CLEAN
ENERGY GENERATION



SOLAR WATER HEATING
901,923
INSTALLATIONS



MARINE
1
OPERATIONAL
PLANT



SOLAR¹
15.3%
OF TOTAL CLEAN
ENERGY GENERATION



LARGE-SCALE SOLAR²
0.4%
OF TOTAL CLEAN
ENERGY GENERATION



HYDRO
45.9%
OF TOTAL CLEAN
ENERGY GENERATION



WIND
30.9%
OF TOTAL CLEAN
ENERGY GENERATION

WIND POWER



71
WIND FARMS AUSTRALIA WIDE
1866
INDIVIDUAL TURBINES
3807
GENERATION CAPACITY, IN MW

<http://www.cleanenergycouncil.org.au>

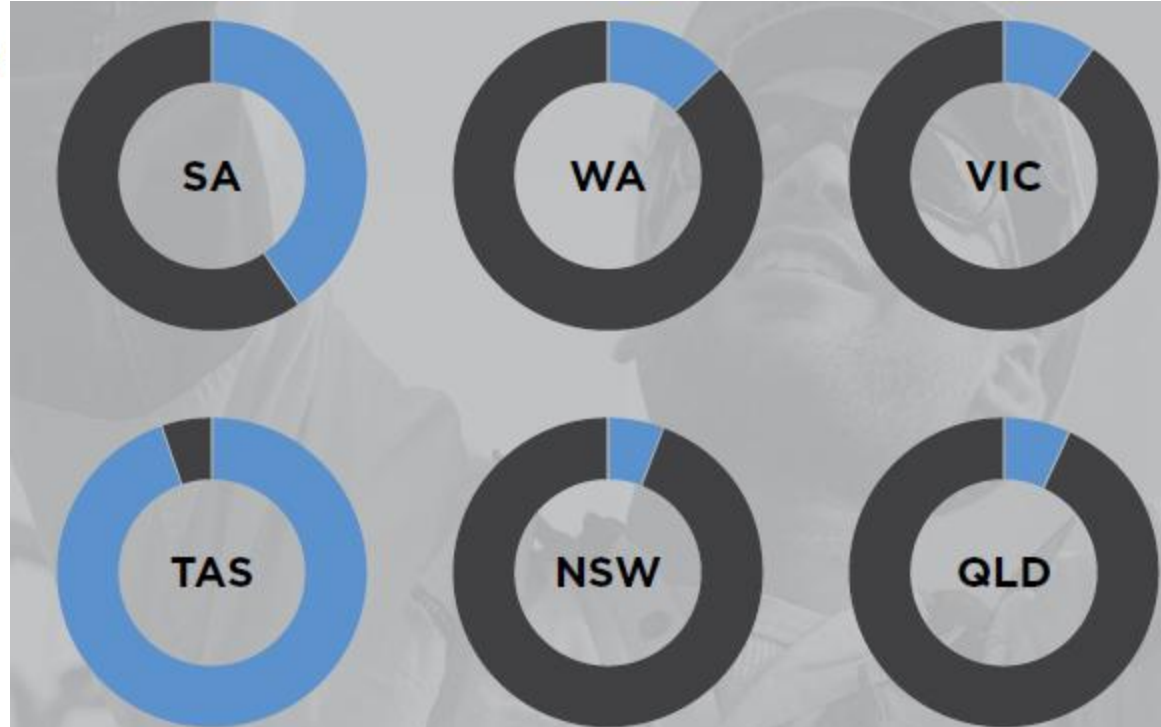
Renewables in each State

ANNUAL ELECTRICITY GENERATION 2014



● Renewables
● Fossil fuels

13.47%
86.53%



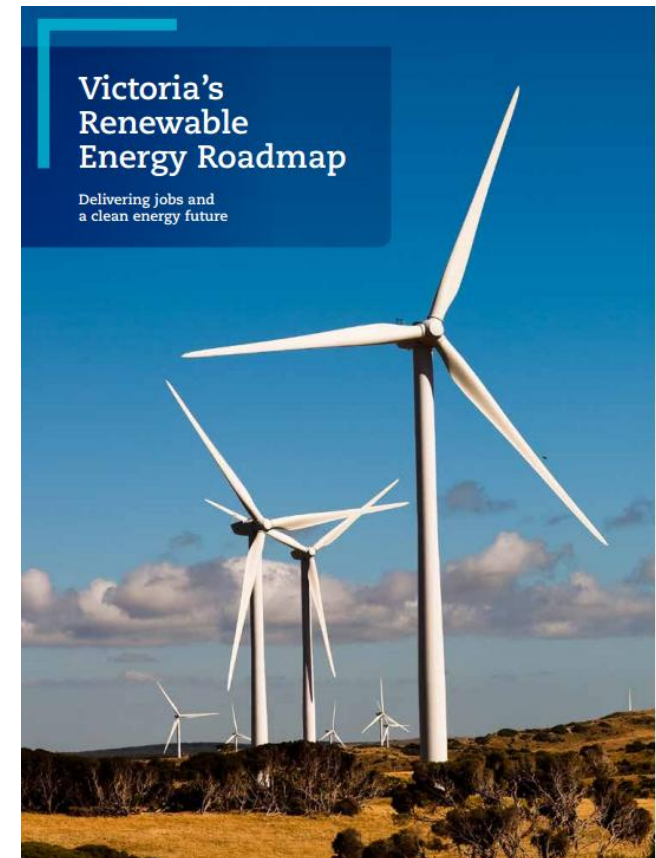
State	Total generation (GWh) ^a	Fossil fuel generation (GWh)	Renewable generation (GWh)	Penetration of renewables
SA	11,933	7115	4817	40%
WA	18,425	16,082	2343	13%
VIC	53,203	48,037	5166	10%
TAS	11,004	584	10,420	95%
NSW	60,594	57,226	3368	6%
QLD ^b	57,683	53,797	3885	7%

Victoria - New Government / New Policy

- Change of Government in November 2014
- Back to Work
 - 100,000 new jobs - \$200m Future Industries Fund
- Re-establish Victoria as a renewables friendly State
 - Reduce wind farm buffer from 2km to 1km (RER 3.2)
- Re-establish a focus on energy efficiency and energy productivity
 - Committed to extending VEET
- Establishing a Carbon target for Victoria
 - Starting with a review of the Climate Change Act
 - Minister for Environment (Lisa Neville)
- Transition economy to lower emissions
 - Supported by the policies above

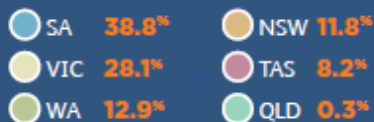
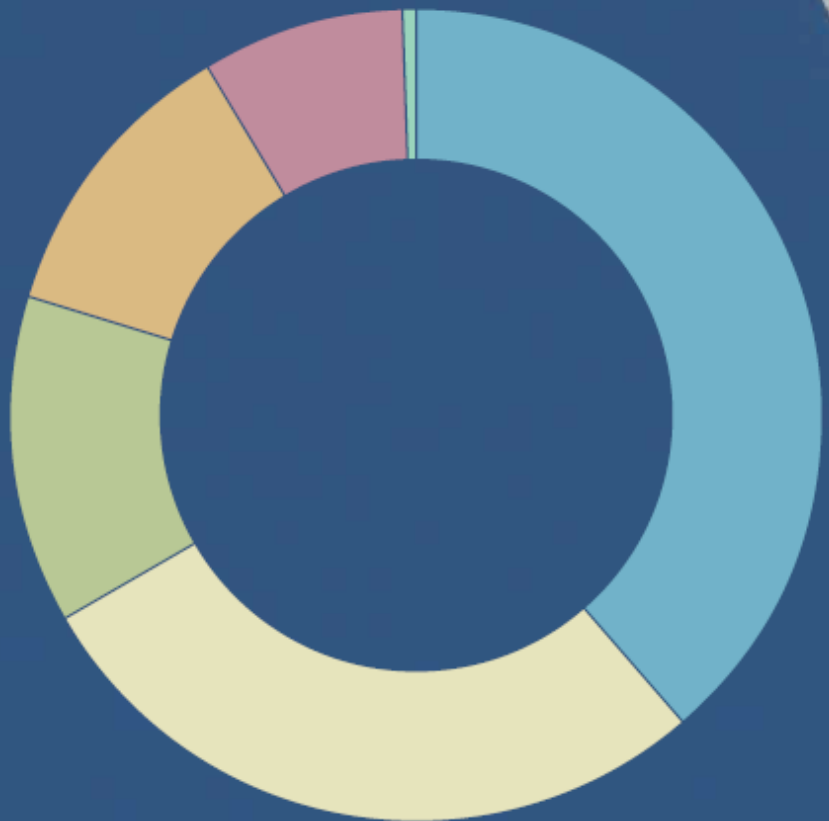
Policy – Renewable Energy

- Roadmap
- Action Plan due early 2016
- Significant consultation (RER 1.6)
- Accelerating deployment
 - REC tender (RER 3.3)
 - Policy options (RER 3.4)
 - Solar competitiveness, with and without ARENA
- Embedded Generation
 - Reducing barriers review
 - Improved connections (RER 4.1)
- Community Energy (RER 5.1)
 - CE Guide for VIC
 - ARENA Financing CE guide
- Renewable business models (RER 4.2)
 - General Exemption Order (GEO)
- Feed in Tariff review (RER 5.2)



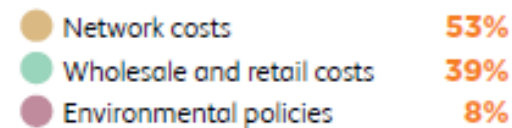
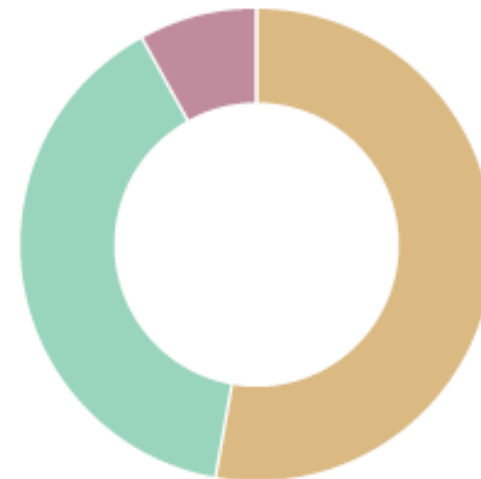
Share of wind by State

PERCENTAGE OF WIND FARM CAPACITY BY STATE



Renewable and Energy Efficiency Schemes add about 8% to our energy costs

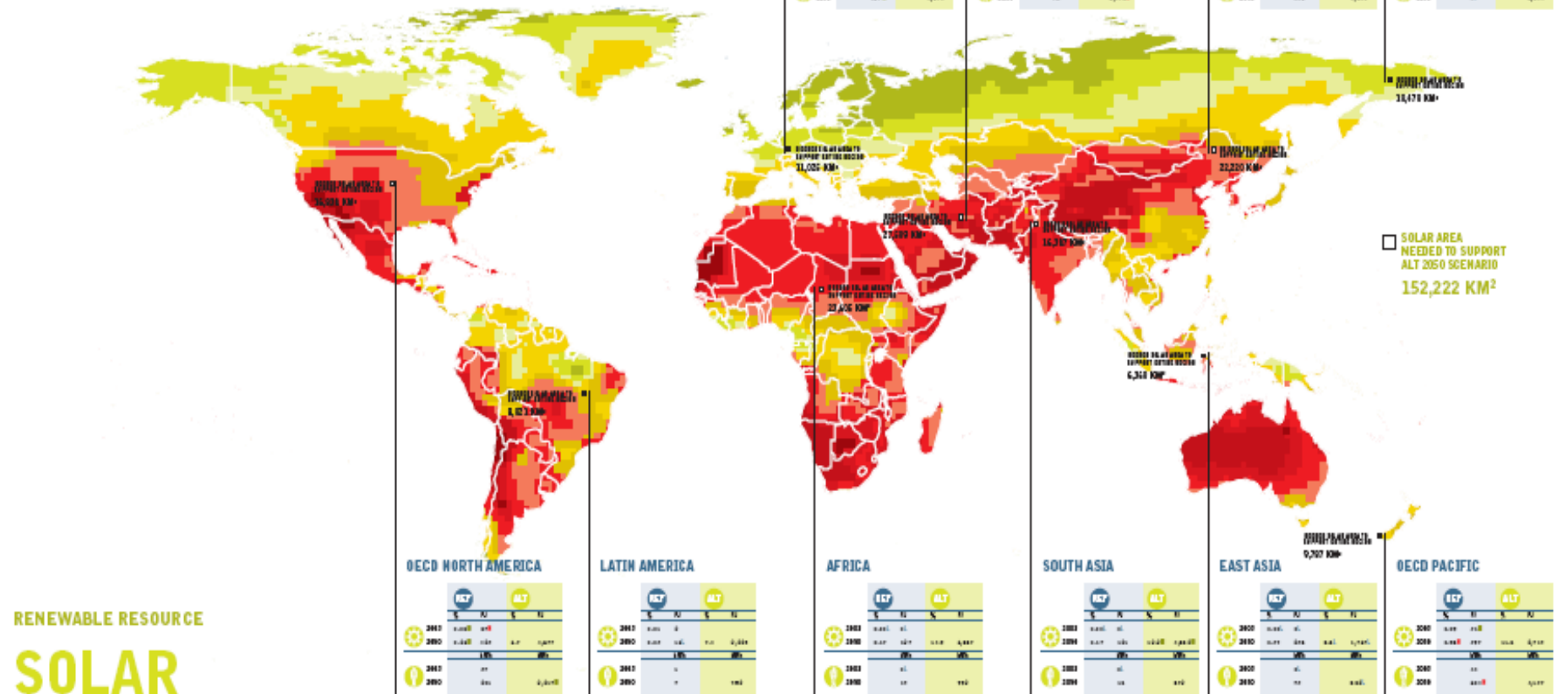
NATIONAL AVERAGE ELECTRICITY COST COMPONENTS AS A PORTION OF ELECTRICITY BILLS²²



Solar Resource in Australia

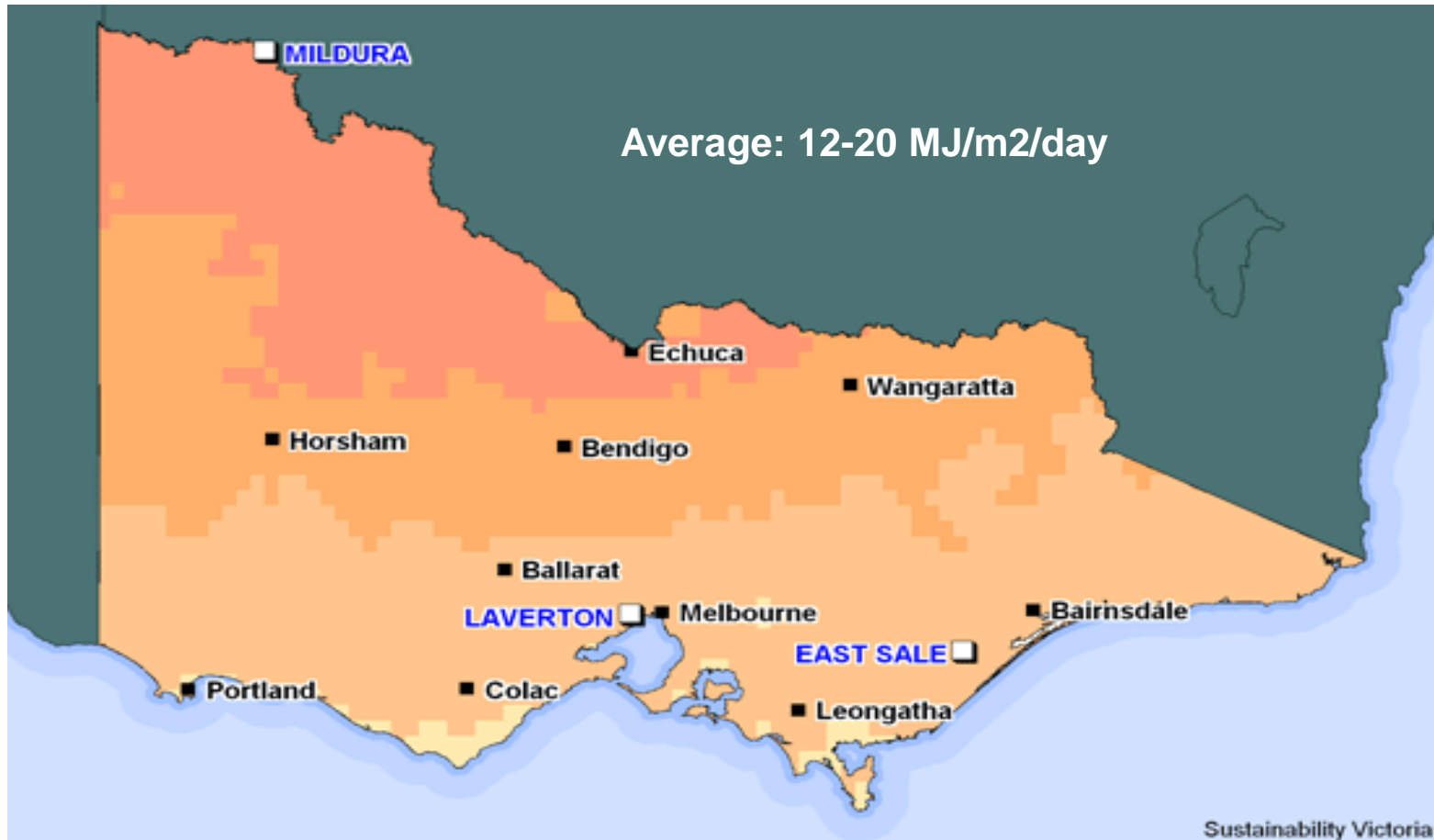
GLOBAL ENERGY CREVOLUTION
& SUSTAINABLE WORLD ENERGY OUTLOOK

map 7: solar reference scenario and the energy [r]evolution scenario
WORLDWIDE SCENARIO

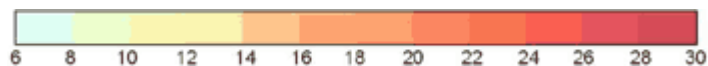


Provided by Sustainability Victoria

Solar Resource in Victoria

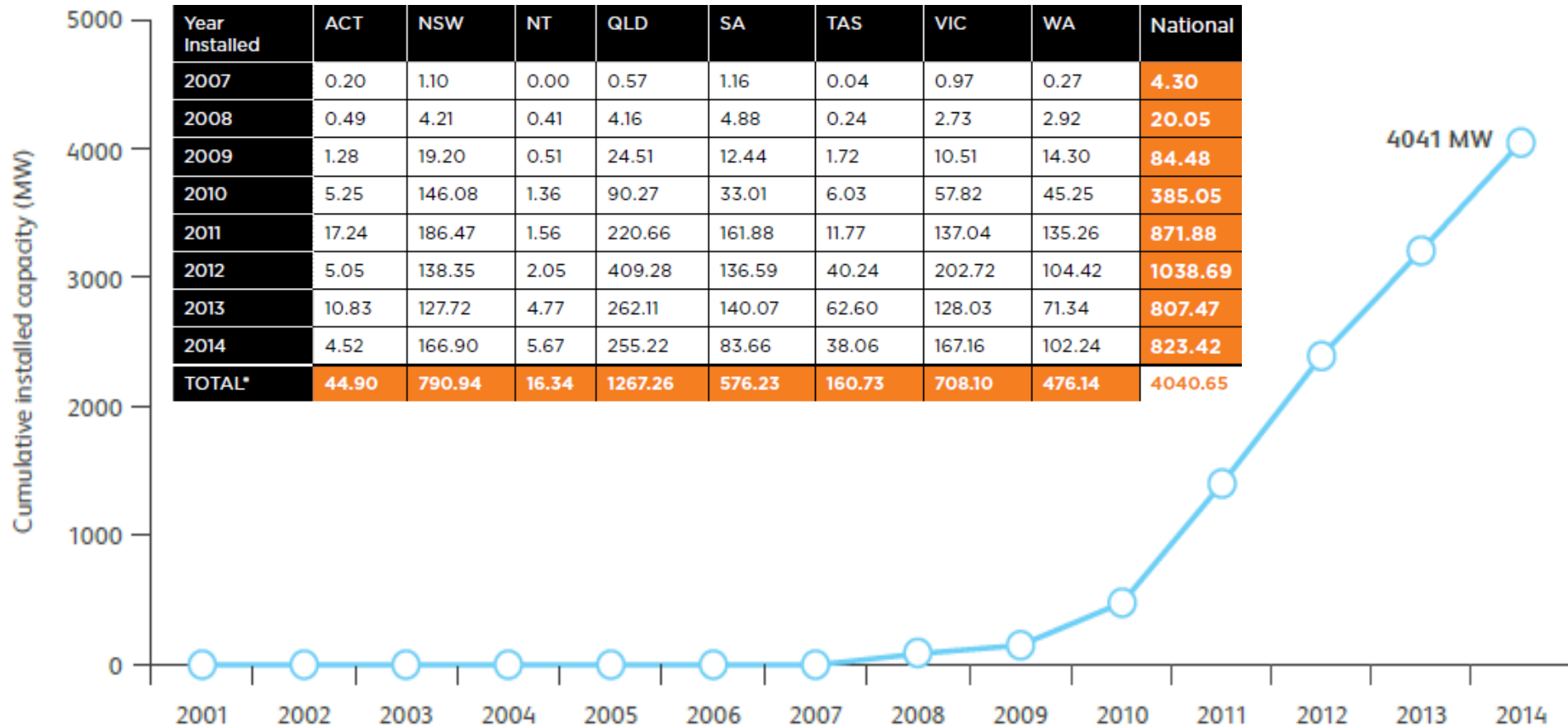


Key: Average Yearly Global Solar Exposure (MJ/sq. m)

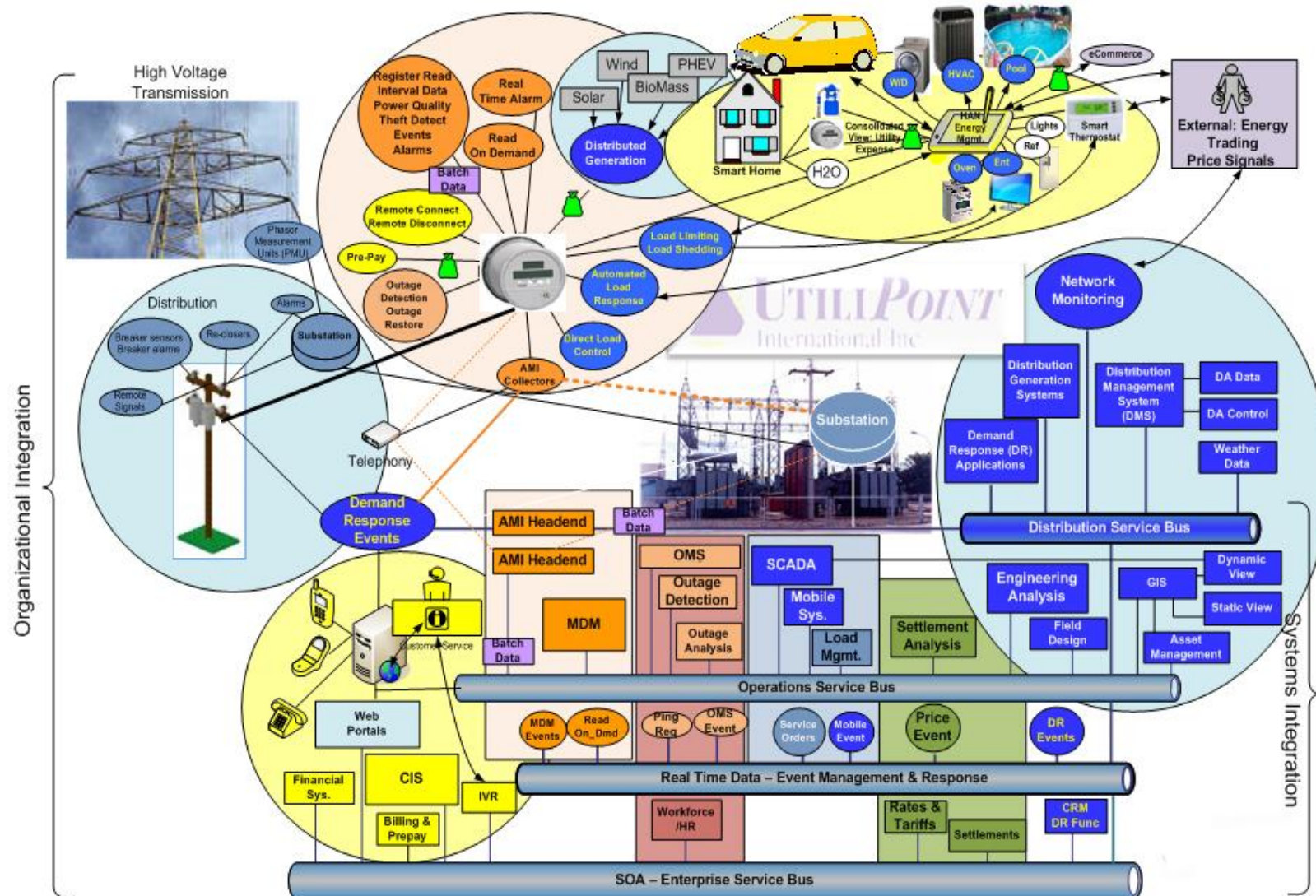


Solar PV Growth

CUMULATIVE INSTALLED CAPACITY OF SMALL-SCALE SOLAR POWER SYSTEMS (MW)



Smart Grid (or Internet of Things)



Smart Grid

- Only Australian State with Interval ('Smart') meters rolled out across all 2.5 million premises (A\$2.3B)
- Rest of Australia on hold
- Globally, a leading jurisdiction
- Data recorded every 30 minutes
- Third party opportunities with the data
- State wide Wireless Mesh
- Water, gas, agriculture, emergency management

Investment Opportunities

- Wind
 - Victoria's Renewable Energy Target - 33,000GWh by 2020
 - 6,000MW – over A\$10 billion of new projects in the next 5 years
 - 1,500MW+ expected in Victoria - A\$2.5 billion
- Solar
 - Previously not competitive with wind
 - ARENA : 200MW reverse auction that will price solar at wind power cost – approx A\$350 million investment
- Renewables (mixed)
 - Victorian Government REC purchase : 330GWh/year, 100MW

Investment Opportunities

- Energy Efficiency
 - Driven by State VEET/ESI program and rising energy costs
 - Growing focus
 - Establishing new energy efficiency equipment and service providers
 - Higher power prices = sector growth
 - Example: double glazed windows, energy management
- Batteries
 - Example: Sunverge (USA) developing 'virtual' linked batteries across multiple locations
 - Several larger 1MW and 2MW grid scale battery projects
 - Medium to long term large opportunity
 - Will commercial/industrial or domestic take off first?
 - Several Australian battery offers to compete with the Tesla

Invest Victoria

Free confidential services to investors:

- Market entry business case development support - providing information on market potential, existing companies, research and development capabilities, labour market skills and location costs
- Support for making connections to industry contacts and local suppliers
- Assist with fulfilling property requirements, including free confidential site identification and facilitation of planning and regulatory approvals
- Global support teams in client's home market
- Support in accessing assistance at all levels of government, including financial assistance to attract strategic footloose investments to the state
- Provide ongoing investor support, both locally and in-market, through an extensive network of overseas offices



Useful Links

Victorian Government Energy Website

- <http://www.energyandresources.vic.gov.au/home>

Clean Energy Council Renewables in Australia Report - Annual

- <http://www.cleanenergycouncil.org.au/cleanenergyaustralia>

ARENA Energy Storage Report

- <http://arena.gov.au/news/sharing-knowledge-on-energy-storage/>

State of the Energy Market Report - Annual

- <http://www.aer.gov.au/publications/state-of-the-energy-market-reports>

Statement of Opportunities Report – Annual

- <http://www.aemo.com.au/Electricity/Planning/Electricity-Statement-of-Opportunities>

ARENA 200MW Solar PV Reverse Auction

- <http://arena.gov.au/programmes/advancing-renewables-programme/large-scale-solar-pv/>

Thank You

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Back up slides

- The Andrews Labour Government has also launched a tender to source RE certificates from new projects in Victoria, bringing forward around A\$200 million of new investments in renewable energy

Policy – Energy Efficiency & Productivity Statement

- Statement will become a Strategy
- Strategy due early 2016
- Significant consultation
- VEET / ESI
 - Ongoing certainty
 - New activities
 - \$230m / year @ \$36/VEEC
- EUAs Victoria wide
 - In place
- Efficient Government Buildings
 - Funding now open again
 - Up to 8 year payback



WIND – (RET)

- Commonwealth - Mandatory Renewable Energy Target (MRET)
- 20% = 33,000GWh by 2020
- Current: ~16,000GWh
- Gap: ~6,000MW of wind power
- About A\$10 billion investment
- 2,000MW plus - 'shovel ready' in Victoria with planning permits
- 1,000MW plus - ready soon

SOLAR

Victoria ~800MW

Australia ~4,500MW

- Mostly domestic rooftop
- Grid scale only ~ 250MW
- Commercial and grid scale increasing
- Largest now 102 MW
 - National Electricity Market = 35,000MW+ of generation
- 35% more expensive than wind power
- ARENA \$100m grants to bring forward 200MW (5 - 50MW projects)
- Origin Energy 5kW systems
 - Free panels power PPA @ 11 cent/kWh PPA
 - Solar PPAs a bigger impact than the Tesla Battery?
- AGL - hybrid home/office solar/battery Sunverge (USA)