

Climate Change and the RDP

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OUTLINE

1. The challenges of climate change
2. Greenhouse gas emissions from agriculture
3. Key concerns
 - a) Mitigation
 - b) Adaptation
4. Evaluation of climate change mitigation and adaptation
 - a) Challenges
 - b) Key actions

The challenges (1) Climate forcing



- Multiple sources of GHG emissions from rural land use
- Many ways in which farming produces emissions of N₂O and CH₄ and CO₂
- Multiple sources of emissions from livestock
- Growth in demand for livestock products with increased affluence

According to Bellarby (2010) between 17 and 32% of all global anthropogenic emissions come from agriculture

The challenges (2) Mitigation and adaptation

▪ Mitigation

If we manage land and livestock differently we can reduce emissions

We can even sequester carbon in some cases, especially with trees and to a degree with permanent pasture

▪ Adaptation

There is a need to think about adaptation within farming and forestry

To drought to floods, to diseases

Involving new cropping and stocking

Providing new services for wider society such as flood control

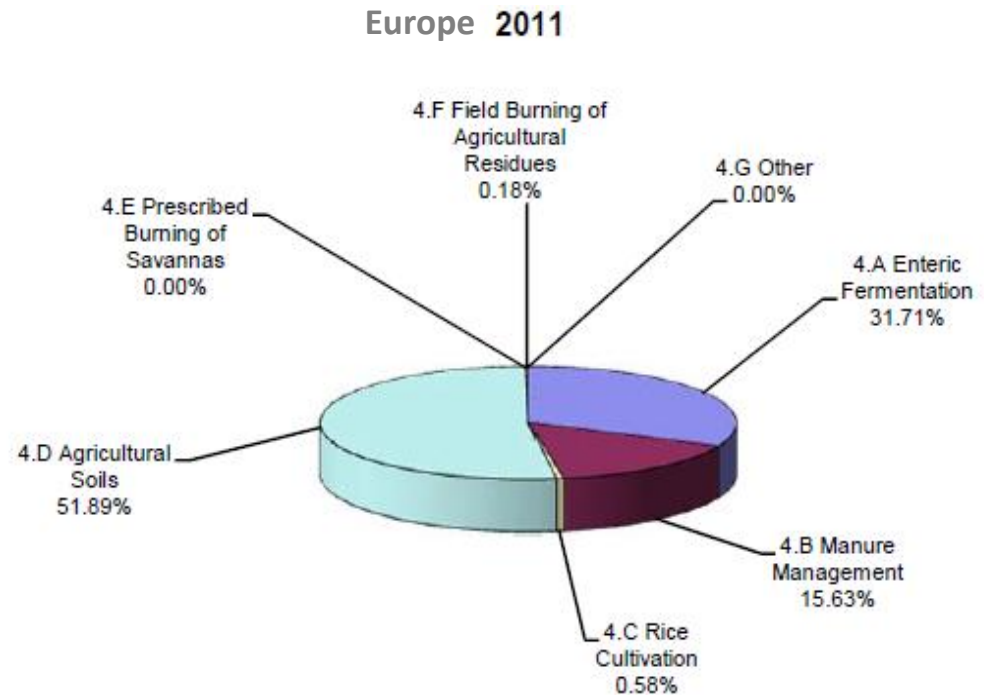
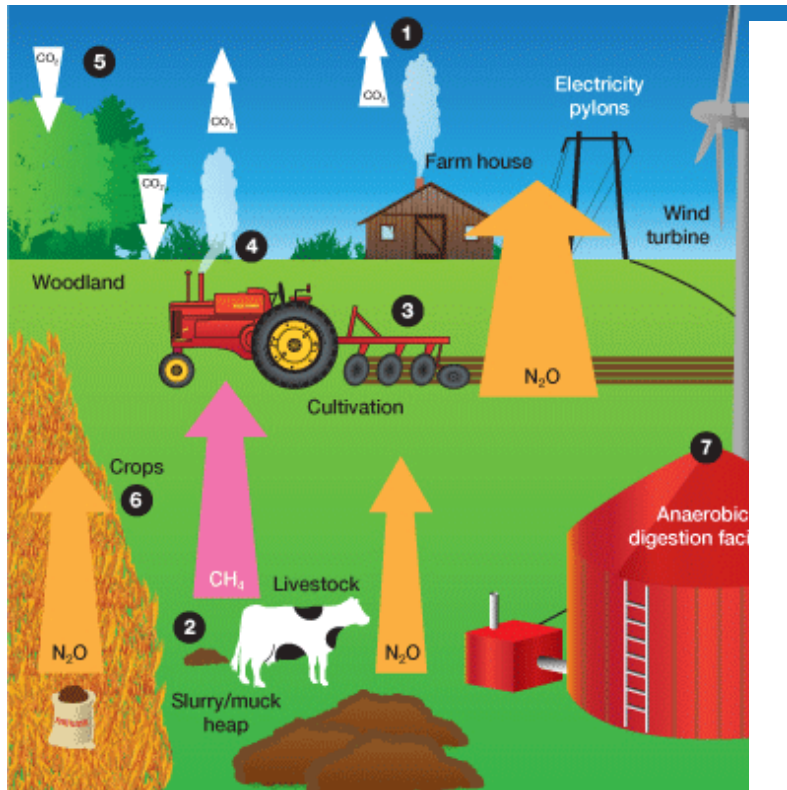
The challenges (3) The global challenge



“The primary question for agriculture is how to decrease greenhouse gas emissions, while at the same time meeting the need for a global rise of food production of 70-100% in order to feed a human population that will rise globally from 6 to 9 billion over the same period.”

Royal Society Report: Reducing greenhouse gas emissions from agriculture: Meeting the challenges of food security and climate change (2011)

The land use sector: GHG emissions



- They are from many sources and are not well understood by those creating them
- Farmers and land managers have limited knowledge of what *their* most effective response might be

The livestock sector

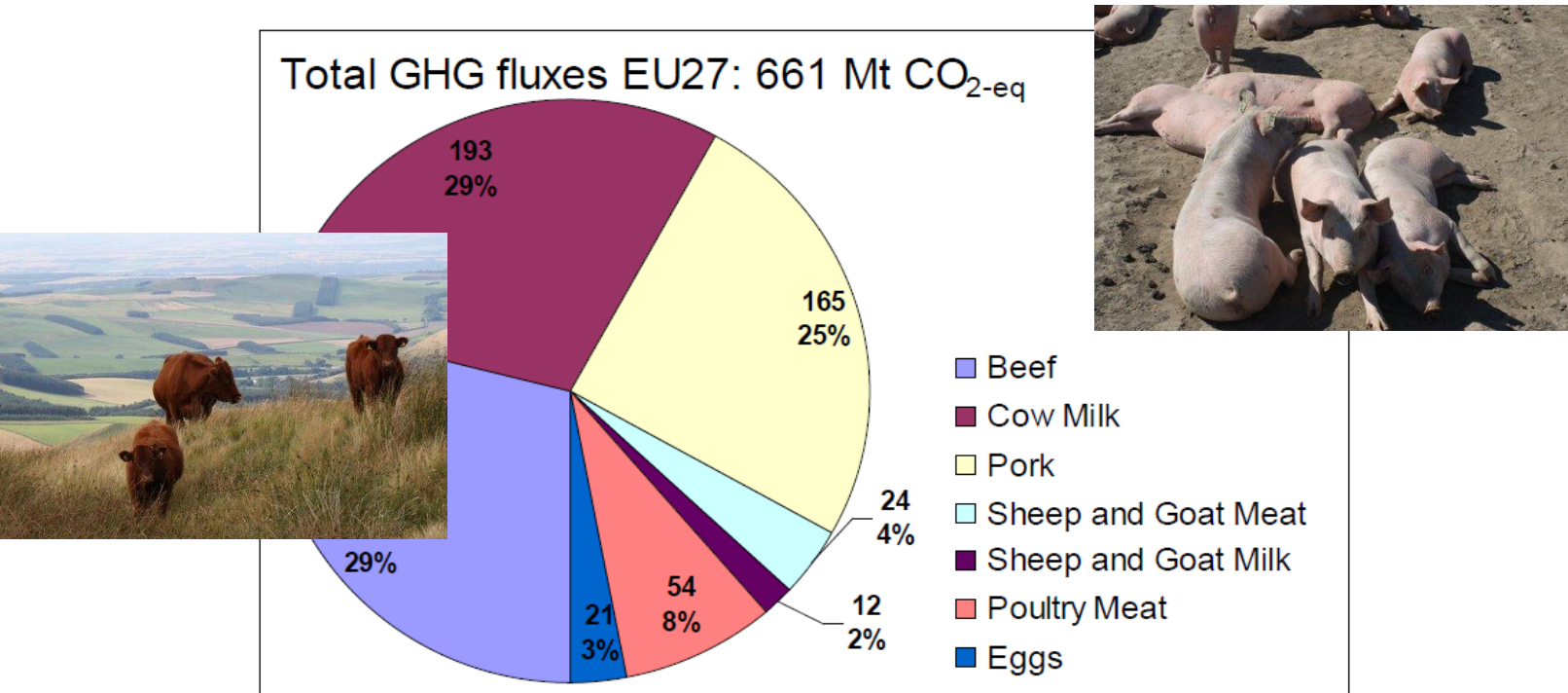
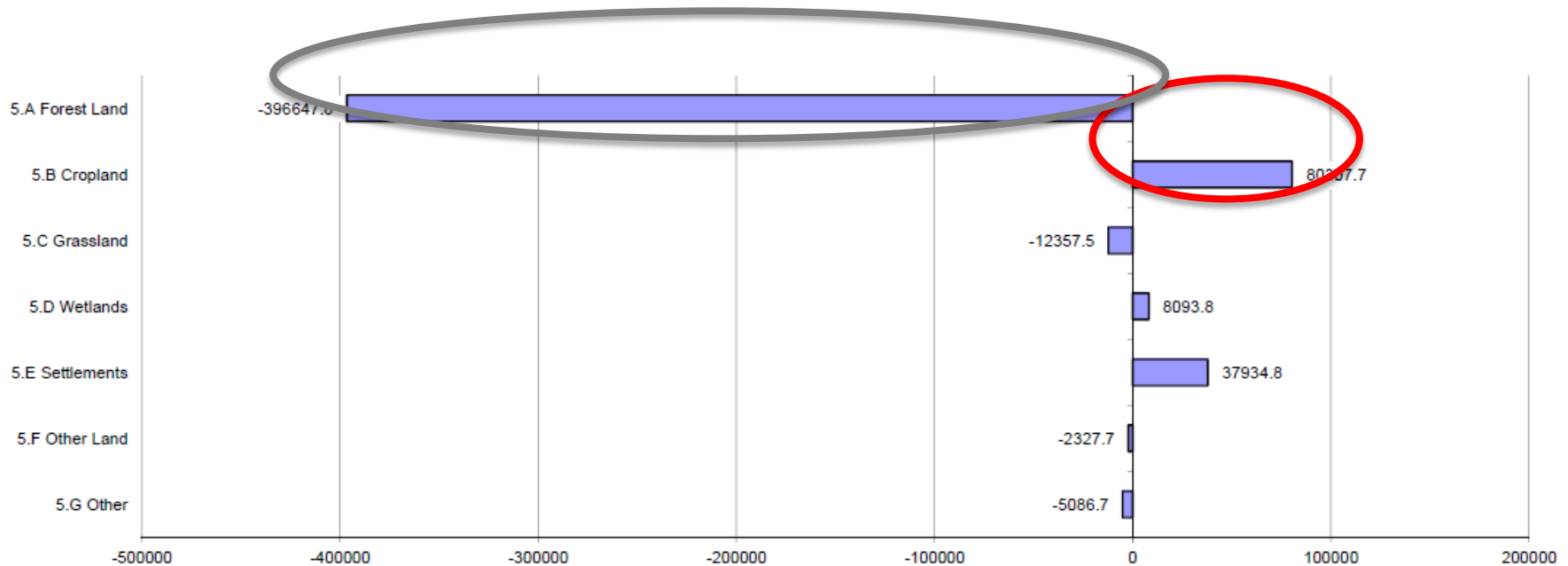


Figure ES7. Total GHG fluxes of EU-27 livestock production in 2004, calculated with a cradle-to-gate life-cycle analysis with CAPRI

Adrian Leip¹, Franz Weiss¹, Tom Wassenaar^{2,4}, Ignacio Perez^{3,5}, Thomas Fellmann³, Philippe Loudjani², Francesco Tubiello², David Grandgirard^{2,6}, Suvi Monni^{1,7}, Katarzyna Biala^{1,8} (2010): Evaluation of the livestock sector's contribution to the EU greenhouse gas emissions (GGELS) –final report. European Commission, Joint Research Centre.

Sequestration and emissions in the LULUCF sector European Union 27 2011



Source UN

- These are based on standardised definitions and do not include livestock on farmed land
- Nitrous Oxide is the big problem

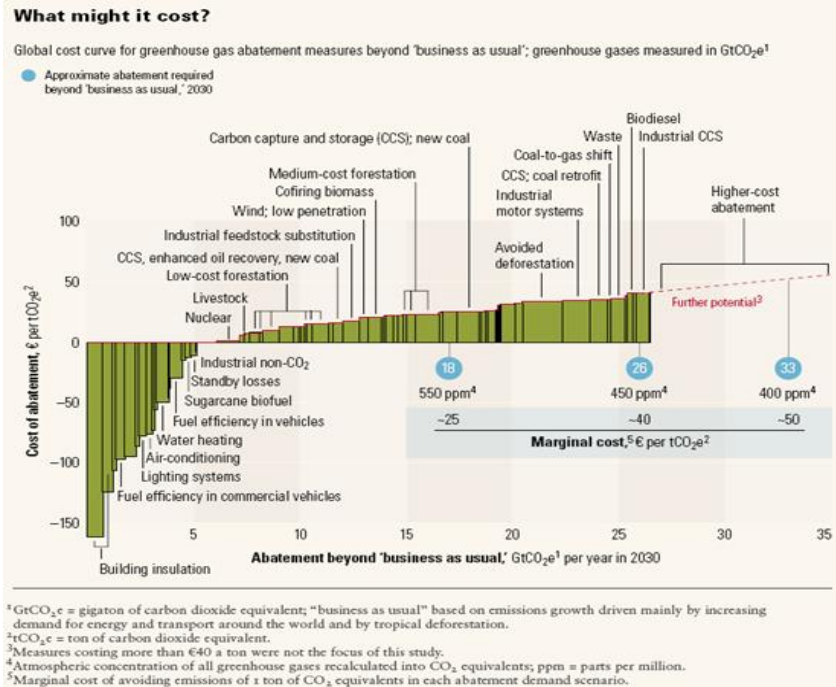
Key concerns: mitigation

- Accuracy of measurement
- Permanence/ temporality
- *Averages and variations therefrom*
- Delivering a response

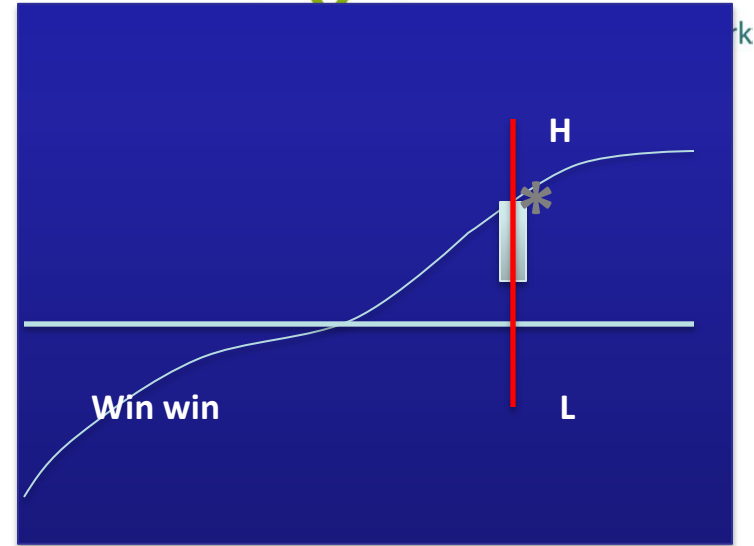
“We need to better understand the non-economic (e.g. institutional, societal, educational and logistical) barriers that prevent cost effective greenhouse gas mitigation options being implemented in the agricultural sector.”

Royal Society Report: Reducing greenhouse gas emissions from agriculture: Meeting the challenges of food security and climate change (2011)

The problem of averages



This is global and not looking at ag sector



The MACC curve is an industry average and will not reflect differences between farms.

The point of intersection of the vertical red line * represents the average cost of sequestering carbon by planting trees across all farms, the rectangle the confidence limits, and the two ends the extreme outliers. For a lightly stocked farm, the emissions reduction costs through forestry will be much lower (at L) whereas for an intensive dairy farm the displaced value of production will reduce income substantially and thereby increase costs to say H. Different farms will be afforesting at above the social cost of carbon (at H), below it but at private cost and below it but with private benefit (at L). But which farms?

Possible mitigating actions





Table 1. A list of proposed measures for mitigating GHG emissions from agricultural ecosystems, their apparent effects on reducing emissions of individual gases (mitigative effect) and an estimate of scientific confidence that the proposed practice can reduce overall net emissions.

| measure | examples | mitigative effects ^a | | | net mitigation ^b (confidence) | |
|--|---|---------------------------------|-----------------|------------------|---|----------|
| | | CO ₂ | CH ₄ | N ₂ O | agreement | evidence |
| cropland management | agronomy | + | | ± | *** | ** |
| | nutrient management | + | | ± | *** | ** |
| | tillage/residue management | + | | ± | ** | ** |
| | water management (irrigation, drainage) | ± | | + | * | * |
| | rice management | | + | ± | ** | ** |
| | agroforestry | + | | ± | *** | * |
| | set-aside, land-use change (LUC) | + | + | + | *** | *** |
| grazing land management/ pasture improvement | grazing intensity | ± | | ± | * | * |
| | increased productivity (e.g. fertilization) | + | | ± | ** | * |
| | nutrient management | + | | ± | ** | ** |
| | fire management | + | | ± | * | * |
| | species introduction (including legumes) | + | | ± | * | ** |
| management of organic soils restoration of degraded lands | avoid drainage of wetlands | + | - | ± | ** | ** |
| | erosion control, organic amendments, nutrient amendments | + | | ± | *** | ** |
| livestock management | improved feeding practices | | + | | *** | *** |
| | specific agents and dietary additives | | + | | ** | *** |
| | longer term structural and management changes and animal breeding | | + | | ** | * |
| manure/biosolid management | improved storage and handling | | + | ± | *** | ** |
| | anaerobic digestion | | + | ± | *** | * |
| | more efficient use as nutrient source | + | | + | *** | ** |
| bioenergy | energy crops, solid, liquid, biogas, residues | + | | ± | *** | ** |

^a '+' denotes reduced emissions or enhanced removal (positive mitigative effect); '-' denotes increased emissions or suppressed removal (negative mitigative effect); '±' denotes uncertain or variable response.

^b A qualitative estimate of the confidence in describing the proposed practice as a measure for reducing *net* emissions of GHGs, expressed as CO₂ equivalence. 'Agreement' refers to the relative degree of agreement or consensus in the literature (the more asterisks, the higher the agreement); 'Evidence' refers to the relative amount of data in support of the proposed effect (the more asterisks, the greater the amount of evidence).

in Greenhouse Gas Mitigation in Agriculture: **Phil. Trans. R. Soc. B** (2008) 363, 789–813
 Pete Smith, Daniel Martino, Zucong Cai, Daniel Gwary, Henry Janzen, Pushpam Kumar, Bruce McCarl,
 Stephen Ogle, Frank O'Mara, Charles Rice, Bob Scholes, Oleg Sirotenko, Mark Howden, Tim McAllister,
 Genxing Pan, Vladimir Romanenkov, Uwe Schneider, Sirintornthep Towprayoon, Martin Wattenbach and Jo
 Smith

Smith et al proposed mitigation (1)



■ Cropland management

- Agronomy
- Tillage management
- Residue management
- Water management/drainage
- Agroforestry
- Set aside
- Plant breeding
- Land use change

■ Grazing and pasture management

- Grazing intensity
- Fertiliser levels/nutrient management
- Increased productivity
- Enhanced animal health
- Legumes in pasture
- Fire management

Smith et al proposed mitigation (2)



■ Management of organic soils

- Avoid drainage of wetlands (peaty soils)
- Erosion control
- Nutrient control

■ Livestock management

- Improved feeding/better diets
- Better vet and med
- Dietary supplements (methane inhibitors)
- Enhanced livestock breeding
- Manure management
- Red to white meat or vice versa?

Smith et al proposed mitigation (3)

■ Manure/biosolids management

- Improved storage and handling
- Anaerobic digestion
- More effective use as nutrients

■ Renewable energy

- Wind
- Water
- Wood
- Solar
- AD

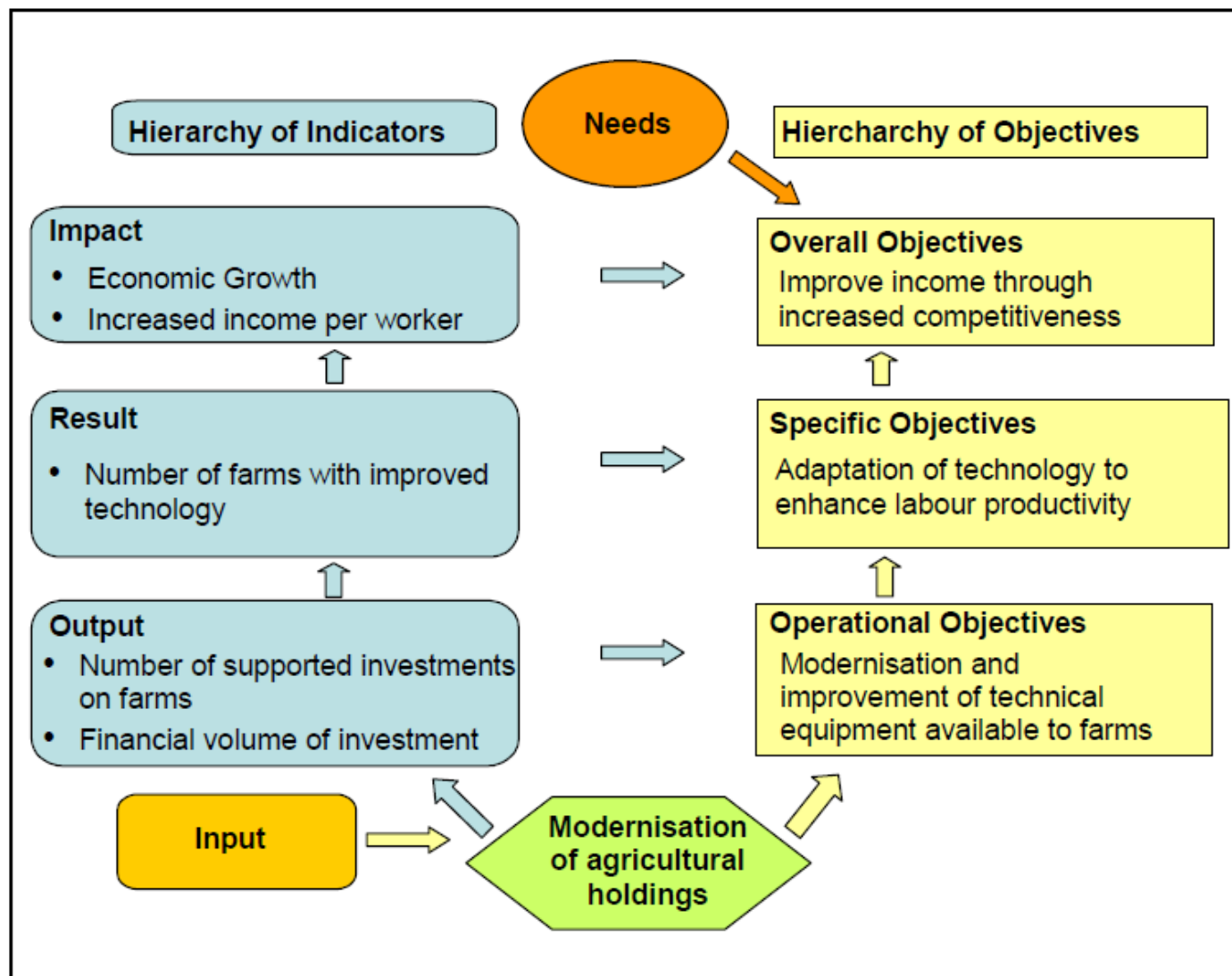
Key concerns: adaptation

- Inadequate science to select optimal intervention
- Uncertainty as to impacts: trickles and pulses-
incremental change and extreme events
- Risk mitigation: insurance vs enterprise change vs
management change
- May involve complex bargaining- e.g. reducing
downstream flooding through headwater vegetational
change
- Regulation may be a challenge (GHG reducing GM?; or
ionophores)

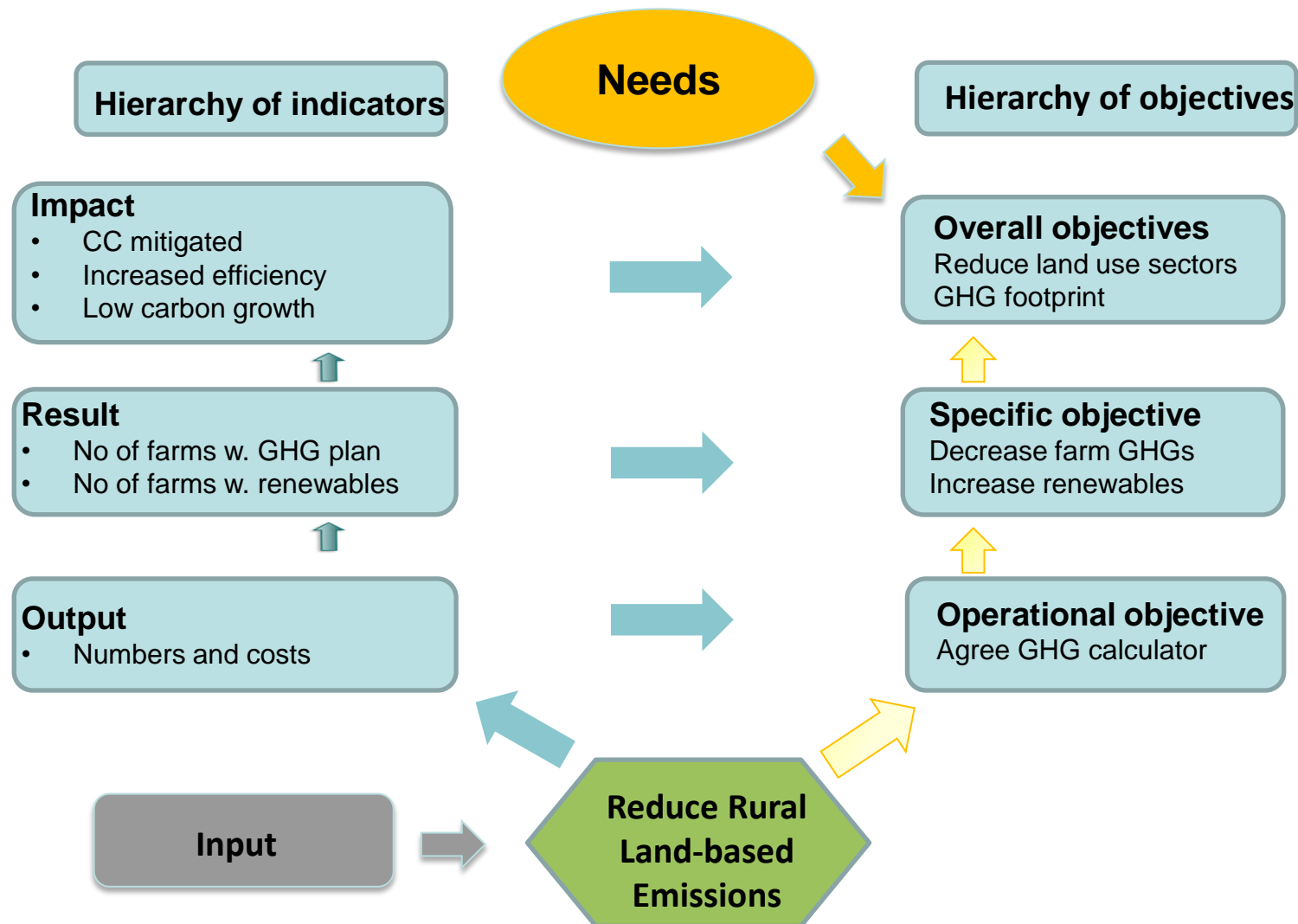
The evaluation challenge

- Looking back to the 2007-13 RDP
- Looking forward to the higher profile Climate change issue in the new RDP

The basic principles of evaluation



What the evaluation principles might be for Climate change mitigation



Evaluation guidelines

- Three mentions of renewable energy In Guidance Note B
 - Two relate to adding value of connecting farm and forest owners to renewable energy chains through their products
 - One relates to the impact indicator of renewable energy

- Four mentions of climate change in Guidance Note B
 - Two in relation to measures (environmental forestry, agri-environmental payments)
 - Two in relation to horizontal questions

To what extent has the programme contributed to promoting sustainable development in rural areas? In particular, to what extent has the programme contributed to the three priority areas for protecting and enhancing natural resources and landscapes in rural areas:

- biodiversity and the preservation and development of high nature value farming and forestry systems and traditional agricultural landscapes?
- water?
- climate change?

Climate change in the 2007-13 RDP



- The Impact Indicator required:

Increase in production of renewable energy

- It is a start but much more is needed to meet both the desired outcome and the evaluation needs
- Many programme elements impact on climate change and not always beneficially
- Other indicators (water quality and FBI) might reflect reduced GHG emissions but not in a clear and direct way

Climate change in the 2014-20 RDP



- Much stronger emphasis on climate change in the new draft regulation
 - 25 mentions of climate change in new regulation 1305/2013
 - 9 mentions of renewable energy
- 20% of total programme on climate change
- Call for specific sub-programmes on CC under “thematic sub-programmes” (para 8)
- Recognition of the polluter pays principle: Does it apply to GHGs?
- We must think about “introducing or continuing to apply agricultural practices that contribute to climate change mitigation and adaptation”

Evaluation: mitigation: what are the key issues (1)

1. Are we confident that the Carbon calculator is sufficiently accurate?

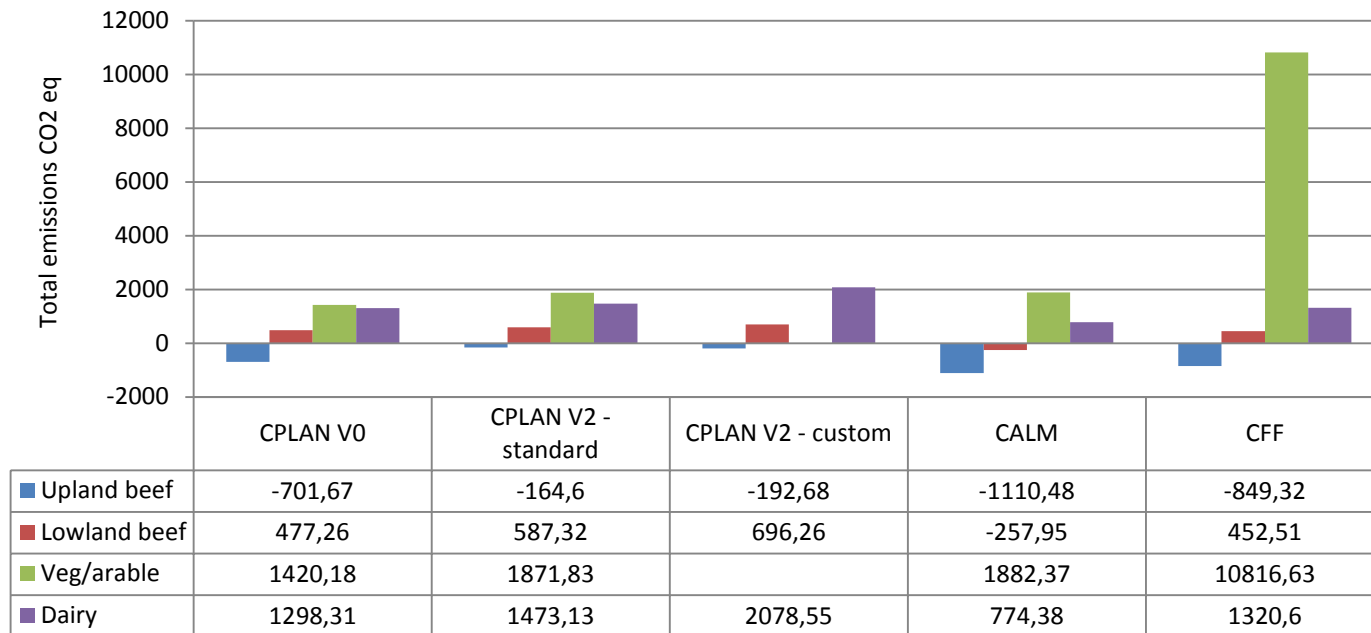


Figure 1: Different carbon calculators compared
(if they are not accurate then we cannot measure an improvement)

Evaluation: mitigation: what are the key issues (2)

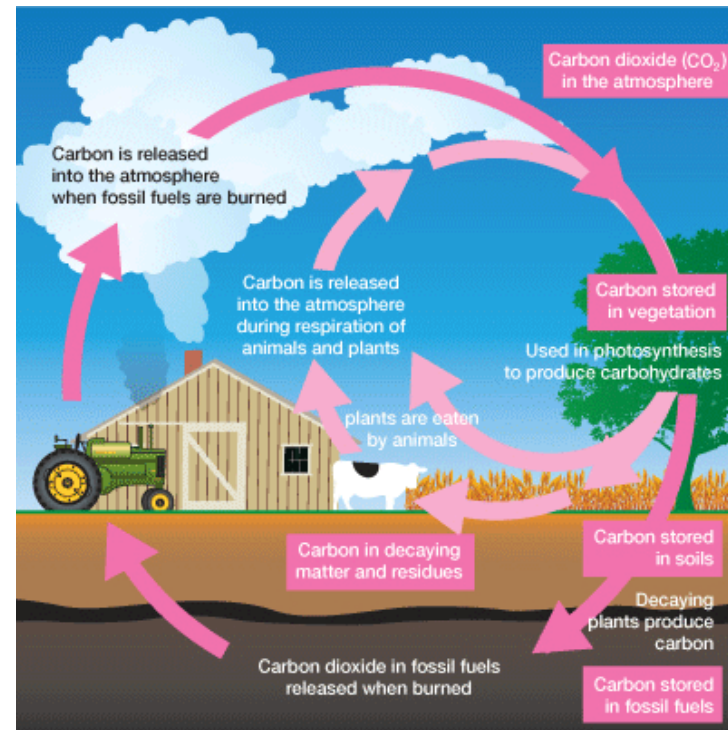
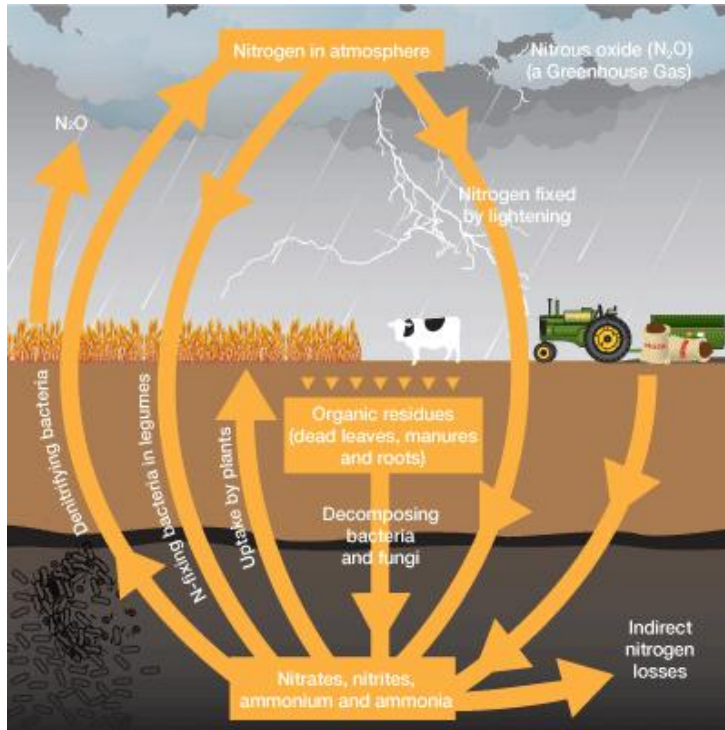
2. We must beware blunt and inappropriate indicators
3. What do we do about GHG impacts of all other Pillar 2 farm policies (and indeed Pillar 1?)?
4. We must focus in policy design on finding the low hanging fruit/ the 'win wins' if we want our interventions to be cost -effective
5. But how do we define them?
 - By reference to the average farm of that type
 - Or via an individualised farm based accounting method?
6. We need a long list of technical possibilities, well grounded in the land use systems of each country, refined by major types and styles of farming
7. We need a shorter list of what is the likely willingness to act (in order to ensure uptake)

Evaluation: adaptation- what are the key issues



- Some adaptation relatively easy (and easy to monitor)
 - New crops
 - Bigger slurry/manure stores
- A key advisory challenge: diffusion and uptake important (easy to monitor)
- Scope for collaborative learning (but difficult to measure in a formal quantitative way)
- Adaptation may require big alternative ways of thinking (e.g. upstream tree planting for flood relief (natural flood management) but are the possibilities in the plan?)
- Maybe need more innovative means of supporting collaborative action than simple individualistic measures (whether dealing with floods or water shortage or biodiversity)
- A design challenge for public agencies in partnership with key actors

We are dealing with complex systems



We need good policy design and robust evaluation

To summarise

- Climate change and adaptation and mitigation in the rural land use sector must be part of the RDPs
- We need an agreed means of measuring GHG emissions
- We need 'climate change literate' policy development
- We need effective means to monitor impacts of changes
- We must go beyond simple (and sometimes naïve) indicators
- Policy design needs to be geared to both adaptation and mitigation
- We need outcomes that promote adaptation rather than coping
- It is very challenging but policy means can help, but they need careful evaluation as we search for success in reducing emissions



The James
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European Evaluation Network
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THANK YOU