

# Scenarios to understand Climate Change Risks and Implications for New Zealand

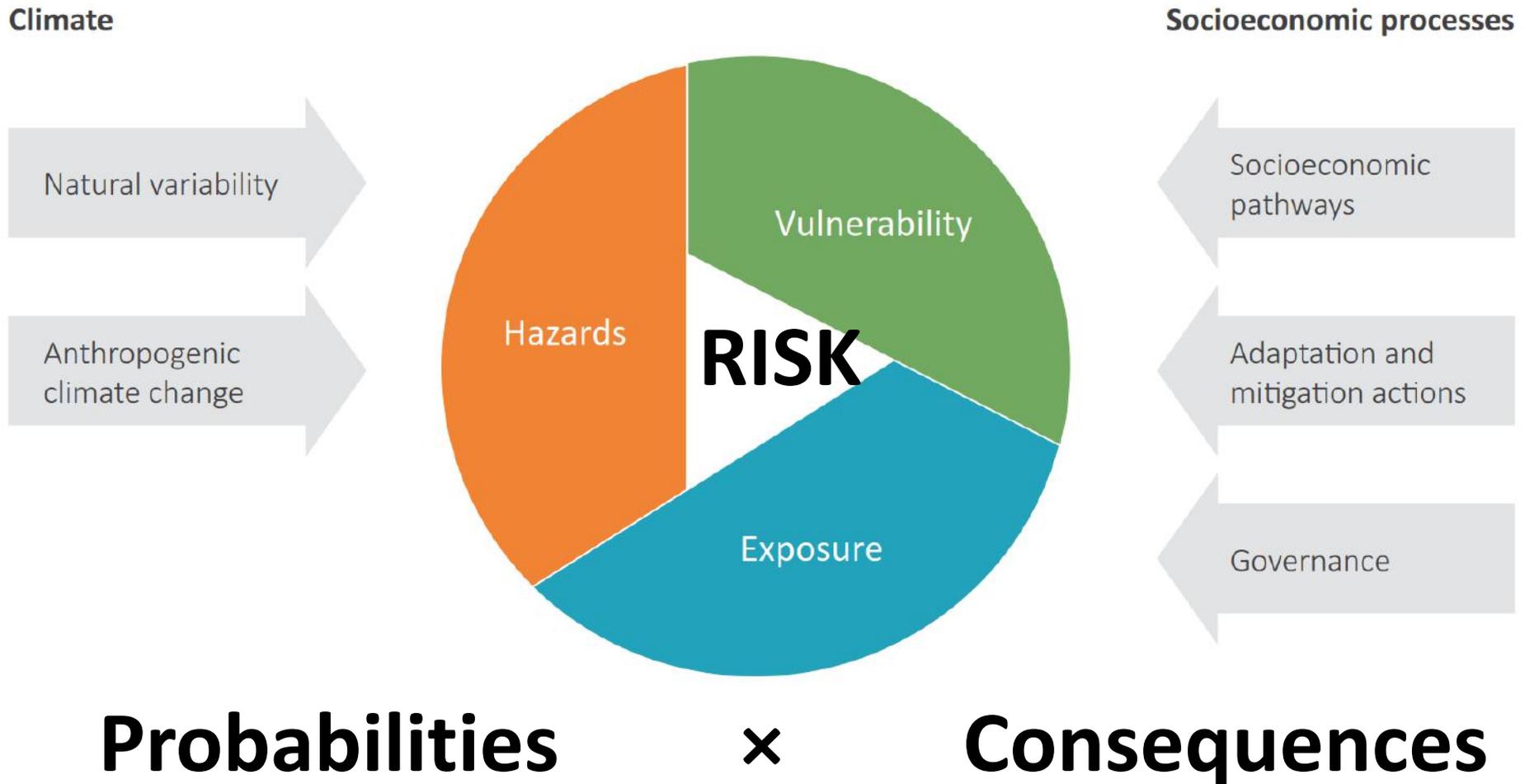
WORKSHOP AT THE TREASURY, MONDAY 18 APRIL 2016

ANDY REISINGER, BOB FRAME

Climate Change Impacts & Implications Programme



# Climate Risks and Implications



# Scenarios

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## *What are scenarios?*

Plausible, alternative stories of the future

## *Why use scenarios?*

They provide a self-consistent basis to explore alternative paths of action, and discuss the implications of alternative futures for today's decisions

## *Why for climate change?*

Inherent future focus, over timescales from years to many decades. High uncertainty and high potential for lock-in and path-dependency – futures thinking can lead to better decisions today to manage risks

## *How are scenarios relevant to NZ?*

Globally-linked but NZ-focused scenarios can aid exploration of NZ decision making options with differing degrees of climate change and differing global, regional and national socio-economic developments

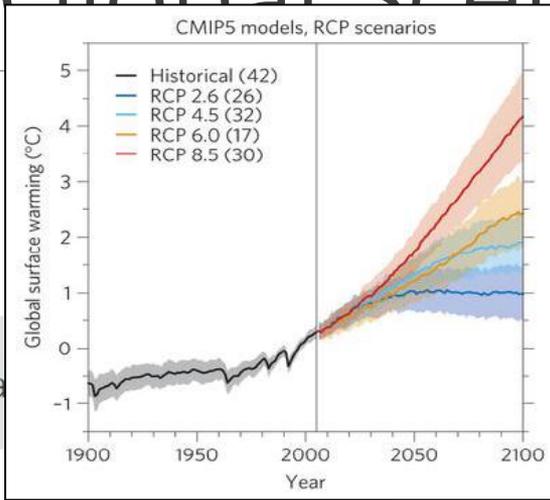
# Global Scenario Architecture

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# Global Scenario Architecture

Climate



Natural

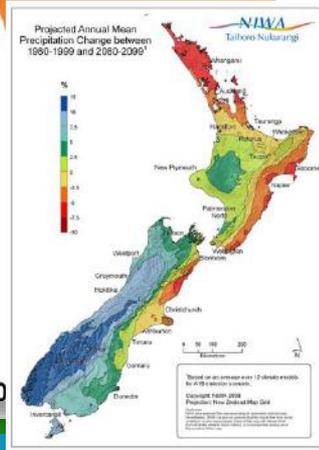
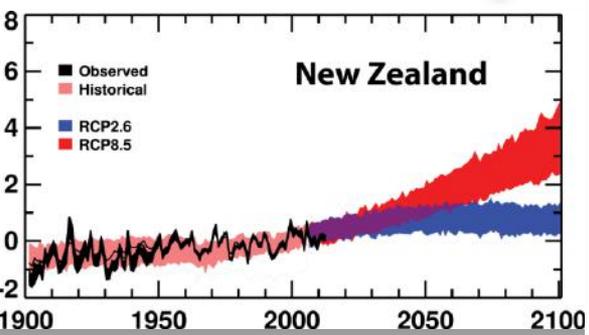
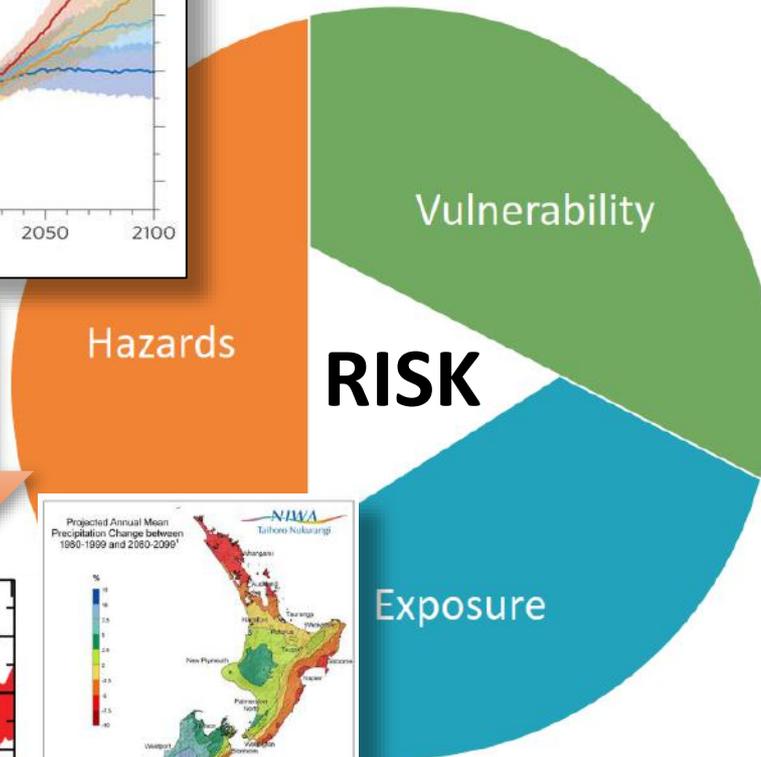
Anthropogenic climate change

Socioeconomic processes

Socioeconomic pathways

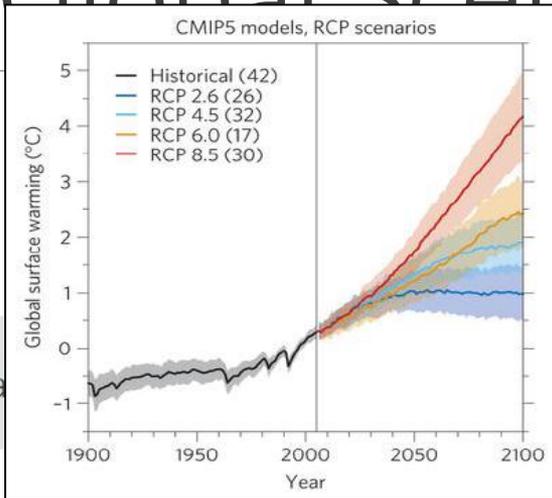
Adaptation and mitigation actions

Governance



# Global Scenario Arc

Climate



Natural

Anthropogenic climate change

Fossil-Fuelled Global Development

Regional Rivalry

Challenges to Mitigation

Middle of the Road

Sustainability

Inequality

**RISK**

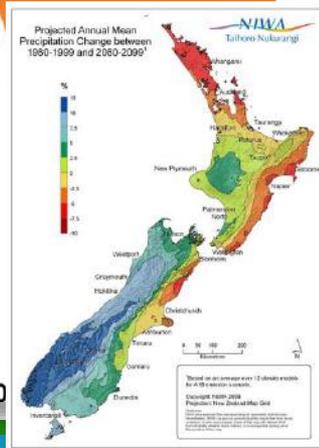
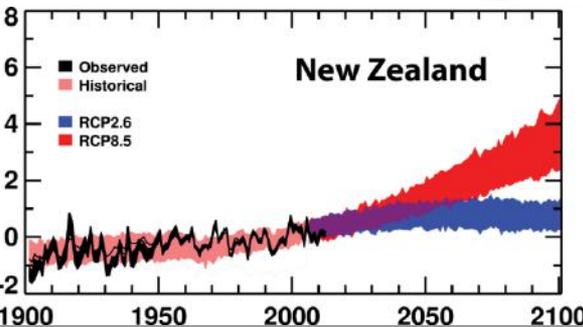
Hazards

Exposure

Challenges to Adaptation

Governance

**Socio-economic scenarios for NZ ?**



# National-scale development paths

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## Shared Policy Assumptions (SPAs)

Pathways describing NZ socio-economic development, including responses to climate change

Changes in population, human development, economy, lifestyle, policies, technology, and environment

For any given global scenario, NZ may choose to:

- Be consistent with
- Lead
- Lag

the global response to climate change in some respects.

# National-scale development paths

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## Shared Policy Assumptions (SPAs)

Pathways describing NZ socio-economic development, including energy, land use, and emissions

Change in land use, forestry, lifestyle, policies, technology, and environment

For any given global scenario, NZ may choose to:

- Be consistent with
- Lead
- Lag

**4 global climate scenarios x**  
**5 global development scenarios x**  
**3 (at least) NZ attitudes**  
**=**  
**60 (at least) NZSPAs**

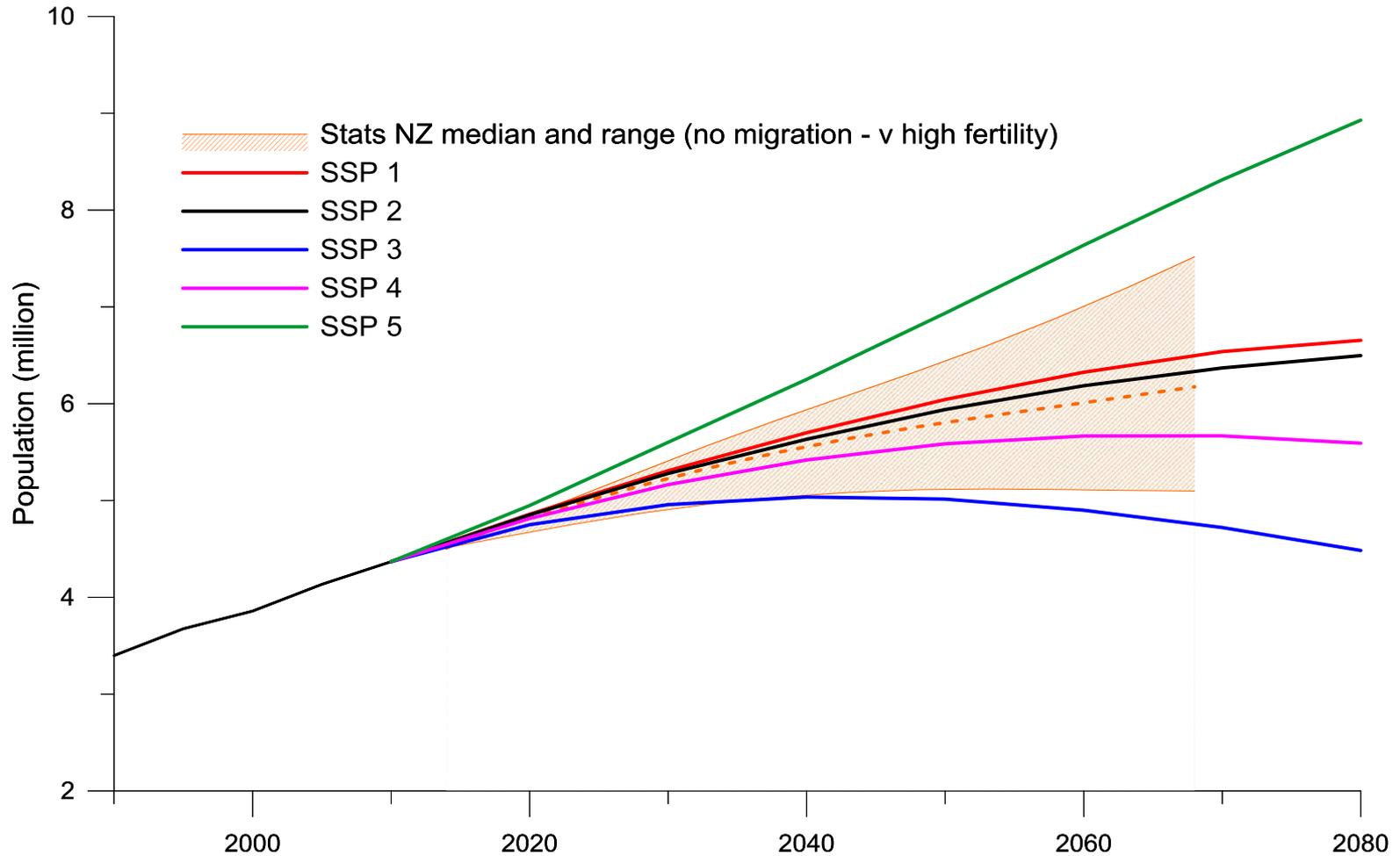
the global response to climate change in some respects.

# What might go in a scenario?

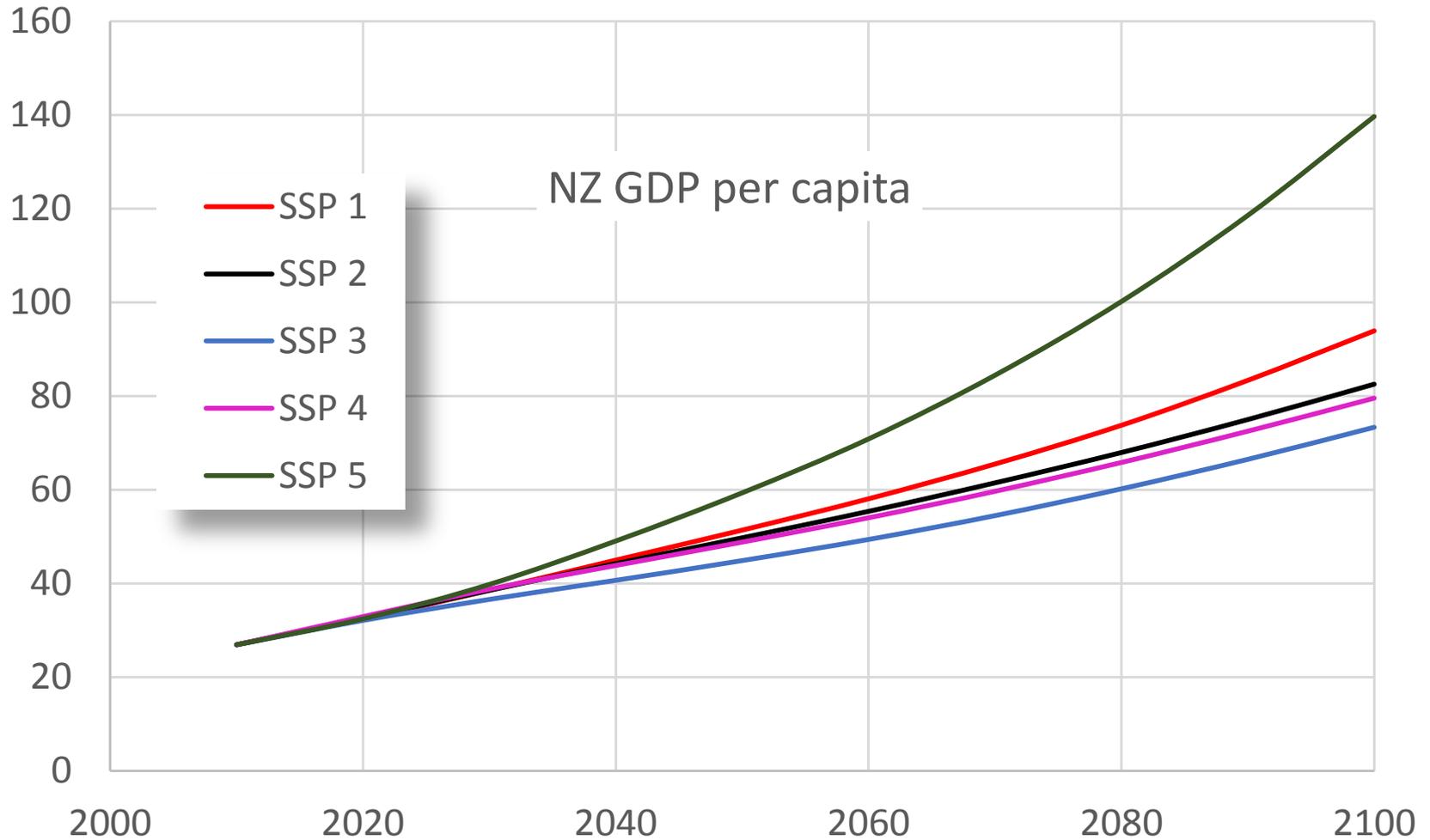
Demographics	<ul style="list-style-type: none"><li>• Population total and age structure</li><li>• Urban and rural population</li></ul>
Economic Development	<ul style="list-style-type: none"><li>• Global and regional GDP, and trends in productivity</li><li>• Regional, national, and sub-national distribution of GDP</li><li>• Share of population in extreme poverty</li><li>• Nature of international trade</li><li>• Sectoral structure of national economies, incl. share of agriculture and productivity</li></ul>
Welfare	<ul style="list-style-type: none"><li>• Human development including access to public health and health care infrastructure</li><li>• Educational attainment</li></ul>
Environment	<ul style="list-style-type: none"><li>• Air, water, soil quality</li><li>• Ecosystem functioning</li></ul>
Resources	<ul style="list-style-type: none"><li>• Fossil fuel resources and renewable energy potentials</li><li>• Other resources such as phosphates, fresh water, etc.</li></ul>
Institutions	<ul style="list-style-type: none"><li>• Existence, type and effectiveness of national/regional/global institutions</li><li>• Degree of participation / Rule of law</li></ul>
Technology	<ul style="list-style-type: none"><li>• Type (slow, rapid, transformational...) and direction (environmental, efficiency, productivity)</li><li>• Innovation in specific sectors</li></ul>
World views	<ul style="list-style-type: none"><li>• Life styles (including diets)</li><li>• Societal values and tensions</li></ul>
Policies	<ul style="list-style-type: none"><li>• Non-climate development strategies, urban planning and transportation policies, energy security policies, and environmental policies etc.</li></ul>

	SSP1	SSP2	SSP3	SSP4	SSP5
RCP8.5			<b>Unspecific Pacific</b> no mitigation, fragmented world, reactive NZ (8.5-3-A)		
RCP6.0					<b>Homo economicus</b> global growth with little mitigation, NZ does minimum but adapts smartly (6.0-5-D)
RCP4.5			<b>Kicking, screaming</b> fragmented world that mitigates through power blocks, NZ dragged along (4.5-3-A)		<b>Clean leader</b> global growth, significant mitigation, NZ leads, strategically exploits competitive advantage (4.5-5-F)
RCP2.6	<b>100% smart</b> global cohesive sustainability focused world with ambitious mitigation, with NZ riding front wave (2.6-1-F)				<b>Techno-garden</b> global ambitious mitigation in a cohesive rich world focused on economic gain, NZ keeps economic focus (2.6-5-B)

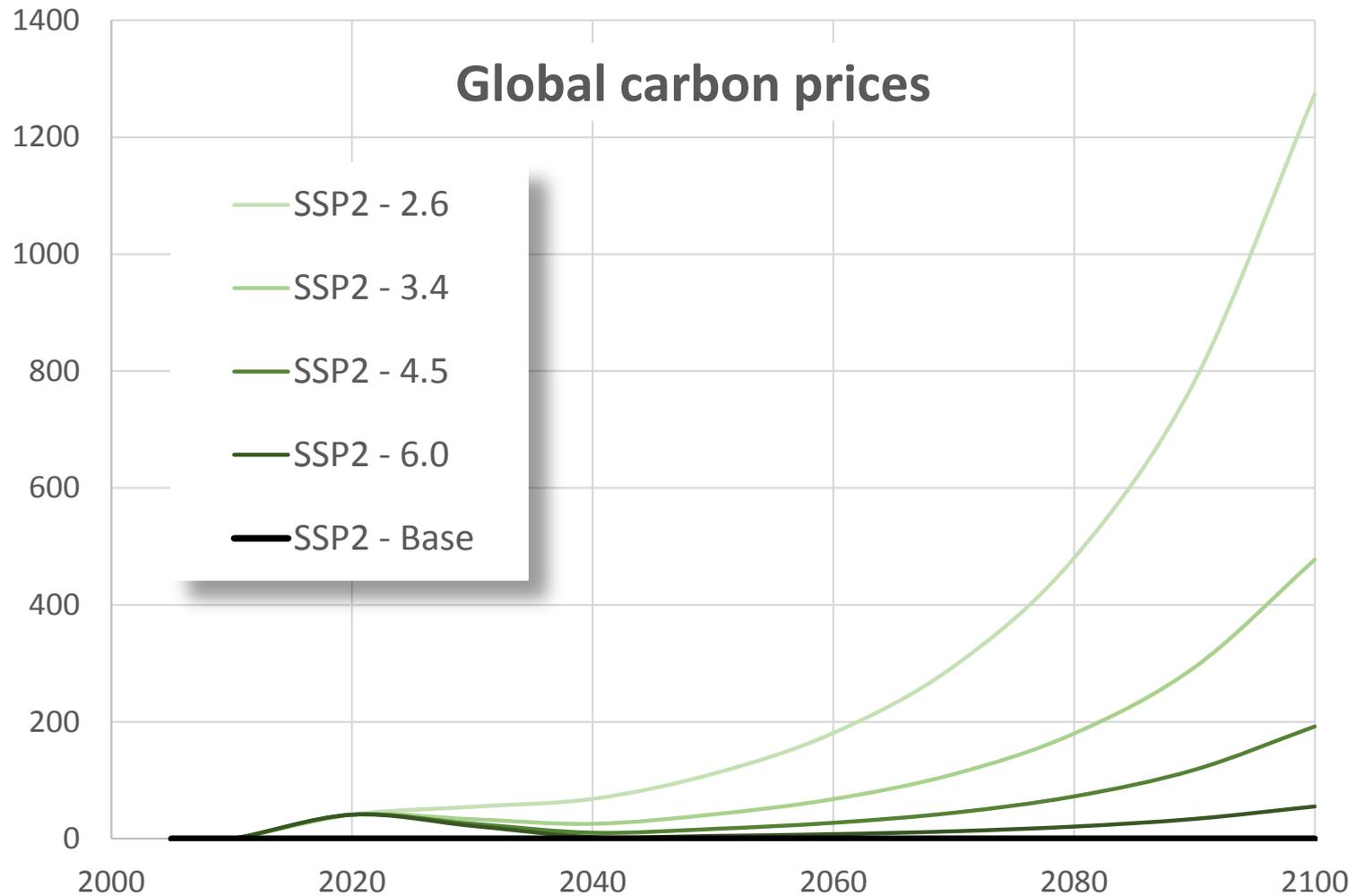
# Scenarios: example results



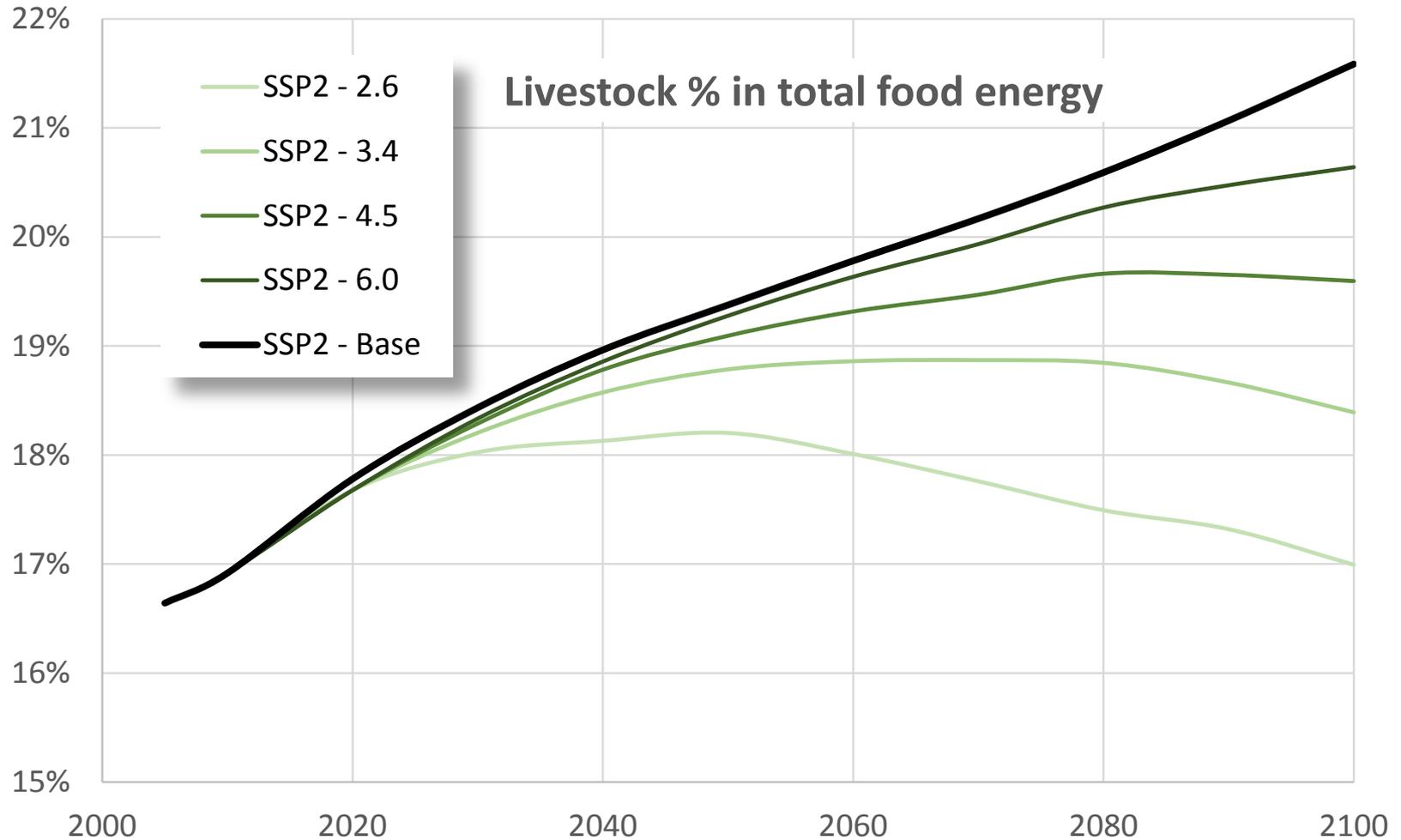
# Scenarios: example results



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# Scenarios: example results



# Scenarios: sample narrative

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**Clean Leader (RCP4.5, SSP5, SPA-lead).** Emissions are reduced globally through developing and sharing more efficient conventional technologies and new technologies, and ensuring mitigation is achieved where most cost-effective through emissions trading. Countries continue to seek exemptions for economically important sectors with locked-in development. NZ is developing innovative low-cost mitigation opportunities and actively trades those. Strategic land-use decisions are made with a view to maximising economic growth in a carbon-constrained world. When it comes to balancing trade-offs in adaptation responses, there is a strategic approach through govt-private sector partnerships that prioritises economic concerns over environmental or societal equity concerns.

# Scenarios: example questions

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- How important for land-use change are climate change impacts vs carbon pricing vs water allocation?
- Do we expect appreciating dairy prices in all futures? If not what are they and how can we tell? What are transitioning options?
- Do we have a better chance of reducing risks to wetlands by focusing on new invasive species or on minimum flows?
- Are all adaptation strategies equally effective/feasible in the different futures? Equally for all sectors/regions?
- Where do coastal hazards present the greatest challenge (in terms of population, governance, resources)?

# Scenarios: example questions

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- How important for land-use change are climate change impacts

**Encourage structured thinking outside comfort zones and group beliefs**

- Do we have a better chance of finding new lands by focusing on new invasive species or on minimum flows? Are they and how can we tell? What are transitioning options?

**Ensure consistency between approach and assumptions**

- Are all adaptation strategies equally effective/feasible in the different futures? Equally for all sectors/regions?

**Identify triggers for change**

- Where do coastal hazards present the greatest challenge (in terms of population, governance, resources)?

# Scenarios: key feedback

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- (How) do sectors/stakeholders engage with an uncertain future? How far out?
- Is a scenario approach useful?  
Do we have the capacity to use scenarios?
- Is self-consistent, nested approach important?
- What elements matter most?
- Qualitative or quantitative?

# Scenarios: next steps

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- Use in case studies to demonstrate utility/relevance
  - model runs
  - engagement and testing with stakeholders
  - reflection in case study summaries/narratives
- Workshop with national stakeholders (April 2016)
- Documentation in final report

**Future work in the Deep South (*and other!?*) NSC  
Bottom-up contributions to global science/IPCC**

# Thanks

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More information at:

<http://ccii.org.nz/>