Costs & Benefits for Adaptation:
Health Sector Application in the Context of Heatwave risks

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Research: Overview

Objective:

- To estimate sub-national level costs and benefits of health sector adaptation

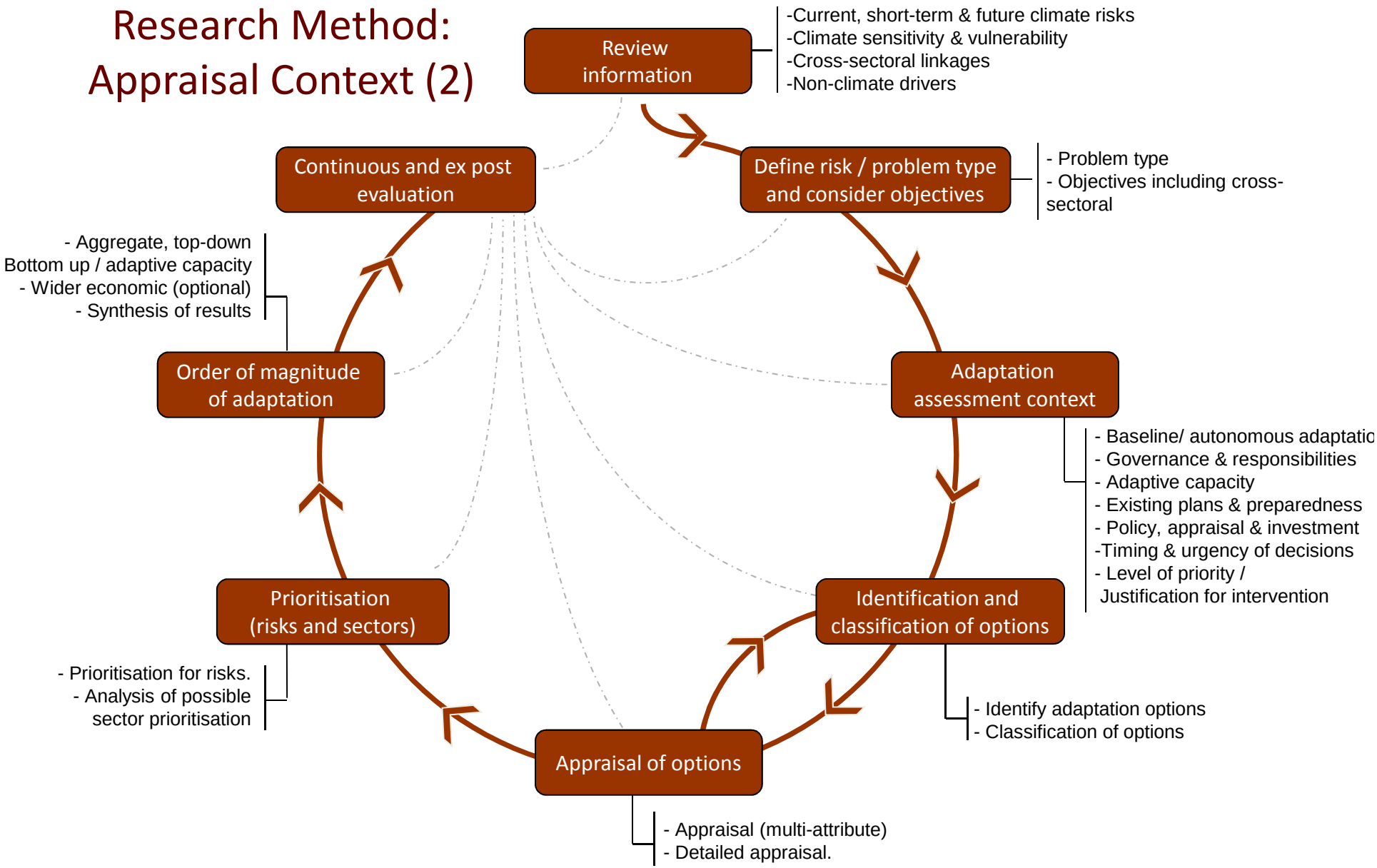
→ (Ex-post) analysis of English heat-wave plan, applied to London: proactive & reactive components

→ Response to climate risk is primary focus for action

Motivations:

- Responds to decision-makers need for spatially disaggregated economic data
- Introduces non-market valuation data to adaptation context
- Provides test for applicability of CBA

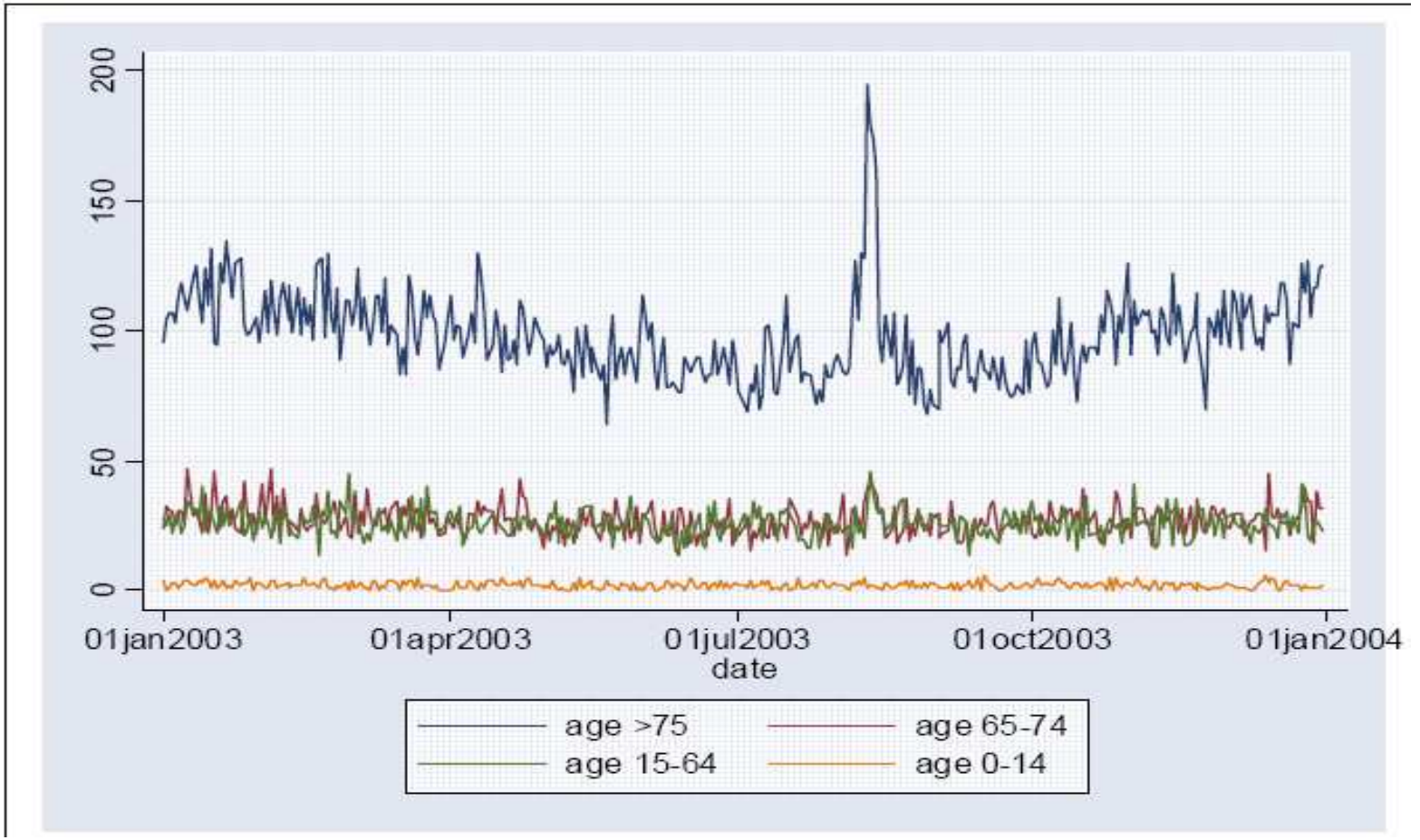
Research Method: Appraisal Context (2)



Research Method: Appraisal Context (1)

- Climate change risks:
  - risk of mortality and morbidity associated with higher ambient temperature (e.g. Hajat et al, 2005)
    - Heat-related mortality in UK when mean daily temperature exceeds 18ºC (Donaldson et al., 2003).
  - risk of mortality and morbidity associated with heat extreme events (e.g. Kovats, 2004).
    - approximately 600 extra deaths in London resulting from 2003 heatwave

Crude daily mortality data for London, plotted against 2003 dates



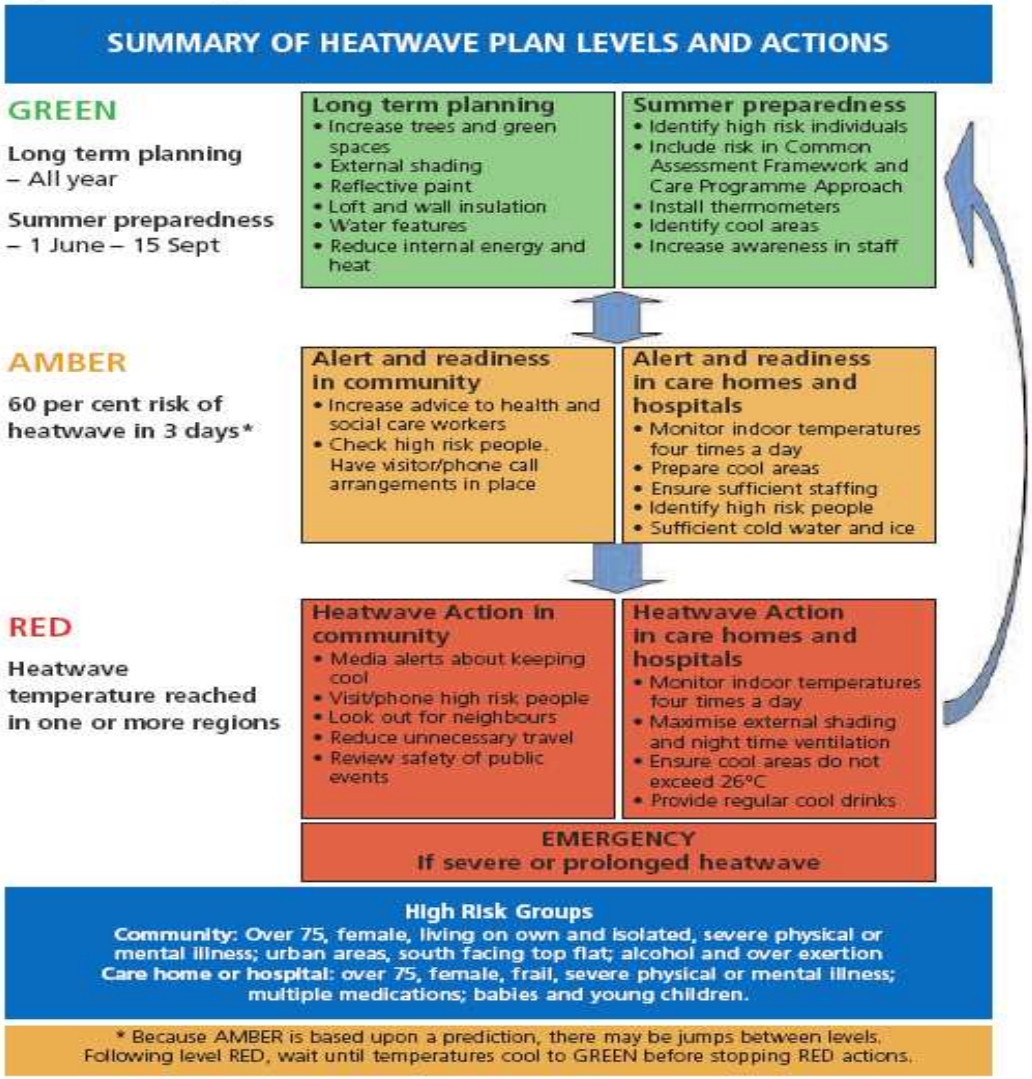
Source: Kovats (2004)

Research Method

- Selection of Adaptation action
  - Heat-wave action plan introduced in England, 2004
  - Focus on community-based health service actions

→ Test whether economically justifiable under changing climate

Figure 4. Summary of Heatwave Plan levels and actions.



Roles of Health Professionals and Resource Implications associated with HWP Implementation (Communities)

Heat-wave Plan Alert Level	Role of Health Professionals	Resource Implications
Level 1 – Awareness	Plan at beginning of heat-wave season to protect vulnerable: - Be familiar with HWP core elements - Give client heat-wave advice leaflet to clients as appropriate. - Consider clients' vulnerability to adverse weather conditions and add to at-risk list	**One hour per Health Professional, annually.** **Other fixed costs components incurred at Level 1 include:** - **Met Office contract fee;** - **Printing, distribution and storage of information leaflets & documentation.**
Level 2 – Alert	- Construct prioritised list of those who require daily contact heat-wave; - Agree to avoid duplicate contact /visits from multiple agencies; - Determine what non-essential activities could cease.	**One and a half hours per Health Professional, each time Level 2 is reached.**
Level 3 - Heatwave	- Stop nonessential activities; - Commence daily contact with clients at risk; - Make daily situation reports	**Four hours/day per Health Professional, for duration of heat-wave.**
Level 4 - Emergency	**- Continue to do best for caseload;** **- Provide situation reports upwards, and raise concerns.**	**Four hours/day per Health Professional, for duration of heat-wave.**

Department of Health (2010) and own assumptions

Method: Current and future costs of HWP

- Estimate total number of Health Visitors (HVs) and District Nurses (DNs) currently working in London, allocated to “acute, elderly and general” populations, i.e. assumed to be Health Professionals (HP) employed and engaged in the demographic group most vulnerable to heat-waves (ONS Labour statistics, 2011).

- Project employment totals over 60 year time period under four population scenarios (UKCIP, 2006). It is assumed that the population-HP ratio is kept constant.

- Calculate annual cost of employing an HP. Cost information is taken from Curtis (2009), and includes: salary, on-costs, non-capital overheads, capital overheads.

- The total expected HP costs for London are calculated for the different HWP levels under event probabilities derived from UKCIP09 scenarios.

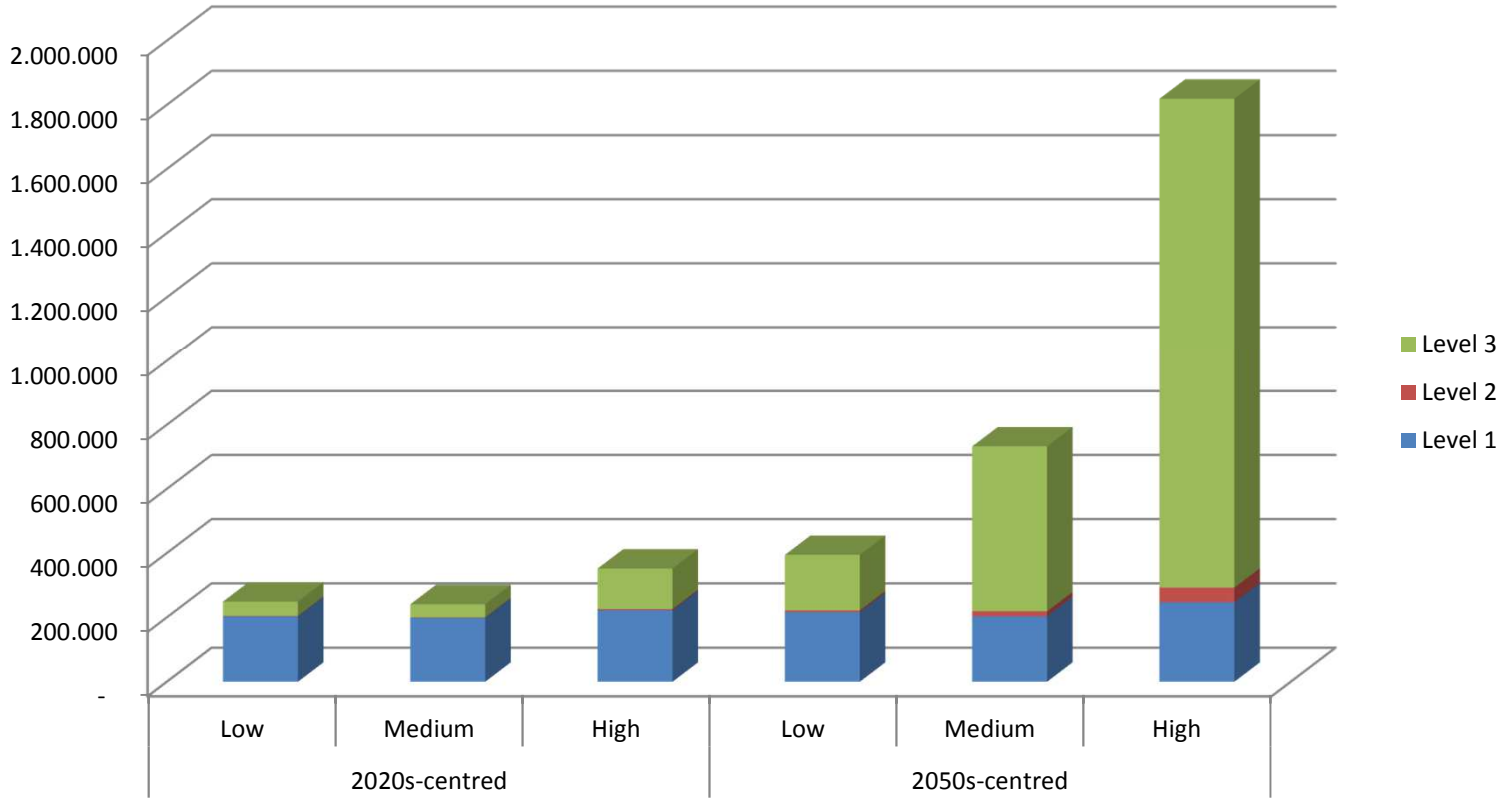
Monetary benefits from HWP implementation

Estimates of benefits made on the basis of the following assumptions.

- The total mortality estimate of the 2003 heat-wave is adjusted for future periods on the basis of the population multipliers derived under the four socio-economic scenarios.
- The HWP is 50% effective i.e. reduces health risks by one-half.
- Each attributable premature death is assumed to reduce the individual's life-time by 0.5 years.
- The value of a life-year is €50,000, consistent with that utilized by DG Environment.

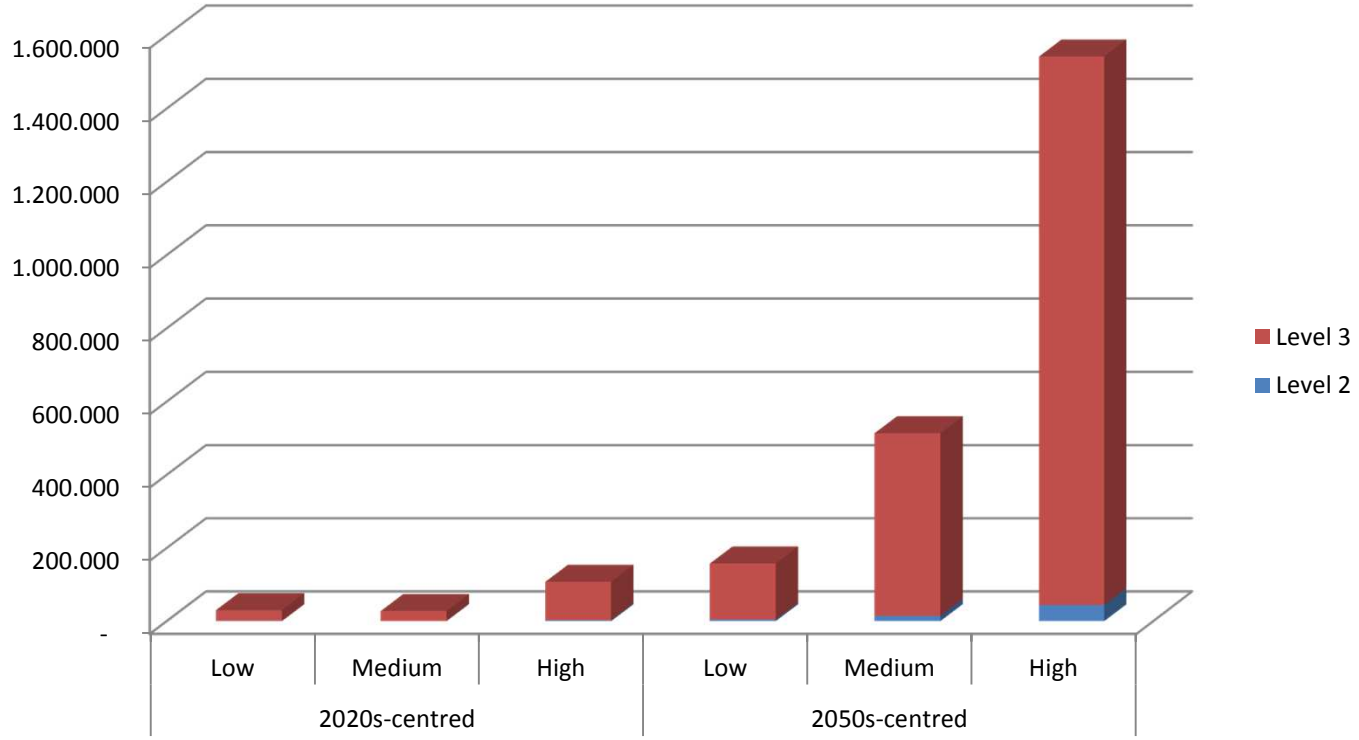
Results (1)

Total Expected Annual Adaptation Costs – Climate and Socio-Economic Changes Combined (€, 2010, undiscounted)



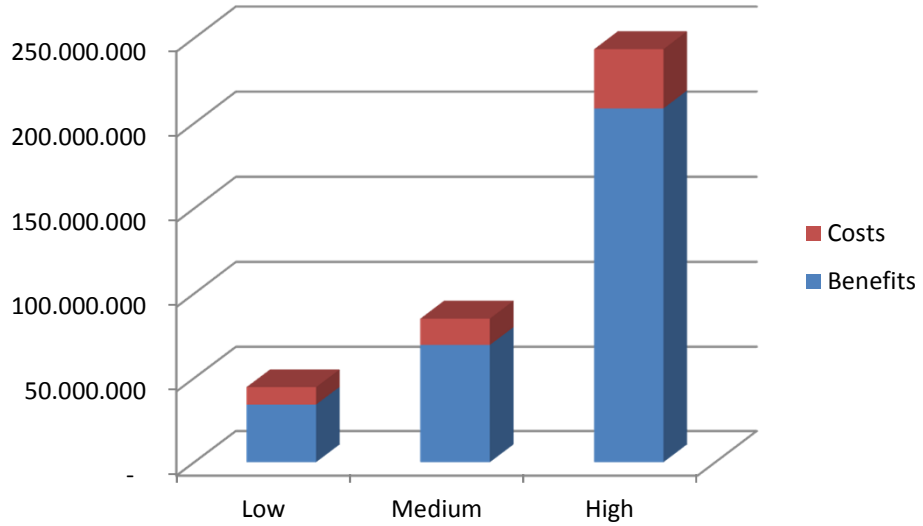
Results (2)

Total Expected Annual Adaptation Costs attributable to Climate Change (€, 2010, undiscounted)



Results (3)

PV Costs and Benefits 2010 – 2070; 4% d.r



	Low	Medium	High
B-C Ratio	3.3	4.5	6.0

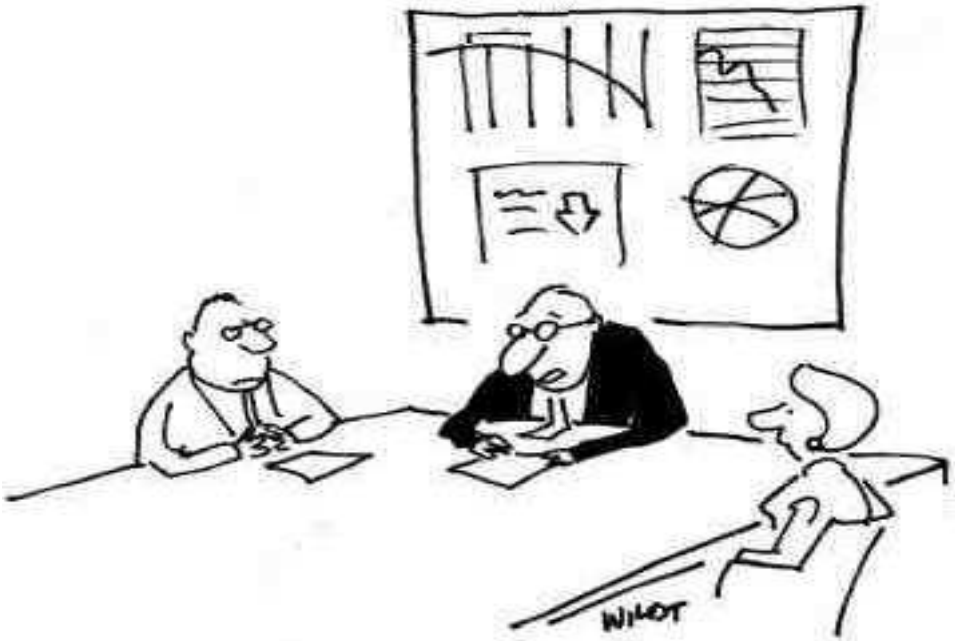
Discussion (1)

- Conservative assumptions adopted in both cost and benefit estimates
- Positive B-C ratio robust across CC scenarios considered, based purely on non-market values
- Assumptions/limitations abound:
  - Length of life gained; valuation
  - No morbidity benefits included
  - No physiological acclimatisation included
  - Fixed, linear, effectiveness of HWP
  - Interpretation of SE scenarios: Δ in (elderly) popn. only
  - Benefits modelled on single-severity event probabilities

Discussion (2)

- Main additional extensions to be made:
  - Include other resource costs, including training, opportunity costs of HP diversions from other duties, etc.
  - Undertake simulations of parameters that determine effectiveness that extend data beyond those from spatial/temporal analogues.

  → Including temporal interactions with effectiveness of longer-term changes in spatial planning, building design.



"Big surprise. That Cost/Benefit analysis cost us more than any benefit we've ever gotten from it."