Carbon efficiency = financial efficiency:

Ireland's 2020 vision for low-carbon agriculture

Rogier Schulte, Trevor Donnellan, Pat Murphy and Thia Hennessy

teagasc

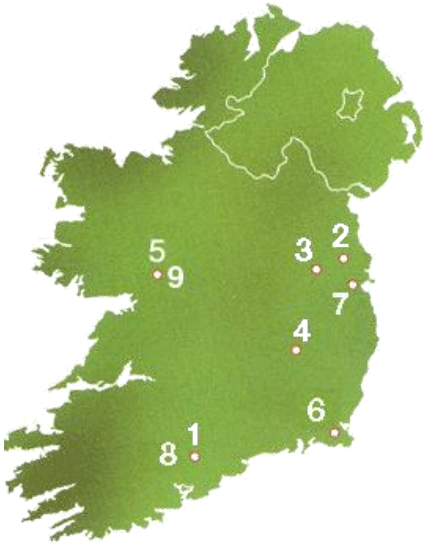
The Irish Agriculture and Food Development Authority

What is Teagasc?

The Agriculture and Food Development Authority of Ireland

Research

- 8 research centres
  - Johnstown Castle: Soils and Environment
  - Oak Park: Crops (incl potatoes)
  - Others: dairying, beef, crops, rural economy, horticulture, food, products
- Additional research farms
- 300 scientific / technical staff



Advice

- 80 local advisory offices
- 500 advisors and specialists

Education

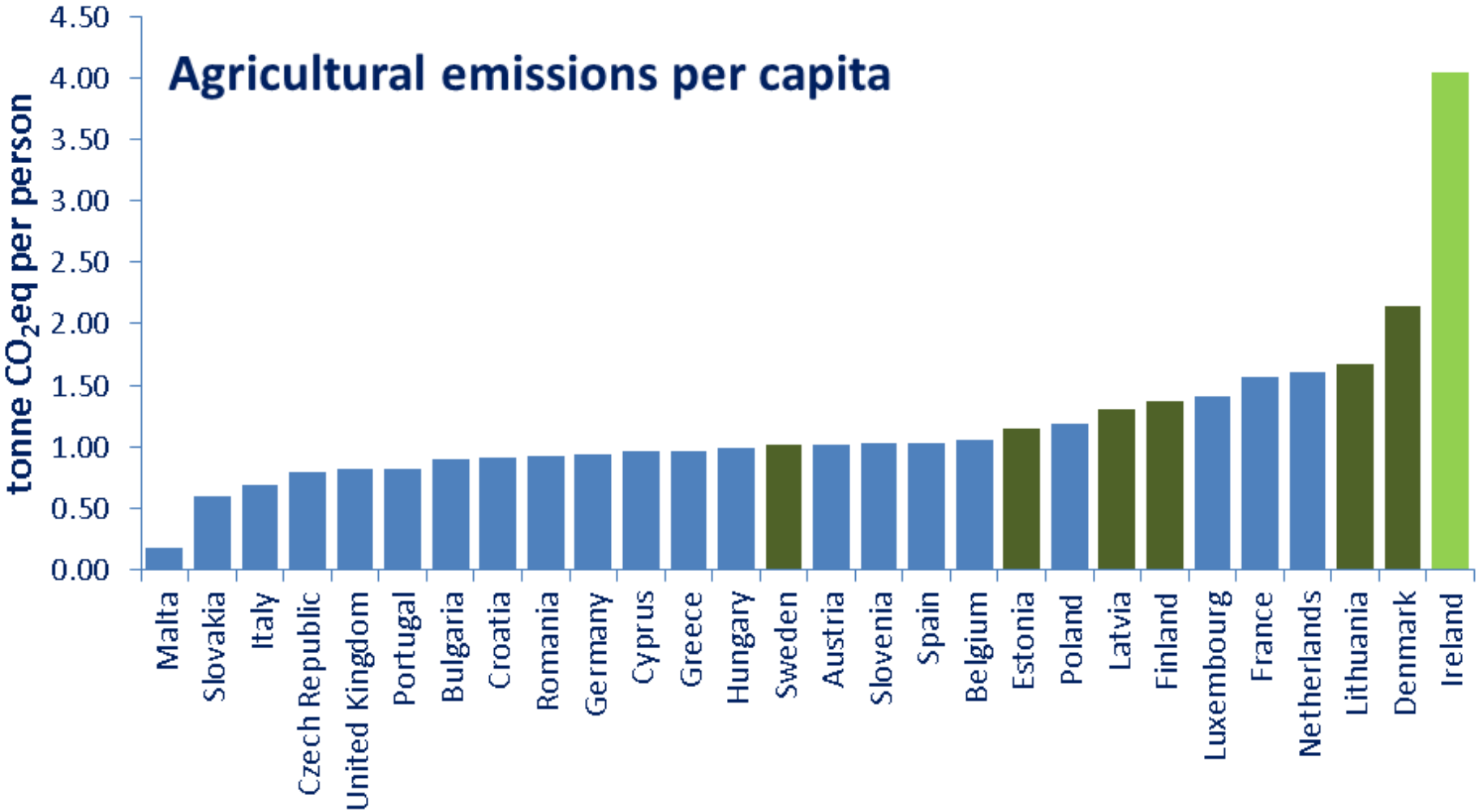
- 4 agricultural colleges + e-college

Teagasc

The Irish Agriculture and Food Development Authority


15.03.2013 14:53

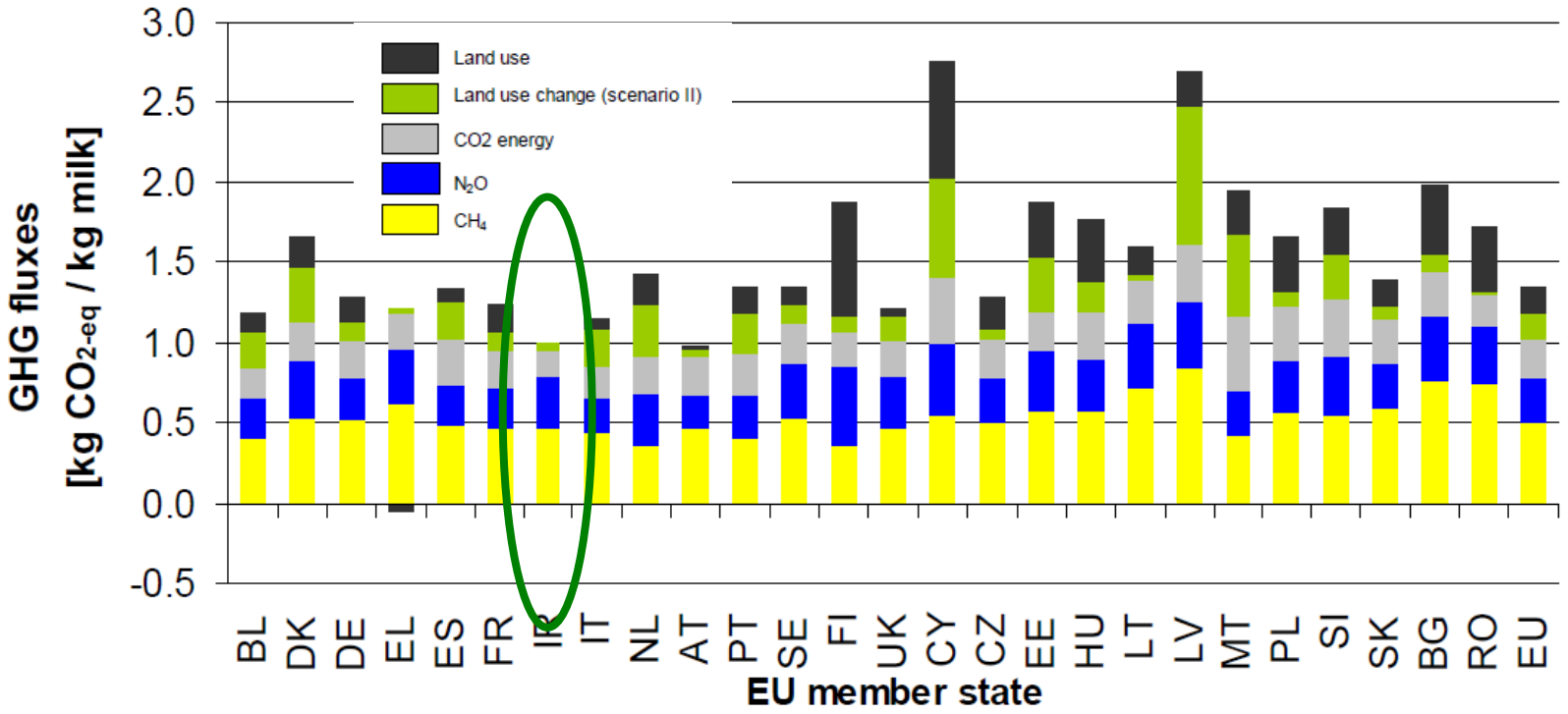
Why am I here?


Agricultural emissions per capita
tonne CO_2eq per person
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Malta
Slovakia
Italy
Czech Republic
United Kingdom
Portugal
Bulgaria
Croatia
Romania
Germany
Cyprus
Greece
Hungary
Sweden
Austria
Slovenia
Spain
Belgium
Estonia
Poland
Latvia
Finland
Luxembourg
France
Netherlands
Lithuania
Denmark
Ireland

"The Irish GHG Paradox"

"Irish agriculture has one of the lowest carbon-footprints, internationally".

Carbon Footprint of Milk (EU report)

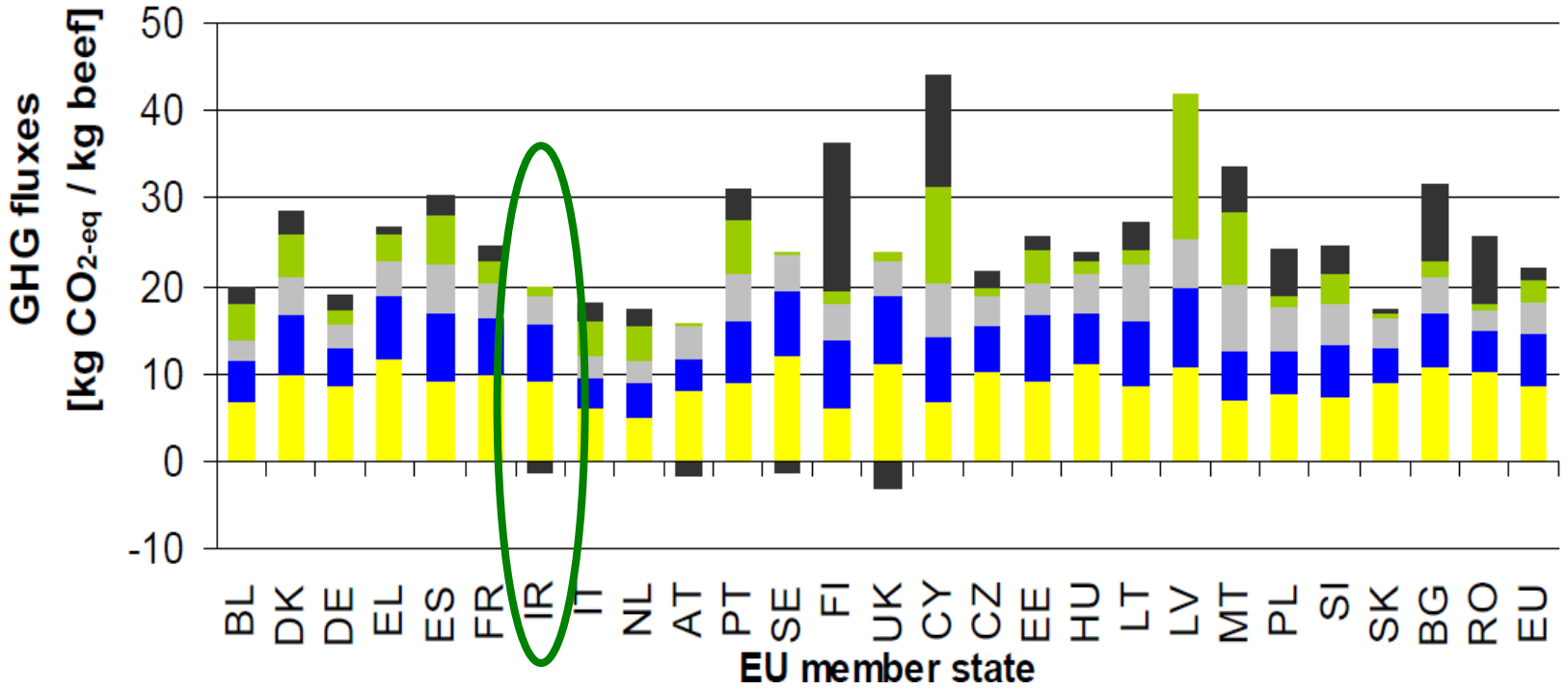


Source: http://ec.europa.eu/agriculture/analysis/external/livestock-gas/full_text_en.pdf

"The Irish GHG Paradox"

"Irish agriculture has one of the lowest carbon-footprints, internationally".

Carbon Footprint of Beef (EU report)



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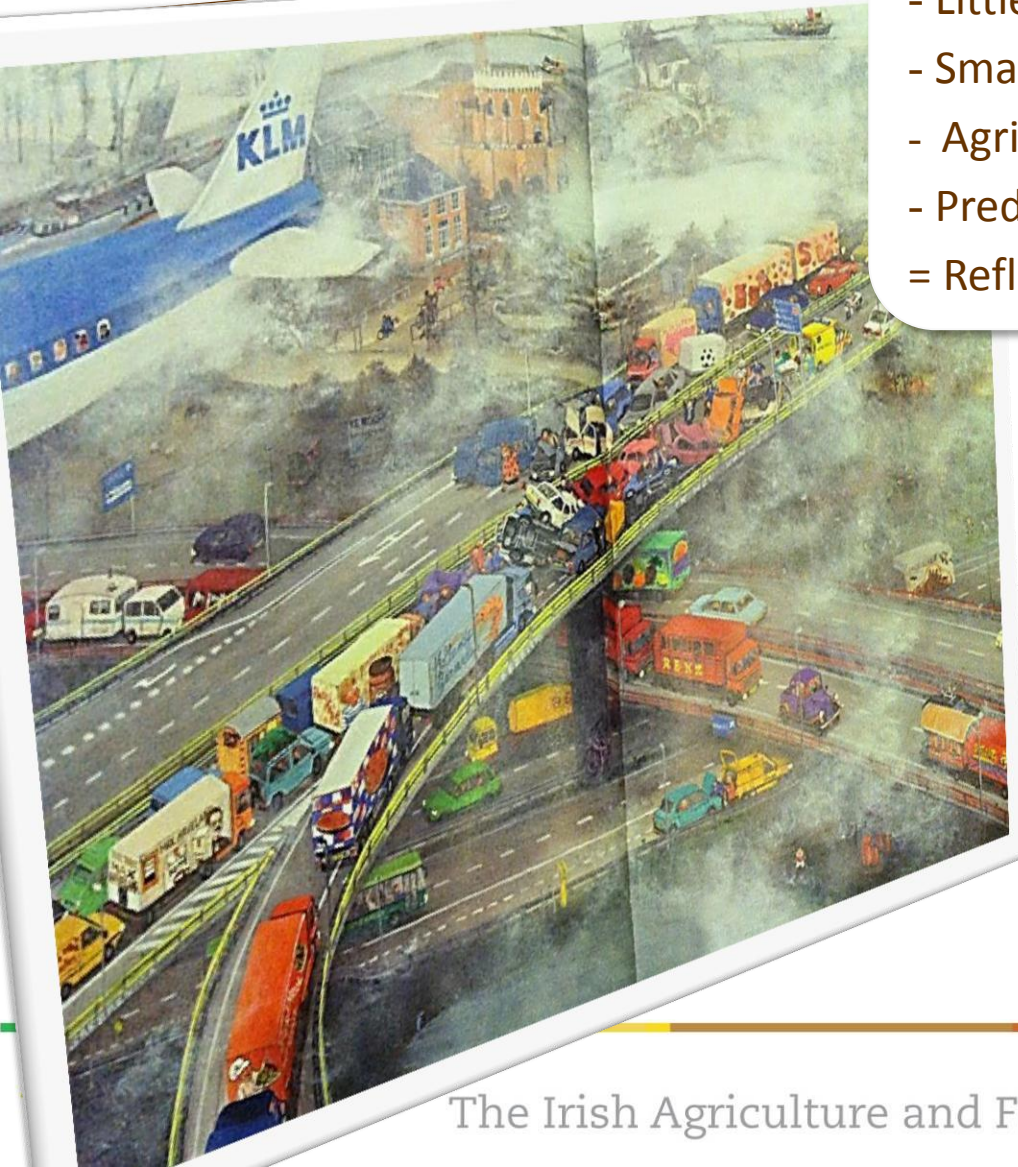
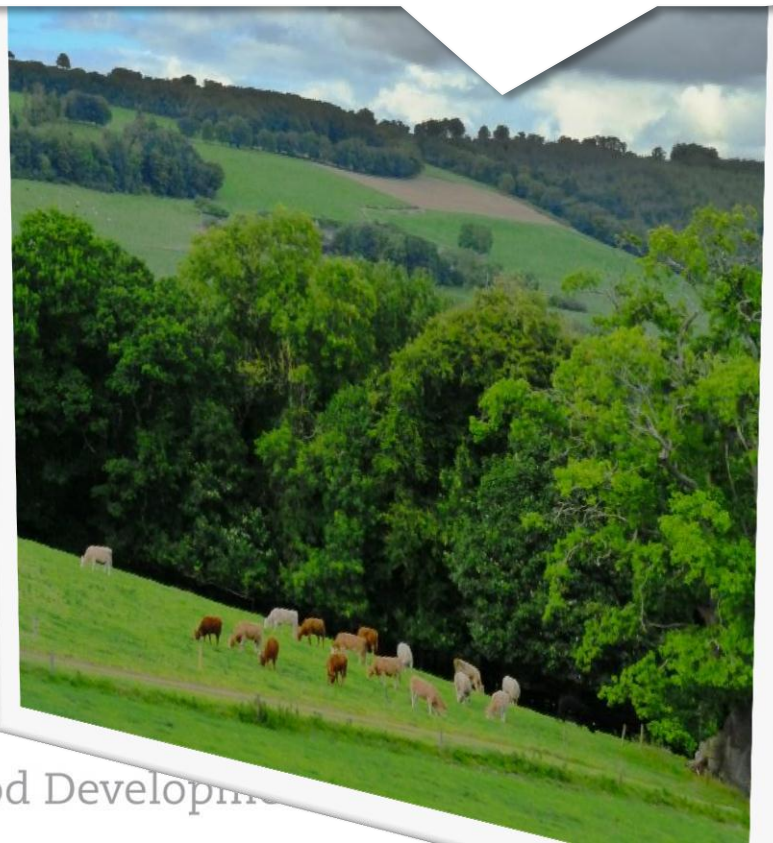
"The Irish GHG Paradox"



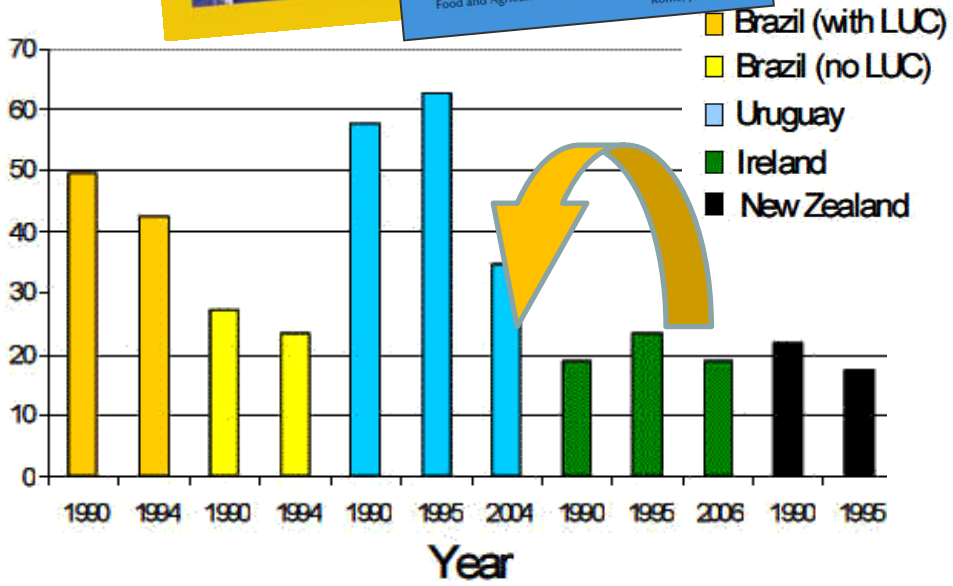
- Little heavy industry
- Small population compared to national herd
- Agriculture = important to economy
- Predominantly ruminant farming

= Reflection of soils & climate



The Challenge

- Agriculture has to play a role…
- But within the context of Food Security…
- But we don't want to curb efficient food systems…
- Risk of carbon-leakage?



Source: Lanigan *et al.*, 2008
www.teagasc.ie/publications/2008/20081110/reps2008_paper02.asp

Displacement of 50% of Irish beef production could increase *global* GHG emissions by 2 – 5 Mt CO_2eq per annum

Teagasc GHG Working Group

2011: "now"

Irish Agriculture, Greenhouse Gas Emissions and Climate Change:
opportunities, obstacles and proposed solutions

Prepared by the
Teagasc Working Group on Greenhouse Gas Emissions:
RPO Schulte (chair), G Lanigan, T Donnellan, P Crosson, L Shalloo, D O'Brien, N Farrelly, J Finnan, M Gibson (secretary), A Boland, G Boyle, O Carton, B Caslin, N Culleton, R Fealy, J Fitzgerald, K Hanrahan, J Humphreys, T Hyde, P Kelly, STJ Lalor, P Maher, P Murphy, N Ni Fhlatharta, C O'Donoghue, P O'Kiely, F O'Mara, KG Richards, M Ryan and J Spink

Editors:
RPO Schulte and G Lanigan

Teagasc
Oak Park, Carlow
28 January 2011

2012: 2020

A Marginal Abatement Cost Curve for Irish Agriculture

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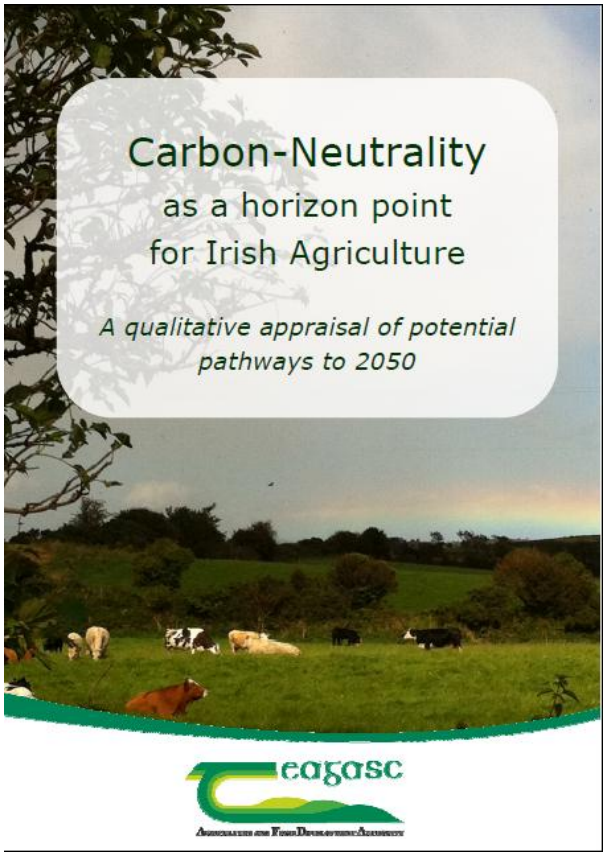


http://www.teagasc.ie/publications/

Food Harvest 2020

"How can we increase food production *and* reduce greenhouse gases from farming?"

Ambition 2020:

Increase:

- primary output by €1.5bn
- value-added outputs by €3bn
- exports to €12bn (+42%)

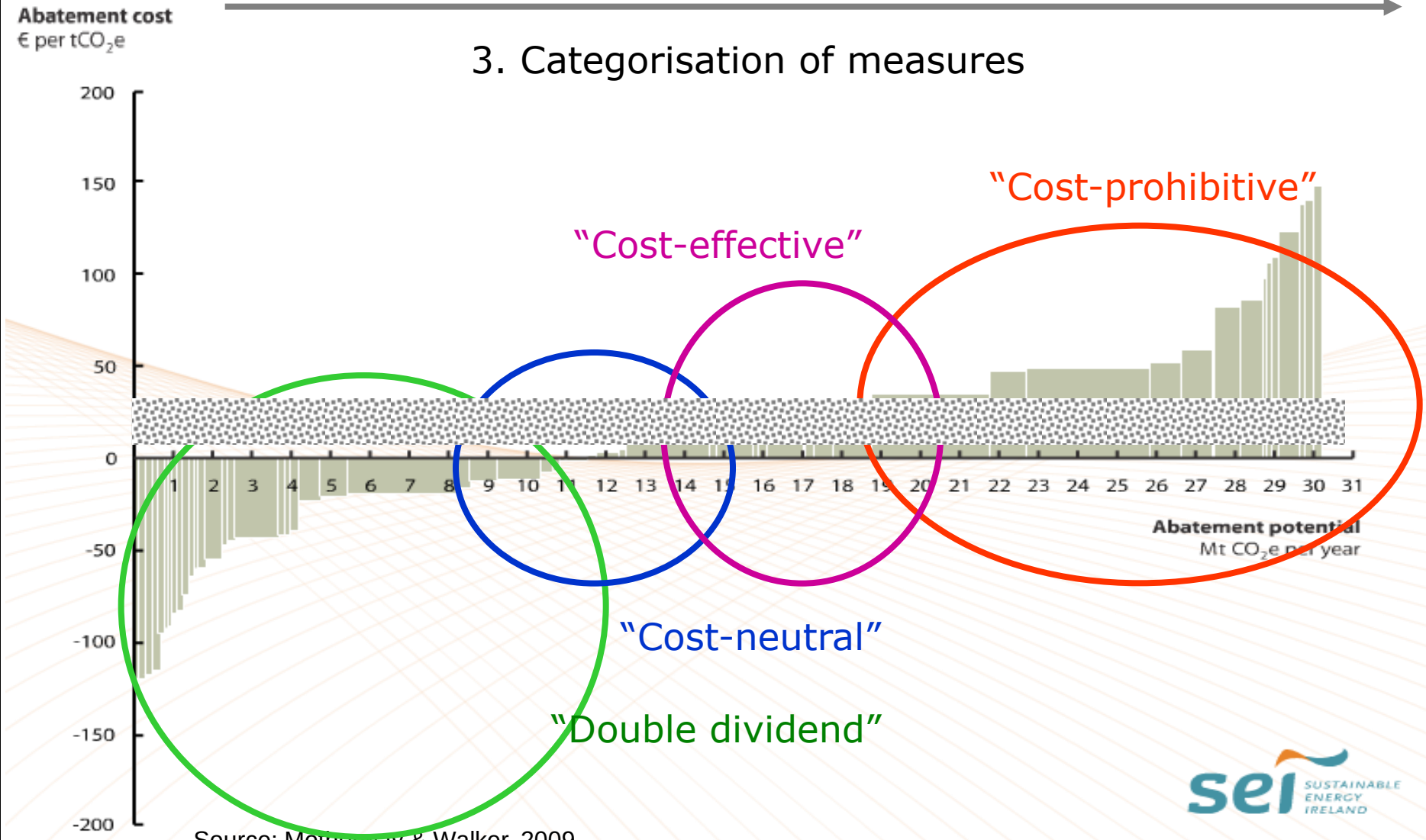
Targets:

- Dairy: milk production +50%
- Beef: output value +40%
- Targets for sheep, pigs, energy crops, forestry, marine

1. Order of magnitude

2. Ranking of measures

3. Categorisation of measures

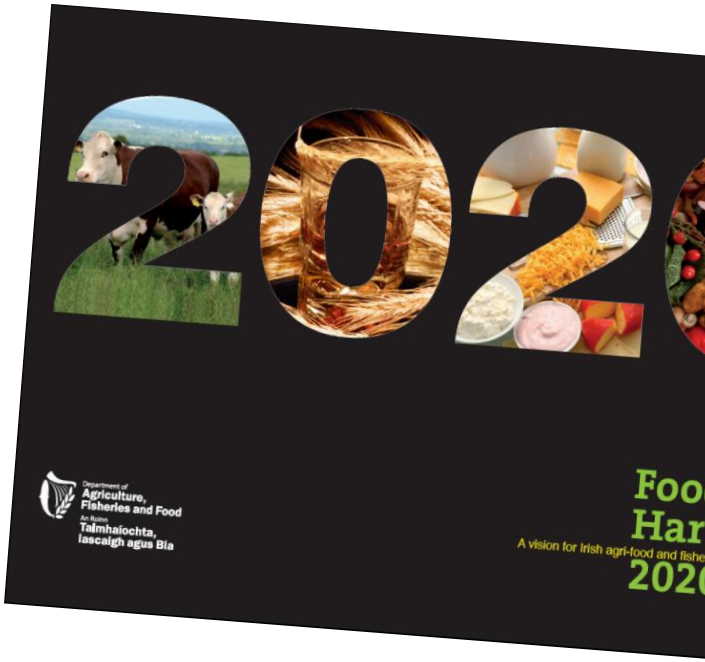


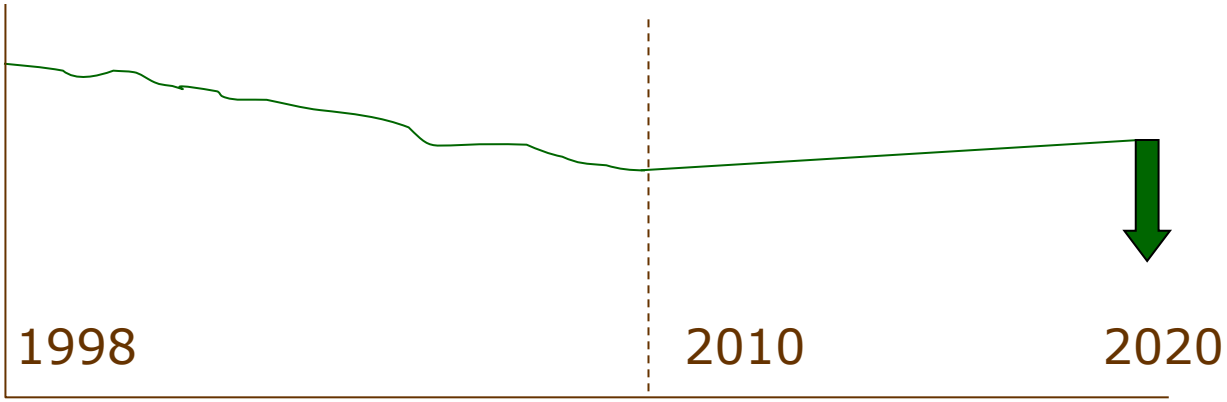
Source: Motherway & Walker, 2009
www.seai.ie/Publications/Low_Carbon_Opportunity_Study

Approach

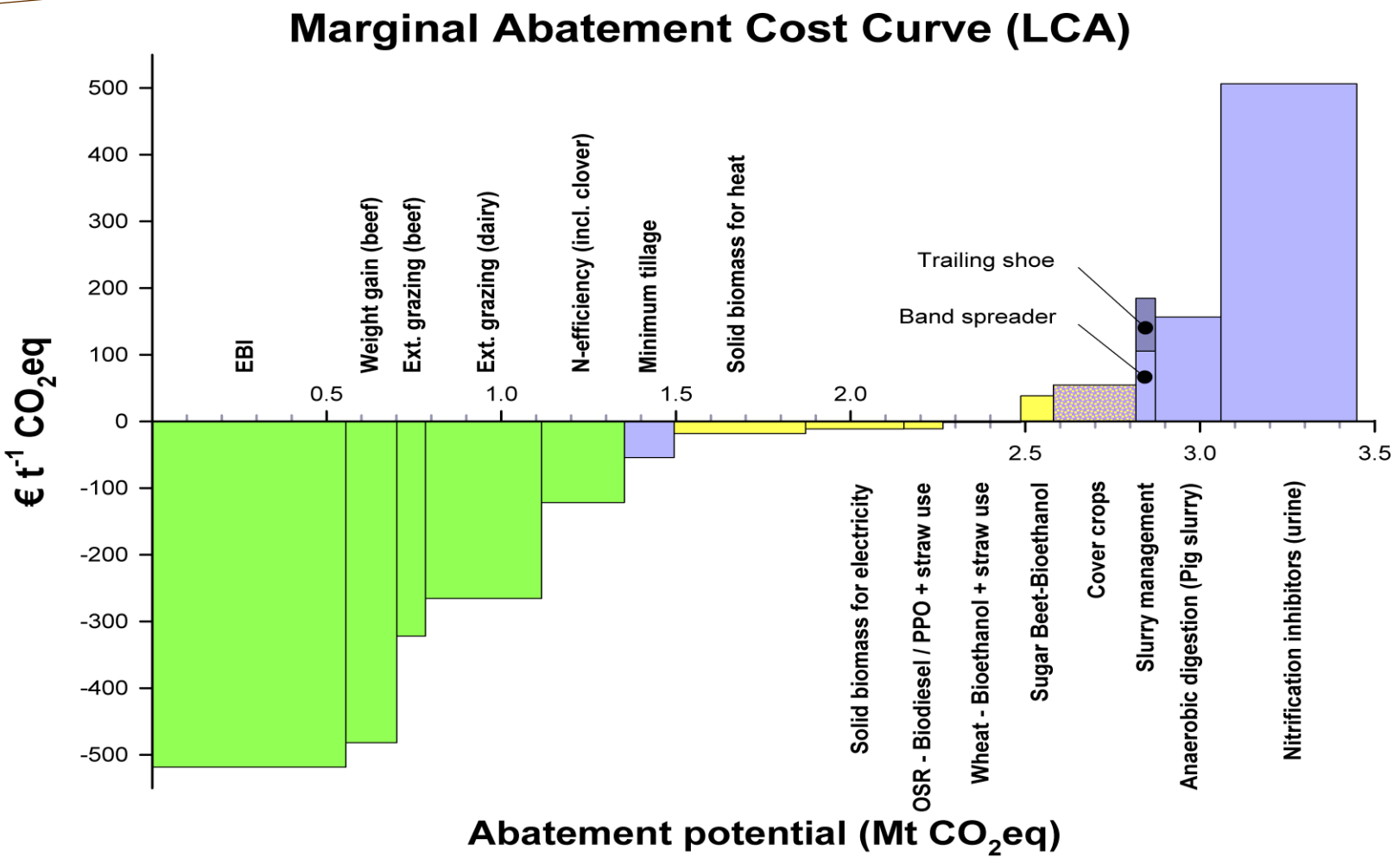
Starting Point: Food Harvest 2020

- GHG emissions projected to increase by 5-10%
- What are the options to reduce GHG emissions while meeting FH 2020?



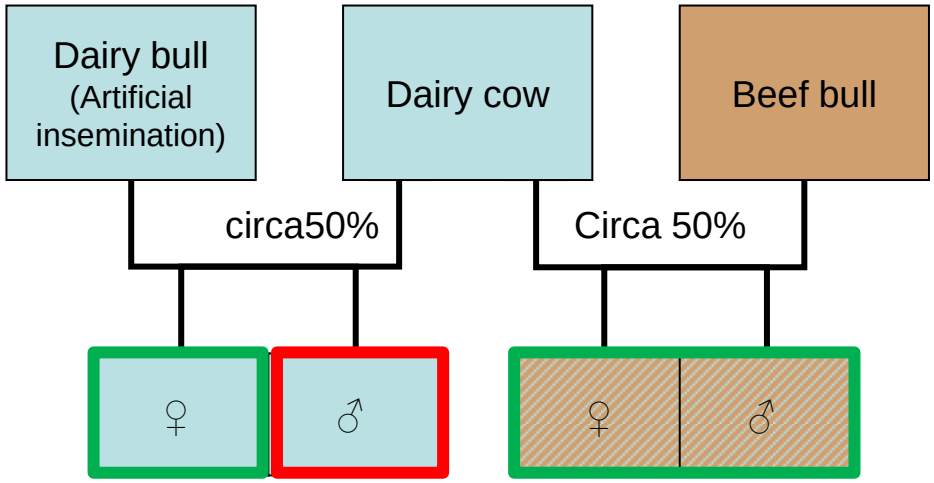


Results: LCA


Marginal Abatement Cost Curve (LCA)
€ t-1 CO2eq
500
400
300
200
100
0
-100
-200
-300
-400
-500
0.5
1.0
1.5
2.0
2.5
3.0
3.5
EBI
Weight gain (beef)
Ext. grazing (beef)
Ext. grazing (dairy)
N-efficiency (incl. clover)
Minimum tillage
Solid biomass for heat
Trailing shoe
Band spreader
Solid biomass for electricity
OSR - Biodiesel / PPO + straw use
Wheat - Bioethanol + straw use
Sugar Beet-Bioethanol
Cover crops
Slurry management
Anaerobic digestion (Pig slurry)
Nitrification inhibitors (urine)
Abatement potential (Mt CO2eq)

Example: sexed semen

Current dairy breeding practice



Circa 25%:

Replacement heifers for dairy production

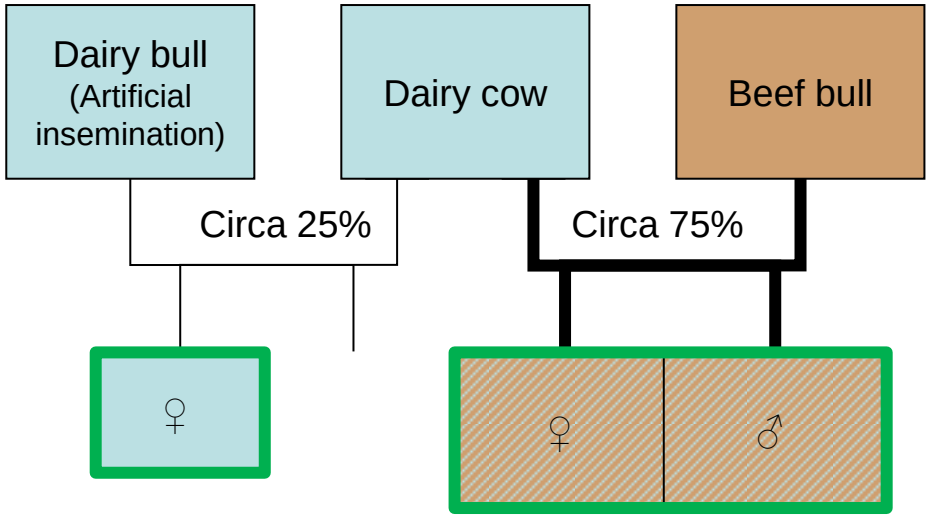
Circa 25%:

Dairy male calves = less efficient meat production

Circa 50%:

Dairy-beef crossbred cattle = more efficient meat production

Sexed semen breeding practice



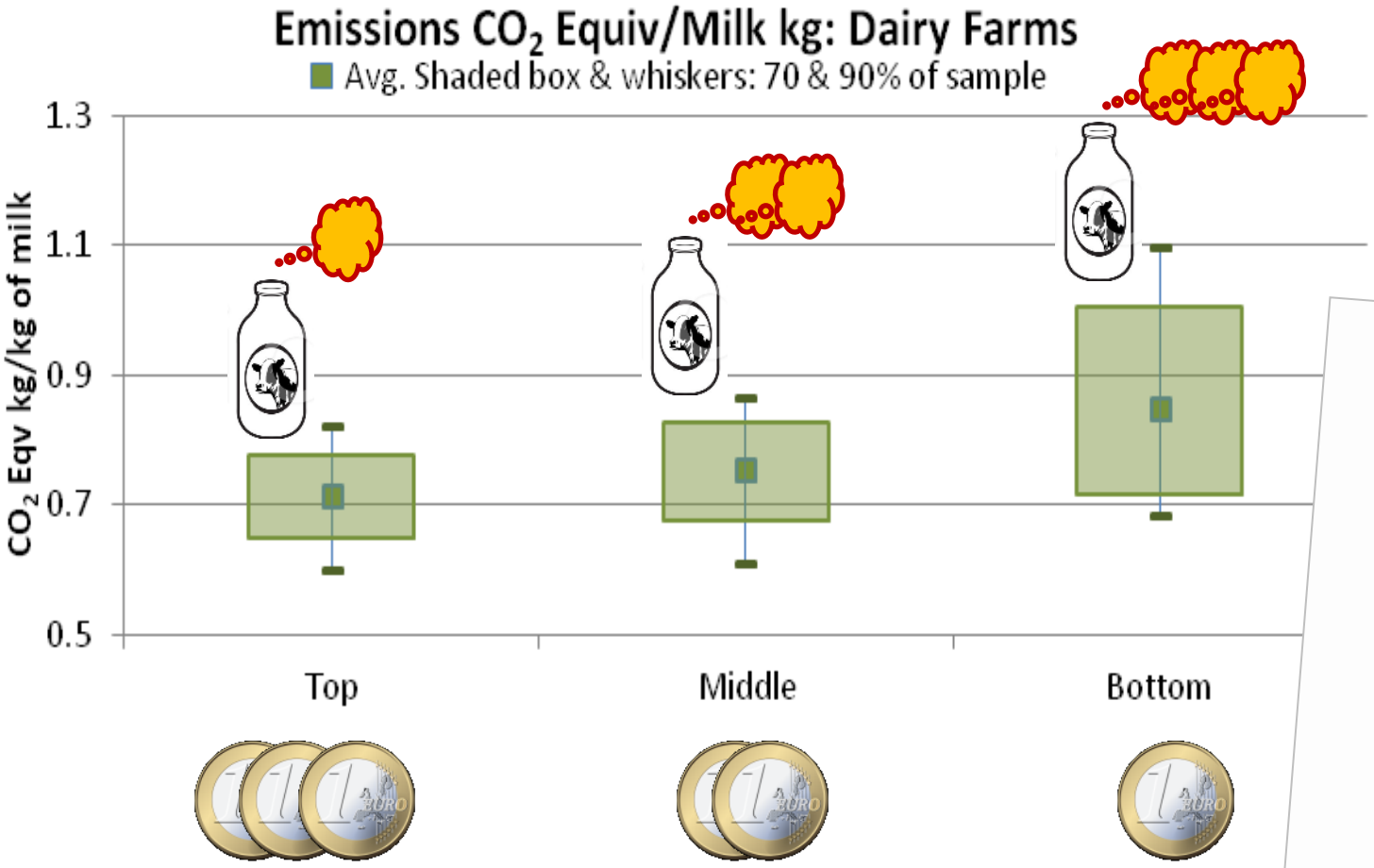
Circa 25%:

Replacement heifers for dairy production

75%:

Dairy-beef crossbred cattle = more efficient meat production

Efficiency = low carbon = profit



Measuring Farm Level Sustainability with the Teagasc National Farm Survey

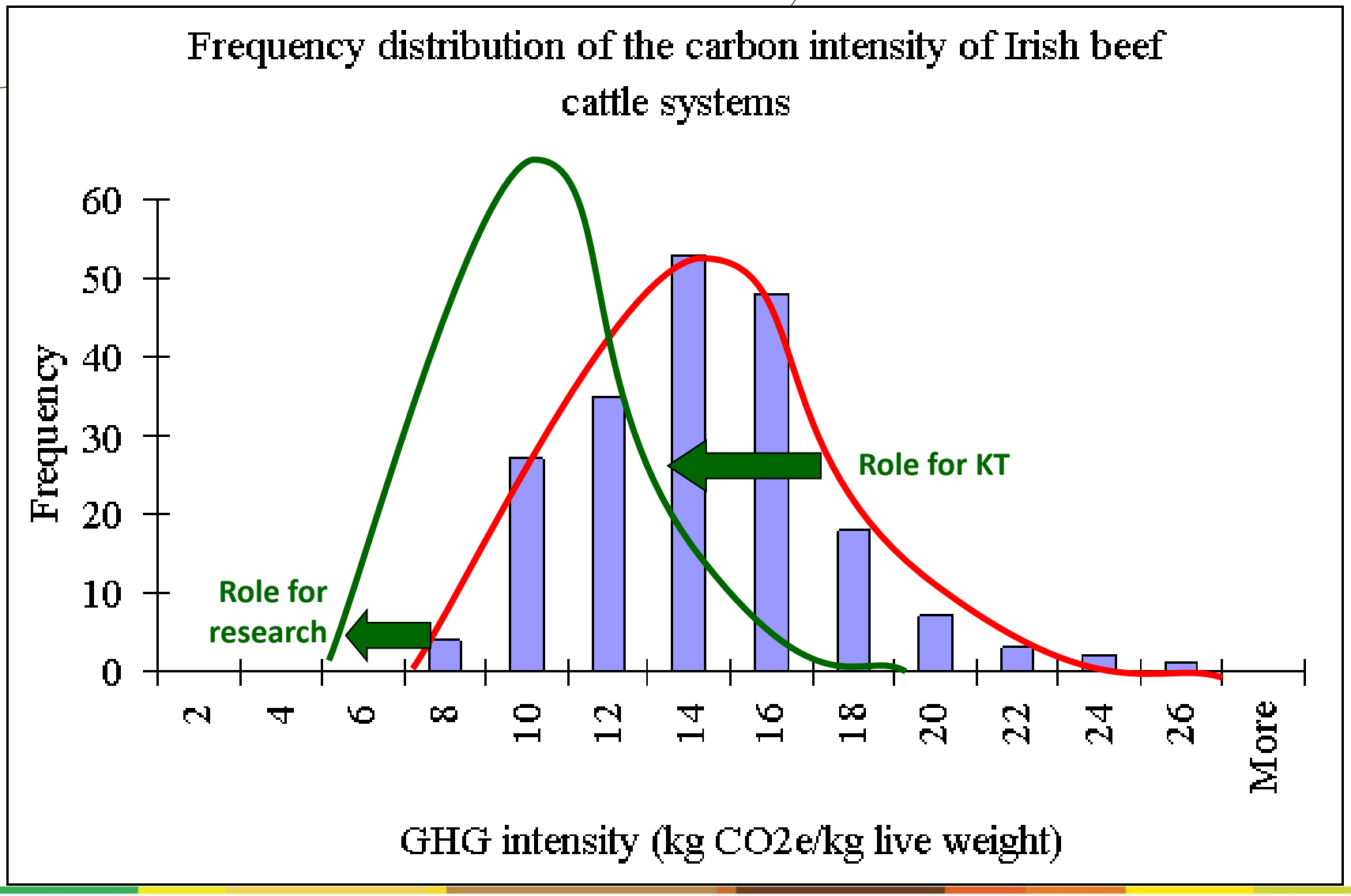
Thia Hennessy, Cathal Buckley, Emma Dillon, Trevor Donnellan, Kevin Hanrahan, Brian Moran and Mary Ryan

Agricultural Economics & Farm Surveys Department
Rural Economy and Development Programme
Teagasc
Athenry, Co. Galway

www.teagasc.ie

December 10th 2013

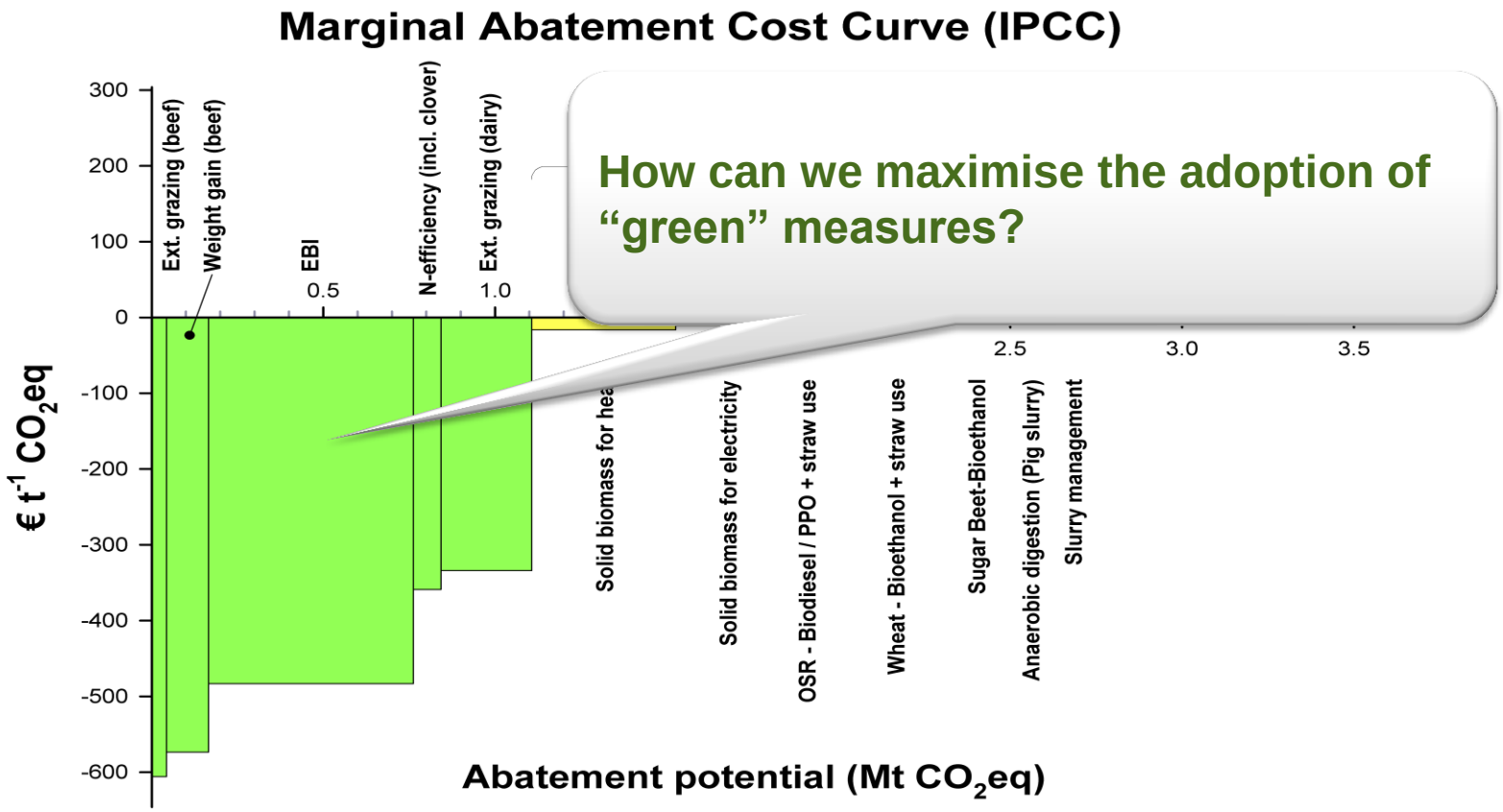
Room for further improvement



The Carbon Navigator

teagasc
Agriculture and Food Development Authority

Bord Bia
Irish Food Board



The Carbon Navigator

Principles:

- Practical language:
  ~~Carbon dioxide, methane, nitrous oxide, mitigation, emission coefficient, …~~
  Grazing season length, nitrogen fertiliser rates, etc…

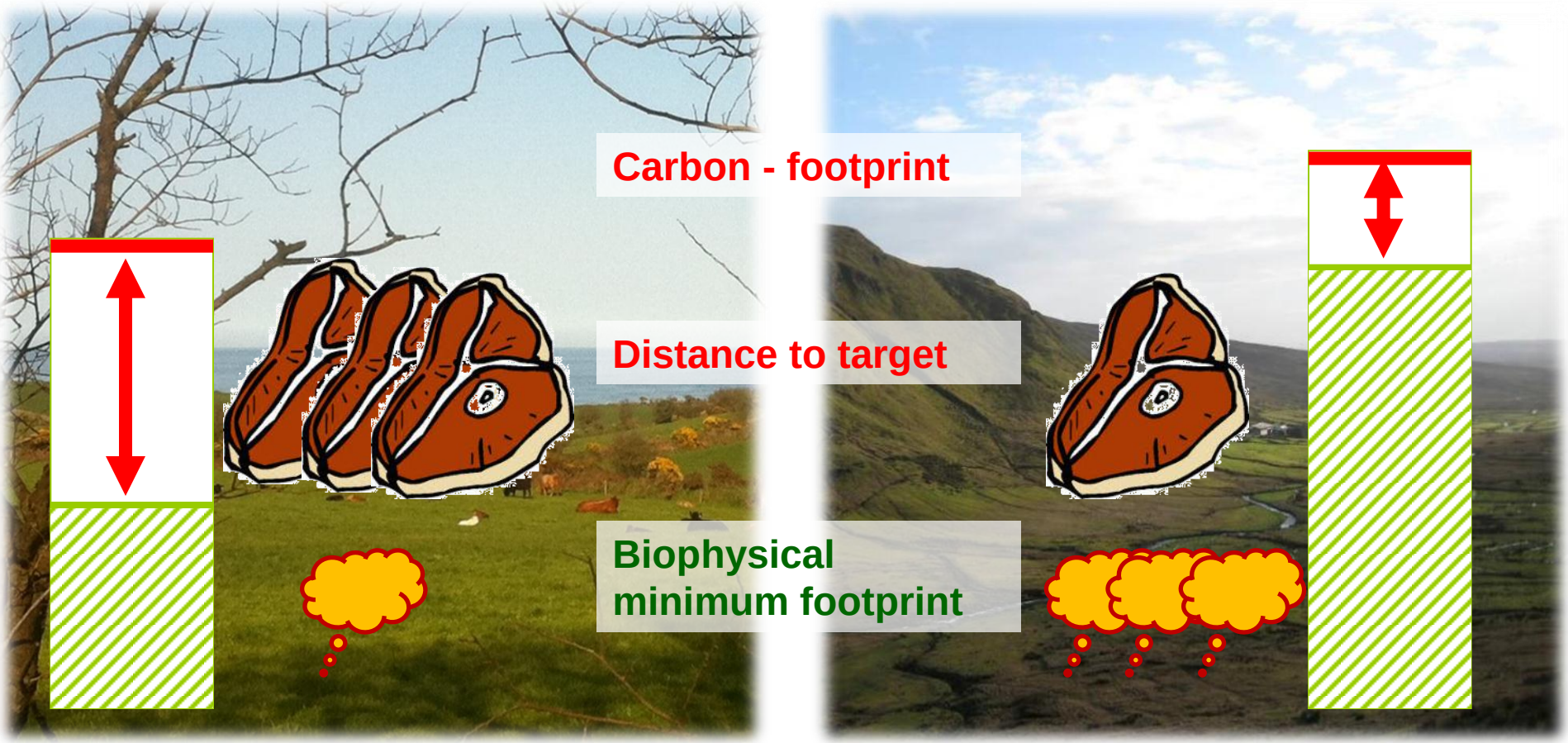
- Carbon reduction = cost reduction
  Carbon Navigator specifies potential € savings

The Carbon Navigator

Principles (cont'd):

- Each farm is unique – which measures are most appropriate on my farm?
- "Comparing like with like": benchmark my farm only against similar farms, on similar soils, in my region.
- "Distance to target": how far have I progressed in reducing my emissions?

Distance to target



Bord Bia Teagasc Carbon Navigator

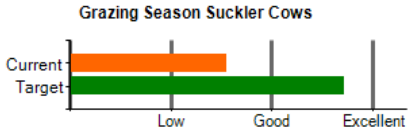
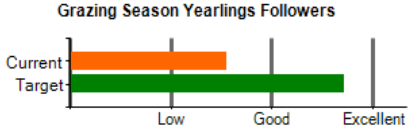
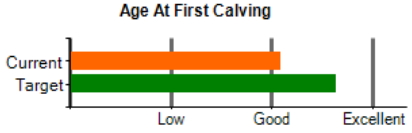
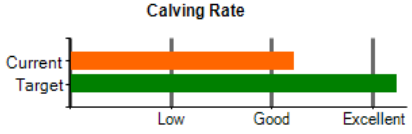
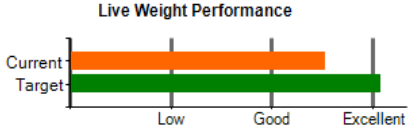
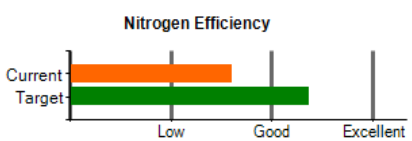
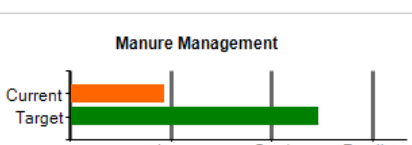
This facility will apply Farm Enterprise Information collected at the last audit to the Carbon Navig

Herd B1111199 *

Update Download Excel File

Potential impact of meeting all targets

-20.0% +€13445

Year 2010		Current	Target	Chart	GHG change	€ benefit
Grazing season - suckler cows	Turnout Date	24/Mar	10/Mar		-2.5%	+€1509
	Housing Date	01/Nov	15/Nov			
Grazing season - yearlings/followers	Turnout Date	24/Mar	10/Mar		-1.9%	+€2208
	Housing Date	01/Nov	15/Nov			
Age at first calving	Age at first calving (months)	30.2	28.0		-0.7%	+€773
Calving Rate	Calving rate (calves/cow)	0.8	0.9		-8.3%	+€3010
Live weight performance	System	Steers & Heifers	Steers & Heifers		-0.4%	+€4497
	Lifetime live weight per day of age (g)	860.00	946.0			
Nitrogen Efficiency	Total CAN and equivalent N in Compounds (t)	18.0	7.0		-1.9%	+€1300
	Total urea used (t)	0.0	5.0			
	Total concentrate fed (t)	12.0	12.0			
	Output kg beef live / ha	473.8	500.0			
Slurry Spread Timing	% in Spring	30	70		-4.3%	+€148
	% Summer following 1st cut	30	30			
	% Later in Summer	40	0			
	Application Method	Splash Plate	Splash Plate			

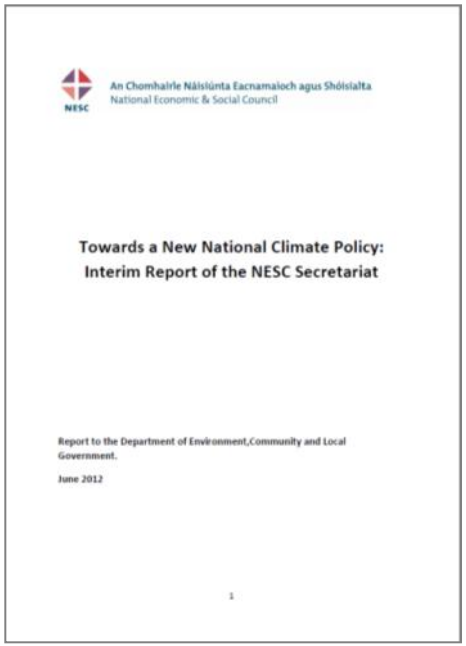
Update

Calving Rate	Calving rate (calves/cow)	0.8	0.9		-8.3%	+€3010

Roll-out 2014

Policy outcomes

Min of Env 2020 report


An Chomhairle Náisiúnta Eacnamaíoch agus Shóisialta
National Economic & Social Council

Towards a New National Climate Policy:
Interim Report of the NESC Secretariat

Report to the Department of Environment,Community and Local Government.

June 2012

1

- MACC accepted as basis for vision and target for 2020

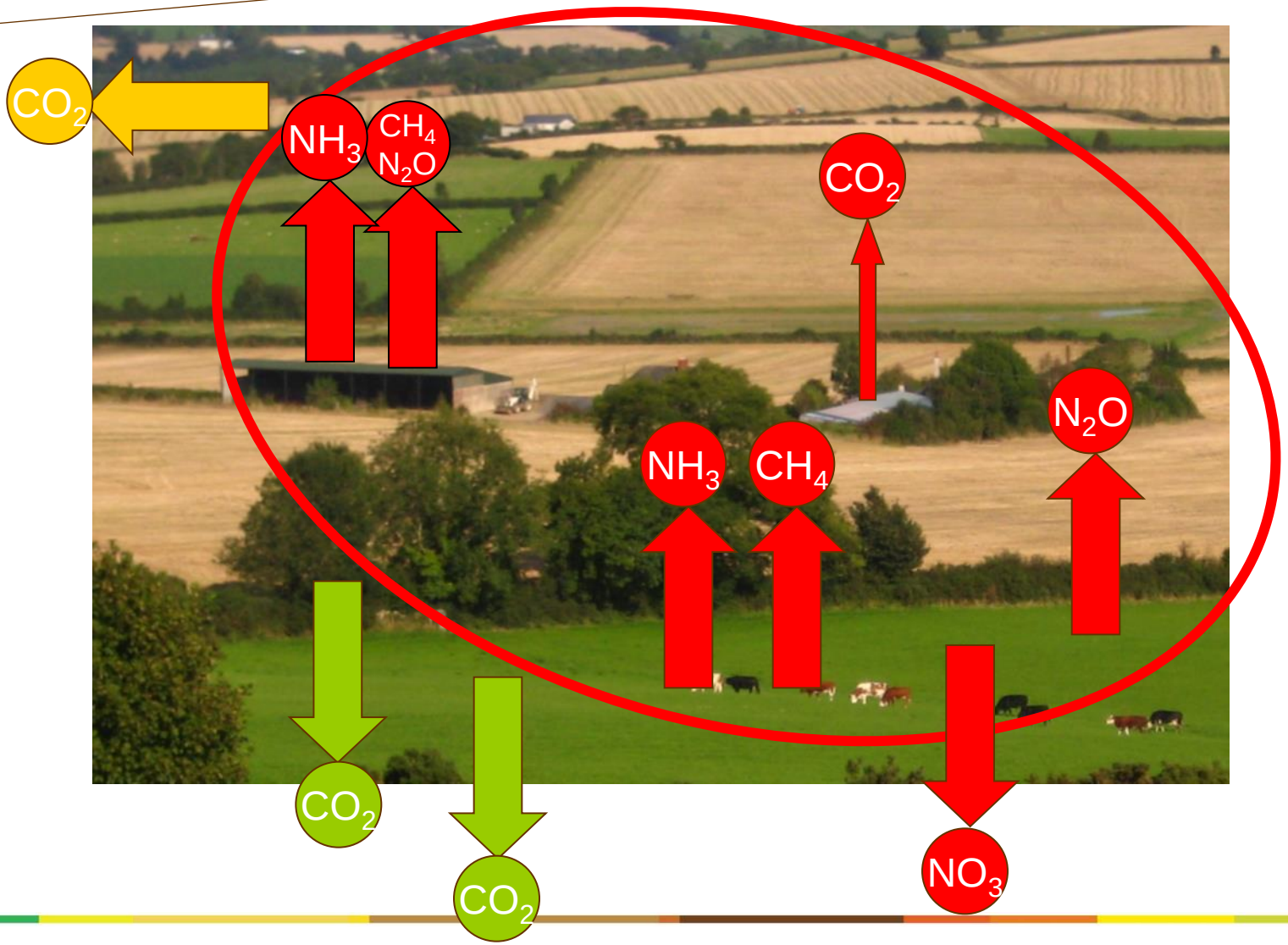
Min of Env 2050 report

- Need to expand our ambition…
- Need more than flat-lining emissions?

Why is it so difficult to further reduce agricultural emissions?

Three reasons!

Reason 3: Emissions *v.* offsetting



Policy outcomes

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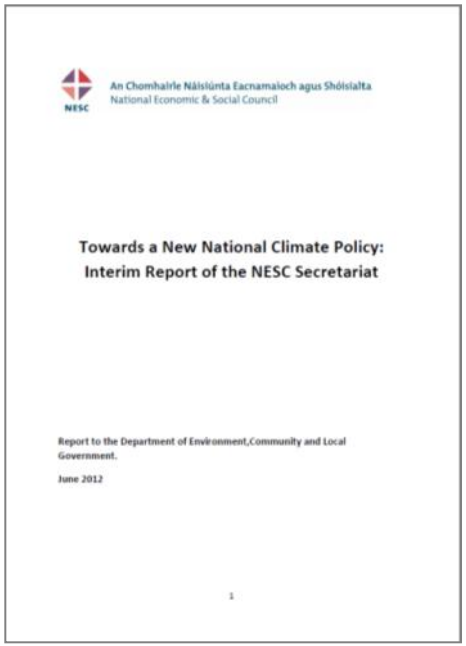
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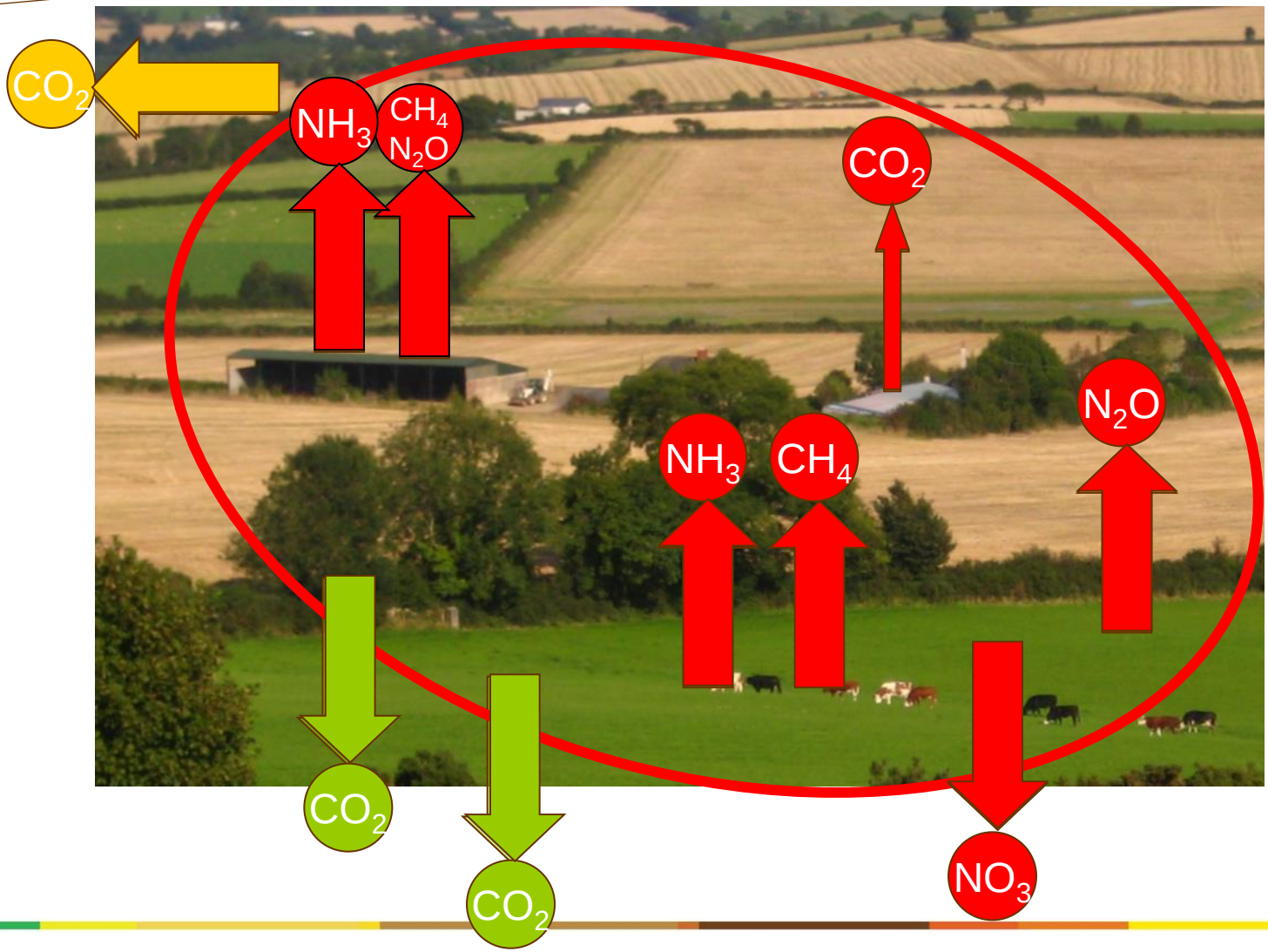
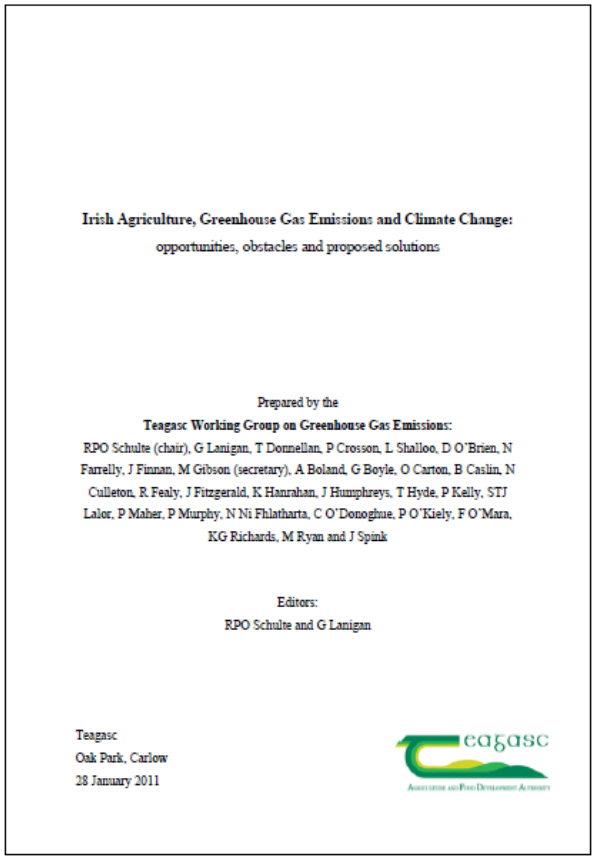
- Need to expand our ambition…
- Why is it so difficult to achieve further reductions in agricultural emissions?
- **"Thinking for ourselves": beyond IPCC metrics**
- **New concept: C-neutral agriculture**

What does carbon neutrality mean?



Teagasc GHG Working Group

2011: "now"



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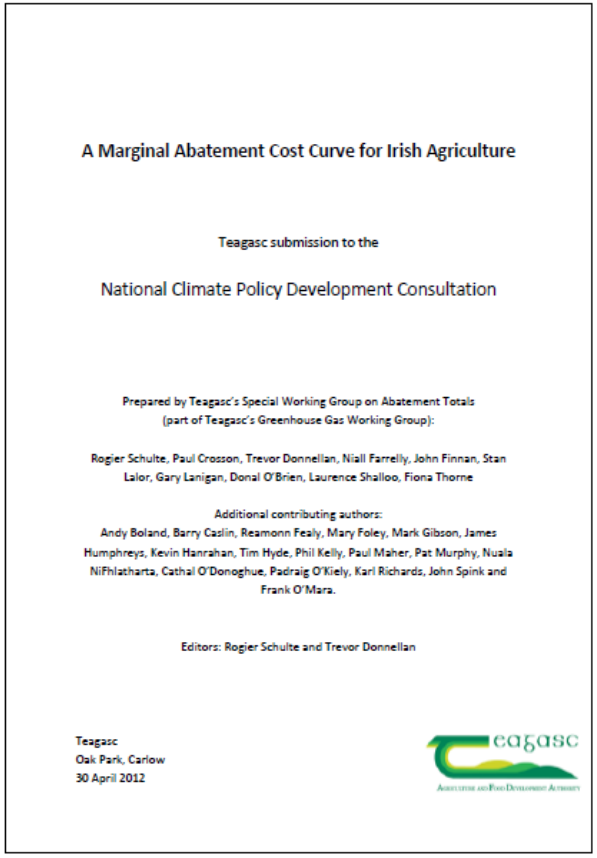

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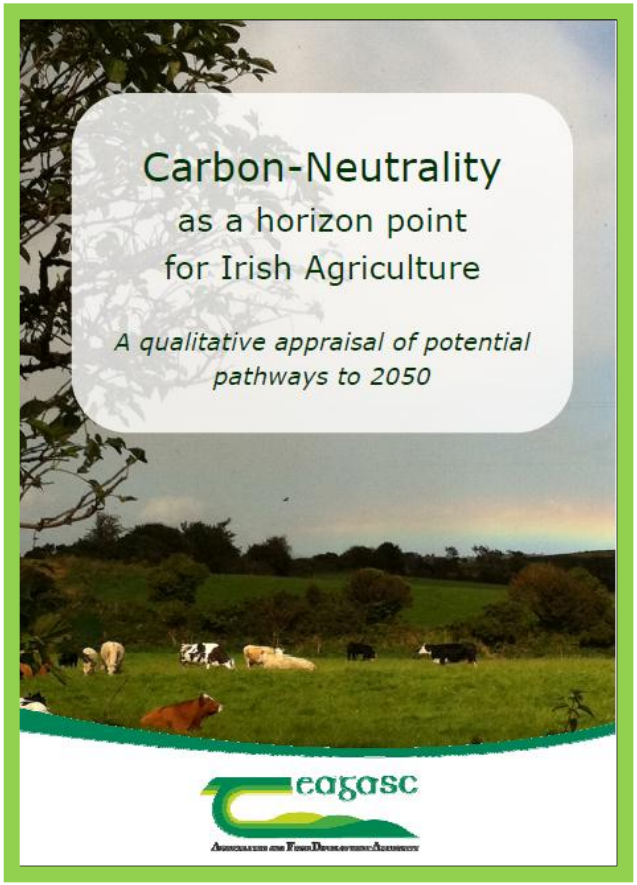


http://www.teagasc.ie/publications/

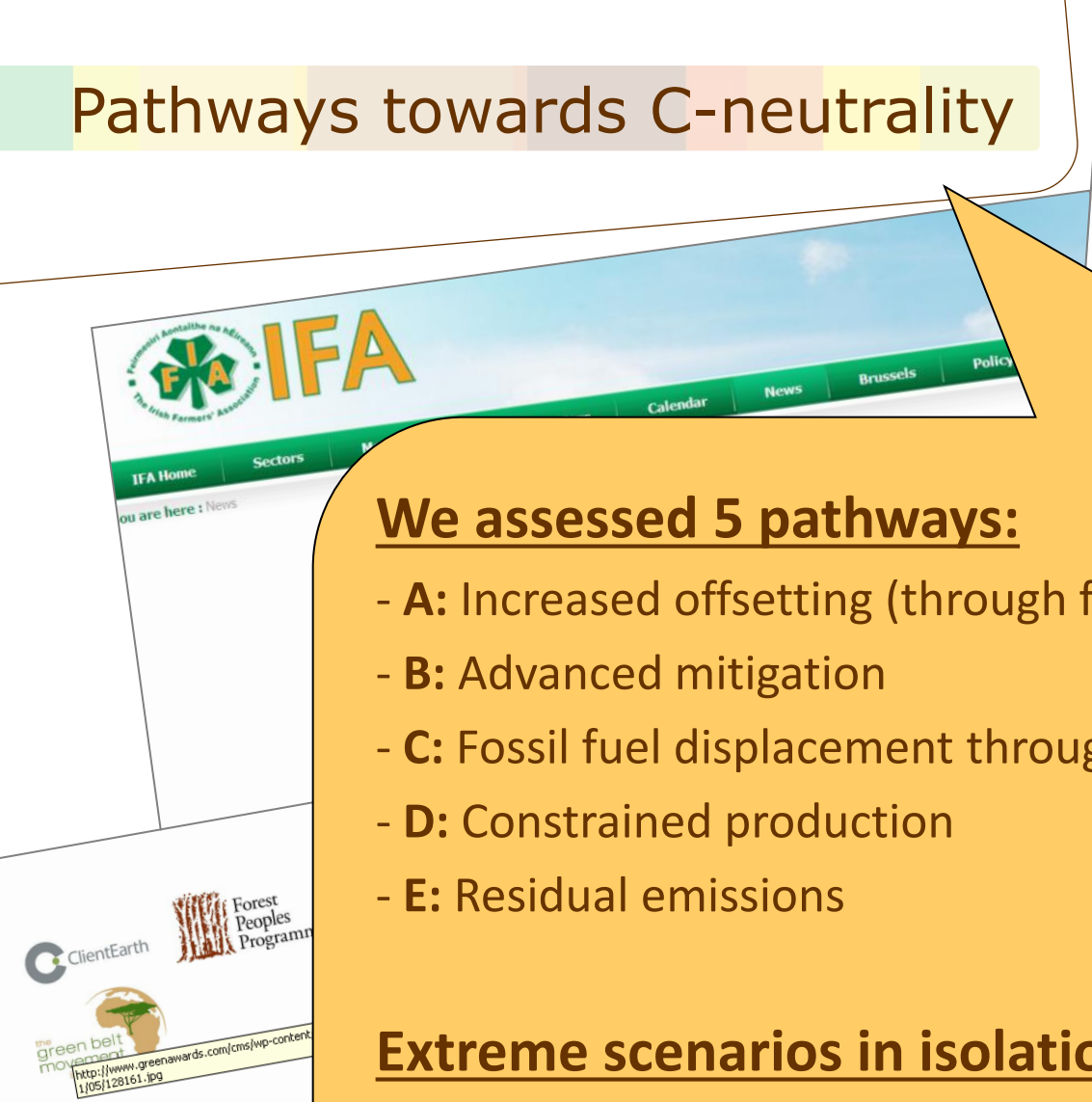
Pathways towards C-neutrality

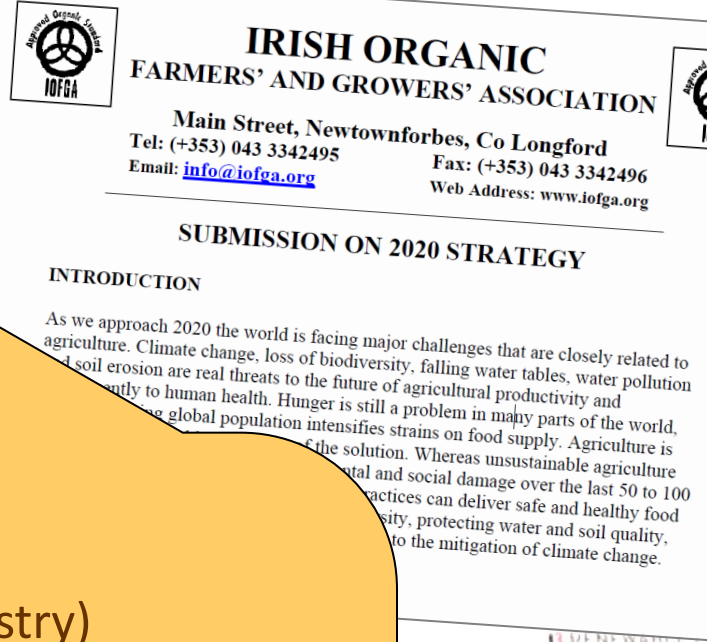
We assessed 5 pathways:

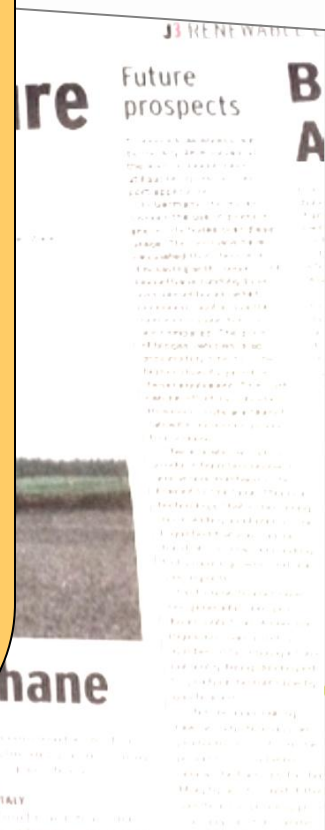
- **A:** Increased offsetting (through forestry)
- **B:** Advanced mitigation
- **C:** Fossil fuel displacement through bioenergy
- **D:** Constrained production
- **E:** Residual emissions

Extreme scenarios in isolation:

- Potential
- Obstacles







Conclusions

- 'Mosaic of solutions' likely to achieve more than single pathways
- Early start ("now") essential to achieve progress by 2050
- Full carbon-neutrality unlikely to be achievable ≠complacency
  Use C-neutrality as a 'horizon point'
- Potential conflict with other aspects of sustainability (e.g. GMO, biodiversity, animal welfare)
  = hard choices required
- The *concept* of C-Neutrality diversifies the menu of options

Developments…

73. Approaches for policies addressing CO_2 emissions and absorptions of the land sector could continue to treat this sector separately, or address it together with the other emissions from the agricultural sector. Considering the strong linkages between land management and agricultural activity this latter option seems to have advantages. The practical implementation could include the CO_2 emissions and absorptions of the land sector in the potential future Effort Sharing Decision (governing the non-ETS sectors) or rather do the opposite, and take the agricultural Non-CO2 emissions out of the potential future Effort Sharing Decision and integrate it together with the CO_2 emissions and absorptions of the land sector into one new pillar of the EU's climate policy. This would allow for broader incentives for climate friendly and smart agriculture than today within a post-2020 Common Agricultural Policy.