



“Climate Change in an era of increasing Food & Energy Poverty”

**IDF Dairy Farming Summit
June 08**

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Chairman, Rural Climate Change Forum, DEFRA

Chairman, Rural Generation Ltd

**THE FIRST
IDF DAIRY
FARMING
SUMMIT**

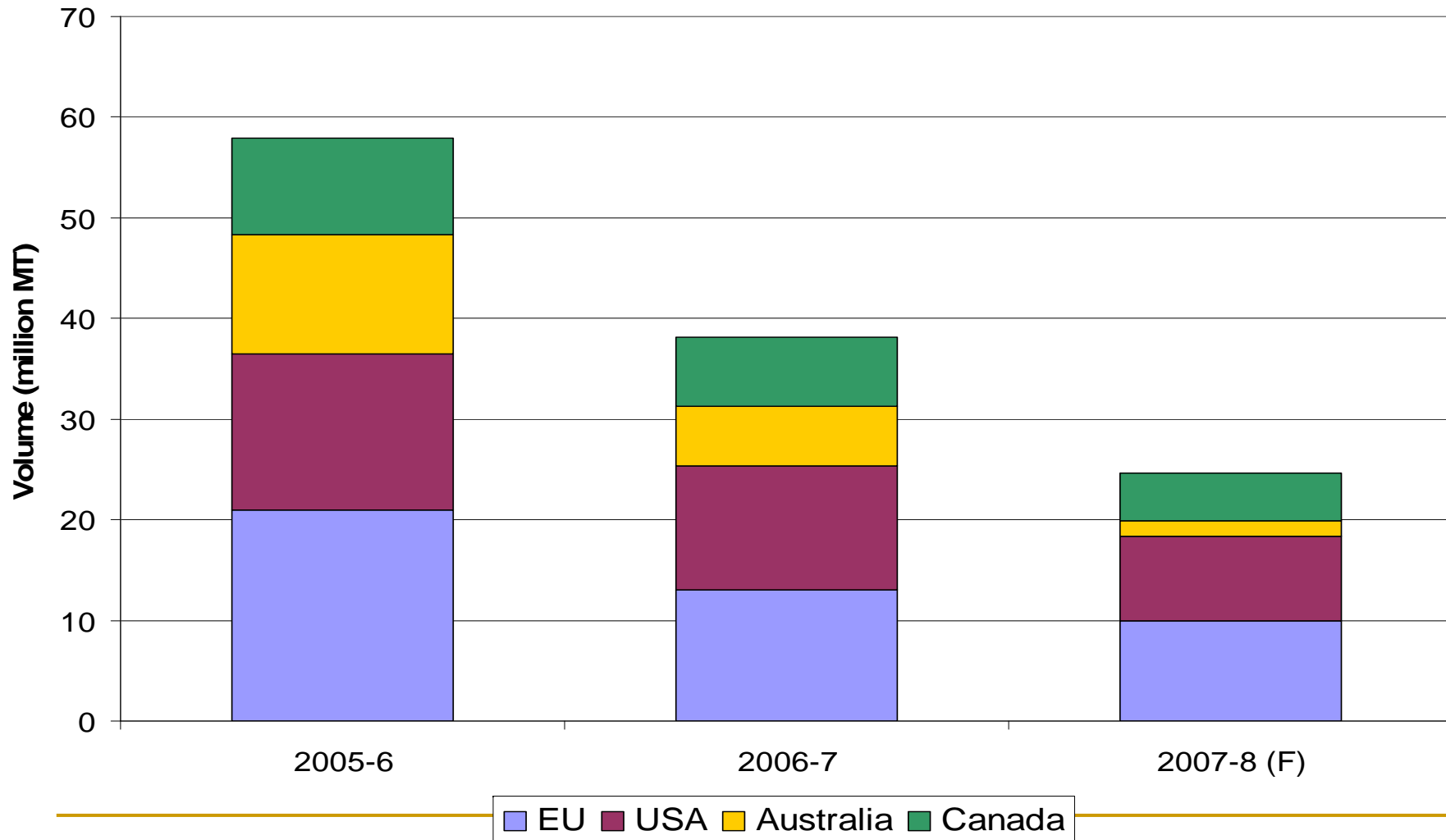
Our Global backdrop

- Globally, 70 million extra people to feed each year, with currently 1 Billion people experiencing Food Poverty
 - Last 100 years, Earth warmed by 0.76C
(50% in last 30 years)
 - The explosion in the Wealth of the Pacific Rim Countries, lifts millions annually out of poverty & leads to dietary change (Starch to Protein!)
 - The passing of “Peak Oil” production (July 06)
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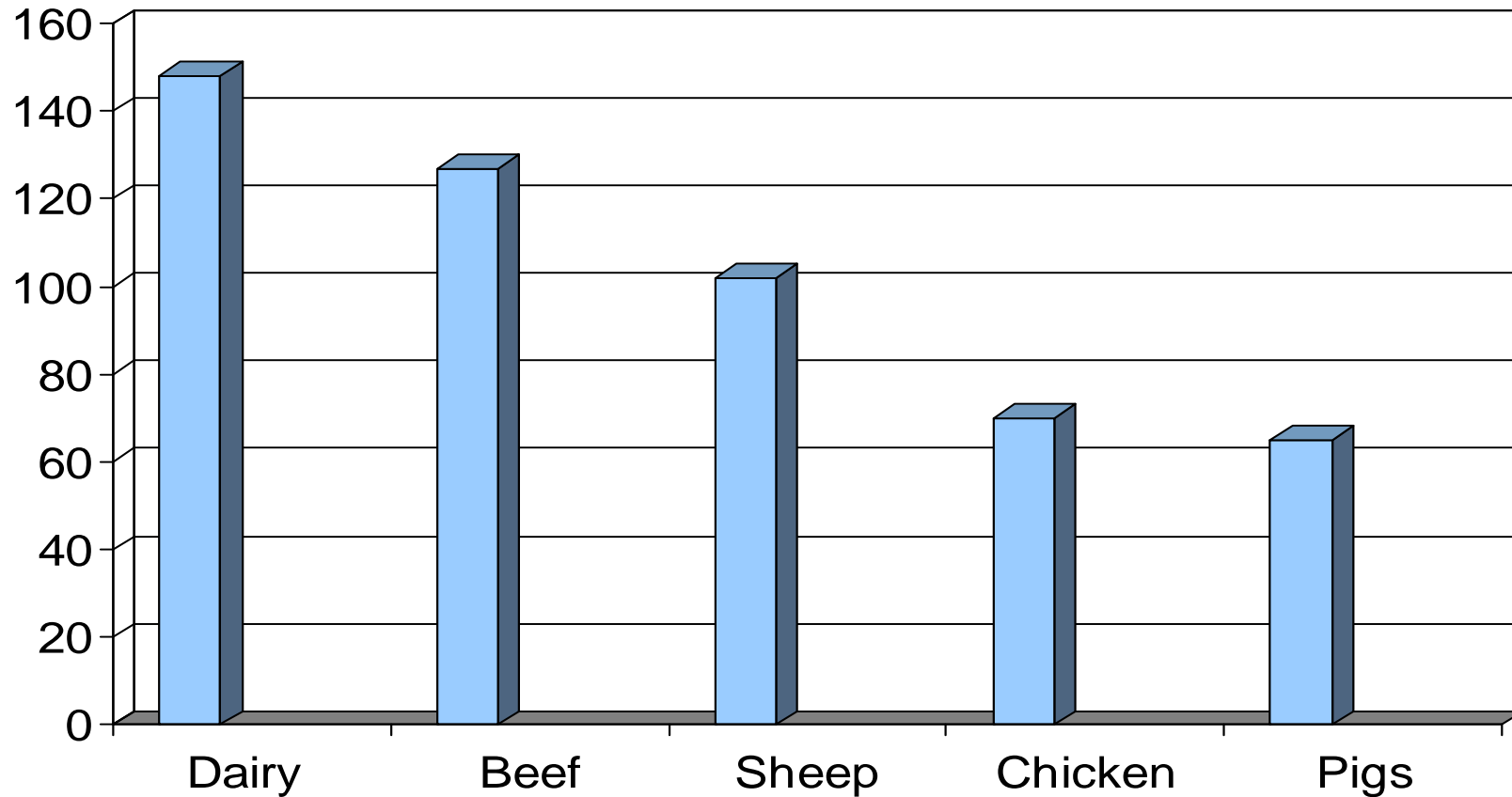
“2007” – A definitive year in Global Agriculture

- First real inflation in food prices for 30 years
 - Dramatic consequences due to weather volatility
eg. Australia, Europe, Bangladesh, etc
 - Lowest Global Grain stocks for 50 years
 - Dash for Bioenergy as Energy Security arrives on Political agenda
 - Exotic diseases sweep Europe eg Blue Tongue
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Declining Global Wheat Stocks (30 days Global Supply!)



Chinese Meat Consumption, % growth, 1996 - 2006



The Consequence of new Pacific Rim wealth on Dietary Change

Change from Starch based diet to protein based diet
increases dramatically Global Grain Consumption

1kg Dairy products

2kg grain

1kg Poultry/egg products

2kg grain

1kg Pork

4kg grain

1kg Beef

7kg grain

The Consequence of Dietary change on Climate Change

The food we eat has a large impact on Climate Change

e.g. A Human Carnivore compared to a Vegan
produces 1.5 tonnes of CO₂e/year more

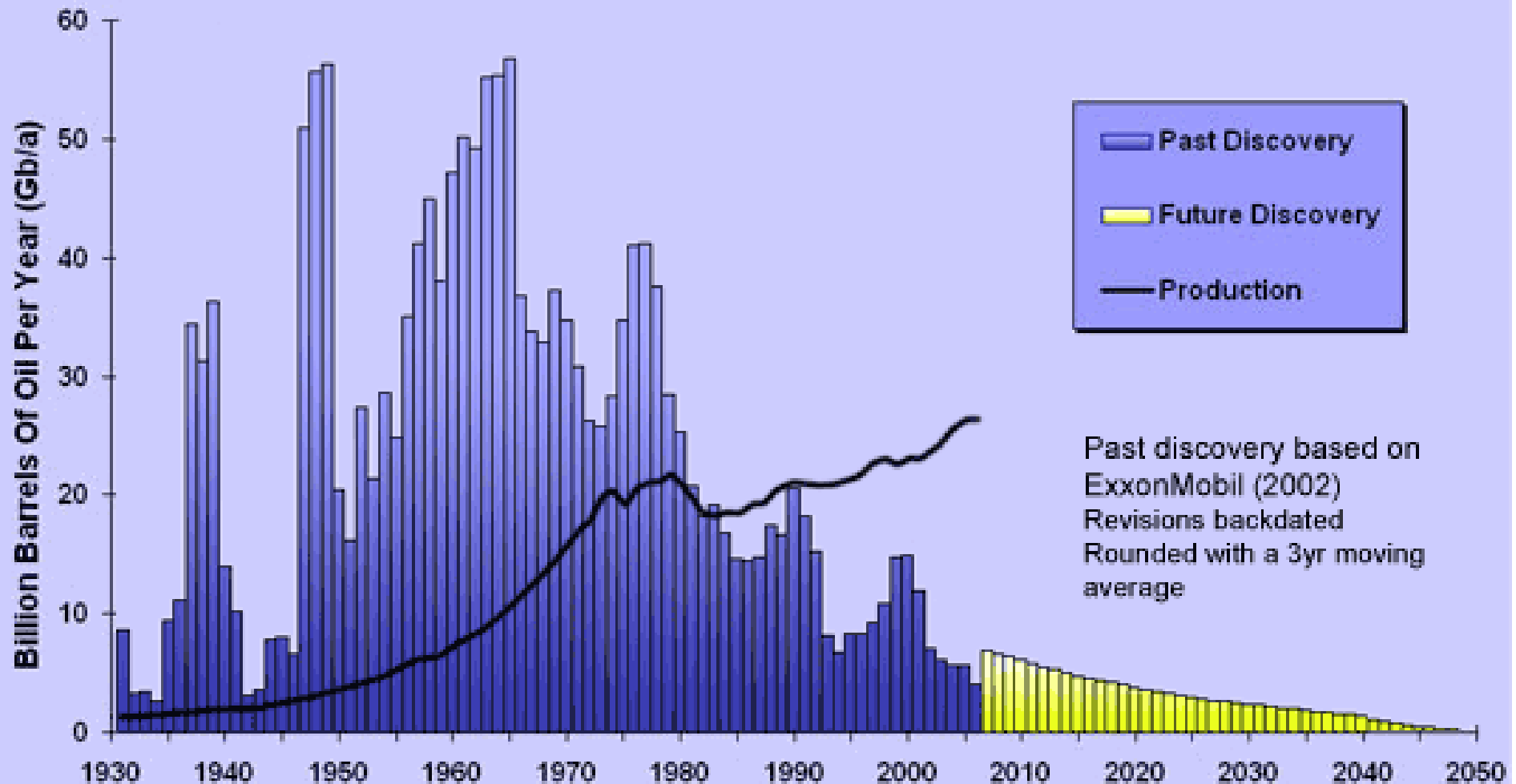
while a 4x4 SUV compared to a Toyota Prius hybrid
produces 1 tonne of CO₂e/year more

“Fossil Fuels – a Finite Resource”

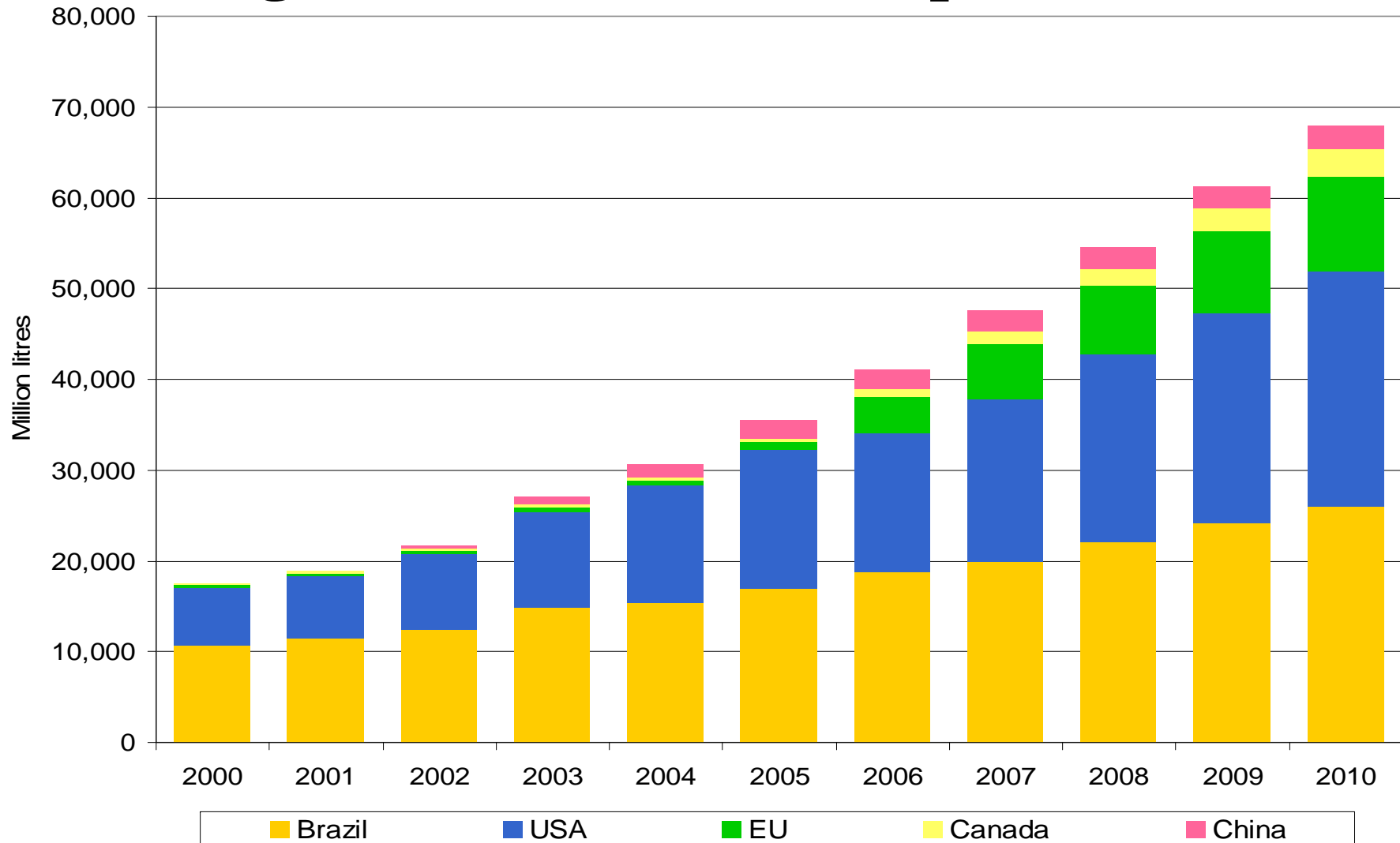
The drive for Alternatives & Energy Security

THE GROWING GAP

Regular Conventional Oil: Discovery & Production



Global growth of Non food crops - bio ethanol



A Bioenergy Prediction

“The fuel of the future is going to come from fruit, weeds, sawdust and almost anything. There's enough alcohol in an acre of potatoes to drive the machinery necessary to cultivate the field for one hundred years.”

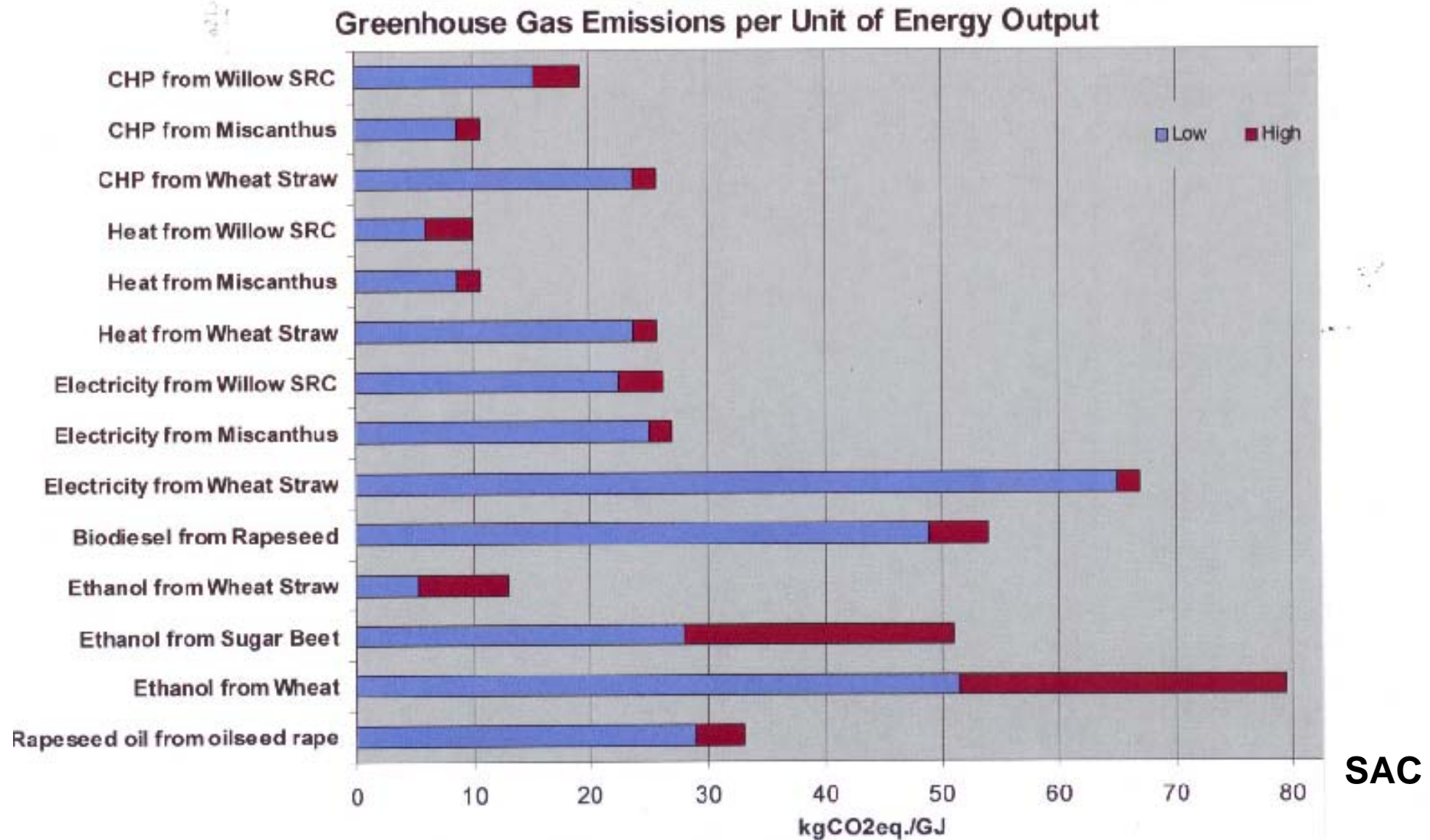
Henry Ford 1925

Global Grain Market & Consequences of a Biofuel expansion

- 60% used for food consumption
- 36% used for animal feedstuffs
- 3% used for biofuels

But Only 3% growth per year in feed & food market
while 20% growth per year in biofuel market!

The Differences in Bioenergy Sources



“The Climate Change Message”

The Three Drivers creating the Change!!

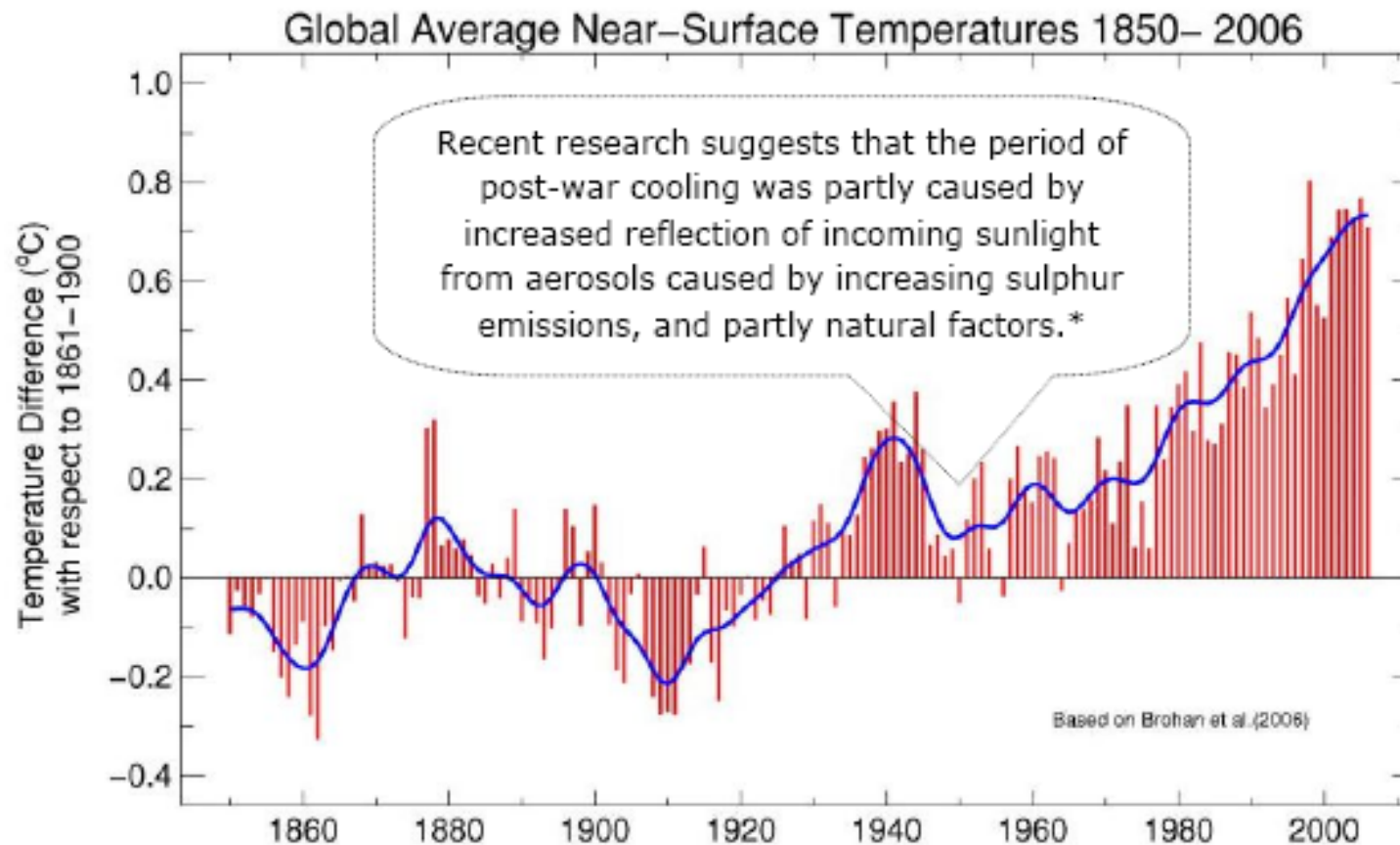
- Food poverty will be exasperated by changing & more volatile weather. Changing length of growing season, with more droughts, floods, pests & diseases are already being experienced!
- The development of new Government Policies!
- The development of new demands from the Market Place!

NB – Impacts will differ depending on where you are!

The “Climate Change Message” Why We Should Care?

- Mean Global temperature to increase by 1.8 (mitigation now) to 4°C (no mitigation), by 2100
 - As temperature rise gathers pace, for every 1°C increase, Global grain yield potential drops 10%
 - As weather becomes more volatile, there will be greater crop failure
-

We have a reliable record of surface temperature readings for the last 150 years which shows a pattern of global warming, particularly in the last few decades



Global average surface temperature increased over the last hundred years (1906–2005) by 0.74°C with particularly strong warming since the 1970s

Atmospheric concentrations of these three gases were stable for thousands of years before growing rapidly following the Industrial Revolution from 1750 onwards

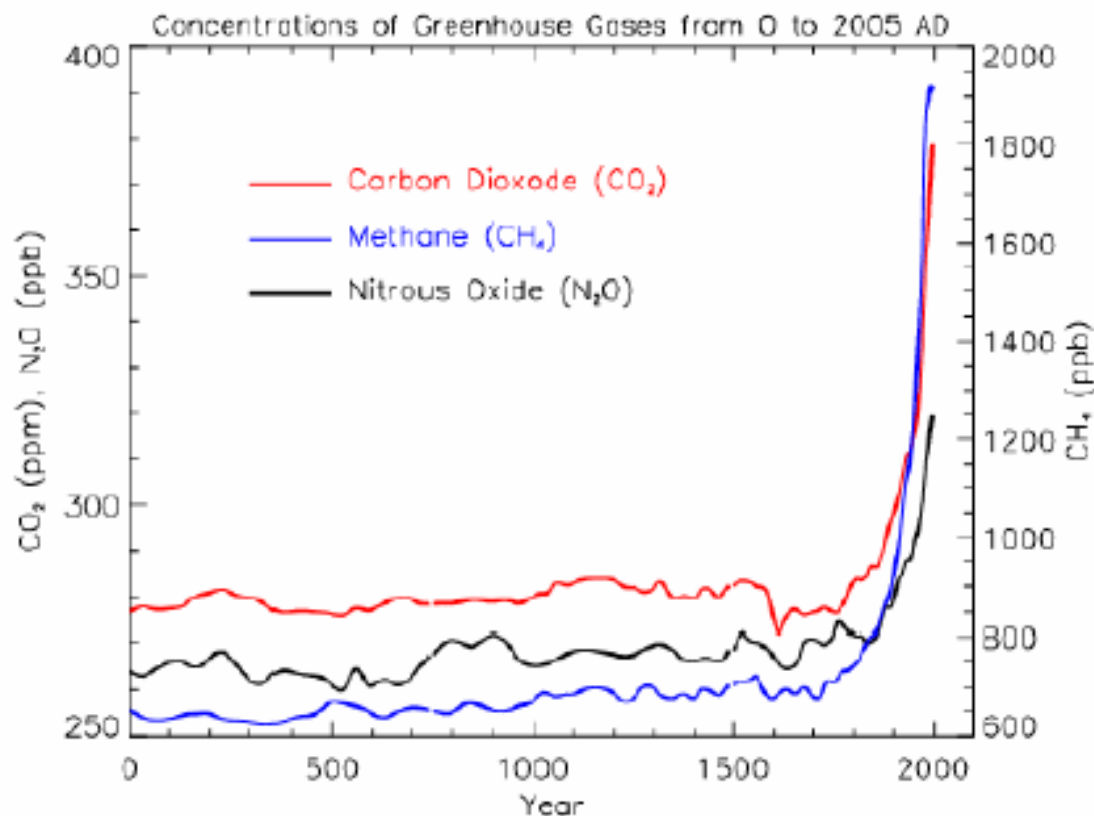


Figure shows changes in the atmospheric concentrations of carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) over the past 2000 years.

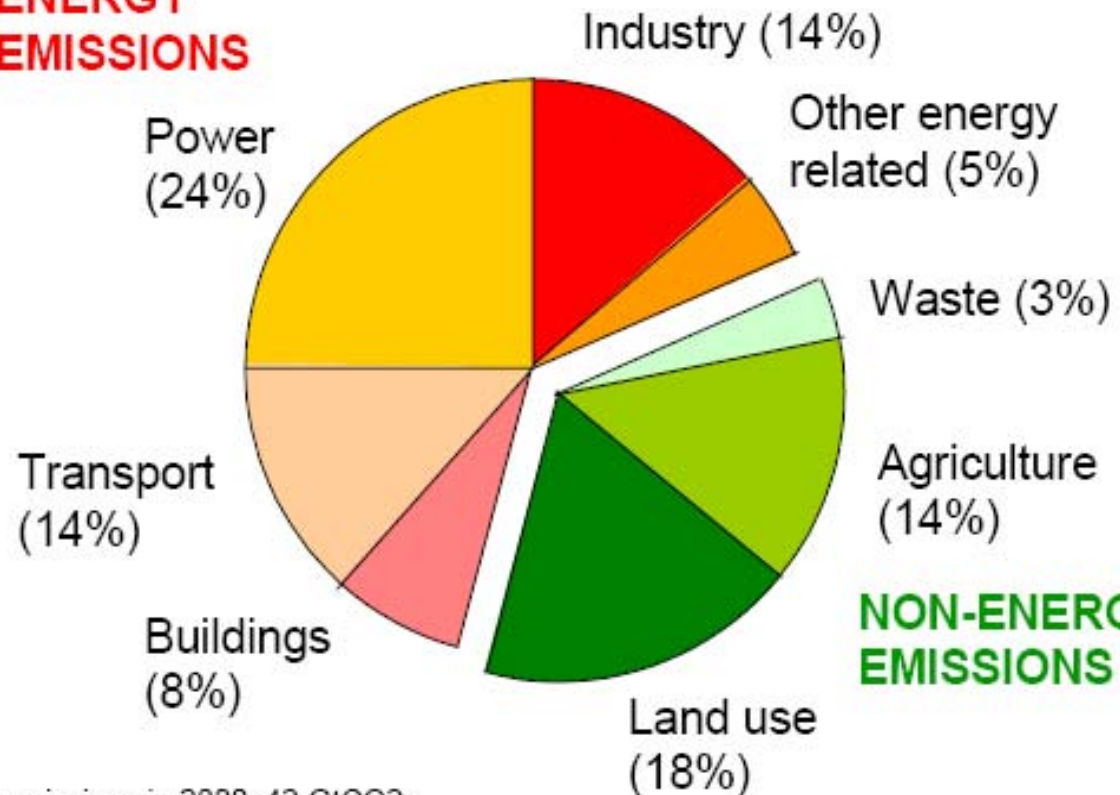
(Measurements are determined from ice cores and atmospheric samples.)

The growth in concentration of carbon dioxide, methane and nitrous oxide after 1750 is consistent with the expansion of human activities resulting from the Industrial Revolution

Agriculture's Contribution to Global Greenhouse Gas Emissions

- Agriculture = 14% of Global GHGs
- Land use (deforestation) = 18% of Global GHGs

ENERGY EMISSIONS



NON-ENERGY EMISSIONS

Total emissions in 2000: 42 GtCO₂e.

Energy emissions are mostly CO₂ (some non-CO₂ in industry and other energy related).
Non-energy emissions are CO₂ (land use) and non-CO₂ (agriculture and waste).

Source: Stern Review: the Economics of Climate Change

“The Climate Change Message”

“UK Agriculture is a Net Emitter of GHGs”

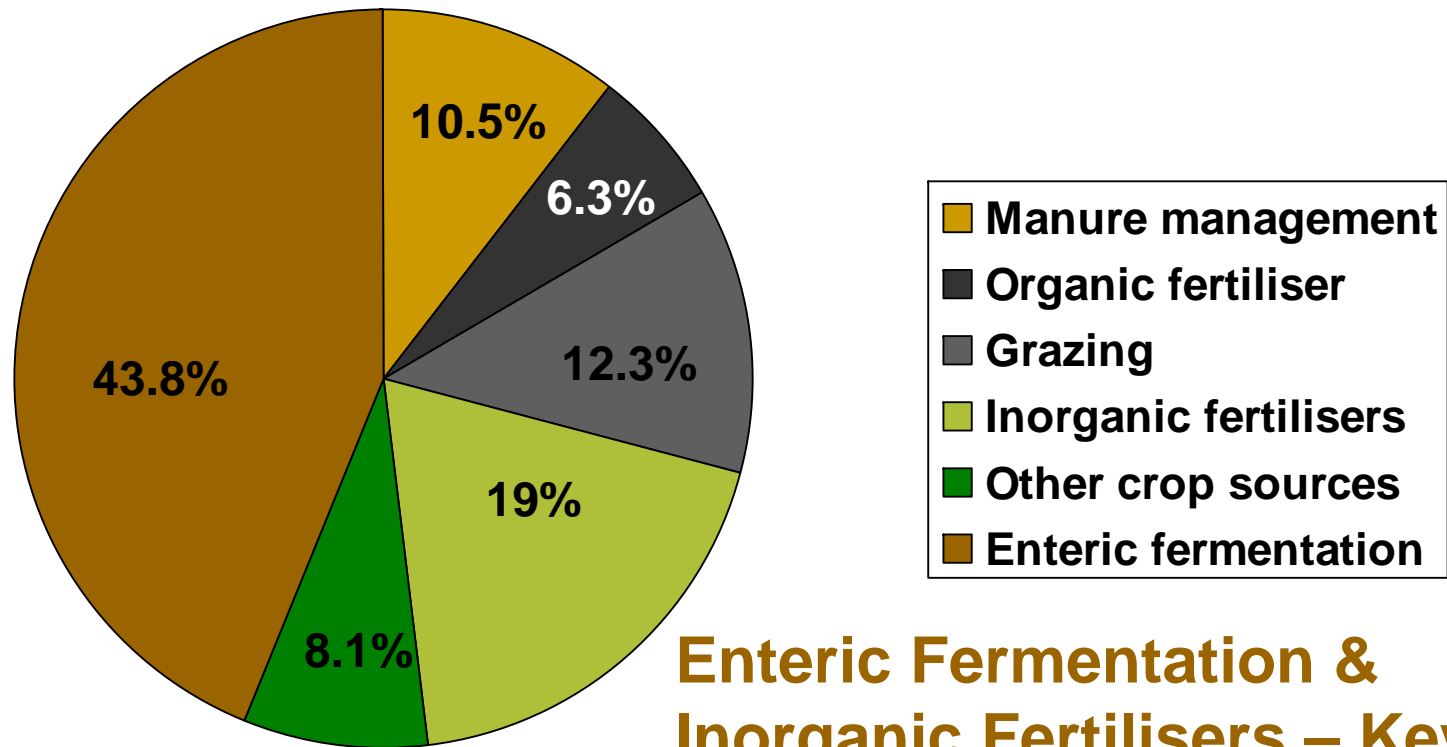
- 7% of UK GHG emissions (25% of Scotland's)
- 1% of UK carbon dioxide emissions
- 37% of UK methane emissions
- 67% of UK nitrous oxide emissions

NB – Methane is 20 times more potent than CO₂

- Nitrous Oxide is 310 times more potent

UK Agricultural CH₄ and N₂O emissions

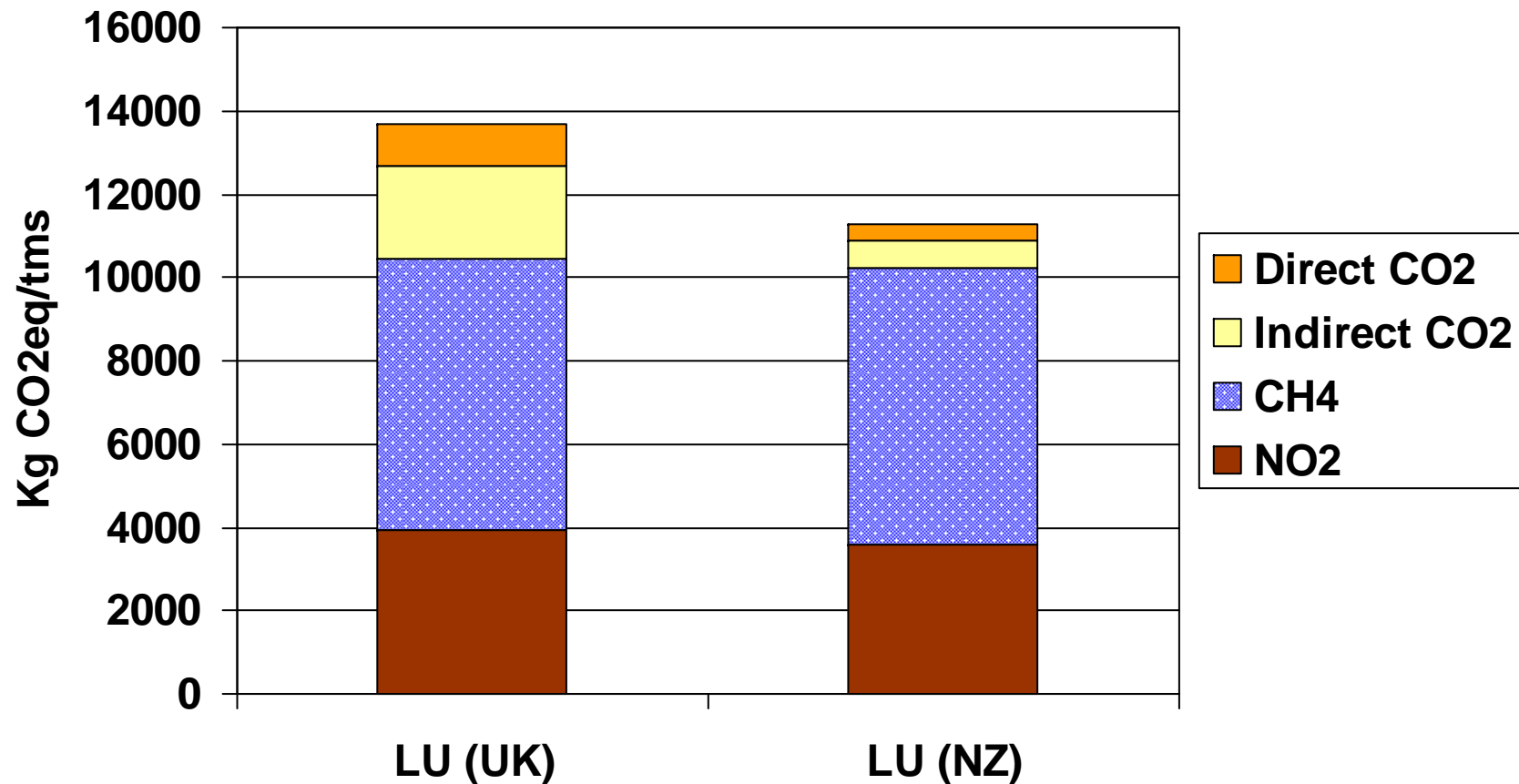
2005 – Carbon equivalent



Dairy Industry Carbon Footprint

- Lincoln study compared UK vs and NZ

UK higher CO₂eq – high fuel & fert use, similar CH₄ & N₂O (high UK milk yield)



NOTE - LU = Lincoln University, New Zealand, tms = Total Milk Solids, CO₂ eq = CO₂ equivalents

The “Message” – Knowledge Gaps!!

Research Priorities (IGER Report)

- Timing of mineral N applications
 - Use of New Crops & Nitrification inhibitors
 - Soil Carbon storage & emissions
 - No or Min Till & Organic soils!!
 - Manipulation of animal diets
 - Improve the National GHG inventory
-

New Policy - The UK & Scottish Climate Change Bills

- The first of their kind in the World & “All Party” Bills!
 - Mandatory targets to reduce GHG emissions by 60% by 2050 in the UK & 80% in Scotland, against a 1990 baseline.
 - Expected Royal Ascent in October, with first report by December 2008
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Climate Change Bill

The Enabling Powers

- The Bill contains enabling powers to introduce new Emissions Trading Schemes through secondary legislation.
 - New Schemes could cover new sectors eg. Agriculture and non-CO₂ gases eg Methane & Nitrous Oxides being converted back to a CO₂ equivalence
-

UK Climate Change Programme included a commitment to.....

Examine the scope and feasibility of a market-based mechanism to facilitate the trading of greenhouse gas (GHG) reductions from agriculture, forestry and other land management sectors

 **Is emissions trading for this sector possible?**

Globally – Currently Chicago Carbon Exchange
New Zealand by 2013, The UK????

Behavioural Change - The “Message” Market Place Developments!

2007 – Walkers Crisps became first UK Food Company to print Carbon Label

“A 35 gram bag contains 75 grams of CO₂”

Currently all major UK Retailers exploring this!!

NB – Without the standardisation of assumptions, agreement on the science and proper communication with consumers, market chaos will occur!!!!

Measuring the Carbon Footprint of Walkers Crisps



Product Life Cycle analysis will become the norm!

Bartletts' Potato Consumer's Dilemmas and Challenges?!

Cold Storage

- High Energy Cost
- 50 – 100 KWh / t

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Sprout Suppressant

- Pesticide Residue

Alternative:-

Israeli / Cyprus - Higher Carbon Footprint

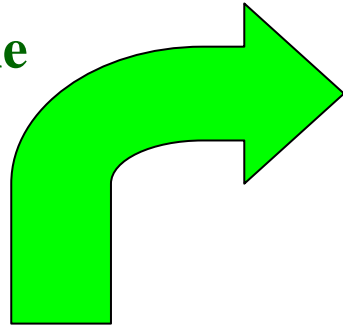
Engagement with General Public will be essential!



Can it be done ?

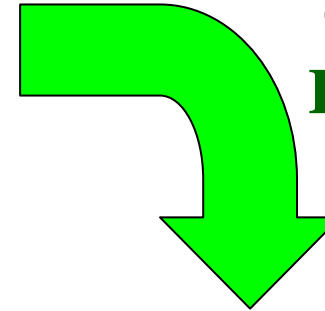
The Rural Generation Ltd “Holistic Cycle”

**Sustainable
Waste
Disposal**

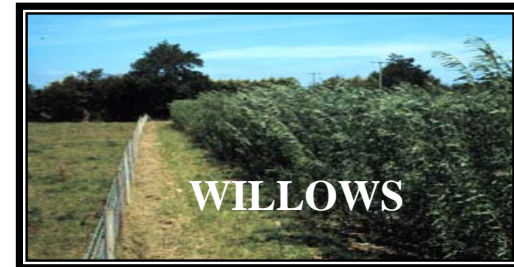


**Bio solid injection
Or tertiary water irrigation**

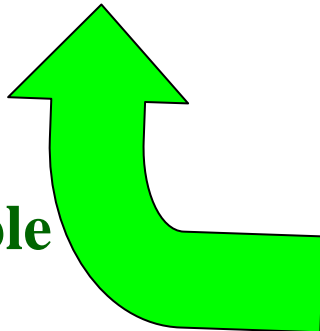
**Organic
Fertiliser**



**Public/Private Energy
Consumers & Waste Producers**

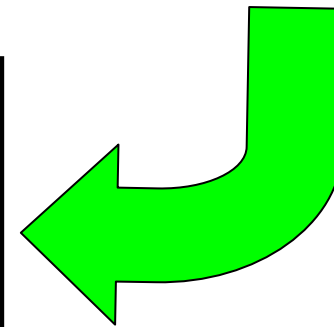


**Renewable
Heat**



Wood Fired Boiler

**Non
Fossil Fuel**



The Rural Generation Ltd “Holistic Cycle”

The result – 8 public goods

- Generates Wealth within the Rural Community
 - Reconnects Rural Communities
 - Provides compliant, sustainable, Waste Management
 - Displace fossil fuels
 - No artificial N used
 - No oil used for heating

 - Increases Energy Security
 - Reduces Carbon Footprint & locks up Carbon within the soil
 - Reduces Greenhouse Gas Emissions – Nitrous Oxide
 - Increases Bio diversity
-

“Climate Change in an era of increasing Food & Energy Poverty!”

In Future, Global land use must simultaneously:-

- Feed the World's population
- Provide clean water & fuel the World
- Generate wealth for Farming & Rural communities
- Provide other raw materials e.g. fibres and pharmaceuticals
- Provide Carbon Storage & reduce other sector's footprint
- Provide wider Environmental Services

NB – Single utilisation is not an option anymore!!
