# Methane to Markets

## The Kindersley Centre, Berkshire

November 29th & 30th 2006

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Department for Environment
Food and Rural Affairs

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# Anaerobic Digestion: a New Opportunity for Agriculture


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# Why are we here?

- **Energy Security**
  - North Sea production of oil and gas in decline
  - Europe increasingly dependent on “Eastern gas supplies”
  - Finite World oil reserves currently estimated at $5.25 \times 10^{12}$ barrels
  - Currently at or close to peak world oil production
  - **Tar Sands currently represent around 2/3rds of total oil reserves found principally in**
    - Canada: Athabasca Tar Sands $1.7 \times 10^{12}$ barrels
    - Venezuelan Ormoco Tar Sands $1.8 \times 10^{12}$ barrels
  - **Environmental Extraction Cost**
    - Canada they cover 140,000 $Kms^2$
    - High water useage to extract
    - High energy cost to extract
  - **Conventional oil reserves $1.75 \times 10^{12}$ barrels**

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# Why are we here?

- Increasing concerns about the sustainability of our life style
  - Moving from “3 planet” earth to “1 planet” earth
  - Increasing questions about the carbon footprint of all that we do
- At best static and likely reducing amount of available land for agriculture
- Increasing demand from China and the Asian economies for
  - Food
  - Raw materials
  - Energy

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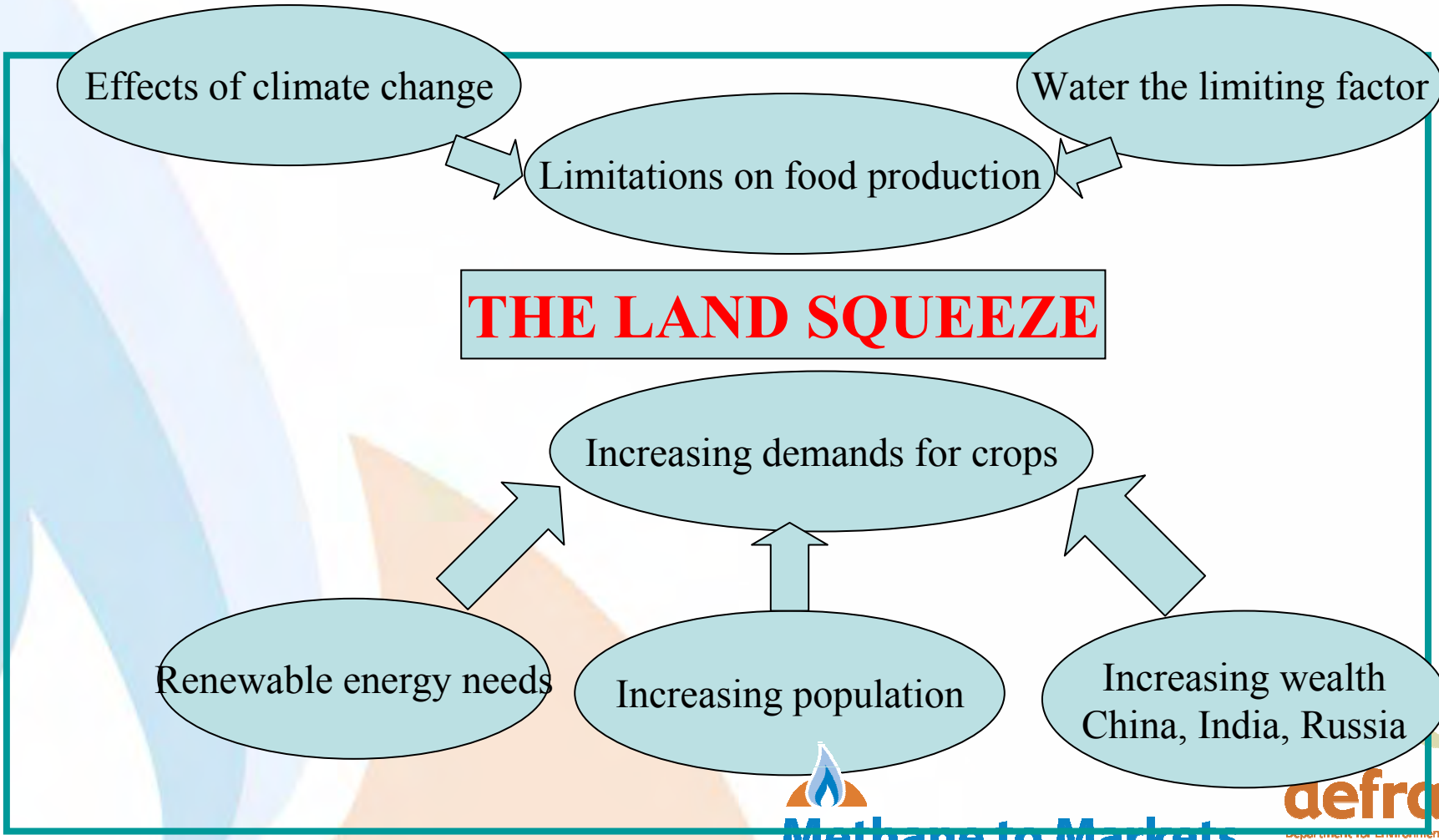
# Demand For Land

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# Why are we here?

- **Climate Change**
  - Differential effects around the world
  - Changed water supply patterns
    - Water increasingly the limiting factor in ALL that we do
    - Severe droughts in many parts of the world
  - Rising temperatures changing the environment
    - Different pest and disease challenges
    - Rising Sea Levels
  - Farmers need a sustainable environment in which to farm and grow crops
- **Causes of Climate Change: Greenhouse gases**
  - Carbon dioxide
  - Oxides of nitrogen
  - Methane

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# The consequence of this is that

- Not only do we need to think of conserving oil and gas supplies for prudent reasons BUT also
- We need to reduce the greenhouse gases that we are producing arising from their combustion
- And find ways that can replace their use in a sustainable manner
- Which suggests that we need to be holistic in our thinking about the issues
- There is NO ONE single solution but rather we need to draw together the various strands
- And for today we need to remember that methane is 23 X as polluting as carbon dioxide
- So where does it come from?

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# Methane from Coal Mining & Forest Fires

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# Methane from Waste

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# Methane from food production

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# Methane Emissions

- Methane was responsible for 10% of UK GHG emissions in 1990
- But has a shorter life expectancy at 12 years than $CO_2$
- Captured $CH_4$ can be a valuable energy source
- There is no current specific policy aimed at reducing methane emissions
- There is a need for an holistic approach to methane control
- Reducing methane emissions can be more cost-effective and climate change mitigating than reducing $CO_2$
- Reducing methane emissions now will be far more effective than later
- So what are the levels of methane emissions?

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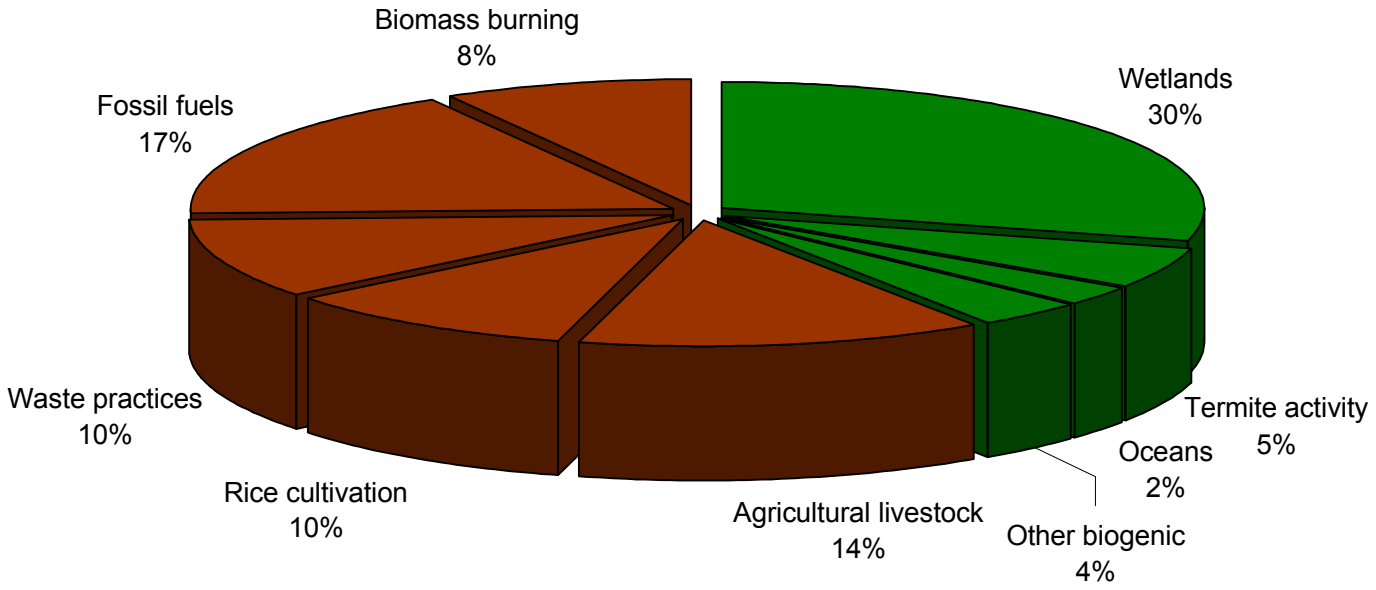
# Global Sources of Methane




- 598 Mt $CH_4$ emitted to atmosphere each year
- 576 Mt $CH_4$ absorbed by sinks
- A reduction in emissions of only 4% would lead to stabilised atmospheric concentrations

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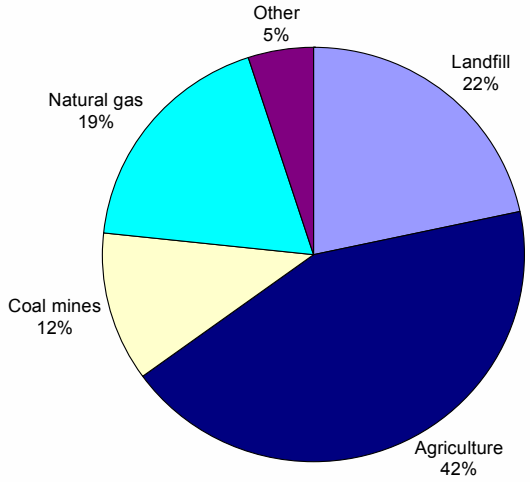
# Methane in the UK




| Mt $CH_4$ | 1990 | 2002 | % decrease |
|---|---|---|---|
| Landfill | 1.17 | 0.46 | 61% |
| Agriculture | 1.03 | 0.91 | 13% |
| Gas Pipe lines | 0.51 | 0.39 | 24% |
| Coal Mines | 0.82 | 0.25 | 70% |
| Other | 0.13 | 0.10 | 22% |
| **Total emissions** | 3.66 | 2.11 | 43% |

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# How does this relate to UK Agriculture?

- 90% from livestock emissions
  - Limited  reduction possibilities from nutrition and breeding
- 10% manure management
  - Conversion by the use of anaerobic digestors using either
  - Slurry alone  or
  - Slurry and food waste mixed

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# Benefits of Anaerobic digestion

- Larger percentage of $CH_4$ recovered than from other methods such as landfill (between 10% and 50% more)
- Gas yields are more regular and sustainable than land fill and usually around 65% methane
- Much reduced time for the waste to fully degrade
  - A few decades to a few weeks
  - Using waste heat to raise the temperature of the digestor to 60ºC can reduce the digestion period from 60 to 20 days
- There is reduced potential contamination/ pollution from the run off
- Removal of noxious odours and much lower levels of pathogens
- Increased availability (and value) of the digestate as the available Nitrogen is increased from <50% to c. 90%

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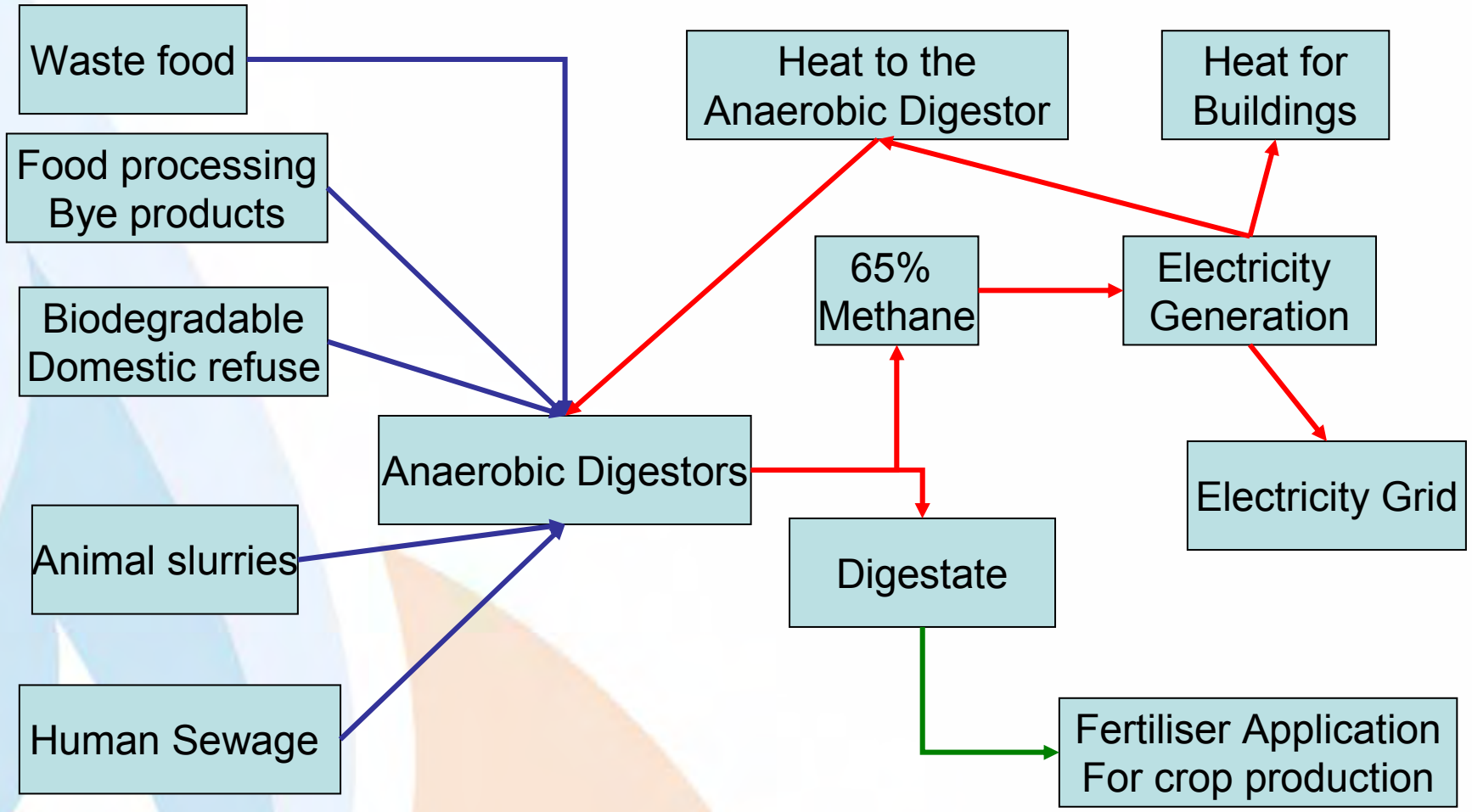
# Anaerobic Digestion flow chart

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# So what are the barriers to wider exploitation of Anaerobic Digestion?

- Ignorance
  - Of the potential
  - By the local authorities
  - Of the local populations
  - By the construction industry
- Bureaucracy
  - Need to establish an agreed digestate standard
  - Supermarket resistance to use of the digestate
  - Food & Feed legislation levels
  - Favourable appreciation by the planning community

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# What does this mean for Agriculture and Farmers?

- Removes risk experienced for the last 50 years of all their 'eggs in one basket': food production
  - Even more important with the removal of classic intervention support methods
  - Creating a more sustainable and balanced model
- Removes a potential problem of sustainable disposal of manures and biodegradable waste
- Creates an alternative income stream
- Produces a valuable fertiliser which is based on a renewable source
- Produces renewable energy

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# CONCLUSIONS

- Anaerobic Digestion offers real opportunities for a sustainable use of ALL agricultural and biodegradable waste to produce a valuable fertiliser and an energy valuable gas
- There is a significant need for all to learn from one another's experiences to speed up the optimal development and use of anaerobic digestion.
- UK is currently lagging behind other EU countries and needs to learn from others
- Removing IGNORANCE at all levels is a critical ingredient in achieving the uptake
- This seminar has an important role in achieving this

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