

Sustaining Victorian Food & Farming 3FP workshop

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Triple Helix Consulting

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Take home messages

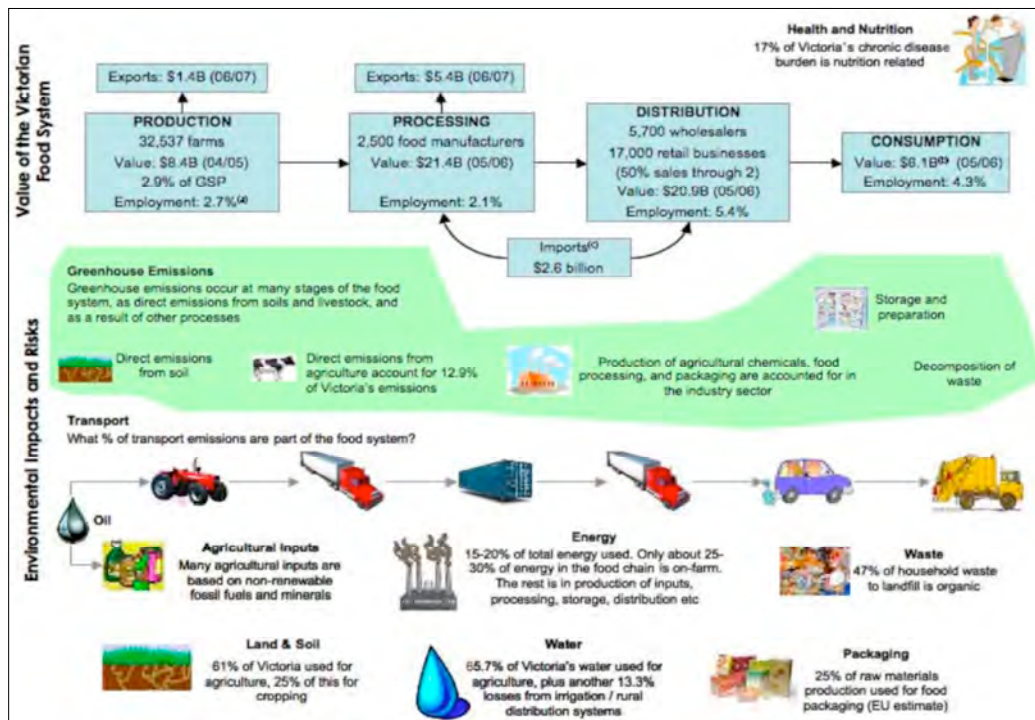
- We are living through a period of unprecedented environmental change, that is likely to intensify - **this is not a blip**
- Business as usual is not a viable trajectory
- The Victorian food system needs to improve its performance irrespective of climate change
 - But climate change raises the stakes & increases the risks
 - Victoria can lead a new approach to food in a drying climate
 - This is about innovation, regional development & leadership
- **To decide not to succeed, is to decide to fail**
- New alliances are needed across the health, food and farming systems, and along the food value chain
- **Leadership is needed at all levels**



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Outline

1. The Victorian Food & Farming System
2. Drivers for Change
3. Opportunities for improvement
4. Flying some kites
5. Hopes from this workshop



1. The Victorian Food & Farming System

- The biggest manufacturing sector
- A major exporting sector (~\$6B, 26% of Aust. total)
- Employs about 15% of Victorians, more in the regions
- A huge environmental footprint
 - Food about 23% of GHG emissions (Ag 13% of Vic emissions)
 - The largest component of household water use
 - Ag 66% of diverted fresh water use (2005)
 - The largest ecological disturbance on rural landscapes
 - Victoria the highest proportion of degraded ecosystems
 - Most rural river reaches failing SEPP benchmarks
- An obvious focus for government priorities like innovation & regional development
 - not to mention culture & identity



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2. Drivers for Change

- World food demand
- Climate
- Water
- Energy
- Soil & other resource constraints



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The human footprint on the planet

	1950	2050
Population	2 billion	9 billion
CO ₂	310 ppm	>450ppm
Energy Use	80EJ/yr	>550EJ/yr
Sea Levels	————	0.2-1.5m higher

- This trajectory cannot be sustained without a radical decoupling of economic growth from resource depletion and degradation, and from emissions of greenhouse gases (GHG).
- Achieving such a decoupling is the most profound structural change the world has ever attempted



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Feeding the world

- In essence, the world needs to double food production by about 2050, & improve distribution
- We have done this in the past, mainly through clearing, cultivating and irrigating more land
 - and to a lesser extent better varieties, more fertiliser etc
- Climate change is narrowing those options, with limits to:
 - water
 - land
 - energy
 - nutrients



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Buenos Aires Herald
A WORLD OF INFORMATION IN A FEW WORDS
Rising food prices may trigger social unrest, instability

THE AGE
Newspaper of the Year
Food prices to soar

The Nation
Food prices spiral

People's Daily Online
Food in Crisis?

DAILY EXPRESS
THE WORLD'S GREATEST NEWSPAPER
PRICE OF FOOD SOARS TO ALL-TIME RECORD

The Seattle Times
Somalis riot over food prices

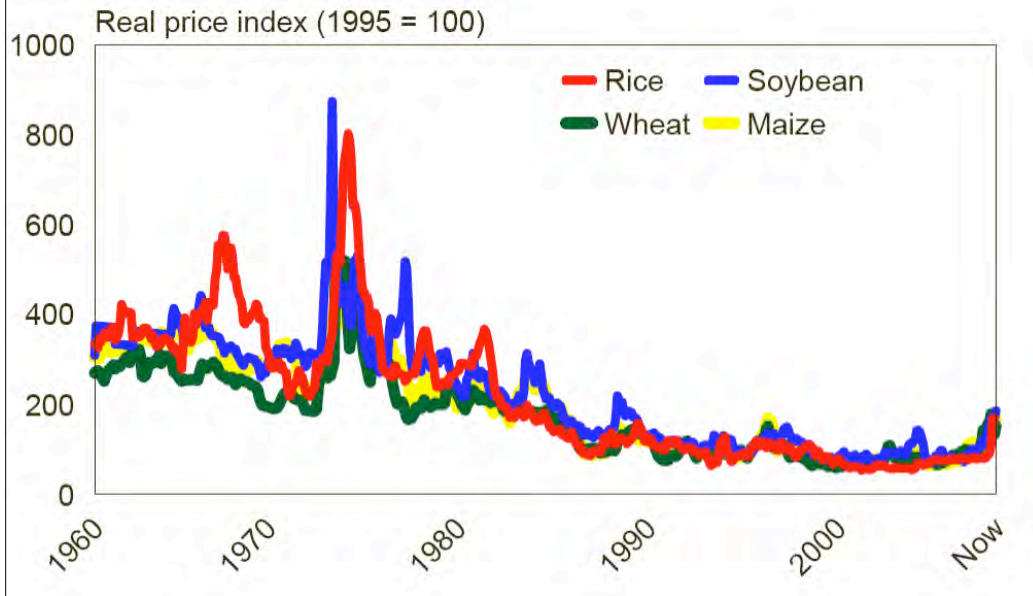
DAILY GUIDE
Food Price Hike Hits Ghana

The Economist

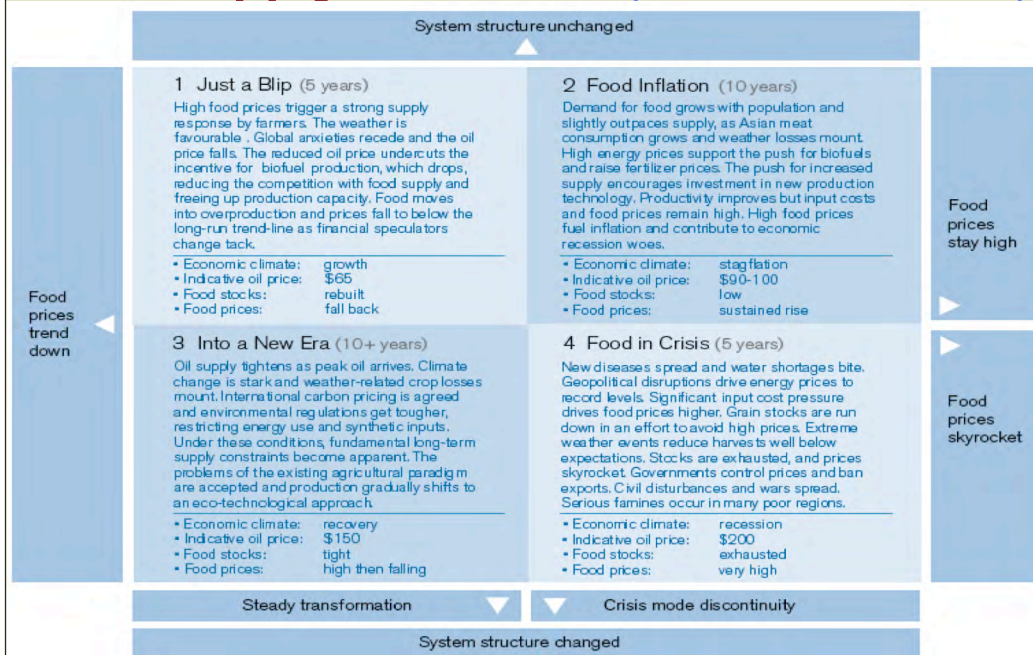
THE HINDU
Food Prices Just Keep on Rising

Food Prices: The Silent Tsunami

But maybe we ain't seen nothin yet....



Food Supply Scenarios (Chatham House 2008)



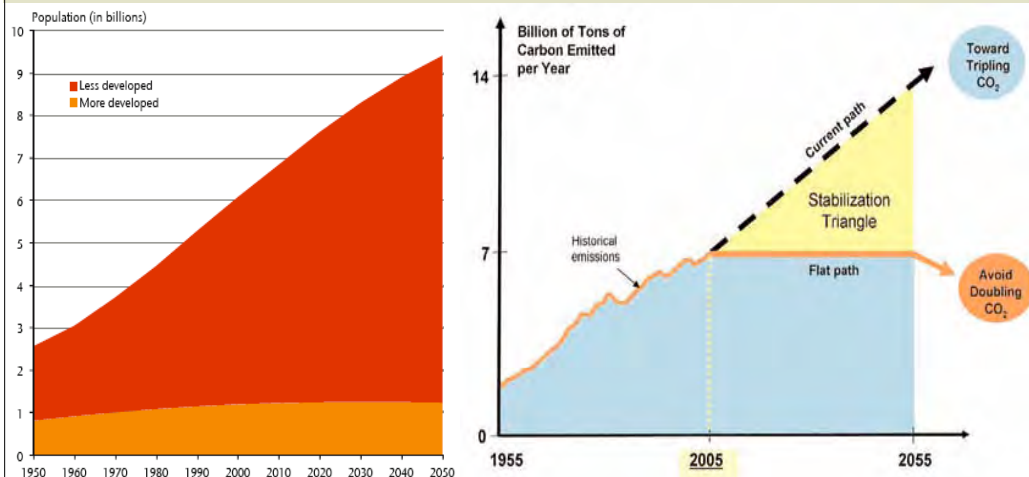
2. Drivers for Change

- World food demand
- **Climate**
- Water
- Energy
- Soil & other resource constraints

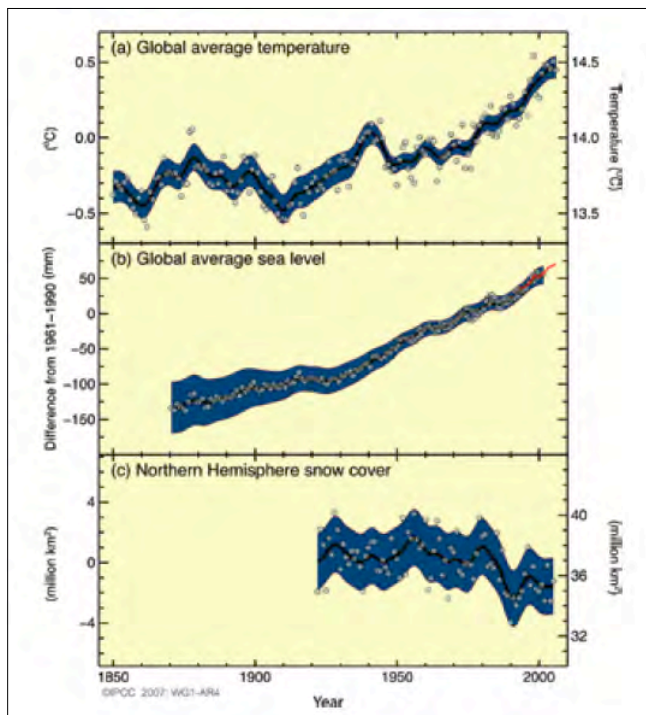
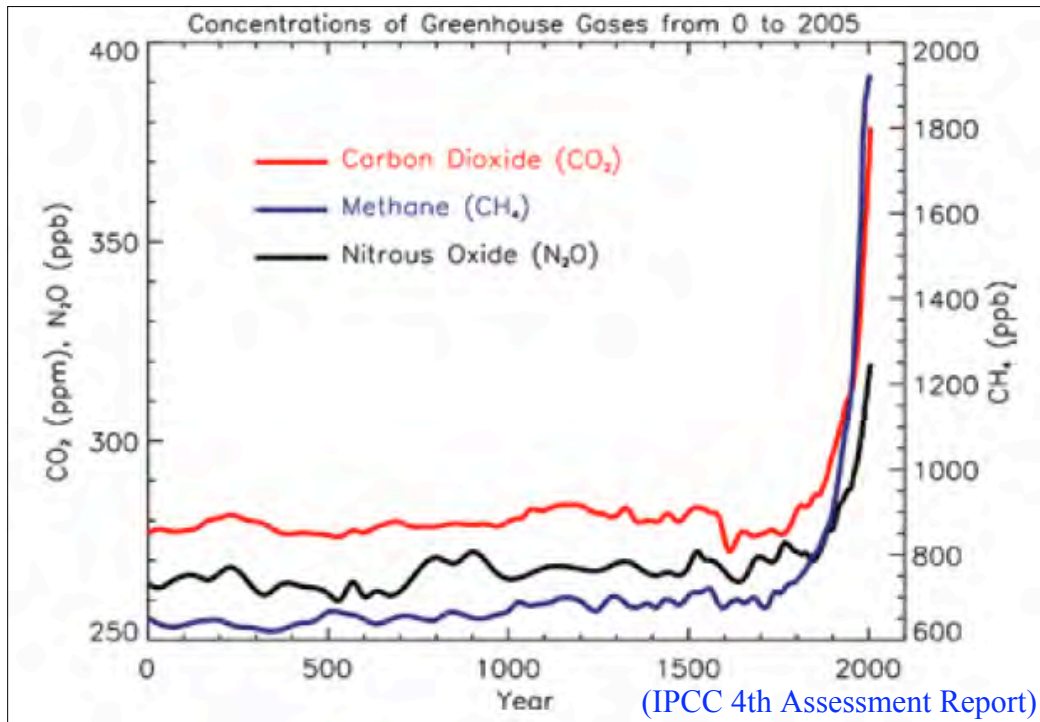


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Population & carbon emissions

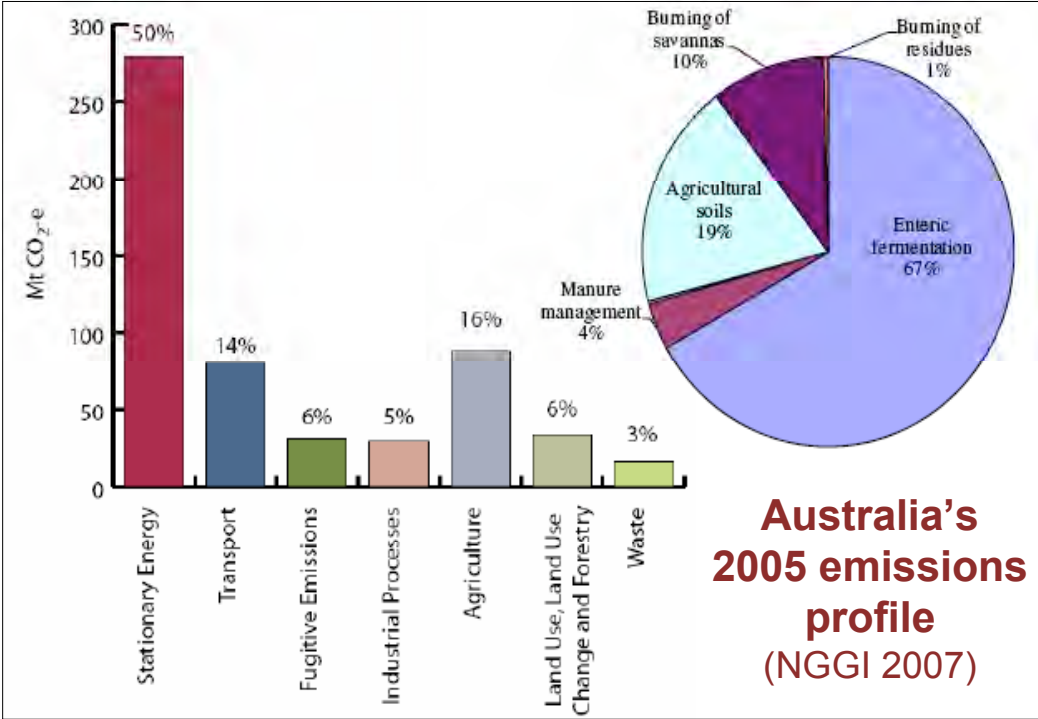
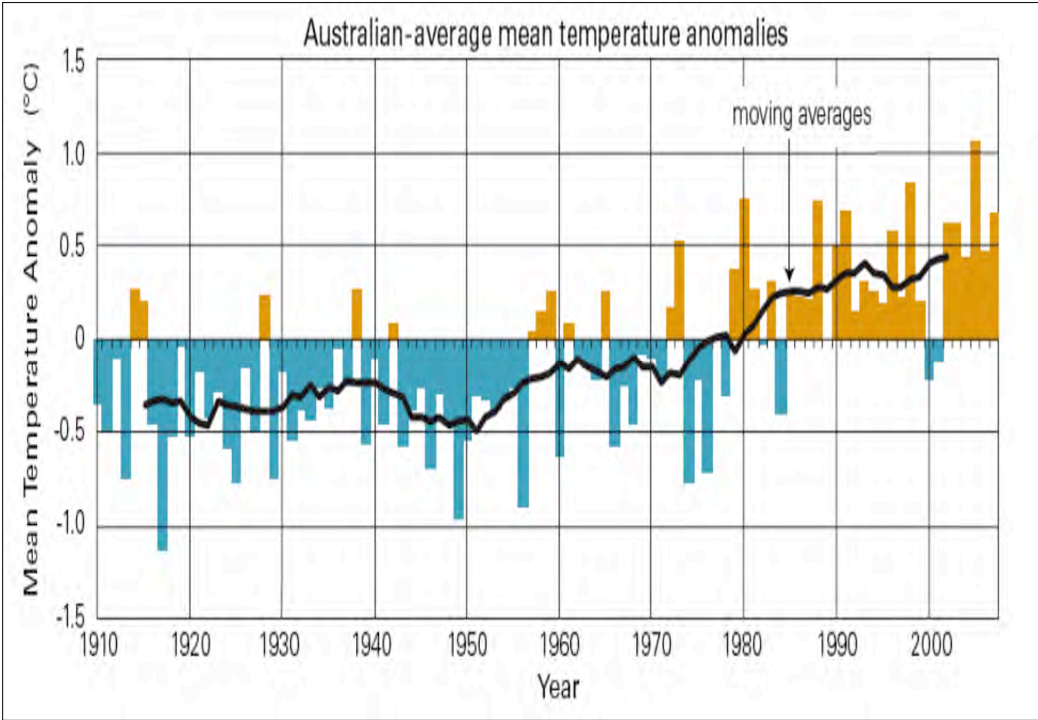


Source: WBCSD & IUCN 2008; Harvard Medical School 2008

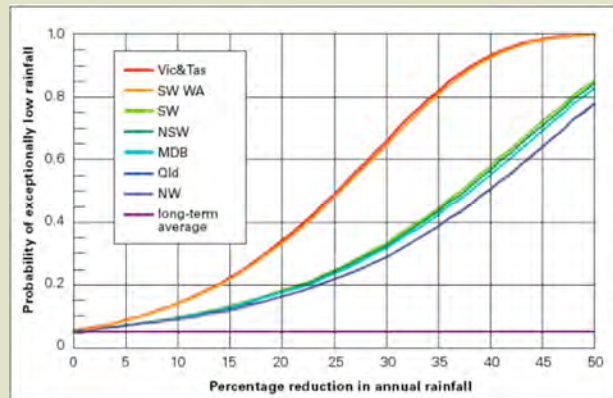


Impacts

- As greenhouse gases increase
 - So does temperature
 - And sea levels
 - Snow & ice melt
 - More variable climate
 - More extreme weather
- Climate change is the biggest market failure the world has ever seen (Stern and Garnaut)



Victoria is one of the most affected regions in one of the most affected countries...



- for a given % reduction in annual rainfall across Australia, there is a much greater increase in the probability of exceptionally dry conditions in Victoria



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Likely on-ground impacts

- Significant long-term reductions in water yield (worse cf. CSIRO models)
- increases in stream salinity, but smaller saline discharge areas
- more frequent and intense damaging summer storms
- more, bigger and hotter bushfires (NRM impacts habitat, water, weeds)
- potential surprises as 'sleeper' weeds and pests take off in more favourable conditions, and as pests and diseases from northern Australia (e.g. cattle tick; fruit fly and cane toads) extend southwards
- shorter growing seasons and less reliable access to water for irrigation
- fewer cold days and significant increases in minimum temperatures — affecting fruit setting
- earlier ripening grapes, and quality problems for reds in particular
- increasing heat stress for livestock, including dairy cows in northern Victoria

2. Drivers for Change

- World food demand
- Climate
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Water

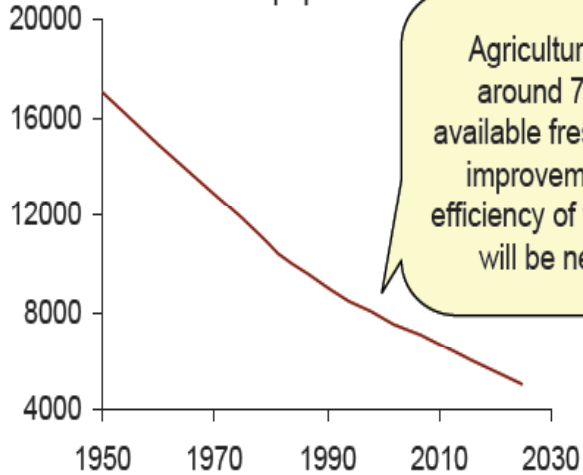
- Each calorie takes one litre of water to produce, on average
- Given population growth and consumption trends, without improvements in water productivity, agricultural water demand (ET) doubles from 6400 km³ to 12000 km³ by 2050
- BUT: Like the Murray Darling Basin, all the world's major food producing basins are effectively 'closed' or already over-allocated
 - Yellow River, Colorado, Amu/Syr Darya, Nile, Lerma-Chapala, Jordan, Gediz, Zayanda Rud, Indus, Cauvery, Krishna, Chao Phraya....



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Water

Actual and projected freshwater availability, cubic metres per head of total world population¹



Agriculture uses around 70% of available freshwater – improvements in efficiency of water use will be needed

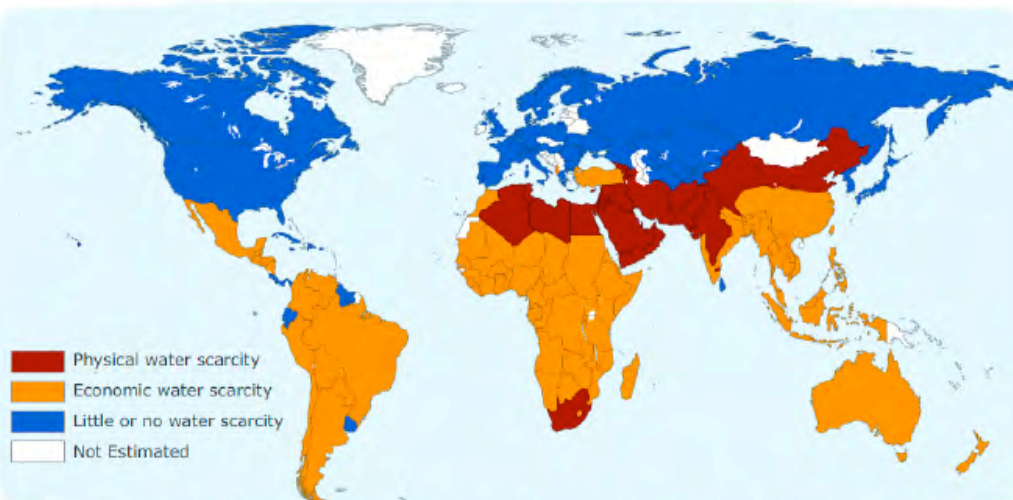


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Physical & Economic Water Scarcity (IWMI 2007)

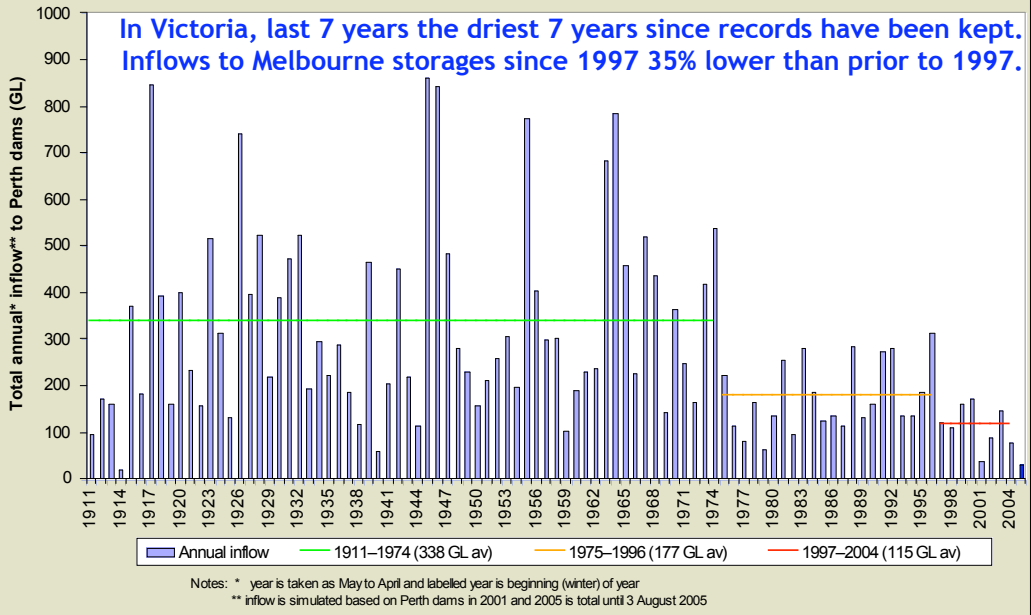
Physical scarcity: Not enough water.

Economic Scarcity: Not infrastructure to make water available to people.



A third of the world population will suffer from water stress by 2025

Perth's Annual Storage Inflow GL (1911-2005)



2. Drivers for Change

- World food demand
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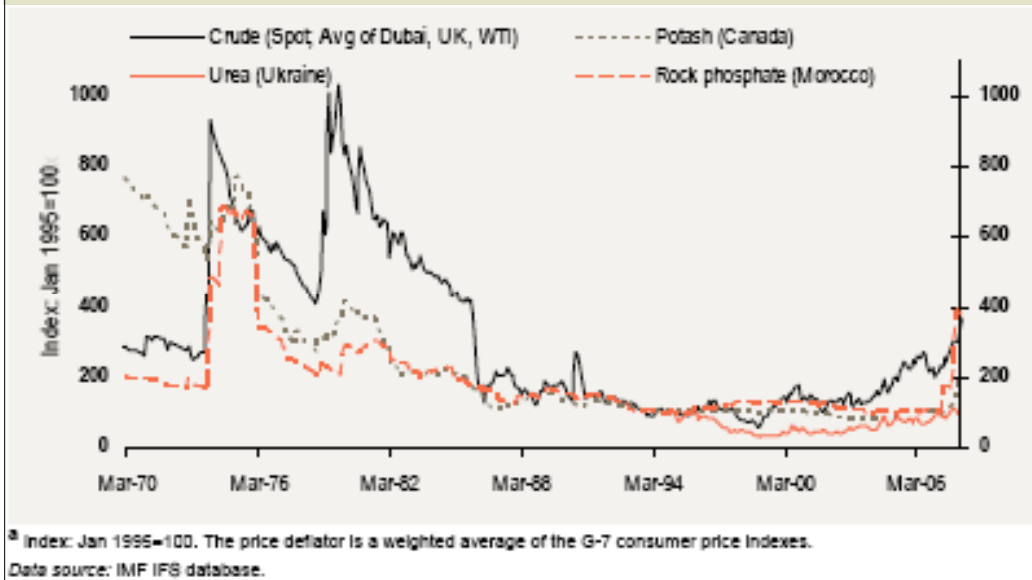
Energy & nutrients

- The era of abundant, cheap fossil fuels is over
- Rising energy costs = rising fertiliser costs

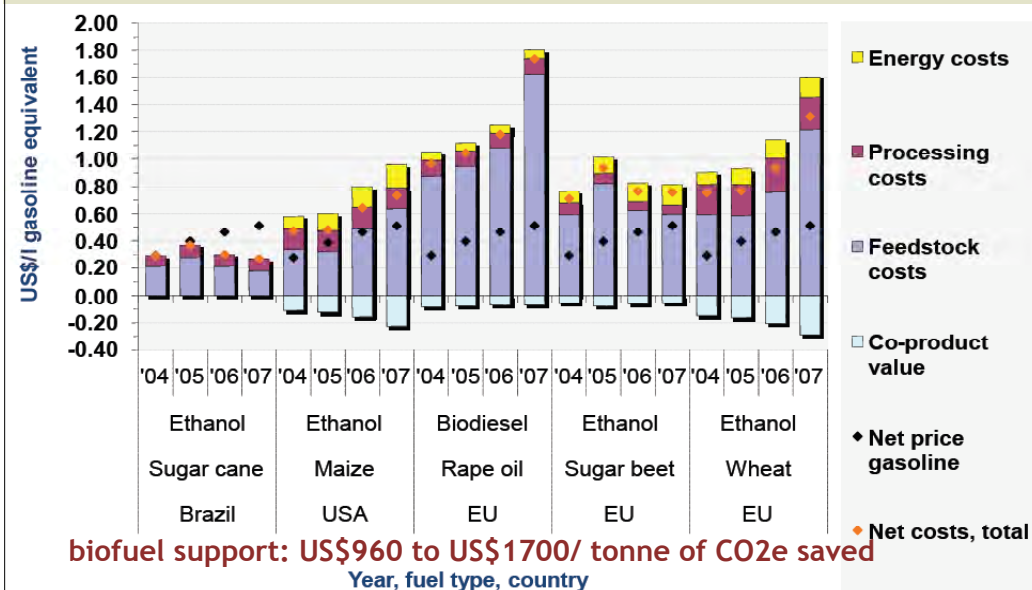


Remaining reserves (billions of barrels) of crude oil (EWG 2007)

Real price of crude oil vs key agricultural fertilisers, 1970-2005



Biofuel production costs vs gasoline prices (OECD 2008)



2. Drivers for Change

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- **Soil & other resource constraints**



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Land & soil

- The FAO has just assessed trends in land condition (measured by net primary productivity) **from 1981-2004**
- Land degradation is increasing in severity and extent:
 - >20 percent of all cultivated areas
 - >30 percent of forests
 - >10 percent of grasslands
- 1.5 billion people depend directly on land that is being degraded
- Land degradation is cumulative. Limited overlap between 24% of the land surface identified as degraded now and the 15% classified in 1991, because NPP has flatlined near zero in flogged areas



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<http://www.fao.org/newsroom/en/news/2008/1000874/index.html>

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3. Opportunities for improvement

- “Joined up” analysis and policy making
- Leadership
- Farming & Land Use Systems
- Knowledge, Research and Innovation
- Skills, Education & Training
- Infrastructure
- Planning & Design



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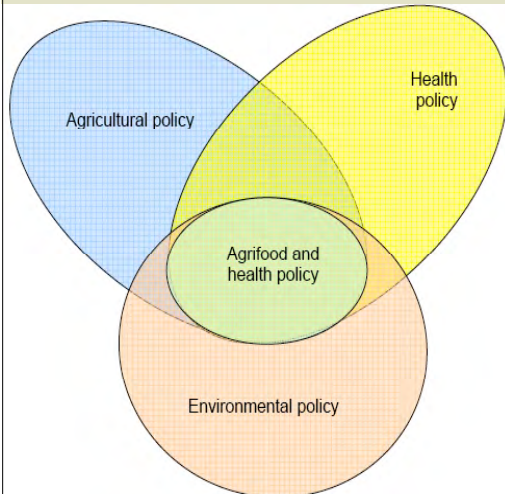


Policy - putting it all together

- The Green Paper and the Future Farming strategy are solid, worthy policy documents
- But they don't do justice to Victoria's proud track record of NRM innovation
- They talk climate change, but their directions look too much like business as usual, incremental change, steady as she goes.
- They fail to push the envelope — stuck in 'modify' and 'adapt' c.f. 'innovate' & 'create'
- The large intersection between them (sustainable farming systems at property, landscape and state scale) is underdone
- Soil health is treated very superficially, food not much, human health not at all
- The planning/development approvals system needs fundamental overhaul
- Infrastructure planning for carbon, energy, transport, waste, education, health and demographics also needs rethinking
- "Joined-up Government" has to be more than a slogan

Policy

- time for new alliances & perspectives



- Healthy farms, healthy landscapes, healthy food, healthy people & healthy communities are interconnected
- We are not used to seeing the farming system as connected to the health system
- This needs to change
 - in research, in assembling a comprehensive evidence base, in policy and in leadership

Source: Tyrczniewicz and McDonald (2007)

Leadership

- **A time for real leaders and leadership**
- **Time for a new Bretton Woods Agreement?**
- **Leadership from below and beyond**
- **Building cohorts of leaders**
 - **across the Victorian food system**
 - **along the food value chain**



Farming Systems

- The biggest issue in agriculture is the gap between the best operators and the average, and especially the gulf between the average and the long tail
- Our best farmers still make good money, even in “drought”
- But most don’t — we need new farming systems
 - Broadacre: e.g. Evergraze, EverCrop, Enrich
 - Intensive: nutrient recycling, bioenergy, closing loops
 - Low-input: the fastest growing market sector, Vic demand exceeds supply
- The sheer weight of demand means there will be big opportunities for smart players
 - Possibly a two-tiered food system
- Agriculture may even become sexy again...



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Better soil management — a win, win, win

- Under climate change, water and energy conservation often seem to be in conflict
 - Water saving options use more energy (e.g. desal, pipelines)
 - Energy saving options are often thirsty (e.g. biofuels)
- **BUT: Increasing soil organic matter:**
 - Improves productivity
 - Increases water infiltration and water holding capacity
 - Improves nutrient retention and cycling (reducing leakage)
 - Reduces energy & fertiliser needs
 - But probably won’t bring big C revenues



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We need a third agricultural revolution — what might it look like?

- Closed loop farming systems
- Smart metering, sensing, telemetry, robotics, guidance
- Understanding & use of soil microbial activity (&GM)
- Urban food production (roofs etc), recycling waste streams & all urban water and nutrients
- Detailed product specification (Tesco) & more returns to farmers
- ‘Carbon plus’ offsets and incentives
- New marketing options,
integrated with transport network



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Land Use Systems

- Victoria already “post-agricultural” in several regions (Neil Barr)
- We have some elements of a new paradigm
 - Ecoservices etc
 - Carbon offsets market (Greenfleet et al)
- And we know areas that need to expand
 - Renewable energy (wind, solar, biomass, biogas)
- New land uses through new regional planning approaches that:
 - are robust under a range of climate change & demographic scenarios
 - build in resilience thinking (e.g. improve habitat connectivity, protect refugia)
 - accommodate mitigation options (energy, transport, food)
 - safeguard productive soil
 - facilitate recycling of water, nutrients and energy



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Woody biomass energy

- **Learning from the Vikings:**
 - Finland: same area and population as Victoria, tougher climate, shorter growing season, slower growth rates (4m³/ha/year Norway pine, Sitka spruce and birch)
 - Private forestry thinnings etc produce 23% of Finland's primary energy, over 75% of thermal energy needs, and 20% of Finland's electricity
 - In Sweden it is 20% with a target of 40%
- **WA already has a pilot plant using oil mallees**
 - Verve Energy at Narrogin
 - Producing euc oil, bioenergy, activated carbon



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Woody biomass energy

- If Victoria is to continue producing large amounts of grass-fed, rain-fed beef and sheep meat, as I believe it should, then it will need significant offsets built-in to grazing systems
- We need to be able to market 'carbon plus' red meat
- Well-designed large scale plantings deliver significant benefits for habitat, micro-climate, aesthetics, water quality and shelter as well as bioenergy and carbon
- **BUT:** without good planning & controls, the market will default to large monoculture plantations replacing agriculture, not integrated into farming systems



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Forestry integrated with farming vs replacing farming



“Carbon plus” wool, beef and sheep meat



Knowledge, Research and Innovation

- The VEIL project has comprehensively mapped knowledge gaps and innovation opportunities
- This project endorses those gaps
- The evidence base needs work, especially along the value chain — more LCAs an urgent priority
- New research alliances are needed across and along the food value chain, from farming to health
- Work is needed in all four quadrants
 - Modify and adapt
 - Innovate and create



Skills, Education & Training

- A huge agenda
- We are where we are, in large part because of insufficient investment in human capital
- At a community level, we need much deeper and broader environmental literacy
 - and ditto for food literacy
- At a professional level, we need talented, committed, innovative people capable of inventing ways of feeding the world using less water, land, energy and nutrients, while emitting less carbon



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Infrastructure

- Transport
 - More rail depots
 - CNG
- Water
 - Reconfiguring irrigation systems
 - Stormwater re-use & sewer mining in urban areas
- Energy
 - Biomass and methane etc
- Waste
 - Where it can't be avoided or reduced, look to reuse it as a source of nutrients, water and energy.



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4. Flying some kites

- The food system = innovation, regional development & culture
- Victoria leading a new approach to food in a drying climate
- A leader in woody biomass energy and solar thermal baseload power
- A world centre of excellence in smart water management and premium foods
- Integrated planning of the transport, energy, health and food systems
- Food Sensitive Urban Design planning revolution
- Using public sector foods to lead innovation



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Ideas worth a shot - project level

- Develop a leadership pool across farming, environment, food and health & fund a series of courses - e.g. ARLP, Williamson, Fairfax
- Landscape reconfiguration pilot - northern irrigation district
- New 'pre-CRC' program could support a food/health/environment sector alliance and scoping work to fill key information gaps.
- An R&D project on farming without oil - e.g. hybrid tractor?
- Farmers' markets integrated into the rail network (with many more rail depots)
- Urban food pilot with recycled water, energy & nutrients
- "The Foodies" – biennial awards celebrating green, healthy, safe, fair foods



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5. Hopes from this workshop

- Feedback on errors of commission or omission in the background paper
- Areas that need more emphasis
- Forward-looking constructive ideas
- A bunch of smart people thinking seriously about a very important issue
- On-going interest in the outputs of this project
- Long-term follow through



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Take home messages

- We are living through a period of unprecedented environmental change, that is likely to intensify - **this is not a blip**
- Business as usual is not a viable trajectory
- The Victorian food system needs to improve its performance irrespective of climate change
 - Victoria can lead a new approach to food in a drying climate
 - This is about innovation, regional development & leadership
- **To decide not to succeed, is to decide to fail**
- New alliances are needed across the health, food and farming systems, and along the food value chain
- Leadership is needed at all levels
- **Let's GO FOR IT!**



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**For more info
and the full background paper**

www.triplehelix.com.au

