Scuola Agraria del Parco di Monza

Composting and Greenhouse Gases:

Strategic Views and a Preliminary Assessment

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(presented by Dr Dominic Hogg, Eunomia Research & Consulting)

Based On…

- **Work with European partners for the European Commission**
  - LDK (Greece)
  - ZREU (Germany)
  - HDRA (UK)
  - Scuola Agraria del Parco di Monza (Italia)

Introduction

- Role of Agriculture in Climate Change Emissions (1990)
  - methane emissions from agriculture were 41% of all CH4 emissions
  - nitrous oxide emissions reached 51% of N2O emissions
  - Together with carbon dioxide emissions agricultural greenhouse gas emissions were about 11% of all greenhouse gas emissions of the EU in 1990.
- What about ‘absorption’/ ‘sequestration’?

European Climate Change Programme, WG Agriculture

- Key Strategic Objectives
  - ***Mitigation potential of Nitrous Oxide emissions from agricultural soils***
  - ***Sequestration potential of agricultural soils***
  - Mitigation potential of Carbon Dioxide by providing renewable raw materials for the energy/industrial sector
  - Mitigation potential of Methane emissions from enteric fermentation and
  - Mitigation potential of Methane and Nitrous Oxide emissions from manure management

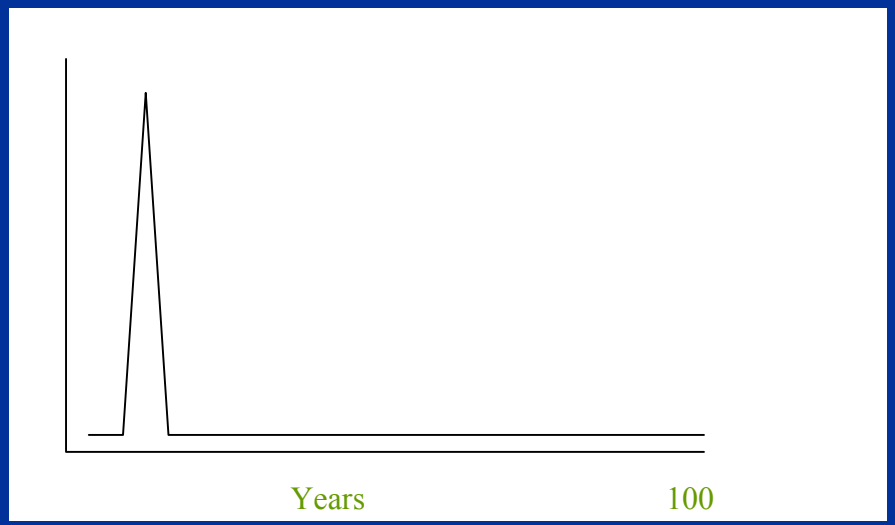
Defining the Problem

- Life-cycle Studies in Waste Management
  - CO_2 From Biogenic Sources Can be Ignored
  - Issue of Time is Ignored – 'Life-cycle Emissions'
- IPPC Approach – 'Short-term' Carbon (100 years) v 'Long-term' Carbon
  - Fine for Modelling Climate Change – Not so Fine For Understanding More 'Marginal' Contributions

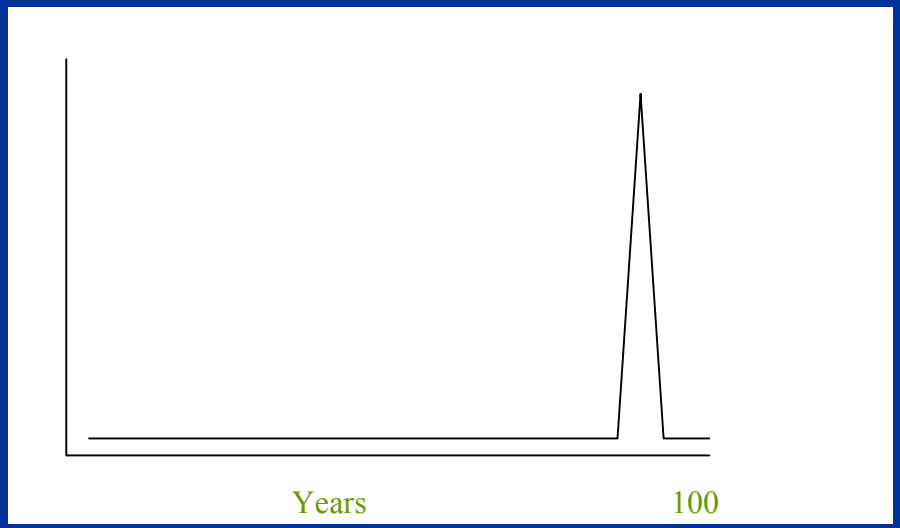
Extreme Situation

- Would It be Preferable to Have a Future Profile….

Like this….?



Or like this….?

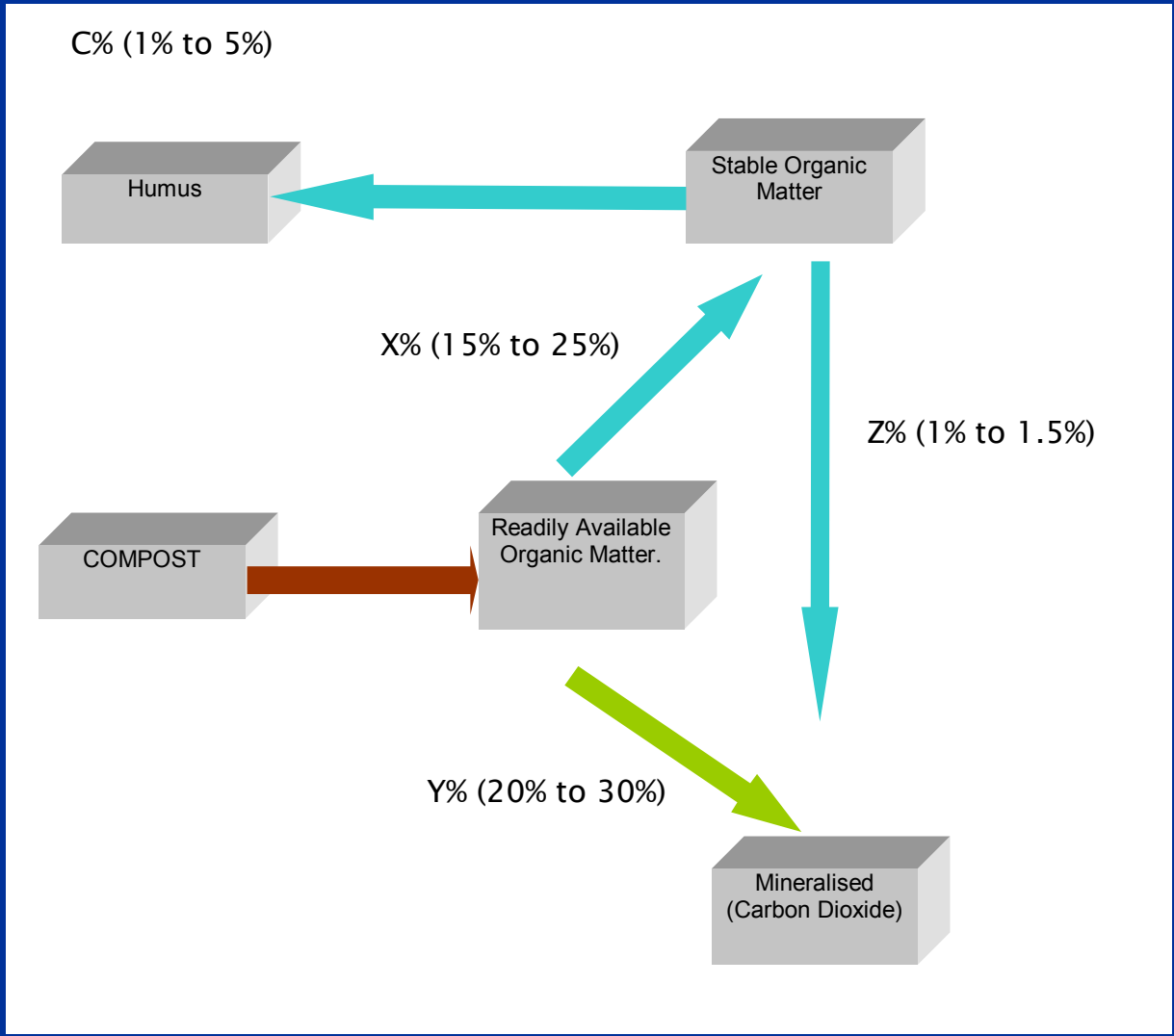


GHGs Have an Effect Over Time – **TIME MATTERS Matters** (Adaptation etc.)

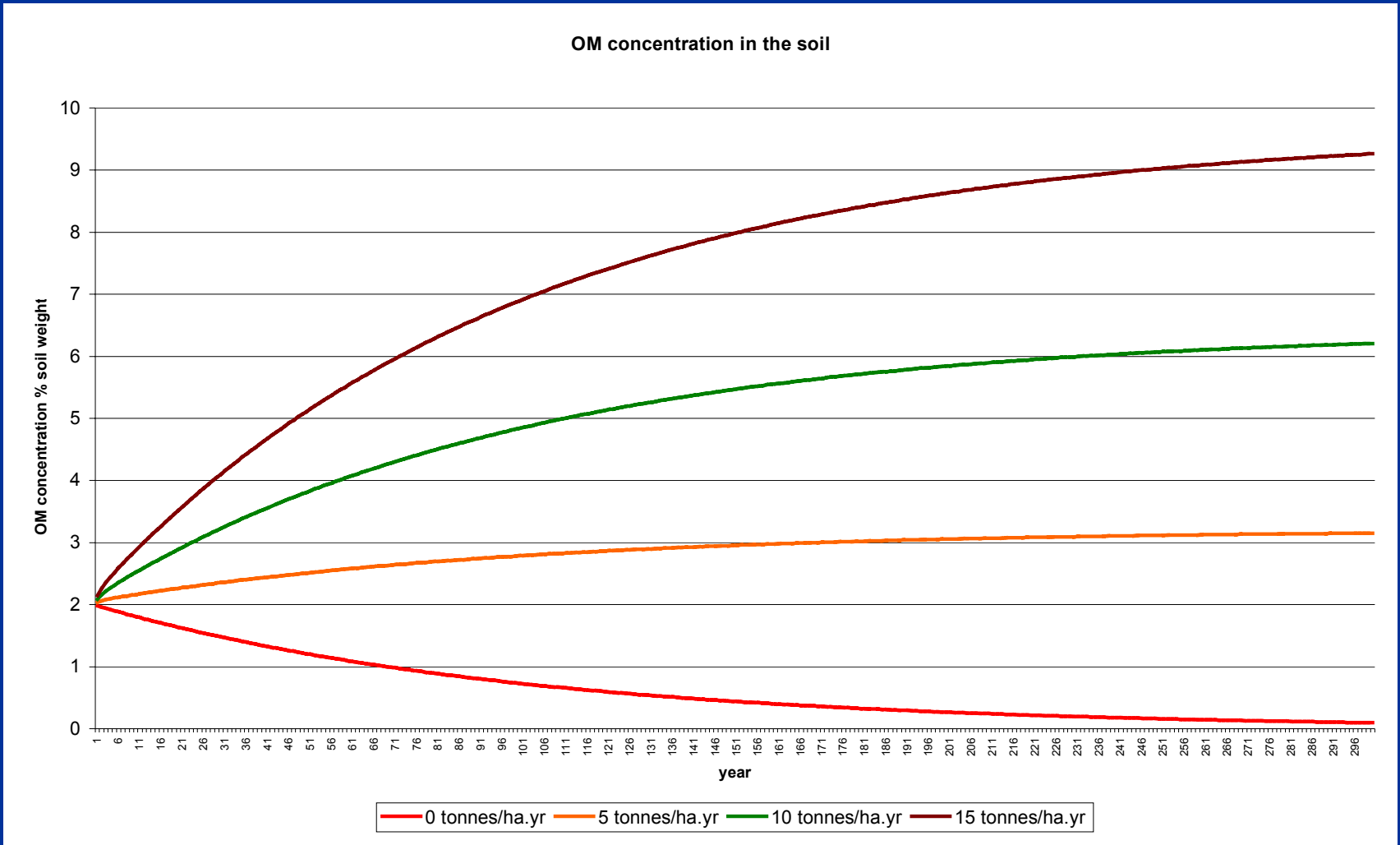
Model Outline

- **“Active” soil fraction** (representing short-term sequestration of carbon – provides source of energy for microbes, and soil carbon and nitrogen supply necessary for amino acid synthesis);
- **“Slow” or “decomposable” soil fraction** (of great importance to developing good soil structure – disturbed by cultivation and other disturbances – provides a source of carbon for biological digestion by microbes, so linking to the active pool. – can be viewed as mature compost); and
- **“Passive” soil organic fraction** (turnover time of order 100 to 1000 years - resistant to oxidation processes – acts as a ‘cement’ that binds particles).

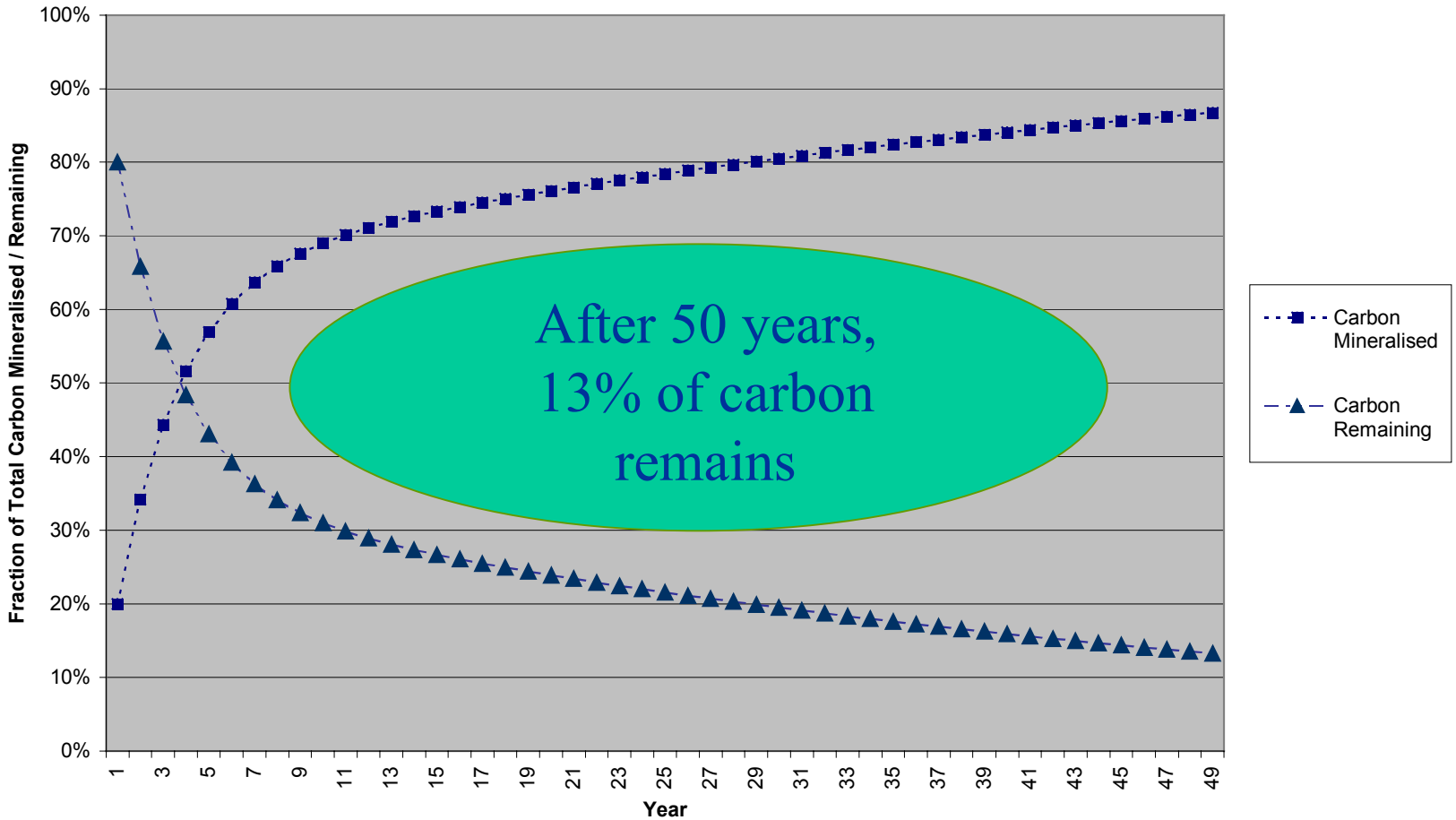
Carbon 'Sequestration'



Carbon 'Sequestration'(2)



Carbon 'Sequestration' (3)



Carbon 'Sequestration'

- Compost (and landfill) Leads to Carbon Emissions over Extended Periods of Time – Not True of Thermal Treatment – 'Time-Limited Sequestration' After Initial Release
- Biogenic Fraction Partially Retained In Soil Over Time
- Provides Soil Organic Matter – Potentially Much Wider Benefits Than GHG Alone
- 'Strong Sustainability'? (natural capital)

Possibilities

- Average 0.3 t/ha C (1.1 t CO2) could be absorbed due to land use change activities, e.g. no tillage system (TransAlta in Canada).
- 20 % of the surface of agricultural land in the EU could be used as a sink. This would result in an absorption potential of 7.8 Mt C, which corresponds to 8 % of the total EU reduction objective.
- Increase of 0.15% of organic carbon in arable soils in a Country like Italy would lock the same amount of carbon in soil that is currently released into the atmosphere in one year by the use of fossil fuels.
- Counters general decline in SOM status

New Ways To Promote The Benefits Of Composting

- Region Emilia Romagna pays 300.000 ITL/ha (some 155 €) to use compost and promote a build-up of S.O.C. in depleted soils
- Region Piemonte pays 425.000 ITL/ha (some 220 €) to use up to 25 tonnes D.M./ha in depleted soils over a 5 years' time frame
- Also Umbria (more limited)

Rationale - Rural Development Plans (2000-06) (Reg. CE 1257, on sustainable agriculture)

Conclusion

- ‘Blindness’ to Biogenic Carbon Issues in Waste Management Studies Have Led to Role of Soils Being Overlooked
- Waste Policies, Climate Change Policy and Inventories Under Kyoto Should Recognise Role of Soils (and recycling!)
- BUT – Don’t Create New Problems in Soils (so standards for application)