

Renewable Energy Technologies

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Government of South Australia

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Energy and Infrastructure

Climate Change Policies

The uptake of renewable energy generation in Australia will increase significantly due to a number of Commonwealth and State climate change measures.

Climate Change Policies

Commonwealth

Carbon Pollution Reduction Scheme (CPRS)

- A proposed major structural change to the economy to limit greenhouse gas emissions.
- Polluters required to pay for emitting.
- Coal-fired generators are the largest emitters.

Expanded Renewable Energy Target (RET)

- RET of 45,000 gigawatt hours (GWh) by 2020.
- Designed to facilitate the uptake of renewable energy generation in the early years of the CPRS.

Renewable Energy Development Fund

- \$435m REDP is part of the \$500 million Renewable Energy Fund

Climate Change Policies

South Australia

South Australia Strategic Plan

- T3.5 Greenhouse gas emissions
- T3.12 Renewable energy

Climate Change and Greenhouse Emissions Reduction Act 2007

- Legislates for the above targets.
- Sector agreements.

Renewable Energy Industry Development Plan

- To encourage the development of renewable energy industries in South Australia through appropriate legislative frameworks.

Feed-in legislation

- Minimum of 44 cents per KWh for small scale solar photovoltaic electricity returned to the grid.

Transition Fuel:

Natural Gas

Renewable Energy Technologies:

Solar

Wind

Hydroelectricity

Geothermal

Wave / Tidal

Biomass



Energy for a sustainable future.



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Transition Fuel

Natural Gas

- Lower emissions intensity compared to black or brown coal.
- Under the CPRS, the uptake of natural gas-fired electricity generation is expected to increase as we transition to a low emissions economy.

Solar

Two main types of solar generation:

Solar thermal systems - heat energy captured and either used directly or stored (e.g. solar hot water).

Photovoltaic cells - *convert* light directly into electricity (panels or solar concentrators). 33% of the nation's grid connected solar photovoltaic panels are located in SA.

Examples:

- Solar Shop Pike River Woolshed, Lyrup, SA
- Solar Systems concentrator PV, Mildura, Vic
- Other solar thermal proposals



Solar

Advantages	Disadvantages
<ul style="list-style-type: none">• Australia receives a lot of sunlight.• Photovoltaic cells can be placed on rooftops for home use.• Good application of photovoltaic cells in remote locations.• Feed-in laws.	<ul style="list-style-type: none">• Rain and cloud.• Electricity or hot fluid storage requirements.• Energy intensive to manufacture.• One of the most costly forms of renewable energy.

Wind

South Australia currently has around 58% of the national installed wind capacity.

There are currently 9 wind farms totalling 740MW in installed capacity.

A further 2 wind farms, totalling 128MW in capacity are under construction.

Planning for Wind Farms' package - streamlines the assessment and approval processes for wind farm applications.

Wind

Advantages	Disadvantages
<ul style="list-style-type: none">• South Australia has an excellent wind resource.• At \$90-120/MWh, it is one of the less costly forms of renewable generation.	<ul style="list-style-type: none">• Generation is difficult to predict.• Intermittent generation, impacting on transmission, peaking generation and frequency control ancillary services (FCAS).• Tends to displace gas (peaking) generation.• South Australia is already nearing international best practice with regard to wind penetration.

Hydroelectricity

Hydro generation provides about 16,000 GWh of electricity around Australia each year.

The most famous Australian source of hydroelectric power is the Snowy Mountains Hydro-Electric Scheme.



Snowy Mountains Scheme Information Centre

Hydroelectricity

Advantages	Disadvantages
<ul style="list-style-type: none">• Mature form of renewable energy technology.• Long life plant.• Inexpensive to operate.• Plant can be stopped and started quickly.	<ul style="list-style-type: none">• Locations are limited.• Large area has to be flooded and dammed.• Adverse environmental impact.• Climate change.

Geothermal

South Australia is home to more than 70 per cent of geothermal exploration investment in Australia.

Investment in geothermal exploration is a result of the South Australian Government's Plan for Accelerating Exploration in South Australia (PACE) and investment friendly regulatory framework.

A 1MW HFR pilot plant is about to be commissioned in April at Innamincka in the State's far north.

Geothermal

Advantages	Disadvantages
<ul style="list-style-type: none">• Potential to supply base-load energy.• South Australia's natural resource endowment.	<ul style="list-style-type: none">• HFR technology is not yet commercial.• Very remote locations.• Global financial crisis.

Wave/Tidal

Wave/Tidal Power is a relatively immature technology.

Carnegie Corporation was recently awarded the first Wave Energy Licence in South Australia.

Wave Energy Licence allows investigation of 17,000ha of seabed near Mt Gambier on the Limestone Coast for potential development sites.

Wave/Tidal

Advantages	Disadvantages
<ul style="list-style-type: none">• Potential for base-load energy.• No fuel and no waste.• Inexpensive to operate and maintain.• Australia's geographic location.• Costs are projected to be reasonable	<ul style="list-style-type: none">• Non-commercial at present.• Can be costly to develop.• Remote location for plant.• Environmental impact.

Biomass

Most common forms of energy from biomass:

Biofuels - bioethanol and biodiesel.

Energy from waste - Electricity generation from landfill gas, sewerage gas, wood waste, bagasse, anaerobic digesters.



2nd generation biofuel: Algae grown in a factory farming environment in the USA.

Biomass

Advantages	Disadvantages
<p>Biofuels:</p> <ul style="list-style-type: none">• A fuel extender.• Waste as feedstocks.• 2nd Generation biofuels. <p>Energy from waste:</p> <ul style="list-style-type: none">• Generate electricity.• Prevent atmospheric venting of methane.• Co-generation.	<ul style="list-style-type: none">• 1st Generation - Competition for arable land and food crops.• Costs, tax arrangements and acute industry contraction.• 2nd Generation biofuels still in research phase.

Clean Coal

Coal-fired electricity generation is emissions intensive.

It comprises most of Australia's installed generation capacity.

The CPRS is expected to encourage research into the broad scale commercialisation of Carbon Capture and Storage (CCS) technology.

The Commonwealth is supporting CCS financially through:

- The Global Carbon Capture and Storage Initiative; and
- The National Low Emissions Coal Fund.



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