

Science and innovation for a natural resource constrained future

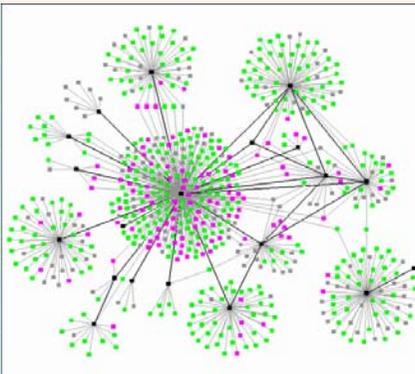
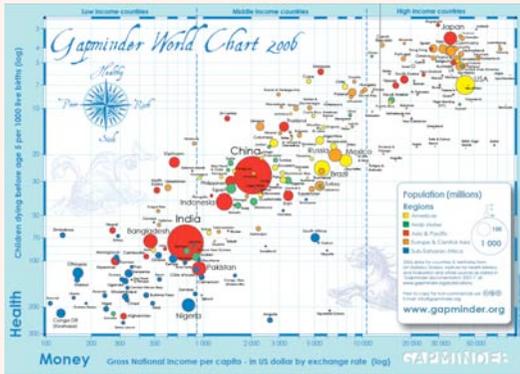
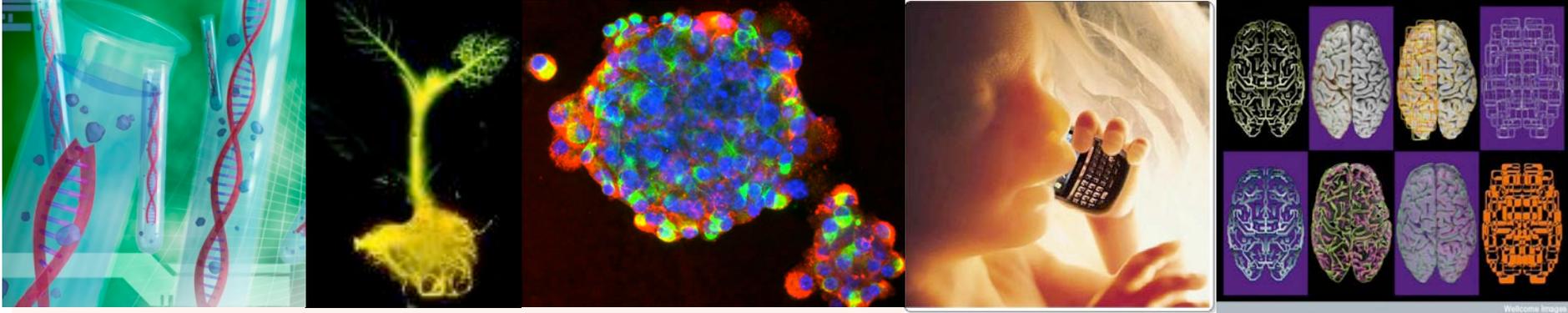


F U T U R E W A T C H

MINISTRY OF
RESEARCH
SCIENCE+
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MARST
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FUTURE WATCH



Futurewatch Outputs

Scanning



Awareness

Action

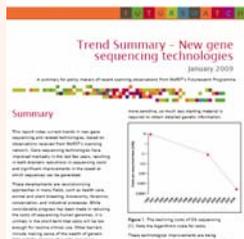
Presentations

Trend summaries

Reports

Workshops

Policy advice



Drivers:

Energy and climate change
 Water and food production
 Urbanization

Responses

Consumer trends
 Business sector trends
 Government intervention trends
 Investment sector trends
 Science trends

The economy, the environment and opportunities for New Zealand

A futures resource

Energy • Climate Change • Water & Food • Urbanisation • Consumers • Business • Investment • Government • Science



My question for you:

To position NZ well for a natural resource constrained future, what science do we need and how should we do it?

Presentation outline

A global snapshot on business, energy and water

Economic geography: New Zealand's size and place in the world

New Zealand's advantages

Playing to our advantages – a science and innovation perspective

Global natural resource issues

Who said this?

“..the developed world’s consumption of energy and natural resource is not a successful model for the developing world to follow as they grow...climate change is a real concern and action must be taken to address its potentially far-reaching consequences”

Greenpeace

Du Pont

Al Gore

Ban Ki Moon

Why are soap powder packets always getting smaller?

Consumers are ripped off – paying more for less
Better technologies means you need less
The Walmart (sustainability) effect
A result of Henkel/Unilever's sustainability initiatives?



There are 600 different supermarket chains in the Europe. How many supermarket buying desks are there?

10,000

2000

600

100

How do the top-end UK supermarkets decide what fish to sell?

They sell any fish, provided it meets health and food quality requirements

They check it meets in country environmental standards, legal conformity etc

Marine Stewardship Council

Advice from Greenpeace

Advice from the equivalent of Forest and Bird

Maersk shipping line is discussing with environmental NGOs what fish it will carry

True

False

Some questions about energy

When was the largest amount of “conventional” oil produced?

Oil production continues to increase

2005

2008

2003

Who said this? If by 2050 there is not a “drop-in” replacement for fossil-derived jet fuels there will be no commercial airliners flying

Greenpeace

Al Gore

Lord Oxburgh (former Chairman, Shell)

Boeing

Maersk now has three types of shipping driven by oil prices:

- Normal
- Slow
- Super slow

True or False?

Some water and food-related questions

How much more food needs to be produced by 2030 to feed the world?

None – we are producing enough already

10%

50%

Twice as much as is produced now

When did the global amount of irrigated land per person peak?

It hasn't – irrigation development is keeping up with population growth

Early 2000s

Mid 1990s

Mid 1970s

China and India are now drilling bores to beyond 1000m in search of water

True

False

(irrigated land accounts for 3/5 and 4/5 of grain production in India and China)

Some insights

Leading businesses (e.g. DuPont, General Electric, Walmart, Maersk) are taking sustainability seriously – why?

Supermarkets are increasing in size and becoming more influential (than WTO?)

Oil is going to be a problem, driving biofuel production (think water, food), greater electricity use for transport (think hydro etc)

Food production will need to increase significantly – will the price too?
Many countries are suffering/about to suffer major water shortages

The New Zealand location and size issue

The world is getting better connected...

We should be able to connect with the world like never before

Or are we becoming more distant as the developed world gets smaller?

ABN Amro moved its headquarters from the Netherlands to London – why?

Where are many of NZ's head offices these days?

Email/internet overcomes distance?

Who has had an email exchange in the last day with someone in South America?

Asia?

North America?

Europe?

Auckland?

Is face to face contact now at a premium and a constraint for NZ, due to distance?

Can NZ's relatively poor economic performance in the last 20 years be in part attributable to the distance/agglomeration effect?

New Zealand's advantages

New Zealand's advantages (1)

Freshwater

Renewable energy resources; wind, water, geothermal, biofuels etc.

Distance/mystique

Education system

Scale – large enough to have a range of expertise

Social conditions

New Zealand's advantages (2)

A “can do” attitude

We can think!

Some smart design



New Zealand's advantages (3)

We know each other

Within 5 phone calls you can find NZ's expert in an area

We cover many areas of expertise



How to play our mixed deck of cards, from a science and innovation perspective

Our mixed deck of cards...

The distance disadvantage

The natural resource advantage

The “we all know each other advantage”

The good science advantage

Some thoughts on the types of science and how we do it

The distance disadvantage

Staying connected

Maintaining face to face contact

Being excellent – making sure people *want* to work with us

Confidence that we can do good things

The mystique factor

Our natural resource advantage

Renewable energy

Water

Fertile land

Marine

Etc

What science do we need to support a natural-resource constrained future, given we have enviable natural resources?

Networked innovation – the “we all know each other” advantage

Moving from 1:1 to many to many focusing on common problems

Do we need broader instruments and approaches in the science system to encourage networked innovation?

The MoRST-Business NZ experiment in networked innovation

What do we need to do to maximise the advantage from everyone knowing each other? - the flip side of the distance issue

Do we need different types of science?

Cradle to cradle

Reframing the research:

- From efficient motors to appliances that talk to the grid
- From efficient buildings to buildings that interact with the grid
- From plugging cars in to considering how grid stability can be maintained and charging your car battery *while* you drive

Eco-innovation

Would smart regulation (market-based) of the irrigation sector result in an export industry in irrigation technology?

- Researchers, regulators and industry working together
- A networked approach
- Driven by regulation in NZ
- Water footprinting

Do we need to think about the regulatory system as a key part of the innovation system?

How should science connect with the regulatory system AND support industry innovation?

Energy Intellect and the electricity market

38 people, \$7Mpa



Dynamic demand control

Grid below 49.2 Hz, 100 MW taken off line in 200ms

Market enabled.

Clever technology, clever interaction with the market.

Tate radios, Energy Intellect etc, all working together to win overseas contracts:
Leveraging the upside of the distance issue (connectedness)

Where else does a regulatory (market-based) system enable innovation?

Zespri – an example of eco-innovation involving regulation?

Why does Zespri achieve a 40% premium in some overseas supermarket chains

High credence attributes – science based

Ahead of competitors, e.g. the splife

Using the supermarkets as regulators

Working on the next innovation, the biomaterial splife, biodiversity in orchards etc

Overall conclusion and question for discussion

New Zealand has some great cards, e.g. natural resources especially water, renewable energy and an inventive people

How do we play these cards well?

How can science best support and help enable a prosperous, distant society in a resource constrained world?

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