

Preparing for an uncertain future: regional energy resilience in Canterbury

EMAN 410 Seminar Series
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It may be hard for an egg to turn into a bird: it would be a jolly sight harder for it to learn to fly while remaining an egg. We are like eggs at present. And you cannot go on indefinitely being just an ordinary, decent egg. We must be hatched or go bad.

C. S. Lewis

What kind of future do we want - will we get?



'Tectonic Stresses'

Energy - increasing
scarcity of conventional
oil

Environmental (ecosystem
degradation)

Climate

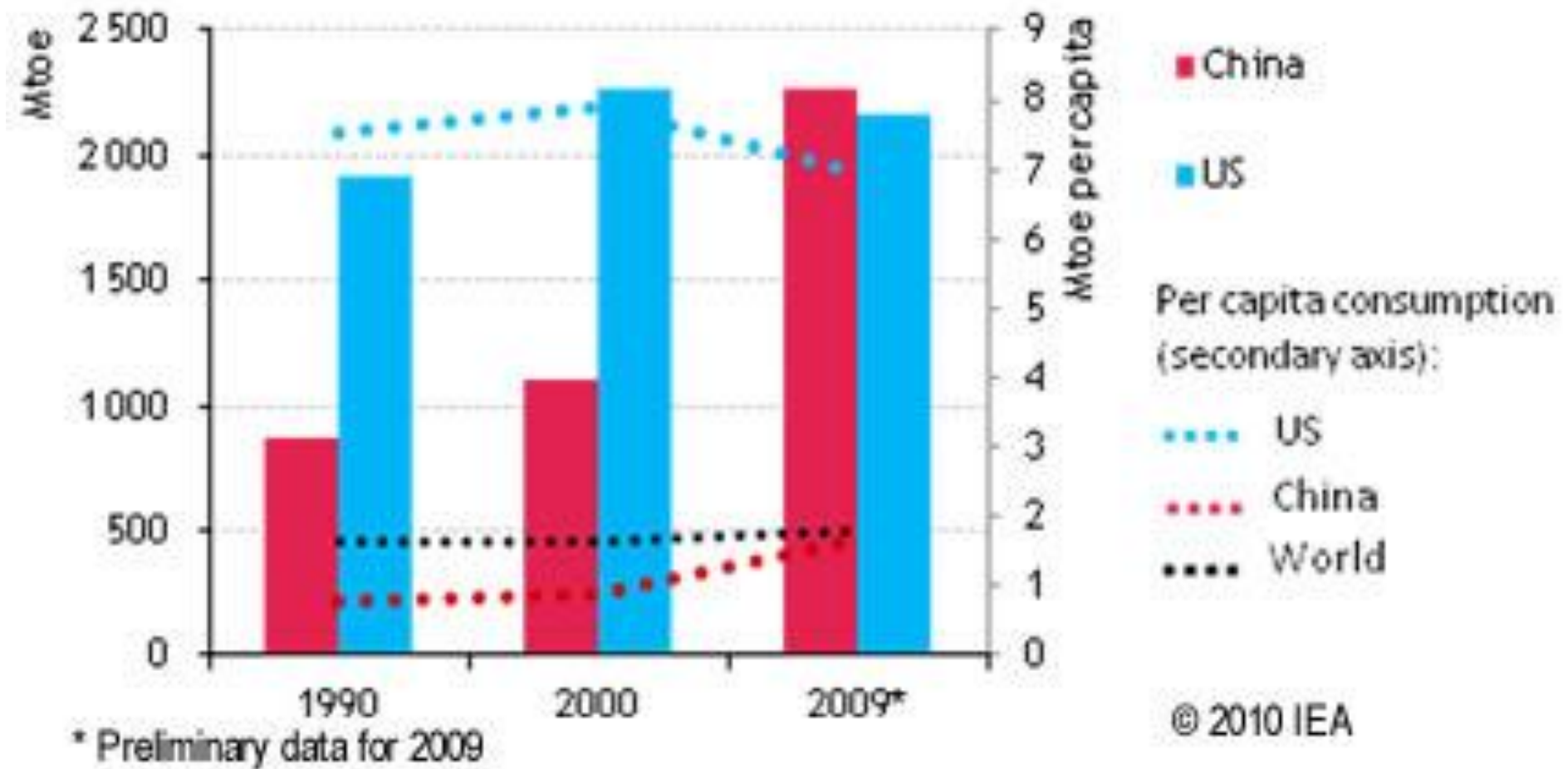
Economics (North vs.
South disparity)

Population

Thomas Homer-Dixon, "The
Upside of Down"



'Third World' emissions are rising fast





WHITE PAPER

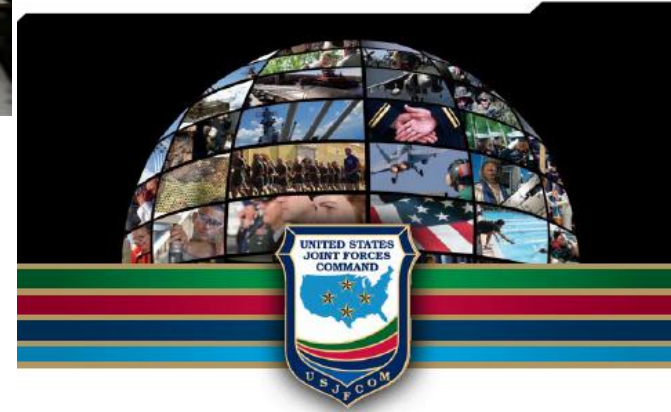
SUSTAINABLE ENERGY SECURITY

Strategic risks and opportunities for business

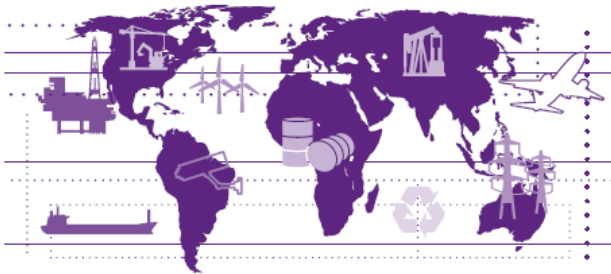


the JOE 2010

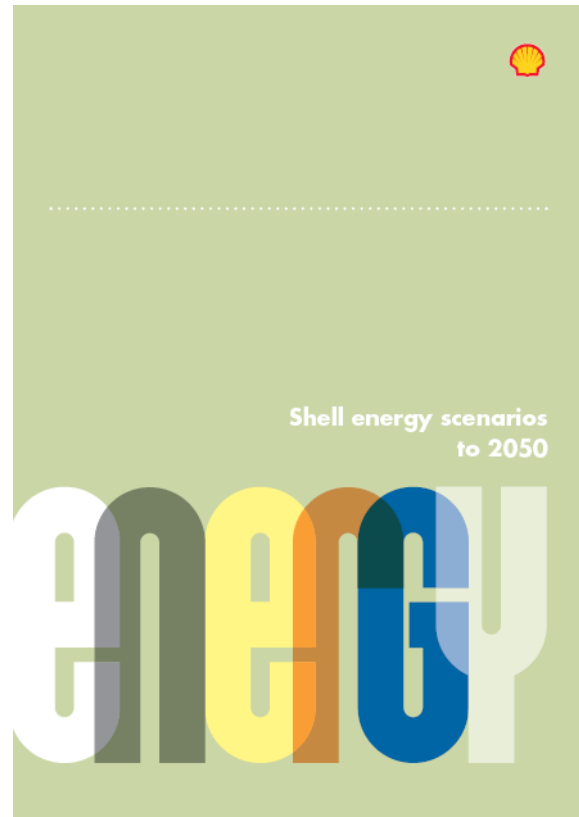
JOINT OPERATING ENVIRONMENT



READY FOR TODAY. PREPARING FOR TOMORROW.



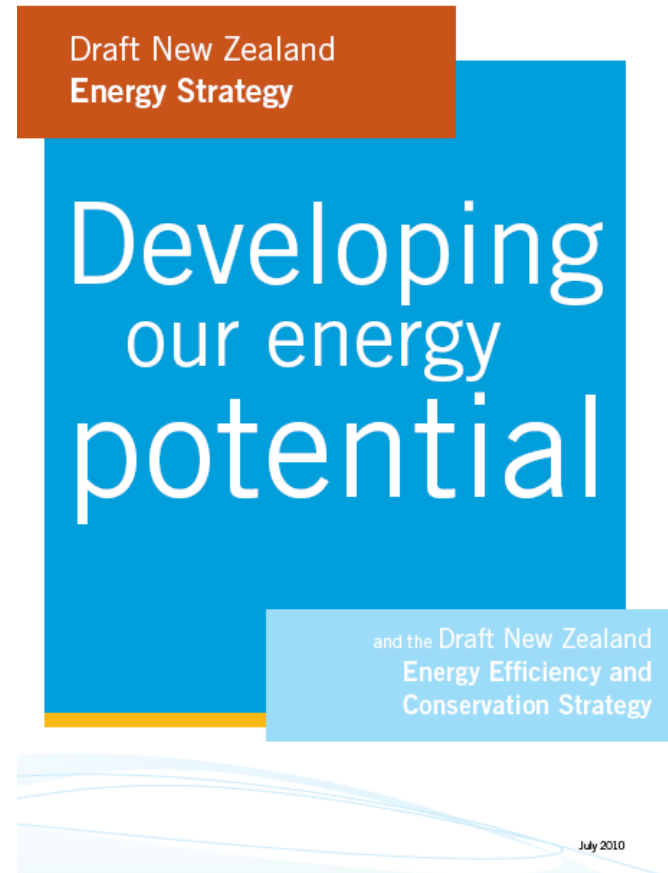
CHATHAM HOUSE



Draft New Zealand Energy Strategy

- Develop resources
- Secure and affordable energy
- Efficient use
- Environmental responsibility

...in no particular order?!



ECan and energy

- Strategy
 - Canterbury Regional Energy Strategy (+ Forum)
 - Energy Demonstration Projects
- Investigations
- Monitoring
- Territorial authority liaison
- Regional environment report
- Regional policy effectiveness





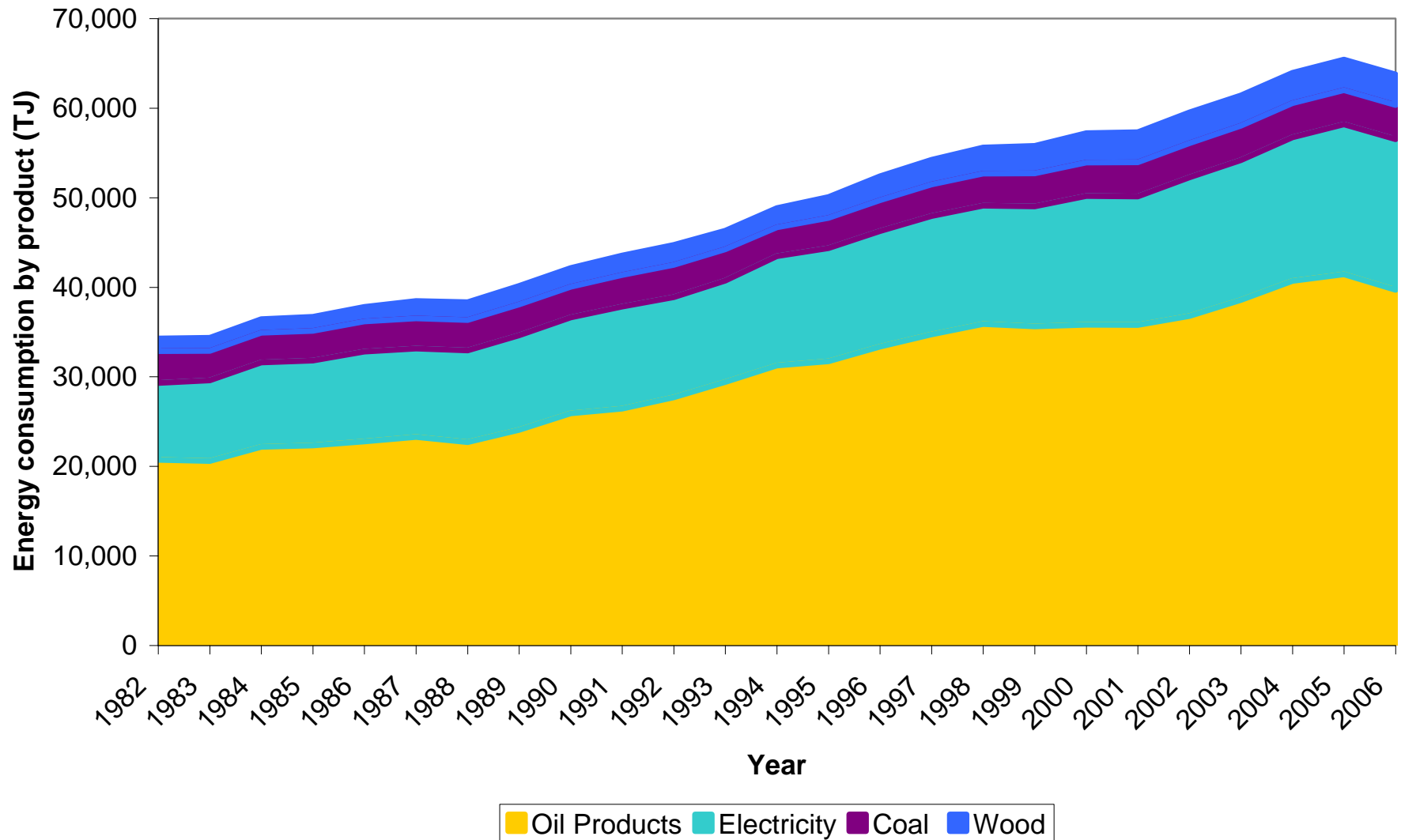
Source: MED
Energy Data File
(June 2009)

Key energy issues /features for Canterbury

- Electricity security
 - Imported liquid (transport) fuel security
 - Energy efficiency (and conservation)
 - Synergy between water resources, (wind resource) and energy efficiency
-
- Country's highest private MV ownership rate
 - Summer time peaks (irrigation)
 - Greatest regional no. of 'smart' meters?
 - Lack of big industry / large % of SMEs



Canterbury Regional Energy Survey



Resource Management Act (RMA)

RMA (1991) (+ amendments)

- ***S7ba: efficiency of end use of energy;***
- ***S7j benefits derived from the use and development of renewable energy***
- ***S30(1)gb: ...strategic integration of infrastructure with land use***

Regional Policy Statement - Energy

Policy 2 - Encourage small and community-scale distributed renewable electricity generation

Policy 3 – Benefits of energy generation facilities and electricity high-voltage network

Policy 4 – Reliable and resilient electricity high-voltage network within Canterbury

Policy 5 - To encourage efficient, reliable and resilient electricity generation within Canterbury.



Territorial authorities and District Plans

Far North District

renewable energy and energy efficiency

Porirua City

windfarms in Rural Zone areas

Waitaki District

District Plan – provisions around development (> 900m); transmission line or small-scale generation of any type – *non-permitted activities*

Christchurch City

Outstanding Natural Landscape vs. appropriate development

Waimate District

new generation plans - amendments re: transmission and renewable energy

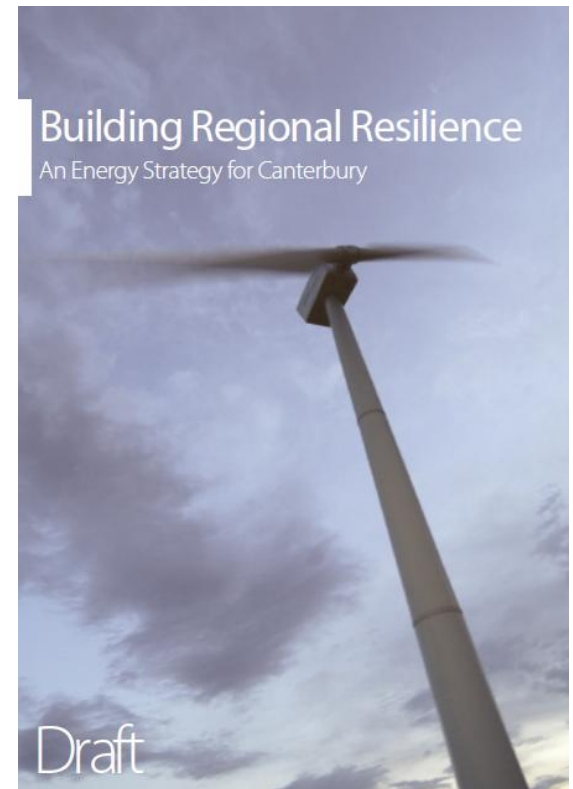


A strategic response

We cannot predict the future, but we can prepare for it.

*This strategy is designed to **enhance the energy resilience of Canterbury** by ensuring we have a secure, reliable, affordable and sustainable energy system*

...taking a 20-year outlook.



Areas of action

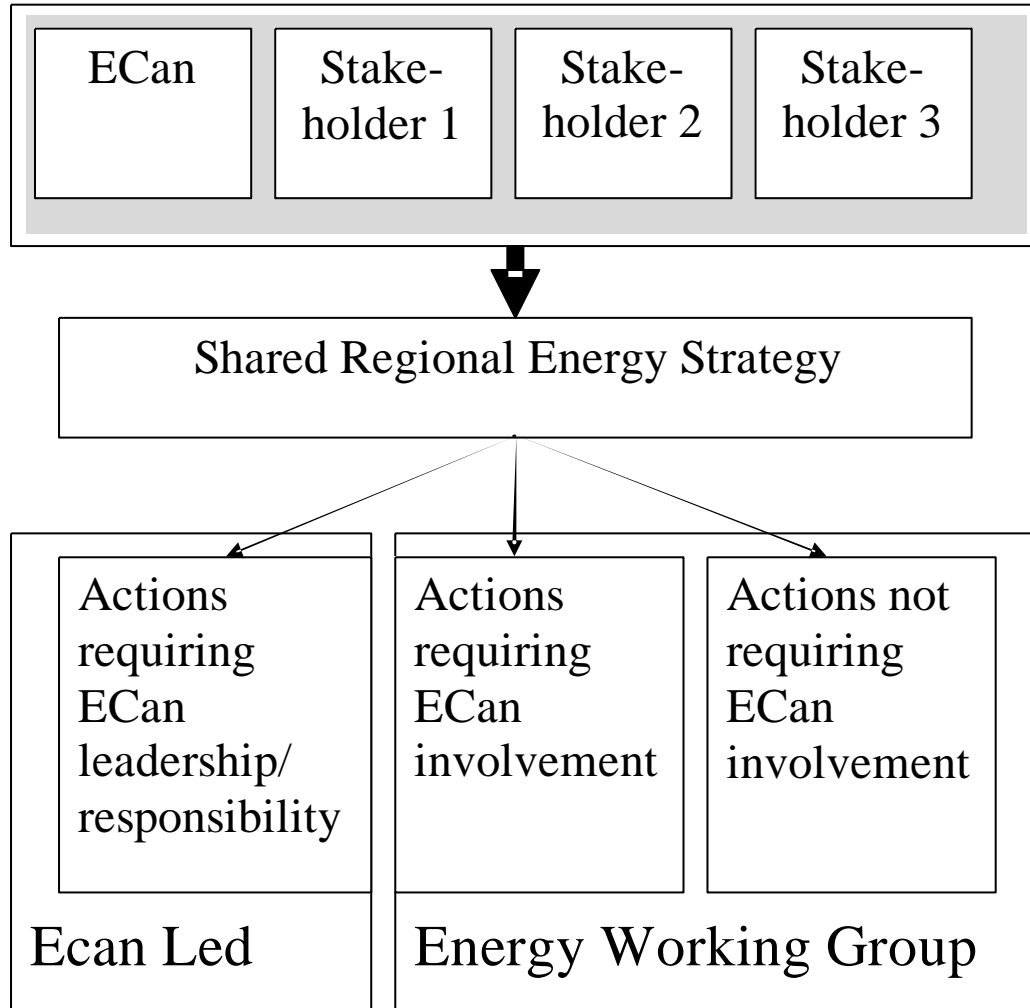
1. Keep options open
2. Encourage diversity of energy generation and use
3. Encourage and environment of innovation
4. Enhance resilient economic and community development.
5. Build relationships across sectors
6. Provide a good flow of information



Identified challenges for strategy implementation

- National policies (e.g. NZES - 2010 review)
- Impact of planning decisions
- Increasing sector demands on electricity supply
- Oil supply restrictions / increasing prices
- Flow on effect of investment decisions
- Impacts of economic situation on energy system
- Level / type of business activity in the region
- Timeframe of new energy technologies (supply and demand)
- Which sectors adopt (technologies) - and how?

Making it happen



Canterbury Regional Energy Strategy Project

- Stock-take of the (2007) energy situation
- Improved approach to energy planning w.r.t. regional priorities and tradeoffs
- What are the local opportunities?
To deliver improved regional energy security and reliability?



Regional Statement of Opportunities for Energy

Hydro

- micro and mini schemes
- water storage

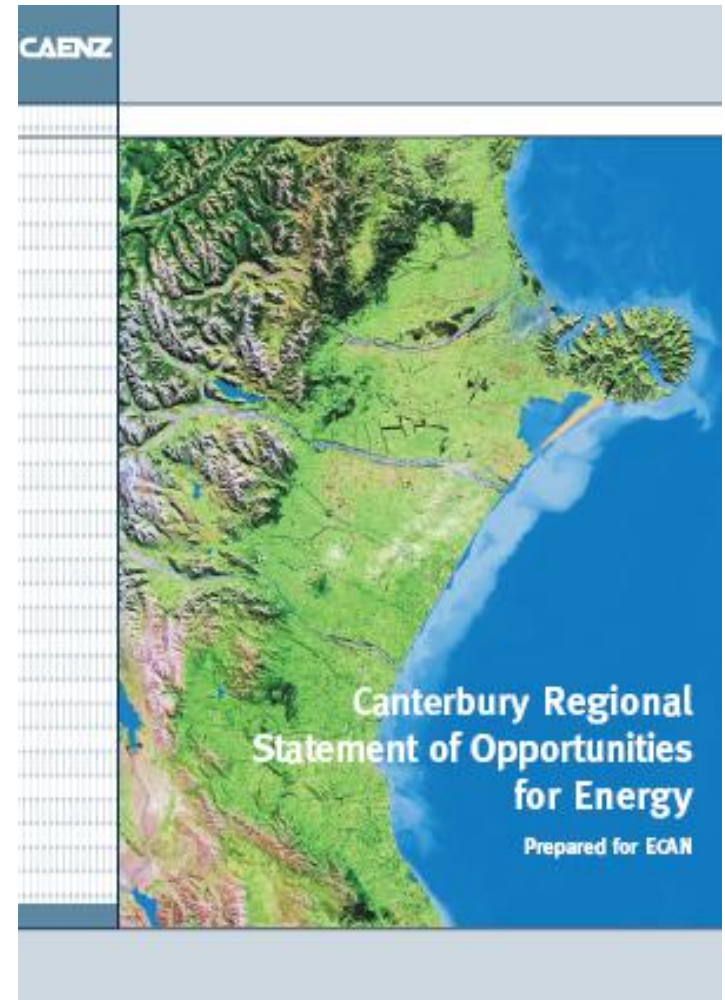
Wind

- mini wind farms
- hot spots (gorges, etc)

Biomass

- dedicated retired land growing high-energy products (e.g. gorse)
- wood to gas conversion
- Biofuels

Solar, marine, etc – not viable economically

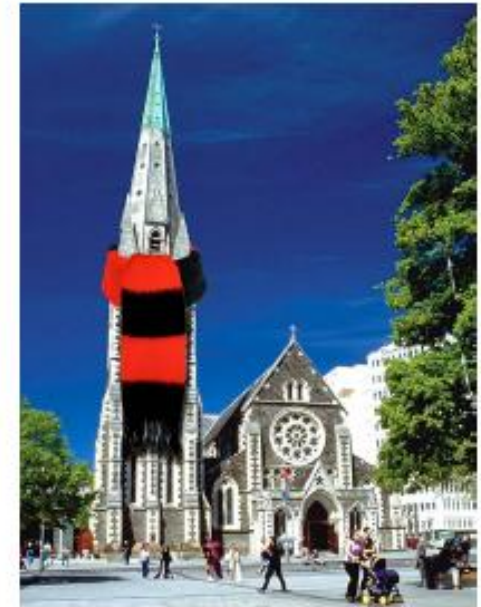


City Council's energy strategy

28 initiatives including:

- establishment of Christchurch Agency for Energy (CAFE)
 - CCC, Meridian, EECA, Orion...and *ECan*
- Residential thermography
- Solar hot water (Solar City?)

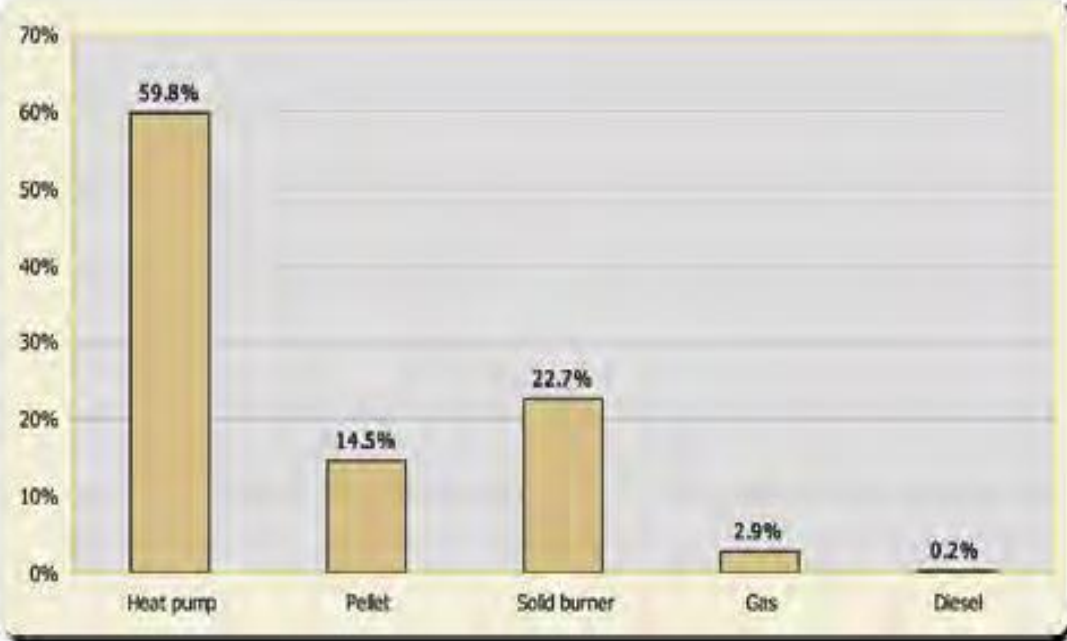
Funded by carbon credits, not rates



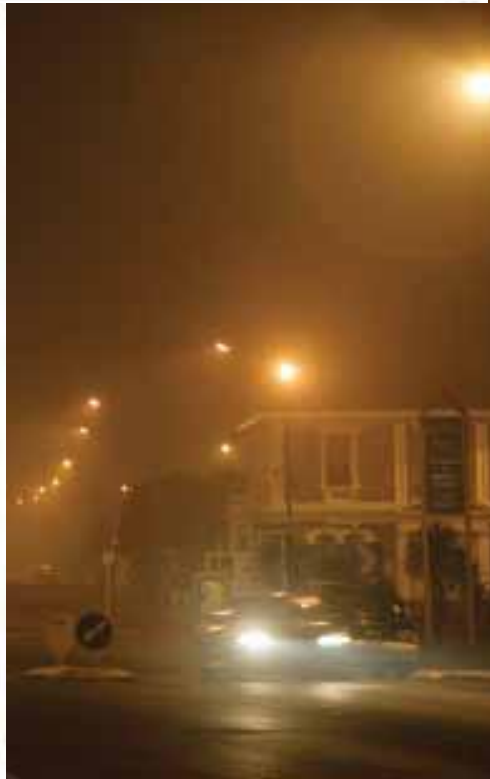
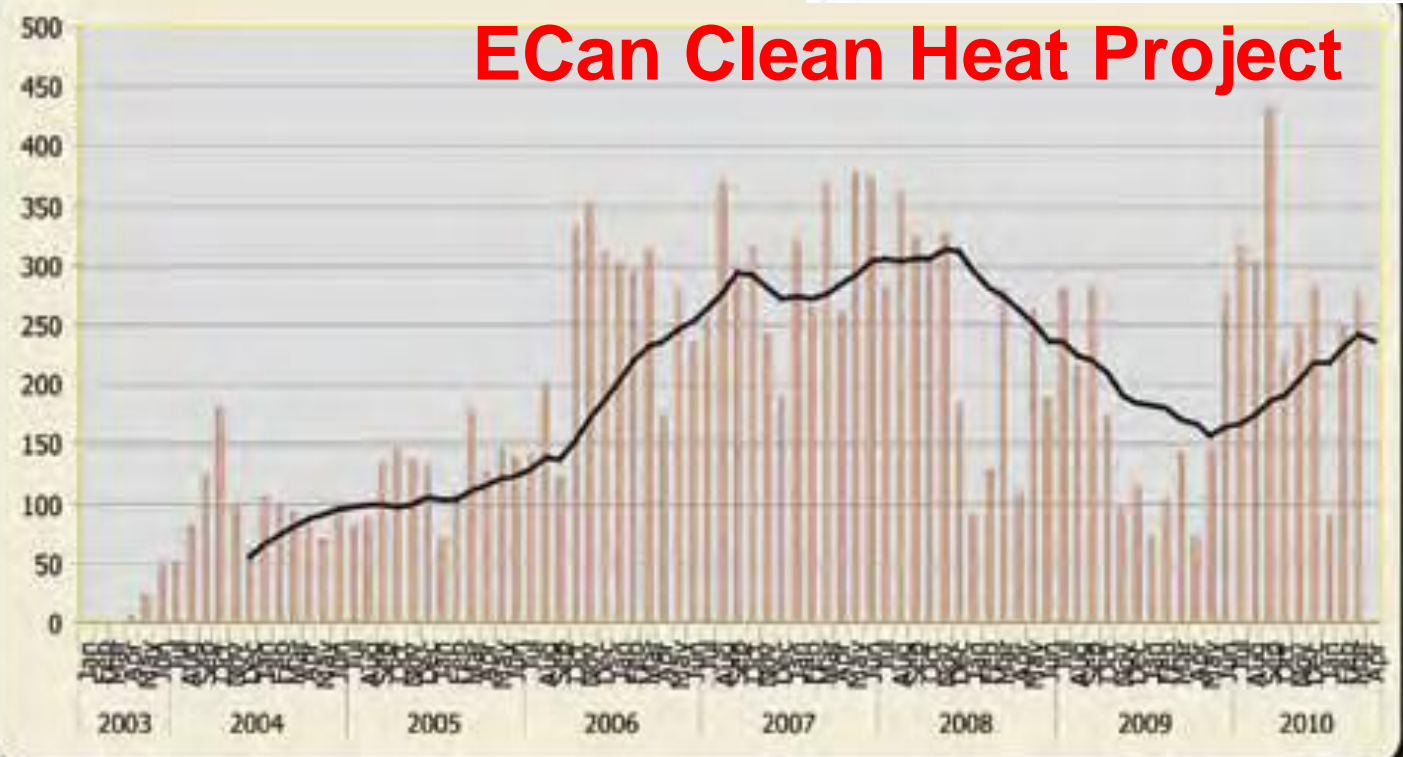
**Sustainable Energy Strategy
for
Christchurch
2008 - 2018**

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

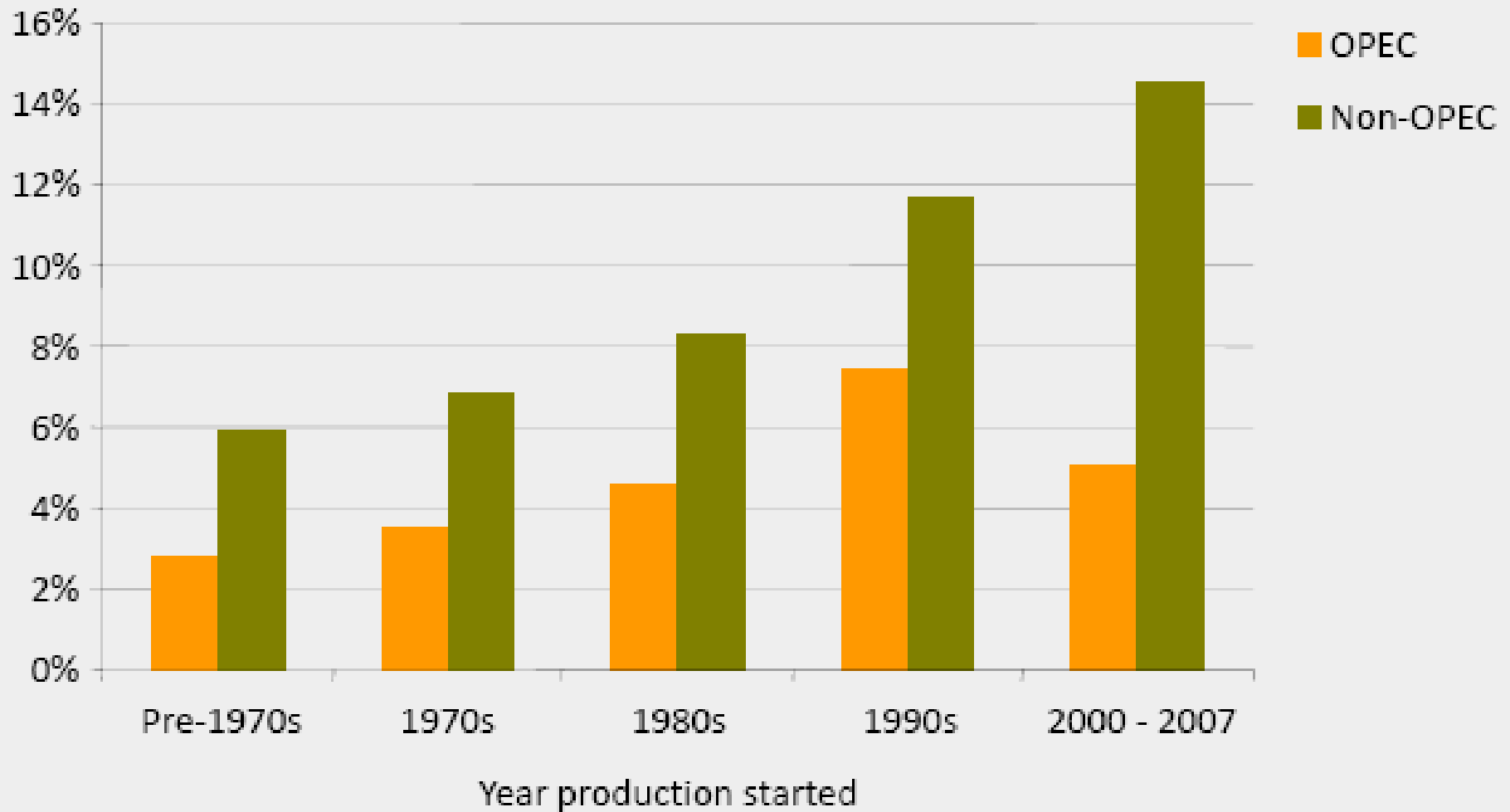
CHRISTCHURCH - ACTUAL & TARGET PM₁₀



ECan Clean Heat Project



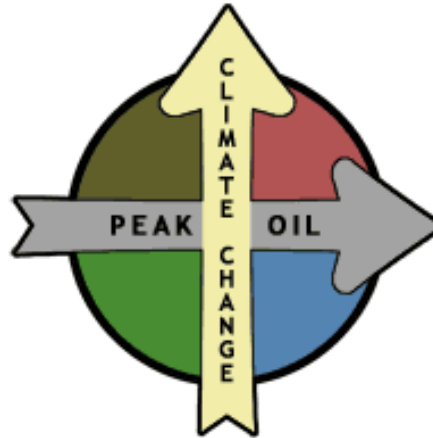
Oilfield decline rates (IEA 2008)



2007 - Peak Oil (and climate change) impact on ECan portfolios

**Regional
Land
Transport**

**Public
Passenger
Transport**

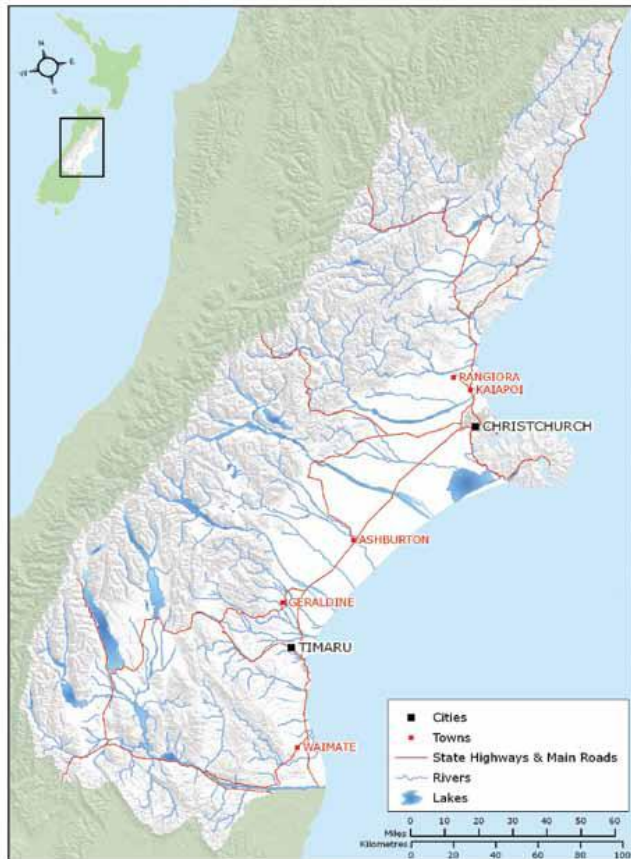


Land Use

**Pests and
Biodiversity**

Logo source: David Holmgren

2009 - Peak Oil impact on Canterbury communities and sectors



1. Understanding the dynamics of the international oil market
2. Dialogue with local stakeholders through semi-structured interviews to gauge their views on future oil vulnerability

Conclusions from recent reports

*“the sources of oil to meet rising demand, the cost of producing it and the prices that consumers will need to pay for it **are extremely uncertain, perhaps more than ever**”*

IEA (2008)

*“A peak in conventional oil production before 2030 appears likely and there is a **significant risk of a peak before 2020**. Given the lead times required to both develop substitute fuels and improve energy efficiency, this risk needs to be given serious consideration”*

UKERC (2009)



Global Oil Depletion

An assessment of the evidence for a near-term
peak in global oil production

UKERC
UK ENERGY RESEARCH CENTRE

Interviewee themes

- Specific impact of the oil price spike in 07/08?
- What relative importance is attached to future oil vulnerability, including views on the future oil price
- Technology and innovation
- Views on the possibility of a short term disruption to oil supply
- What role for Environment Canterbury on this issue?

Impact of the oil price spike in 07/08?

- Vulnerable sectors/organisations – export, transport, long distance tourism, rural, households with low/fixed incomes
- Impacts somewhat merged with other issues (financial crisis, recession)
- Generally, organisations caught out by the suddenness of the rise
- A few organisations have taken a long term, strategic view; most haven't

Stakeholder views on future oil vulnerability and the future oil price

- World not running out of oil...but running out of cheap oil – general belief that oil prices would continue to rise
- Oil price consciousness generally short-lived - climate change policies currently seen as a more significant driver of change
- Variable responses going forward:
 - Somewhat transitory impact for many – now back to BAU
 - Fundamental to business survival for others (e.g. Air NZ)
 - Tourism industry strategic study

Technology and innovation

- Technological optimism
- Alternative fuels from NZ's large biomass resource?
- Electric Vehicles – turns focus to clean electricity supply security and grid integrity

Likelihood of a short term disruption to oil supply?

- High proportion of interviewees considered there was a realistic riskbut:
 - Not much knowledge on planned contingencies
 - Not much evidence of risk management strategies being adopted

Recommendations for ECan

1. Stakeholder briefing around oil security and oil emergency response procedures
2. Determine EV considerations re: planning for a secure and sustainable electricity supply and grid architecture in the region
3. Risk Management – encourage regional organisations to adopt appropriate risk management strategies to deal with:
 - oil price pathways and price volatility
 - possibility of short term supply disruption
4. adopt approached to increase non-active transportation modes

Recommendations strongly endorsed by Regional Transport committee, Dec 2009

Is electrified land transport the answer?

Clive Matthew-Wilson, *Dog & Lemon Guide*

+ves

- Reduced dependency on liq. Fuels
- Some efficiency gains esp. for 'special trips on empty roads'

-ves

- Carbon intensity of electricity
- Congestion decreases?
- Efficiency overtaken by 'perpetual growth'

The Emperor's New Car



A critique of the economic and environmental value of electric cars



By Clive Matthew-Wilson
editor, *The Dog & Lemon Guide*
dogandlemon.com

© Some parts of the material in this report appeared previously in the 2010 Dog & Lemon Guide

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What about biofuels?

- Can we make enough?
- Supplementary, low % blends (biodiesel and ethanol)
- Focus on diesel substitutes
- No to 'bad' fuel imports



Some biofuels are better
than others:
Thinking strategically about biofuels

29 July 2010

 Parliamentary Commissioner
for the **Environment**
Te Kaitiaki Takeo a Te Whare Pāremata

Canterbury Water Management Strategy

Identify potential opportunities for social / technological innovations to reduce the energy demands for irrigation

- By 2015... electricity used in the use of water
- By 2040, energy used per hectare for irrigation



We need numbers, not adjectives!

CONSUMPTION

Jet flights:
30 kWh/d

Car:
40 kWh/d

PRODUCTION

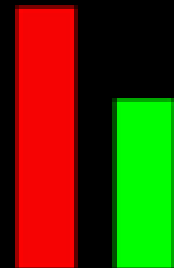
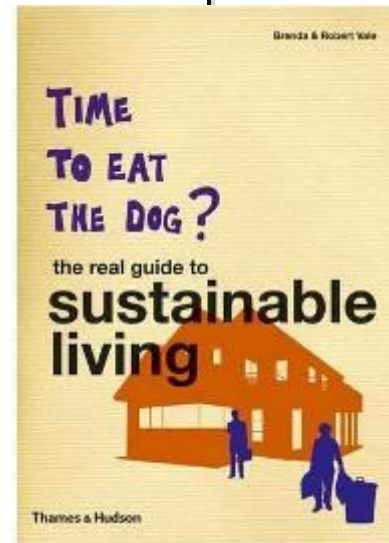
Wave: 4 kWh/d

Solar heating:
13 kWh/d

Wind:
20 kWh/d

Sustainable Energy –
without the hot air

David JC MacKay



Barriers /considerations w.r.t. renewable energy

District plan provisions

- E.g. what is 'appropriate'?

Economics

Access to grid / networks

Site location / **landscape**

Ecology/biodiversity

Funding and incentives

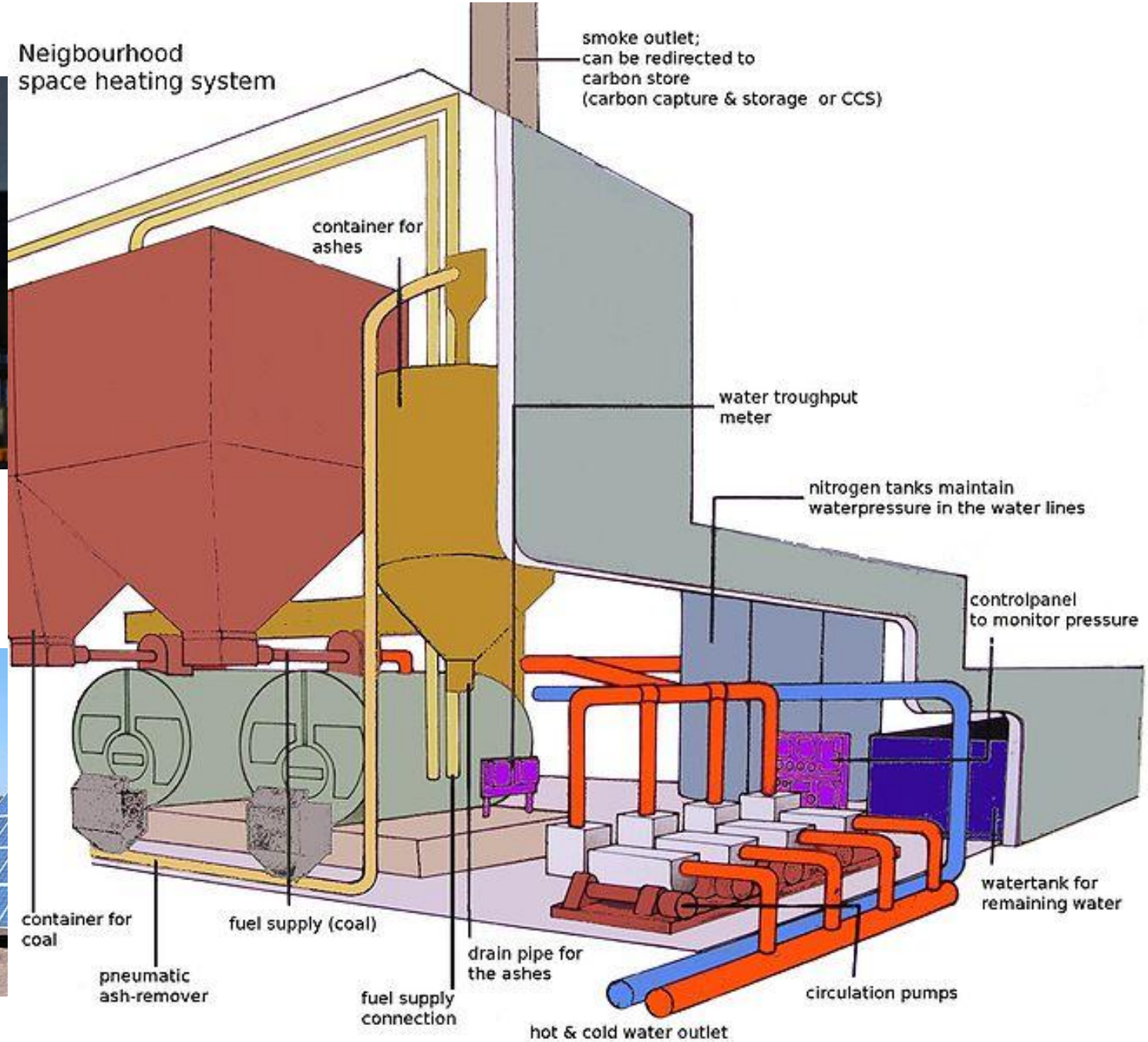
Lack of guidelines

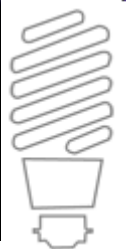
Risks and opportunities

'Merton' Rules?



Neighbourhood space heating system



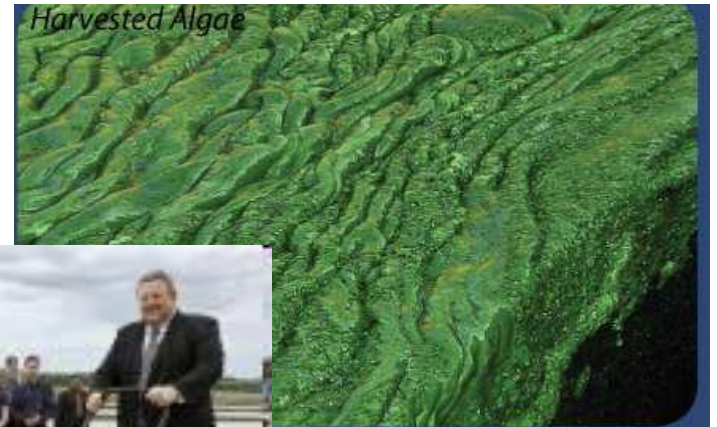


BioGenCool (Natural Systems) – energy dairy waste

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



Bio-crude oil from wastewater algae



Super Critical Water Reactor



EECA wood energy projects



Radford Yarns



NZ Foam Latex



Mairehau HS

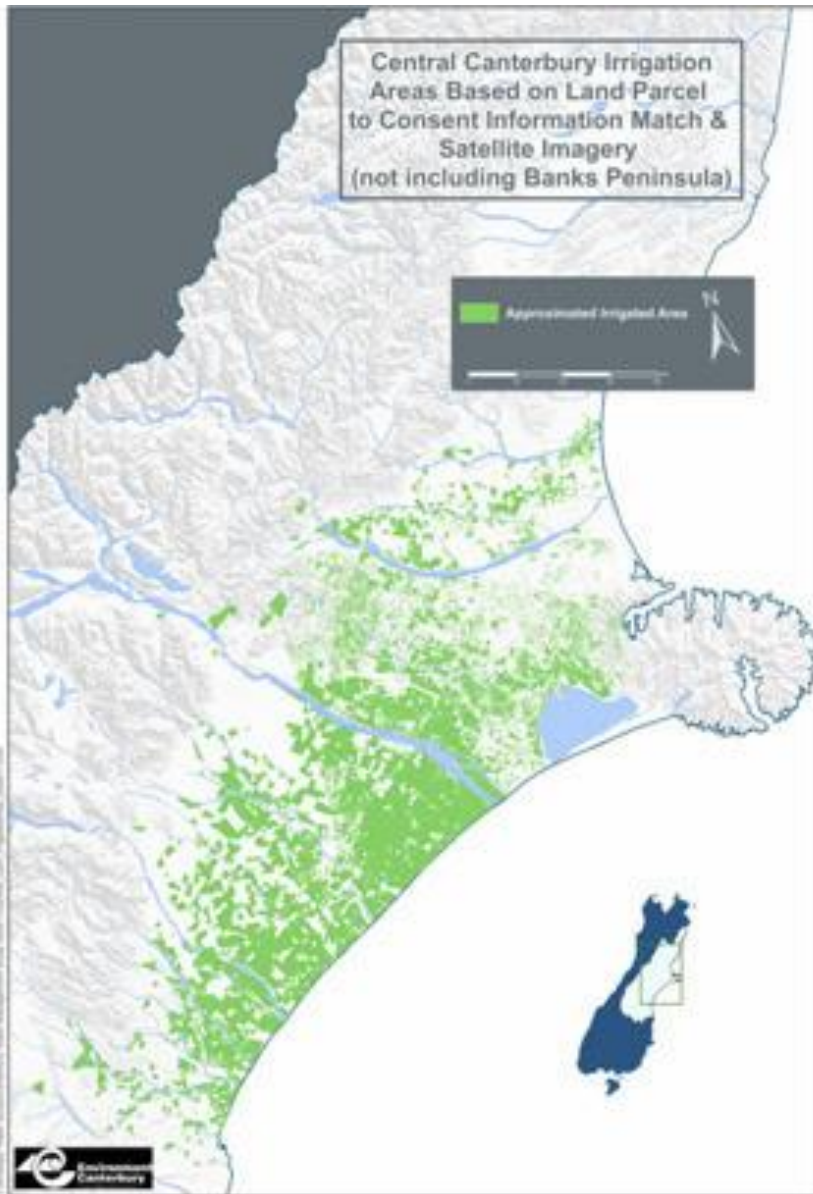


Biogas from piggery waste

EECA Biogas feasibility studies, including:

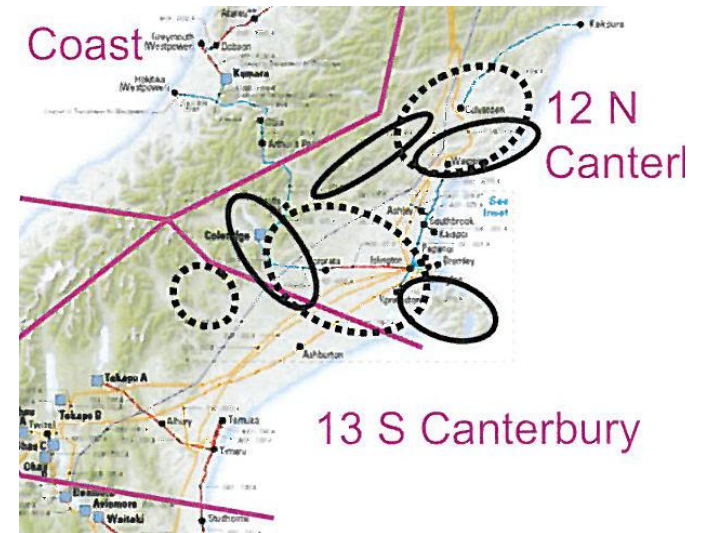
- Lepper Piggery, Taranaki – up and running
- **Selwyn District** – Rolleston Prison – “Feasibility Study for Construction and Operation of a Regional Digester Facility”
 - with Dept of Corrections and NZ Pork





Canterbury's wind resource

- Some observations
 - 0.2% of NZ's electricity generation
 - 7.5% nationally (21% S Island)
 - N Canterbury - favourable sites; localised hotspots
 - S Canterbury – better for hydro?!



Canterbury's 'wind farms'

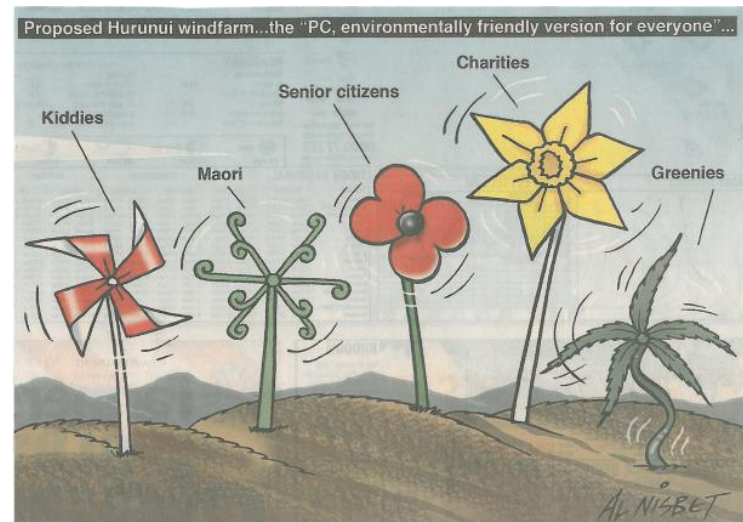


Wind 'on the radar'

Mt Cass (MainPower)
- 35-40 MW



Project Hurunui (Meridian)
- 80-90MW



Community wind project - Harbour Wind

- Banks Peninsula community electricity generation from 3-6 wind turbine cluster (1.5-3MW)
- Provision in Banks Peninsula District Plan re: no inappropriate development on an outstanding natural landscape (ONL)
- Community challenge:
 - ‘appropriate’ development vs. ONL



Source: NASA

Transition (energy descent) community groups

Lincoln EnviroTown Trust
Project Lyttelton
Sustainable Living Education Trust

St Albans Community -
Community energy expo

Mt Pleasant Community -
Sustainable transport

New Brighton Project –
weekend eco market

Roimata Community - energy
checks

Sumner Redcliffs Project -
community resources

Transition Timaru - learning /
behaviour change



JUST LOOK AT
THOSE EYESORES!

