



Sustainability victoria



Solar Photovoltaics in Victoria

Resource, status and policies

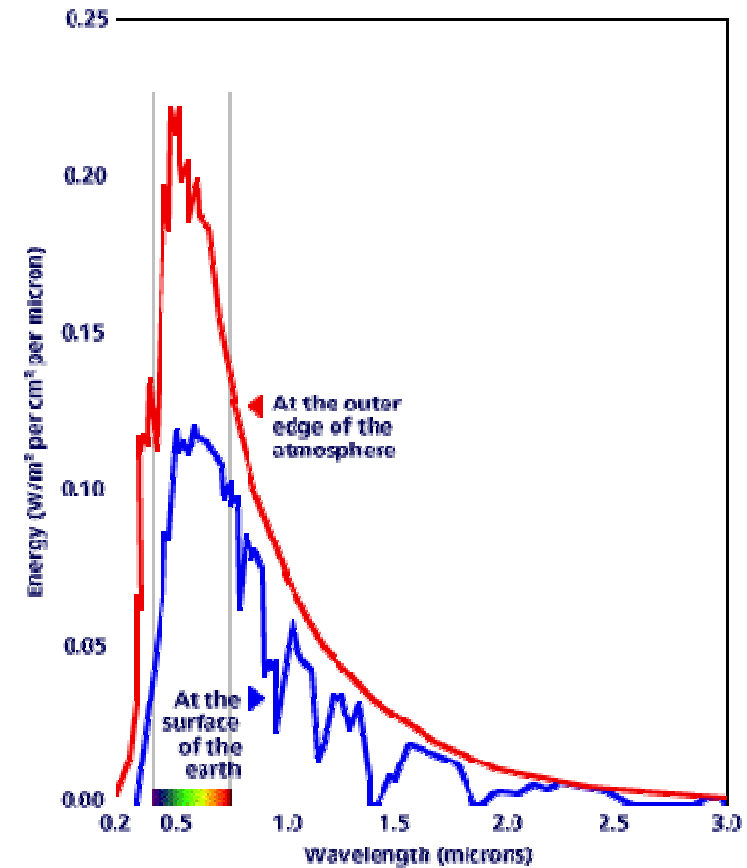
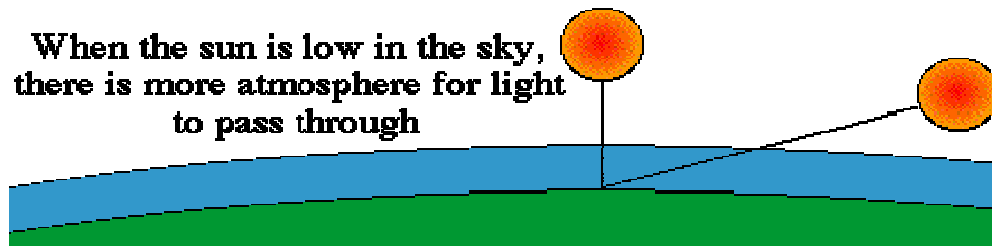
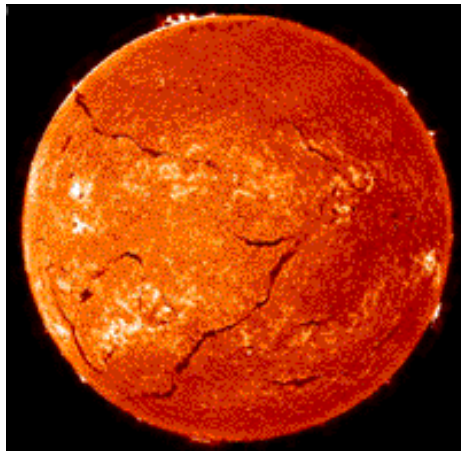
John Edgoose

Outline

- > Context of greenhouse gas emissions
- > Victoria's solar resources
- > Status of renewable energy and photovoltaics (PV) in Australia and Victoria
- > Federal and Victorian government policy

Most renewable energy is Solar

The sun is the source of much of our energy.



Solar energy

The sun –

- > Drives wind and ocean currents
- > Creating waves
- > Drives photosynthesis → biomass → fossil fuels

Exceptions:

- > Geothermal (nuclear decay / pressure)
- > Tidal (gravitational)

Solar Energy

> Familiar technology



Context - Climate change

> IPCC – Climate change: The Physical Science Basis

- Global atmospheric concentrations of carbon dioxide, methane and nitrous oxide have increased markedly as a result of human activities. The global increases in carbon dioxide concentration are due primarily to fossil fuel use and land-use change.

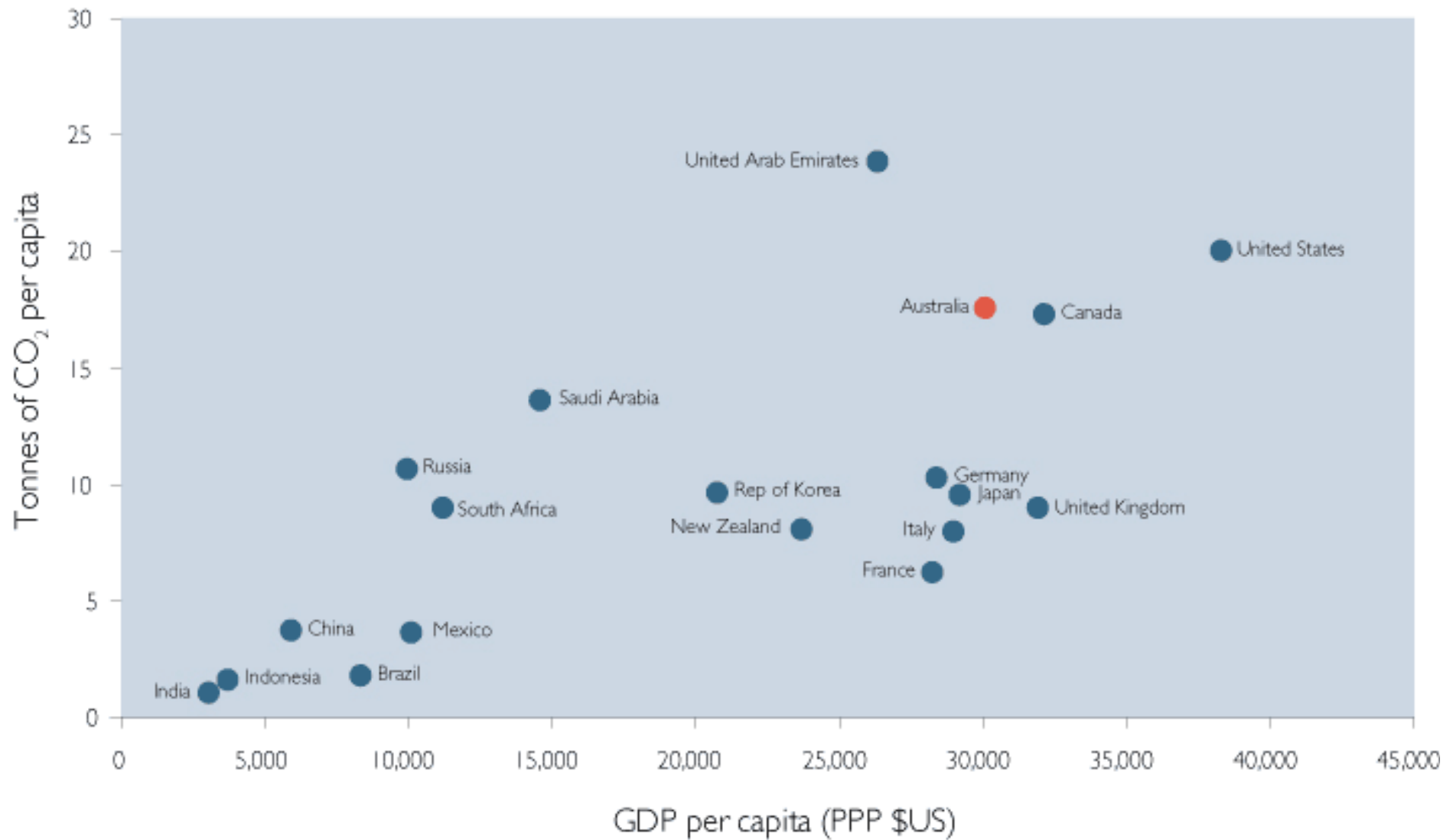
> Stern Review

- There is still time to avoid the worst impacts of climate change, if we take strong action now.

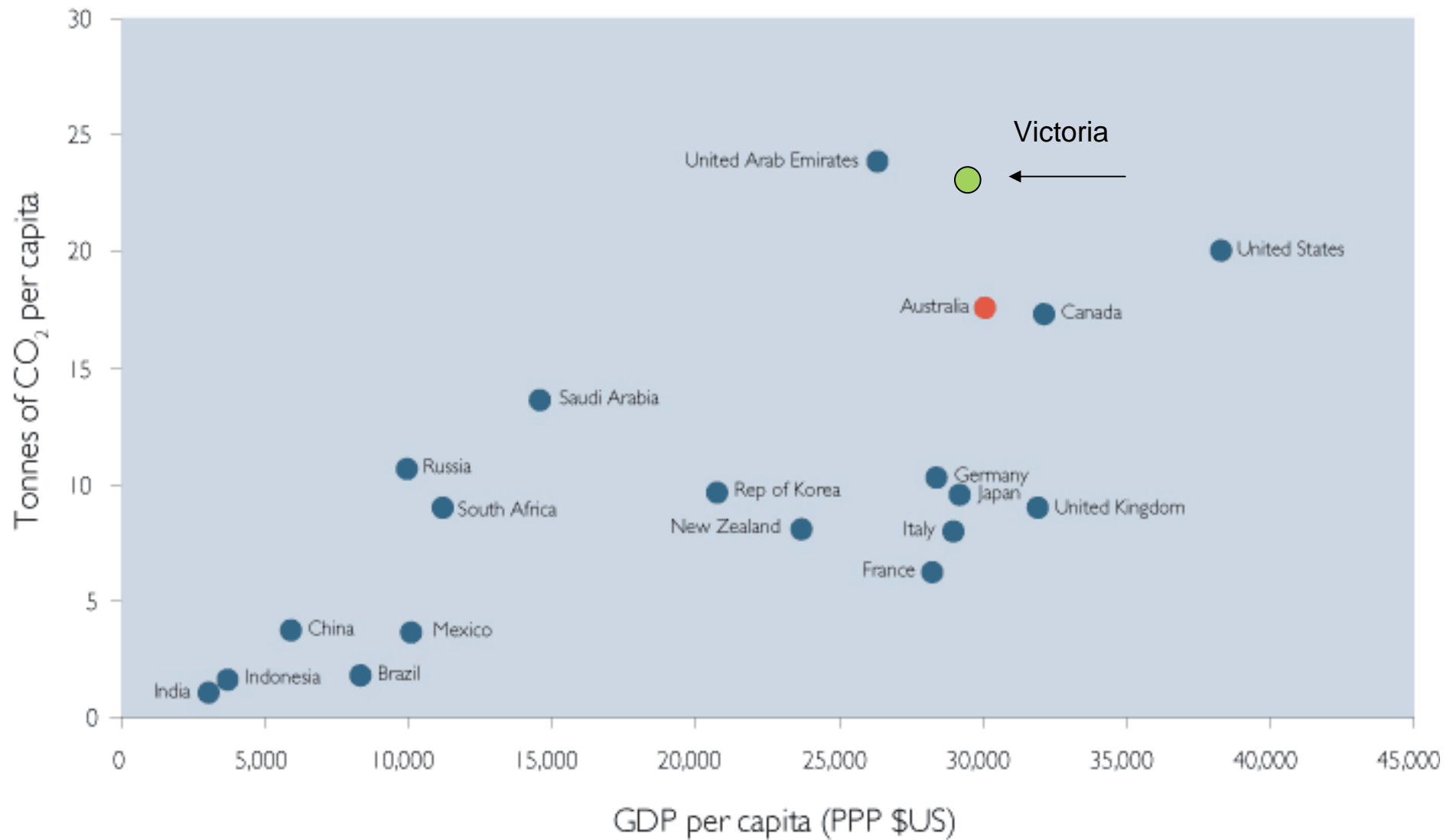
> Garnaut

- action will need to be taken earlier than previously thought
- Australia is more exposed to the impacts of climate change than other developed countries

Context - Australia's CO₂ position

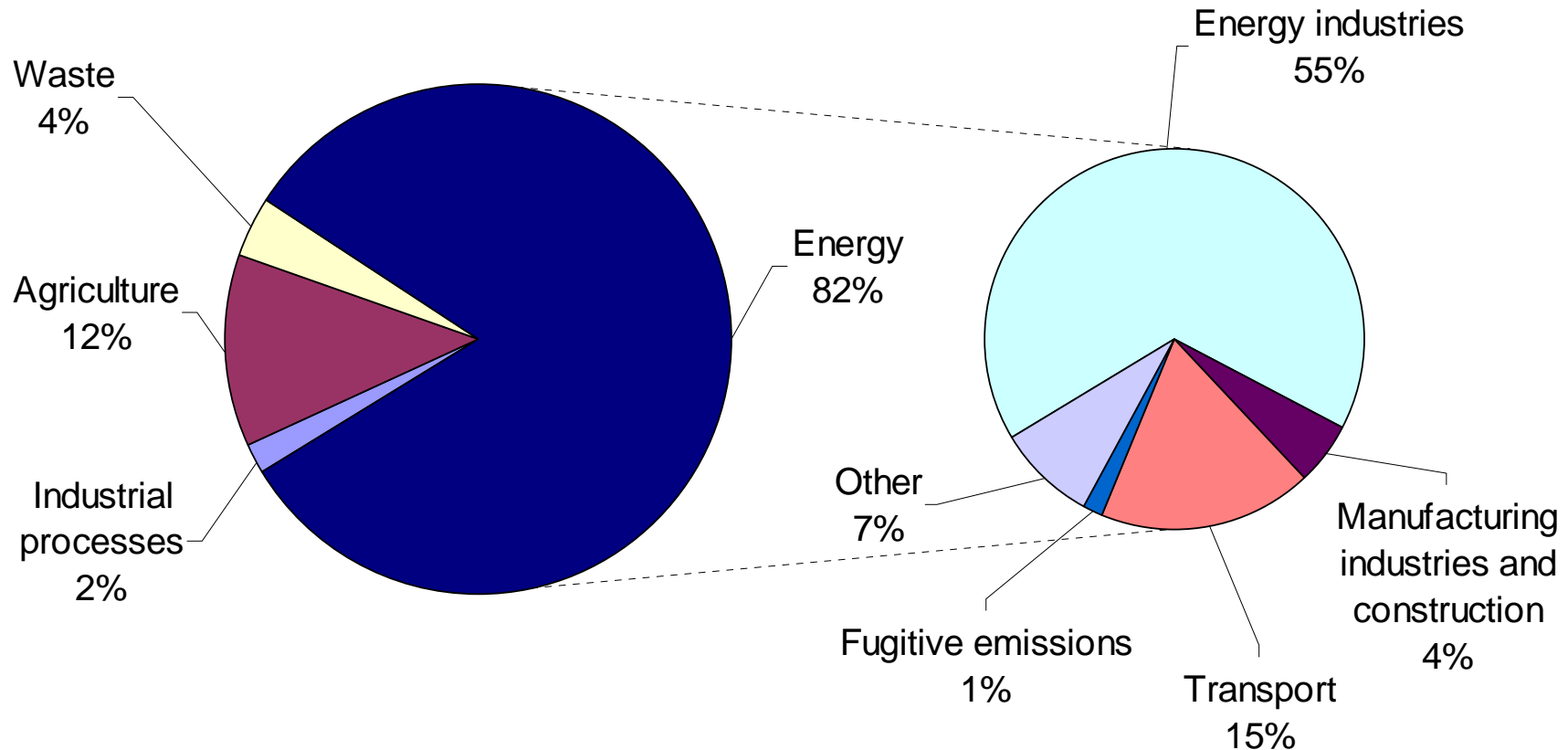


Context - Australia's CO₂ position



Victorian greenhouse pollution by sector

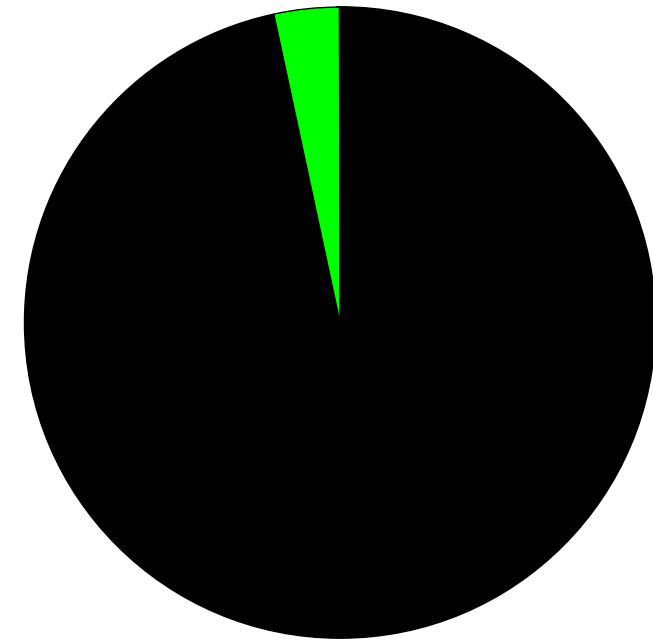
Almost 70% of Victoria's greenhouse pollution is from the stationary energy sector.



Source: Victorian Greenhouse Inventory, 2004

Status of renewable electricity in Victoria

- > Renewable energy comprises 855 MW installed capacity in Victoria
- > Total generation capacity of approximately 8,500 MW
- > Renewables supplied 1900 GWh to the Victorian grid in 2007 (3.5%)

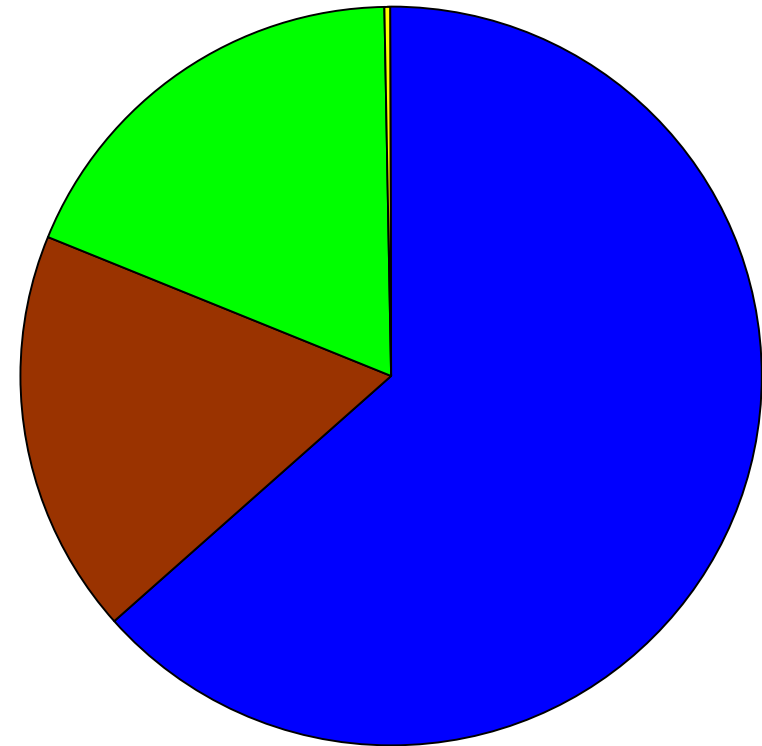


■ Non Renewable Energy

■ Renewable Energy

Size of solar PV in Victoria

- > The main sources are hydro, wind and biomass
 - hydro-electric (1140 GWh)
 - wind (362 GWh)
 - biomass (320 GWh)
 - solar (3 GWh)



■ Hydro Electric ■ Biomass
■ Wind ■ Solar

PV installations - Victoria

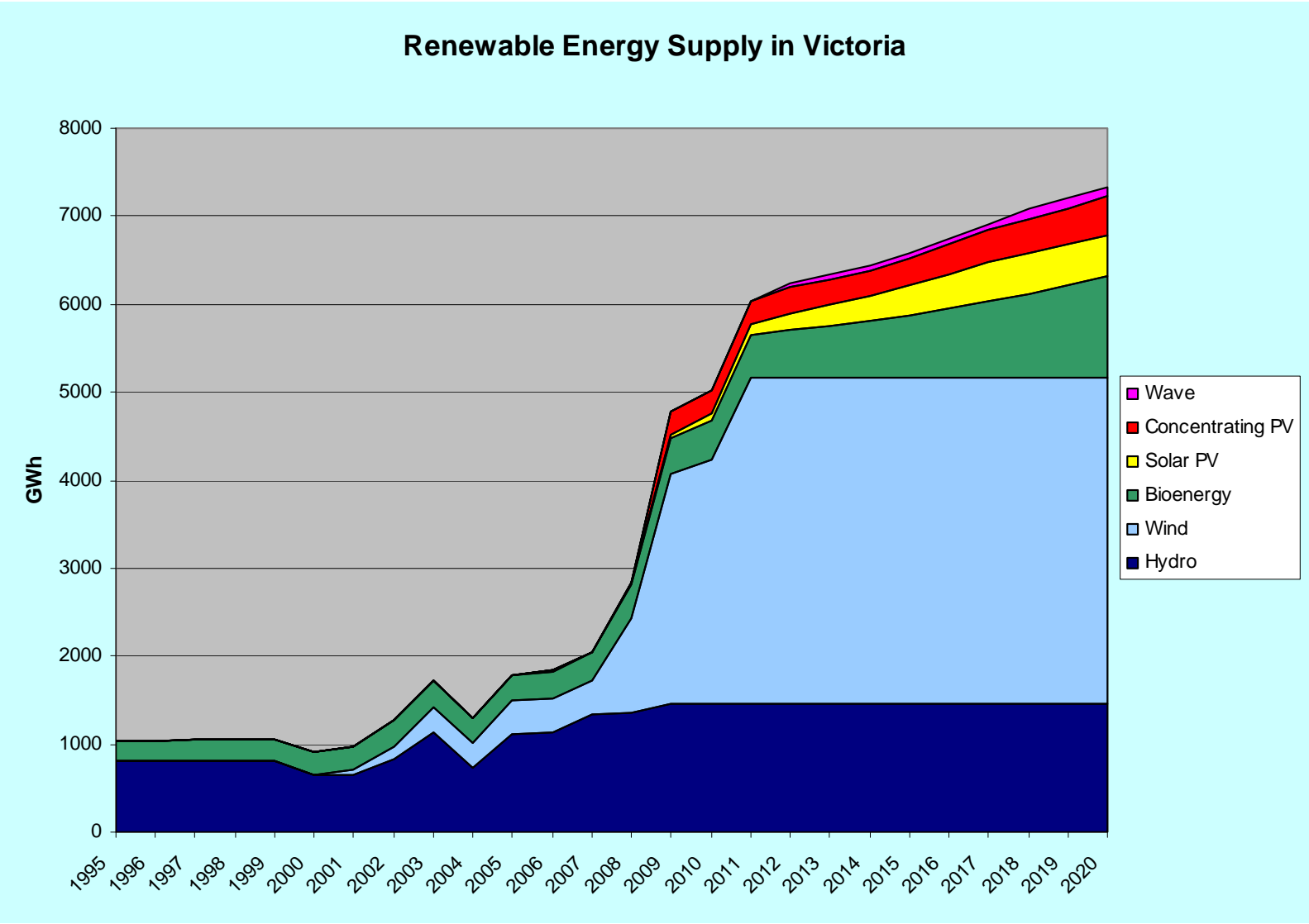
PV Installations 10 kW and above

<i>Project Name</i>	<i>Capacity (kW)</i>	<i>Year Commissioned</i>
Queen Victoria Market	190	2003
Melbourne University Building A	46	2001
Fosterville Test Facility	24	2001
MYOB	22	2001
Ceres - Origin Energy Park 1&2 (Aurora Project)	20	1997
Melbourne Cricket Ground	20	2006
Carlton (60L Building)	10	2002
Reservoir Civic Centre	9	2003
Tullamarine – Calder Sound Barrier	25	2007

Small PV Installations by program

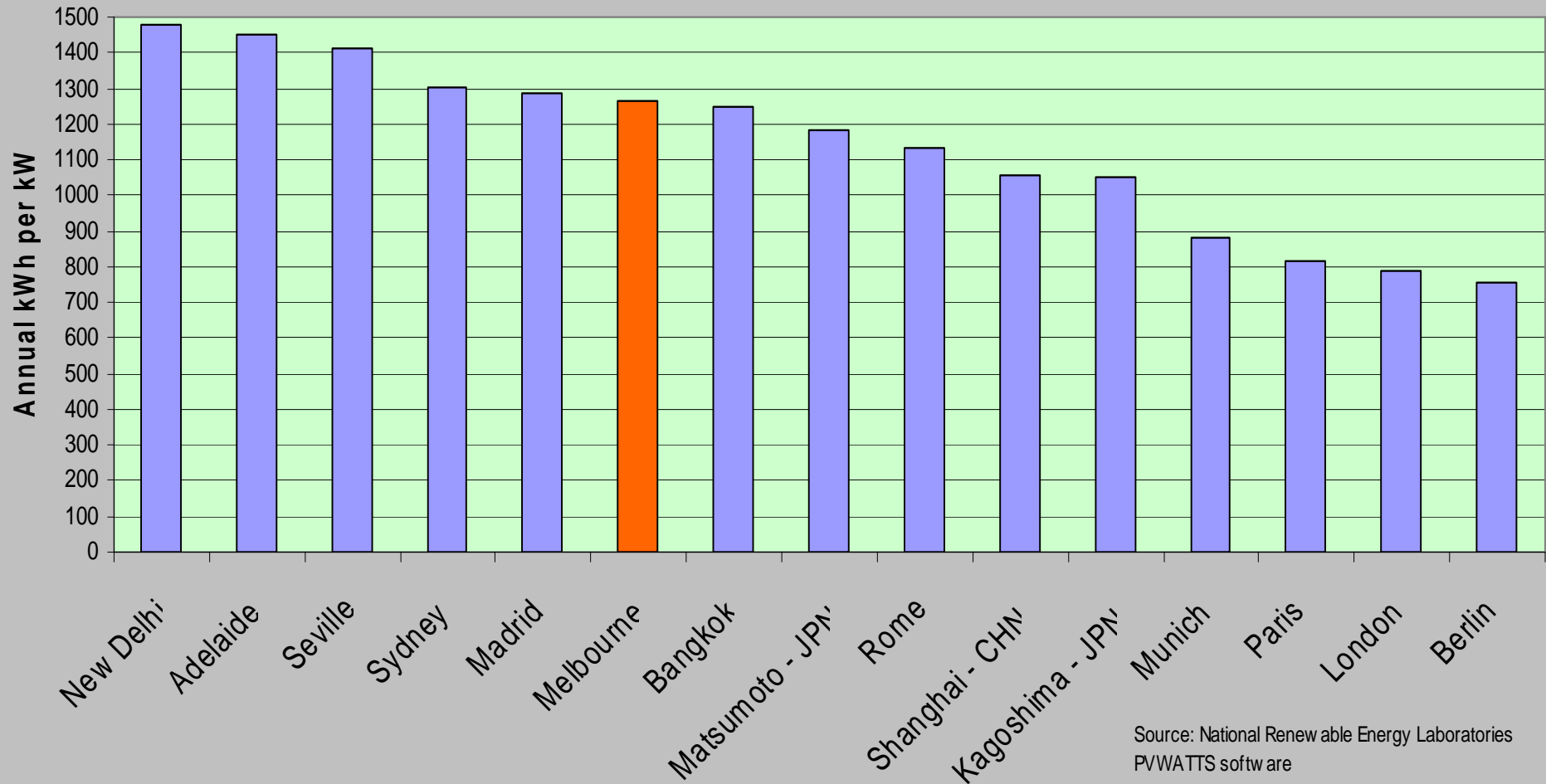
<i>Program</i>	<i>kW</i>	<i>Year started</i>
PVRP	4,230	1999
RRPGP	40	Sep-07

A renewable electricity generation scenario



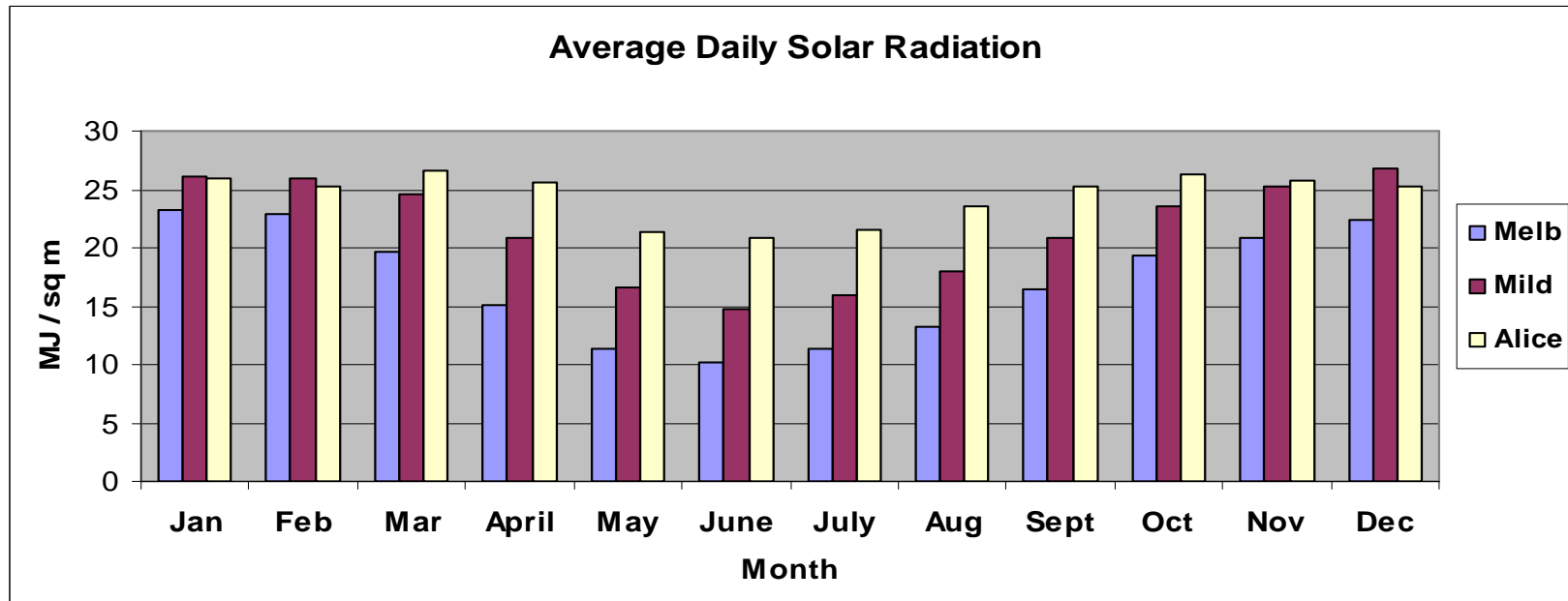
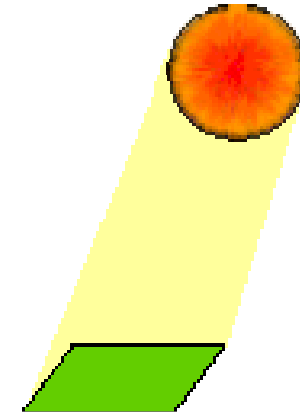
Melbourne's Solar Resource

Solar Resource in Selected Cities

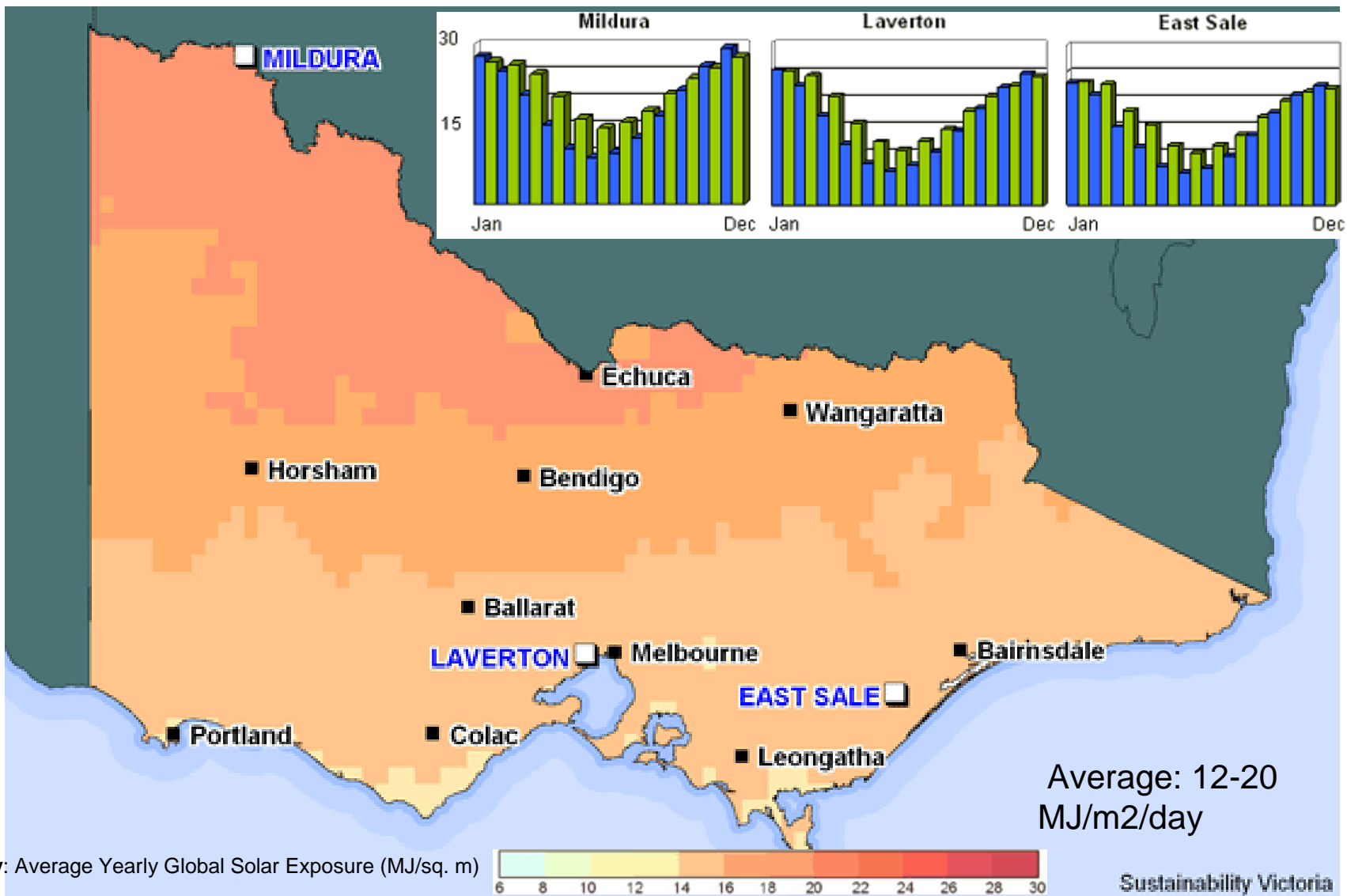


Solar energy resource

- > Measured in MJ / m²
- > Direct and diffuse radiation combined to give global solar radiation data.
- > Most common data sets - Horizontal plane and north facing inclined plane.

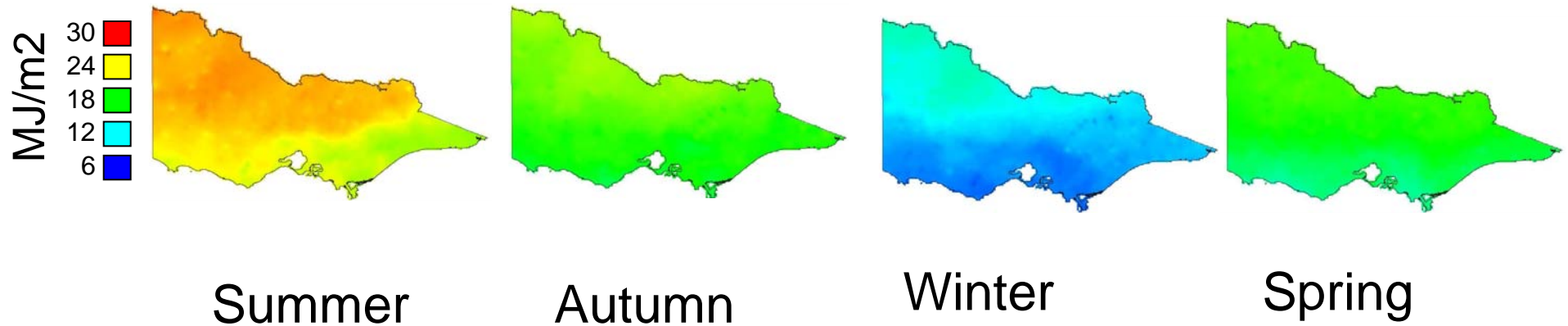


Solar resource in Victoria

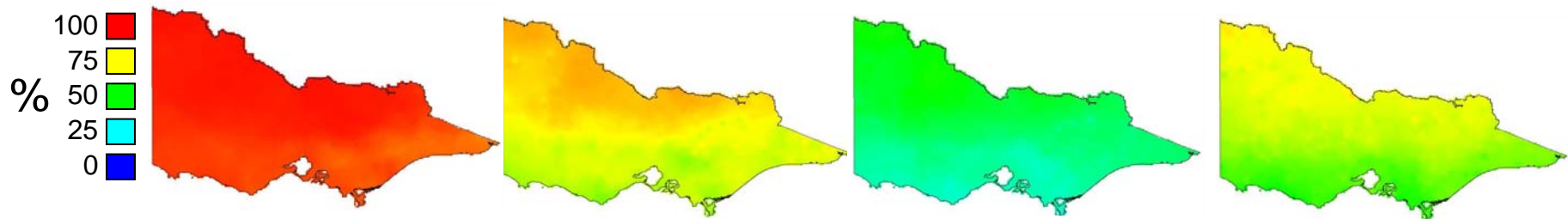


Seasonal Solar Radiation and Savings

Solar Radiation @25° Incline



Solar Savings



PV Technology status

- > Flat plate – Mono/Poly crystalline Si/Amorphous/Thin films
 - Established small scale (residential + Commercial + Communication) markets
- > Large Concentrators
 - Emerging markets
 - Solar Systems (NT + Mildura) – Melbourne based
- > Linear Concentrators and CHP
 - Emerging from R&D
- > Emerging technologies
- > Remains very expensive energy (8x to 10x wind)

Solar collectors - low concentration



Building integrated PV



Building Integrated PV

Europe well advanced in BIPV



Tullamarine Calder Interchange

Solar PV Sound Barrier – 25 kW



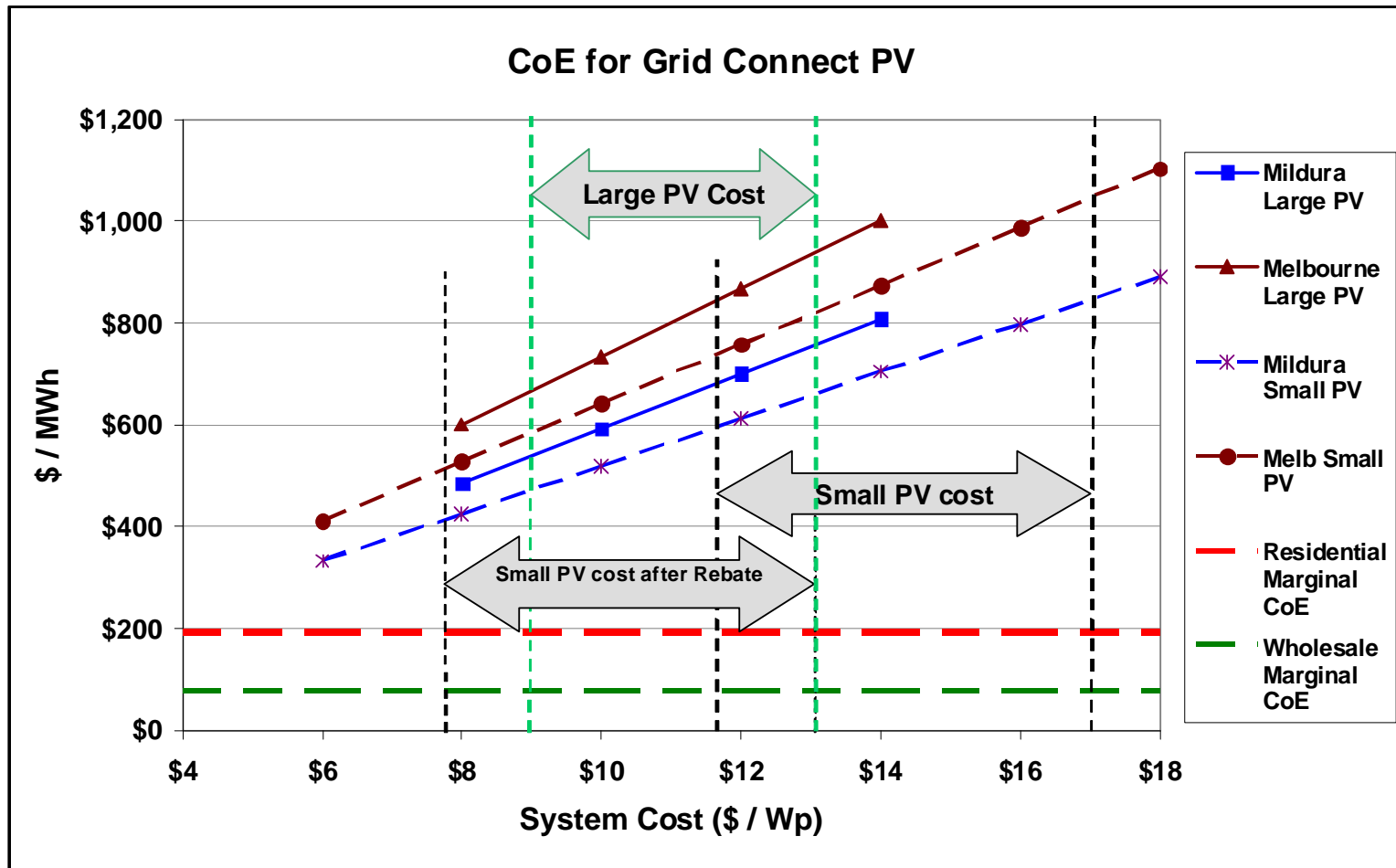
25 kW of photovoltaic panels form the top 1 metre of a freeway noise barrier.

Length : 500m

Power fed into the freeway lighting circuit

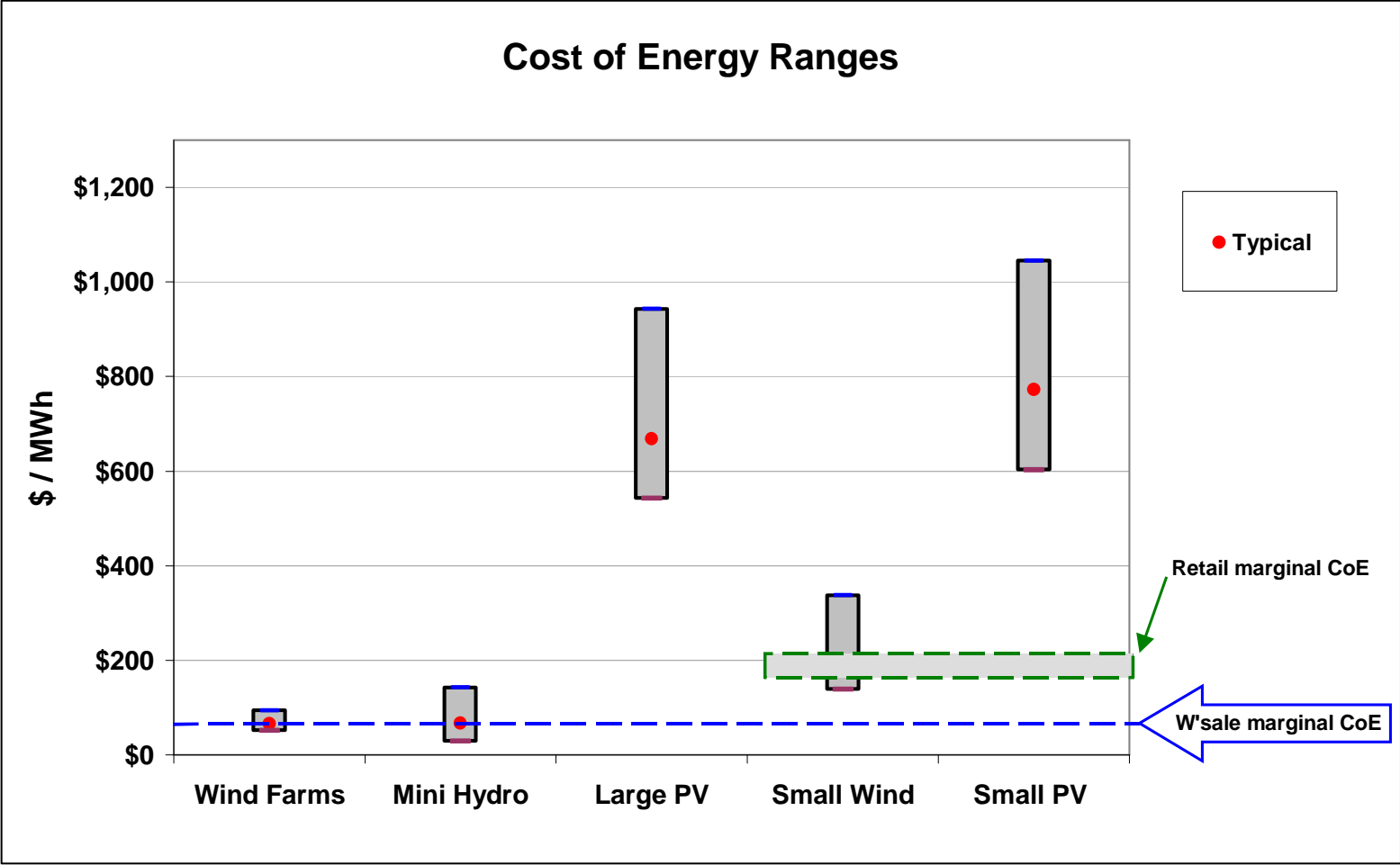
**Project cost = \$700,000
RESF = \$140,000**

PV - Cost of Energy



CoE needs to be < marginal CoE to be financially viable

Comparing cost of energy



Options for Communities

1. Collective purchase of multiple small systems. e.g. 50 household PV systems or SHW.

Advantages:

- Make use of rebates
- Lower price from bulk buy

2. Community Investor Coop (Similar to Hepburn)

Advantages:

- Can fund a bigger project on a neutral site.

Options for Communities

3. Part share on a large projects – e.g. community owns 2 turbines in a windfarm.

Advantages:

- Not responsible for planning , development and delivery

4. Government funded project - Please give it to us in our back

Advantages:

- No or little cost
- BUT limited community buy-in and not sustainable.

Federal Renewable Energy Policy

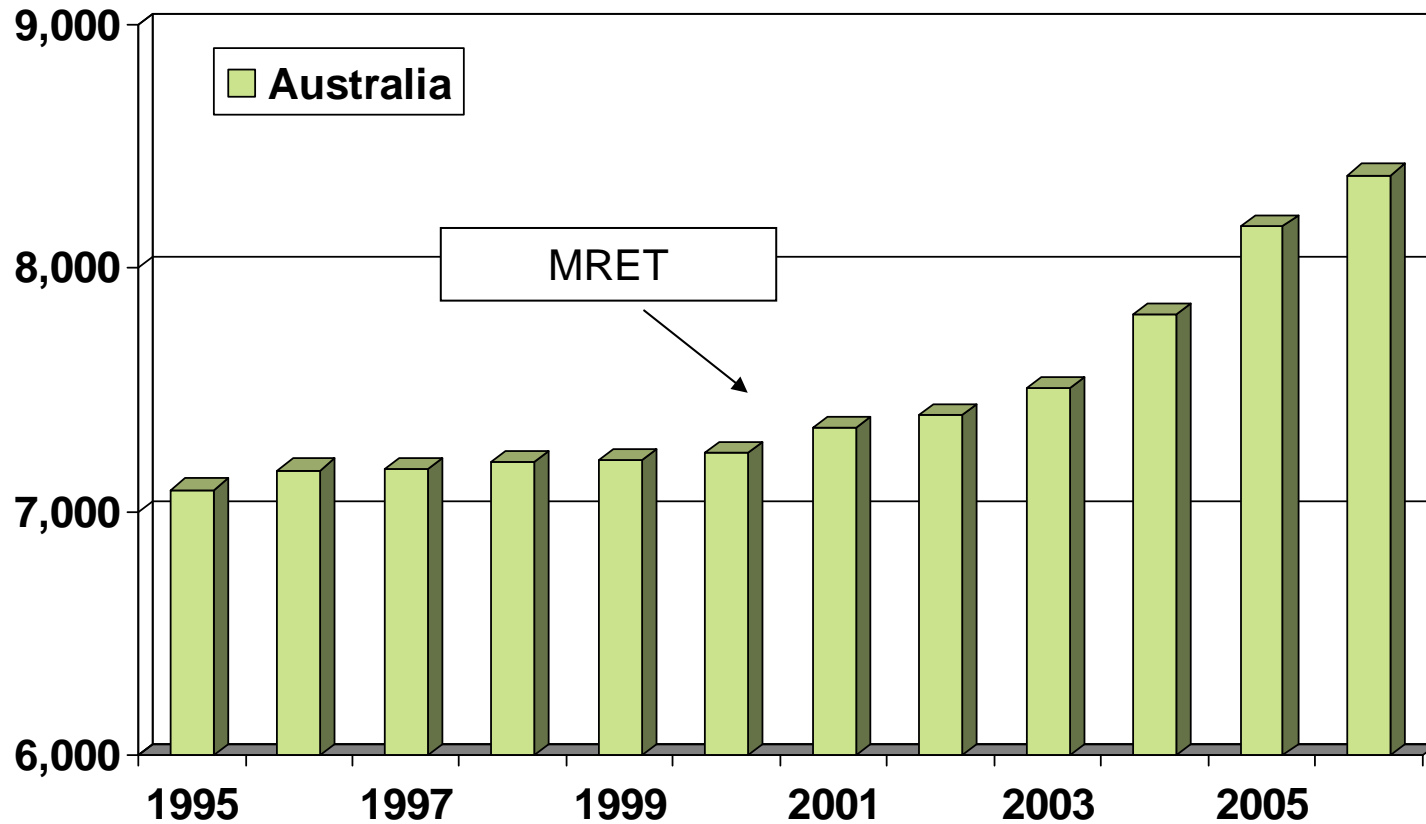
Carbon Pollution Reduction Scheme

- > A broad based emissions trading scheme using a “cap and trade” model
- > Implementation from 2010
- > Final design and emissions reduction targets confirmed later in 2008
- > Will increase the costs of fossil-fuel based electricity, making renewable energy more cost competitive



Mandatory Renewable Energy Target

Renewable Energy - Total installed capacity (MW)

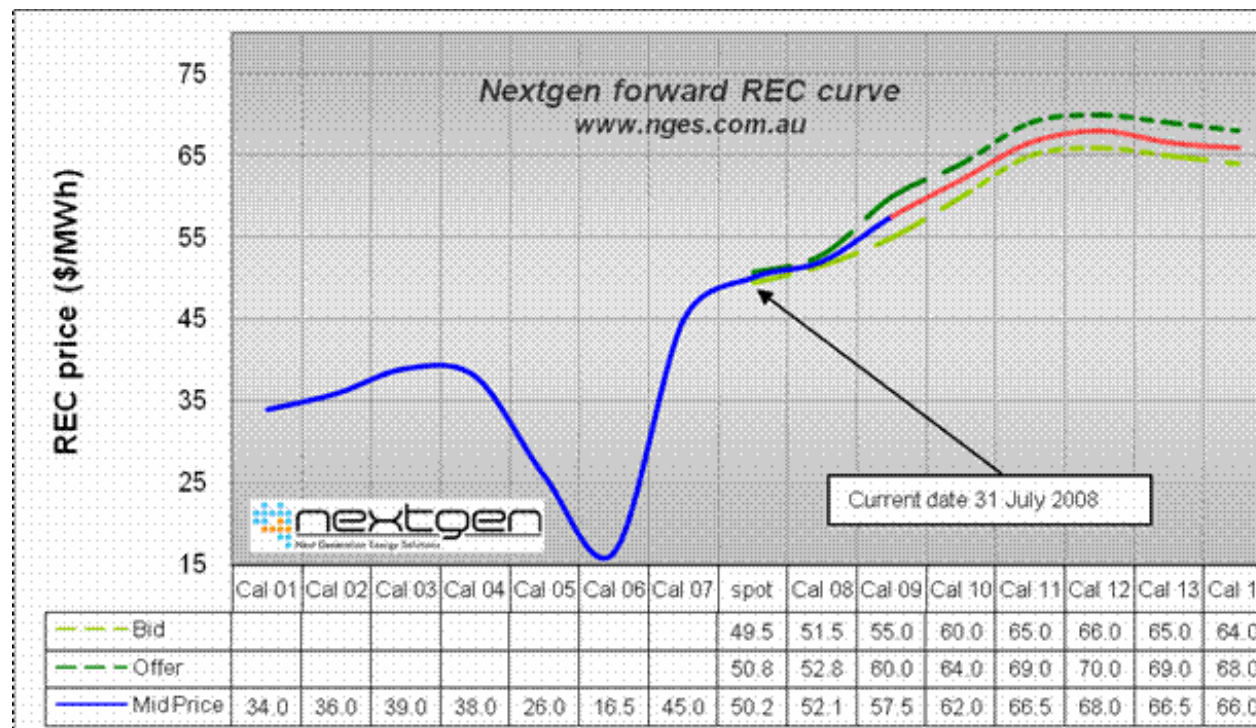


Source: Australian Clean Energy Council

Federal Renewable Energy Policy

20% Mandatory Renewable Energy target – TBC

- > 20% of electricity supply – approx. 60,000 GWh - by 2020
- > 50,000 new jobs and \$20 billion in investment – estimated
- > RECs currently trade at around A\$50 per MWh
- > Small scale PV eligible to produce RECs – 15 years production upfront



Federal Government's Funding Programs

Industry Funding

\$500 million Renewable Energy Fund

- > Generate \$1.5 billion worth investment in RE technologies
- > Includes a \$50 million **solar innovation fund**

\$45 million Climate Ready Program

- > Funding for commercialisation activities to develop solutions to climate change challenges

\$27 million Renewable Energy Equity Fund

- > Venture capital for small innovative companies

\$500 million Low Emissions Technology Demonstration Fund

- > Supporting the demonstration of innovative low emissions technology, including **solar energy (large)**

Federal Government's Funding Programs

Residential and Community PV Funding

\$328 million Remote Renewable Power Generation Program

- > 50% of capital cost for renewable energy systems remote from electricity grid

\$150 million Solar Homes and Communities Plan

- > Rebates capped at \$8,000 for solar home systems

\$300 million Green Loans Program for Households

- > Low interest loans for green home improvements, including PV

\$489 million National Solar Schools Program

- > Includes \$200 million to equip every school in Australia with a PV system

\$75 million Solar Cities Program

- > Funding for selected cities in Australia to trial solar technologies

Future outlook

- > Carbon market through the Emissions Trading Scheme
- > Federal Feed-in-Tariff

Victoria's Renewable Energy Support

- > State target of 10% renewable electricity by 2016
- > \$72 million funding for renewables under the **Energy Technology Innovation Strategy**
- > Introduction of **feed-in tariffs** for small-scale solar energy generation from 2009: Max 2kWp residential
- > \$50 million Solar Systems Pty Ltd proposed heliostat solar power station near Mildura.
- > \$4 million **Smart Energy Zones** program
- > \$5 million **Solar Schools** program

Solar PV Feed-in Tariff

- > A feed-in-tariff has been announced for small scale solar installations in the residential sector
- > 60 Cents / kWh paid for metered exported energy for installations up to 2 kW
- > National approach to feed-in tariffs by the Federal Government has been proposed.

Other Funding Sources in Victoria

Sustainability Fund

- > supports projects that foster sustainable resource use and have economic and social benefits for Victorian communities.

Renewable Energy Support Fund

- > Up to 20% capital cost for medium-scale technically proven technologies that are near commercial.

Centre for Energy and Greenhouse Technologies

- > Venture capital funds / support services for commercialisation

Summary

- > PV market is currently small but growth is expected
- > Federal and State governments making increased renewable energy commitments
- > 20% renewable energy target by 2020 will drive \$20 billion investment
- > Carbon Pollution Reduction Scheme will drive structural adjustment to a low-carbon economy
- > Renewable energy target for Victoria - 3274 GWh new renewable generation by 2016
- > Proposed feed-in tariffs could drive PV uptake in Victoria
- > Victoria has world-class solar resources and a strong demand for renewable electricity.

Thank You

Resources

www.sustainability.vic.gov.au

www.dpi.vic.gov.au

www.greenhouse.gov.au

www.cleanenergycouncil.org.au