

MAINTAINING FARM PROFITABILITY AND PROFITS IN A CHANGING CLIMATE

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Omakau / 23 September 2009 www.acecrc.org.au

CLIMATE CHANGE: THE SCIENCE AND ITS IMPACTS





Dr Jim Salinger

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CO₂ and Temperature

- 
 • Joseph Fourier – 1820s
 - Speculated that the atmosphere keeps the Earth warm
- 
 • John Tyndall, Irish earth scientist, 1860s
 - Found the key greenhouse gases
 - Block heat from escaping to space
- 
 • Svante Arrhenius, Swedish chemist, ~1900
 - Doubling CO₂ would raise temperatures 5°C
- 
 • Athol Rafter, DSIR scientist, 1950s
 - Noted that fossil carbon building up in atmosphere

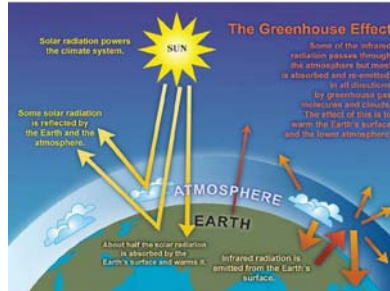
CO₂ and Temperature

- 
 • Joseph Fourier – 1820s
 - CO₂ doubling best estimate 3°C (2.0 - 4.5°C)
This century
- 
 • CO₂ concentration now 38% above pre-industrial
Half that increase in last 30 years
- 
 • Most of the CO₂ there for centuries to come
Oceans & ice sheets take centuries to adjust
- 
 • Noted that fossil carbon building up in atmosphere

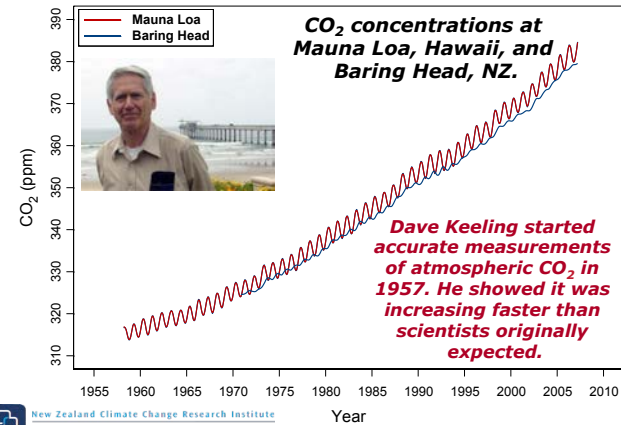
The greenhouse effect



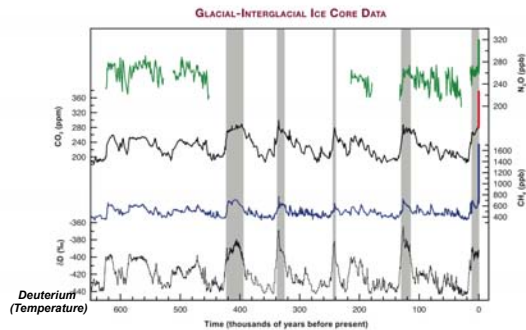
- **Long-term balance controlled by:**
 - Amount & distribution of sunlight (nature)
 - Greenhouse gas concentrations (man & nature)
- **Atmosphere is 0.04% CO₂**
 - Difference between +15°C and -18°C



Increases in greenhouse gases

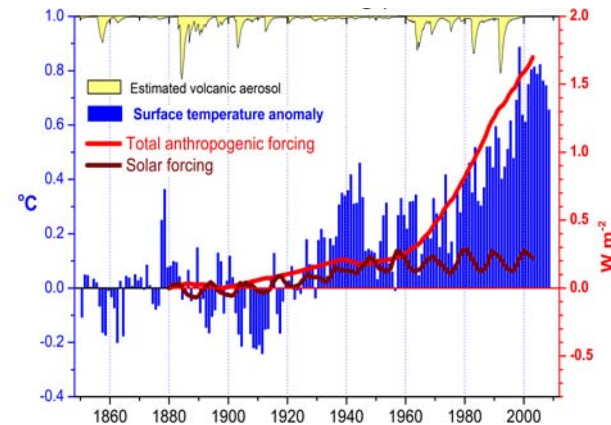


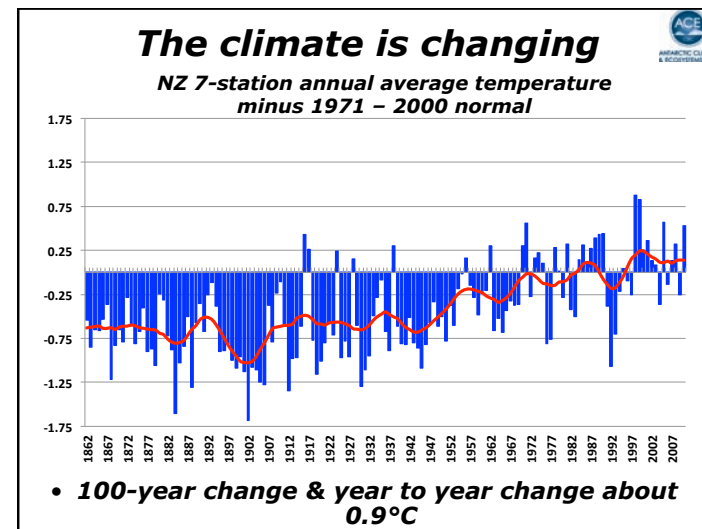
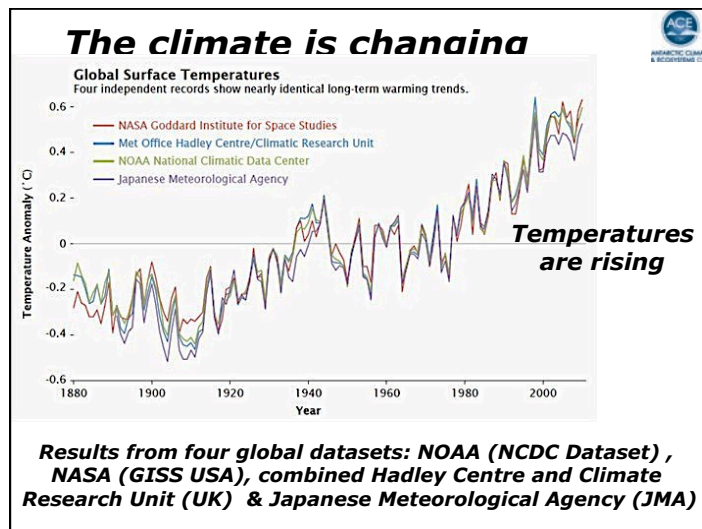
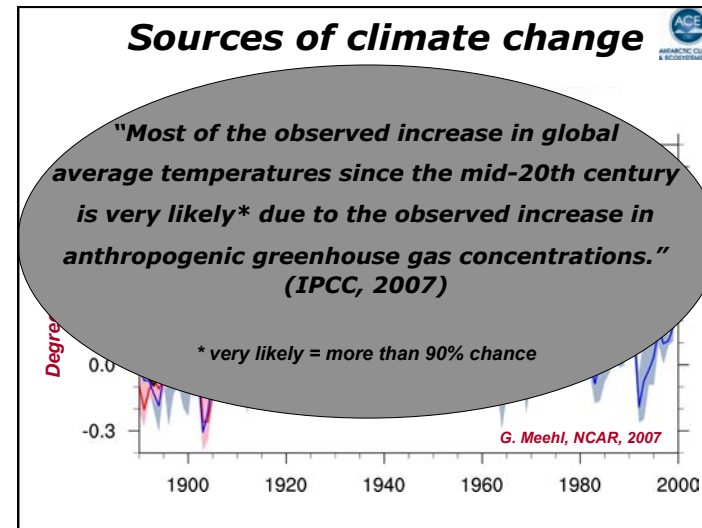
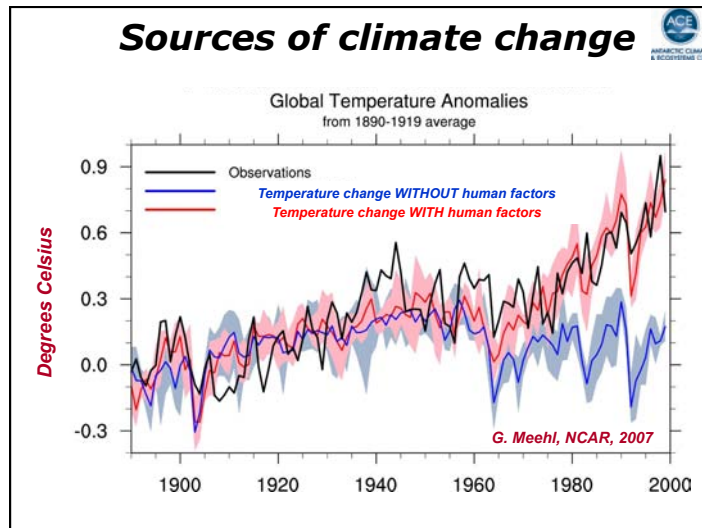
Increases in greenhouse gases

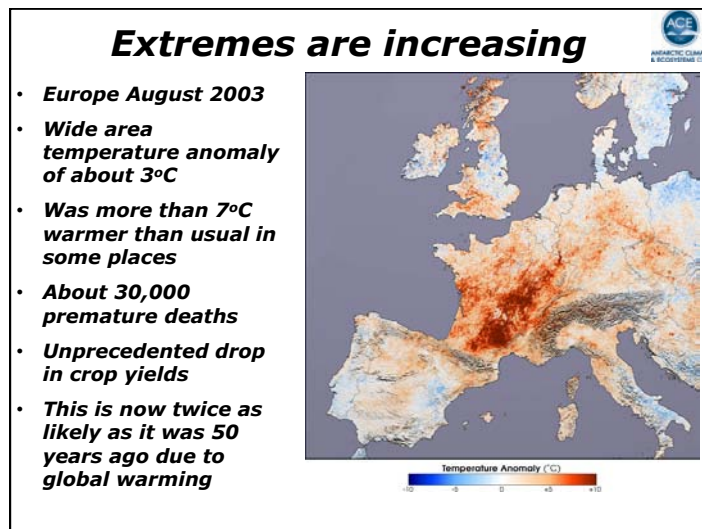
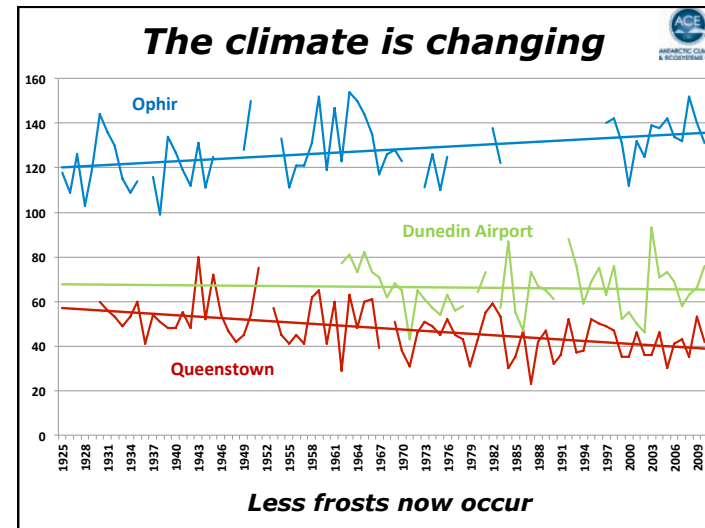
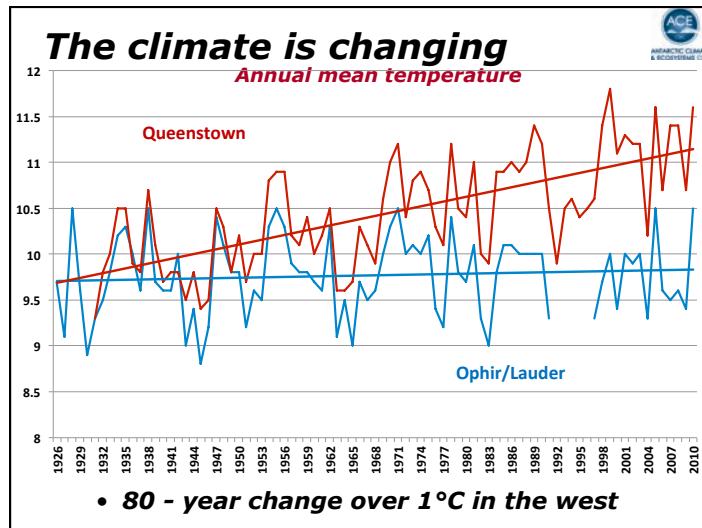


- **Global atmospheric concentrations of CO₂ and CH₄ have increased markedly as a result of human activities since 1750 and now far exceed pre-industrial values determined from ice core measurements spanning the last 650,000 years.**

Sources of climate change







Extremes are increasing


- 2010 Pakistan record breaking floods began in late July 2010, resulting from heavy monsoon rains in Pakistan and affected the Indus River basin
- Drought and widespread fires in Russia at the same time as near-record flooding across much of China is raising the question of correlations between extreme events
- Extremes like this have been expected to become more frequent, for some time
- But climate scientists are now concerned about likely connections between them

Russia

China


Pakistan

Extremes are increasing


ANTARCTIC CLIMATE & ECOSYSTEMS (ACE)

Global warming 'influencing weather extremes'


By Isaac Davison 5:30 AM
Friday Jul 15, 2011




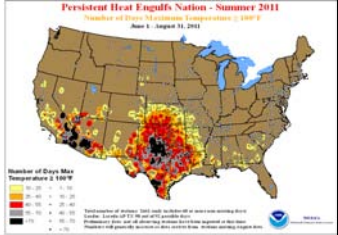
Human-influenced global warming has played a role in the severe weather events in New Zealand and abroad over the past year, says a visiting climate expert, Christchurch-born climate scientist Kevin Trenberth, now employed by the US National Centre for Atmospheric Research.

Weather-related disasters in the past year range from a heatwave in Russia to flooding in Pakistan, China, India, and Queensland and drought in Brazil. New Zealand also broke temperature and rainfall records and experienced a deadly tornado in Auckland. After the deadly US spring storms, Dr Trenberth said: **"When natural variability is compounded by human influences on climate this is what we get. Records are not just broken, they are smashed."**


Extremes are increasing

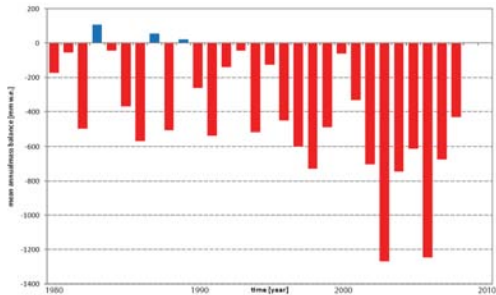


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- The blistering heat experienced by USA during August, as well as the June through August months, marks the second warmest summer on record (NOAA's National Climatic Data Center).
- The average U.S. temperature in August was 24.3°C, 1.7° above the long-term (1901-2000) average, while the summertime temperature was 23.6°C, which is 1.3° above average.
- Texas, Oklahoma, New Mexico and Louisiana had their warmest summers on record. Average summer temperatures in Texas and Oklahoma, at 30.4°C, exceeding the previous seasonal statewide average temperature record for any state.


Glaciers are shrinking

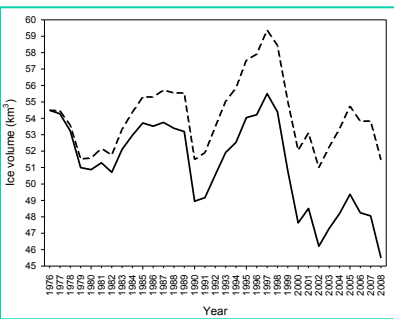

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Glaciers are shrinking world wide

Alpine Response

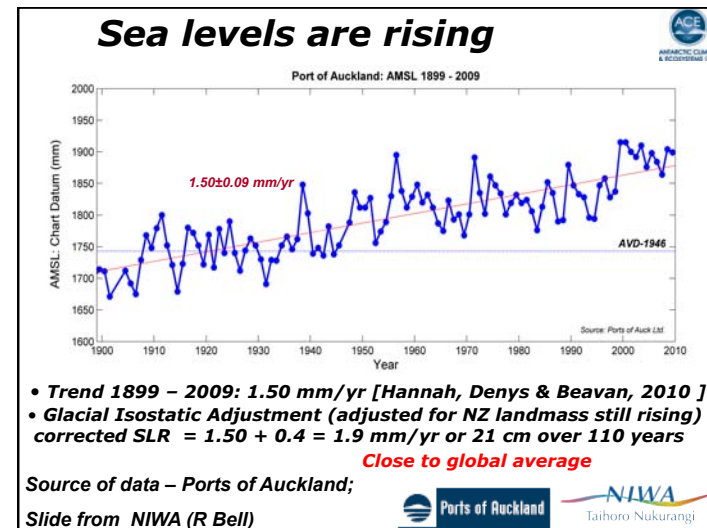
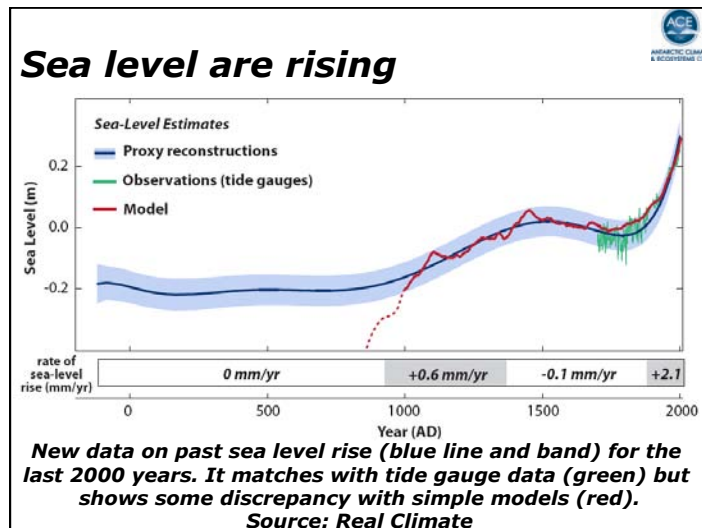
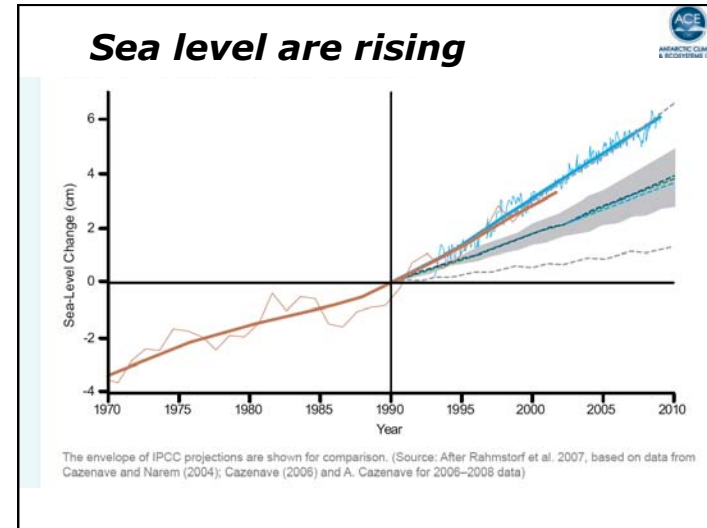
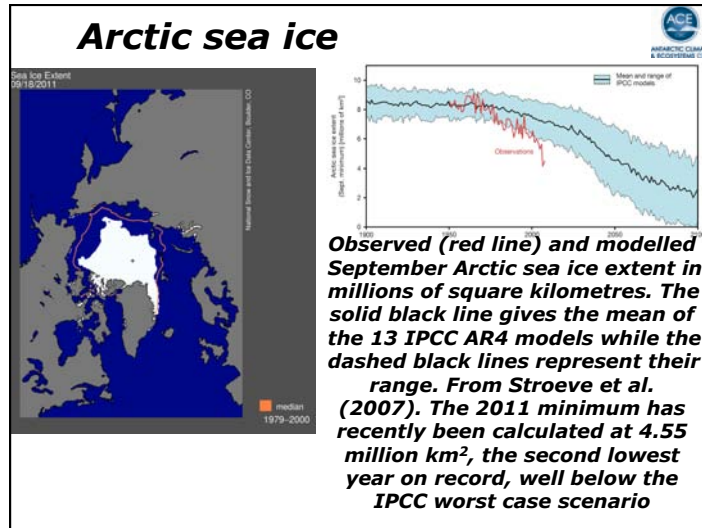

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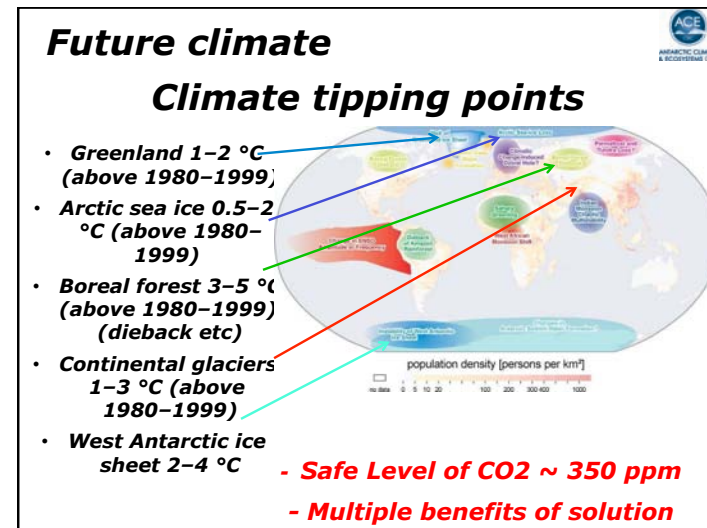
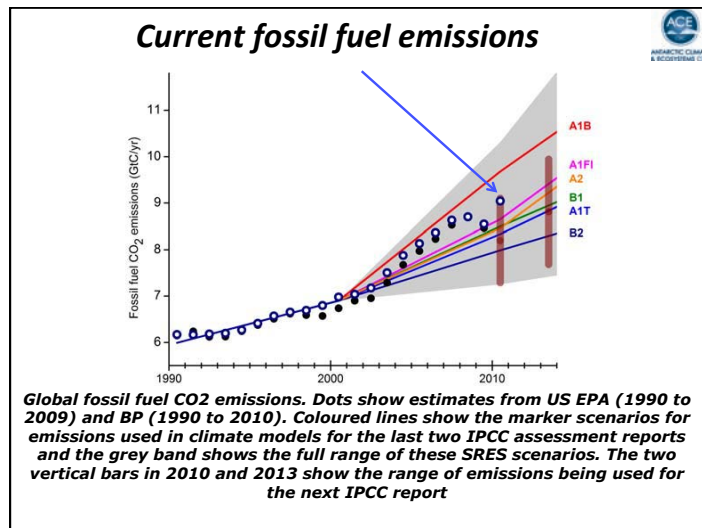
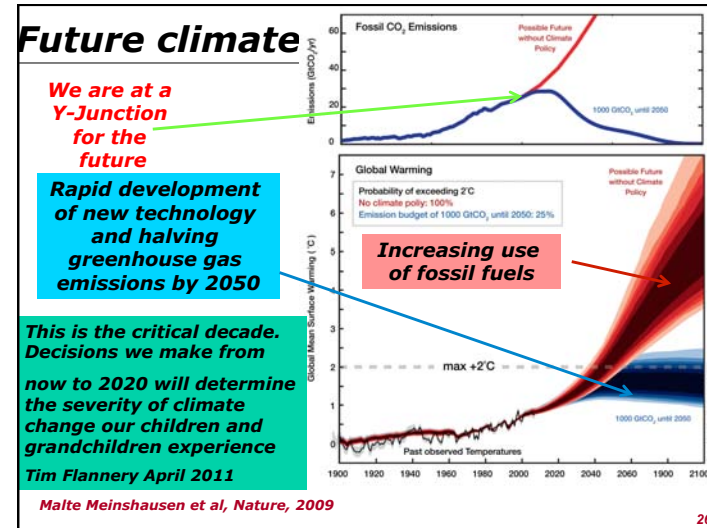
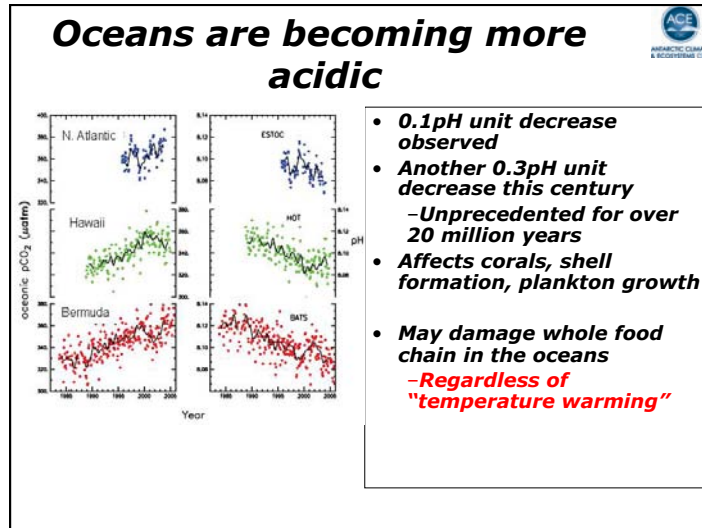


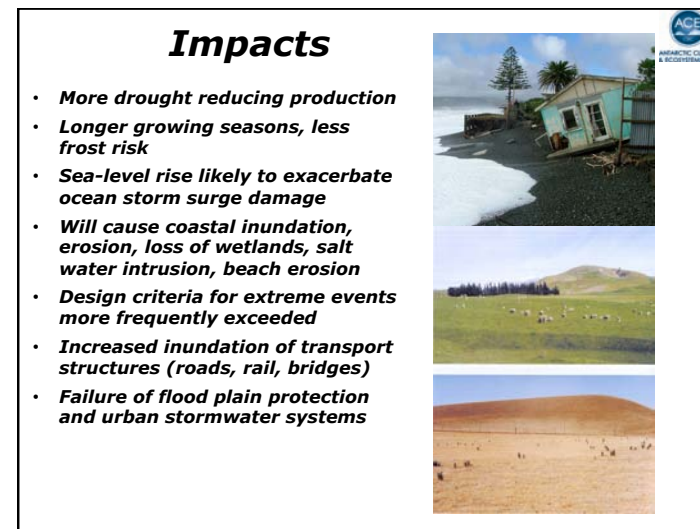
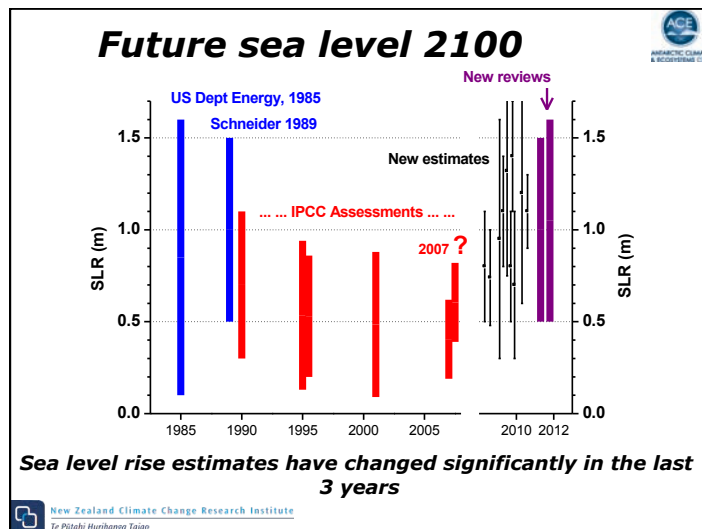
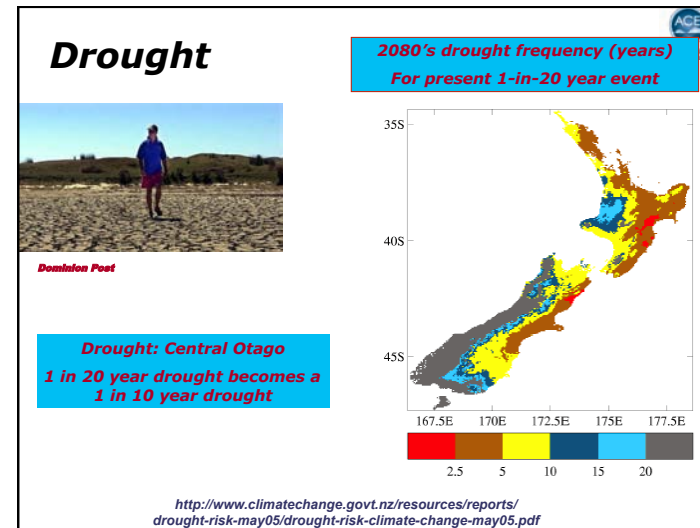
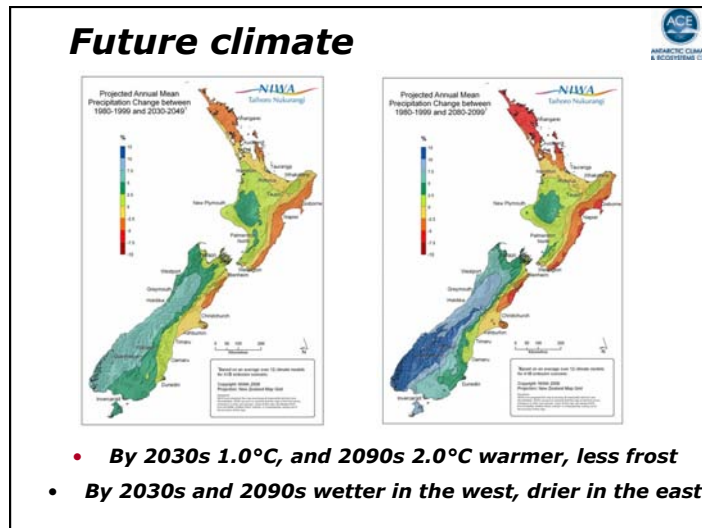
- Southern Alps ice volume has decreased 16% from 55 to 45 km³ 1976 - 2008



Total volume change of alpine ice (solid line)







Summary

- *More greenhouse gases warm the climate*
- *Carbon dioxide 38% higher than pre 1750 & rapidly rising*
- *Temperatures and sea levels are rising, extremes increasing*
- *Less frosts are occurring, glaciers and sea ice shrinking*
- *At a critical point in carbon emissions for the future*
- *Temperatures and sea level will rise significant this century and beyond*
- *Impacts will occur, and mitigation options available for agriculture eventually*



ANTARCTIC CLIMATE & ECOSYSTEMS
COOPERATIVE RESEARCH CENTRE

www.acecrc.org.au

Rod Oram's presentation
Omakau, September 23rd, 2011

Reinventing Paradise

Farming profitably
through climate change

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Agenda

- What's up?
- Why us?
- Our response
- Our advantage

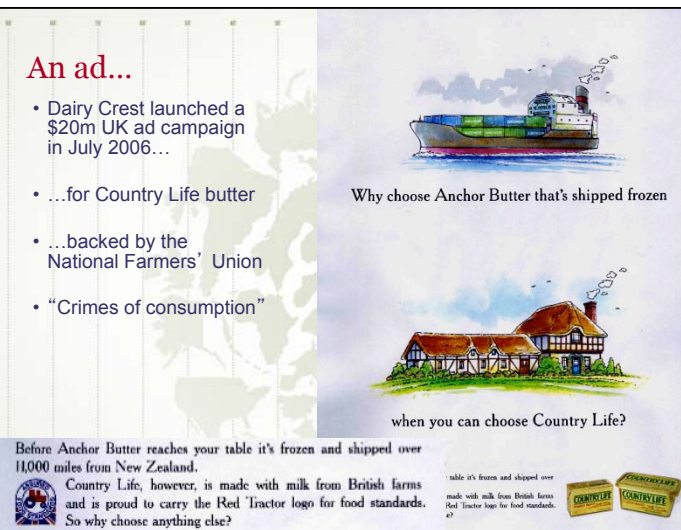
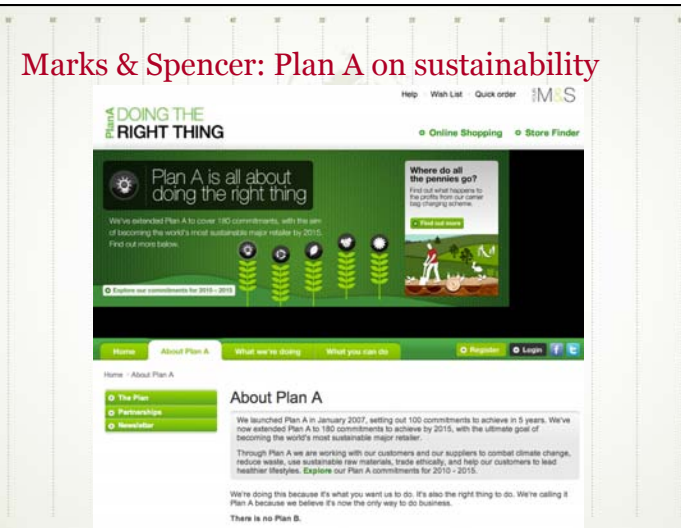


How we – and others – brand NZ overseas



Whole Foods' flagship store, London







Lincoln University...Prof. Caroline Saunders

AERU

The Agribusiness and Economics Research Unit (AERU) operates from Lincoln University providing research expertise for a wide range of organisations.

AERU research focuses on economics, resource, environmental, and social issues.

The AERU employs full-time researchers and it also functions

Related Links

- Carbon Calculator for New Zealand Agriculture & Horticulture
- AERU Research News 2010 (PDF 1504 KB)
- Annual Report 2009 (PDF 258)
- Newsletter (PDF 484 KB)
- Postgraduate study

Enough Food? - World Food Supply

- Currently enough food for 12bill with pop of 7bill predicted to rise to 11bill
- With climate change food supply predicted to increase
- Policies in major countries currently restrict supply, eg: US conservation land 37.6 m ha of which between 4 and 11 million could be used

However.. Enough food but..

- The distribution of food is a huge issue
- Need to empower rural producers
- New production with climate change need
 - infrastructure
 - property rights
 - knowledge of different crops including pests and disease in new areas

So enough food???

But... Does this account for...

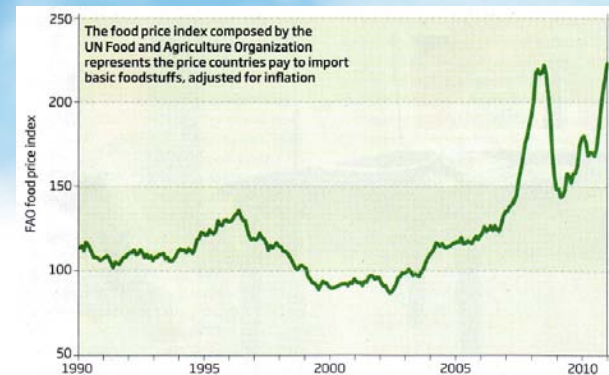
- Water shortages – 2/3 world predicted to experience water stress
- Oil- the availability of cheap supplies
- Inputs such as fertiliser and pesticides
- Less land with predicted loss of 12 mill ha
- Loss of ecosystems and their services
- Changing diets

Future market conditions

- In theory enough food but distribution even more an issue
- The important factor in world markets including food and oil is the fluctuations and uncertainty
- The fluctuations are factors which lead to imperative for change

Imperative to change

- Frequency of oil crises: Political factors, exploration in ecologically vulnerable areas.
 - Climate change: Floods, droughts, shift in production.
 - Food crisis
 - Financial crisis
 - Commodity speculation
 - Fluctuations in prices
- Hit the vulnerable, lead to political crisis.



FAO Food Price Index

So for NZ

- We cant feed the world (2% dairy)
- But need to maintain high value for products based on sustainability and help other countries with our technology
- But... to access high value markets need to assess attributes of product
- This includes being aware of market requirements and policy
- Assurance schemes can lead to win win situation for NZ

NZ Brand

- NZ does brand itself as Clean and Green
- Generally surveys overseas show positive reaction to NZ brand (100% pure; Zespri)
- Need to maintain this to access high value premium markets
- Price not important for consumers in these markets but attributes of products are such as how it is produced
- Retailers are vying with each other to develop schemes to attract this type of consumer

Market schemes



- Leaf Marque – UK, Germany, France, Italy, Sweden and Luxembourg



- Natures choice – Tesco



- Eco– Plan A – M & S



- Good Steward Chain – Walmart

- Assured Food Standard – Red tractor label



- GLOBAL G.A.P.– 93,000 producers 100 countries

Risks and opportunities for our exports

- To access premium market segments have to consider sustainability including social & environmental factors
- Often these are defined by overseas markets
- We have to ensure these factors are defensible and not pseudo
- Food miles ignores production resource use

Food Miles

- ‘the number of miles (kilometres) a product has to be transported from the farmer/grower to various stages of production until it reaches the supermarket and finally the plate of the consumer’.
- Simplistic concept .. But traction with popular press and some environment and other ‘groups’
- Ignores energy use and emissions in production
- We compared UK produce to NZ produce delivered to UK market

Dairy: NZ Versus UK

- NZ uses under half energy than the UK does
- Even despite not being able to obtain as detailed data on UK capital inputs
- Even when methane and nitrous oxide included the UK produces 34% more GHG emissions per kgMS and 30% more per ha



Lamb greenhouse gases – NZ vs. UK

Item	Energy MJ/Tonne carcass		CO ₂ Emissions kg CO ₂ /Tonne carcass	
	NZ	UK	NZ	UK
Direct sub total	4,158	17,156	256	1,117
Indirect sub total	3,698	27,452	241	1,607
Capital sub total	731	1,251	66	125
Total Production	8,588	45,859	563	2,849
Shipping NZ to UK (17,840 km)	2,030	-	125	-
Total Production Energy Input/Emissions	10,618	45,859	688	2,849

Dairy greenhouse gases – NZ vs. UK

Item	GWP ₁₀₀ kg CO ₂ equivalent/ha		GWP ₁₀₀ kg CO ₂ equivalent/kgMS	
	NZ	UK	NZ	UK
Energy	1,145	2,825	1.37	3.47
Methane	5,780	5,310	6.63	6.52
Nitrous Oxide	3,150	3,655	3.66	4.49
Total Emissions (85% allocation to milk)	8,585	10,020	9.89	12.31
Total Emissions (100% allocation to milk)	10,080	11,790	11.61	14.49

Greenhouse gases: Lincoln Uni vs. 'typical' farm

Table 1 Carbon Footprint of the LUDF vs. a "Typical" NZ Dairy Farm

	Carbon Footprint (kgCO ₂ eq/t MS)		Carbon Footprint (kgCO ₂ eq/ha)		Carbon Footprint (kgCO ₂ eq/cow)	
	Lincoln Uni. Dairy Farm	Typical NZ Dairy Farm	Lincoln Uni. Dairy Farm	Typical NZ Dairy Farm	Lincoln Uni. Dairy Farm	Typical NZ Dairy Farm
Direct Energy	380	360	755	375	185	135
Indirect Energy	730	780	1,455	815	350	290
Capital	50	140	105	145	25	50
Methane	4,770	5,570	9,510	5,805	2,300	2,070
Nitrous Oxide	2,950	3,070	5,875	3,200	1,420	1,140
Total	8,875	9,920	17,700	10,340	4,280	3,690

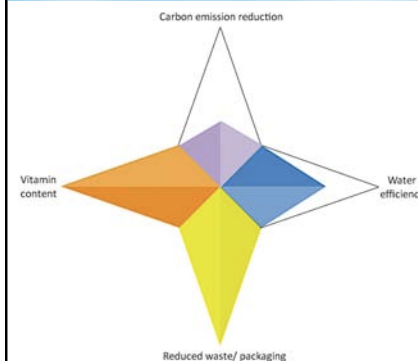
Sustainability & Market Access Issues

- Carbon Footprinting
- Local food and seasonal consumption
- Lower meat and dairy consumption
- Ethical food - fair trade and organic!
- Biodiversity and wildlife
- Water quality and quantity
- Ageing Population
- Food waste

Carbon Footprinting Methodology

- Retailers and others now carbon footprinting
- 15 schemes implemented world wide
- Tesco in 2007 said they would do all 70,000 products (done 6 product lines)
- Japan, Germany, Thailand, Korea, Sweden and Switzerland also have schemes.
- Issues with methodology and science
- Cost of footprint and potential to be trade barrier

Surveyed with other attributes UK and Japan



UK ranks:
Vitamins, water and waste/recycling and then carbon

Japan ranks:
Water, waste vitamins and then carbon

Cutting carbon footprints!

- Modelled producer assuming unrealistic cuts in inputs of 50% and 15% increases in yield – affected **footprint by -4%**
- However modelling consumers making half trips to supermarket and dropping waste from 11% to 9 % **reduces footprint by 14%**
- More emissions in trip to pick up air freighted vegetables than the air freight
- Hence most impact is made by changes at top of supply chain – by consumers

Local Food and Seasonal Consumption

- Growing demand for local food – zero kms
- UK and US government promoting local food and food miles! (sausages from supermarket would have to travel 227,727 miles to have same footprint as those from local shop)
- Growth in local farmers markets, box schemes ect
- Seasonal consumption also may not be better for the environment
- Also consider wider sustainability implications

Waitrose -

- Waitrose will be the first supermarket to stock their own 100% British dairy products, and customers will be able to trace its provenance from farm to fridge.
- This is great news for the cows and the British farmers and the environment. The cows are being raised in the lap of luxury. They are living in light airy barns, with clean beds of straw or a specially designed comfy mattress; nutritional advisors to ensure a healthy diet and pedicures--their hooves are regularly trimmed.

Lower Meat and Dairy Consumption Low Carbon Diets

- Demand for reduction in meat and dairy consumption (livestock 18% of worlds total)
- 'meat free Monday' Paul McCartney
- Ghent – meat free one day a week
- WWF meat should be labelled 1-3 times a week max
- NHS – reducing meat and dairy in diets

Lower meat and dairy consumption Low carbon diets

- Research shows that dairy based diet not much different from vegan diet for emissions (6%)
- Meat based diet more emissions (23% more)
- Further research into alternative sources of supply for meat and its by products

Emerging markets

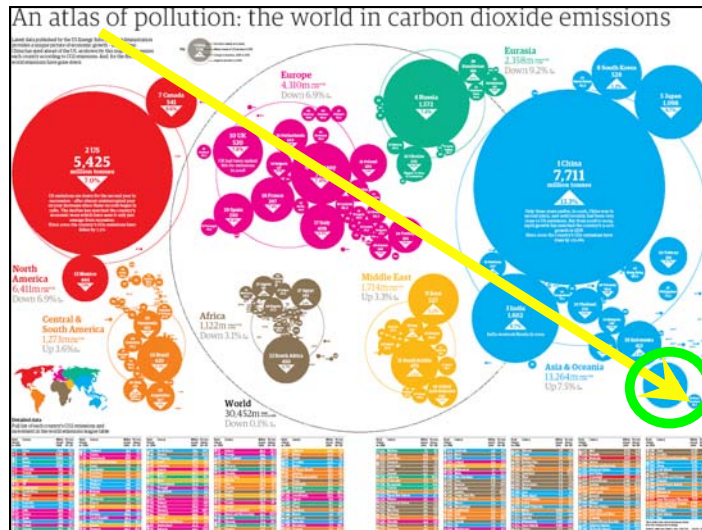
- Considerable growth especially for livestock products (but much met by their own increase in production)
- One billion middle class in Asia, Latin America and central and eastern Europe
- Main change from small retailers to supermarkets and global procurement
- Eg China from no supermarkets in 1990 to 60,000
- Growth from western chains (Tesco Walmart) and these likely to require same standards of procurement for their other markets

Other countries being subsidies to meet sustainability requirements

- EU Single Farm Payment – subsidises farmers to comply with environmental criteria and will include carbon footprinting (75bill euros)
- EU also pays extra for farmers for agri-environmental schemes to – (22 bill euros)
- EU pays to help comply with market schemes (92 million ecu)
- US – increase in conservation area (115 million acres)
- Increase in payments for working land conservation (US\$3.4 billion)

Agenda

- What's up?
- **Why us?**
- Our response
- Our advantage



- ### Why New Zealand?
- Our environment matters:
 - Of all OECD countries, we're the most dependent on our natural environment for earning our living
 - Environmental integrity and brand are vital to earning that living
 - Our resources are thin:
 - We are a very, very small, thinly resourced, open economy
 - ...we have few people, limited capital
 - We have to innovate fast and efficiently, in business and government
 - E.g. world's first independent Central Bank; fiscal responsibility act
 - We think and act globally to create opportunities...e.g.:
 - World Trade Organisation; sponsoring China's admission; first FTA
 - WTO agricultural negotiations
 - UN in general...
 - ...UNFCCC in particular, e.g. on agriculture and forestry
 - ...Kyoto chairman is Adrian Macey, a NZ diplomat

- ### Agenda
- What's up?
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- ### Role of NZ government – overseas
- **Global Research Alliance on Agricultural Greenhouse Gases**
 - Proposed by NZ government at Copenhagen in 2009...to:
 - Reduce emissions; increase food production
 - Help developing countries to join global climate change frameworks
 - Alliance now has 36 countries + 3 observers including the EU
 - = 70% of global agricultural GHGs; agriculture = 15% of total GHGs
 - Three main workgroups:
 - Livestock, led by NZ and Netherlands, 483 projects identified to-date
 - Croplands, led by US, 429 projects to-date
 - Paddy Rice, led by Japan, 60 projects to-date
 - Secretariat: NZ
 - Successful Ministerial Summit in June
 - What in means to NZ:
 - Bedrock science for us; our biggest international science collaboration
 - Government has committed NZ\$45m over four years 2010-13

Business engagement

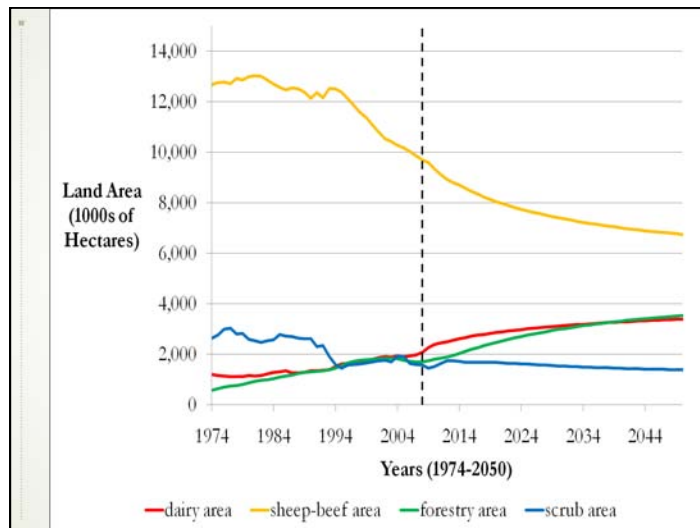
- After years of scepticism, engagement is growing
- Some leaders emerging, e.g.
 - Fonterra in the dairy sector
 - Air New Zealand
 - Zespri in kiwifruit
 - Mighty River, Meridian and Contact in renewable electricity
 - NZ Post in transport
- Investment in renewable electricity accelerating
- Some fuel switching e.g. from coal to wood chips in industrial plants
- But generally speaking, if companies aren't directly engaged in the ETS as "points-of-obligation", then many tend to ignore even basics such as energy and fuel efficiency audits, improvements
- Clean tech activity still very modest
 - ...tho some outstanding individual companies and investors

Land Use and Climate Change in New Zealand

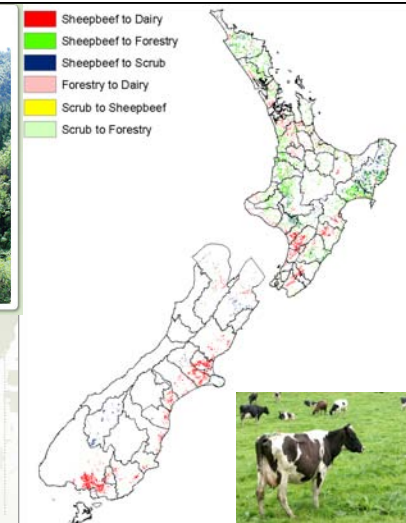
Suzi Kerr, Motu

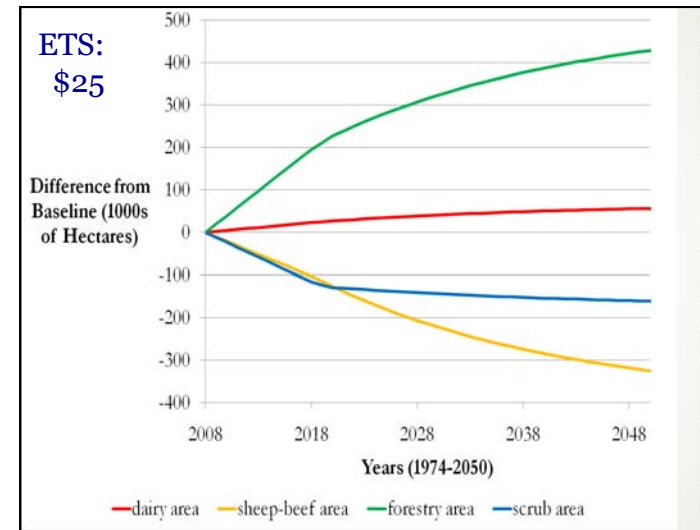
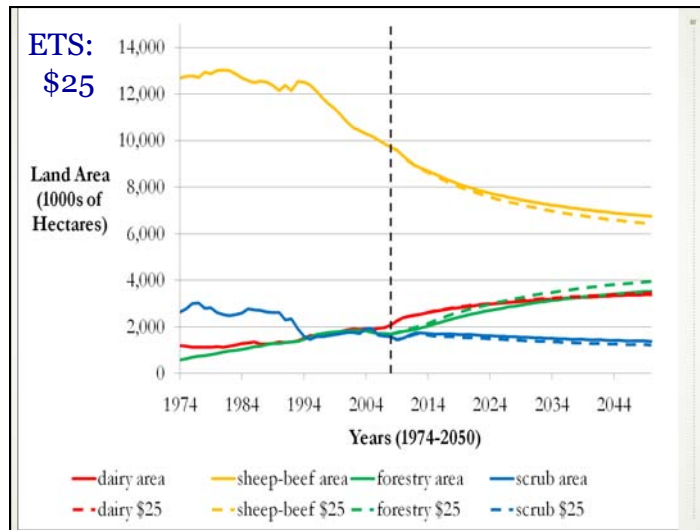
Australia-NZ Climate Change Conference,
1-2, August, 2011

Watch Suzi's conference presentation at
www.climateandbusiness.com



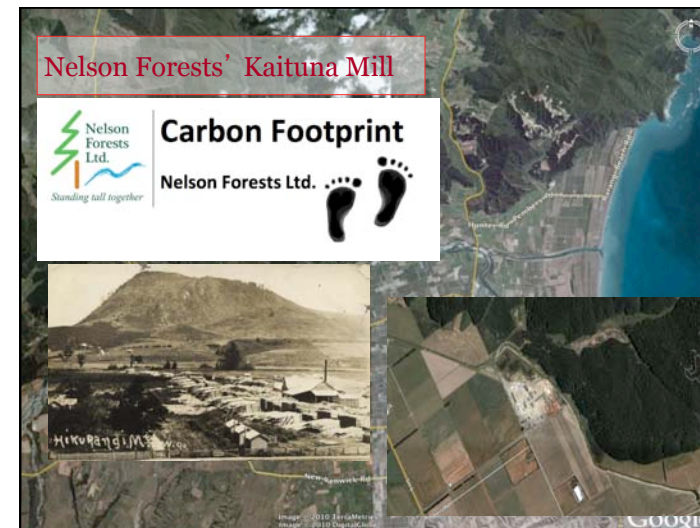
Pressure for land use change to 2030





Forestry engagement

- Forest owners suffered great turmoil because of policy indecision, shifts by last government
 - Impact included virtually no new planting; heavy deforestation
- Much more policy stability now
 - Impact includes big pick up in planting
 - Notably, some sales of Kyoto forest credits to overseas buyers
- But big issues still to be resolved, e.g:
 - For small forest owners, decision whether to opt in or out of the ETS is a big one
 - Uncertain future for permanent forest sinks
 - ...likewise, international negotiations on forestry rules
- New Zealand remains very dependent on its Kyoto forests for minimising its Kyoto obligations
- This is a short-term strategy; doesn't solve long term emissions, mitigation & adaptation; policy and action still inadequate on those issues





Zespri

- April 2009: Published its carbon life cycle analysis:
 - Orchard operations make up 17% of total emissions for EU exports
 - Packhouse & coolstore processes account for 11% of total emissions
 - Shipping accounts for 41% of total emissions
 - Repacking and retailer emissions amount to 9% of total emissions
 - Consumer consumption & disposal comprises 22% of total emissions
- Bottom line: resource efficiency builds a more profitable, resilient business
- E.G. Kite-assisted ships save 22% of their fuel bills on average



Zespri

- Established brand
- Built marketing
- Innovated – gold
- Innovated – orchards
- Innovated – intellectual property
- Clever, 12-month supply chain
- Result?
- 40% - 100% premium in EU
- ...and lots more science yet

From exporter to global leader...

...decommoditising a commodity



Farming engagement

- Dairy exports are NZ's largest source of foreign exchange (about 25%)
- Dairy farming is NZ's largest industrial GHG emitter (about 40%)
- Dairy sector is NZ's largest export conundrum
 - Can it grow volume and value strongly?
 - Can it do so in environmentally responsible ways?
 - Can it compete against low-cost farmers overseas?
- Sheep & beef farmers have the same issues
- Federated Farmers has been the fiercest ETS critic
 - Focusing only on cost and competition...not on opportunities
 - Sceptical about climate change, worries about economic impact
- Strong countervailing voices e.g. Fonterra
- Government is taking reasonably firm line with FedFarmers
 - ...pushing the benefits of the ETS, science, int'l engagement

NZ Agricultural Greenhouse Gas Research Centre

- New ways of working
- ...on science; on collaboration, NZ and globally
- ...on engaging with farmers

Pastoral Greenhouse Gas Research Consortium

- Since 2002, 50/50 government and industry
- \$30m investment in science so far
- NZ Agricultural Greenhouse Gas Research Centre
- Opened March 2010; \$48.5m funding next 10 years
- Four main workstreams...\$15.6m committed 2010-14
- Mitigate methane; mitigate nitrous oxide; increase soil carbon; deliver farming solutions



The Centre's role is to find ways for New Zealand to meet its international greenhouse gas emission obligations without reducing agricultural output.



Our opportunity

- 1 litre of milk = 940 gm of CO₂ equivalent
 - (According to the lifecycle analysis of milk by Fonterra, processor of 90% of NZ's milk, and a world leader in the global dairy trade)

16,000,000,000 litres = 15,040,000,000 kg of CO₂ eq

- 15.04m tonnes of CO₂ eq per year is not a waste product, or a liability

**Helping animals digest their feed better
so they produce fewer emissions, more energy
would help close the nutrient cycle**

**This a brilliant business opportunity...
healthier cows and soil...**

= more food, better environment, bigger profits

Fonterra's strategy

- 4.4m milking cows; 19% of agricultural GHGs; 25% of exports

• Progress:

- 13.9% cut in energy emissions per tonne of product over last 8 years
 - Its plants began using ETS discipline in 2006
- 8.5% cut in agricultural emissions per litre over past 8 years

• Goals:

- 10% cut in ag emissions per unit of production by 2013 is NZ dairy goal
- 30% cut by 2030 possible Fonterra believes...
 - "There is no debating the opportunity. We have a head start on some of our competitors." See Andrew Ferrier at www.climateandbusiness.com

• Strategy:

- Pricing ag emissions would cost average farm \$22,000 a year
- So, don't activate ag emissions in the ETS
- If they were, production would fall here...rise in higher emission country
 - **But it's argument is deeply flawed**

What's really at stake

- Fonterra: ETS will cost average farm \$22,000 a year
- **Fact:** - No it won't; the industry will get free carbon credits to nullify impact
 - Cost will be \$8,300 in 2015 for the average farm
- Fonterra: ETS will cut production here
- **Fact:** - No it won't; more land will go into dairying
 - Dairying will become more intensive, so more emissions efficient
- Fonterra: What happens in NZ is significant to global industry
- **Fact:** - World dairy output grows each year by more than entire NZ output
- Fonterra: We don't need the discipline of ETS...we'll do this anyway
- **Fact:** - The ETS and gov't oversight will keep dairy industry focused
 - These new disciplines drive new analysis, insights, science & tools
- **Fonterra must lead**...it can drive these emissions & productivity gains better than any other global producer
 - It buys one-third of its milk overseas
 - Its ramping up farming overseas

ETS impact on farming

- Animals should be activated in the ETS in 2015, the government's latest review of the ETS recommended
- ...and get the same 2-for-1 deal of all other sectors and extend that for 3 years
- ...to reduce the financial cost
- But government signaling it will delay ag

Emissions Trading Scheme
REVIEW 2011

DOING NEW ZEALAND'S FAIR SHARE
Emissions Trading Scheme Review 2011 (Final Report)



Types of participants	2012	2013	2014	2015	2016	2017	2018	2019
Agriculture ETS participants receiving agricultural allocation	\$0	\$0	\$0	\$1.3	\$1.4	\$2.0	\$2.7	\$3.5
Highly emissions-intensive, trade-exposed ETS participants receiving industrial allocation	\$1.3	\$1.8	\$2.5	\$3.3	\$3.5	\$3.8	\$4.0	\$4.3
Moderately emissions-intensive, trade-exposed ETS participants receiving industrial allocation	\$5.0	\$6.9	\$8.7	\$10.8	\$11.0	\$11.3	\$11.5	\$11.8
Other ETS participants receiving no allocation	\$12.5	\$16.8	\$20.8	\$25.0	\$25.0	\$25.0	\$25.0	\$25.0

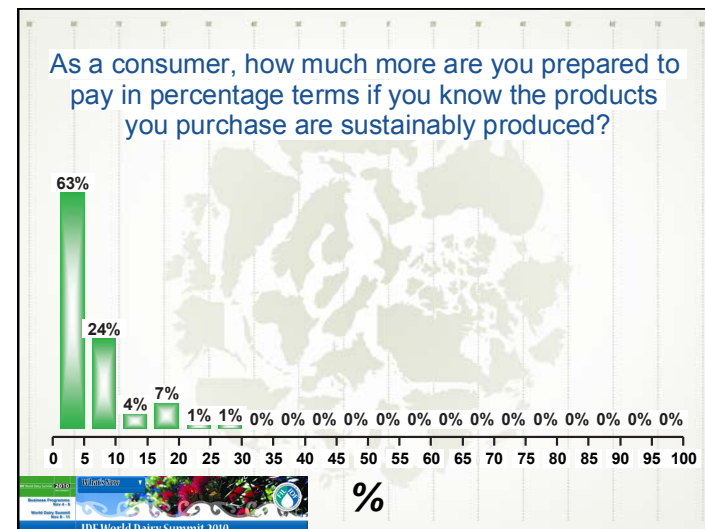
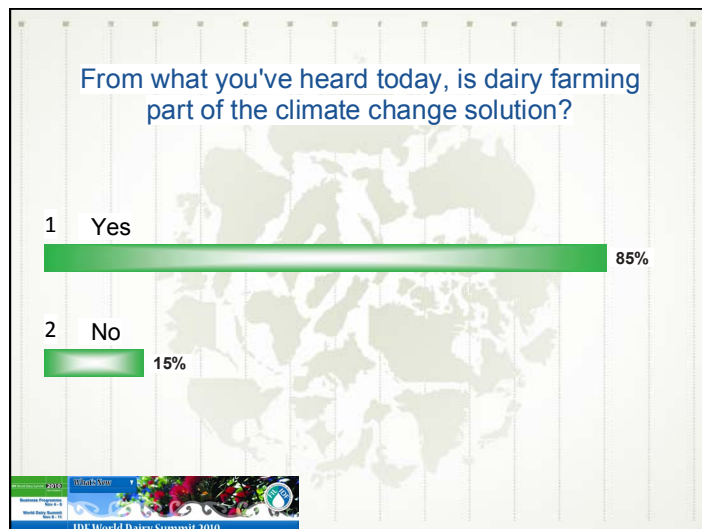
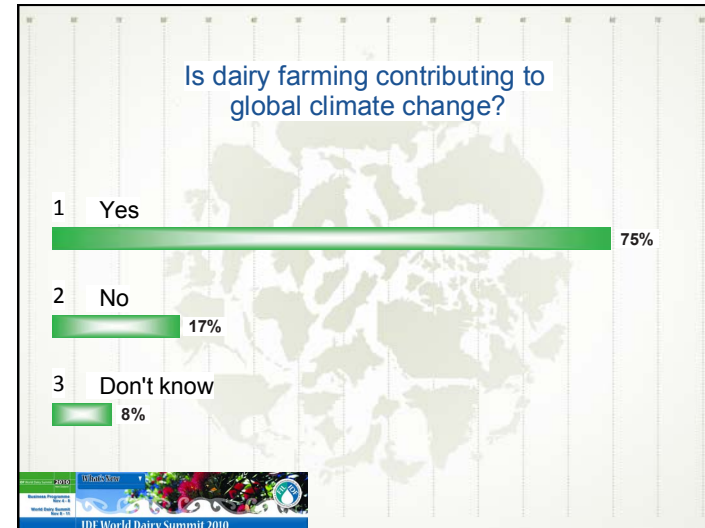
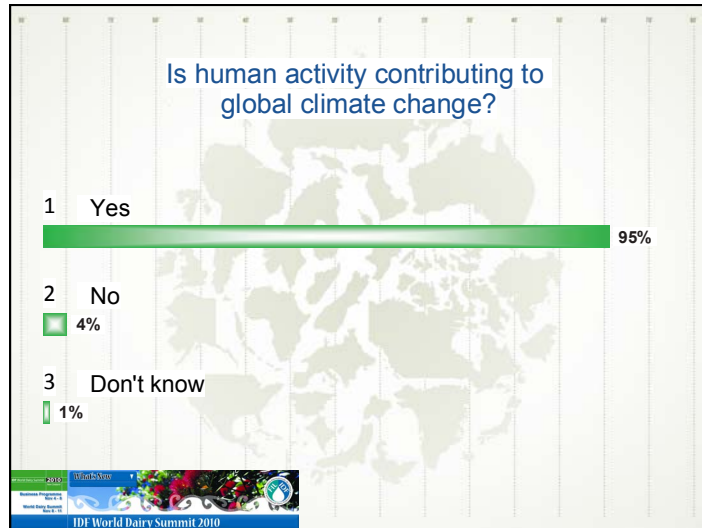
Table 10.3: Summary of impacts on farmers (assuming a \$25 carbon price)

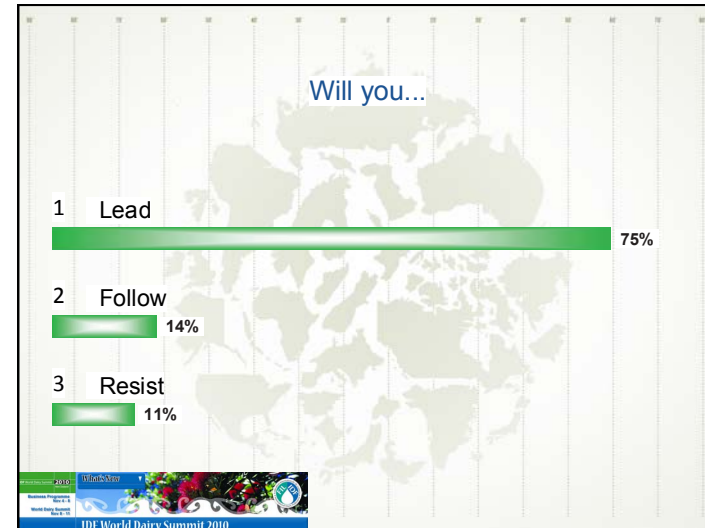
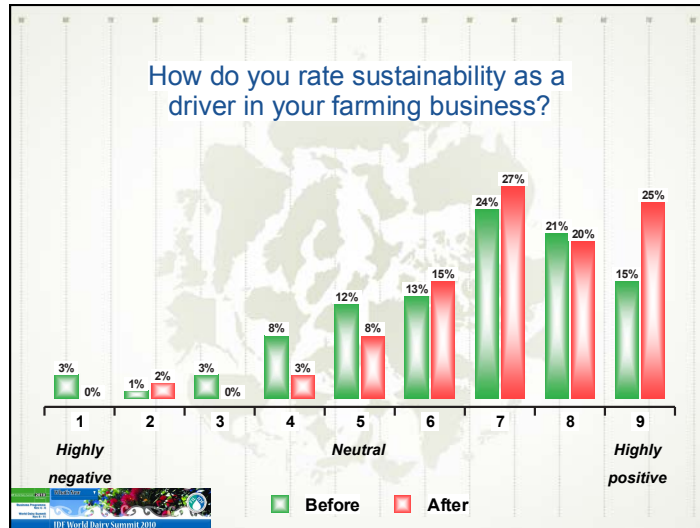
	Status quo	Panel's recommendations
Average dairy farmer's expenditure on energy and obligations		
2013	\$6,700 pa	\$4,400 pa
2015	\$9,900 pa	\$8,300 pa
2016	\$10,200 pa	\$8,400 pa
2017	\$10,500 pa	\$9,200 pa
2018	\$10,800 pa	\$10,100 pa
2019	\$11,200 pa	\$11,200 pa
Average sheep and beef farmer's expenditure on energy and obligations		
2013	\$2,400 pa	\$1,600 pa
2015	\$5,500 pa	\$3,900 pa
2016	\$5,800 pa	\$4,100 pa
2017	\$6,100 pa	\$4,800 pa
2018	\$6,400 pa	\$5,700 pa
2019	\$6,700 pa	\$6,700 pa

The road to sustainable dairy farming

- The International Dairy Federation began locking on to climate change issues a few years ago
 - Leaders within it include Fonterra, exporter of 90% of NZ's milk... and David Homer, an IDF board member and UK dairy farmer
- The IDF's 2010 World Dairy Summit was in Auckland last November
 - 2,250 delegates from 30 countries
 - Sustainable dairy farming was one of the conference streams
 - ...attended by 250 farmers and scientists
 - ...upbeat assessment of science, environment & business opportunities
 - Some of the delegates responses follow...







- ## Agenda
- What's up?
 - Why us?
 - Our response
 - **Our advantage**

- ## Our advantage
- In a world where one product, one country looks ever-more like others...
 - ...we stand out for our innovative, practical, leading approaches to issues
 - An example:
 - Our pavilion at the Shanghai World Expo last year was very distinctive
 - ...and in many lists of Top 10 "must see" pavilions
 - Expo's theme: "Better City, Better Life"
 - China investing in new technology, materials, energy sources so many more people can enjoy higher living standards
 - Our pavilion featured NZ's very distinctive urban lifestyle
 - In these sorts of ways, we're starting to reap the same rewards from responding constructively to climate change

