Cerulogy

Low carbon fuels – exploring the future EU policy framework

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Introductions

- Chris Malins
- Independent consultant at Cerulogy
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  - Fuels Lead for the International Council on Clean Transportation 2010-2016
  - Communications Specialist for the UK Renewable Fuels Agency 2008-2010
- Member of numerous advisory groups
- PhD in Applied Mathematics, Sheffield University

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https://scholar.google.co.uk/citations?user=Y16zidkAAAAJ&hl=en&oi=ao

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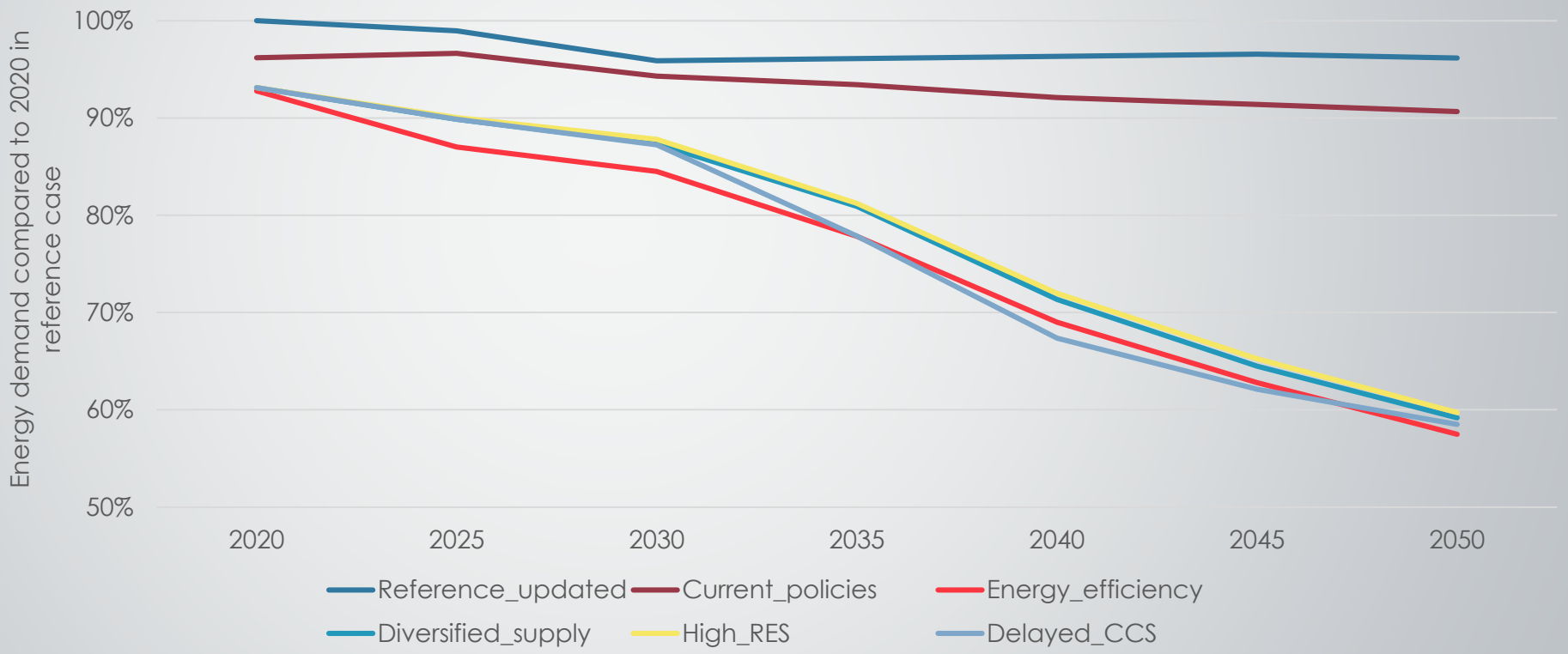
Context – reducing transport energy demand



EU Energy Outlook

How did we get here?

RED, FQD, ILUC, ETS

EU low carbon fuels, 2010-2020

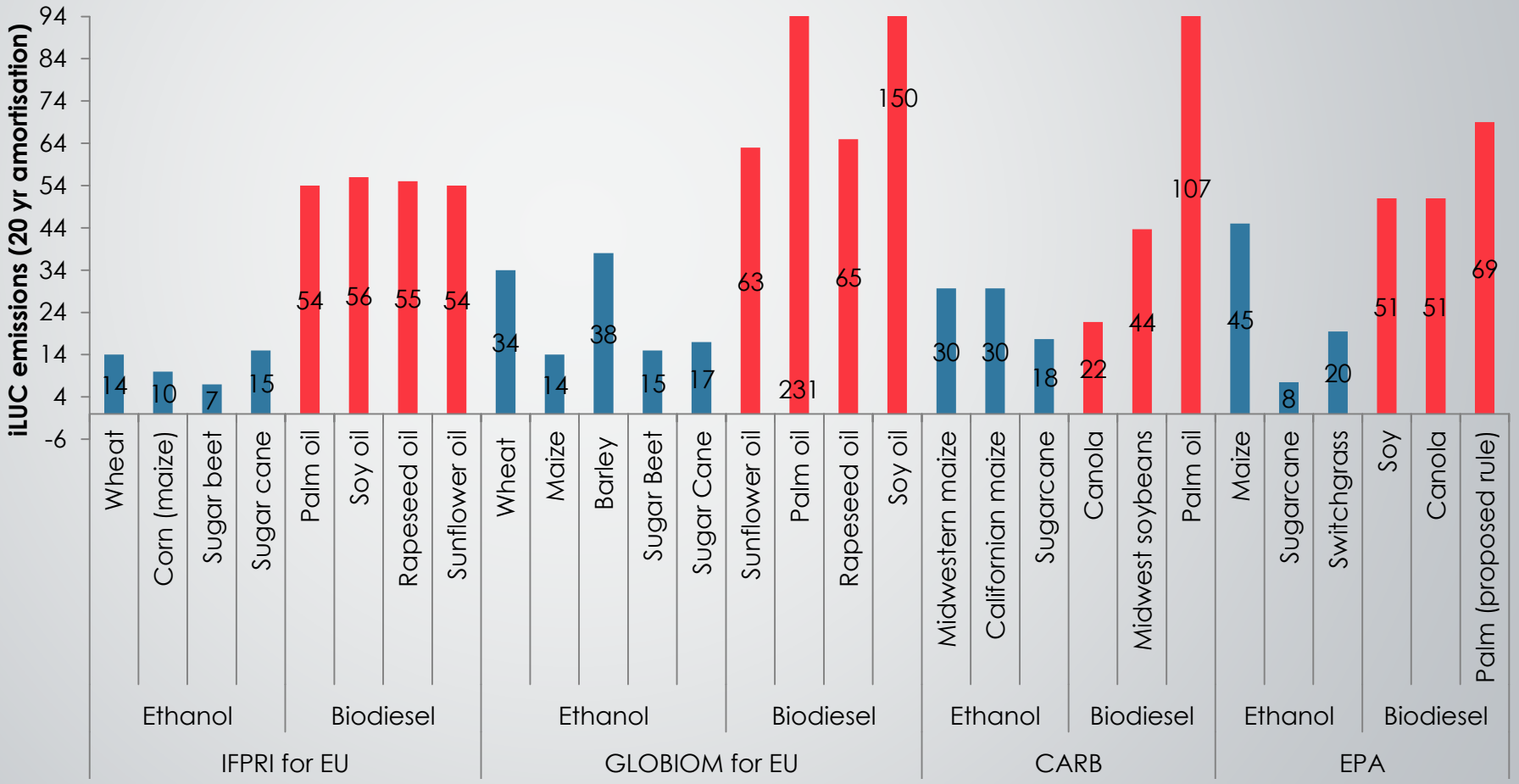
- EU biofuel industry is policy created and sustained
- Energy mandate under the Renewable Energy Directive (RED), GHG mandate under Fuel Quality Directive (FQD)
  - Double counting for fuels from 'wastes and residues' and cellulosic fuels
  - Basic sustainability criteria
  - Not effective as advanced biofuel policy
- ILUC/food vs. fuel debate
  - Enthusiasm for 1G biofuels is reduced
  - No real agreement on regulating ILUC
- ILUC Directive amends RED/FQD
  - Cap* 1G fuels
  - Indicative ILUC numbers
  - Non-binding advanced biofuel target

*…support for

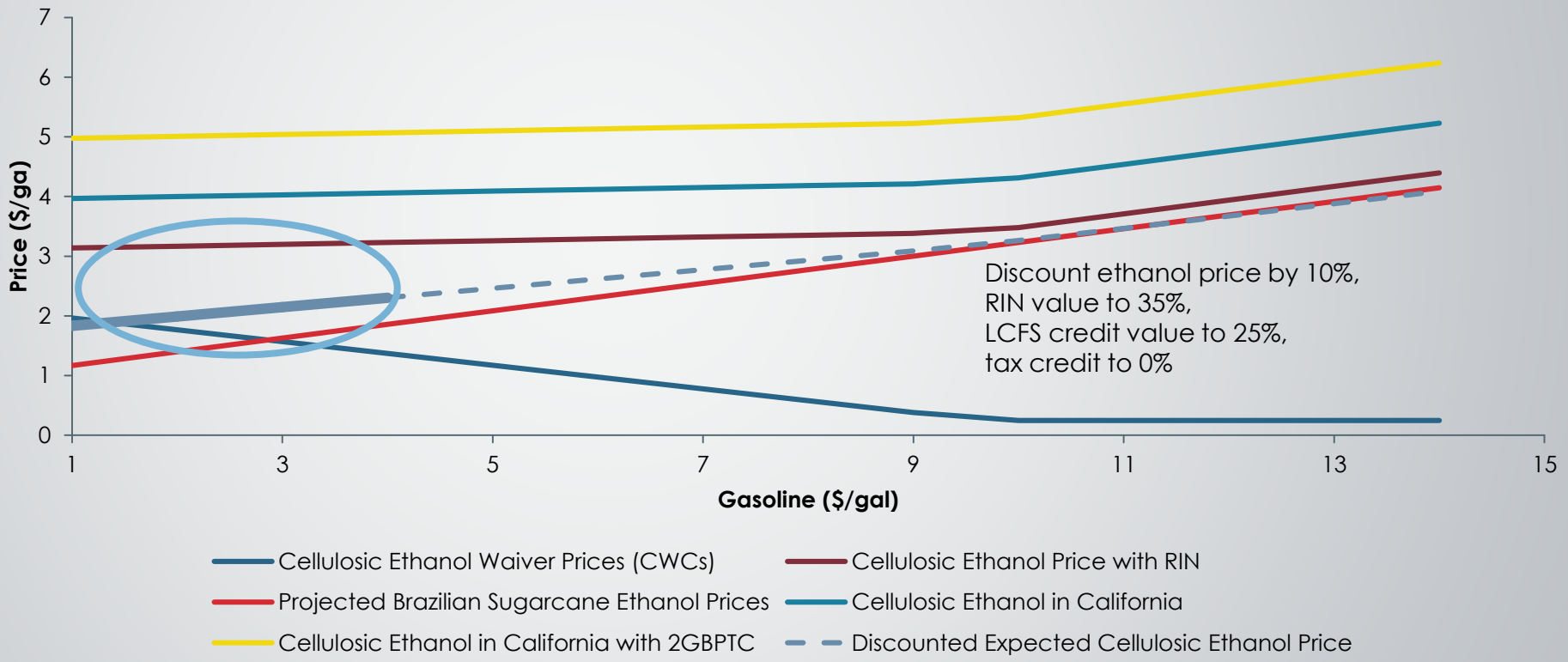
What hasn't worked?

- Indirect land use change (ILUC) – biofuel support policy has probably driven agricultural expansion in a way that undermines policy goals
  - Analysing and reacting to ILUC remain enormously controversial, but central to the effectiveness of policy
  - There's also food vs. fuel, which is controversial at every level
  - Sustainability uncertainty leads to policy uncertainty leads to value uncertainty
- Cellulosic fuel technologies have been held out as the near future for a decade and more – but we haven't got far
  - Compare to recent excitement about power to liquids fuels
- Sustainability governance is challenging, and generally decried as too weak when reviewed
  - Voluntary standards have provided more assurance than legal requirements

Indirect land use change estimates from regulatory studies



Discounting the value proposition for uncertainty



This is out of date now, but illustrates the point!

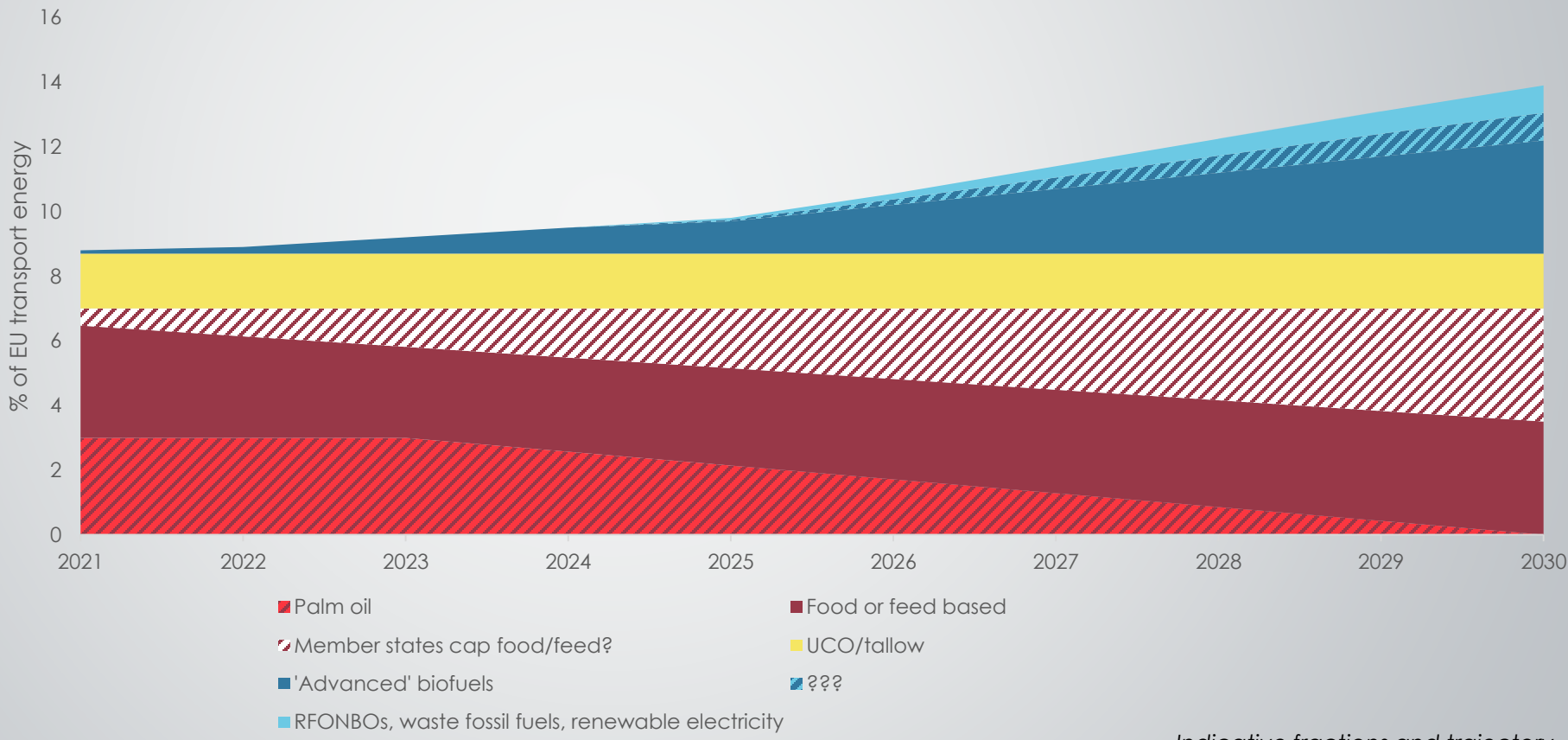
Where are we now?

Out with the RED, in with RED II

RED II

- Creates a more 'nested' set of targets
  - Advanced (Annex IX A) biofuels > residue based (Annex IX B) biodiesel > RFONBOs and recycled carbon fuels > other non-food biofuels > food based biofuels > high ILUC-risk biofuels (palm oil)
- Advanced biofuels receive strongest ever EU support
- Flexibility at the Member State level (Directive not Regulation)
  - Choosing trajectories
  - Implementing mechanism
  - Volume vs. energy vs. GHG targets
  - Food cap
  - Recycled carbon fuels
  - Cap on Annex IX Part B
  - Double counting
  - Further ILUC-related differentiation

Illustrative supply scenario



Indicative fractions and trajectory

Other elements

- High ILUC-risk fuels* to be phased out by 2030
  - Commission proposal identifies palm oil (review due by 2021)
  - Treatment of PFAD likely to be decided at Member State level
- Low ILUC-risk biofuel certification
  - Additionality-assessed yield projects
  - Abandoned and degraded land projects
  - Smallholder yield projects
  - *Only regulatory value is to palm oil projects (MS could expand this)*
- Enhanced incentives for aviation/maritime fuels (1.2x multiplier)

**Associated with 'significant' conversion of high carbon-stock landscapes*

Where are we going?

Advanced biofuels, co-processing, PtL, aviation

Big questions!

- What outlook for advanced biofuels?
  - Targets provide a much stronger signal
  - Value proposition still very unclear
  - Depends on Member State implementations
  - Sensitive to competition
- What about other advanced low carbon fuels?
  - Cost outlook for electrofuels (RFONBOs) more difficult than advanced biofuels
  - Place of recycled carbon fuels sensitive to implementation
- Modal choices?
  - Non-CO_2 effects may make aviation environmentally preferable market
  - Multiplier + CORSIA could add value for aviation applications
  - Tougher fuel specs and limited airline willingness to pay may however leave road transport as dominant market
- Is RED II 'fit for purpose'?
  - The framework is solid (given what was on the table)
  - Implementation decisions crucial
  - Now probably not the time to consider yet another round of revision!

Opportunities

- Fuel suppliers (incl. refiners and importers) likely to remain as regulated parties under RED II
  - Puts industry at the centre of RED II decision making, like it or not!
- While liquid fuel demand will reduce, it will certainly not disappear
- Co-processing/retrofitting to utilise existing refinery capacity
  - HVO
    - Not palm oil, ideally not food oils, preferably not PFADs
    - Opportunity to enter market for sustainable oilseeds? (Cf. UPM and carinata)
  - Pyrolysis oils
    - Co-processing in existing refineries identified in some studies as a lower cost BtL pathway
    - Engineering issues relating to pyrolysis oil must be managed
  - FT wax upgrading

Conclusions

- A decade of great uncertainty is giving way to a decade of less uncertainty
- It's still hard to pin down the future value proposition from policy to low carbon fuels in € per litre

Thanks!

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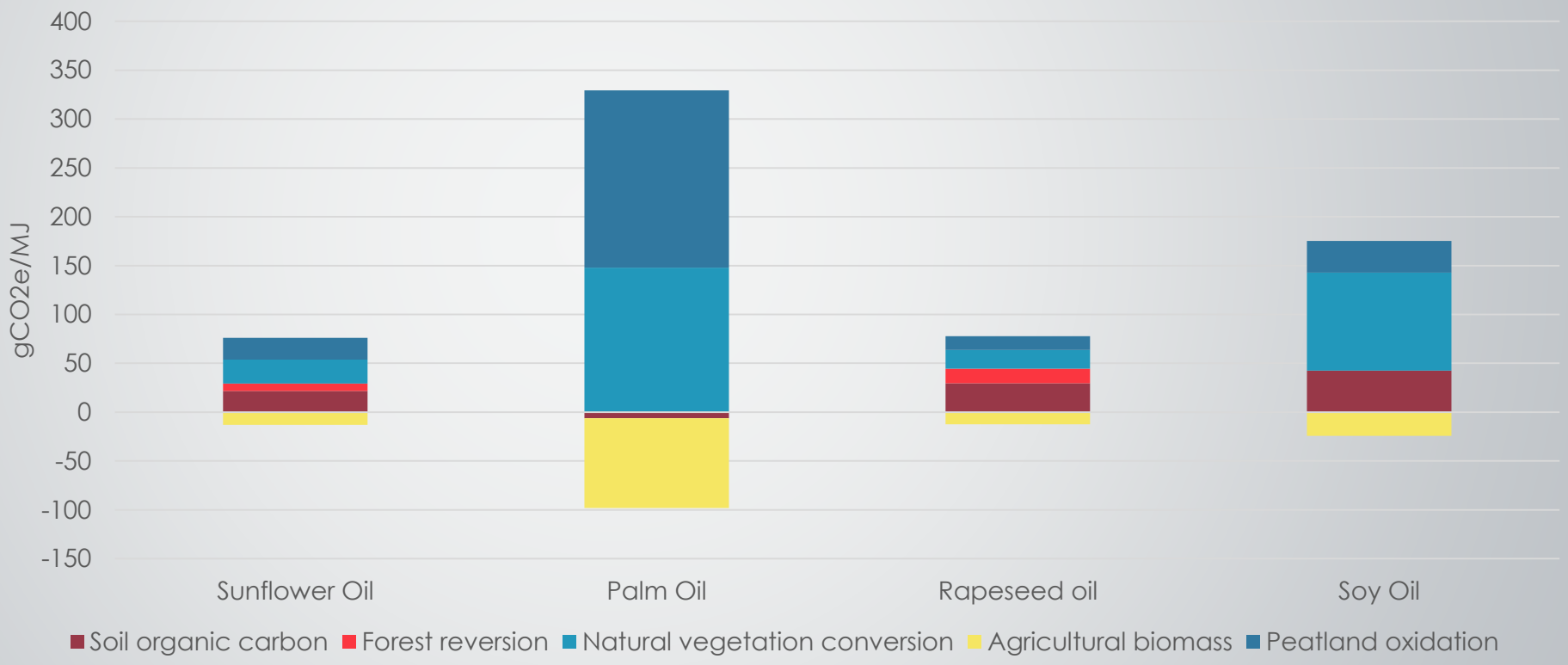
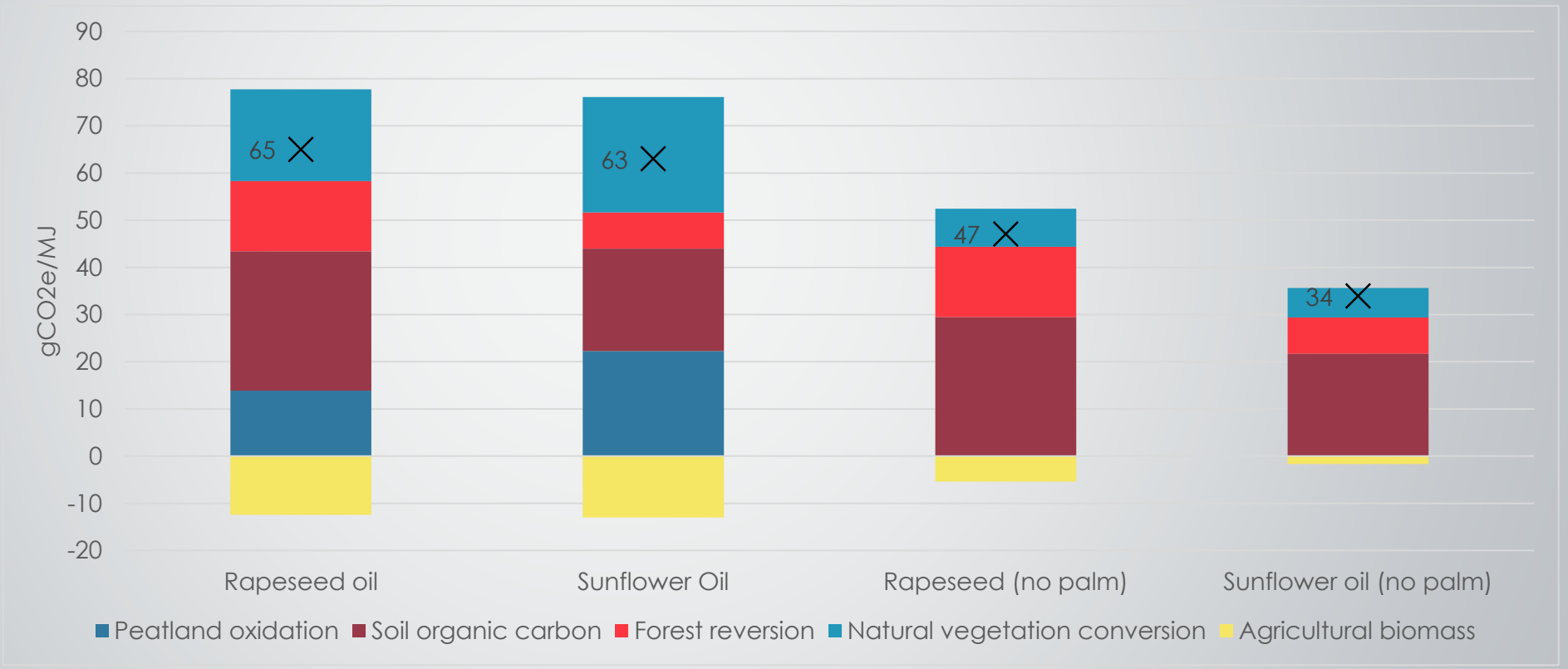
Here's one I made earlier

Slides for potential questions

ILUC – would everything be fine if we just got away from palm oil?

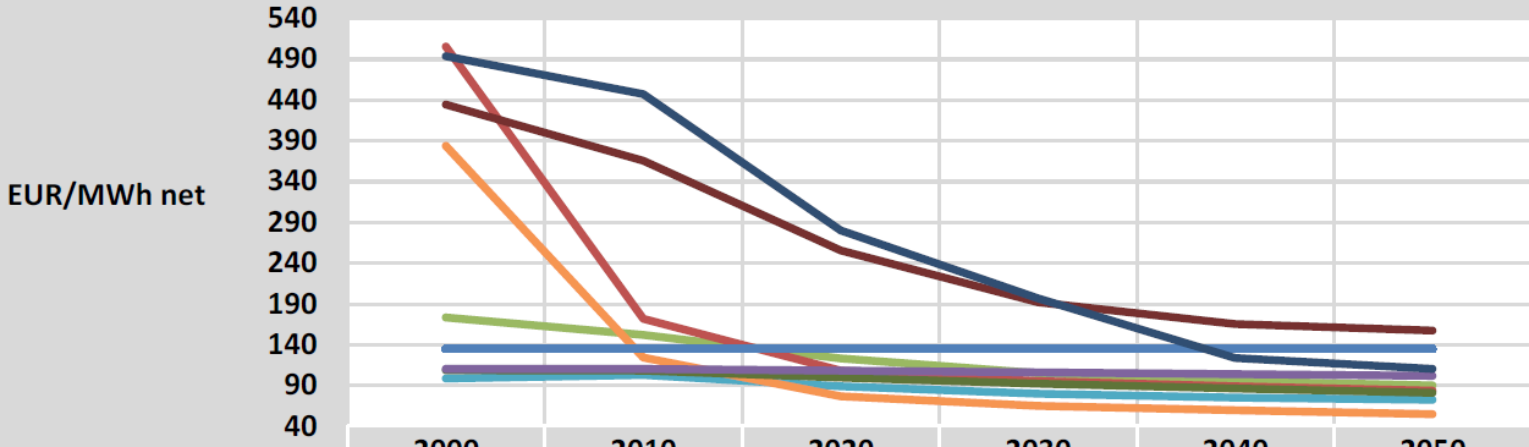


Not really – both IFPRI-MIRAGE and GLOBIOM still bad for biodiesel



Will renewable electricity be cheap?

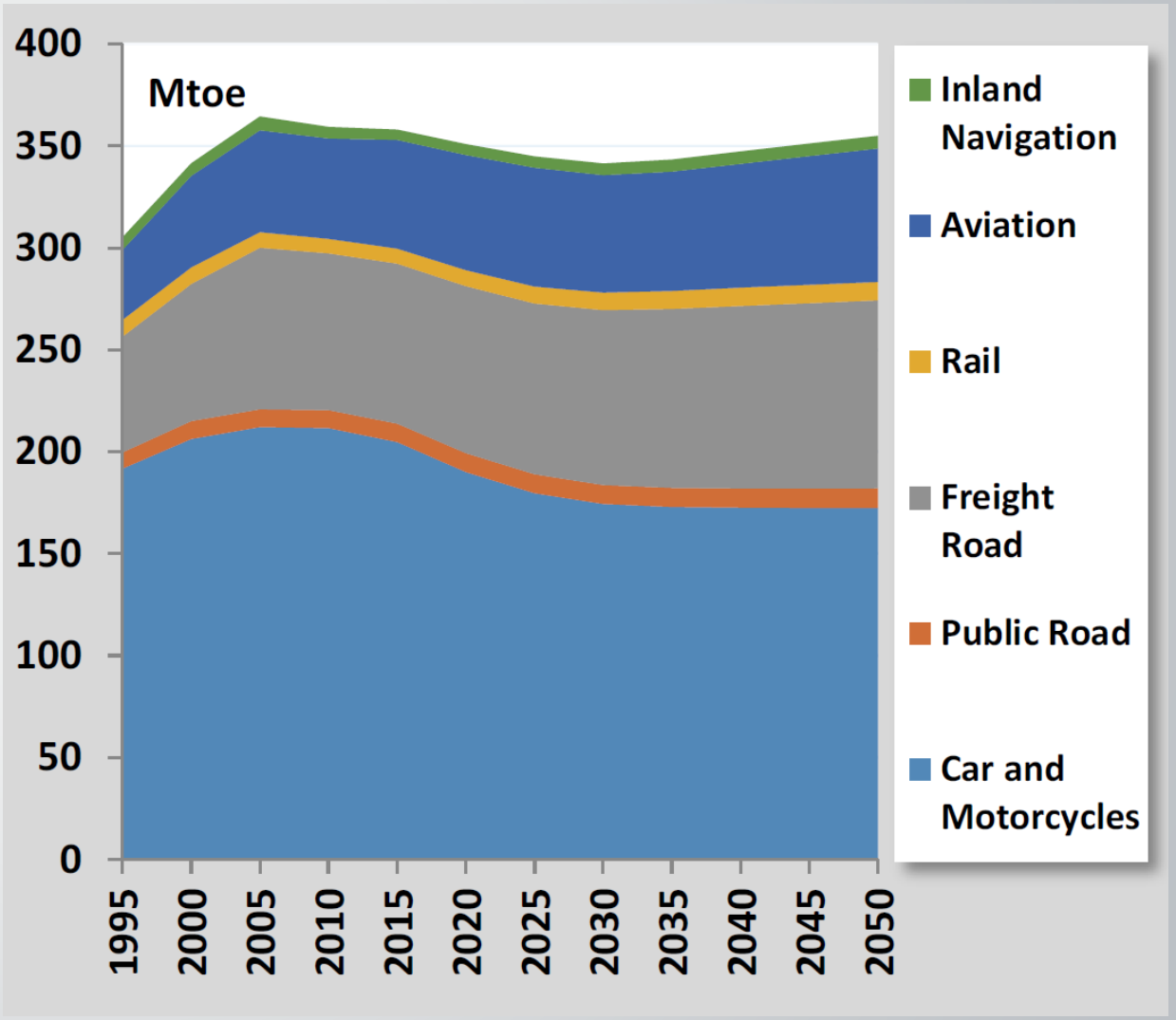
Levelized cost of power generation of new plants
Assumptions: Annual capital cost at WACC 7.5% real, operating hours per year as observed today



	2000	2010	2020	2030	2040	2050
Wind Offshore	173	152	123	105	95	90
Wind onshore	99	103	89	80	75	72
Solar PV - South of Europe	383	124	77	65	59	55
Solar PV - North/Central Europe	505	172	108	95	89	84
Solar Thermal	434	365	255	192	165	157
Geothermal	109	108	99	92	86	81
Large Hydro	135	135	135	135	135	135
Small Hydro	110	110	108	106	104	101

EU Reference Scenario 2016

Transport energy demand



EU Reference Scenario 2016