

**TO:** Planning and Environment Committee

**FROM:** General Manager City Environment

**MEETING DATE:** 2 October 2006

**SUBJECT:** **CLIMATE CHANGE PREDICTIONS POLICY**

## SUMMARY

In order to undertake planning for the future of the City over the next 50-100 years, it is important that the Council adopt some kind of prediction about the effects of climate change into the future. Current predictions are that rainfall frequency and intensity, temperature variability and associated sea level rise will all impact on Dunedin. Given that many of the City's plans, particularly in terms of its infrastructure extend into the 50-100 year timeframe, it is prudent to start factoring in such changes. It is recommended that the predictions from the Intergovernmental Panel on Climate Change (IPCC) be adopted for planning purposes.

**POLICY IMPLICATIONS:** Yes, adopting the predictions will have an effect across the entire Council.

## OTHER IMPLICATIONS:

- (i) **Approved Annual Budget:** No.
- (ii) **LTCCP/ Funding Policy:** Possibly, this will depend on the outcomes of the planning process.
- (iii) **Community Boards:** Yes.

## RECOMMENDATIONS

- 1 That the Committee adopt the **Climate Change Predictions Policy** set out in Attachment One as a new Council Policy.
- 2 That the Committee note that the Policy is based on the predictions of the Intergovernmental Panel on Climate Change.
- 3 That any changes to the predictions by the Intergovernmental Panel on Climate Change are brought back to the Committee for consideration and adoption.
- 4 That the Committee note that an Interdepartmental working party will be established to develop a work programme to ensure that climate change effects are taken into account in all Council activities.

## BACKGROUND

There are a variety of predictions about whether or not climate change is occurring in the world, and if it is occurring, the impact of such change in terms of temperature, rainfall and associated sea level rise brought about by ice melt, etc. At the same time the Dunedin City Council is making decisions on infrastructural replacements and renewals that in many cases have a greater than 50-year life. Examples of these would be the Roding network, many community assets and wastewater, storm water and water pipe networks. There are also potential impacts on water availability for supply purposes, potential impacts on coastal conservation works and the potential for areas of low lying land to be inundated with sea level rise which raises important planning issues.

In order to plan appropriately into the future, it is prudent to adopt international best predictors of the effects of climate change so that future potential changes can be taken account of in our current planning.

### Current Predictions

Recognising the problem of potential global climate change, the World Meteorological Organisation (WMO) and the United Nations Environment Programme (UNEP) established the Intergovernmental Panel on Climate Change (IPCC) in 1988.

The role of the IPCC is to assess on a comprehensive, objective, open and transparent basis the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts and options for adaptation and mitigation. The IPCC does not carry out research nor does it monitor climate related data or other relevant parameters. It bases its assessment mainly on peer reviewed and published scientific/technical literature. A main activity of the IPCC is to provide at regular intervals an assessment of the state of knowledge on climate change.

The First IPCC Assessment Report was completed in 1990 while the Third Assessment Report, being the latest, was completed in 2001. The IPCC has decided to continue to prepare comprehensive assessment reports and is scheduled to complete its Fourth Assessment Report in 2007.

The IPCC has predicted global temperature increases of between 1.4 and 5.8 degrees Celsius by 2100. While temperature increases for New Zealand are expected to be less than the global average (due to a lag in warming of the oceans around New Zealand) there is still expected to be changes including:

- ⇒ increased temperatures
- ⇒ decreased frost risk but increased risk of very high temperatures
- ⇒ stronger west – east rainfall gradient (wetter in the west and dryer in the east)
- ⇒ increased frequency in extreme daily rainfalls
- ⇒ increased sea level
- ⇒ increased westerly winds.

In terms of more specific predicted climate change effect, the following table shows the range of change predicted for Otago and Dunedin in terms of temperature changes and rainfall.

### Climate Changes

Temperature Changes (°C)	Summer	Autumn	Winter	Spring	Annual
1990 – 2030's	-0.2 to 1.2	0.0 to 1.1	0.2 to 1.8	0.0 to 1.2	0.1 to 1.3
1990 – 2080's	-0.1 to 2.7	0.4 to 3.3	0.7 to 3.5	0.2. to 3.0	0.4 to 3.1
Rainfall Changes (%)					
Dunedin 2030's	-7 to +8	-2 to +3	-7 to +15	-4 to +11	-2 to +6
2080's	+1 to +34	-9 to +46	-5 to +30	-2 to +16	+2 to +14

## Sea Level Rise

In terms of sea level rise predictions, New Zealand studies have predicted increases in a range of 5 – 7 mm per year. Taking that into account the recommended planning values for sea level rise are as follows:

Sea Level Rise	2050	2100
Mean sea level increase	+0.33 metres	+0.66 metres

There are a wide range of assumptions that have gone into the above predictions. Rather than try and understand all of the assumptions, the predictions from the IPCC and the subsequent work done in New Zealand that has given rise to the above predictions are the best scientific predictors of the potential effects of climate change that we currently have.

The IPCC is shortly going to be bringing out a revised prediction about climate change and sea level rise based on further modelling and verification of work that they have undertaken. It is to be expected that the IPCC will firm up on their view of the potential impact with each subsequent prediction. Any planning will need to take account of this.

## Implications of Predicted Change

The Ministry for the Environment New Zealand Climate Change Office has also produced a number of guidance manuals to assist in assessing and planning for the effects of climate change, including some specifically for Local Government. Arising from those reports are the following sorts of tables that assist the thinking that is needed to deal with the potential climate change. These are examples only and will need significant investigation and input by Council and external stakeholders.

### Impacts of Climate Change on Council Functions

Function	Climate Change Mechanism	Potential Impacts
Planning	Increase in high intensity rainfall effects	▪ Increased flood risks may require planning restrictions on flood plains etc.
	Increased sea level	▪ Planning restrictions in at risk coastal areas.
Roading	Increase in high intensity rainfall events	▪ Increase in road washouts and landslips onto roads. ▪ Increased maintenance required for water tables.
	Increased sea level	▪ Erosion of coastal roads/roadbeds. ▪ Increased closures due to sea inundation. ▪ May require road levels raised.
Stormwater	Increase in high intensity rainfall events	▪ Increased stormwater surcharging. ▪ Possible property damage.
	Increased sea level	▪ Greater reliance on pumping. ▪ Higher groundwater level impacts on underground pipe networks.
Water	Reduced annual rainfall	▪ Less secure raw water supply.
	Increased seal level	▪ Possible salt-water invasion of aquifers. ▪ Higher groundwater level impacts on underground pipe networks.

### Impacts of Climate Change on Non-Council Functions

Function	Climate Change Mechanism	Potential Impacts
Electricity	Reduced annual rainfall	▪ Lower storage in hydro lakes – higher power prices, power shortages.
	Increased average temperatures	▪ Increased electricity usage for air conditioning in summer. ▪ Reduced consumption for heating in winter.

There are already a number of activities that have begun at the Council which are aimed at looking at the implications of climate change as follows:

- There is a sea level rise study underway which will look at the impact of sea level rise on our planning scenarios. This will need to look at such things as:
  - Potential District Plan changes to take account of climatic changes and potential inundation and increased coastal erosion associated with sea level rise;
  - Infrastructural assets which may need to be altered to take account of sea level rise, such as roads and related infrastructure and water pipes;
  - Coastal reserves and the impact of increased sea levels and storm related events
- Water and Waste Services will be producing water, wastewater and stormwater strategies, which will have to deal with the issues of climate change and the impact on water availability and the likely increased intensity of weather events
- Flood risk management is continually being looked at in response to events such as the floods on 26 April 2006.

These items were included in a report to the 26 June 2006 Finance and Strategy Committee which also considered the issue of peak oil. That report also noted a number of other activities that were either being undertaken or were being looked at to address the issues of greenhouse gas emissions and possible ways of dealing with future oil shortages. That list is as follows:

- For emission reduction at the landfill, we currently have a project looking at landfill gas recovery for which funding is provided in the LTCCP.
- What we do with sludge at the Tahuna Wastewater Plant upgrade will be an important issue in terms of methane production.
- The Resource Recovery and Waste Management Strategy identifies ways of trying to reduce the amount of organic materials that finds its way into the landfill. Further on we might be able to deal with some issues such as dealing with plastics to turn them into diesel, etc.
- The Dunedin City Council Energy Manager will directly help to reduce our green house gas emissions in part through the Communities for Climate Protection programme.
- It is possible that the Dunedin City Council owned companies could investigate the use of waste as alternative heating sources, both commercially and residentially.
- The Transportation Strategy encourages a shift away from single occupancy vehicles. It promotes cycleways, walking and public transport.
- The joint Dunedin City Council / Otago Regional Council Public Transport Working Party is looking into alternatives to cars.
- Work will be done on the mission critical hierarchy for the Dunedin City Council lifelines.
- The Dunedin City Council's pilot programme for Cosy Homes may help to reduce the use of oil.

## **DISCUSSION**

Adopting predictions of climate change will enable the Dunedin City Council to incorporate appropriate variables into its long term planning. The best estimates of climate change worldwide are those that come from the Intergovernmental Panel on Climate Change and it is recommended that they be adopted.

These predictions, if adopted as Council Policy, would then be used in all future planning. Renewal of existing assets, constructions of new assets or facilities, all work programmes and all planning initiatives would take these predictions into account. Any significant implications resulting from the impact of our climate change would then be reported to the relevant Committee for full consideration.

In order to progress this work across the Council, an Interdepartmental Working Party will be established to understand the implications of the adoption of the predictions and to develop a work programme to ensure that the predictions are taken into account within the appropriate activities.

Climate Change predictions are likely to change over time as new information becomes available. It is recommended that the Council Policy is updated, through consideration by this Committee, of any future IPCC predictions.

Prepared by:

Approved for submission by:

Tony Avery  
**GENERAL MANAGER CITY ENVIRONMENT**

Jim Harland  
**CHIEF EXECUTIVE**

Date report prepared: 26 September 2006

<b>Policy Manual details that will apply if adopted:</b>	
Title of the position, which is the key contact for the administration and review of this Policy or Policy Statement	<i>Climate Change Predictions Policy</i>
Outcome(s) to which this Policy or Policy Statement contributes	<i>Wealthy Community Accessible City Safe and healthy people Sustainable City and environment</i>
Sub-outcomes to which this Policy or Policy Statement contributes	<i>A city that encourages sustainable economic development.  A city that encourages strategic investment in people and businesses.  A local transport system that is integrated with the wider needs of the community.  Dunedin is connected to the global transport nodes.  A place where people are safe in their homes, work and public spaces.  Our services, infrastructure, and environment enhance quality of life.  We enhance our place through quality developments.  We value the natural environment, biodiversity and landscapes.  We actively promote sustainability.</i>
Review date	<i>At release of revised predictions from the IPCC or 30 October 2009, whichever is sooner</i>
Office Use Only: New Policy Number, if applicable. Committee Code /mm/yy/Agenda Item No. (Codes: PE, CDC, ISCOM, EDC, FS, CL)	____/____/____/____

## Attachment

Attachment One - Policy - **(Climate Change Predictions Policy)**

## ATTACHMENT ONE

### Climate Change Predictions Policy

On 30 October 2006, the Dunedin City Council adopted the following predictions of climate change from the Intergovernmental Panel on Climate Change (IPCC). These predictions are to be used, where relevant, in all planning processes and activities undertaken by the Council, which would result in decisions, which have an effective life of greater than 50 years. Such decisions would include decisions around the renewals of existing assets, construction of new assets or facilities, all work programmes and all planning initiatives.

Any significant implications resulting from the impact of any climate change will need to be reported to the relevant Committee for full consideration.

The climate change predictions to be used are as follows:

Temperature Changes (°C)	Summer	Autumn	Winter	Spring	Annual
1990 – 2030's	-0.2 to 1.2	0.0 to 1.1	0.2 to 1.8	0.0 to 1.2	0.1 to 1.3
1990 – 2080's	-0.1 to 2.7	0.4 to 3.3	0.7 to 3.5	0.2. to 3.0	0.4 to 3.1
Rainfall Changes (%)					
Dunedin 2030's	-7 to +8	-2 to +3	-7 to +15	-4 to +11	-2 to +6
2080's	+1 to +34	-9 to +46	-5 to +30	-2 to +16	+2 to +14

Sea Level Rise	2050	2100
Mean sea level increase	+0.33 metres	+0.66 metres

Examples of the sorts of consideration that will need to be given in decisions that have an effective life of greater than 50 years are as follows. Note that these are examples only and there are likely to be a wide range of potential effects that will need to be considered.

Function	Climate Change Mechanism	Potential impacts
Planning	Increase in high intensity rainfall effects	▪ Increased flood risks may require planning restrictions on flood plains etc.
	Increased sea level	▪ Planning restrictions in at risk coastal areas.
Roading	Increase in high intensity rainfall events	▪ Increase in road washouts and landslips onto roads. ▪ Increased maintenance required for water tables.
	Increased sea level	▪ Erosion of coastal roads/roadbeds. ▪ Increased closures due to sea inundation. ▪ May require road levels raised.
Stormwater	Increase in high intensity rainfall events	▪ Increased stormwater surcharging. ▪ Possible property damage.
	Increased sea level	▪ Greater reliance on pumping. ▪ Higher groundwater level impacts on underground pipe networks.
Water	Reduced annual rainfall	▪ Less secure raw water supply.
	Increased seal level	▪ Possible salt-water invasion of aquifers. ▪ Higher groundwater level impacts on underground pipe networks.

Climate change predictions are likely to change over time as new information becomes available. As any new IPCC prediction becomes available, the Council will need to consider whether this policy is updated.