Webinar

Resource use and waste generation in Aotearoa – filling (some) gaps

Parliamentary Commissioner for the Environment
Te Kaitiaki Taiao a Te Whare Pāremata

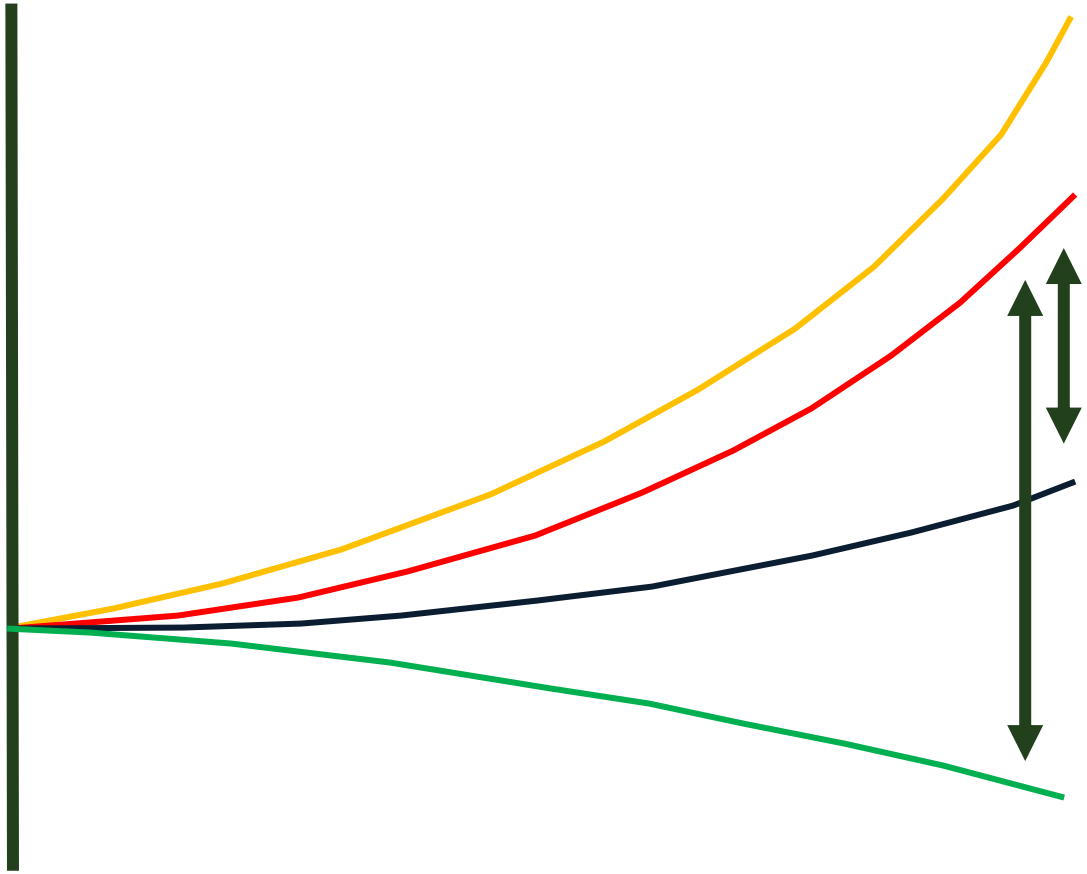
16 June 2025


Simon Upton

Plan for today

1. Some context and scene setting
2. Key insights from our research
3. What's next
4. Q&A

A starting point: resource use, resource efficiency, decoupling



Human well-being

Economic activity (GDP)

Resource decoupling

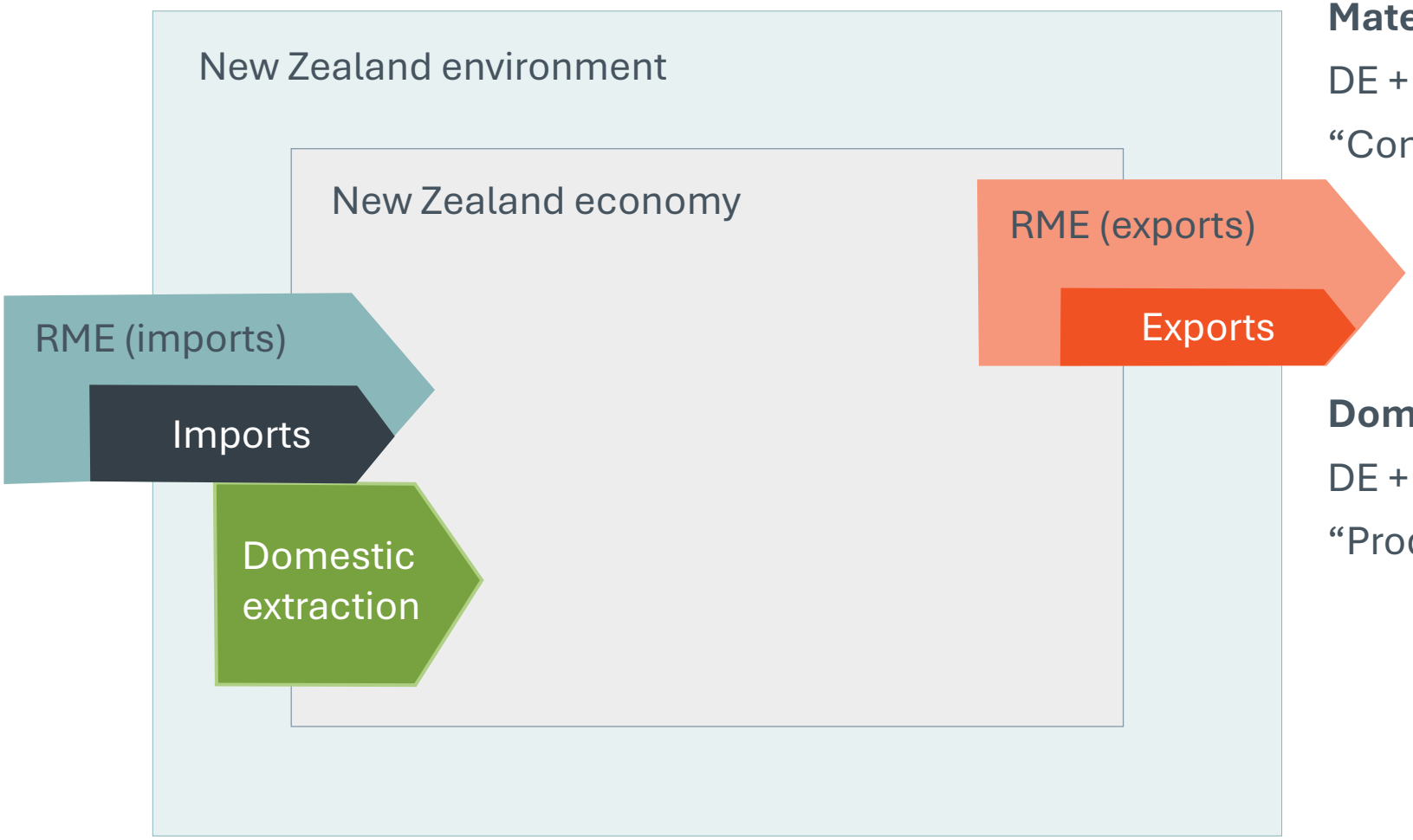
Resource use

Impact decoupling

Pollution/waste generation

Source: International Resource Panel (2016)

Conclusions about decoupling depend on how resource use is measured



Material Footprint (MF)

DE + RME(IMP) – RME(EXP)

“Consumption-based” resource use

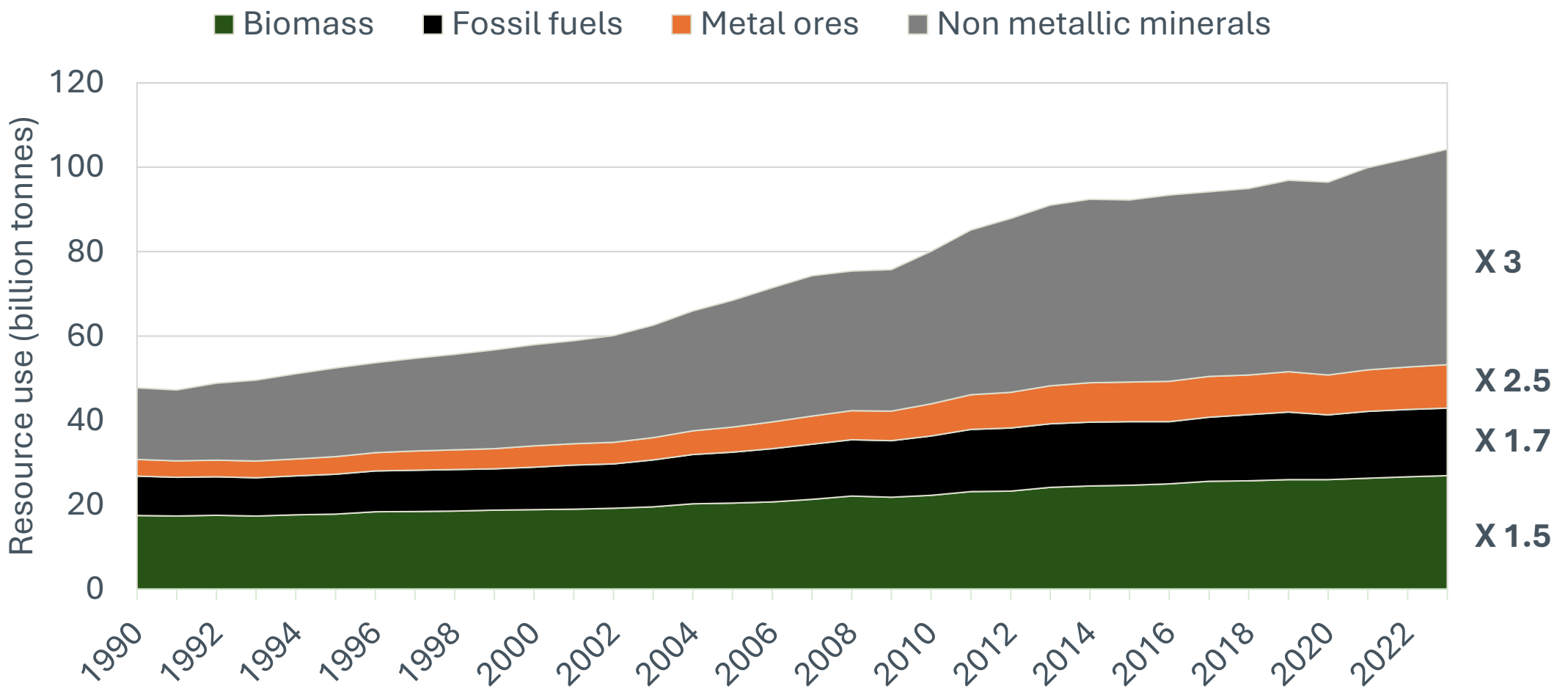
Domestic Material Consumption (DMC)

DE + IMP – EXP

“Production-based” resource use

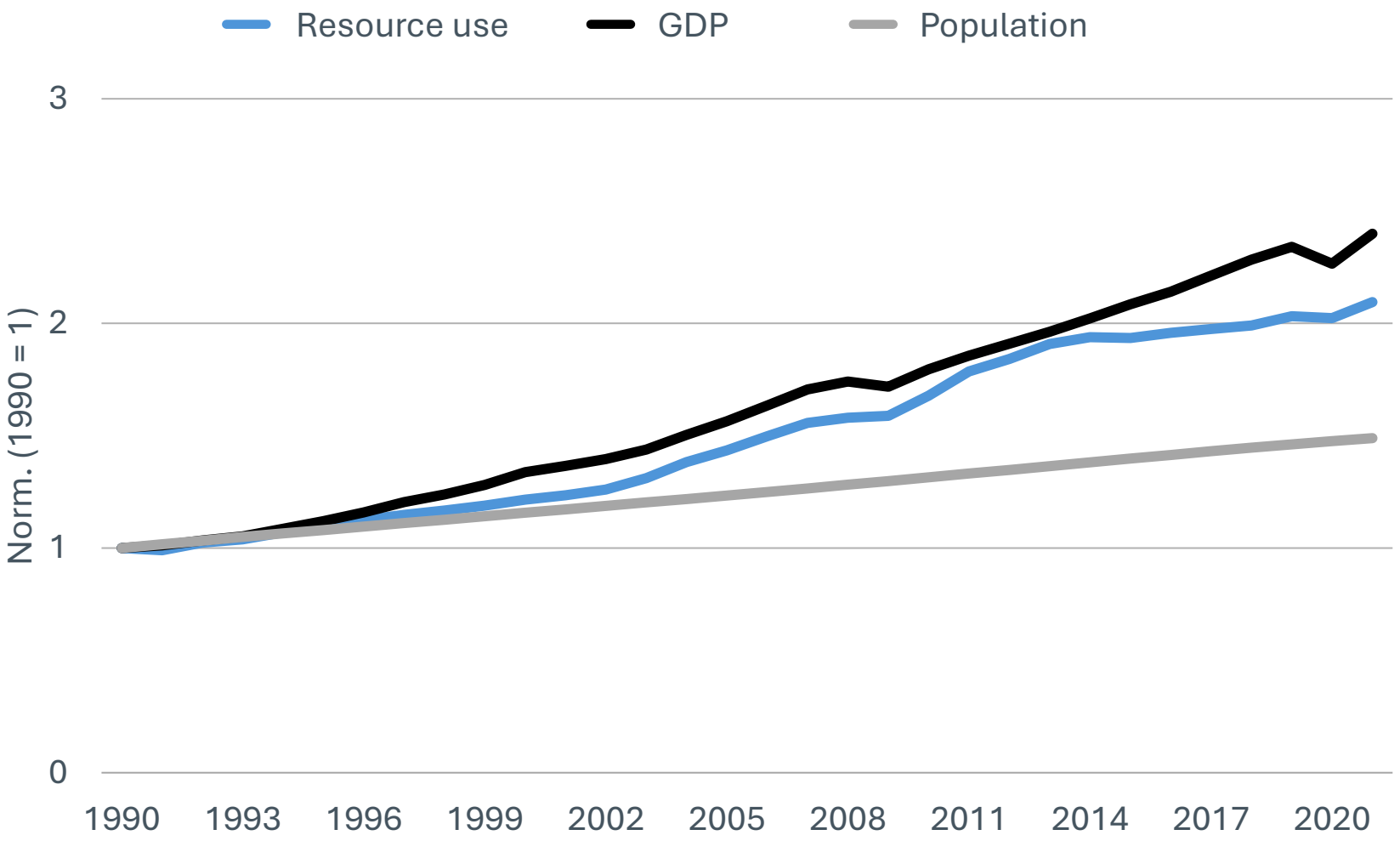
Schaffartzik et al. (2013) and UNEP (2021)

Global resource extraction and use: 1990–2023



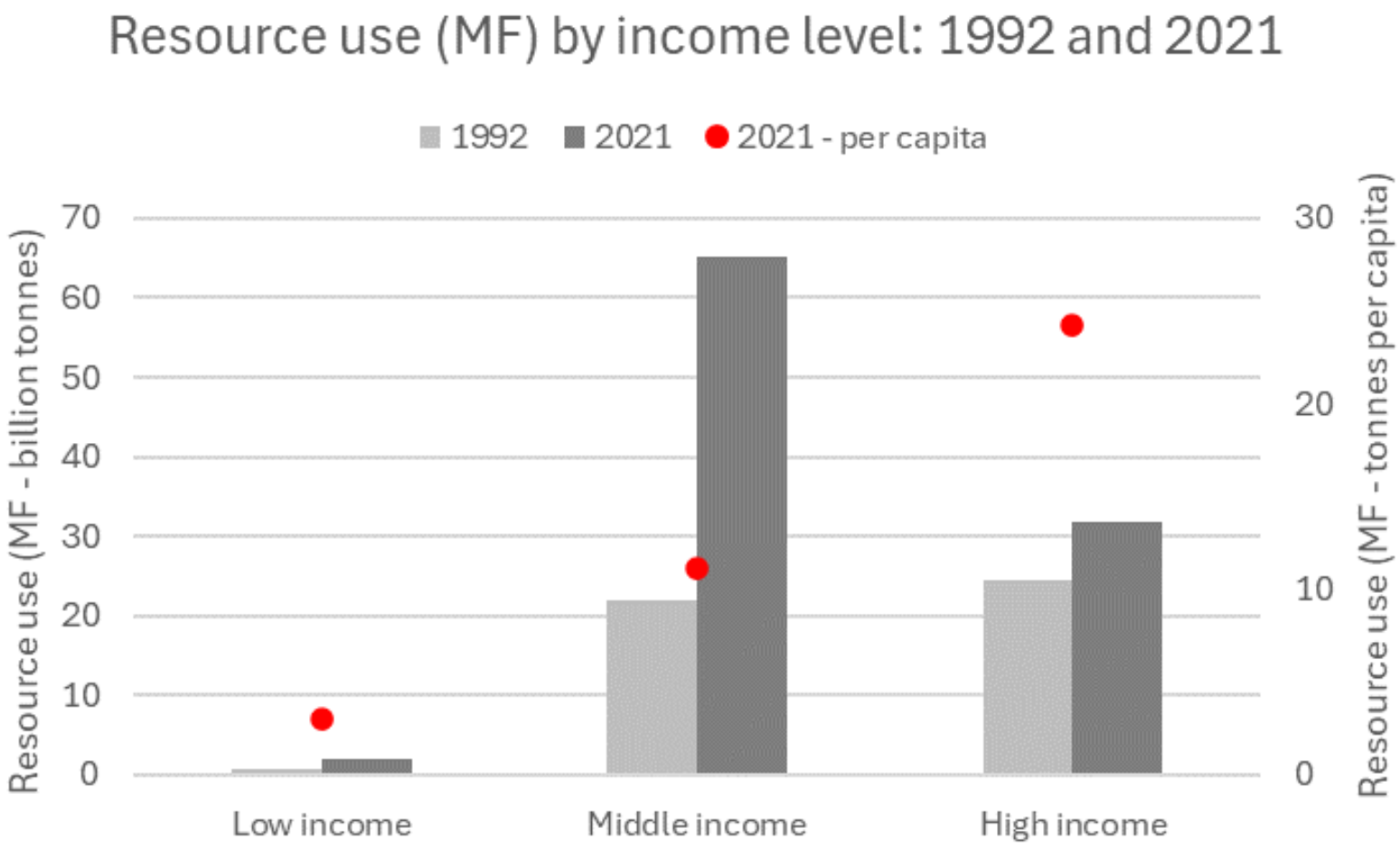
Source: UNEP IRP – GMFD

Limited resource decoupling at the global level



Source: UNEP IRP – GMFD
GDP in constant 2015 USD

Most of the growth in natural resource use in emerging economies



Source: UNEP IRP – GMFD

Why does increasing resource use matter?

Increasing extraction and use of natural resources is not really a problem in and of itself, but it does come with risks:

- Resource depletion and/or degradation
- Geopolitical supply risk
- Wastes/residues/pollutants overwhelm assimilative capacity of the environment

There are interactions and feedbacks between each of these risks …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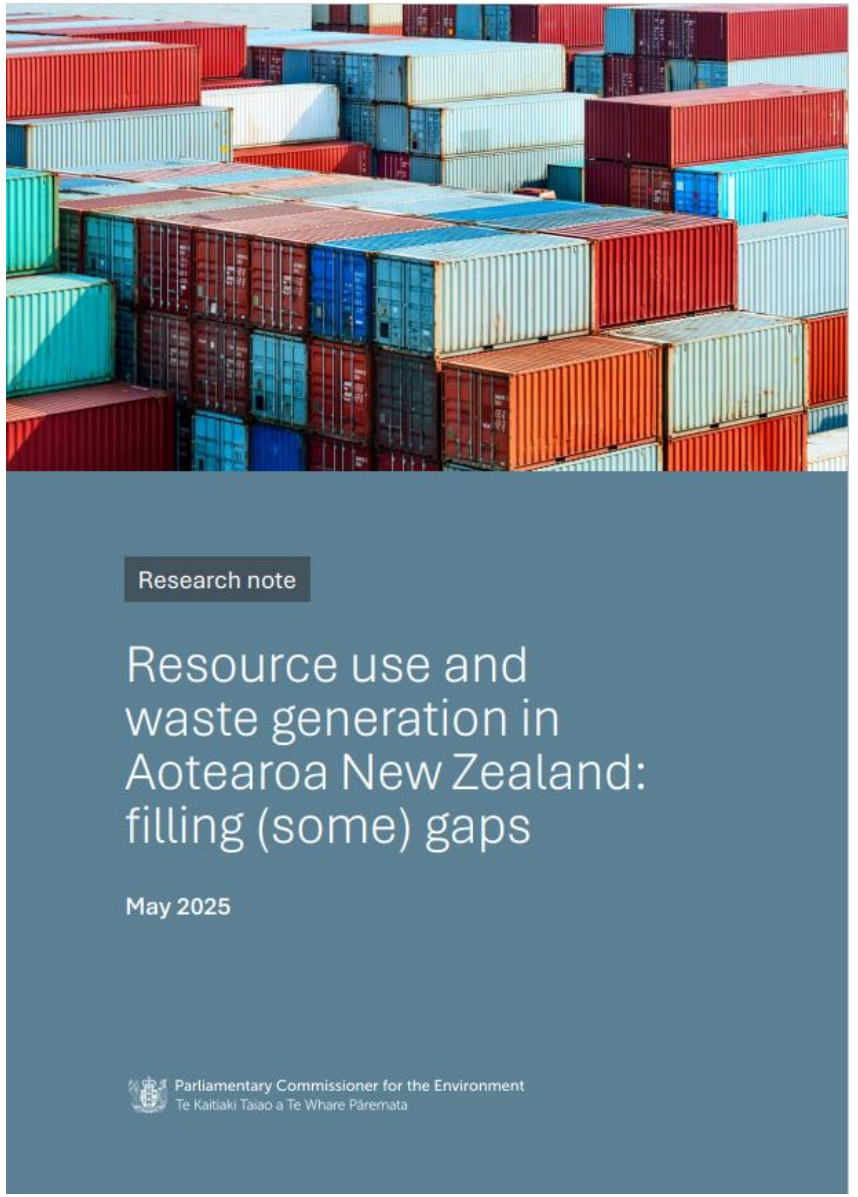
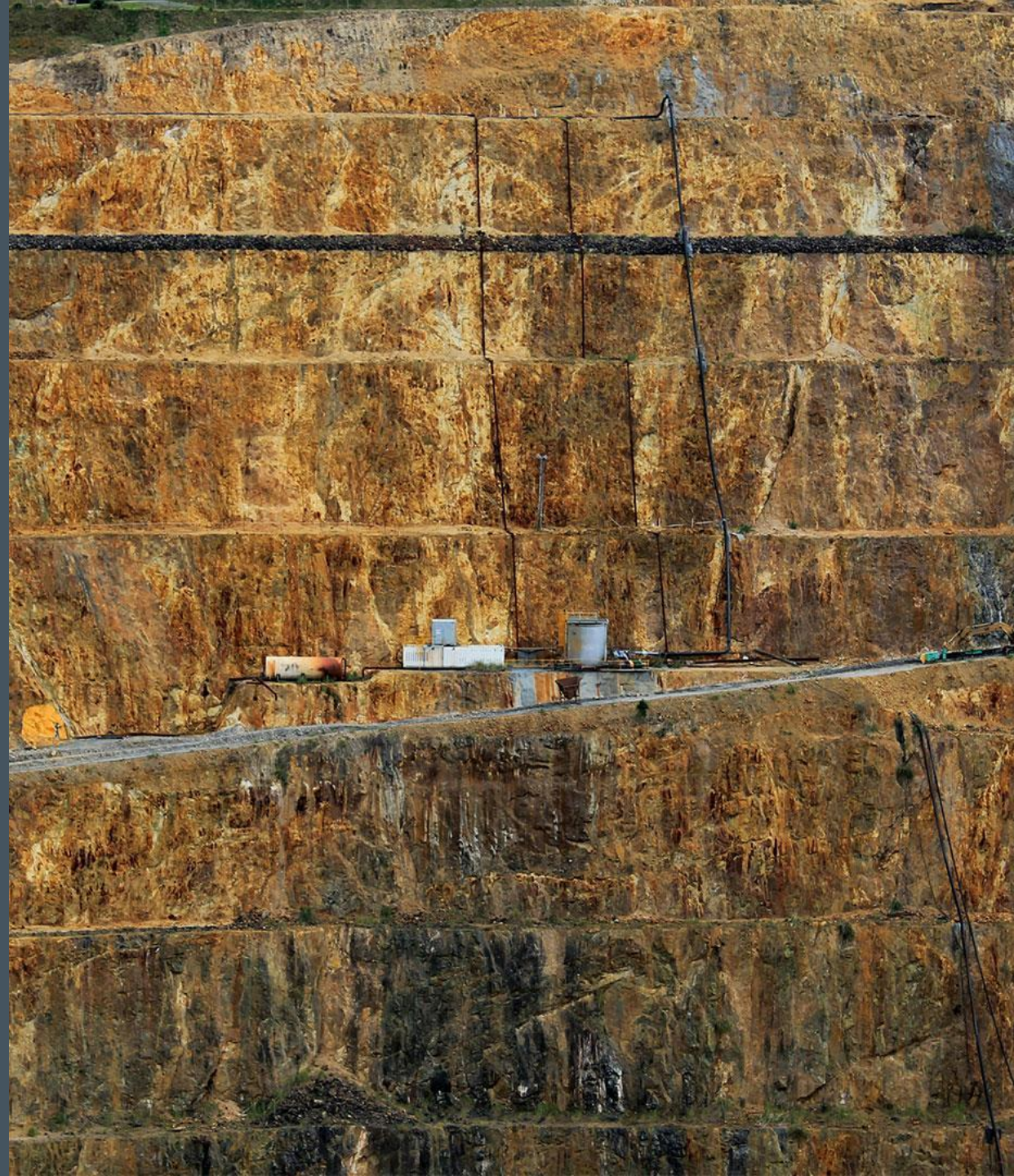
Resource use and waste generation in Aotearoa New Zealand
A literature review
April 2024


Research note
Resource use and waste generation in Aotearoa New Zealand: filling (some) gaps
May 2025
Parliamentary Commissioner for the Environment
Te Kaitiaki Taiao a Te Whare Pāremata

Insight 1:

The resource requirements of New Zealand's economy are increasing



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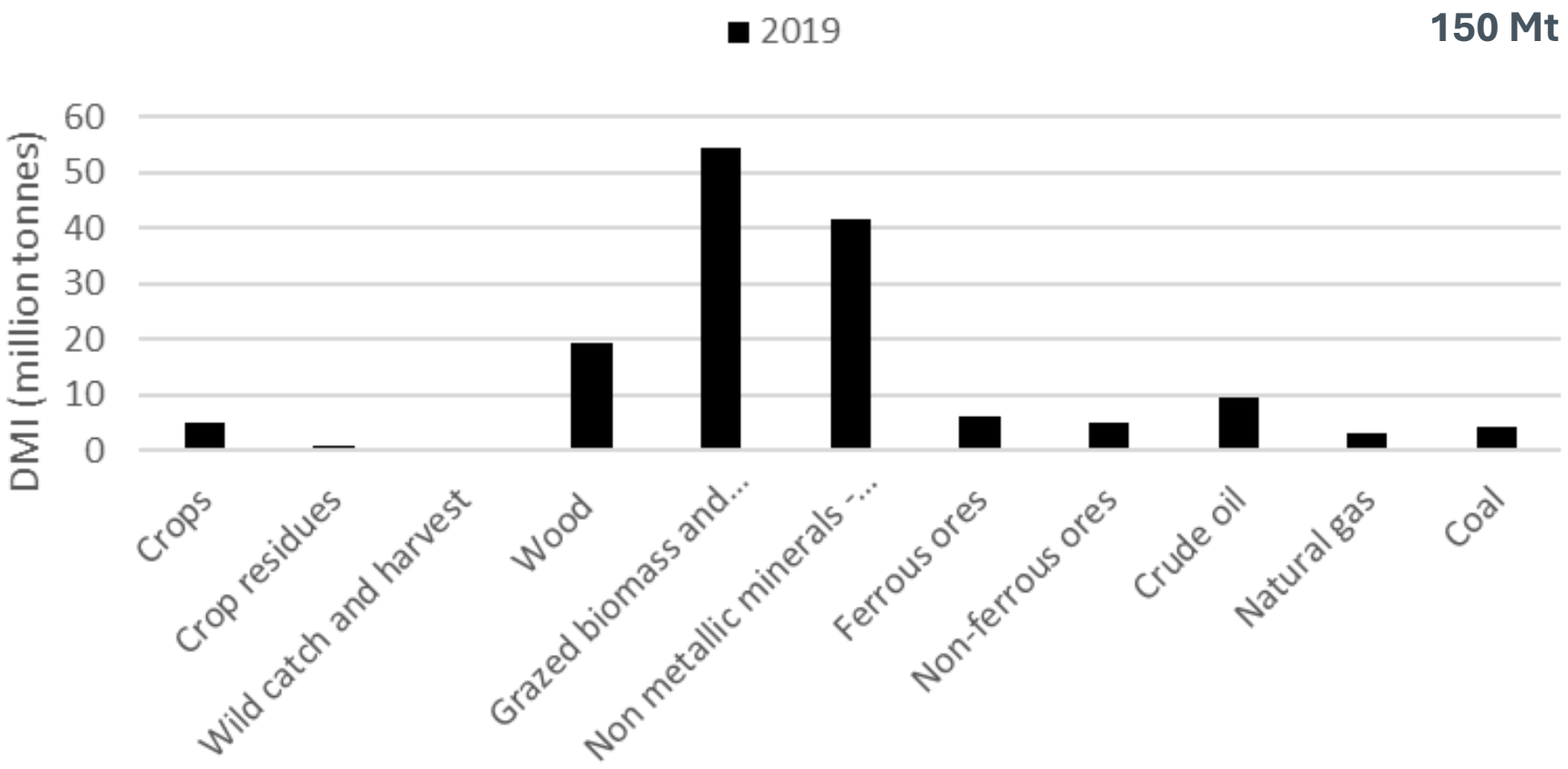
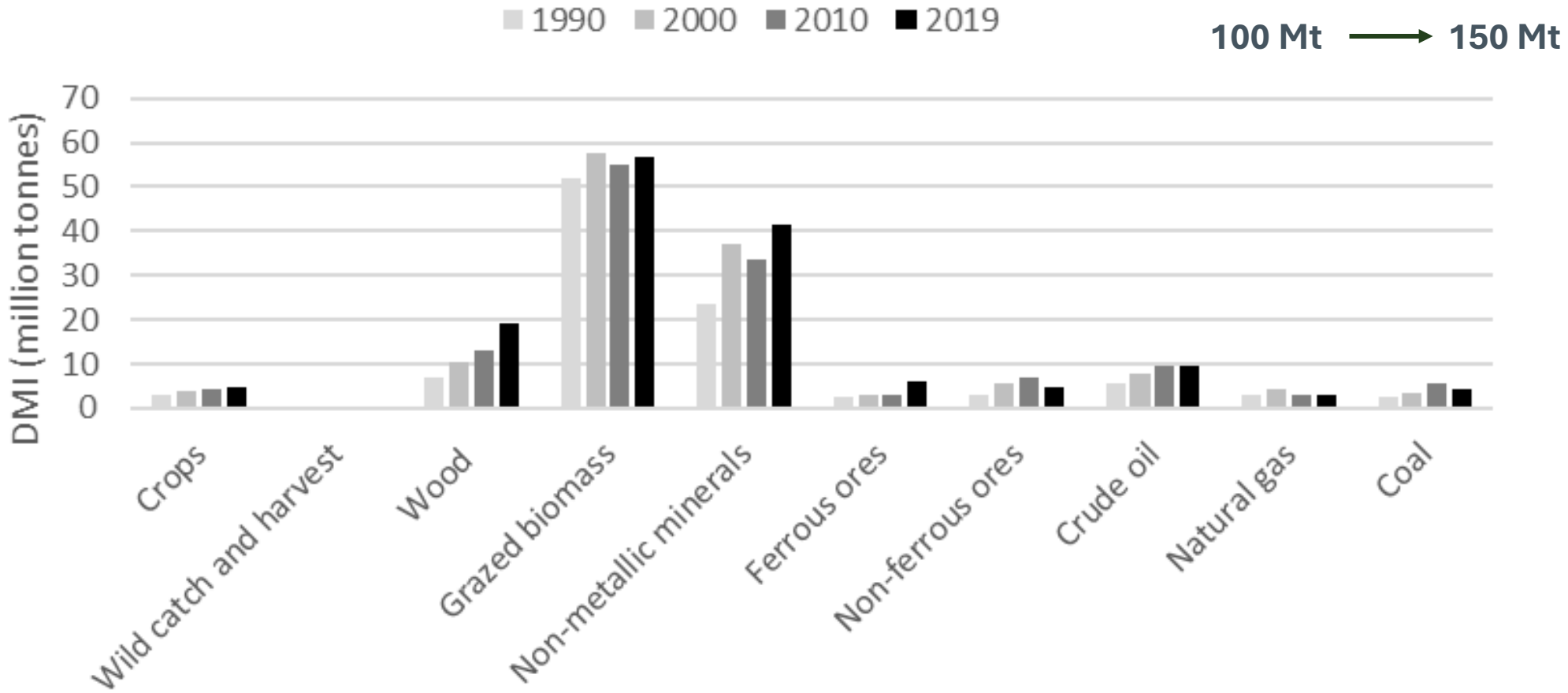
New Zealand natural resource inputs (DMI) in 2019



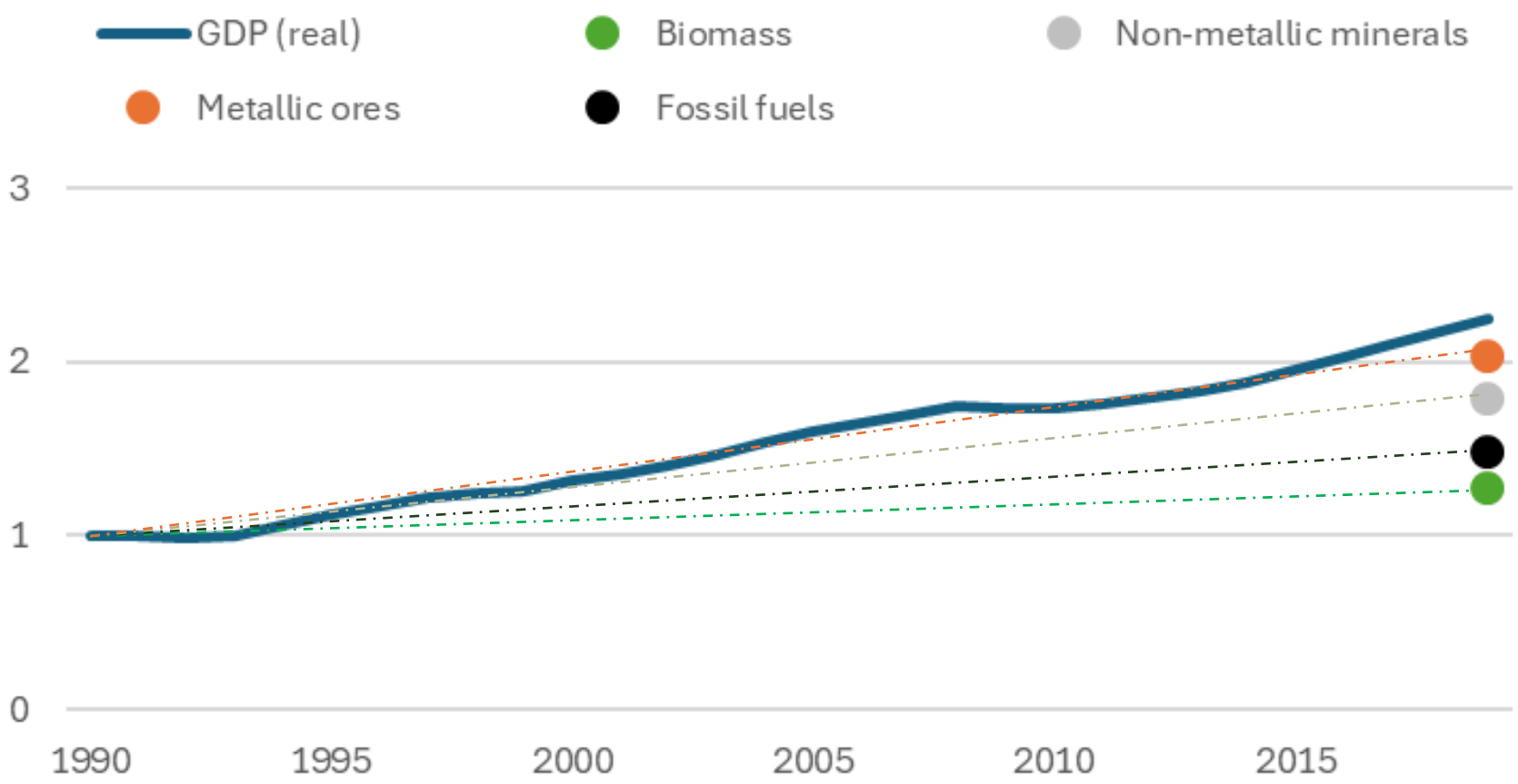
Source: PCE compilation

New Zealand natural resource inputs (DMI): 1990–2019



Source: PCE compilation

New Zealand decoupling: 1990–2019



Source: PCE compilation

Insight 2:

New Zealand's economy is far from being circular

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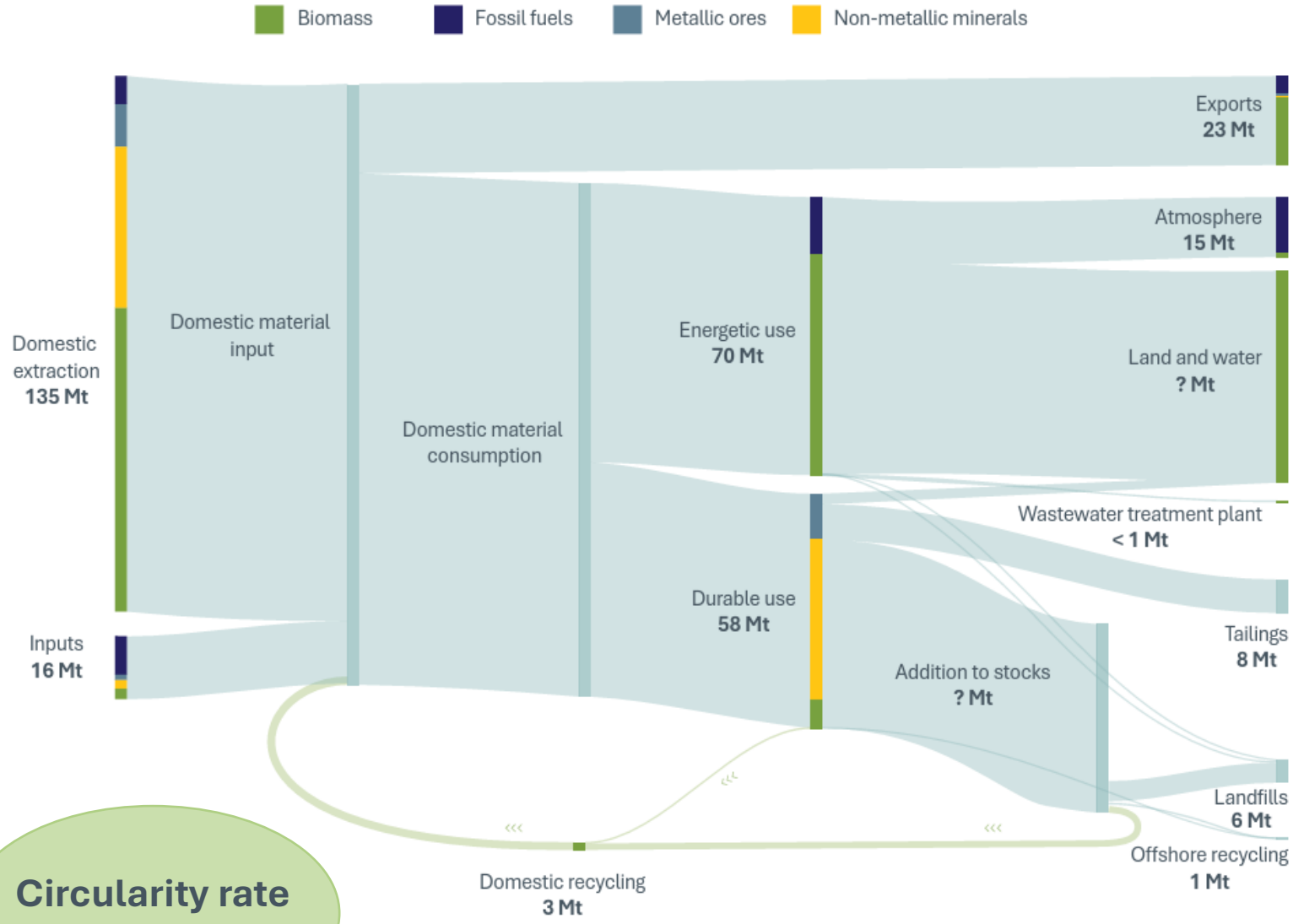
Material flows through New Zealand economy in 2019

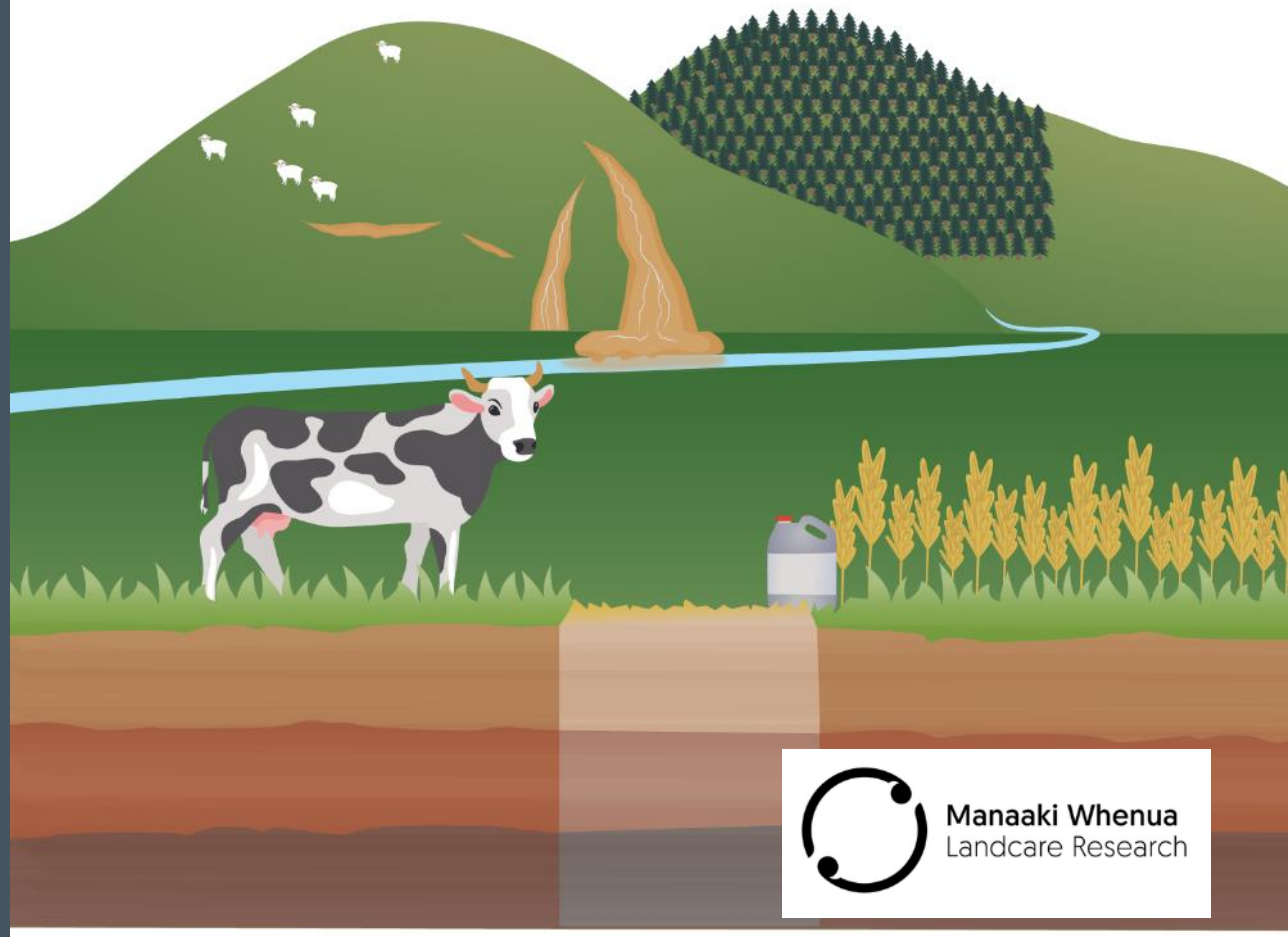


Circularity rate ~ 2%

Source: PCE compilation

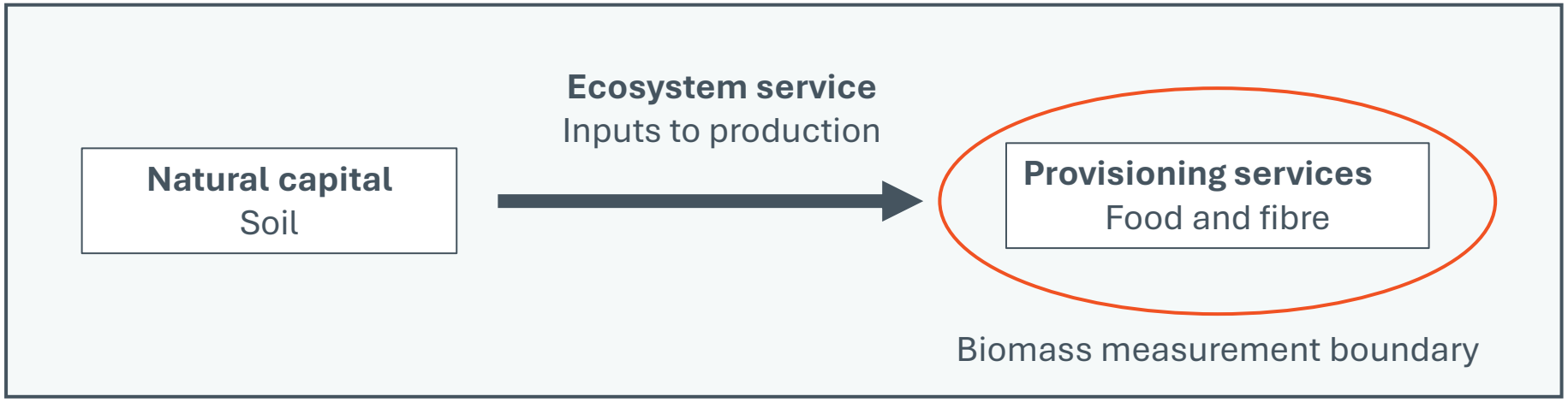
Insight 3:

Two thirds of our domestic resource extraction relies on soil – and is at risk



Accounting for New Zealand's soil resources

- Important for New Zealand's biological economy
- Resource accounting boundary does not extend to soil resources



- Review risks to soil resources:
  - Impact of primary sector activities
  - Reversibility
  - Implications for productive capacity

Different primary sector activities have different impacts

Primary sector activity	Soil impacts
Dairy	Compaction Contamination (zinc and cadmium)
Exotic forestry	Compaction Erosion
Dry stock hill and high country	Erosion
Arable cropping / sort-rotation horticulture	Compaction Loss of soil carbon
Perennial horticulture	Contamination (copper)

Some of these impacts are reversible. Some are not…

Reversible impacts:	Irreversible impacts:
• Nutrient depletion and pH changes (through fertilizers, lime, compost)	• Trace element contamination (copper, zinc, cadmium)
• Soil compaction (with management changes - easier in shallow layers)	• Soil erosion and loss to waterways
• Soil carbon depletion (through organic inputs or plant growth)	• Potentially irreversible changes to soil biological communities

Implications for productive capacity

Greatest future risk:

- Trace element contamination in horticultural and dairy systems.

Other risks:

- Compaction and impact on pasture yields.
- Erosion and loss of topsoil layer.

Limitations and data gaps in the evidence base:

- Focuses mainly on soil properties, not productive capacity.

Insight 4:

There are other data gaps and a recommendation

Data gaps

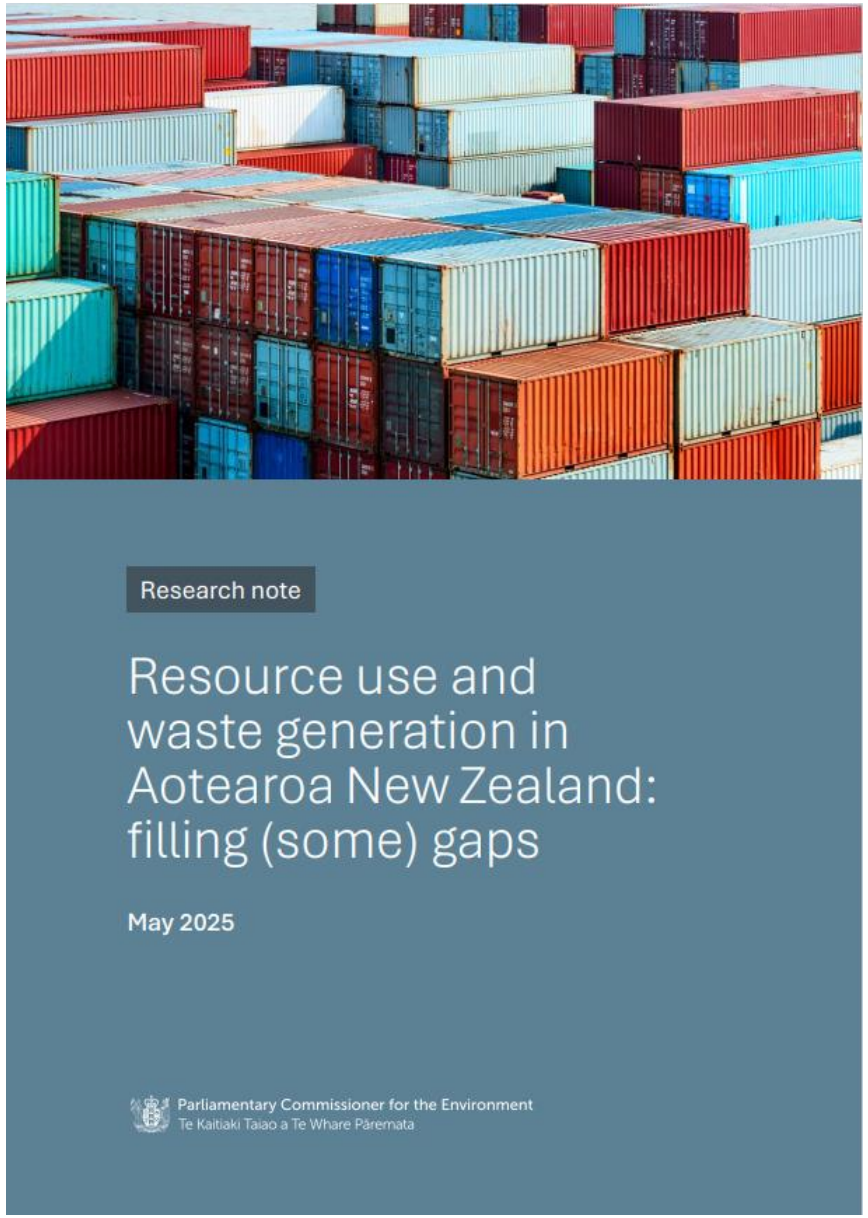
Data and knowledge gaps relate to water, soil and waste:

- Domestic extraction of biotic resources
  - Water abstraction
  - Soil (productive capacity, emerging contaminants, biological communities)
- Wastes, residues and pollutants
  - Quantity and composition of certain waste steams
  - Recycling rates

A recommendation

"Stats NZ should establish, and regularly update, a national material flows platform."

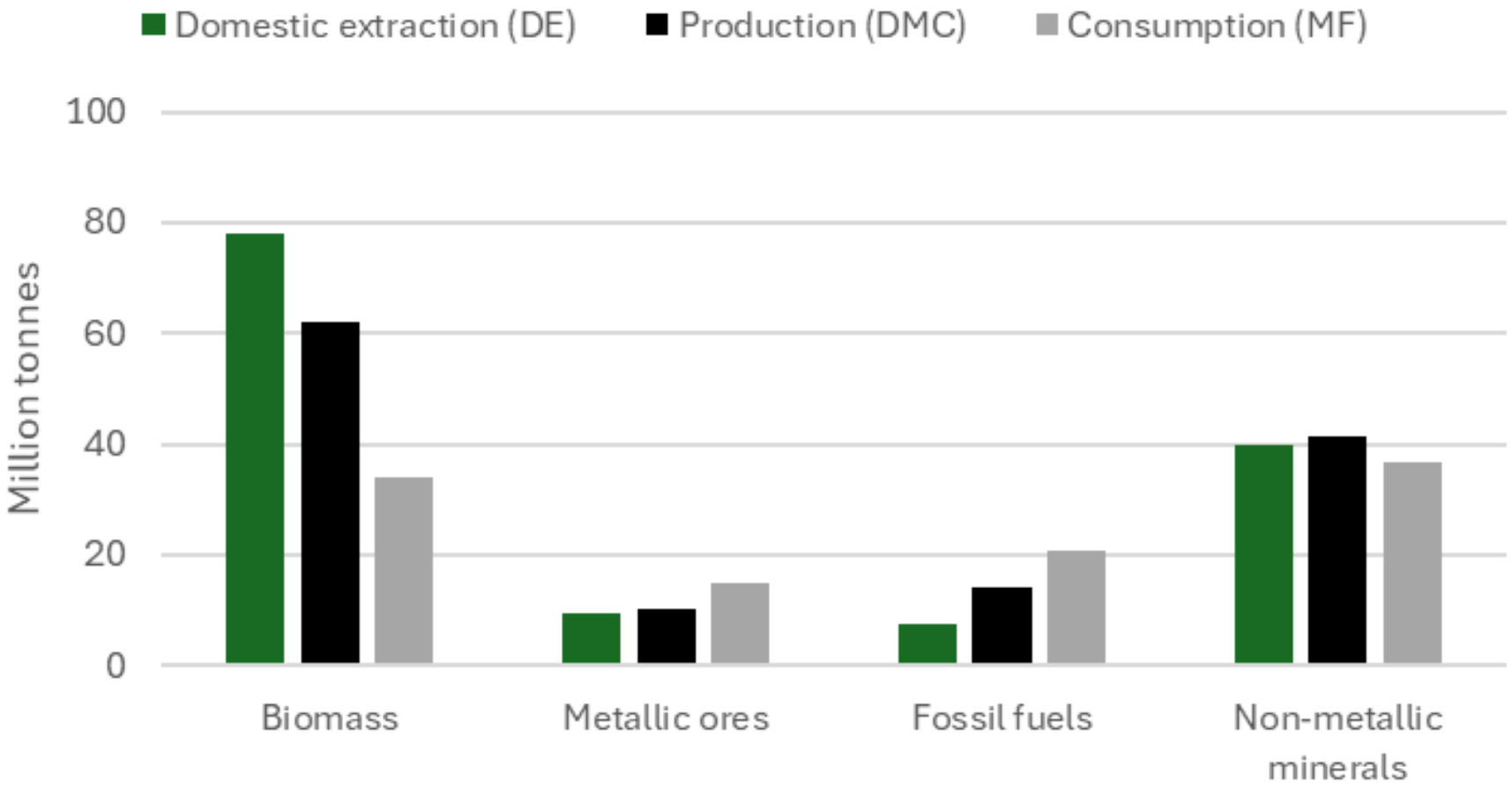
- Natural capital adjusted productivity measures
- Circularity analysis
- Environmental reporting



Insight 5:

Consumption-based analysis tells a different story

Production vs consumption-based resource use 2019



A ‘typical’ NZ lifestyle required 21 tonnes of natural resources in 2019

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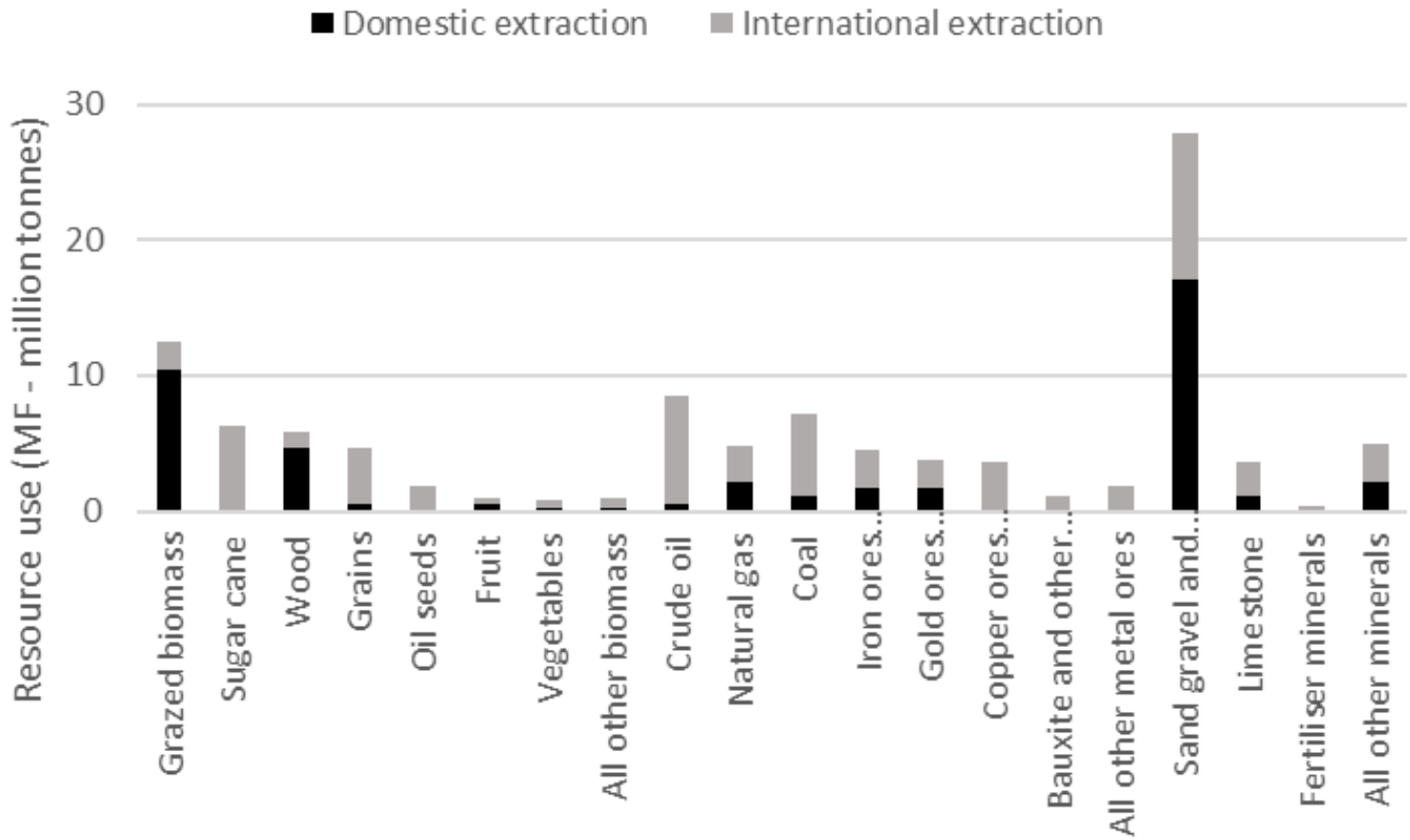
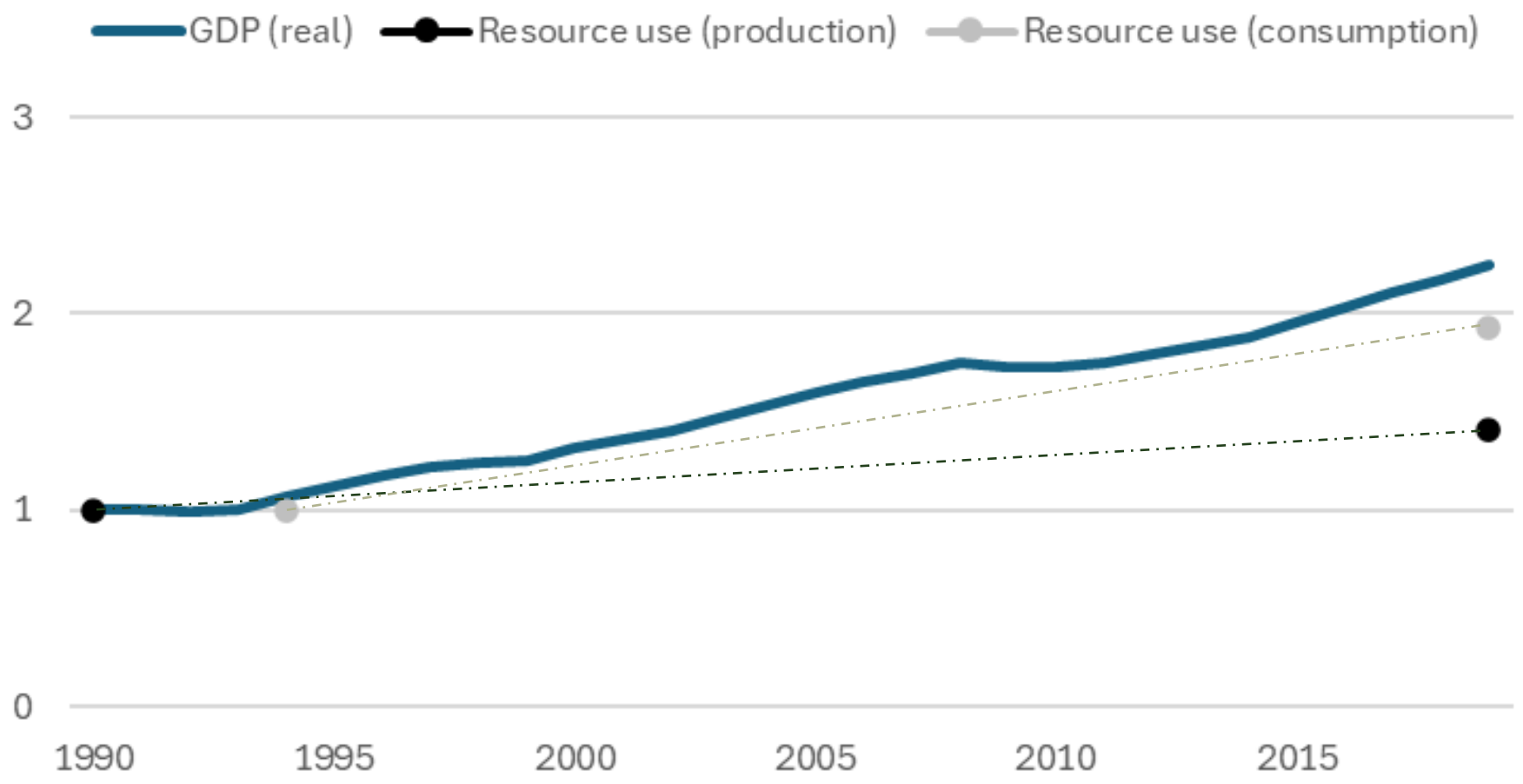
SENSE PARTNERS
DATA LOGIC ACTION

In 2019, 60% of New Zealand's resource footprint was extracted elsewhere



New Zealand decoupling: 1990 - 2019

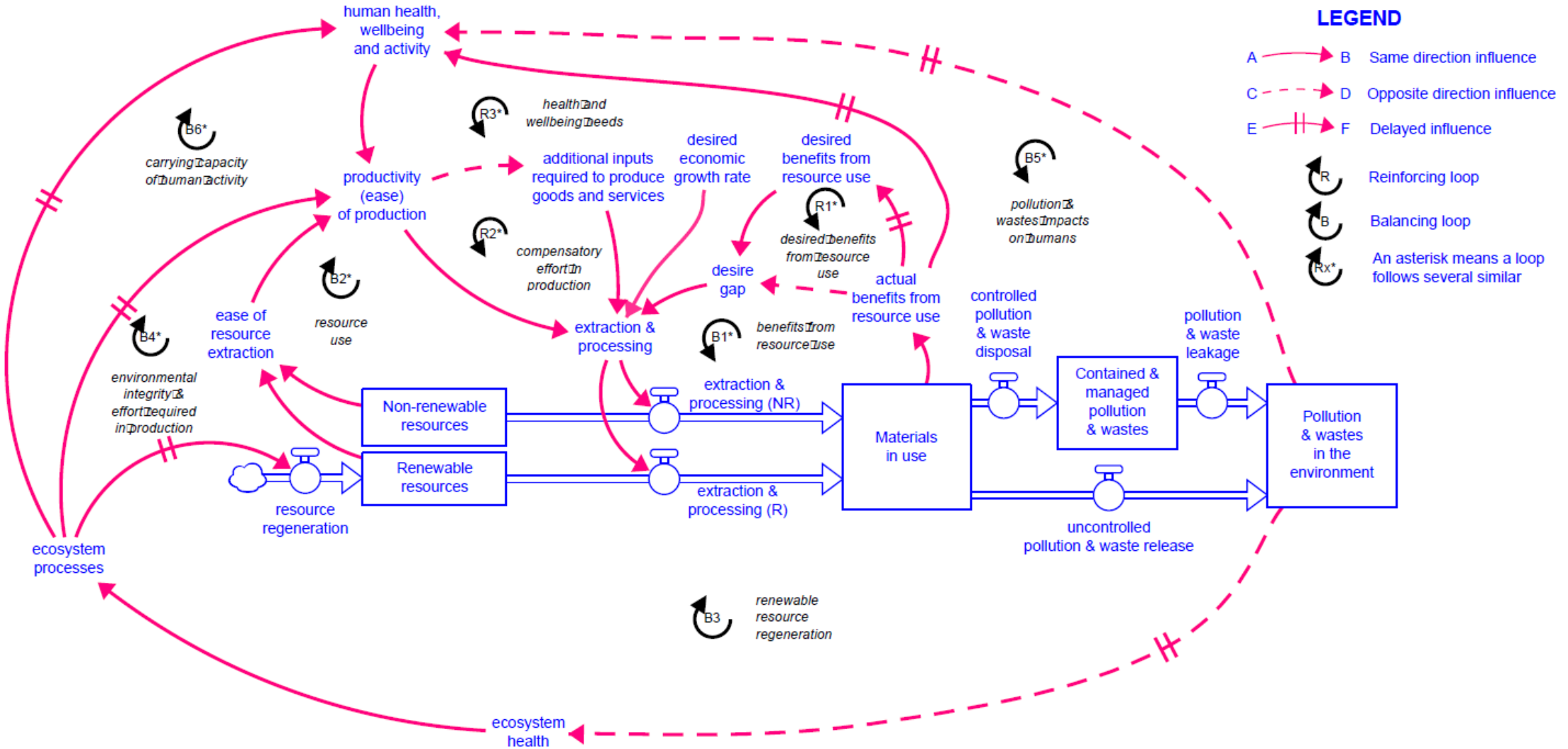


Source: PCE compilation

Insight 6:

Efficiency gains, substitution and pollution storage can help to reduce the impacts of growing resource use. But only so much...

How do resource use and waste flows translate into environmental pressures?



Capture and containment

Strategy 1:
Capturing or containing contaminants before/as they enter the environment:

- Landfill, e.g. containing household waste, also biosolids
- Wastewater treatment plant, e.g. filtering human waste, including hormones
- Carbon capture and storage (CCS), e.g. capture of CO2 from large point-source and then stored in deep geological formation

Substitution

Strategy 2:
Substitution of one resource with another (less polluting/damaging one):

- Invention of the plastic bag in 1965 by a Swedish firm
- Rapidly replaced cloth and paper bags across Europe
- Plastic bag was invented to replace single-use paper bag associated with deforestation in Europe

There are often unexpected consequences of doing well-intentioned things.

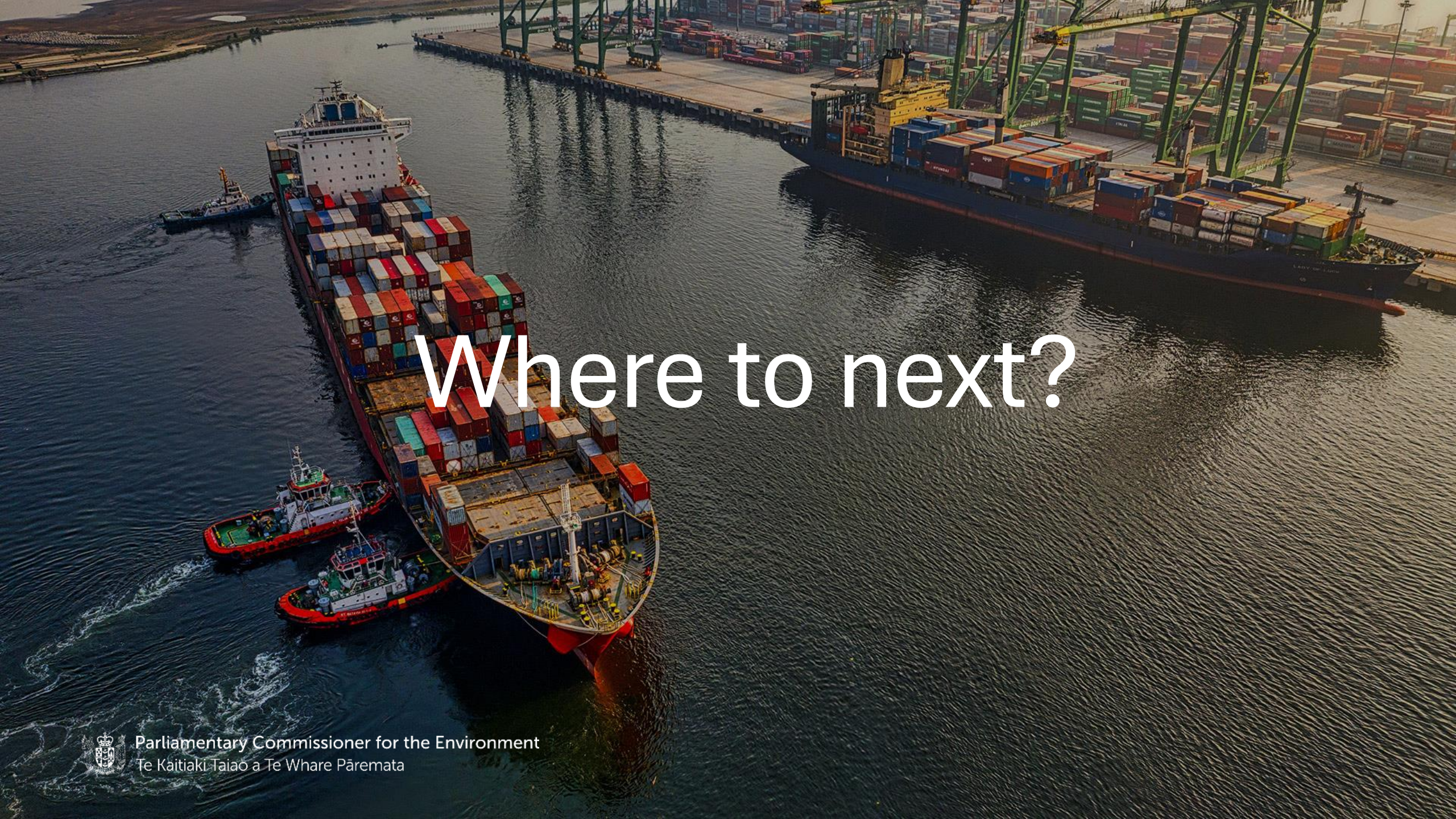
The limits to efficiency gains

Strategy 3:
Improving efficiency to reduce use:

- Improved efficiency of air-conditioning has made it cheaper to produce A/C units and to run them
- More people buy A/C units and run them for longer
- While individual A/C units use less electricity, the total amount of electricity used to cool buildings has increased

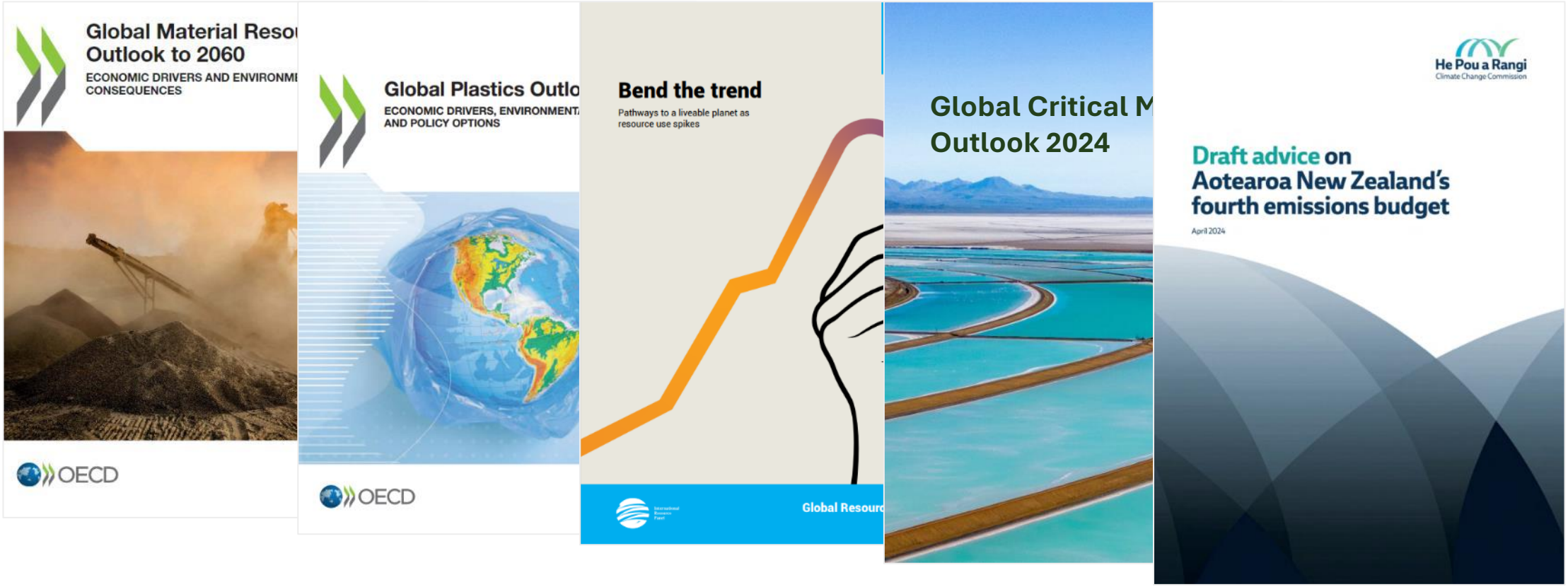
Other insights

(from material specific research)



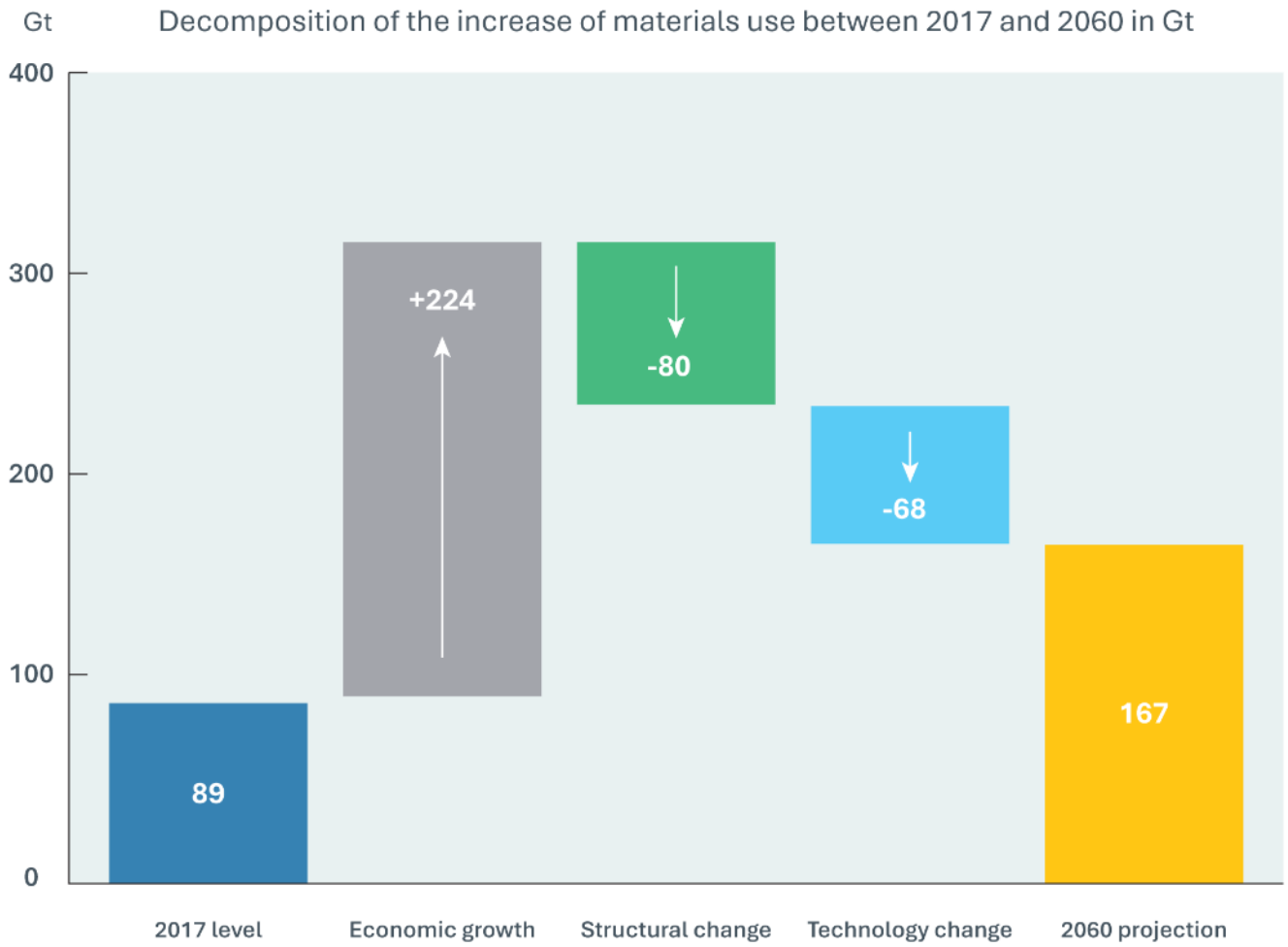
Where to next?

There are lots of global modelling exercises on the future of natural resource use



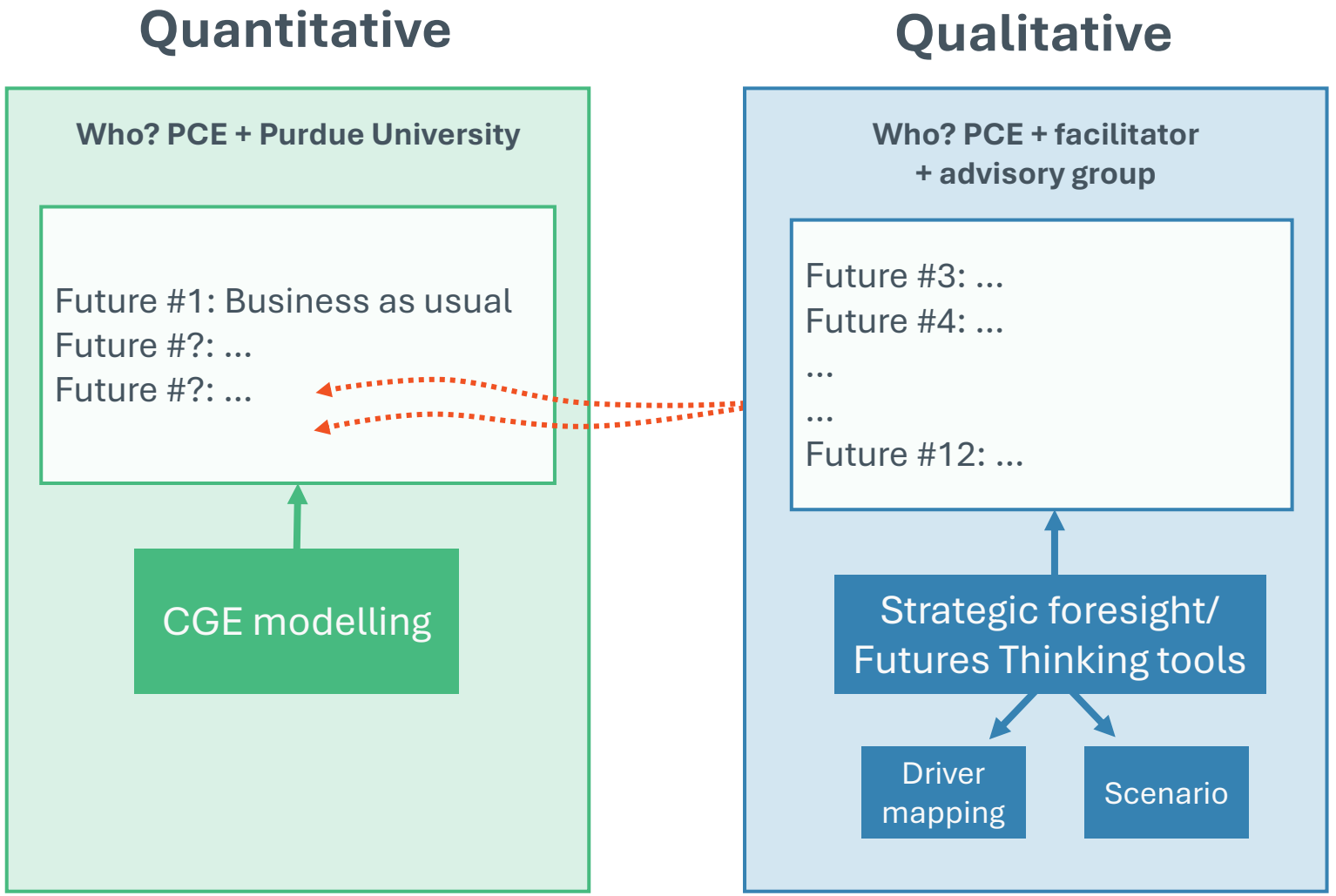
Global resource use is expected to increase, mostly due to economic growth… but there is no New Zealand specific result.

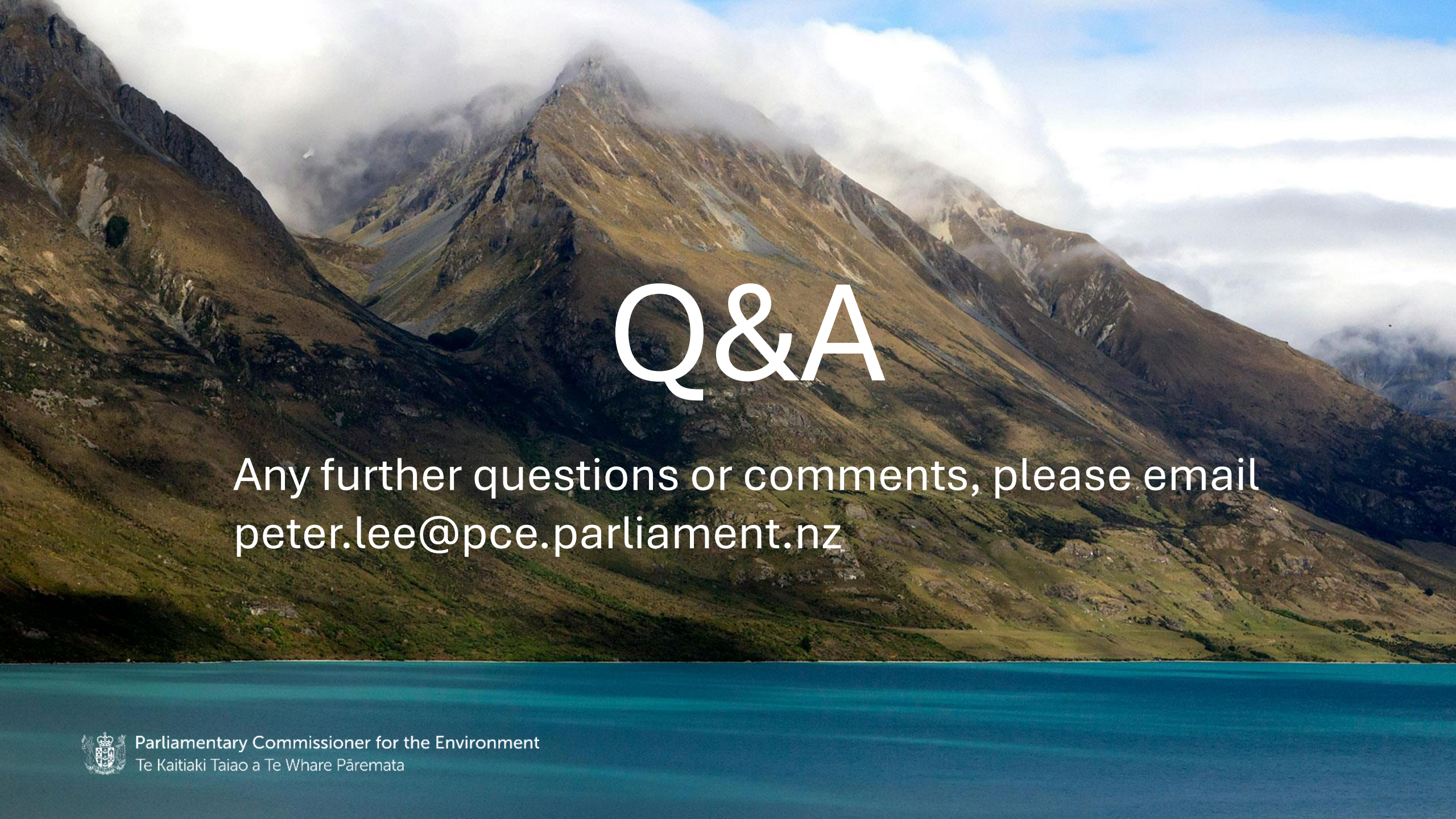
Figure 1.2. Structural and technology change is projected to slow down the growth in materials use



Source: OECD (2019)

We want to fill this gap next through a mix of quantitative modelling plus scenario development.





Q&A

Any further questions or comments, please email peter.lee@pce.parliament.nz