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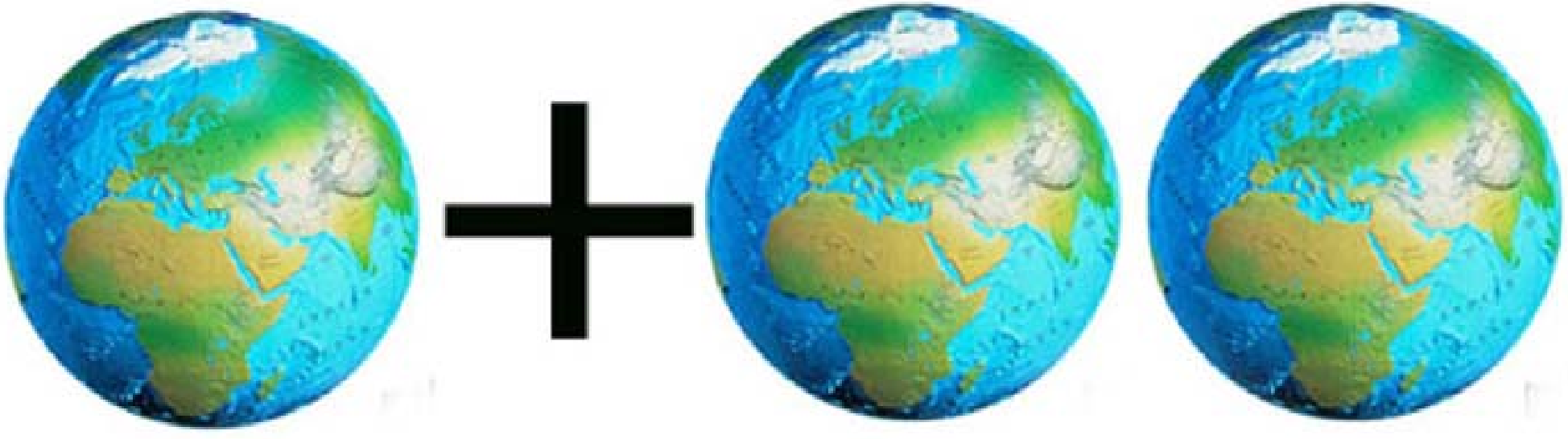
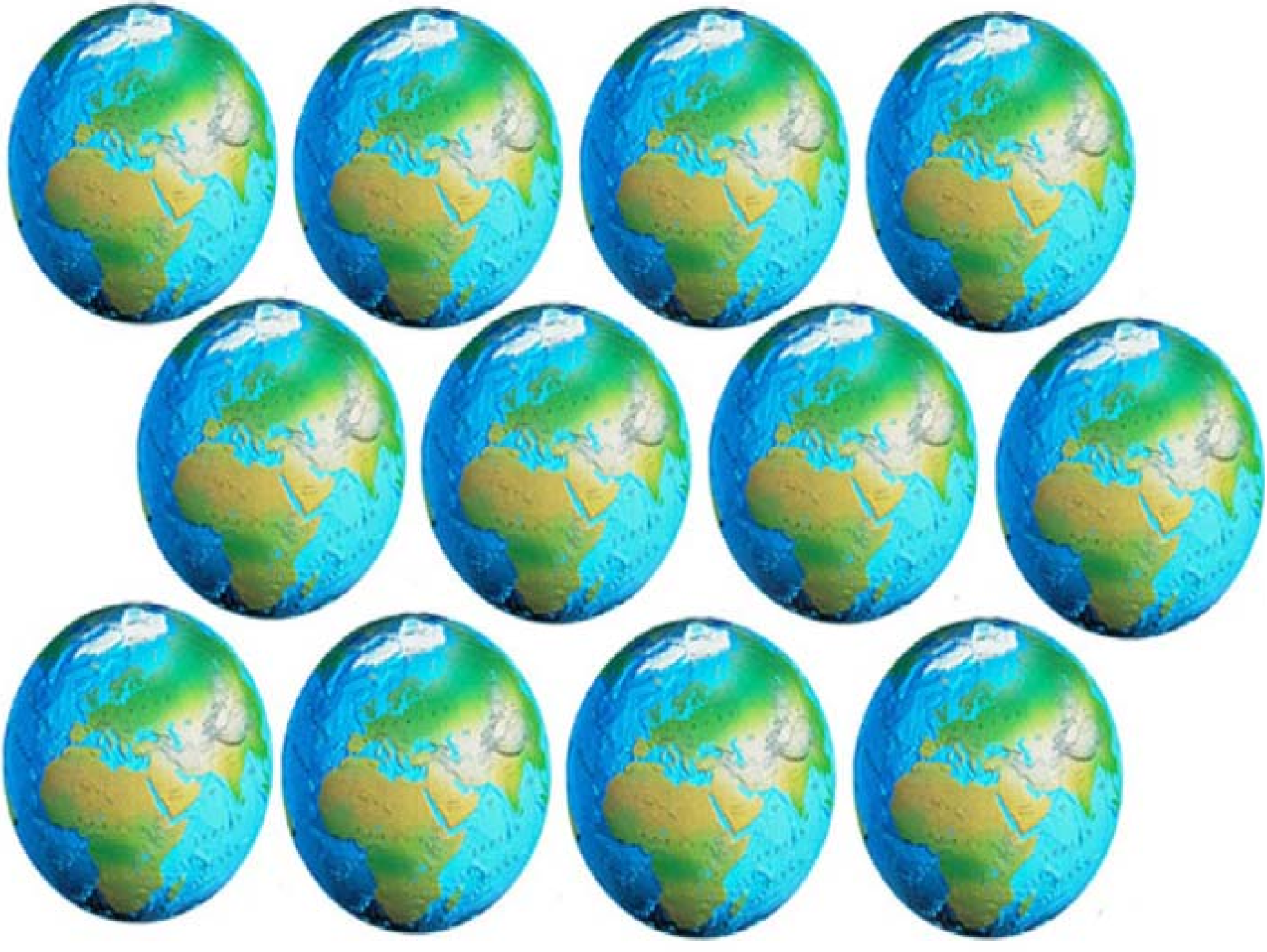
If the world lived like the USA…



..we would need 2 extra earths

If the population doubled…

If worldwide standards of living should double over the next 40 years….



" People are not content with the low quality protein from vegetable sources. In every country where incomes are rising, demand is rising rapidly for cooking oil, pork, fed lamb, eggs, poultry and other resource-costly foods that provide higher quality protein" .

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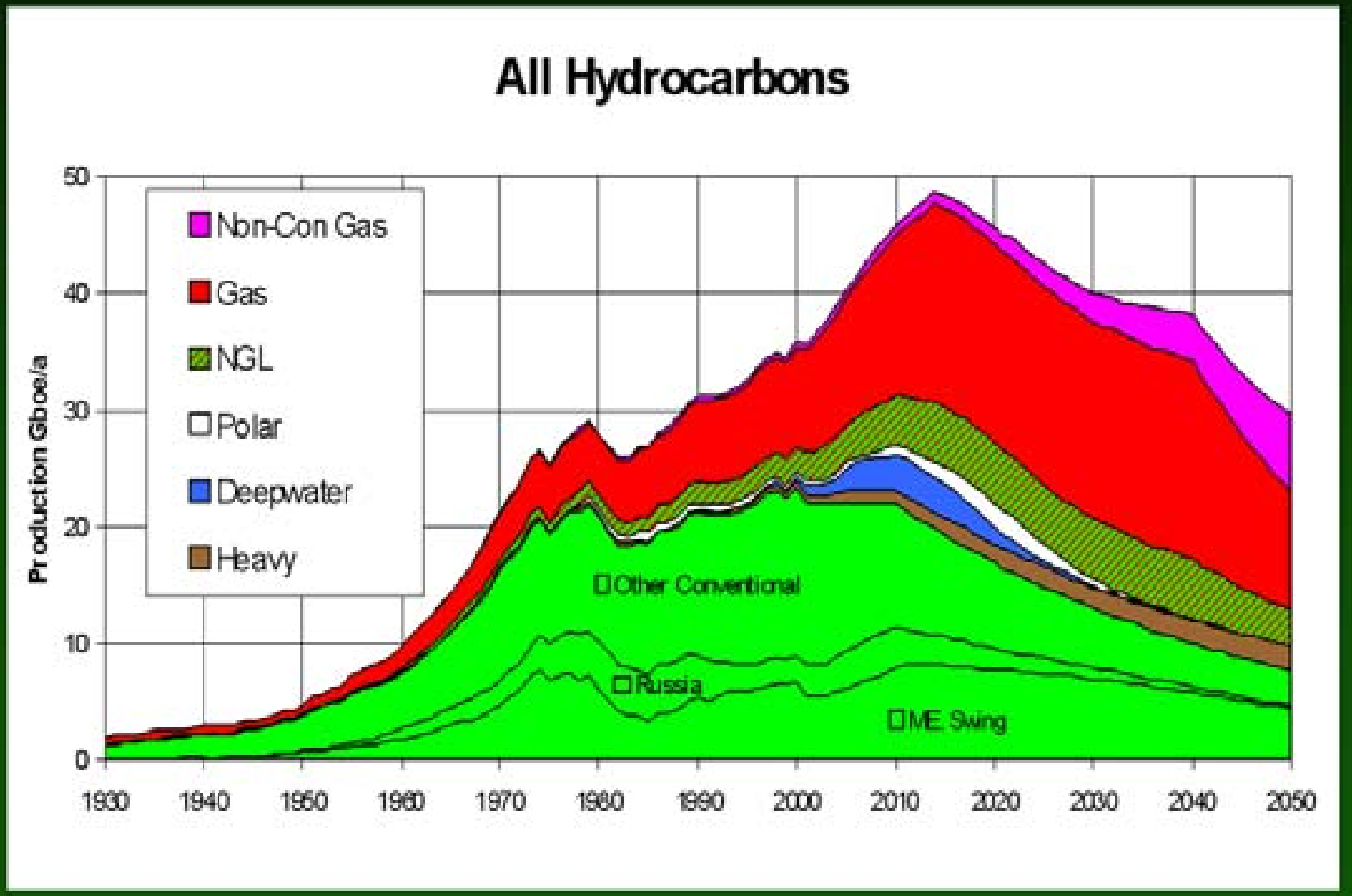
Carbon Dioxide Emissions from a Traditional Sunday Lunch for Four!

Product	Origin	Distance (miles)	Mode of Transport	Quantity (kg)	Carbon Dioxide emmisions (g)
Beef joint	Australia	13339	ship	1.6	343
Potatoes	Italy	1521	truck	5.0	771
Carrots	Soth Africa	5979	plane	2.0	10969
Broccoli	Guatamala	5457	plane	0.9	4505
Runer beans	Thailand	5924	plane	1.0	5434
Total		32220			22022
Blueberries	New Zealand	11706	plane	1.0	10738
Strawberries	California	5452	plane	1.0	5001
Total		17158			15739
Grand Total		49378			37761

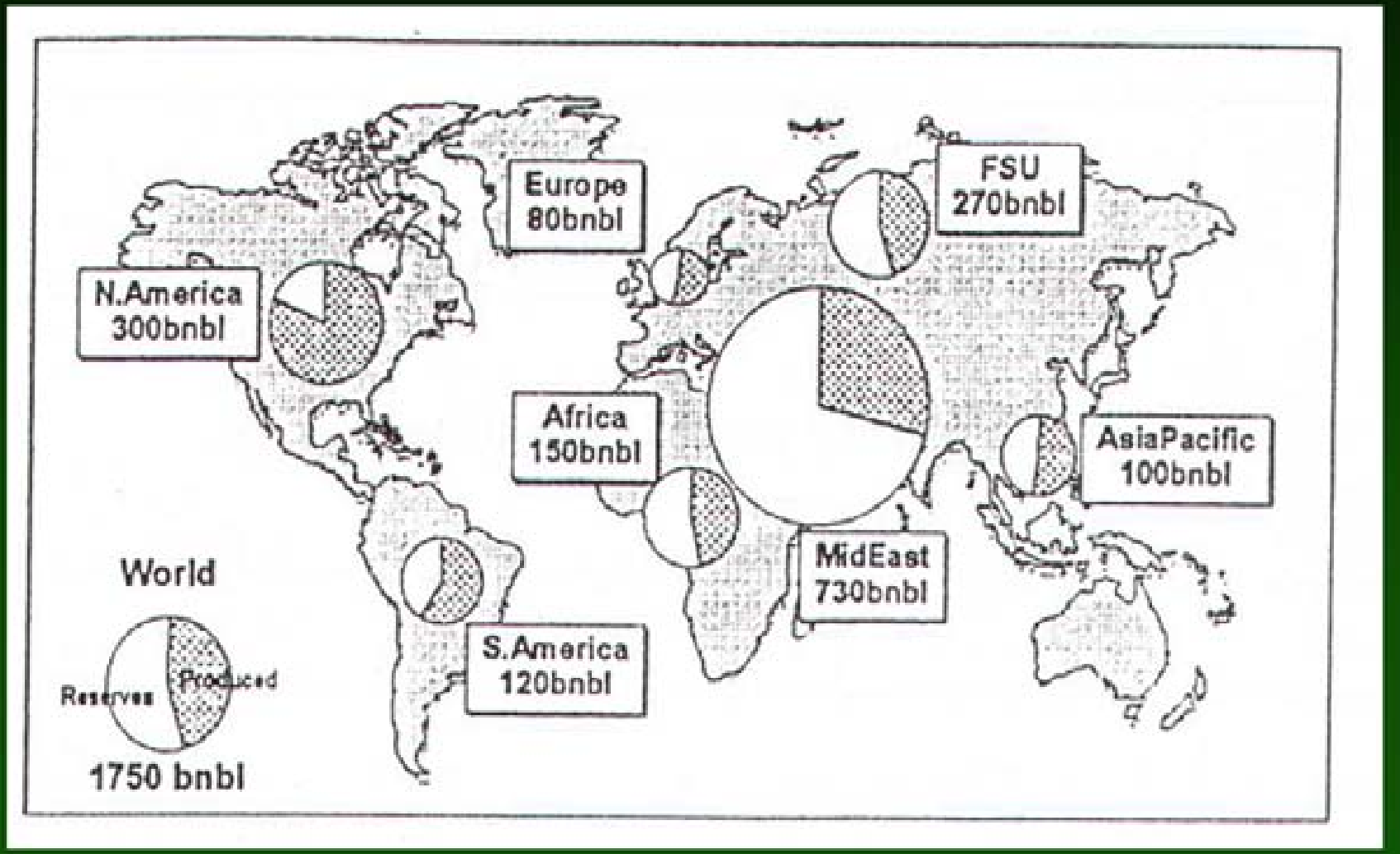
Four oil shocks

1. About 2005: conventional oil peaks.
2. About 2010: all oil peaks.
3. About 2015: all hydrocarbons peak.
4. About 2040: gas peaks

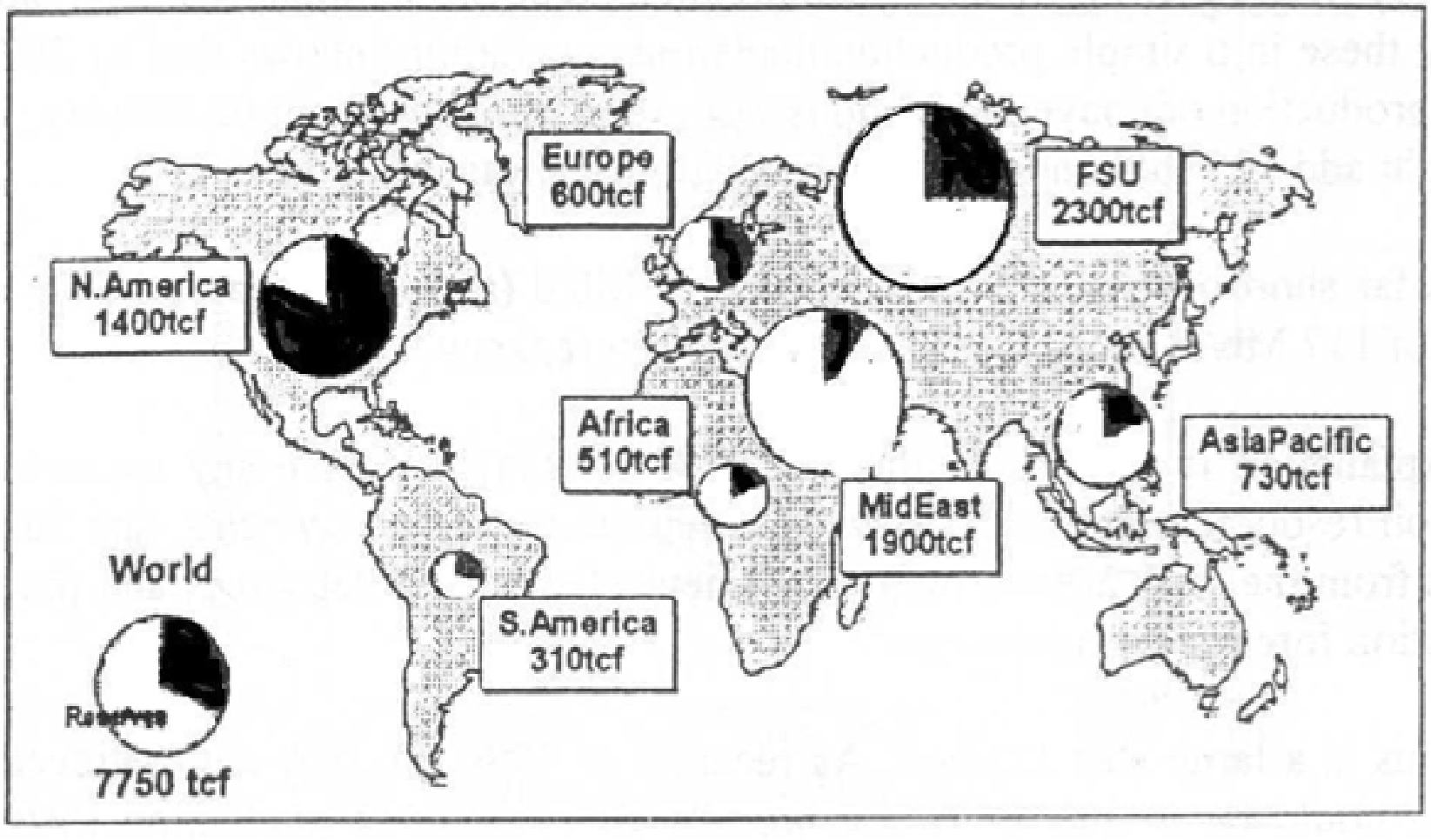


The ticking clock I
Oil depletion worldwide

Conventional crude oil

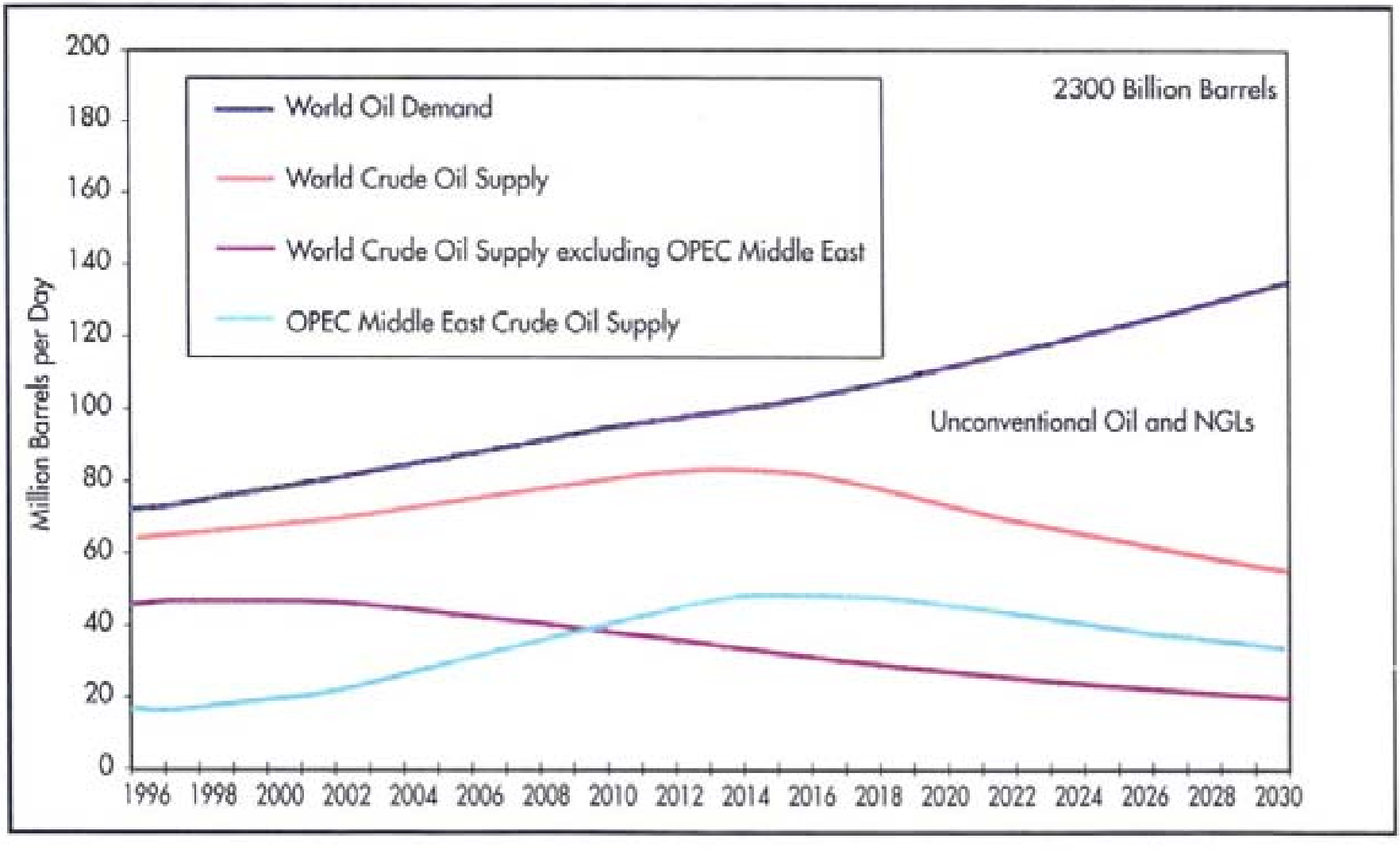


The ticking clock II:
Gas depletion worldwide



The code that almost no one cracked

Figure 7.7: **Oil Supply Profiles 1996-2030**
Ultimate Conventional Oil Reserves of 2300 Billion Barrels



All the signs point to a future where primary goods such as food and primary resources such as soil and water will be scarce and vulnerable. An economic sector such as organic agriculture that produces one and conserves the other can lead the way to wider economic and social recovery.

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Principles of Organic Farming

Organic agriculture is based on

The principle of health

The principle of ecology

The principle of fairness

The principle of care

Principles of Organic Farming

Principle of health

Organic Agriculture should sustain and enhance the health of soil, plant, animal, human and planet as one and indivisible

Principles of Organic Farming

Principle of ecology

Organic Agriculture should be based on living ecological systems and cycles, work with them, emulate them and help sustain them.

Principles of Organic Farming

Principle of fairness

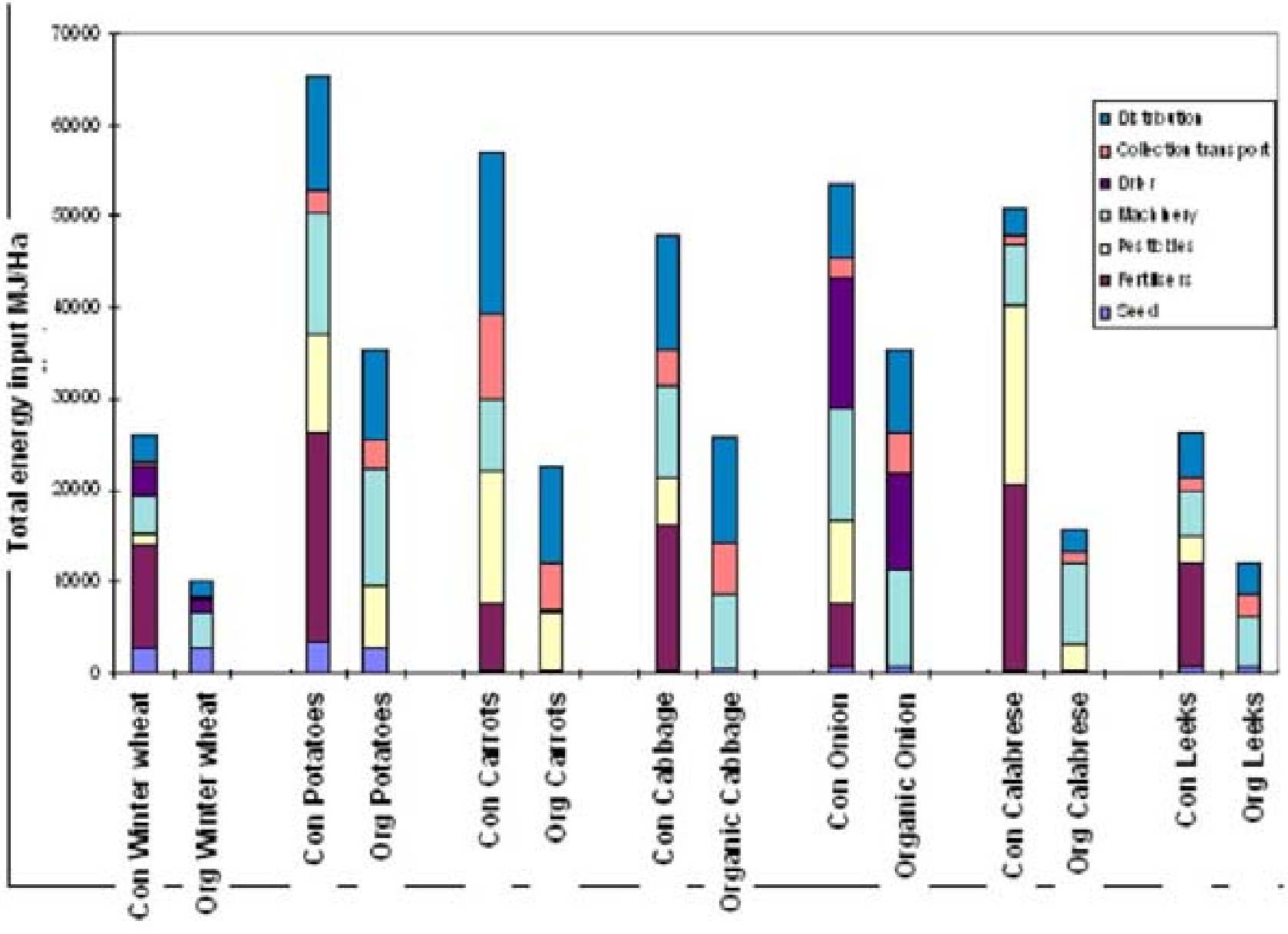
Organic Agriculture should build on relationships that ensure fairness with regard to the common environment and life opportunities

Principles of Organic Farming

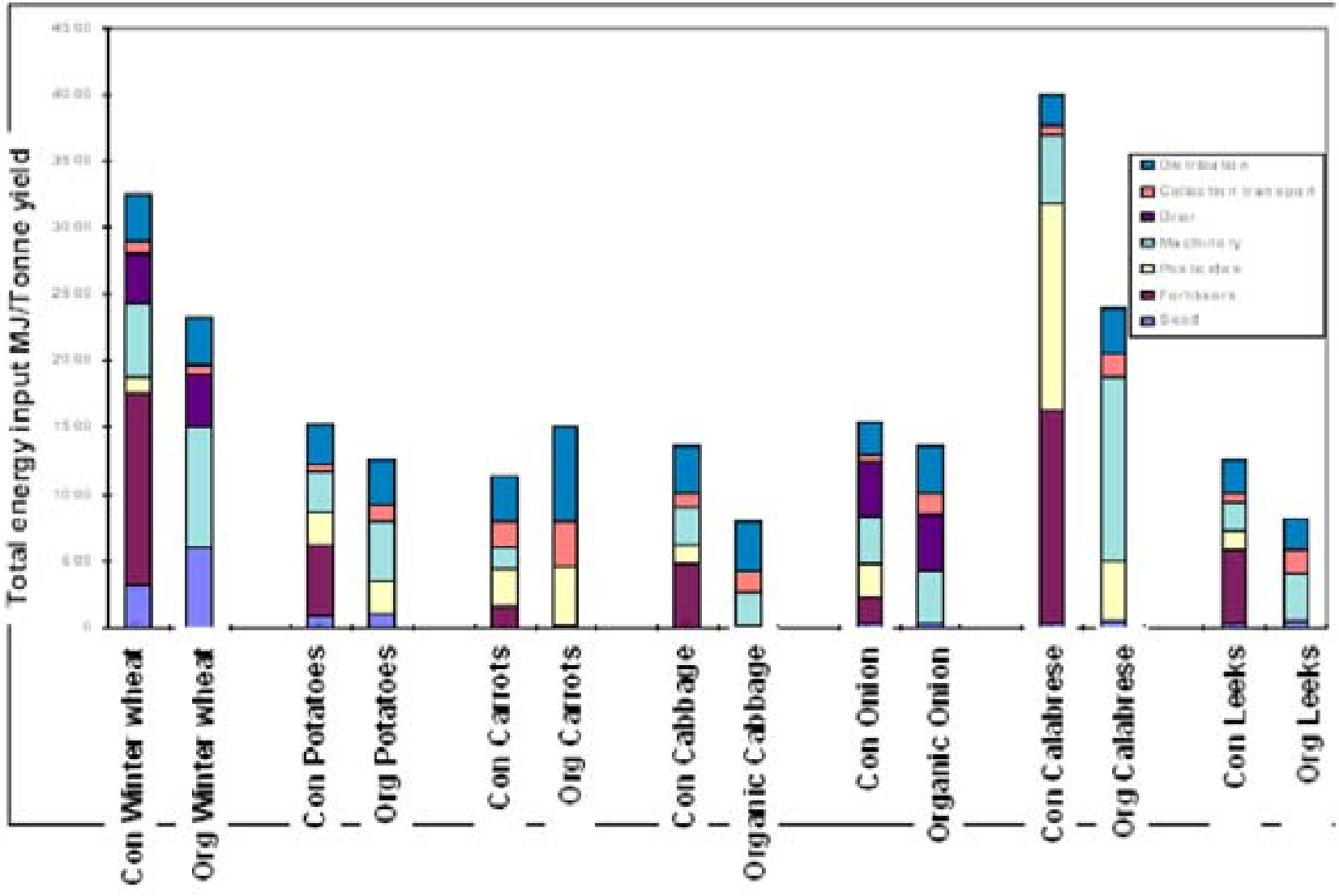
Principle of care

Organic Agriculture should be managed in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment.

Energy input by category on an area basis (Anon, 2000)



Energy input by category on a unit output basis (Anon, 2000)



Life Cycle Analysis

Environmental impact assessments for products should be based on Life Cycle Analysis.

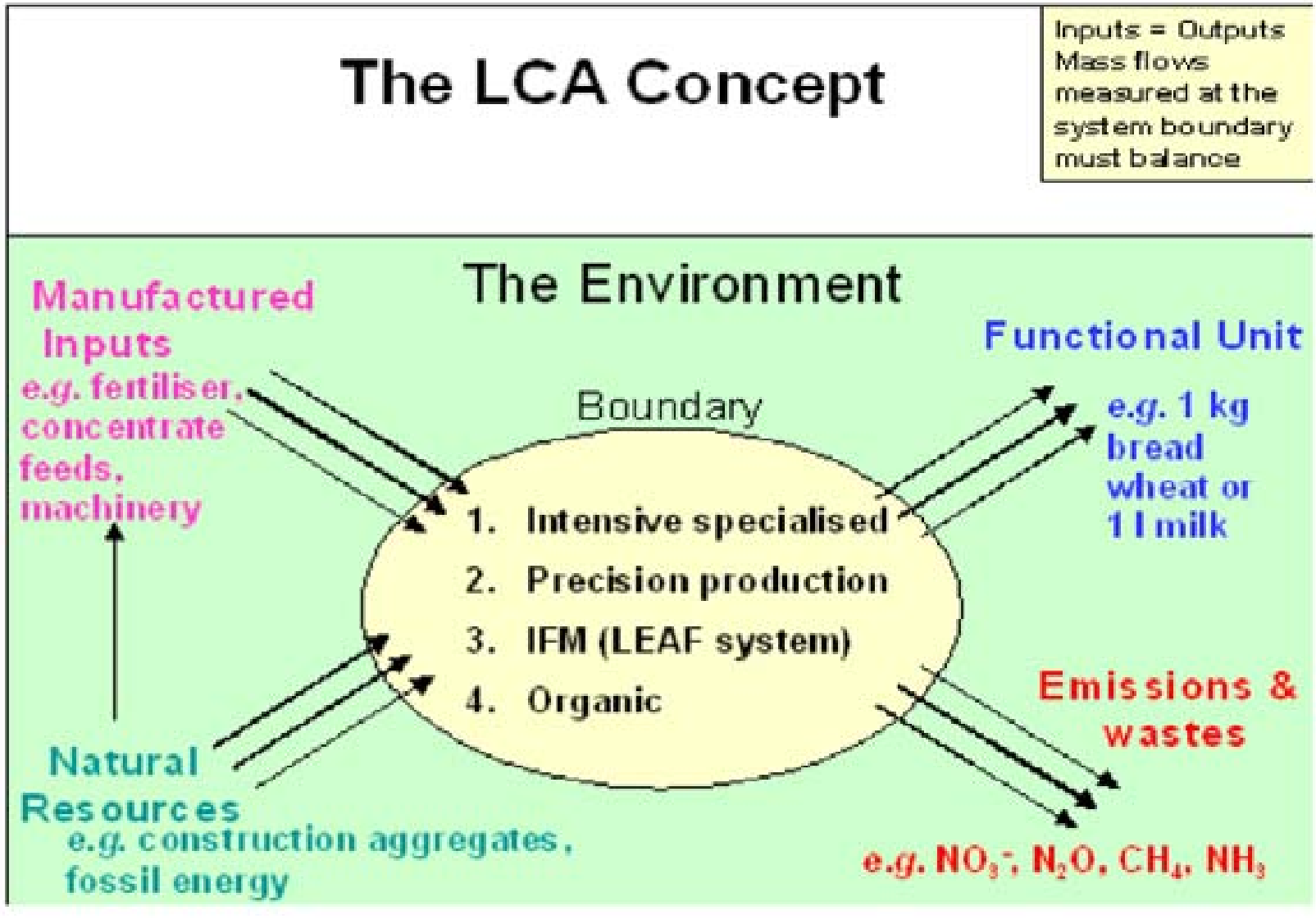
This provides a methodology for considering each stage of the product's life from extraction of the raw materials, through manufacture and construction, use and disposal.

In theory LCA analysis should consider the positive social and economic benefits of each activity though in practice this is too complicated and the method usually concentrates on quantifying negative impacts for comparison

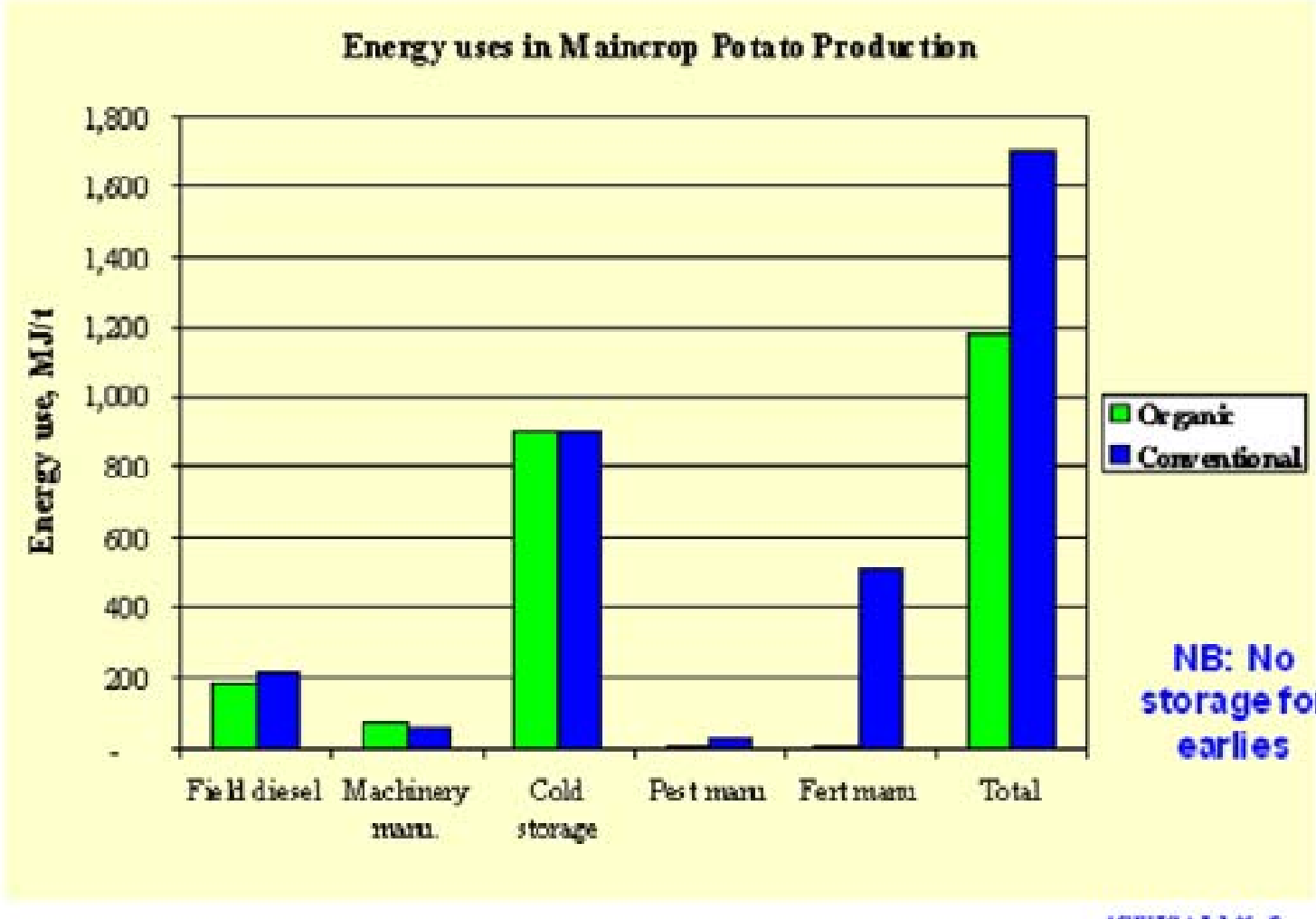
Determining the environmental burdens and resource use in the production of agricultural and horticultural commodities

1 t Bread wheat	1 t Pig meat
1 t Potatoes	1 t Poultry meat
1 t Oil seed	1 t Beef
1 t Tomatoes	1 t Sheep meat
12,000 Eggs	1000 l Milk

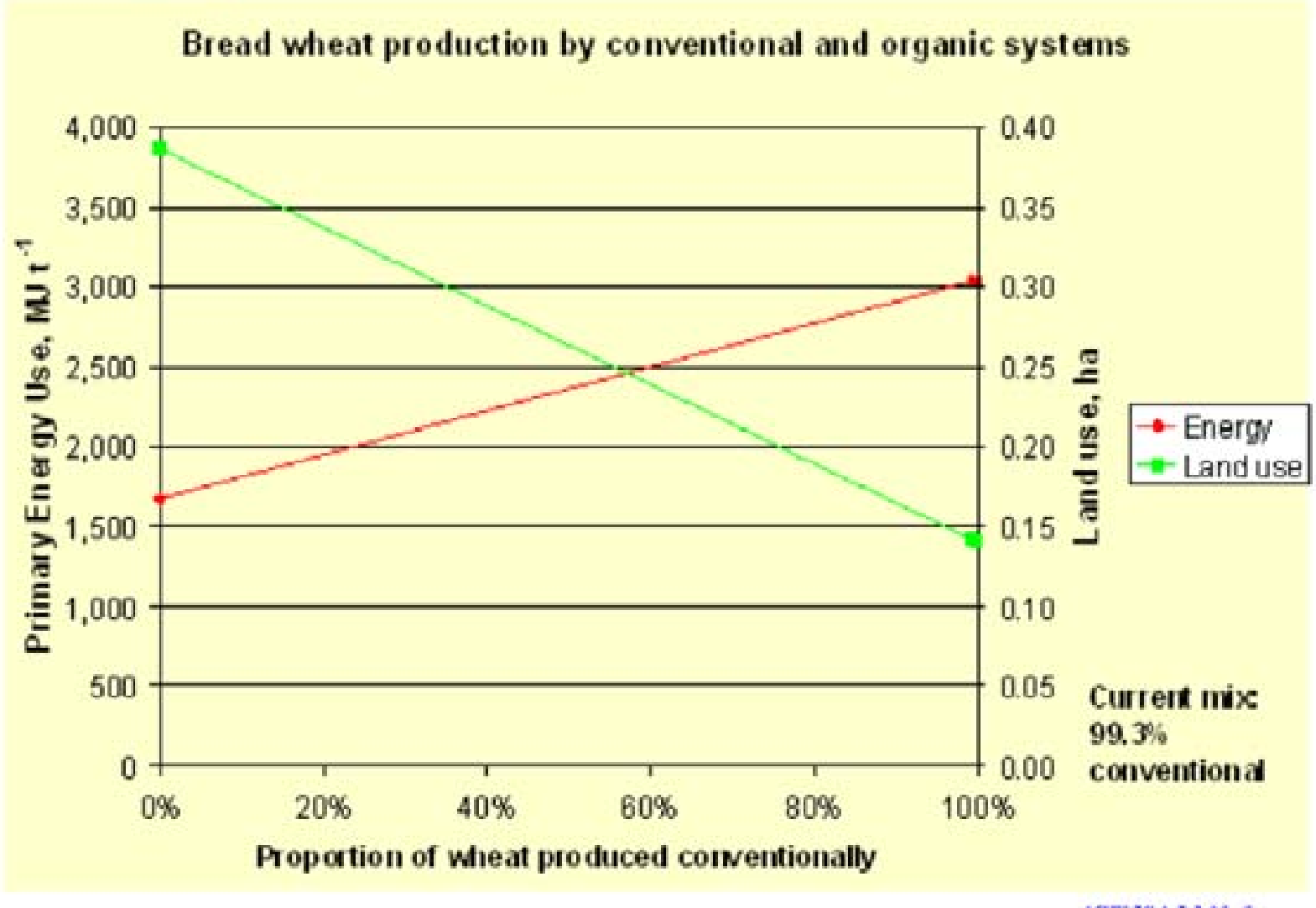
Life Cycle Analysis



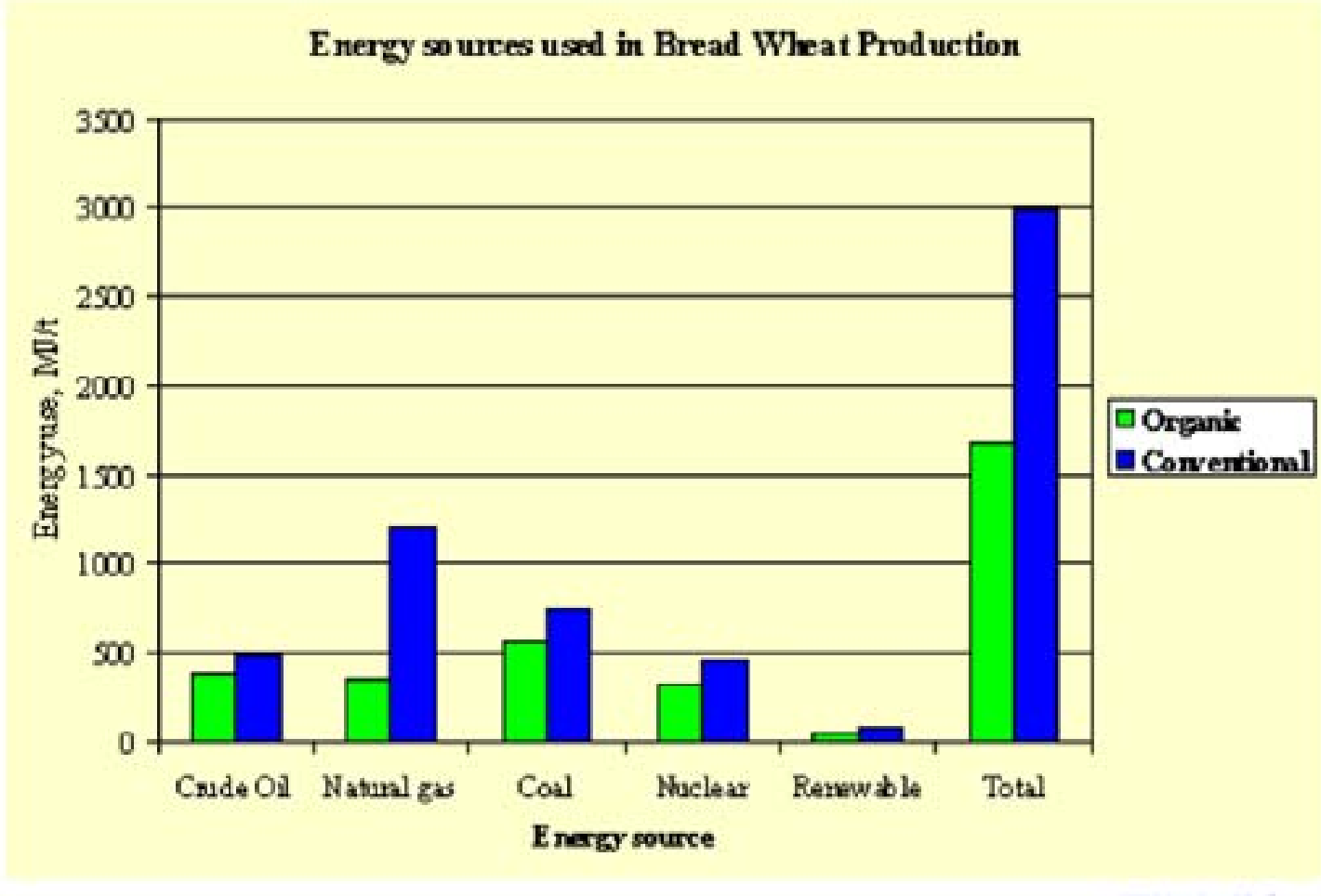
Energy Uses – Potatoes



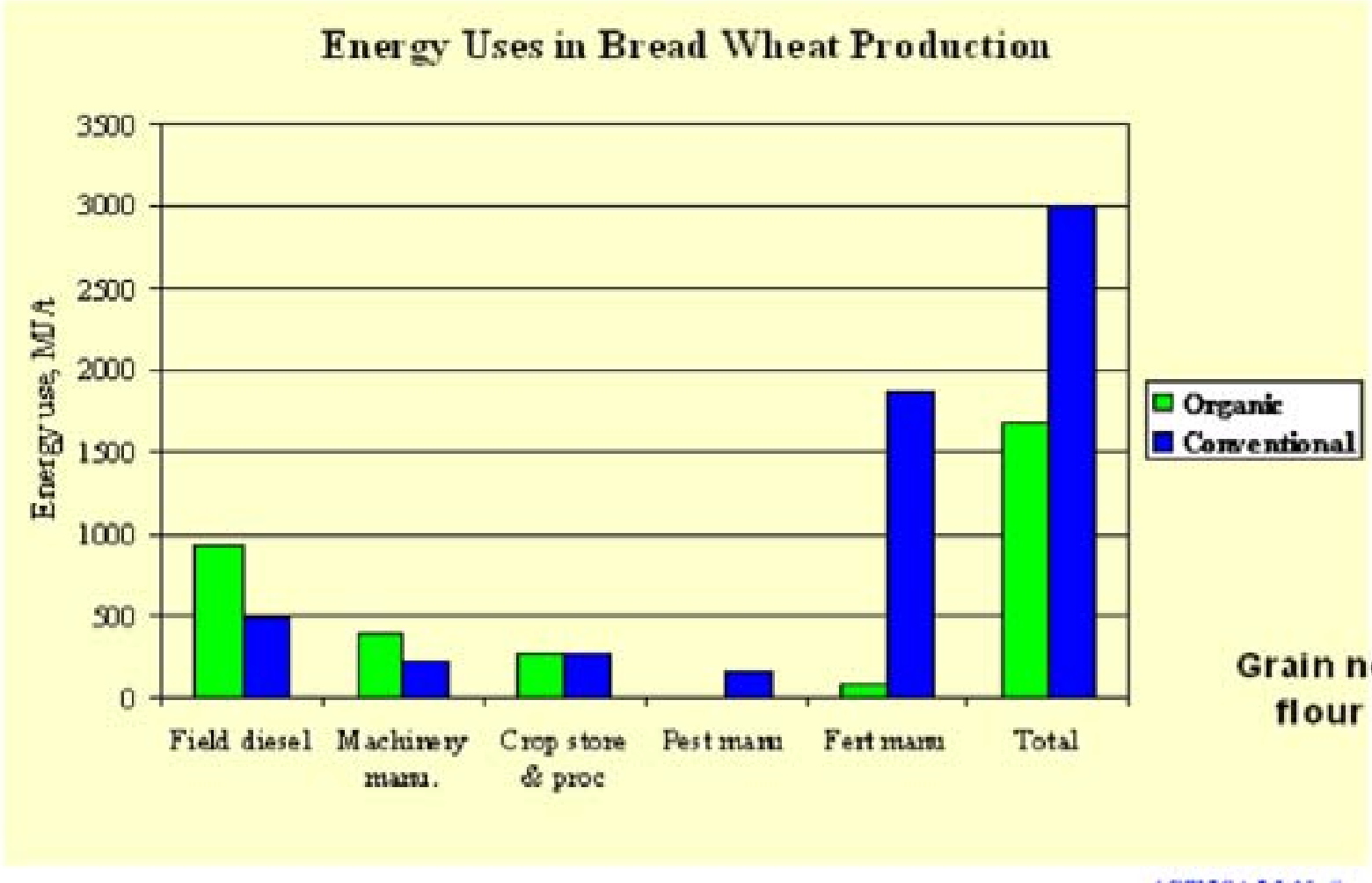
Bread Wheat Production



Energy Sources – Bread Wheat



Energy Uses – Bread Wheat



Energy used for growing main crops, MJ/t

	Conventional	Organic	O/C
Bread wheat	2,990	1,680	56%
Feed wheat	2,830	1,640	58%
Spring barley	3,280	1,820	55%
Winter barley	3,150	1,820	58%
Rape	7,130	4,010	56%
Field Beans	3,430	2,540	74%
Potatoes, main	1,700	1,180	69%
Potatoes, early	1,100	514	47%

Conclusions

- Organic arable: about 60% energy of conventional, but at least twice the land

Energy Budget for Sheepdrove Arable Enterprise

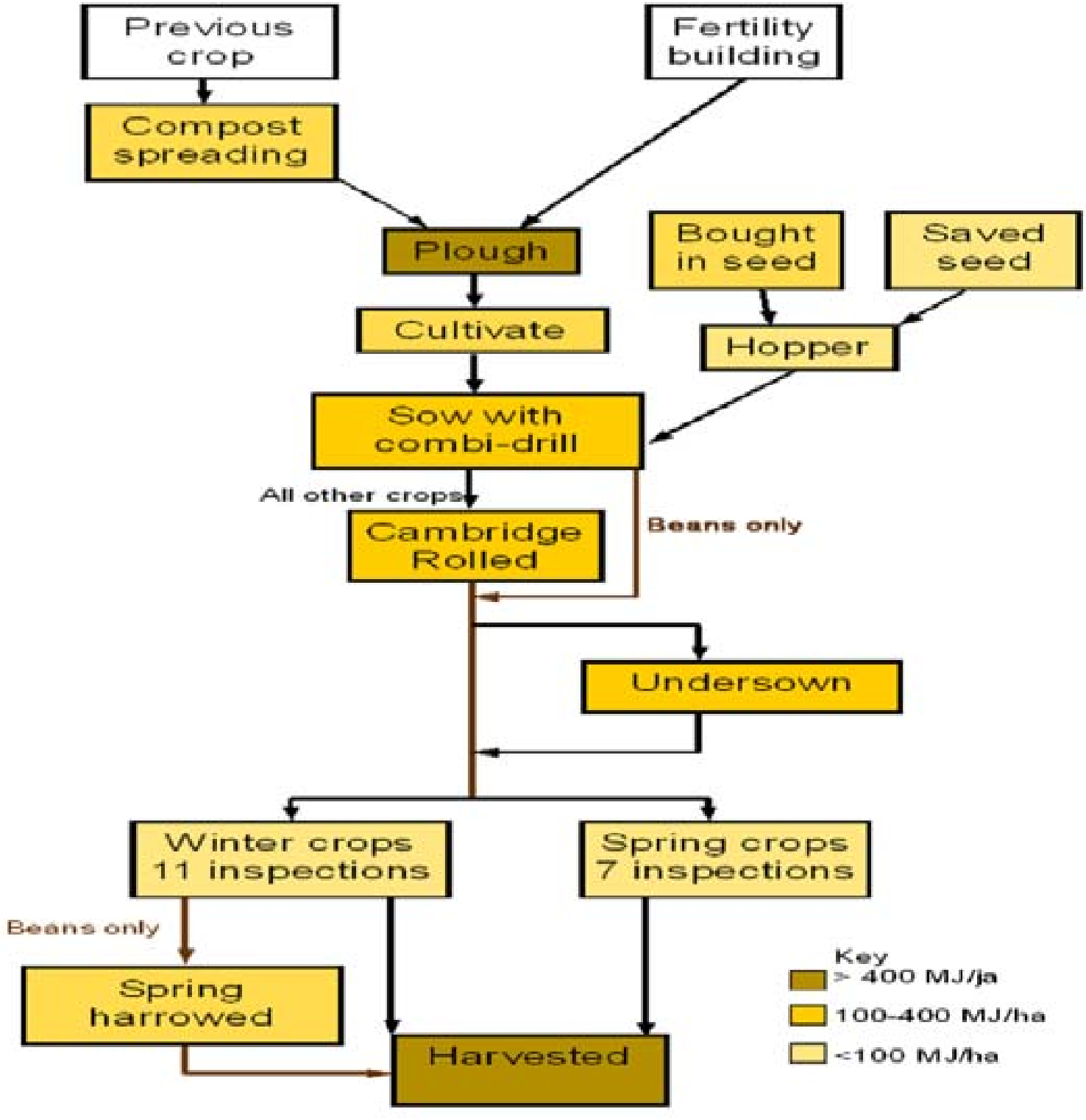
An investigation was undertaken to explore the energy inputs into the arable system for one production year at Sheepdrove Organic Farm.

The objectives were to:

Analyse the on-farm energy inputs into the all arable crops per hectare and put figures to the inputs.
To identify significant inputs within the enterprise
To identify possible energy-saving techniques
And identify potential alternative sources of energy
Energy savings will increase the profitability of the arable enterprise.

Approach

Energy demanding activities for arable crops were identified and per hectare figures were calculated for each activity.


Previous crop
Fertility building
Compost spreading
Plough
Bought in seed
Saved seed
Cultivate
Hopper
Sow with combi-drill
All other crops
Beans only
Cambridge Rolled
Undersown
Winter crops 11 inspections
Spring crops 7 inspections
Beans only
Spring harrowed
Harvested
Key
> 400 MJ/ja
100-400 MJ/ha
<100 MJ/ha

Conclusions

Ploughing, combining and drying the grain were identified as the main energy inputs into the system.

Ploughing and combining use fossil fuels whereas the dryer uses both electricity and fossil fuel.

Ways to reduce the power input into the grain dryer were researched such as maintenance, operation method modifications, etc.

Currently the most fuel-efficient way to dry the grain would be to use a fan-ventilated system using LPG

Conclusions

Bio-diesel was found to be the most viable alternative and a production cost of 27.52p/l was calculated.

	Bio-diesel p/l	Red Diesel p/l
Waste oil	10	0
Production cost	13.3	0
Duty	4.22	0
Total cost	27.52	24.95

It would mean that the use of fossil fuels would be replaced by a renewable source of fuel and therefore the overall carbon footprint would be smaller.

However since it has a lower energy content compared to diesel it would mean an overall increase in the fuel used

Alternative methods of producing the power for the grain dryer were also investigated and it was found that a 6kW wind turbine was the best option.

On Farm Wastewater Management using a Multi-Stage Reed Bed System in an AONB

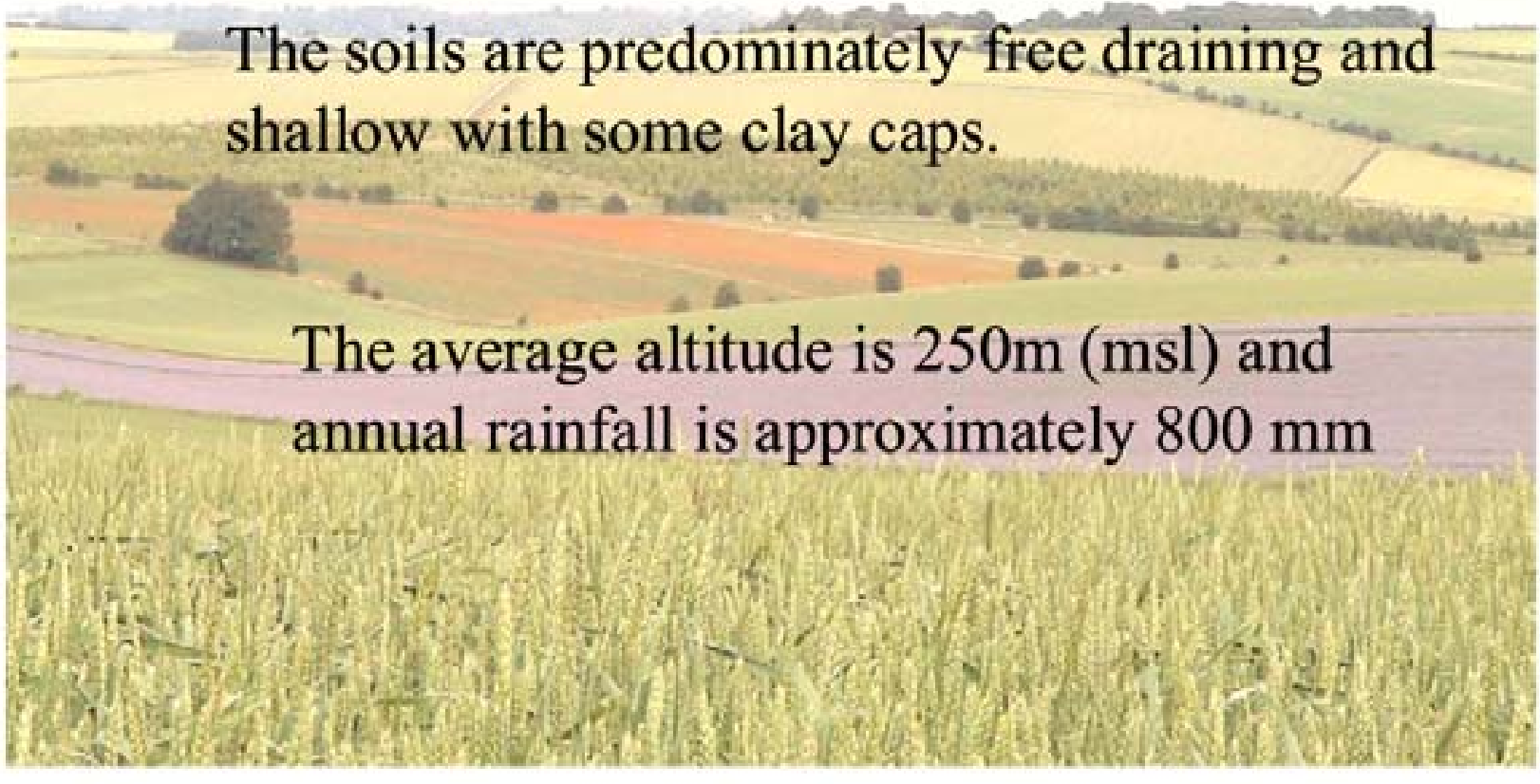
Lois Philipps[1] Chris Weedon[2] & Claire Aspray[1]

1: Elm Farm Research Centre, Hamstead Marshall Newbury Berks RG20 0HR

2: Watercourse Solutions Ltd Will's Barn Chipstable Taunton Somerset TA4 2PX

Context

Sheepdrove is a 800ha mixed organic farm situated in the Berkshire Marlborough Downs AONB

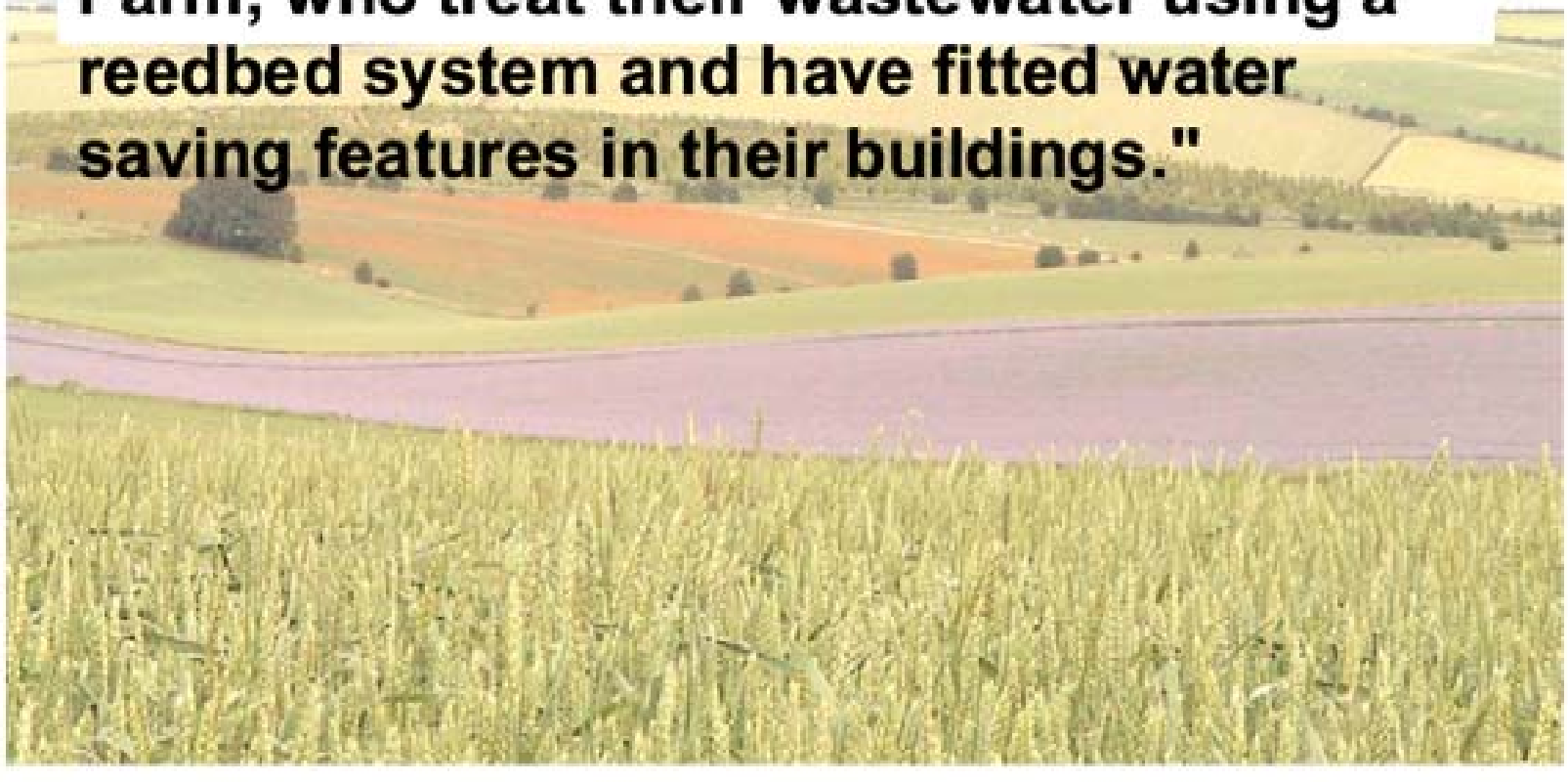


The soils are predominately free draining and shallow with some clay caps.

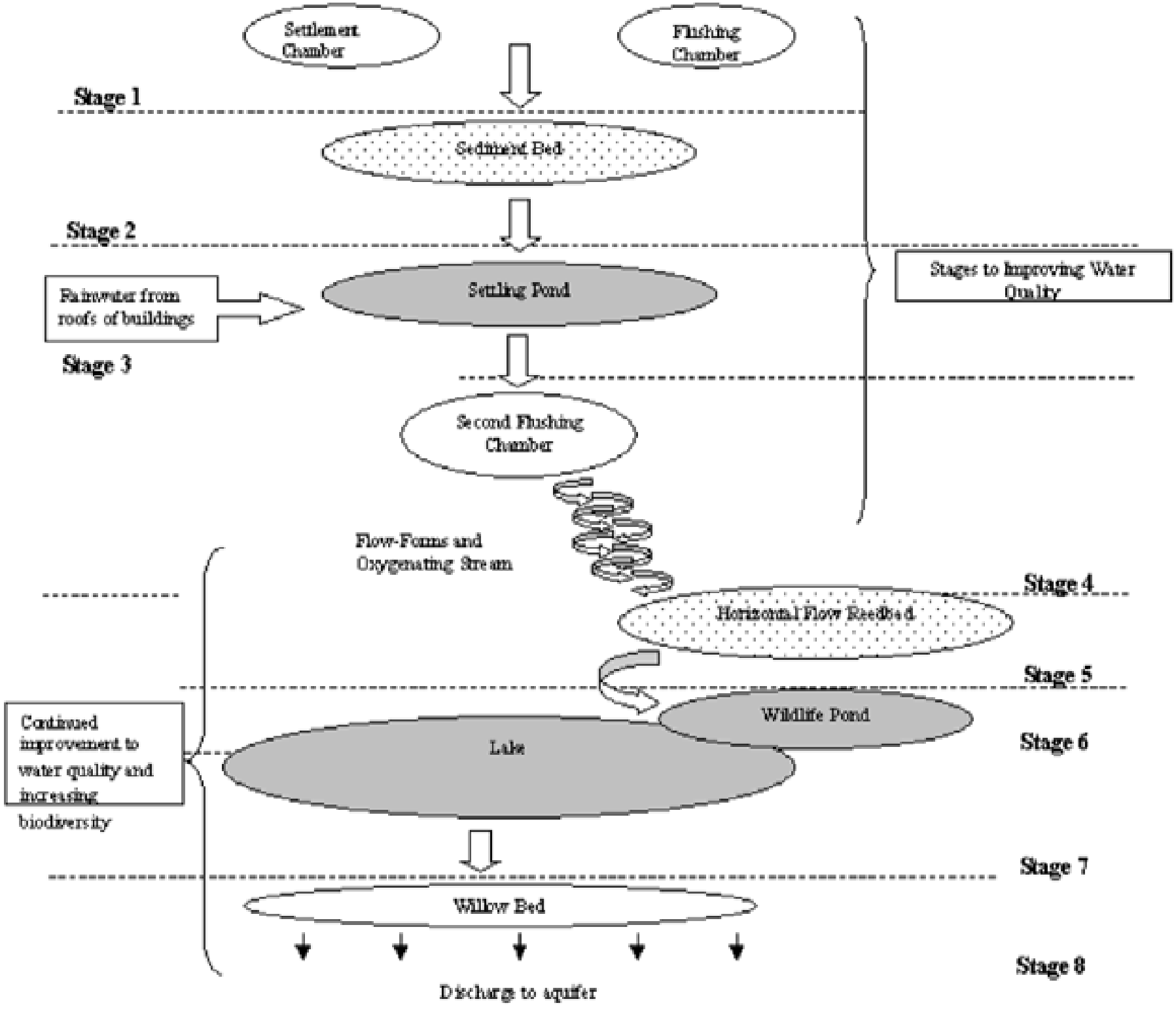
The average altitude is 250m (msl) and annual rainfall is approximately 800 mm

Context

The EA Chief Executive,Barbara Young, promoted Sheepdrove as a case in point for positive environmental practice, and said: **"There are good examples being set by businesses like Sheepdrove Organic Farm, who treat their wastewater using a reedbed system and have fitted water saving features in their buildings."**



The Poultry System


Settlement Chamber
Flushing Chamber
Stage 1
Sediment Bed
Stage 2
Stages to Improving Water Quality
Rainwater from roofs of buildings
Settling Pond
Stage 3
Second Flushing Chamber
Flow-Forms and Oxygenating Stream
Stage 4
Horizontal Flow Reedbed
Stage 5
Wildlife Pond
Continued improvement to water quality and increasing biodiversity
Lake
Stage 6
Stage 7
Willow Bed
Stage 8
Discharge to aquifer

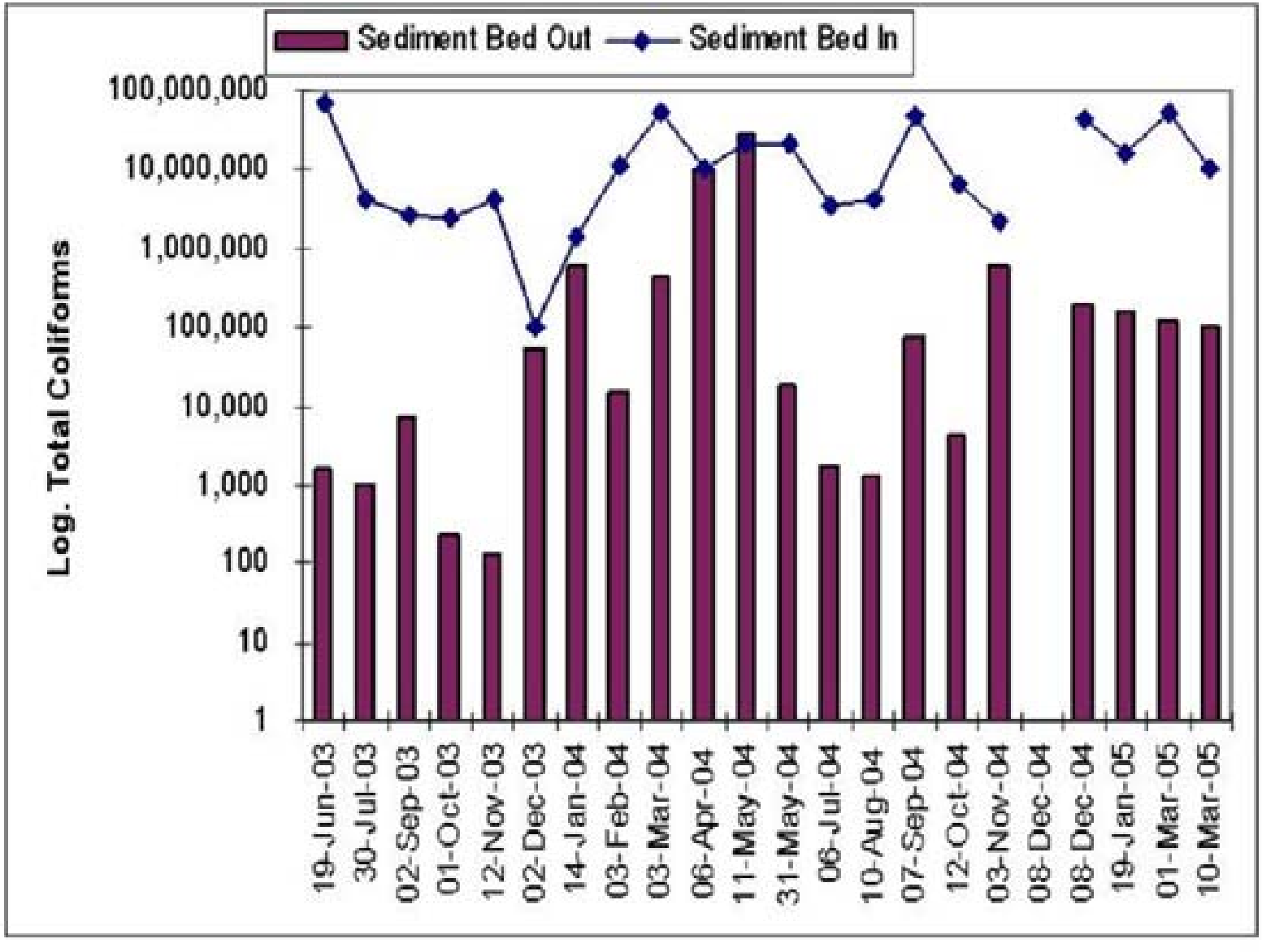
Pre-Treatment

Wastewater from the processing Plant is first treated to remove fat using a dissolved air floatation treatment system (DAF Plant)

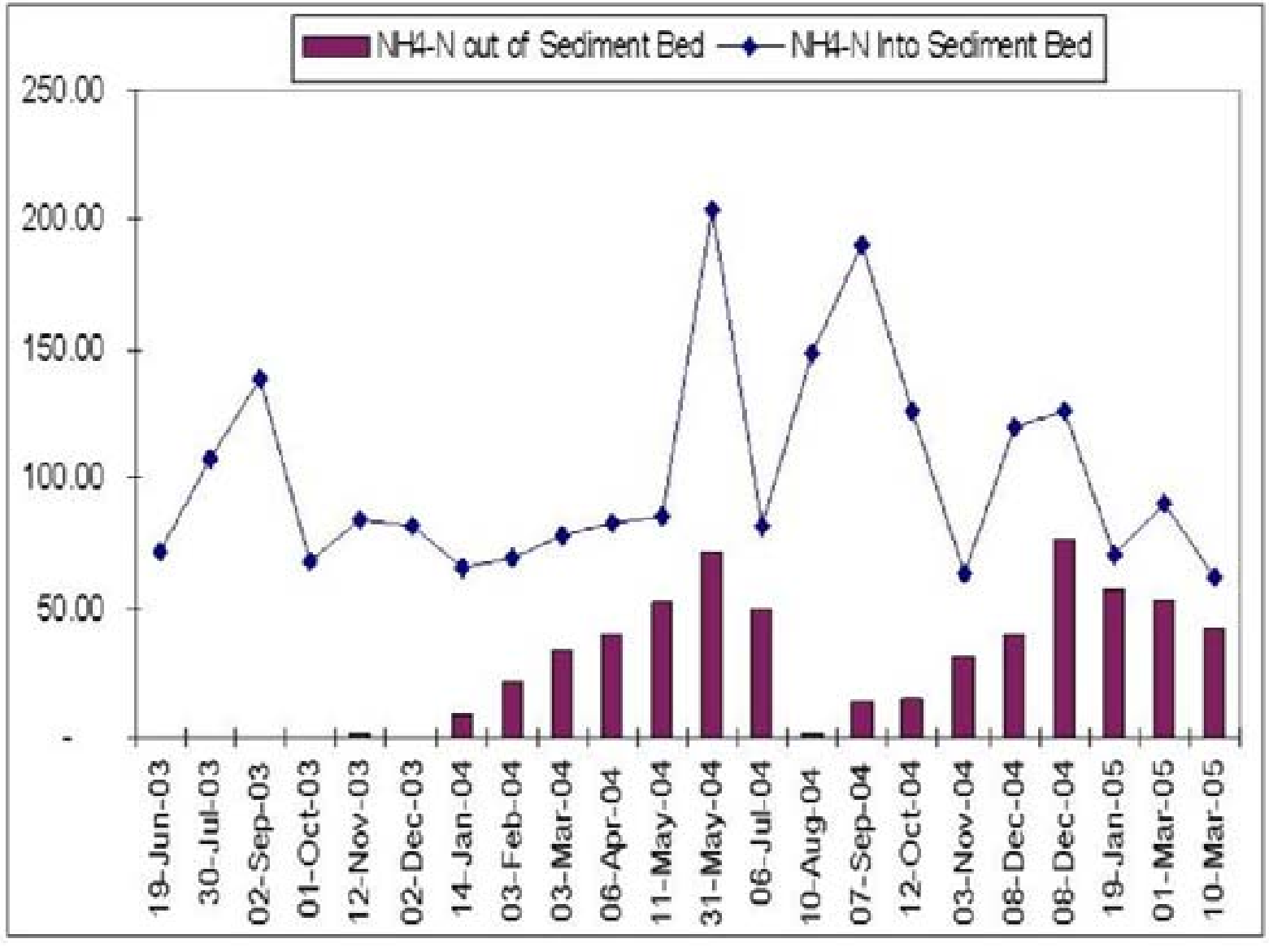
Settlement & Flushing Cambers (Stage 1)

Compact Vertical Flow Reed Bed (Stage 2)

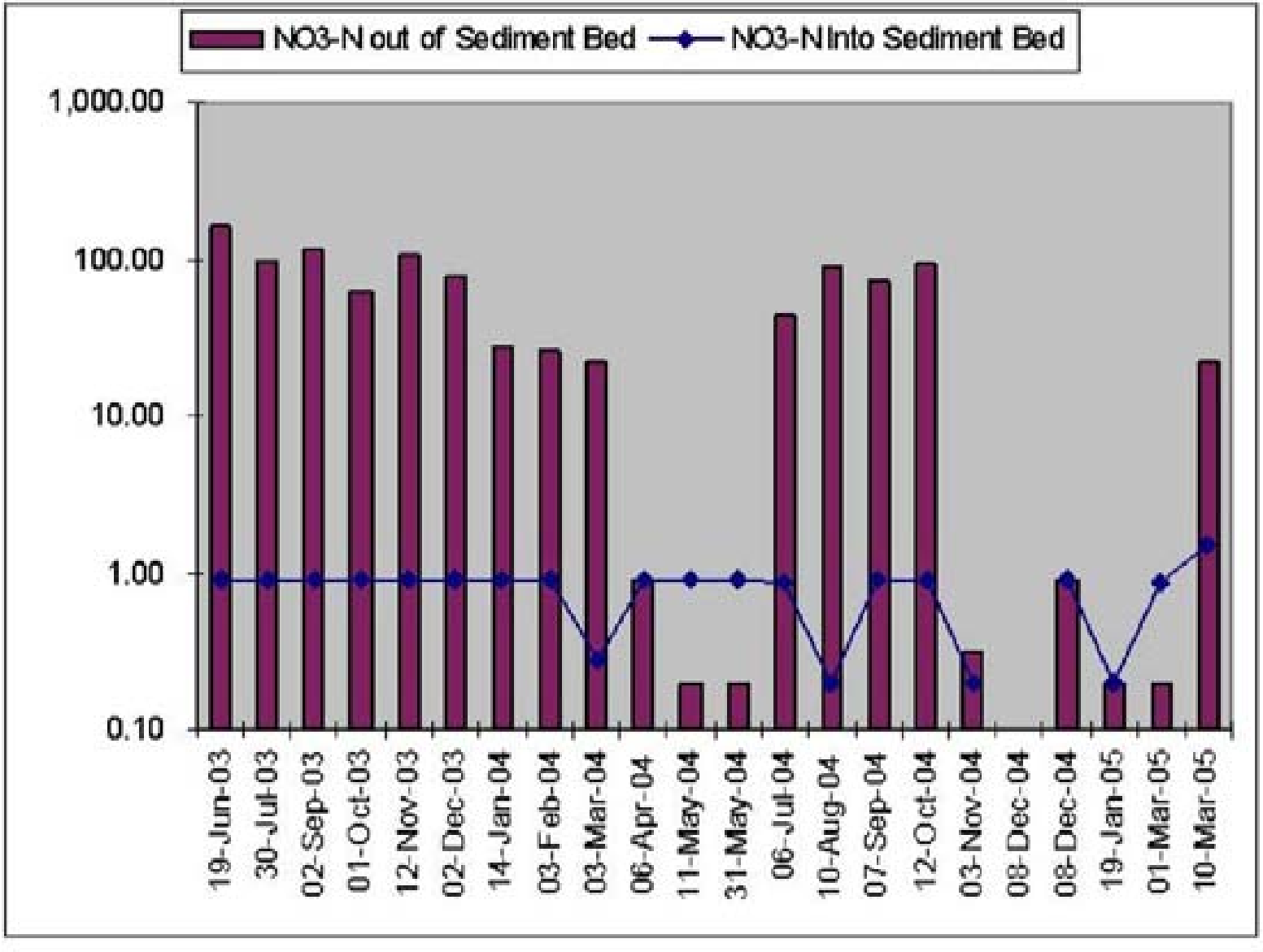
Compact Vertical Flow Reed Bed (Stage 2)



Compact Vertical Flow Reed Bed (Stage 2)



Compact Vertical Flow Reed Bed (Stage 2)



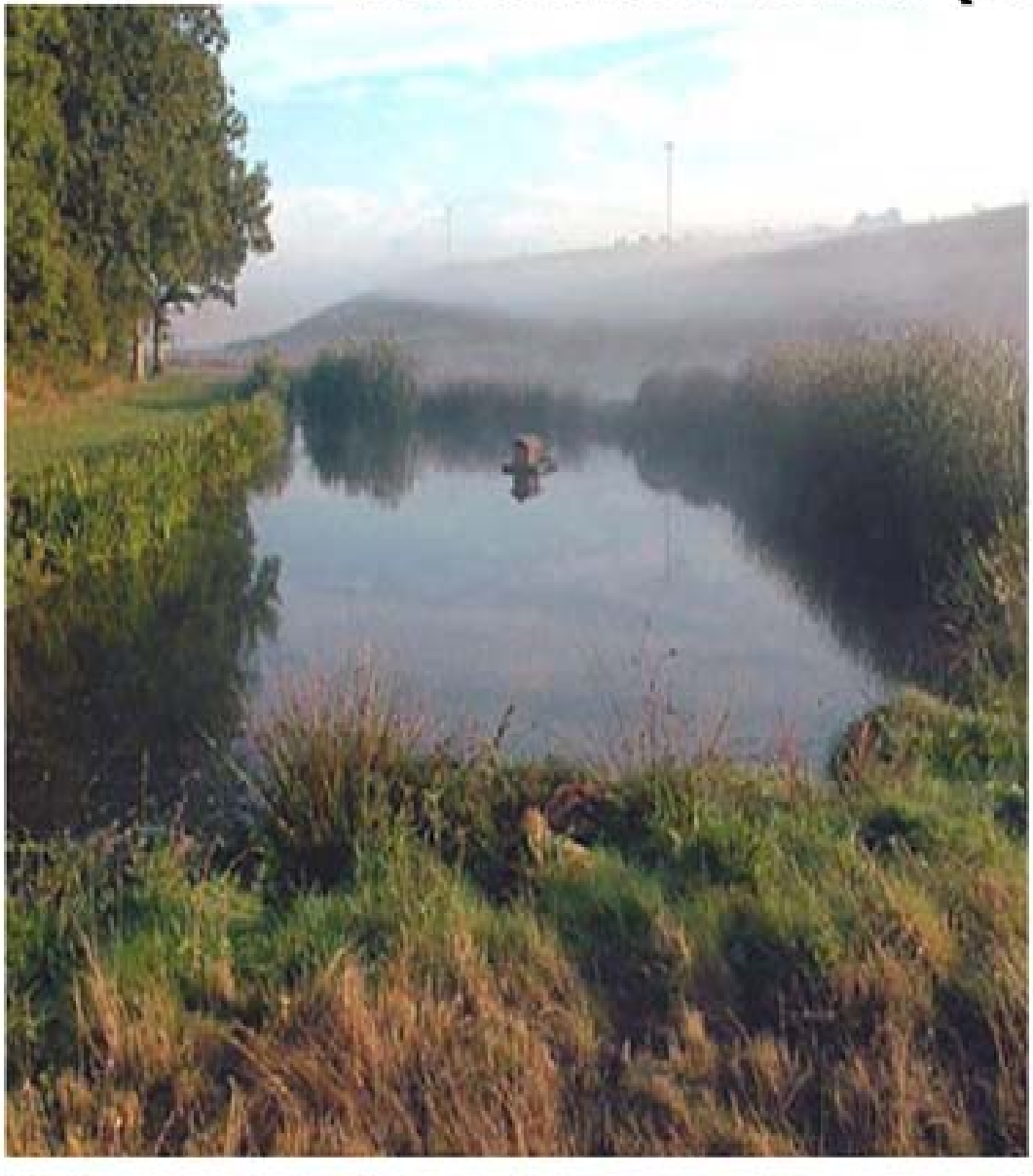
Settling Pond (Stage 3)

'Grey' Water from buildings enters the system

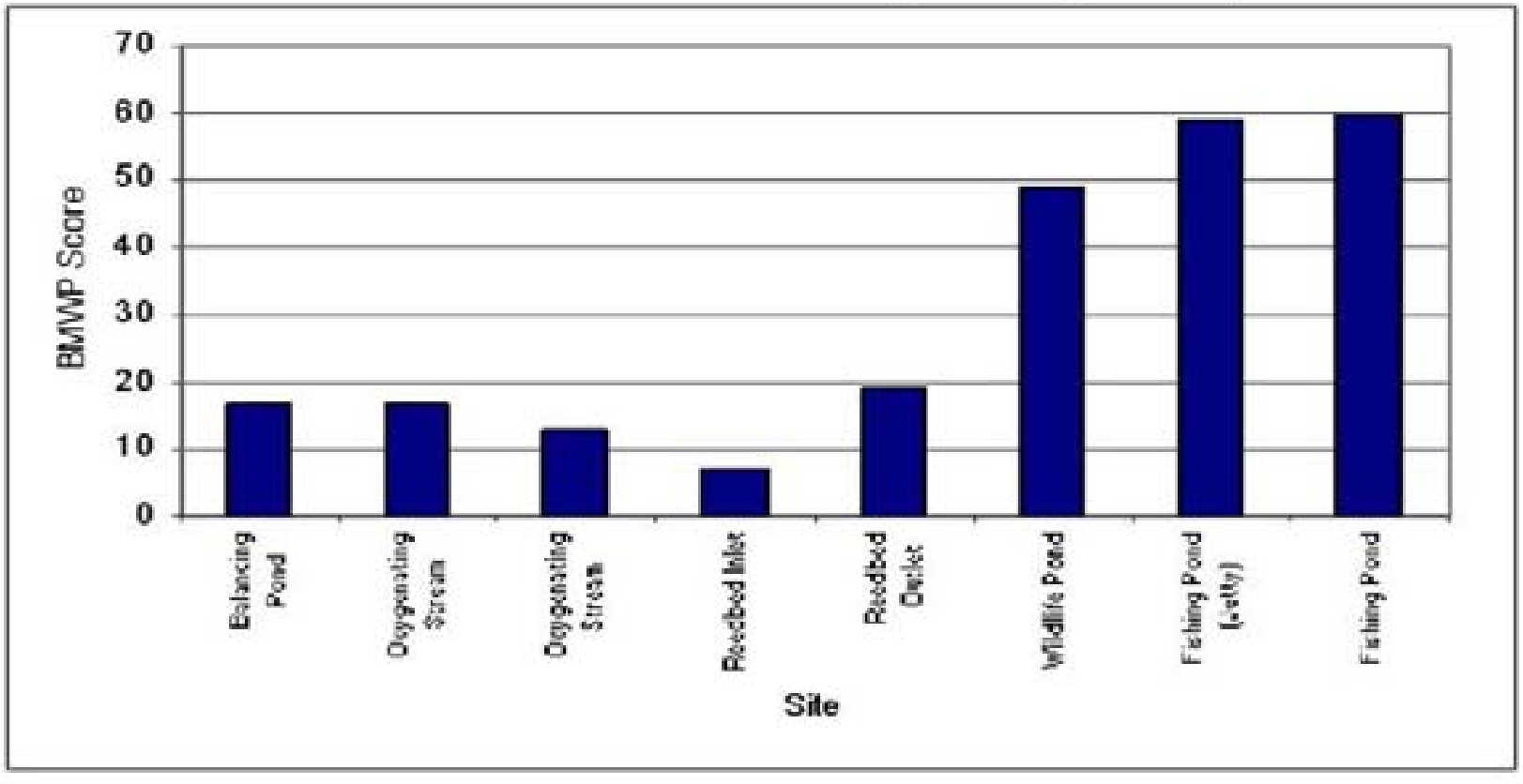
Flow forms and Oxygenating Stream (Stage 4)

Free Water Surface Reed Bed (Stage 5)

Wildlife Pond (Stage 6)



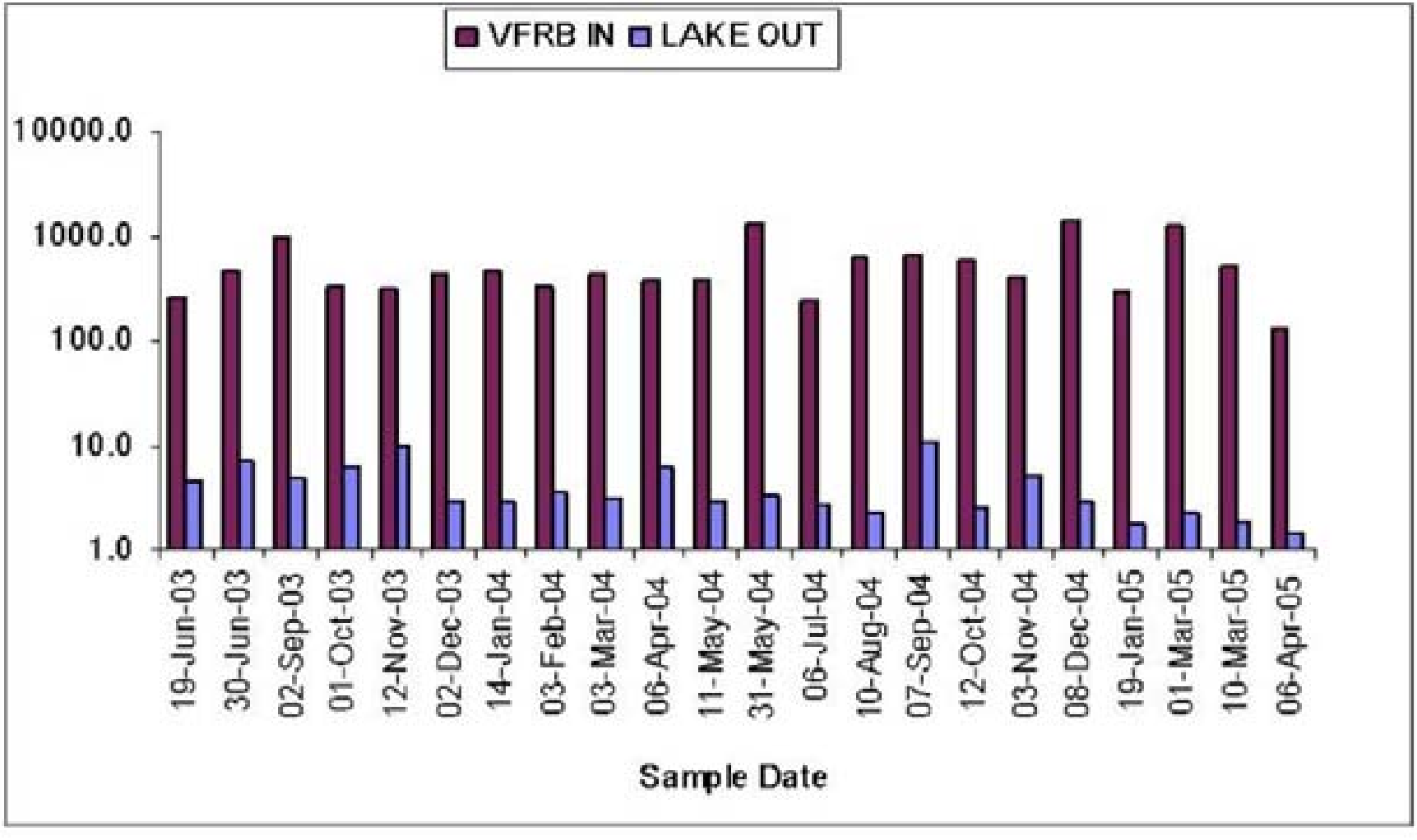
Wildlife Pond (Stage 6)



Biological Monitoring Working Party Scores (BMWP)

Lake (Stage 7)

Lake (Stage 7)



Reduction in BOD from beginning to end of the reed bed system

Willow Bed (Stage 8)

Sheepdrove Organic Farm swept the board to win both 'Agriculture' category and 'Defra Overall Winner' in today's Environment Agency Water Efficiency Awards 2005

The panel of judges said: "Their whole approach is excellent, demonstrating an integrated and environmentally aware ethos across the business."

Acknowledgements

The authors wish to thank:

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The Farm Director and Jason Ball the Sheepdrove Biodiversity Officer for their help and support

Wildlife & Wetlands Trust for the provision of the aquatic flora & fauna data

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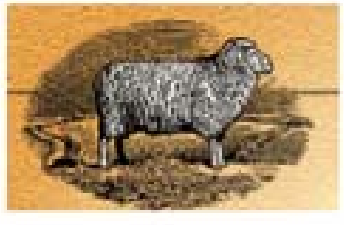

Watercourse Systems Ltd