Section 3

Challenges and Opportunities

Tomorrow's climate, today's challenge, local opportunities.
3 Challenges and Opportunities for the Sunshine Coast

The Sunshine Coast region has a subtropical climate. It has tropical rainforests, beaches, a rural hinterland with a backdrop of ranges, peaks and valleys which offer tourist opportunities, support rural industries and provide lifestyle advantages.

The regional and coastal location of the Sunshine Coast, together with population growth pressures, demographic distribution of its population, and an increased demand for services contribute to the region’s vulnerability to climate change and peak oil.

These challenges need to be acknowledged (see Figure 3) and addressed in order to reduce vulnerability to climate change and peak oil.

Figure 2: Climate change challenges

- **Natural environment**
  - e.g. existing threats – multiplied by climate change.

- **Lifestyle**
  - e.g. increasing non-renewable energy consumption, increasing waste, unsustainable transport behaviour, need for food security.

- **Population growth and development**
  - e.g. demand for services and infrastructure, increased risks.

- **Economy/ marketability**
  - e.g. reliance on climate sensitive economies, need to transition the economy.

- **Health**
  - e.g. reduced water quality and availability, heat stress, disease, injury from extreme weather.
3.1 Exposure of the natural environment to climate change

3.1.1 Biodiversity

The Sunshine Coast is one of the most biodiverse regions in Australia and home to native species found nowhere else in the world. It incorporates the iconic National Heritage listed Glasshouse Mountains and several national parks.

Climate change is a significant long-term threat to biodiversity on the Sunshine Coast. Research to date indicates that the hotter, drier conditions expected for this area are likely to change life-cycle patterns, magnify declines to biodiversity through loss of plant and animal species, accelerate habitat loss but increase weed and pest infestations. These impacts will be exacerbated by the saltwater intrusion associated with sea level rise and increased risk of bushfire. Native vegetation is already under pressure from development.

Protecting habitat, rehabilitating areas, enhancing wildlife corridors and reducing pest species are some ways to help wildlife adapt to changing conditions and also provide the potential to sequester carbon. Actions to build resilience of the biodiversity on the Sunshine Coast are a major focus of the Sunshine Coast Biodiversity Strategy 2010-2020.

3.1.2 Waterways

The Sunshine Coast region includes thousands of kilometres of waterways with five major river systems:

- Maroochy River
- Mooloolah River
- Pumicestone Passage
- Headwaters of Mary River
- Headwaters of the Stanley River

The Sunshine Coast region also includes a small section of the southern headwaters of the Noosa River.

With increased storm and flood events, higher sea levels and storm surges predicted, low lying freshwater systems may be vulnerable to saltwater intrusion and inundation. During wet periods, freshwater reaches are likely to be exposed to increased bank erosion and increased runoff of pollutants. Research to date indicates that the hotter, drier conditions expected for this area are likely to reduce environmental flows, reduce water quality and affect aquatic life and river recreational activities.

Rehabilitating the river banks not only protects the water courses from bank erosion but acts as a filter to clean water systems and acts as a carbon sink to sequester carbon dioxide from the atmosphere. These water systems and their catchments also contribute to the water supply networks that service the Sunshine Coast and greater SEQ region. They will become even more important if the effects of prolonged drought are experienced due to climate change.
3.1.3  Coast

The Sunshine Coast has approximately 60 kilometres of coastline, with clean sandy beaches interspersed by rocky outcrops or headlands.

The coastline is subject to a range of natural processes associated with events such as storms, cyclones, east coast lows, spring tides and storm surges with sandy beaches and dunes vulnerable to shifts in sediment and erosion and low lying areas vulnerable to flooding. Coastal areas are also affected by flooding from extreme rainfall events.

In the future, risks from these events are anticipated to increase. A rise in sea level, increased storm activity and changed rainfall and temperature patterns associated with climate change are likely to exacerbate flooding, coastal inundation and shoreline erosion. Acidification of the oceans as a result of rising carbon dioxide levels is also likely to threaten marine biodiversity, corals and fish stocks and undermine the values of the Sunshine Coast coastal environments.

Further work needs to be undertaken to determine the Sunshine Coast’s coastal vulnerabilities. The development of a coastal management plan and shoreline erosion management plans will help to determine the priority actions required for high risk coastal areas, such as hard infrastructure solutions, beach nourishment, whether the area is naturally inundated etc. It is intended that risks to both coast and waterways will be addressed through a Sunshine Coast Waterways and Coastal Foreshores Management Strategy.

3.1.4  Cultural values

Indigenous Australians have a long and ongoing association with the natural environment. It is entwined with cultural, social and spiritual traditions. There are many sites and places of cultural significance across the Sunshine Coast which may require protecting with changes in climatic conditions.

Mudjimba Island (Creation Story):
Ninderry stole a beautiful woman from Coolum. When Coolum rescued his bride to be, Ninderry threw a boomerang and succeeded in knocking off Coolum’s head, which rolled into the sea and is represented today by Mudjimba Island.

(Source: Sunshine Coast Libraries)
3.2 Population growth and development

The past two decades have seen substantial population increases on the Sunshine Coast. The current population of approximately 285,000 (2014) is projected to reach 470,000 by 2036 (Queensland Treasury).

With further urban expansion of coastal settlements, storms and floods have the potential to affect more people, industries and coastal infrastructure. Predicted increases in severe storms combined with higher sea levels is likely to exacerbate this risk.

The impacts of climate change and declining oil supplies need to be factored in strategic land use and transport planning decisions and disaster management plans. Appropriate transport routes, services and infrastructure should be available in the event of an emergency to protect existing and planned settlements.

Vulnerability assessments and hazard mapping will help to identify areas on the Sunshine Coast at risk from natural hazards and inform the planning scheme and strategic land use, infrastructure and transport planning.

Oil vulnerability studies will help identify communities that are most vulnerable to rising oil and fuel prices which include communities with a higher dependency on cars and less financial capacity to pay high fuel prices.

3.2.1 Demand for services

Past population growth has resulted in increased pressure to provide services and infrastructure including houses, schools, roads, public transport, hospitals, libraries, jobs and leisure facilities.

An increase in water and energy demand is anticipated to put more pressure on local supplies and generate increased emissions.

Scientists indicate that lower annual rainfall volumes predicted as a result of climate change is anticipated to increase the risk of water shortage particularly during drought conditions. The impacts of water shortage will be a consideration for the State Government and water entities. Integrated water management concepts such as rainwater harvesting and the reuse of grey water, in buildings and across communities, can help to reduce water consumption and water demand.

Demand for power on the Sunshine Coast is rising at well above the national trend. Electricity demand has increased by up to 70 per cent in the past decade. Local electricity supplier, Energex, is predicting a 40 per cent increase in the region's power usage over the next six years based largely on the Department of Infrastructure and Planning population growth projections for the Sunshine Coast and the increasing popularity of high-energy consumer goods, such as air conditioners and larger televisions.

The increased number of days over 35°C, predicted as a result of climate change, is anticipated to affect peak energy demand through an increased demand for cooling, and may result in more frequent blackouts (Maunsell 2008). Partnerships between Council, energy companies and the community aimed at influencing behavioural change to reduce energy demand through initiatives such as Earth Hour are intended to reduce this risk. Exploring the feasibility of generating localised, renewable energy may identify an alternative to costly, high-impact power generation and infrastructure provision on the Sunshine Coast.

As peak oil impacts and cost of transport fuels increase, the demand for housing in centres with access to services, facilities and employment is likely to grow. Access to alternative methods of transport to private vehicle travel will also be needed, as will the need to plan for renewable energy recharge infrastructure as demand for private vehicle use continues.
3.2.2 Implications for Council assets and infrastructure

The impacts of climate change and peak oil have potential to affect Council assets and infrastructure. This can occur directly through physical exposure to climate change elements causing damage to infrastructure, or indirectly through costs associated with increased maintenance, oil and energy price rises, or increased insurance costs.

Reduced levels of service delivery are potential outcomes of more volatile climate conditions. Alternative robust materials, construction type and location must be factored into the whole-of-life costs for long term infrastructure projects. In some instances, relocation of existing infrastructure may be an appropriate risk management strategy.

Many risks to Council assets and infrastructure have been identified through a Climate Change Infrastructure Adaptation Project. Extreme and high risks are identified in Figure 3. These actions will require prioritisation by relevant areas of Council, particularly at the time of major upgrading and subject to funding requirements.

3.3 Health implications

Changes in the size of the Sunshine Coast population have been accompanied by shifts in age distribution, with increasingly large populations of children under five and adults over 65 living in the region (Department of Infrastructure and Planning 2008).

Older and younger populations are vulnerable when disasters occur. An increase in severe storms, heat waves, bushfires and droughts and longer lived cyclones present increased health risks (e.g. heat stroke, mosquito borne disease, respiratory illnesses, injury) for these vulnerable groups. Increased temperatures could have indirect health risks for the Sunshine Coast such as a southern spread of irukandji stingers and a potential increase in food poisoning outbreaks. Specific risk minimisation and risk management strategies can reduce health implications associated with climate change, such as providing community safety programs to ensure the wellbeing of residents and visitors, and considering health risks resulting from mosquito borne disease when planning settlements. There may also be an increased demand for access to local medical facilities.

Figure 3: Extreme and high risks to Sunshine Coast Council assets and infrastructure.

<table>
<thead>
<tr>
<th>Extreme Risks</th>
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</thead>
<tbody>
<tr>
<td>Increased erosion of beaches with detrimental impacts on tourism and economy.</td>
</tr>
<tr>
<td>High Risks</td>
</tr>
<tr>
<td>Flooding and erosion of unsealed roads.</td>
</tr>
<tr>
<td>Loss of landfill capacity after cyclones.</td>
</tr>
<tr>
<td>Extreme weather impacts on parks and open spaces.</td>
</tr>
<tr>
<td>Increased intensity of heat from heat sinks.</td>
</tr>
<tr>
<td>Increased energy costs for cooling.</td>
</tr>
<tr>
<td>Increased bushfire risk to buildings.</td>
</tr>
<tr>
<td>Increased erosion of building footings.</td>
</tr>
<tr>
<td>Increased water ingress into buildings.</td>
</tr>
<tr>
<td>Reduced effectiveness of sea walls and groynes.</td>
</tr>
<tr>
<td>Decreased structural stability of bridges.</td>
</tr>
<tr>
<td>Changes in water quality performance of major lakes and wetlands.</td>
</tr>
<tr>
<td>Increased erosion of natural waterways.</td>
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<tr>
<td>Increased tail waters causing upstream flooding.</td>
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<tr>
<td>Salt water intrusion into drainage systems not designed for salt water.</td>
</tr>
<tr>
<td>Inadequate storm water drainage capacity.</td>
</tr>
<tr>
<td>Strong winds increase tree falls across roads causing harm to people.</td>
</tr>
</tbody>
</table>
3.4 Impacts on the economy and marketability

Tourism is one of the major industry sectors on the Sunshine Coast, attracting approximately three million visitors each year. The other major sectors are retail and construction, which along with manufacturing, food processing, agriculture, property and business, health and community and finance and insurance services are the core economic drivers for the region.

There are also a growing number of environmental industries (businesses that manufacture products and services that mitigate the effect of the human footprint and assist in adapting to climate change and peak oil, such as water harvesting, environmentally sustainable building design and supplies and renewable technologies) across the Sunshine Coast.

Tourism and related industries (e.g. retail and hospitality) are particularly exposed to direct and indirect impacts of major natural disasters (Gurran, Hamin and Norman 2008). Coastal amenity and lifestyle attractions including beaches are key to the region’s popularity, but are immediately affected by climate change and associated extreme weather events. The tourism industry is also vulnerable to rising fuel prices due to its reliance on road and air transport. Passenger rail to Sunshine Coast beach destinations would provide for weekend tourism from Brisbane by public transport.

Agriculture is another vital industry sector sensitive to seasonal weather variations associated with climate change. While climate change may offer new agricultural opportunities and increase some yields, increased temperatures and drought are predicted to put overwhelming heat stress on the industry, its equipment and stock (ClimateRisk 2009).

Agriculture is also dependent on oil as a fuel used for production and food distribution and as a component in fertilisers. A rise in oil prices is likely to have an impact on the price of food that is produced outside the region and distributed over long distances and has the potential to favour smaller, local producers who are not impacted significantly by increased fuel prices. A renewed focus on local production for local consumption and protection of productive agricultural land for this purpose through planning measures can help build resilience to climate change and peak oil implications. This may also assist the Sunshine Coast to become a food provider for Brisbane in the future.

The regional locality of the Sunshine Coast makes the transport industry an important economic activity. The road transport sector is almost completely dependent on oil and it is highly vulnerable to the potential impacts of oil price rises with flow-on implications for other sectors of the economy including food production and distribution, and tourism.

Most industry sectors on the Sunshine Coast are highly dependent on oil as a fuel source (e.g. tourism, construction, manufacturing, agriculture/forestry/fishing). Several risk assessments have been undertaken to identify the socio-economic impacts of declining oil supplies on the region. Details are provided in Section 5.2 of the Peak Oil Background Study.

Any moves to create a more diverse economy utilising low carbon, low oil, energy efficiency and renewable energy will help build the community’s long-term resilience.
3.5 Lifestyle

Easy access to low cost energy and reticulated water, the availability of ‘throw away’ or energy intensive products, a widespread habit of over-consumption, an increase in waste and unsustainable transport behaviour are increasing greenhouse gas emissions exponentially. There is also a perception by some that climate change will be solved by technology, which has led to a resistance to change behaviour.

3.5.1 Community greenhouse gas emissions

Greenhouse gas emissions are expected to increase on the Sunshine Coast due to the growing population, lifestyle choices and pressure from peak oil, with the potential for increased burning of coal and other fossil fuels as oil substitutes.

To ensure future financial security and wellbeing, measures need to focus on rapidly decreasing greenhouse gas emissions as part of an effort to combat climate change.

The housing footprint on the Sunshine Coast with the current trend for detached housing containing large floor plans and with little consideration given to design, materials, orientation and energy consumption is a significant issue and will be addressed in the Sunshine Coast Affordable Living Strategy.

Planning policy can require energy efficiencies in the built environment, encourage settlement patterns that reduce vehicle travel, promote walking, cycling and public transport use and support alternative energy sources.

Communities can decrease emissions by changing behaviour, reducing energy use, considering energy efficiency when purchasing and making decisions (e.g. building and designing a new home, shopping, reducing car use) and by generating renewable energy.

In 2007 there were a total of 8 million visitors to the Sunshine Coast region generating approximately 2.33 million tonnes of greenhouse gas emissions.\(^5\) Significant emission reductions could be made through the introduction of water, waste and energy efficiencies within the hospitality and tourism industries and businesses across the region. Visitors could purchase carbon offsets when booking flights to sequester the carbon associated with the flight. They could also be encouraged to utilise public transport services through better promotion and delivery of services to tourist ‘hot spots’ when visiting the Sunshine Coast and in making green accommodation choices which are designed for climate, efficient water use etc.

To ensure a coordinated and strategic approach to reducing greenhouse gas emissions, it is proposed that Council work with community to develop a Sunshine Coast community emission reduction plan with a target and trajectory.

Australia’s per capita greenhouse gas emissions are the highest of any developed country. (Garnaut 2008)

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\(^5\)Figures based on the carbon footprint calculations provided by Australian Tourism and expressed in units of carbon dioxide equivalent (CO\(_2\)e).
3.5.2 Council greenhouse gas emissions

An inventory of Council greenhouse gas emissions was undertaken across all sectors of Council in 2007. The results demonstrate that waste in landfills accounts for a significant proportion of Council’s emissions.

It is necessary to focus on reducing emissions from landfill waste in a combined effort to tackle climate change and align with associated emission reduction policies. Council currently has a strong emphasis on resource recovery and reuse across the region which needs to be reinforced and supported by mechanisms to encourage recycling, composting and minimising green waste. Investigations are underway into generating energy from waste emissions in accordance with the Sunshine Coast Waste Minimisation Strategy.

Emission reductions can be made within the fleet sector by reducing the use of fossil fuels and switching to alternative lower emission fuels such as biofuels.

Other emission reductions can be gained through a mix of energy efficiencies, renewable technologies, improved building standards, staff and community behavioural change, green power purchase and through establishing or purchasing carbon offsets.

Significant effort and resources will be required to ensure Council’s transition to a carbon neutral organisation.
3.6 Responding to the challenges

“The earlier effective action is taken the less costly it will be.” (Stern 2006.)

Responding early to the challenges and taking a proactive approach to climate change and peak oil can mitigate future issues and costs and can also provide economic, social and environmental opportunities for the region.

Adopting a long term planning approach using a 100-year planning horizon (consistent with the planning horizon used by the IPCC), with a staged approach for short term projects, can ensure that future climate conditions are factored into Council’s strategic, infrastructure and operational projects to help reduce risks and long-term costs.

Many of the actions that respond to the key challenges are outlined in the relevant action plans. Those actions which fall outside the responsibility of the Sunshine Coast Council are likely to require policy responses from other levels of government, as well as non-government organisations.

In some cases further analysis and risk or vulnerability assessment and hazard mapping will be required to better understand the nature of these challenges.
### 3.6.1 New opportunities

*New opportunities will arise in the changing environment and are incorporated into the Strategy for further consideration and implementation.*

<table>
<thead>
<tr>
<th>Business opportunities for Council</th>
<th>Partnerships with business, government and research and development organisations can be established to capitalise on new opportunities in areas such as renewable energy generation, carbon sequestration and supply chain improvements.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creating future economic opportunities for the Sunshine Coast</td>
<td>The Sunshine Coast is an attractive location for renewable energy investment and offers a potential hub for the development of innovative, low energy technologies. Diversifying the economy by supporting current and attracting new high value/low impact businesses will encourage a reduction in emissions and help to build local resilience. The Sunshine Coast region also offers a competitive advantage in food production.</td>
</tr>
<tr>
<td>Capitalising on the benefit of climate change</td>
<td>Climatic changes have potential to offer some advantages including longer growing seasons (providing adequate water supplies are available). Warmer winter temperatures also have the potential to attract more tourists during winter months.</td>
</tr>
<tr>
<td>Capitalising on the climate change expertise in the region</td>
<td>The Sunshine Coast has locally and internationally recognised climate change authorities. Specialist skills and knowledge can be garnered by facilitating a Sunshine Coast Climate Change ‘Think Tank’ to provide guidance and direction to the Council and the local community.</td>
</tr>
<tr>
<td>Value-adding</td>
<td>Preparing for climate change and peak oil impacts may provide opportunities for value-adding to existing capital projects. For example, implementing integrated water management within new developments.</td>
</tr>
</tbody>
</table>
Section 4

Strategic Framework

(Areas) responding early to climate change are most likely to better withstand their impacts and maintain a platform for health and prosperity. IPCC2007
4 Strategic framework

A strategic framework has been developed to address the challenges and opportunities associated with climate change and peak oil on the Sunshine Coast and provide a proactive approach to reducing greenhouse gas emissions, cutting oil dependency and building community resilience and business capacity.

4.1 Goal

‘To build a low carbon, low oil, resilient future for the Sunshine Coast.’

4.2 Key policy approaches

The strategic framework is based on four key policy approaches:

| Leadership | Provide leadership and build capacity of local government, industry, business and the community to manage climate change and peak oil risks, while capitalising on new opportunities. |
| Mitigation | Identify and facilitate ways to minimise Council, community, business and industry greenhouse gas emissions across the Sunshine Coast to address the cause of climate change. |
| Adaptation | Assess the risks associated with the effects of climate change and implement actions to help the region prepare for and adapt to the impacts of climate change. |
| Energy Transition | Address the issue of declining oil supplies and transition to alternative energy sources to reduce reliance on oil and coal-based fuels across the Sunshine Coast. |
4.3 Objectives

To guide the development and implementation of the Strategy, a set of objectives have been developed under each of the key policy approaches. The eight objectives form the basis for establishing necessary targets, program development and action planning.

As the model shows, there are likely to be overlaps and synergies between policy approaches. The policy approaches have been developed to align with Federal and State Government policy directions that deal with emissions mitigation, climate change adaptation or peak oil but rarely all three together.
4.4 Strategy implementation and review

A supporting action plan has been developed. It highlights specific actions to be undertaken within the timelines of the Strategy. Annual actions and priorities will be determined based on Council’s annual budget considerations.

4.4.1 Reporting

Progress on the actions and indicators will be reported to key decision makers every three years. There will also be quarterly reporting obligations on the delivery of the Strategy through Council’s Operational Plan and annual reporting of key performance indicators that relate to the corporate targets.

Sustainability indicators included in the Sunshine Coast Community Plan will identify how the region is progressing towards achieving the goal ‘to build a low carbon, low oil, resilient future for the Sunshine Coast’.

<table>
<thead>
<tr>
<th>Corporate Key Performance Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage change in corporate greenhouse gas emissions</td>
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<tr>
<td>• Percentage change in landfill greenhouse gas emissions</td>
</tr>
<tr>
<td>• Percentage change in corporate greenhouse gas emissions generated from non-renewable electricity consumption</td>
</tr>
<tr>
<td>• Percentage change in corporate renewable electricity consumption</td>
</tr>
<tr>
<td>Change in corporate use of crude oil-based fuels</td>
</tr>
</tbody>
</table>

4.4.2 Review

There is likely to be a need to update the information or actions identified within the Strategy and/or its supporting background studies over time. The basis for these changes could stem from a number of sources, for example:

• the implementation of appropriate targets and milestones and the level of progress towards these targets and milestones
• changes to legislation or supporting frameworks and policies
• revisions to the data, scientific evidence or projections on which the Strategy is founded
• the potential to utilise future carbon reduction opportunities.

The Strategy will be reviewed every three years to respond to emerging issues. A more formal review and update of the Strategy and its supporting strategies will be undertaken after five years to reflect developments in science, technology and government policy direction.

4.4.3 Funding

There are costs associated with tackling climate change and energy transition.

Many of the actions identified in the relevant action plans will be undertaken using existing resources and budget allocations. In other cases, actions will be subject to Council’s annual budget process or may be funded through the Environment Levy.

The cost of action indicates up-front costs only and does not factor in return on investment. In several cases the implementation of efficiencies will produce significant long term financial savings.

To achieve its goals, Council will endeavour to secure financial support from the public and private sector and explore the feasibility of collaborative projects with government, industry, community and research partners.
Glossary, abbreviations, references and background studies
Glossary

**Adaptation**
Adjustments in human or natural systems, including changes in behaviour, institutional structure or policy, which are responsible to actual or expected climate changes and have long-term implications.

**Adaptive Capacity**
Describes the ability of built, natural, and human systems to accommodate changes in climate (including climate variability and climate extremes) with minimal potential damage or cost.

**Alternative Energy**
Energy derived from nontraditional sources (e.g., solar, hydroelectric, wind, compressed natural gas).

**Biodiversity**
Biodiversity commonly refers to a variety of species and ecosystems on earth and the ecological processes of which they are a part.

**Carbon Dioxide**
This is a naturally occurring gas and is expressed as CO₂. It is also a by-product of burning fossil fuels and biomass, as well as land use changes and other industrial processes and is the principal human-induced greenhouse gas that affects the earth’s atmosphere.

**Carbon Dioxide Equivalent**
Greenhouse gases have differing radiative properties. Emissions are expressed in terms of their global warming potential or specifically as CO₂ equivalents (CO₂e). For example, methane is 21 times more potent than CO₂ as a greenhouse gas, and so one tonne of methane is expressed as 21 tonnes of CO₂e emitted.

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**A Strategy for the Future**
To meet the needs of future generations and respond to the threats that climate change and peak oil present, it is necessary to take action now.
Carbon Footprint
A carbon footprint is an inventory of all greenhouse gas emissions.

Carbon Neutral
A voluntary mechanism where an activity, event, household, business or organisation is responsible for achieving zero carbon emissions by balancing a measured amount of carbon equivalent (CO₂e) released with an equivalent amount sequestered or offset. Best practice for organisations and individuals seeking carbon neutral status entails reducing and/or avoiding carbon emissions first so that only unavoidable emissions are offset.

Carbon Pollution Reduction Scheme
The main way the Federal Government proposes to achieve Australia’s greenhouse gas emissions reduction target under the Kyoto Protocol is via a Carbon Pollution Reduction Scheme. This scheme has two distinct elements: the cap on carbon emissions and the ability to trade carbon permits. In general the Federal Government will set a cap on the total amount of carbon pollution allowed in the economy with permits issued up to that annual cap. Industries that emit more than 25,000 tonnes of greenhouse gases on specified thresholds annually will be required to obtain a pollution permit for every tonne of greenhouse gas that they emit – providing a strong incentive for emitters to reduce pollution.

Climate
The average and variations of weather in a region over long periods of time. The classical period is 30 years, as defined by the World Meteorological Organization (WMO). These quantities are most often surface variables such as temperature, rainfall, and wind. Climate in a wider sense is the state, including a statistical description, of the climate system.

Climate Change
This is a descriptive term which encompasses both natural and human induced changes to the climate.

Climate Hazards
These are significant natural hazards influenced by weather and climate such as cyclones, storms and floods. Many natural hazards are climate hazards, with key exceptions being earthquakes and tsunamis.

Conventional Oil
A term which refers to crude (or unrefined) oil that is extracted from underground or under the sea floor. Conventional oil currently makes up approximately 85 per cent of all liquid fuel production, the other 15 per cent being unconventional oil.

‘Duty of care’
‘Duty of care’ is a standard of reasonable care provided while performing any acts that could foreseeably harm others.

Ecosystems
Natural units consisting of all plants, animals, humans and micro-organisms (biotic) in an area functioning together with all of the non-living physical factors (abiotic) of the environment.

Energy Transition
Energy transition is the period of time when the mix of energy sources used to power a country’s economy changes. The next energy transition for the Sunshine Coast is preferably towards renewable energy that powers a localised and low carbon economy.

Global Warming
This is the hypothesis that the earth's temperature is being increased, in part, because of greenhouse gas emissions associated with human activities, such as burning fossil fuels, biomass burning, cement manufacture, cow and sheep rearing, deforestation and other land-use changes. Global warming and climate change are not interchangeable. Global warming refers to the increase of the Earth's average surface temperature, due to a build-up of greenhouse gases in the atmosphere, while climate change is a broader term that refers to long-term changes in climate, including average temperature and precipitation.
<p>| <strong>Global Circulation Model</strong> | Global circulation models (GCMs) are complex computer programs that consider a range of factors to mathematically simulate global climate. They are based on mathematical equations derived from our knowledge of the physics that govern the earth –atmosphere system. Global circulation models may also be referred to as Global Climate models. |
| <strong>Greenhouse Gases</strong> | The term greenhouse gases refer to a number of gases that contribute to the greenhouse effect. While carbon dioxide is the most commonly known greenhouse gas, other greenhouse gases include methane (CH$_4$), Nitrous Oxide (N$_2$O), perfluorocarbons (PFCs), sulphur hexafluoride (SF$_6$) and hydrofluoroearthocarbons (HFCs). Changes in the concentration of greenhouse gases in the atmosphere have been attributed to the key influence driving climate change via a process called the enhanced greenhouse effect. |
| <strong>Gross Regional Product/ Gross State Product/ Gross Domestic Product</strong> | Terms which refer to the market value of all final goods and services produced within a Region, State or Nation in a given period of time. |
| <strong>Impacts (of climate change)</strong> | The effects of climate change on natural, productive and human systems. |
| <strong>International Transition Towns Movement</strong> | International grassroots initiative that encourages the formation of local transition towns that, through community engagement, can build community resilience in response to the challenges of peak oil and climate change. |
| <strong>IPCC</strong> | The Intergovernmental Panel on Climate Change (IPCC) is a United Nations scientific body that provides authoritative scientific information from approximately 4,000 of the world’s leading climate scientists principally in the atmospheric sciences, but also comprising social, economic and other environmental components potentially impacted by climate change. |
| <strong>Kyoto Protocol</strong> | The Kyoto Protocol is a set of rules under the United Nations Framework Convention on Climate Change. The Convention was a major step forward in tackling the problem of global warming. Australia became a full member of the Kyoto Protocol in March 2008. |
| <strong>Liquids</strong> | Refers to ‘liquid fuels’, a commonly used term which refers to both ‘conventional’ oil as well as ‘unconventional’ oil. |
| <strong>Locational Vulnerability</strong> | An assessment that determines which residential locations will be the most vulnerable to rising fuel prices and increasing transportation costs. |
| <strong>Low Carbon</strong> | A low carbon economy or low fossil fuel economy is a concept that refers to an economy which has a minimal output of greenhouse gases. |
| <strong>Low Oil</strong> | A low oil economy refers to an economy which has a minimal use of oil. |
| <strong>Methane (CH$_4$)</strong> | This is one of the six greenhouse gases to be mitigated under the Kyoto Protocol. It has a relatively short atmospheric lifetime of 10 ± 2 years. Primary sources of CH$_4$ are landfills, coal mines, paddy fields, natural gas systems, and livestock (e.g. cows and sheep). It has a global warming potential of 21 (100 year time horizon). |
| <strong>Mitigation</strong> | Activities that are undertaken to reduce greenhouse gas emissions. |
| <strong>National Greenhouse and Energy Reporting System</strong> | A nationally consistent framework for greenhouse gases and energy reporting within the National Greenhouse and Energy Reporting Act 2007. This provides the foundation for a potential Carbon Pollution Reduction Scheme. |</p>
<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrous Oxide (N₂O)</td>
<td>One of the six greenhouse gases to be curbed under the Kyoto Protocol, N₂O is generated by burning fossil fuels and the manufacture of fertilizer. It has a global warming potential 310 times that of CO₂ (100 year time horizon).</td>
</tr>
<tr>
<td>No Regrets</td>
<td>A term used to describe actions that result in greenhouse gas limitations and abatement, and that also make good environmental and economic sense in their own right.</td>
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<tr>
<td>OECD</td>
<td>The Organisation for Economic Co-operation and Development (OECD) is part of the system of Western international institutions developed after World War II and is the main forum for monitoring and evaluating economic trends and developments in its 30 member countries. Australia joined the OECD in 1971.</td>
</tr>
<tr>
<td>Oil Supply ‘Crunch’</td>
<td>Refers to the increasing upward pressure on global oil prices as a result of increasing demand for oil globally not being matched by increasing oil supplies globally.</td>
</tr>
<tr>
<td>Oil Vulnerability (assessment or analysis)</td>
<td>Is the examination of the susceptibility of an economy, industry sector or household to harm from peak oil. Vulnerability is a function of an economy, industry sector or household's sensitivity to rising oil prices and its capacity to adapt.</td>
</tr>
<tr>
<td>Offsets</td>
<td>Reductions or removals of greenhouse gas emissions that are used to counterbalance emissions elsewhere in the economy.</td>
</tr>
<tr>
<td>Peak Oil</td>
<td>The term peak oil is when the rate of global oil production reaches a peak i.e. it is the point at which the extraction of conventional crude oil from all oil fields in the world is at its maximum rate and signals when the rate of oil being produced will begin to decline.</td>
</tr>
<tr>
<td>Precautionary Principle</td>
<td>A term used to describe an approach where the lack of full scientific certainty is not used as a reason for postponing cost-effective measures where there are threats of serious or irreversible damage.</td>
</tr>
<tr>
<td>Regional Energy Production Opportunities</td>
<td>An assessment of the potential for energy production options that would be economically viable on the Sunshine Coast. This would include the production of both alternative liquid fuels and electricity.</td>
</tr>
<tr>
<td>Renewable Energy</td>
<td>Renewable energy is energy generated from natural resources such as sunlight, wind, rain, tides, geothermal heat, which are renewable (naturally replenished).</td>
</tr>
<tr>
<td>Resilience</td>
<td>This is the ability to absorb disturbances, to be changed and then to reorganise and still have the same identify (retain the same basic structure and ways of functioning). It includes the ability to learn from the disturbance.</td>
</tr>
<tr>
<td>Risk</td>
<td>The probability that a situation will produce harm under specific conditions. Risk is generally defined as a combination of the likelihood of an occurrence and the consequence of that occurrence.</td>
</tr>
<tr>
<td>Scenario</td>
<td>A term used to describe a plausible description of how the future may develop, based on a coherent and internally consistent set of assumptions about key relationships and driving forces (e.g. rate of technology change).</td>
</tr>
<tr>
<td>Sector</td>
<td>A general term used to describe any resource, ecological system, species, management area, activity, or other area of interest that may be affected by climate change.</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>The degree to which a built, natural, or human system is directly or indirectly affected by changes in climate conditions (e.g. temperature and rainfall) or specific climate change impacts (e.g. sea level rise, increased water temperature).</td>
</tr>
</tbody>
</table>
SimCLIM
A climate change model where outputs and projections are generated by adjusting local climate variables in accordance with the patterns associated with a selected global circulation model and climate change scenario. The Hadley GCM was used for the projections in this Strategy.

SRES Scenarios
These are emission scenarios developed by Nakićenović and Swart (2000) and used, among others, as a basis for some of the climate projections shown in Chapter 10 of the Fourth Assessment Report (AR4) produced by the IPCC (IPCC 2000).

Systems
This refers to the built, natural, and human networks that provide important services or activities within a community or region. Built systems can refer to networks of facilities, buildings, and transportation infrastructure such as roads and bridges. Natural systems can refer to ecological networks of fish, wildlife, and natural resources like water. Human systems can refer to networks of public health clinics, courts, and government.

Weather
The weather is a set of all extant phenomena in a given atmosphere at a given time. It also includes interactions with the hydrosphere. The term usually refers to the activity of these phenomena over short periods (hours or days), as opposed to the term climate, which refers to the average atmospheric conditions over longer periods of time.

Unconventional Oil
Refers to oil shales; oil sands-based synthetic crudes and derivative products; coal-based liquid supplies; biomass-based liquid supplies; and liquids arising from chemical processing of natural gas.

Vulnerability
This is the susceptibility of a system to harm from climate change or peak oil. Vulnerability is a function of a system’s sensitivity and the capacity of that system to adapt.
## Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCP</td>
<td>Cities for Climate Protection program</td>
</tr>
<tr>
<td>CO$_2$</td>
<td>Carbon dioxide</td>
</tr>
<tr>
<td>CO$_2$e</td>
<td>Emissions equivalent to carbon dioxide</td>
</tr>
<tr>
<td>COAG</td>
<td>Council of Australian Governments</td>
</tr>
<tr>
<td>CPRS</td>
<td>Carbon Pollution Reduction Scheme</td>
</tr>
<tr>
<td>CSIRO</td>
<td>Australian Commonwealth Scientific and Industrial Research Organisation</td>
</tr>
<tr>
<td>GCM</td>
<td>Global Circulation Model</td>
</tr>
<tr>
<td>GWP</td>
<td>Global Warming Potential</td>
</tr>
<tr>
<td>ICLEI</td>
<td>International Council for Local Environmental Initiatives</td>
</tr>
<tr>
<td>IEA</td>
<td>International Energy Agency</td>
</tr>
<tr>
<td>IPCC</td>
<td>Intergovernmental Panel on Climate Change</td>
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<tr>
<td>IUCN</td>
<td>International Union for Conservation of Nature</td>
</tr>
<tr>
<td>LGAQ</td>
<td>Local Government Association of Queensland</td>
</tr>
<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
</tr>
<tr>
<td>ppm</td>
<td>Parts per million</td>
</tr>
<tr>
<td>SEQ</td>
<td>South East Queensland</td>
</tr>
</tbody>
</table>
References


Australian Government (2009), Department of Climate Change, Climate Change Risks to Australia’s Coast, A First Pass National Assessment.


Lerch, D (2007), Post Carbon Cities: Planning for Energy and Climate Uncertainty, Post Carbon Institute, CA, USA.


