Power up Canterbury: threats to and opportunities for a sustainable energy future

Mike O'Connell
Energy Policy Analyst

Presentation – EMAN 410 Seminar Series
University of Otago

Friday 15th August 2008

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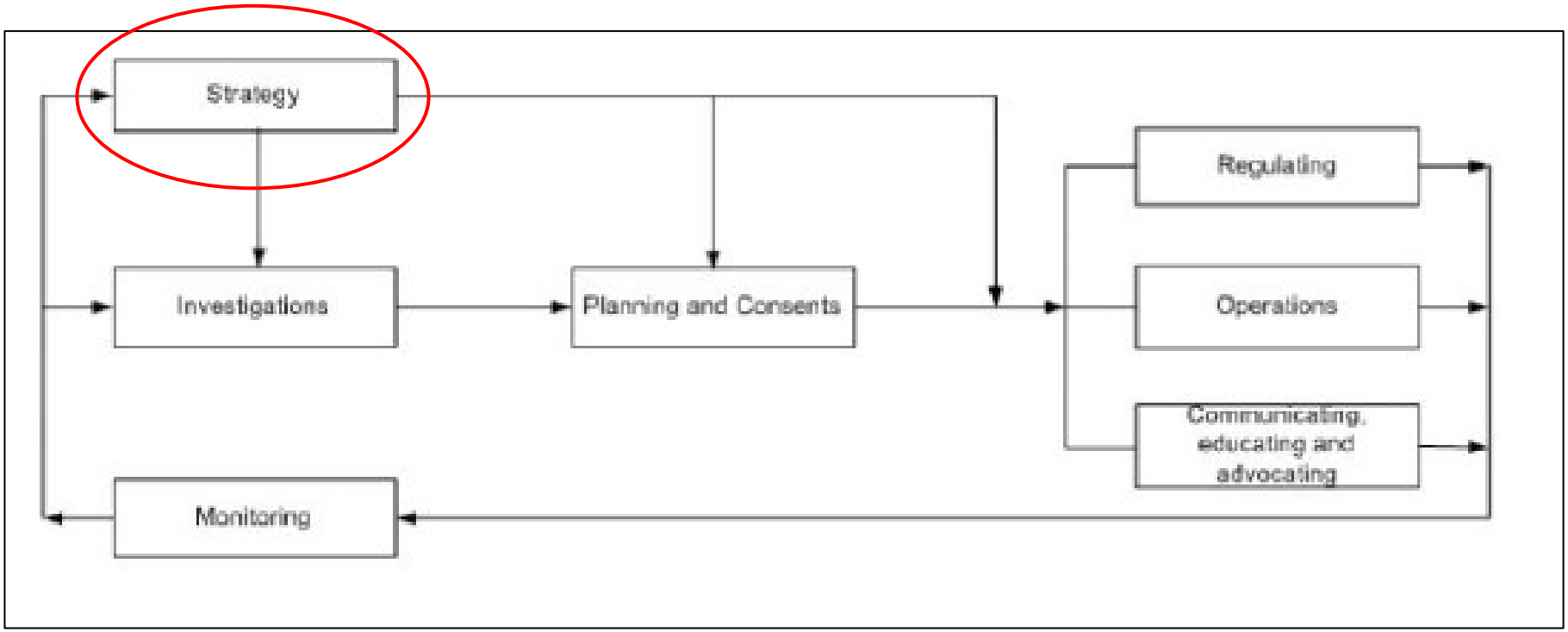

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Bigger Picture

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CO2
© Seppo Leinonen, seppo.net

10 Newly Released Global Statistics to Make You Think.

- 80% of the original forests are gone
- 25% of mammal species are threatened
- 50% of all mangroves are gone
- 10% of bird species is threatened
- 50% of the words coral reefs is in danger
- 50% less freshwater fish
- 70% of sea fisheries are over-fished or have completely collapsed
- 60% of the worlds largest rivers are dammed or diverted
- 50% of all wetlands have gone
- 67% of all farmland is degraded
- **50% extinction probability for humanity**

Maud Island frog.

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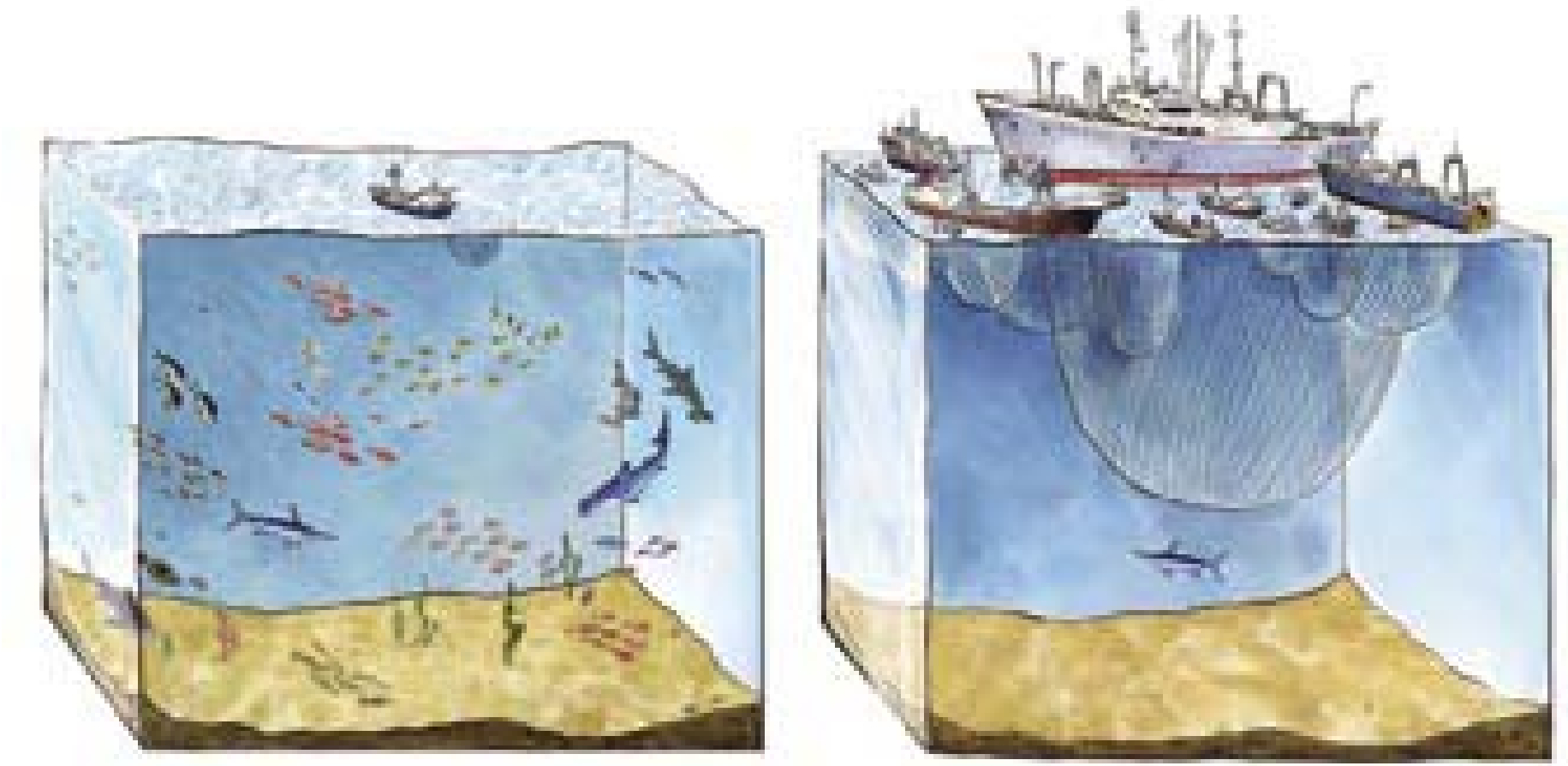
Source: World Watch Institute, Vital Signs, 2007

Energy use...or abuse?



Source: Herman E Daly, Scientific American, Sep 2005

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‘Tectonic Stresses’

Energy - increasing scarcity of conventional oil

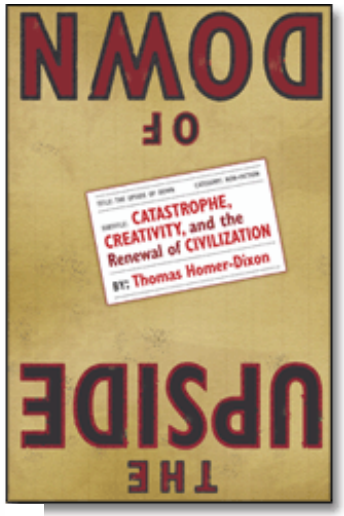
Environmental (ecosystem degradation)

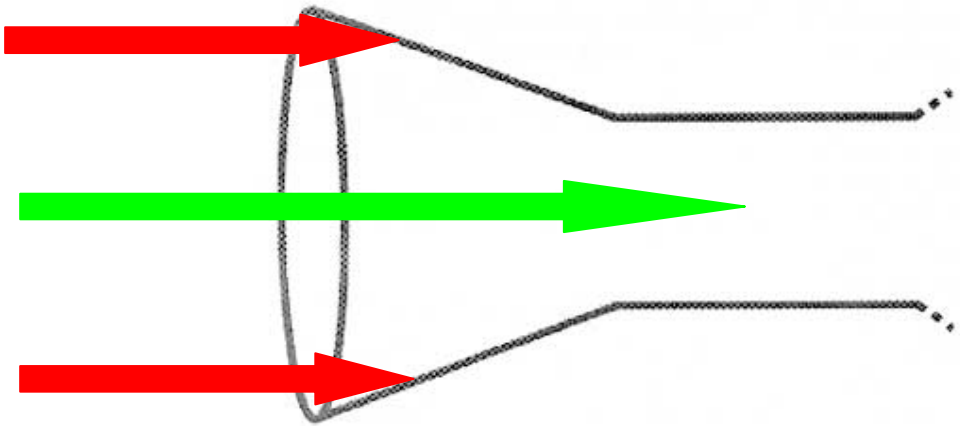
Climate

Economics (North vs. South disparity)

Population

Thomas Homer-Dixon, The Upside of Down





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The energy problem (I)

'...Any intelligent fool can make things bigger, more complex, and more violent. It takes a touch of genius – and a lot of courage – to move in the opposite direction'

Albert Einstein

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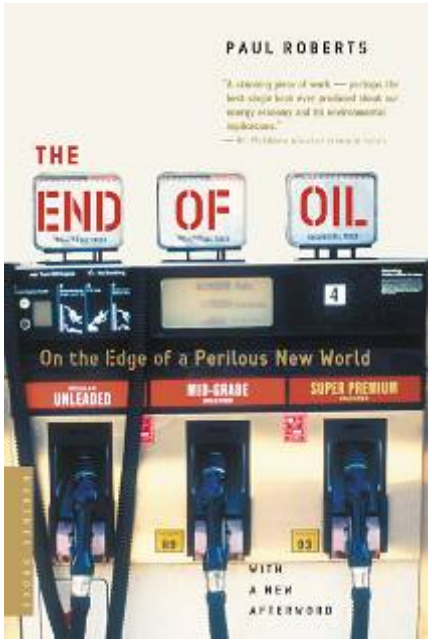
The energy problem (II)

'...*we are not only ignorant of what energy is, and the critical role it has played and continues to play in economics and politics, but most of us simply don't care about energy*'



Paul Roberts, 'The End of Oil', 2004

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Energy ‘threats’

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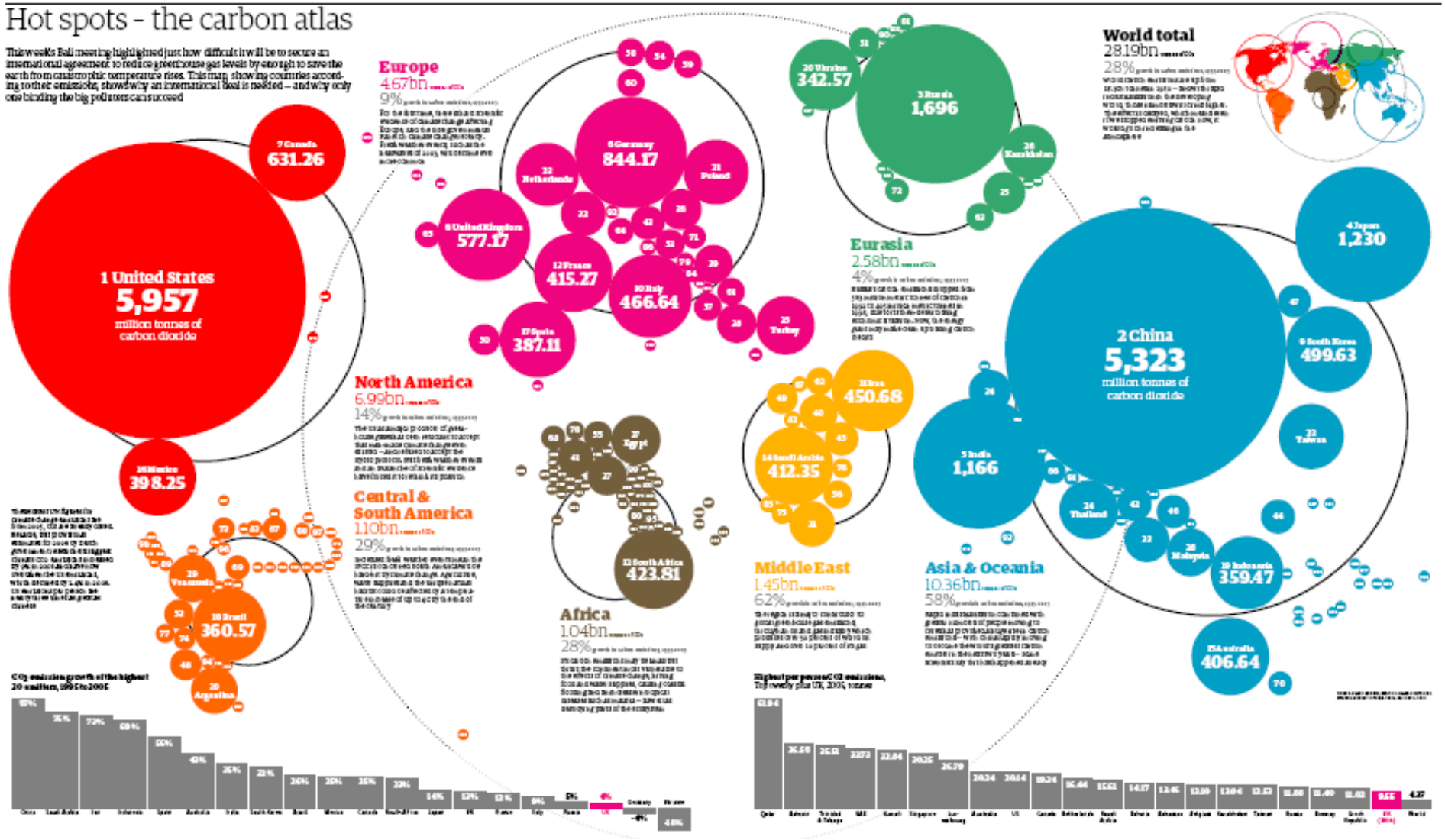

Source: The Guardian (UK) – data sourced from Energy Information Association

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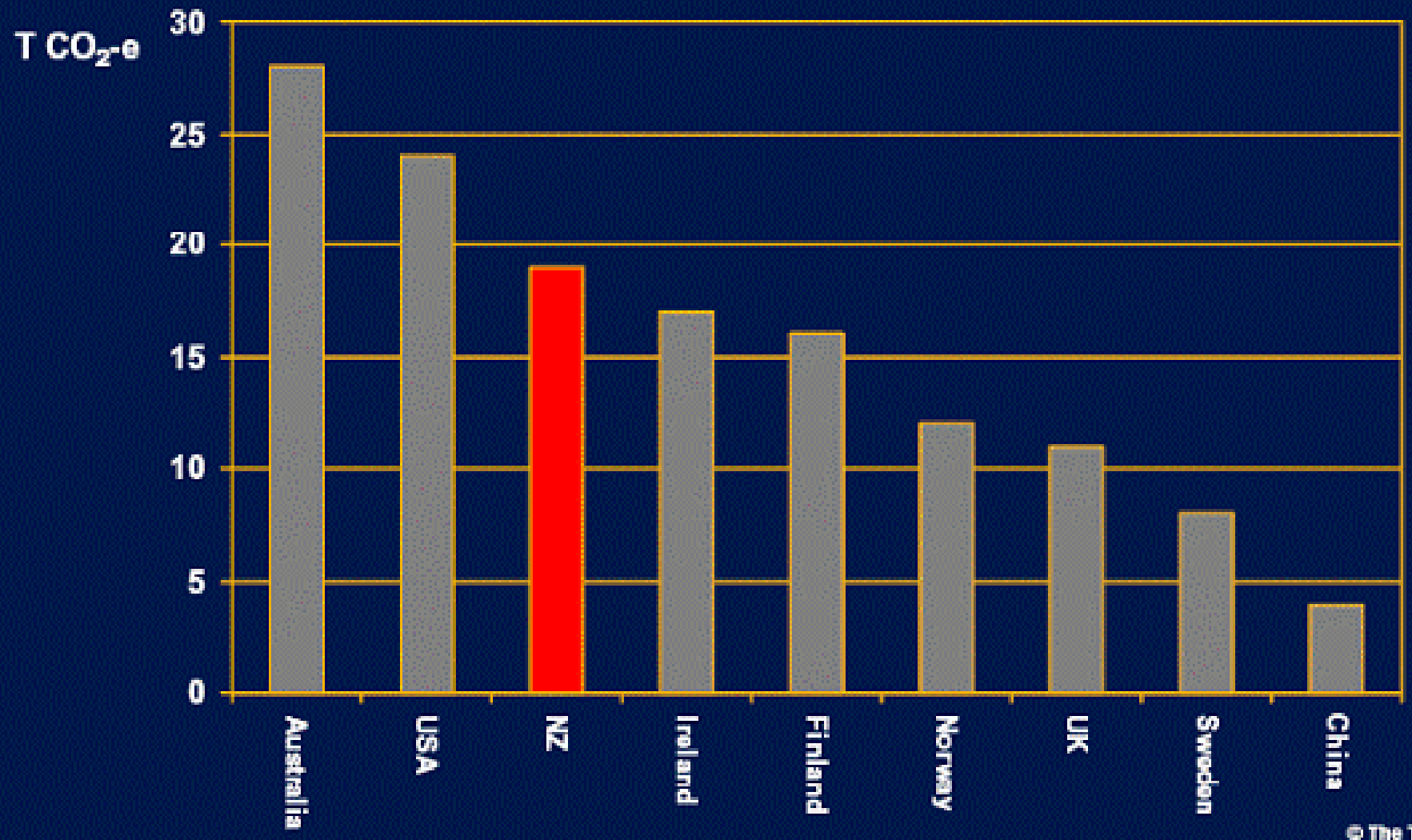
Per capita emissions

Source: World Resource Institute (WRI)

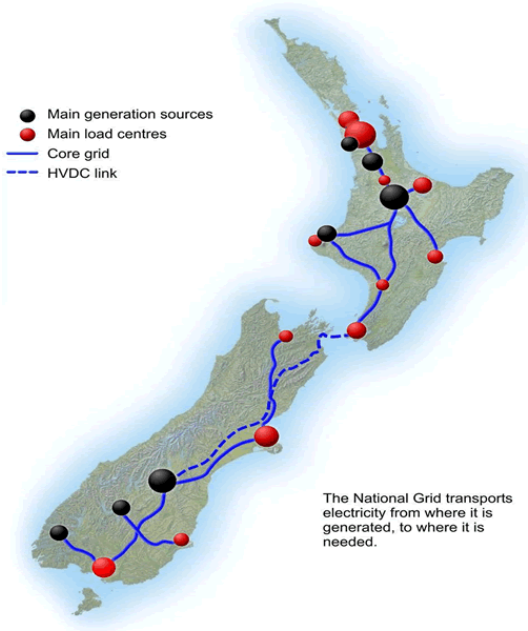


A need to...

- Reduce greenhouse gas emissions
- Reduce dependence on imported fossil fuels
- Decouple energy use (and high energy intensity) from GDP

Nationally - *"Towards a sustainable low emissions energy system"* (**New Zealand Energy Strategy – Dec 2006)**

Regionally – *"A sustainable, affordable reliable and secure energy system"*



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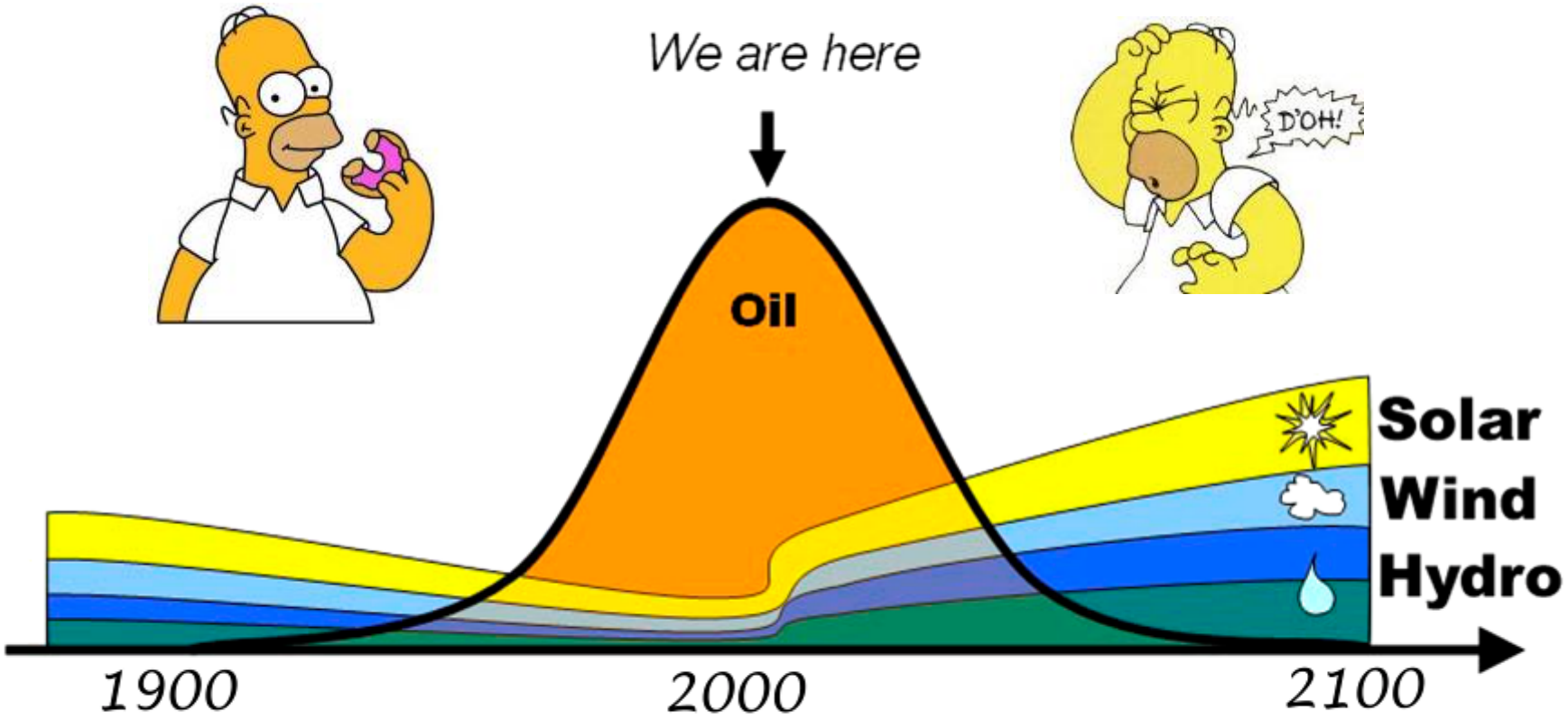

We are here
D'OH!
Oil
Solar
Wind
Hydro
1900
2000
2100

National Research FLAGSHIPS CSIRO

**PEAKING OF WORLD OIL PRODUCTION:
IMPACTS, MITIGATION, & RISK MANAGEMENT**

Robert L. Hirsch, SAIC, Project Leader
Roger Bezdek, MISI
Robert Wendling, MISI

February 2005

House of Commons
All Party Parliamentary Group on Peak Oil

and

reset
Renewable Energy • Shelter • Environment Training

The Impact of Peak Oil on International Development

June 2008

Registered Office: 20 St Leonards Bank, Edinburgh EH8 9SD

Griffith UNIVERSITY

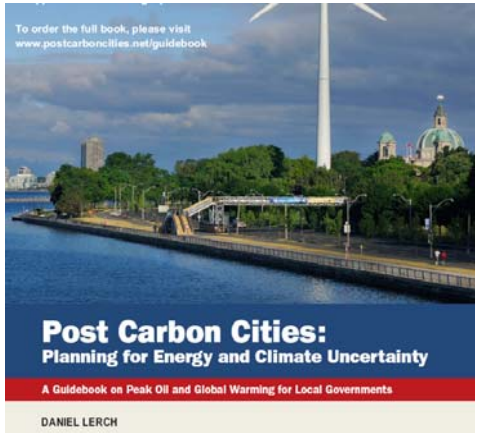
**Shocking the Suburbs:
Urban Location, Housing Debt and
Oil Vulnerability in the Australian City**

Jago Dodson and Neil Sipe

**Peak Oil Production and the Implications to the State of Connecticut
Report to
Legislative Leaders and the Governor**

"We've got 85 million barrels of (global) supply and 88 million barrels of demand."
T. Boone Pickens

"Demand will be going up, but it will be constrained by supply. I don't think we are going to see the supply



Post Carbon Cities:
Planning for Energy and Climate Uncertainty

A Guidebook on Peak Oil and Global Warming for Local Governments

DANIEL LERCH

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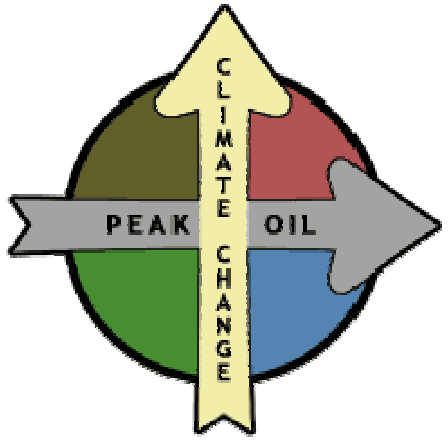
ECan 'position' on Peak Oil

Climate Change and Peak Oil – Key issue:

Climate change and Peak Oil impacts may have major impacts for the environment, and on the social and economic wellbeing of the Canterbury region



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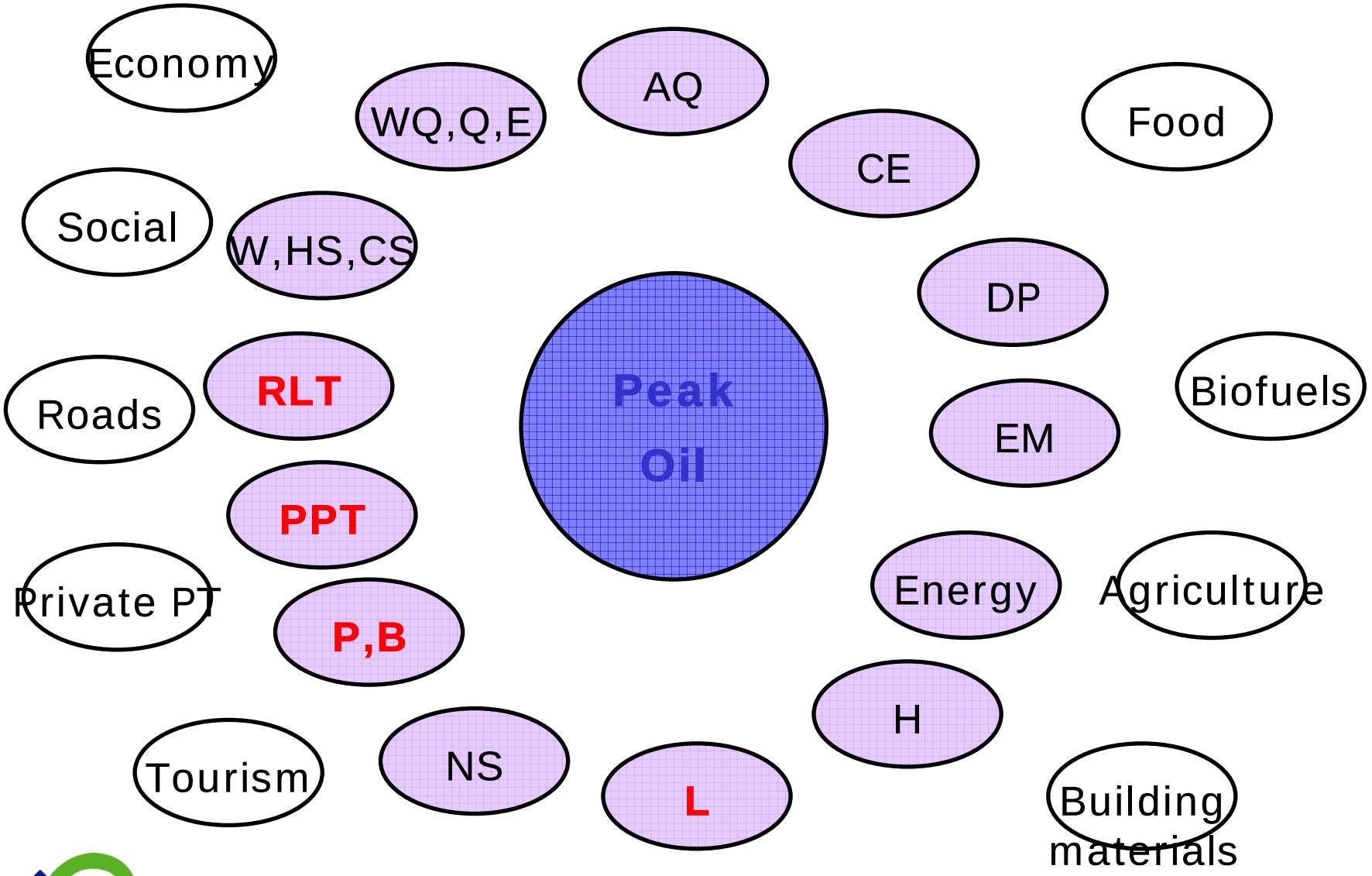
ECan Portfolios - wider potential impacts of Peak Oil



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NZ Peak Oil 'studies'

- **Dunedin City** - Peak Oil: The Role of Local Authorities in Powering Down to the Solar Age – Leah McBey (former Cr) (Mar 06)
- **Wellington City** - Oil Prices and 'Peak Oil': Council Response (Aug 06)
- Energy Risk to Activity Systems as a Function of Urban Form – Dantas, Krumdieck and Page - *LTNZ research report 311* (Mar 07)

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Energy ‘opportunities’

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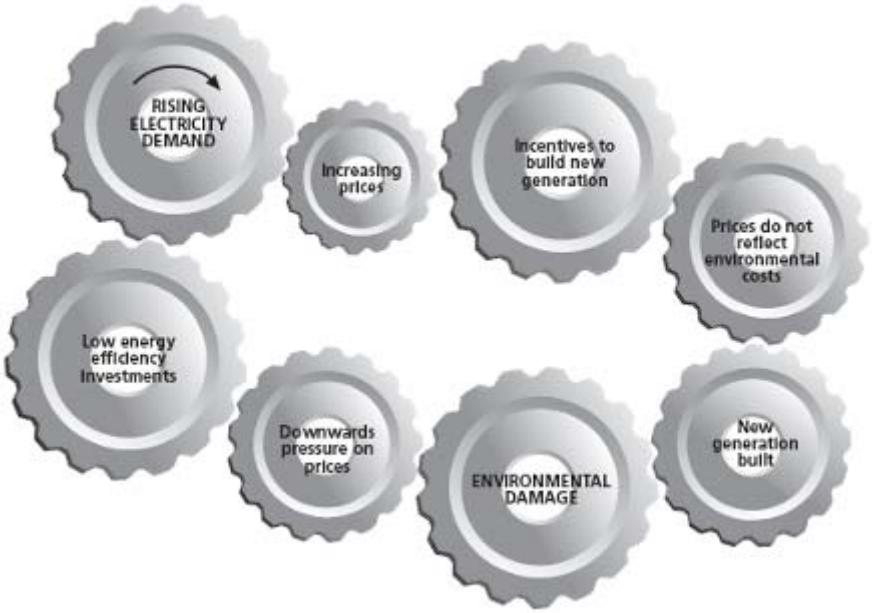

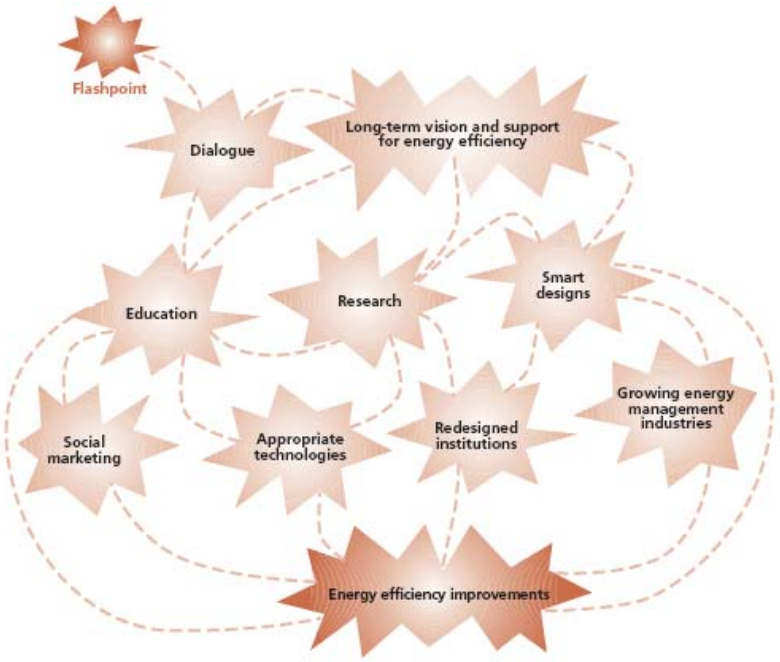

Fuelling the future

Sparking new designs

Acknowledgements: Future Currents (PCE (2005)

Just what is energy?

‘Energy’ - and energy policy development - is considered to encompass:

- All primary energy sources
- All consumer energy
- All energy requirements and services
- Design / performance of energy systems
- Rules, regulations, plans

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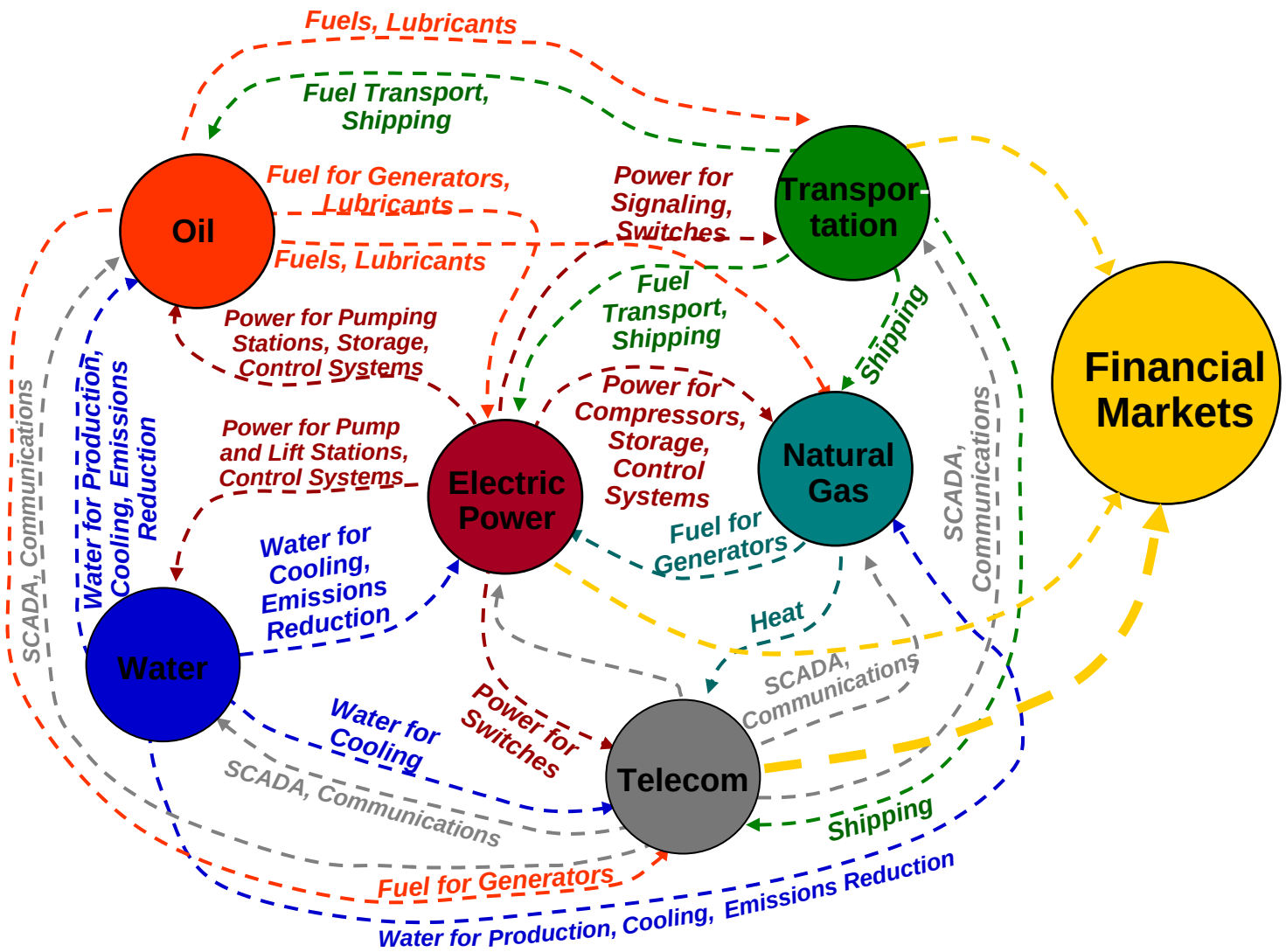
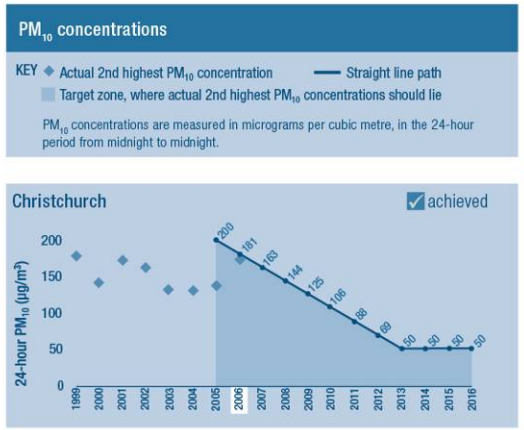


O'Rourke from Peerenboom, Fisher, and Whitfield, 2001

Energy Issues

- Electricity importing (thermal)
- Transmission
- X-portfolio (AQ, water)
- Fuel poverty
- Transport CO_2
- Renewable energy and the RMA
- Summer grid load – *irrigation*
- Peak Oil



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Emerging inter-relationship issues

Residential housing

- 80,000 homes in Canterbury 'below standard'
- Regional investment – insufficient and lack clarity of purpose
- Most retrofit packages limited to insulation
- Perverse outcomes

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Equity and other issues

- **Clean Heat Project**– an excellent model but…approx. 70% ratepayers don't benefit
- Closing the gap between air quality and energy policy
- NZ has a 'cult of cold'
- **Fuel poverty** – '*a cutting edge issue*'
- Need for a Warm Homes Standard?

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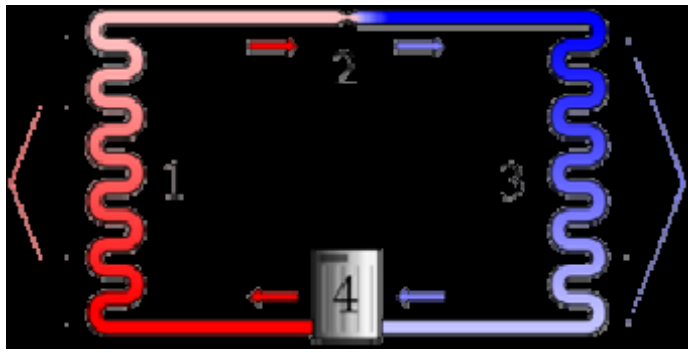
Air quality…or energy efficiency problem?

- Increased use of heat pumps – increased demand on grid?
  - ECan BRANZ study
- The role of wood (waste) for space heating
  - Better matching fuel type with energy service
- Resilience
  - E.g. pellet fires require electricity



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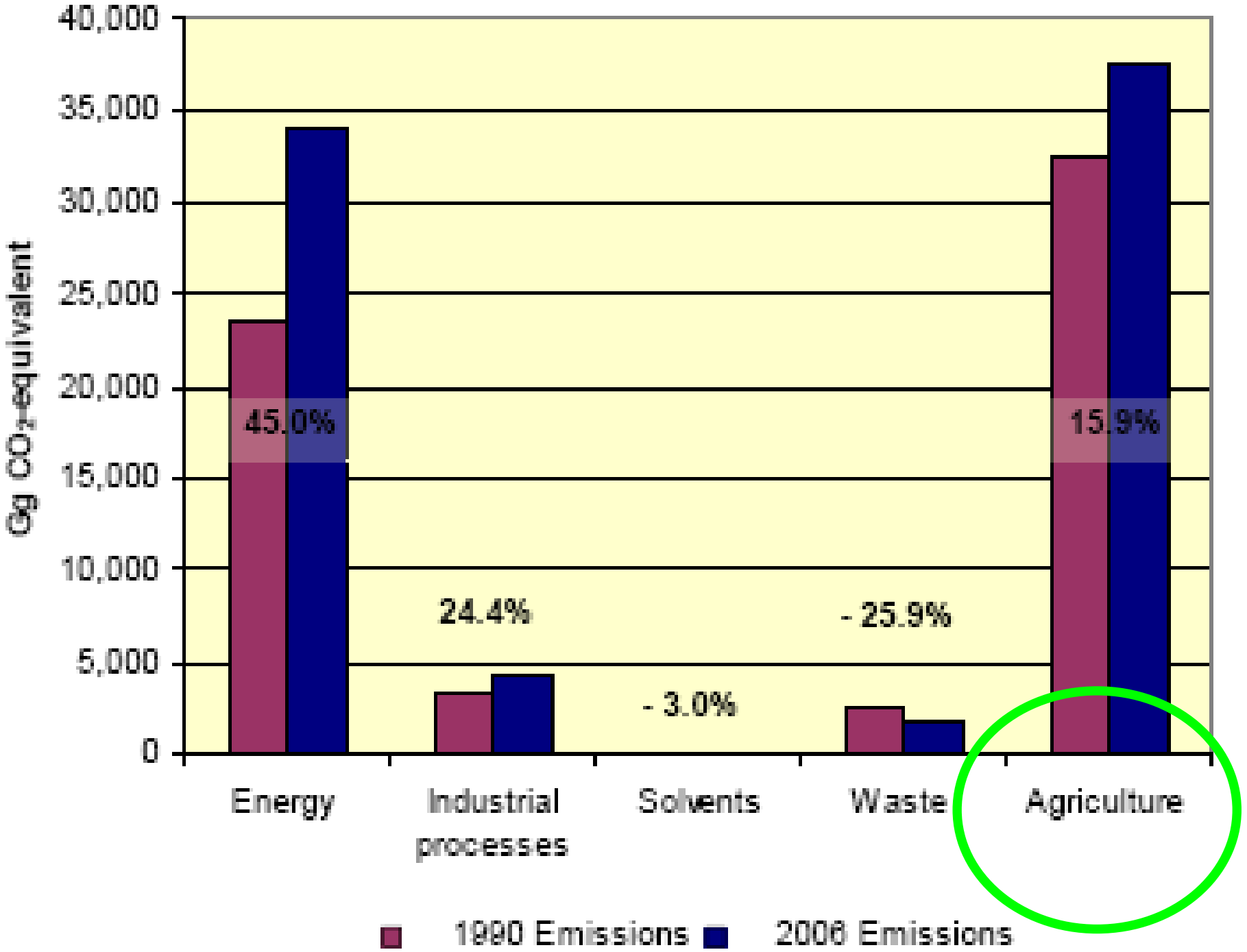
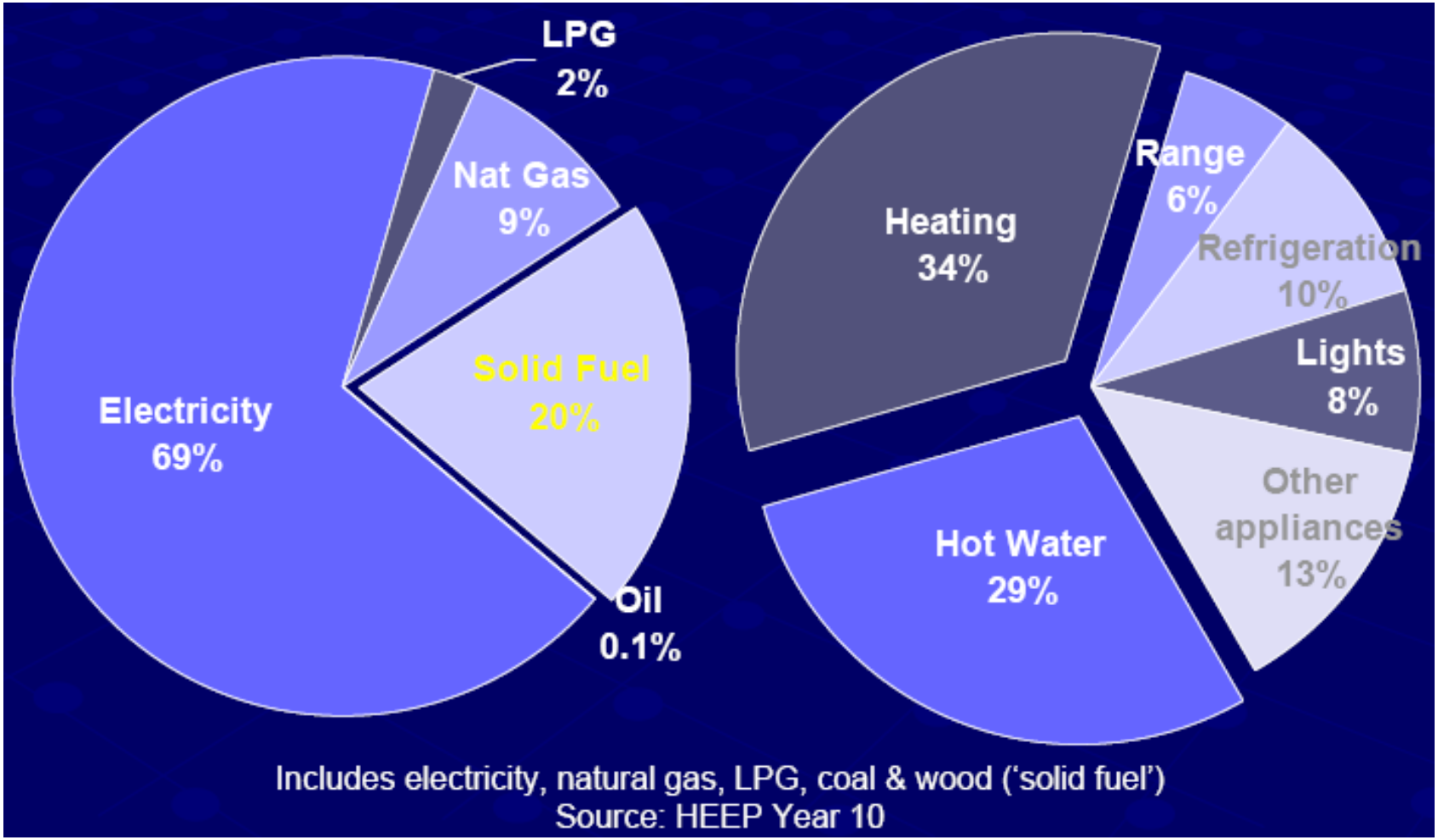

40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
Gg CO_2-equivalent
45.0%
24.4%
- 3.0%
- 25.9%
15.9%
Energy
Industrial processes
Solvents
Waste
Agriculture
1990 Emissions
2006 Emissions

Energy (residential) end use



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‘Wretched energy guzzlers’

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It gets worse...

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This?

- Globalisation
- Business As Usual
- Environmentalism
- Products
- Cradle to grave
- ‘Fast’
- Standard of living
- Consumerism (wants)
- End of pipe
- Active

...Or this?

- Localisation
- Eco-centric business
- Environ. stewardship
- Services
- Cradle to cradle
- ‘Slow’ (stability)
- Quality of life
- Meeting needs
- Aspect and design
- Passive

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How about this instead?!

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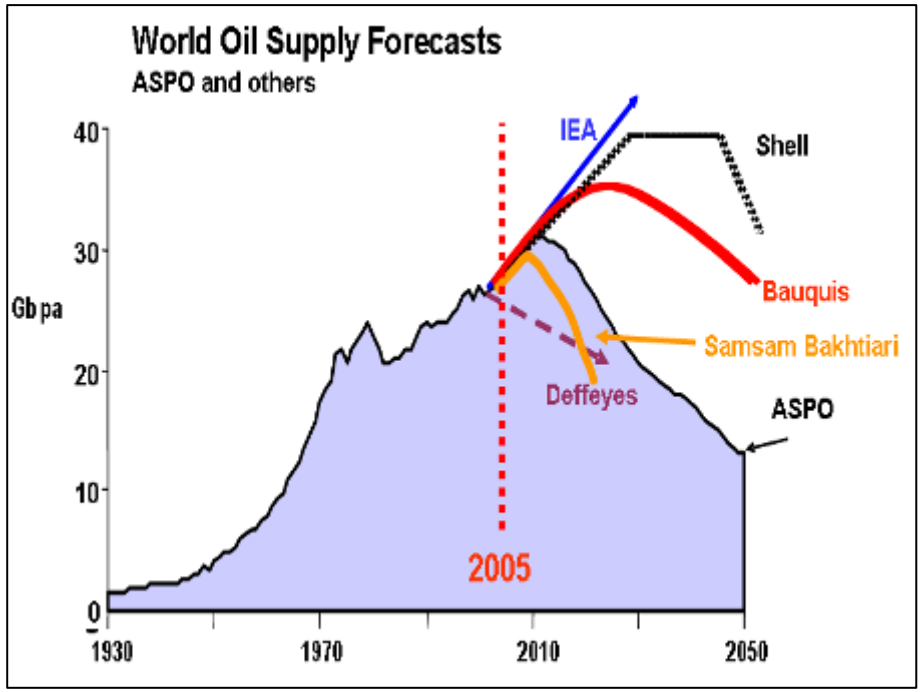
Investigations...e.g. Peak Oil and climate change effects: Issues facing Environment Canterbury



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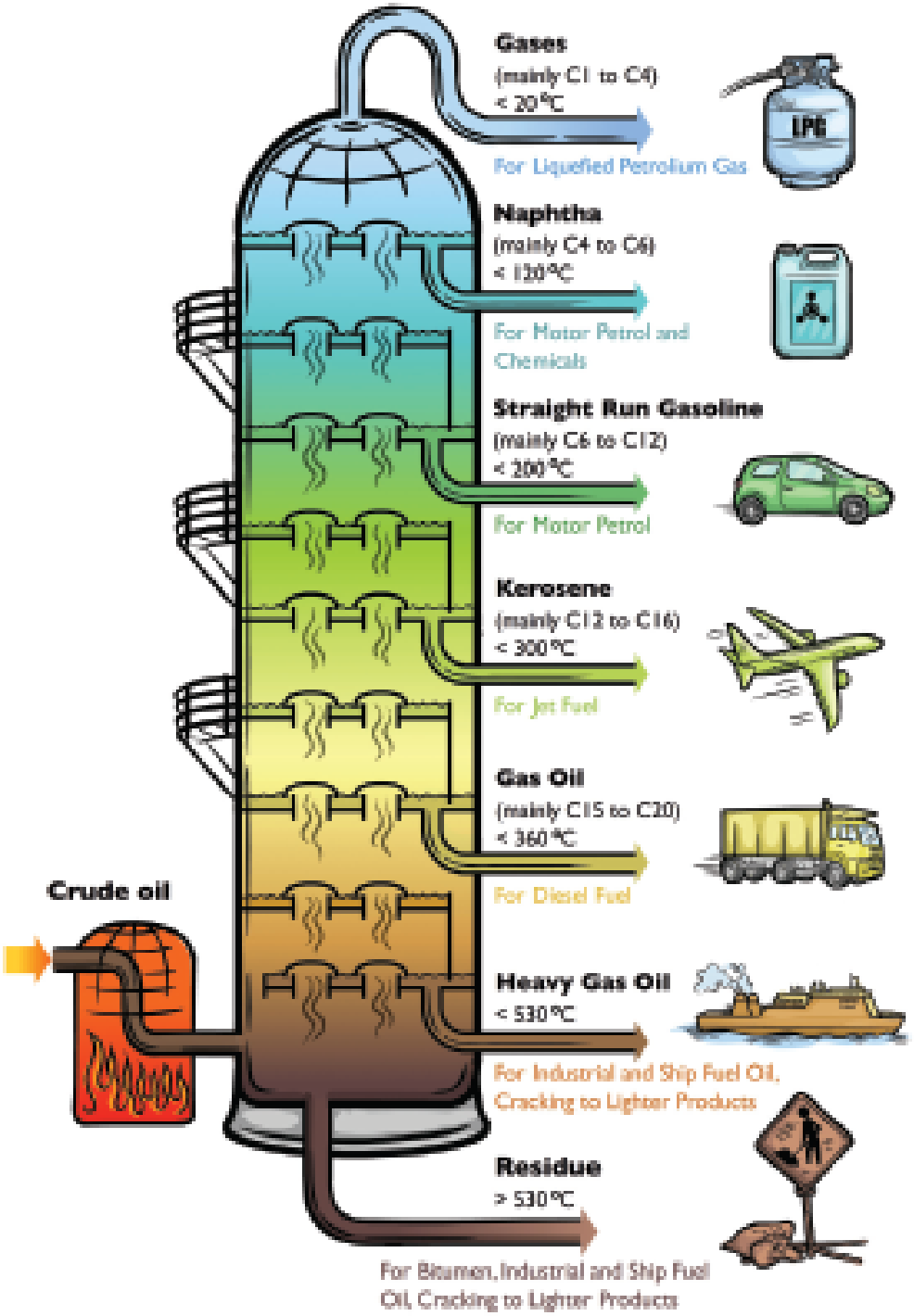
The importance of oil to NZ



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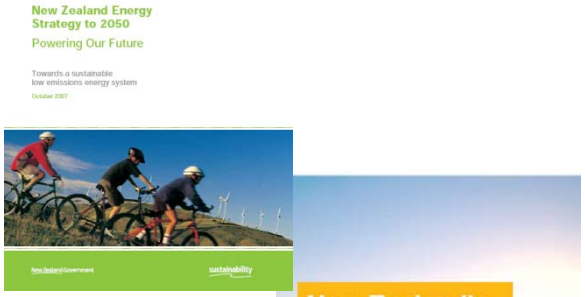
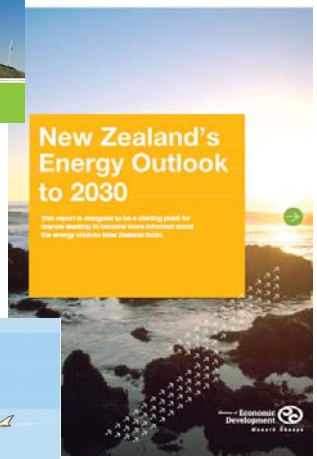
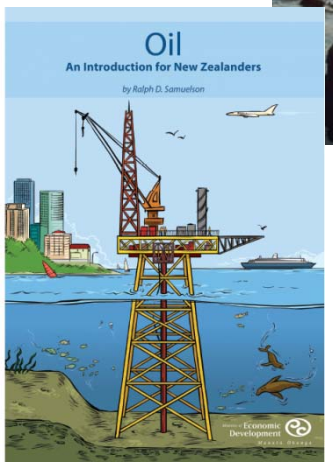
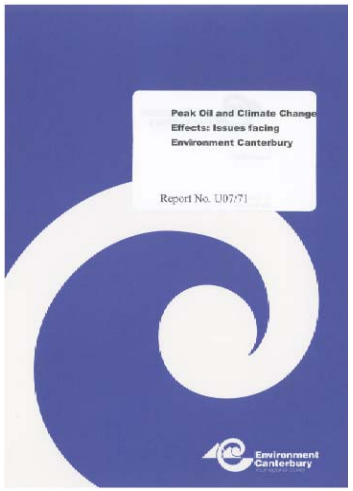
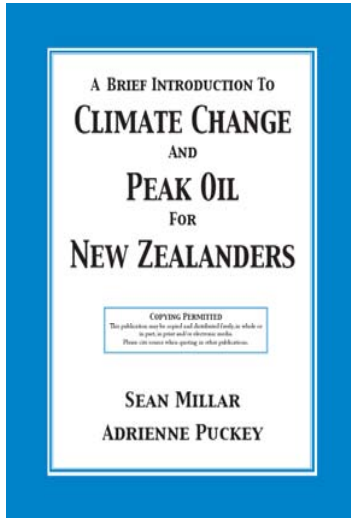
Our response to oil depeletion?

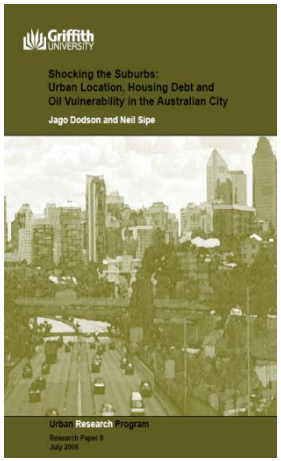


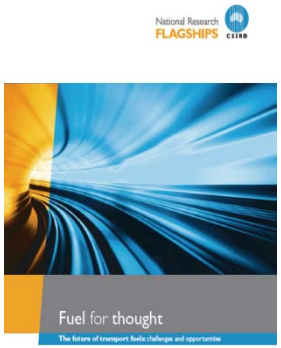












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NZ (and Canterbury) vulnerability

- AGRICULTURE - strongly oil-dependent - 10:1 Energy / Food-energy
- EXPORTING - (meat, milk, timber, etc.) - escalating costs of long-haul transport
- TOURISM - long-haul transport costs
- TRANSPORT - rising costs of private motoring, public passenger network, roading and maintenance, etc

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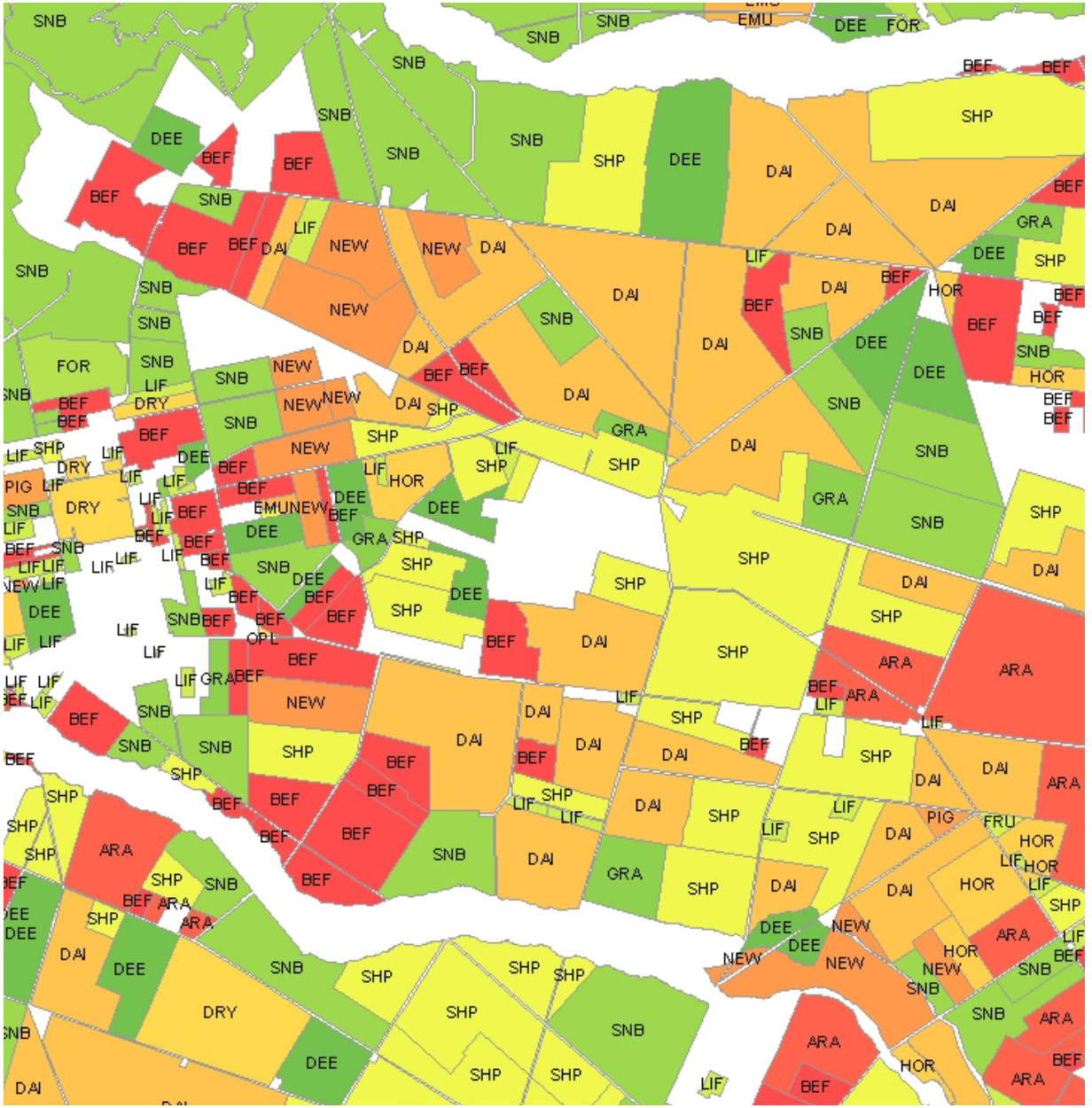

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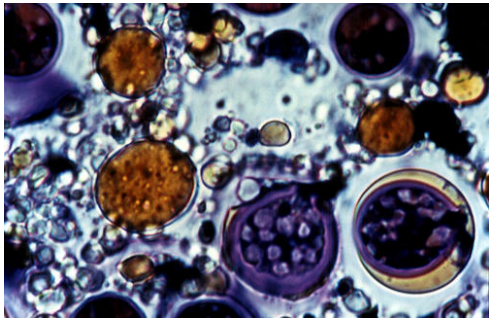
Food...or fuel?



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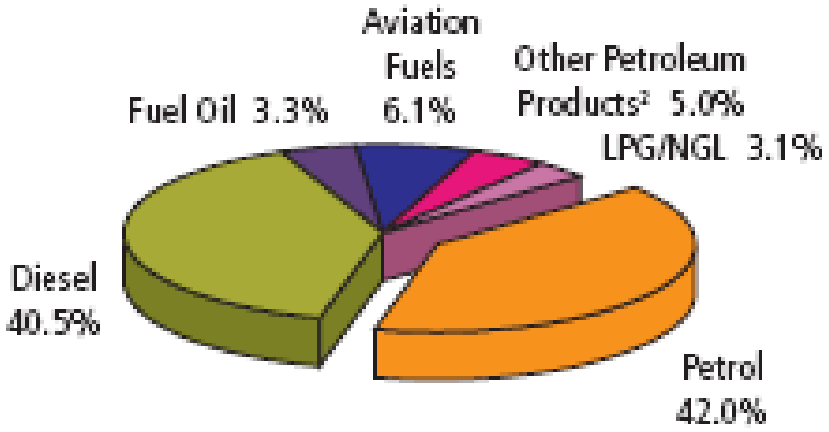
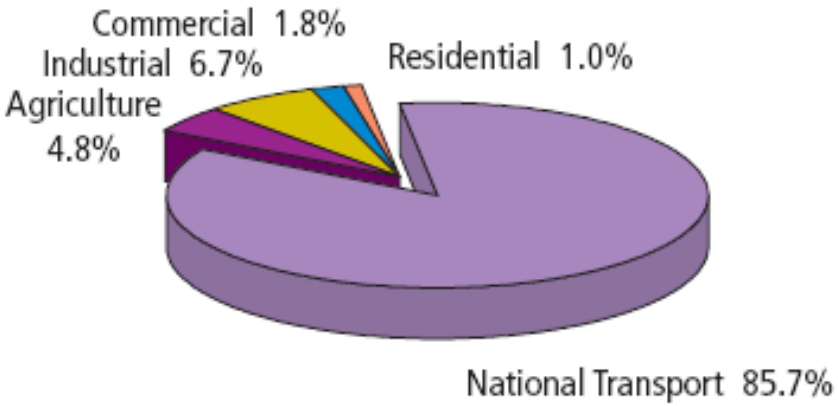
NZ oil consumption by product and sector





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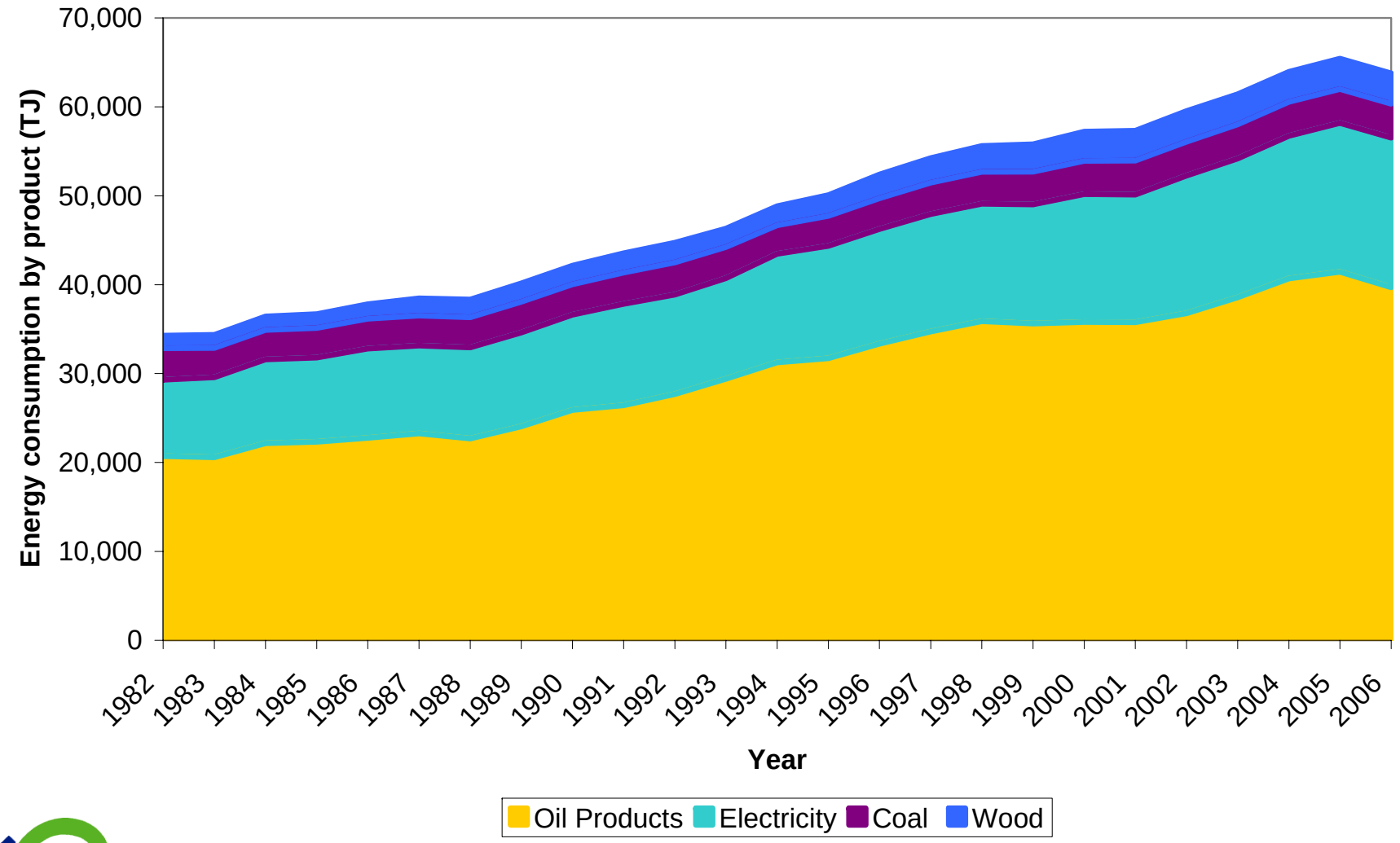
Monitoring – biennial regional energy survey



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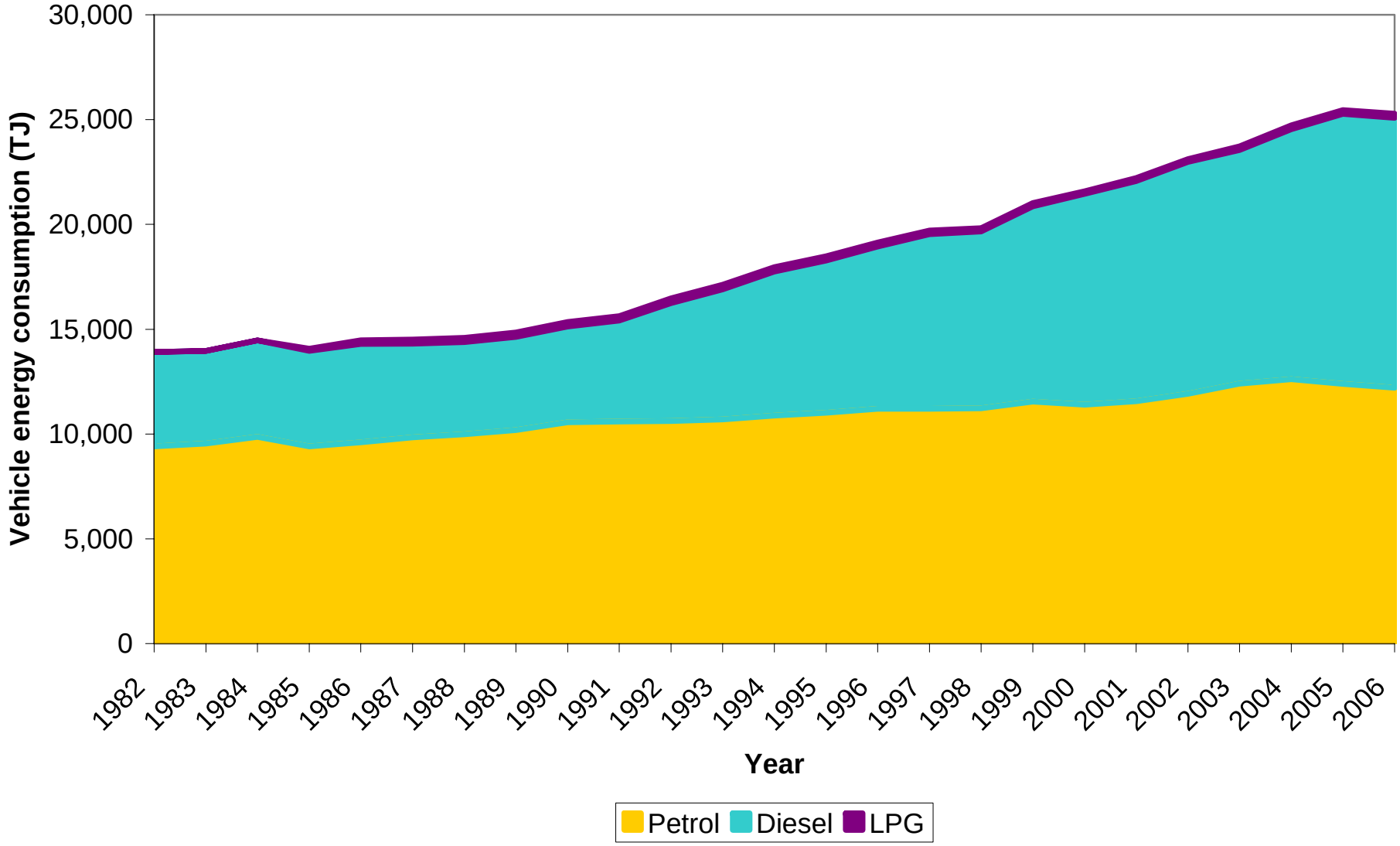
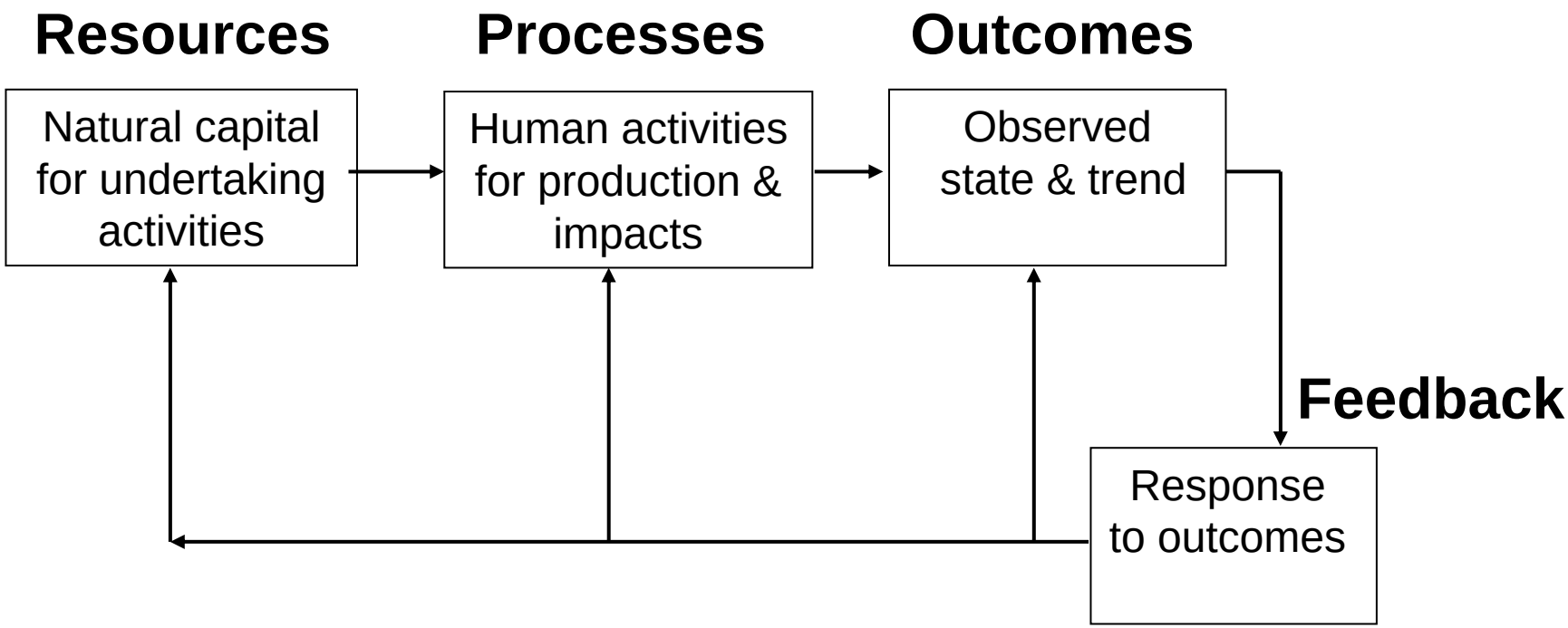
Canterbury vehicle energy product by consumption



Regional Environment Report



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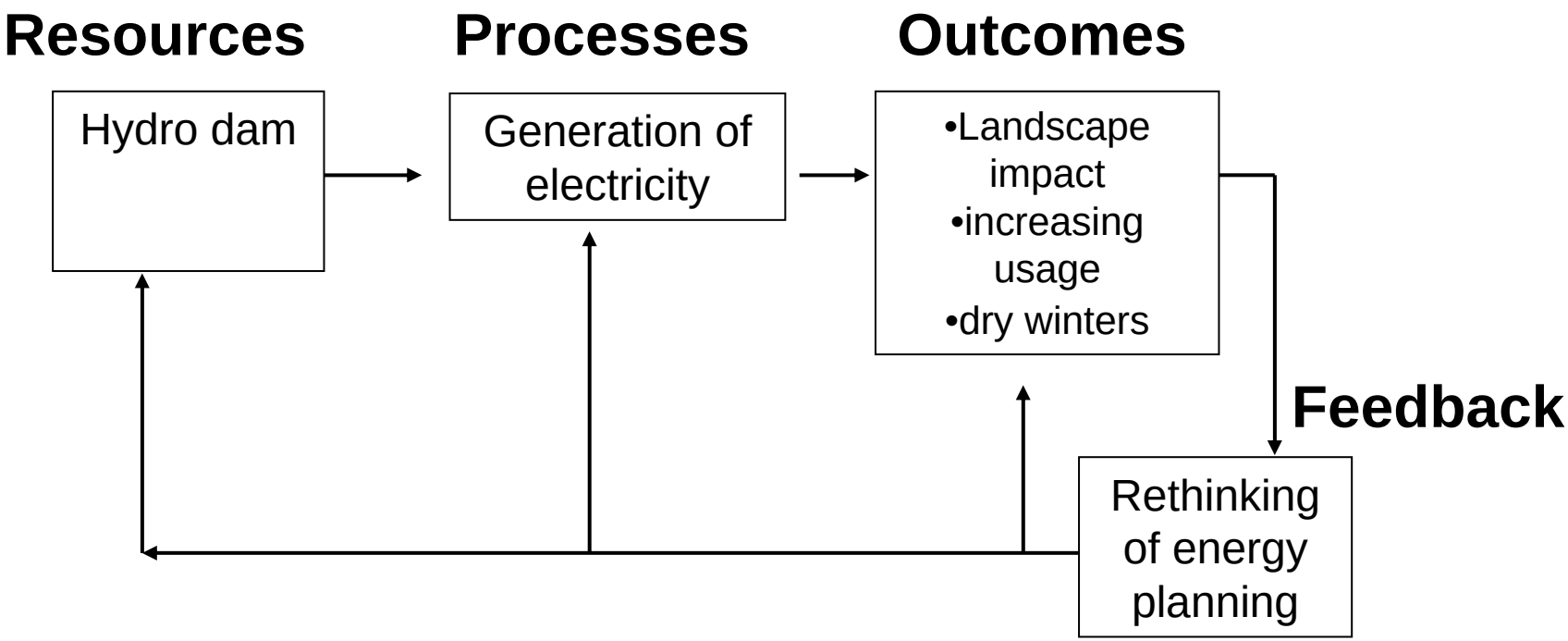
RER – Energy. E.g....



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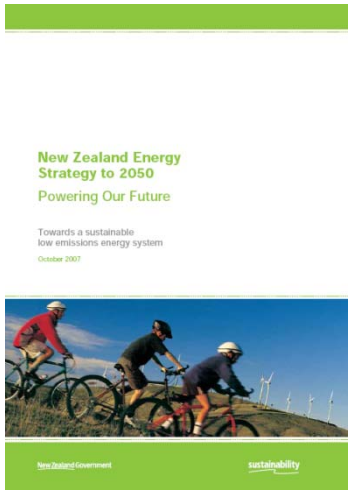
Central government energy policy

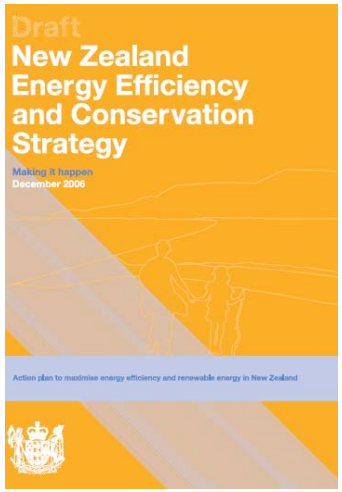
New Zealand Energy Strategy (2007)

- *Resilient low carbon transport*
- *Security of electricity supply*
- *Low emissions power and heat*
- *Energy efficiency*
- *Sustainable technologies and innovation*
- *Affordability and wellbeing*



New Zealand Energy Efficiency and Conservation Strategy (2007)

- *S 6.3...Local Government taking action = energy efficiency and conservation action plan* (link with CCP programme)



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Statutory priorities

RMA (1991) (+ amendments)

- ***Part 2***, ***S 7ba****: efficiency of end use of energy;* ***7i*** *effects of climate change;* ***7j*** *benefits derived form the4 use and development of renewable energy*
- ***S30(1)gb****: …strategic integration of infrastructure with land use*

RPS (1998) (under review)

- *Ch 14 Energy, Method 1a*
- *Ch 12 Settlement and the Built Environment, Method 12.3 b*

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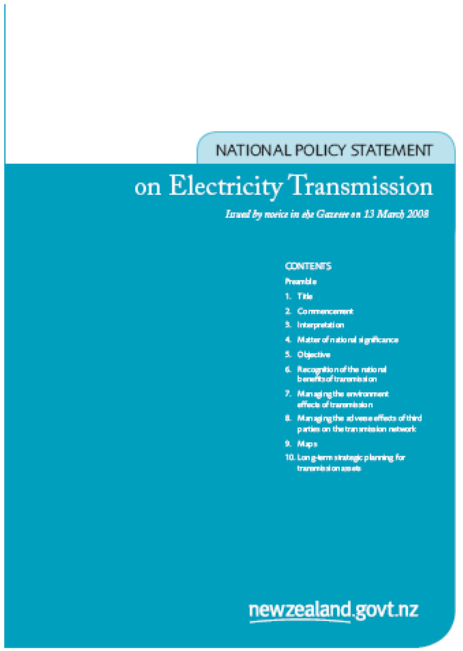
Statutory priorities (cont.)

NPS - Electricity Transmission (Mar 08)

- *buffer corridors*
- *long-term planning for transmission investment...integration with land use*



NPS - Renewable Electricity Generation (August 14)

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Statutory priorities (cont.)

Local Government Act (2004)

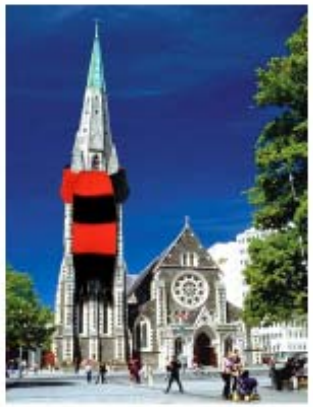
- *Sustainable development approach*
  - *>> statutory backing for non-statutory process*

Proposed Canterbury Natural Resources Regional Plan

- *Chapter 3 Air - method of Regional Energy Strategy*

Environment Canterbury Regional Energy Strategy

- endorsed Jun 07



Sustainable Energy Strategy
for
Christchurch
2008 - 2018

A strategy for our City to lead the community towards a more sustainable energy future

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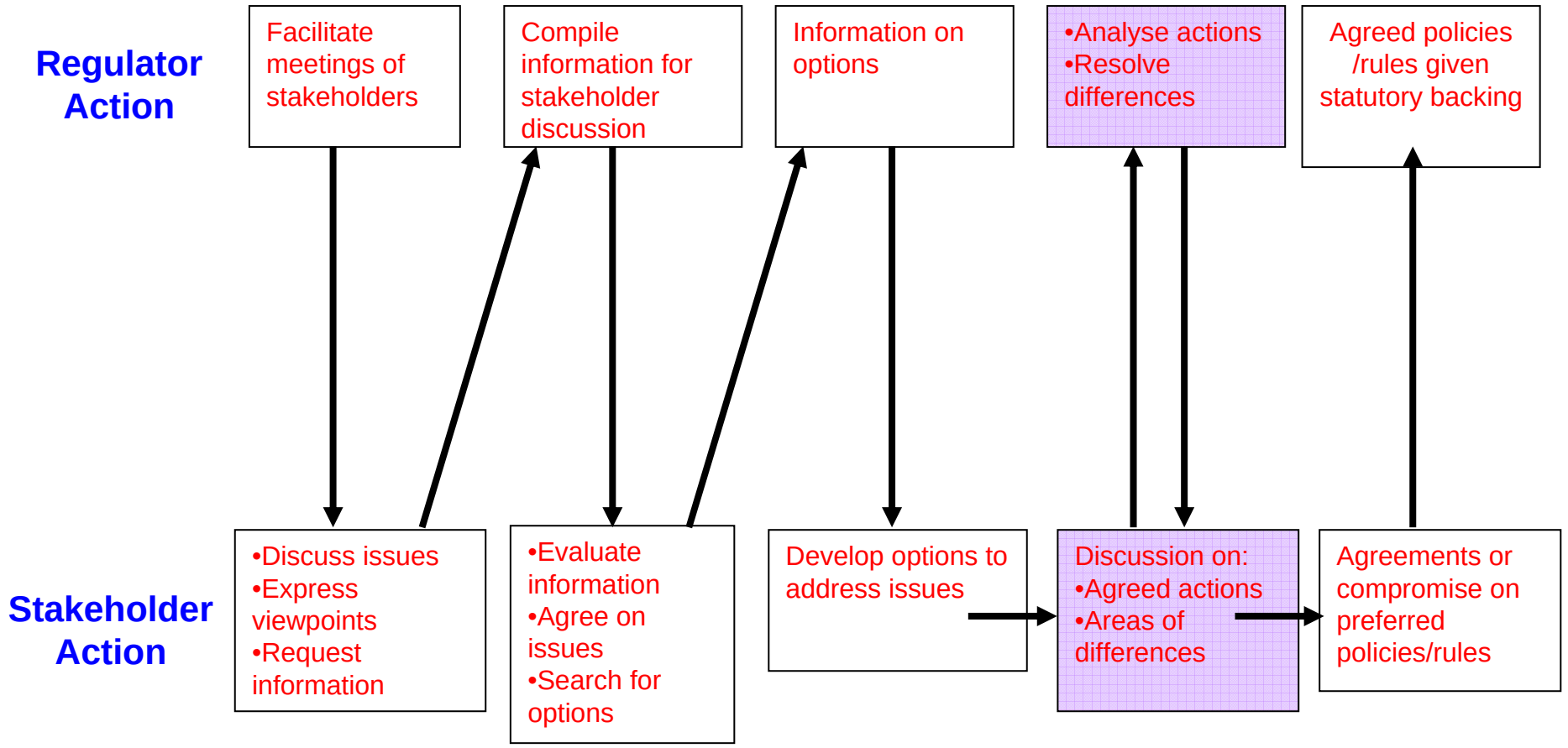
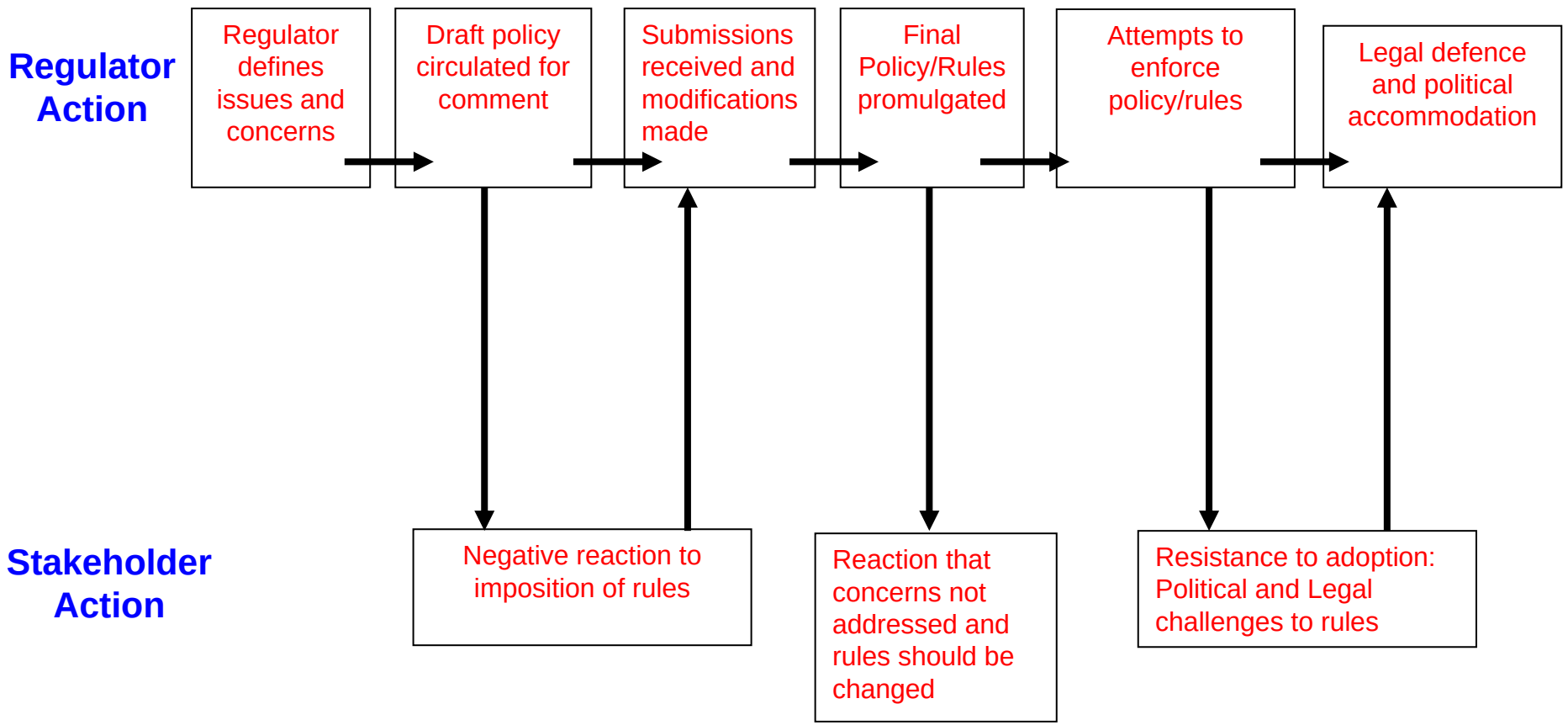
Achieving a sustainable regional energy system -

Collaborative Approach



Acknowledgement – Bryan Jenkins, ECan

As opposed to…regulatory approach

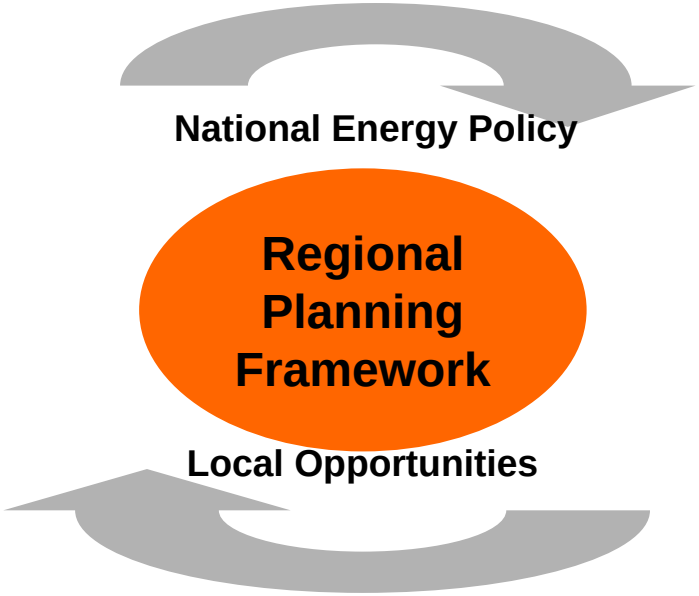


Acknowledgement – Bryan Jenkins, ECan

Canterbury Regional Energy Strategy Project (CRESP)

Expected outcome:

A decision framework that creates a long-term strategic horizon for regional energy planning and achieving community understanding of the critical issues facing the region



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CRESP - Stage 1 Summary

- A stock-take of the current energy situation
- An improved approach to energy planning to take into account regional priorities and tradeoffs
- Focused on creating local opportunities and delivering improved energy security and reliability at the regional level

http://www.ecan.govt.nz/Our+Environment/Energy/plansandreports

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Regional Energy System – Canterbury

Vulnerabilities

Lack of premium energy resources

High transmission dependency

Water scarcity & competition

Air Quality

Opportunities

Consumer response

Fuel substitution/Heating

Reticulated gas

Offshore oil/gas prospects

Small/medium scale generation

Provision for future energy reserve options

Source: Canterbury Regional Energy Strategy Project (**CRESP**)

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CRESP Stage 2: A Regional Collaborative Project

CRESP - INVESTIGATION & ANALYSIS

Regional Initiatives

– environmental and planning considerations around potential energy developments

Local Opportunities

– e.g. combined hydro-irrigation schemes, waste-to-energy and wind power projects

Industry Initiatives

– demand mgmt/risk-pricing, smart metering, alignment of underlying infrastructure assumptions with key drivers in business investment decision making

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Regional sustainable energy opportunities

1. Oil
2. Natural Gas
3. Coal
4. Wood
5. Renewables - geothermal
6. Irrigation and small scale hydro
7. Biofuels
8. Emerging energy sources - Synfuels, landfill gas, coal seam gas

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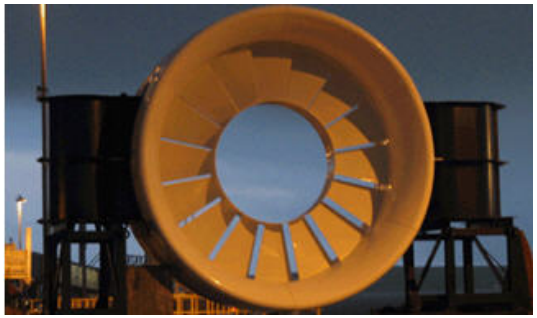
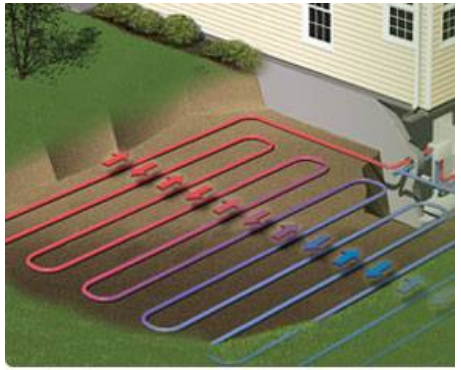
Are we really ‘running out of energy’?





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Or not looking hard enough?!

Wind

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Energy demand reduction projects

PROJECT LYTTELTON
the soul of a sustainable community

sustainable otautahi christchurch

LINCOLN ENVIROTOWN TRUST

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Demo project – e.g. Natural Systems and BioGenCool

The technology integrates three core technologies:

- Biodigestion of waste materials to *biogas*
- Cogeneration of *biogas* into *heat* and power
- Power used on site to produce *ice* for cooling

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ECan's priorities for enhancing its role in energy are to:

i. Develop a **strategic direction** for regional energy sustainability;

ii. Increase **advocacy** role by coordinating local energy efficiency initiatives and the Clean Heat programme

iii. **Partnership**… information sharing between the energy industry and councils

iv. Develop a business case for industry and council investment in **energy demand reduction** projects ('quick wins')

v. **Improve internal processes** – better align desired energy outcomes with *Policy making and planning* and *Regulating*.

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Nuclear energy in New Zealand?

- *'…we really want to have generation in New Zealand that is appropriate, and the current technology that's available in nuclear will not work here. So I don't think it is right for New Zealand'*
  - Statement from the Electricity Commissioner, 22.5.08

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Unexplored territory

Where are we going - and what on earth is the rush?!

How much is enough (energy)? And how do we know when we have enough?!

Energy efficiency…

- *'it's so efficient I want two…'*

'Unacceptable' forms of energy generation and 'gap bridging' technologies

How much 'growth'? And what about 'stability'?

- 'Role' of ecological economics?
  - **Dr John Peet**

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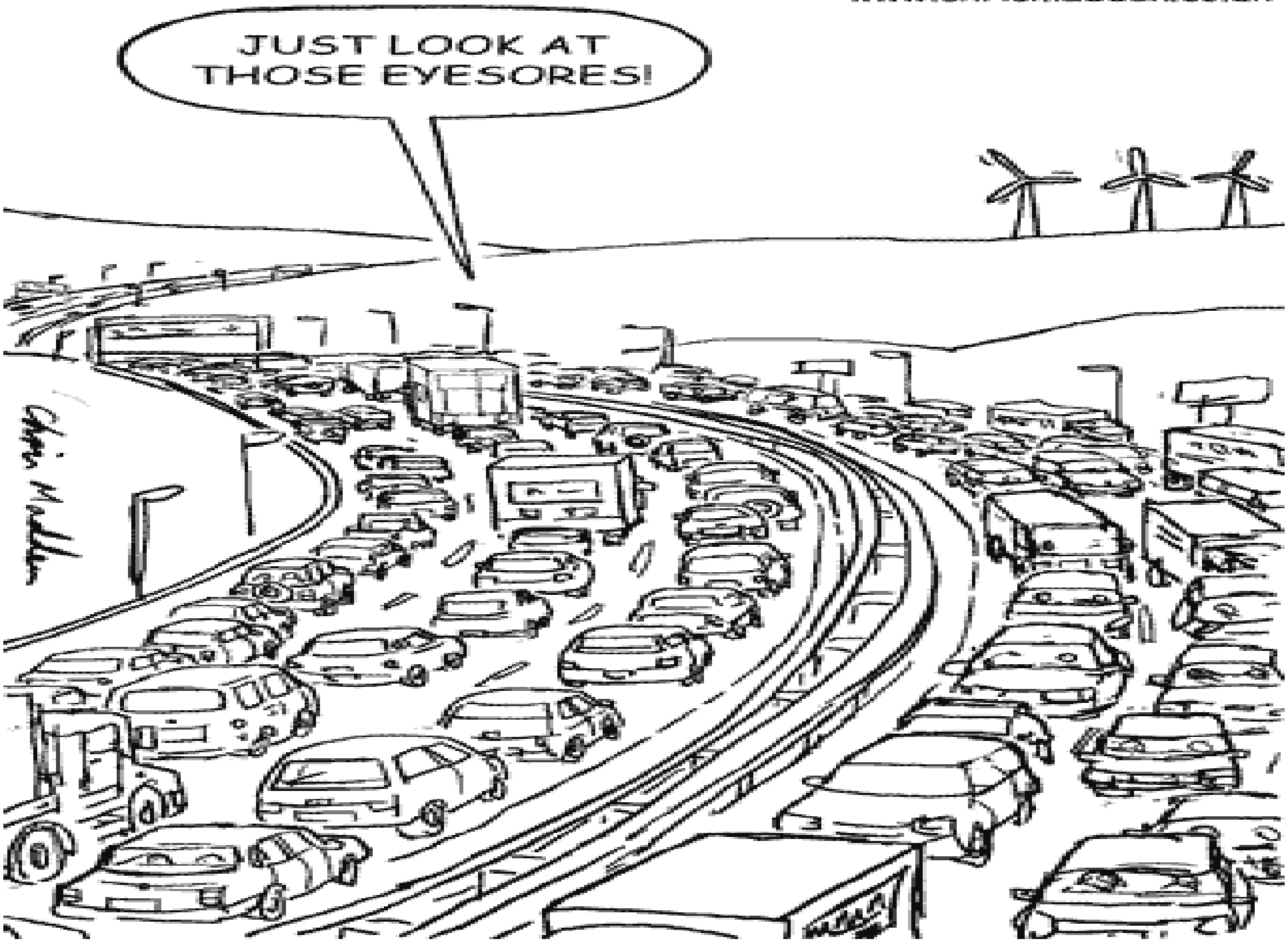
www.chrismadden.co.uk

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