Climate change is a real and happening thing …

- The evidence for global warming is unequivocal (IPCC)
- It is very likely to be human-induced (IPCC)
- Represents a “real and present danger”
  Sir David King, Chief Advisor to UK Government

The climate is changing and it is our fault … but there are things we can do!
Engineering Lifelines Context

- “…climate change is not a new hazard, it is an exacerbator…”
- Historic climate conditions no longer accurate indicators
- Design of new structures must account for climate scenarios several decades into the future
- Urban infrastructure needs to adapt to new climate risks to ensure safety & quality of life, as well as reduce long-term costs.

Visit [www.mfe.govt.nz/issues/climate/sectors/engineering.html](http://www.mfe.govt.nz/issues/climate/sectors/engineering.html) and
and

Climate change in NZ

- In NZ, changes already observed since 1950 include:
  - Mean temperature increase of 0.4 °C
  - Decrease in cold nights & frosts
  - Sea level rise of 0.07 m
  - Loss of >¼ of alpine ice mass
  - Increased beech seed production
- NZ’s climate “virtually certain” to be warmer in 21st century, with noticeable changes in extreme events
- Natural systems, water security and coastal communities most vulnerable
NZ: Past and Projected Temperature

Slightly more warming in the North
+1.9 to 2.3 °C
(New Advice)
Global Sea Level Rise

- Global average sea level rose by approx. 0.17 m (±0.05 m) over 20thC, faster than sea level rise in 19thC
- Recent sea level rise (1993–2003) has been an average of about 3.1 mm/yr
- 2007 IPCC projections: globally-averaged sea level rises of 0.18 to 0.59 m by 2100
- NB: Estimates could be higher if melting of Greenland & Antarctic ice sheets continue to increase (extra 25%?)
Climate Change in the Coastal Environment

- ↑ wind
- ↑ storm surge
- ↑ waves
- ↑ intensity of XTCs
- Changes in coastal erosion processes due to changes in coastal sediment supply, storminess & river flow regimes

Climate Change and Freshwater

- ↑ in rainfall intensity
  - +8-16% by 2030, and +16-24% by 2080
- ↑ in annual rainfall event (+40%)
- ↑ frequency of heavy rainfall events (up to 4x)
- ↑ in flood frequency, flood peak & max. discharge
MfE Adaptation Work Programme

• Partnerships with
  – Local Government
  – Engineers (ELG & IPENZ)
  – Central Govt. depts.
  – Insurance sector
  – Agriculture (led by MAF)
• Wider engagement with professional bodies
• Focus on NZ’s particular vulnerabilities:
  – Water and coastal
  – Infrastructure & utilities
  – Primary production
  – Biodiversity and biosecurity
What work already exists?

- Guidance brochures
- Quality Planning Guidance Note
- Technical reports
- Workshops
- Engagement with stakeholders
- Govt CC work programmes


What’s coming in 2007/08?

- IPCC 4th Assessment Report
- Update of guidance materials
  - CC Effects & Impacts Assessment
  - Local Govt Guidance book (aka ‘red book’)
  - Coastal Hazards & Climate Change
- New MfE Impacts & Adaptation web pages (incl. case studies)
- QP Guidance Notes
  - Update: climate change
  - New: coastal & natural hazards
Questions??

ELG Seminar Outline
Two hour interactive session in Wgtn, Wairarapa, West Coast & Chch

- Exercise 1: How does current climate/weather affect your sector?
- Discussion 1: Climate Change & the Coastal Environment
- Discussion 2: Climate Change and Freshwater
- Exercise 2: Risk Assessment for Engineering Lifelines
- Group Discussion
Lifelines workshops

• Aim:
  – To stimulate thinking and action about climate change and lifelines
  – To inform with latest results
• To get some feedback on “The Issues”
  • Areas of concern
  • Gaps
  • Ideas for action

Matrix 1

Credit to Terry Boyle of Transit, founder of the original Climate Change Matrix!

<table>
<thead>
<tr>
<th>Lifelines Sector</th>
<th>Climate Variables</th>
<th>Sea Level</th>
<th>Wind</th>
<th>Storm Surge + waves</th>
<th>Erosion + Slipping</th>
<th>Rainfall Intensity</th>
<th>Floods</th>
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### Matrix 2 – with climate change

<table>
<thead>
<tr>
<th>Lifelines Sector</th>
<th>Climate Variable and Change Indicators</th>
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<tr>
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<td>Sea Level Rise</td>
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<td>↑ 0.19 - 0.58m by 2100</td>
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</tbody>
</table>

- **Transport**
  - Road
  - Rail
  - Aviation
  - Marine

- **Power**
  - Gas
  - Fuel
  - Electricity

- **Telecoms**
  - Phone
  - Radio

- **Civil**
  - Urban
  - Storm water
  - Sewage
  - Water Supply

### Results

- Rain intensity often top issue
- Rain totals next
- Wind, sea level and storm surge
- Lightning, hail
- Snow
Mind catching!

- Liquefaction
- Fog
- Copper cable underground at coast
- Quote: Possibly the key is to design in flexibility to “allow” for future change rather than make things bigger/stronger.
- “Current capacity inadequate!”

Finding Solutions

- Lifelines workshops
  - who’s next?
- IPENZ partnership
  - Workshops
  - Best practice guides, codes of practice, standards etc
- Triangular Meeting
  - Engineers, Local government, Insurance
- MfE Guidance updated
  - Including case studies
Group break-out

• Problem
  – Specific
  – Barriers

• Solution
  – Specific
  – Measurable
  – Appropriate
  – Reasonable
  – Time bound

• Action
  – Who!

• Sector Spilt, ÷ by 2

Problem-solution-action

Specific climate change impact problem
or
General climate change issue

• 5 mins to decide
• 10 mins to solve!
• 2 min report back

• Barriers to ACTION
Summary

• Climate change is a real and happening thing … how will you respond?
• Lifelines workshops – round 2
• MfE Guidance – coming soon
• New MfE Impacts & Adaptation web page – under construction