

Biomass Futures Project

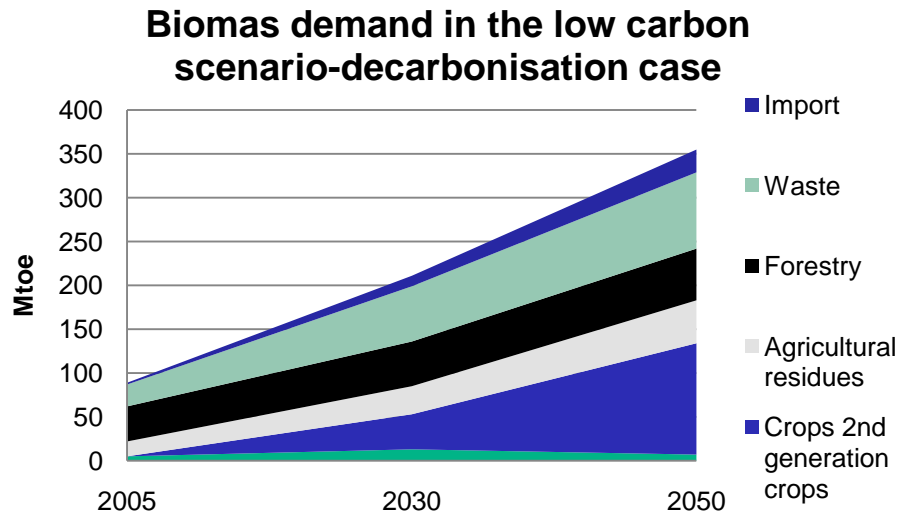
Scenarios for biomass' role in a low
carbon future

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Overview

- Low carbon future
- EU policy framework
- Bioenergy projections in various scenarios
- Bioenergy scenarios considered for the biomass futures projects

Low carbon energy future



- GHG reduction targets
- RE targets
- Nuclear generation
- Gas and clean coal

Source: EC, 2011. A roadmap for moving to a competitive low carbon economy in 2050.

RE represent 44% of power generation, while nuclear provides 29% of total power generation in EU, by 2050.

EU RE policy: 2008 RE directive

- 20% Renewables target for 2020
 - Differentiation among MS
- 10% renewables in transport target
 - ‘Double counting’ of several biofuels (electricity).
 - Sustainability criteria:
 - No-go areas (forests, nature reserves, etc.)
 - GHG threshold (35% → 50/60%)
- EC work in progress on Indirect Land Use Change (ILUC)

Current status

- Liquid biofuels/bioliquids
 - Most operationalisation issues solved (certification schemes, ‘biodiverse grasslands’)
 - ILUC:
 - December 2010: remaining uncertainties/deficiencies in analyses
 - IA by July 2011, possibly with legislative prop.
- Solid biomass:
 - Feb 2010 report: no short-term need for cert.

Bioenergy projections

Biomass consumption by 2020 in terms of final energy [Mtoe]

	Electricity	Heat	Biofuels
EREC ⁽¹⁾	20-22	86.5-87	28-36
EEA, 2008 ⁽²⁾	36	54	14
Green-X	16-23	65-93	28-31
NREAP	20	90	29

- Does the biomass supply match to the demand?
- Were the sustainability criteria included?
- Are the targets ambitious enough to reach the overall RE targets?

1. http://www.erec.org/fileadmin/erec_docs/Documents/Publications/45pctBy2030_ERECReport.pdf
 2. http://www.eea.europa.eu/publications/technical_report_2008_10

Bioenergy projections

Biomass consumption by 2020 in terms of final energy [Mtoe]

	Electricity	Heat
EREC(1)	20-22	8-10
EEA, 2008	36	10
Green-X	36	10
NREAP	36	10

The projections on bioenergy deployment in the NREAPs can be based on *weak statistics* and there is a lack of scientific studies backing the outlined pathways!

Bioenergy development remains a 'black box' and will pose great challenges to politicians to reach the *a priori* formulated pathways (according to the expert survey) demand?

Energy ambitious enough to reach the overall RE target?

1. http://www.erec.org/fileadmin/erec_docs/Documents/Publications/45pctBy2030_ERECReport.pdf
2. Figures represent baseline and reference scenario results

Biomass Futures project objective: to develop and analyse the impacts of bioenergy scenarios for the European Union (EU).

Member States set out the sectoral targets, the technology mix they expect to use, the trajectory they will follow and the measures and reforms they will undertake to overcome the barriers to developing renewable energy.

Each MS shall submit progress report by 31 Dec 2011 presenting the developments in the availability and use of biomass for energy. Our results can feed into this reporting period.

We will present the role sustainable biomass will play in reaching the targets set in the NREAPs and update of these plans.

Scenario I: Reference

- It assumes the renewable energy targets set by the RE Directive are met.
 - Energy demand is derived from PRIMES reference 2010
 - RE and bioenergy demand from NREAPs
 - Bioenergy supply from WPs 3-4
 - Biomass imports derived from IIASA
 - Policy measures in line with the NREAPs
 - Sustainability:
 - ✓ only the GHG emission reduction for the transport sector (as set in RED),
 - ✓ no emission reduction target for electricity and heat sector,
 - ✓ no iLUC.

- *Added value: guide the MSs on how to reach their planned bioenergy targets (in a cost effective manner).*
 - i. *the type of biomass used to reach the targets,*
 - ii. *the feedstock allocated to the conversion technologies,*
 - iii. *the costs, and*
 - iv. *the avoided GHG emissions*
 - v. *the policy costs*

Scenario II: High biomass scenario

Preliminary modelling results show that less than half of the total biomass is utilised to reach the NREAP targets!

- Most input data will be the same as reference scenario
- The bioenergy demand figures will be different than the NREAPs,
 - We will increase the bioenergy demand and recalculate the relative impacts on other RE targets
 - We will increase the RE targets in line with the increase in bioenergy demand
 - We will include sensitivity runs for the import
- The policy instruments will be the focus
 - We will present the relevant policy costs

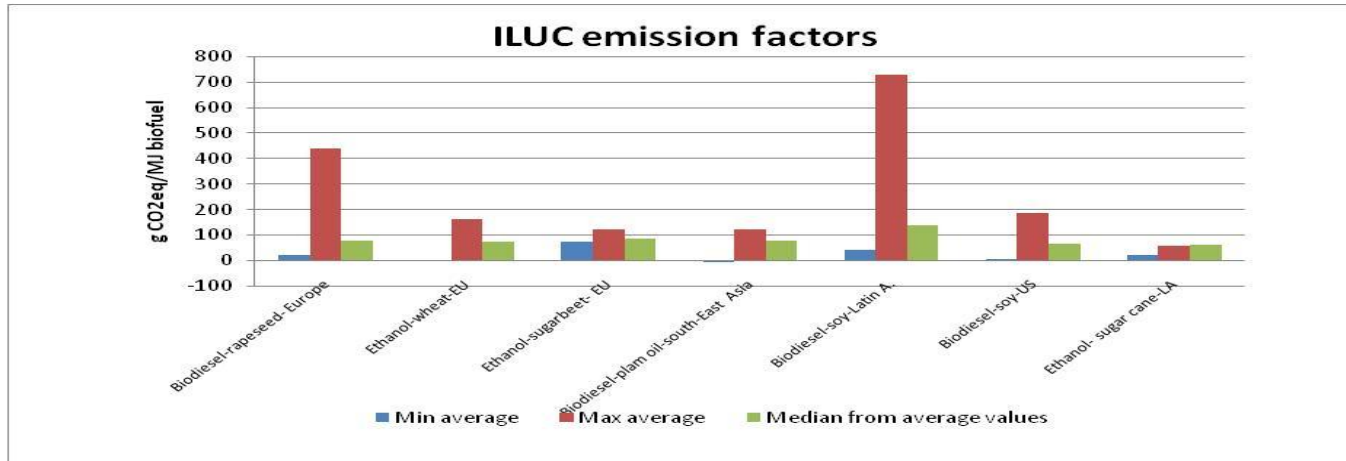
Added value: we will highlight the policy instruments that enable higher utilisation of biomass for energy

Scenario III: Sustainability scenario

- Most of the input data will be the same as reference, only sustainability will be more stricter
 - In addition to the transport sector, GHG emission targets will be set to bio-electricity and heat (70% reduction)
 - Both direct + indirect land use change will be included

Added value: this scenario will enable us to compare the NREAPs and present recommendations to the MSs and the EC.

iLUC effect : results from EEA work in progress



1. IFPRI study: “Global trade and environmental impact study of the EU biofuels mandate” (Al-Riffai et al., 2010).
2. ADEME study: “Analyses de Cycle de Vie appliquées aux biocarburants de première génération consommés en France” (ADEME, 2010).
3. E4tech study: “A causal descriptive approach to modelling the GHG emissions associated with the indirect land use impacts of biofuels” (E4tech, 2010).
4. PBL study: Identifying the indirect effects of bio-energy production (PBL, 2010a) and
5. CARB study: Proposed Regulation to Implement the Low Carbon Fuel Standard Volume I. Staff Report: Initial
6. Statement of Reasons (CARB, 2009a; CARB, 2009b)
7. JRC study: Indirect Land Use Change from increased biofuels demand (JRC-IE, 2010).
8. Oeko-Institut: The “iLUC Factor” as a means to hedge risks of GHG emissions from indirect land use change (Oeko, 2010).

iLUC effect : results from EEA work in progress

➤ production on land otherwise would have been abandoned,
 ➤ DDGS preventing soy area expansion in Brazil

➤ by-product replacing the expansion of soy plantation in Brazil

➤ production on land with the highest carbon stock; conversion of primary forest.

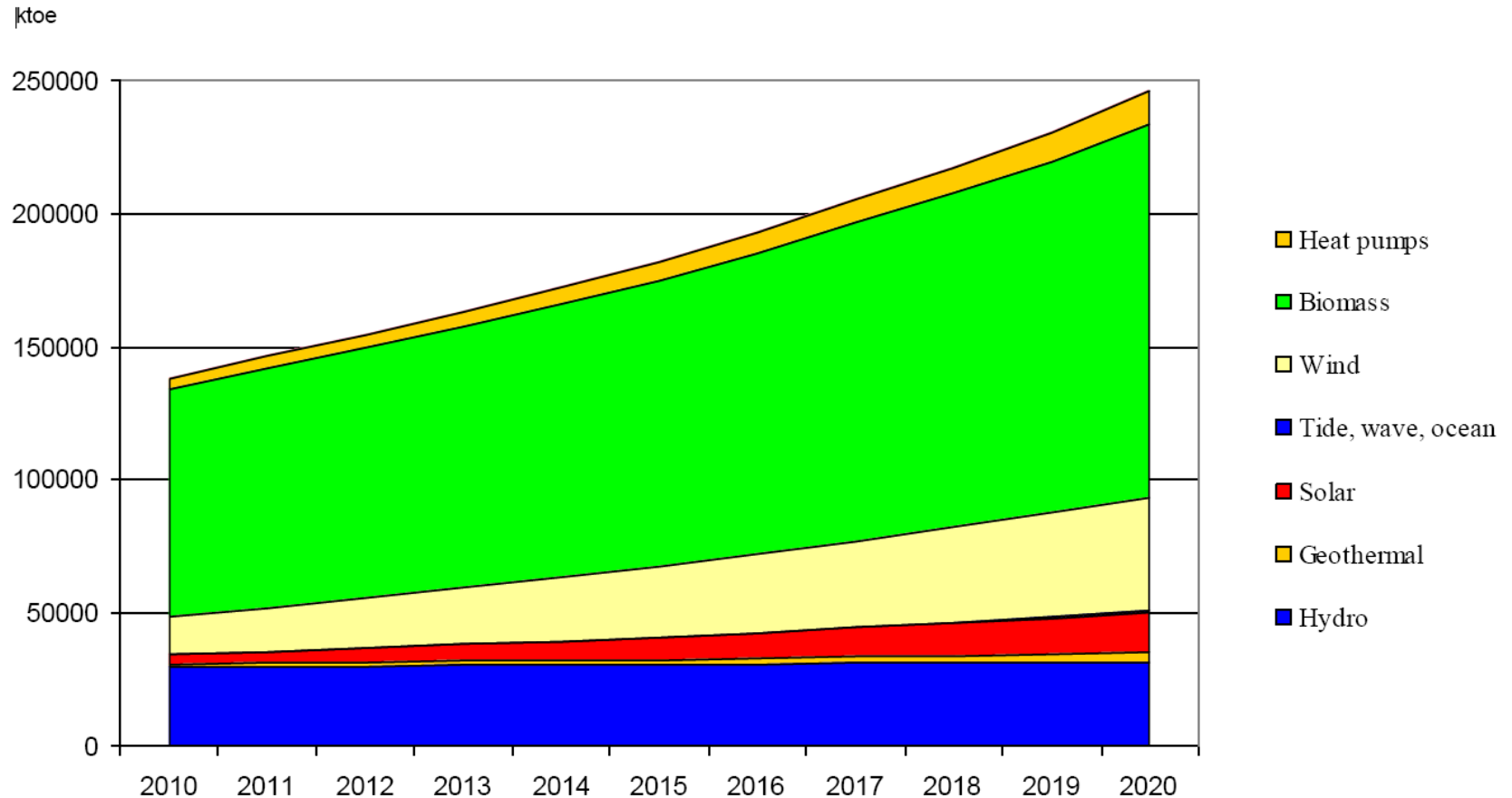
Type of biofuel	Minimum ILUC emission factor	Maximum ILUC emission factor	Median from average values
Biodiesel-rapeseed-EU	-33 80	80-800	77
Ethanol-wheat-EU	-79 79	-8-329	73
Ethanol-sugar beet-EU	13-33	65-181	85
Biodiesel-palm oil –South East Asia	-55-45	34-214	77
Biodiesel-soy-LA	13-67	75-1380	140
Biodiesel-soyUS	0-11	100-273	65
Ethanol-sugar cane-LA	-1-48	19-95	60

Thank you for your attention!

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	BAU	Reference	High biomass	Sustainability
Energy demand	PRIMES baseline	PRIMES reference	PRIMES reference	PRIMES reference
RE demand	PRIMES baseline	PRIMES reference+ NREAPs	PRIMES reference + NREAPs	PRIMES reference+ NREAPs
Bioenergy demand	Will be determined by REsolve	NREAPs	Will be determined by Resolve model	NREAPs
Biomass sustainability	<ul style="list-style-type: none"> Only fulfill the GHG emission criterion for biofuels and bioliquids(as defined in the RED) No iLUC factor 	<ul style="list-style-type: none"> Only fulfill the GHG emission criterion for biofuels and bioliquids(as defined in the RED) No iLUC factor 	<ul style="list-style-type: none"> Only fulfill the GHG emission criterion for biofuels and bioliquids(as defined in the RED) No iLUC factor 	<ul style="list-style-type: none"> Sustainability criteria discussed in WP4 is applied to the biomass potential.(??? RED+) GHG emission reduction is extended to electricity and heat sector. iLUC effect is mimicked in terms of a risk adder??
Policy instruments	2009 level	Updated in accordance with the NREAPs. Post 2020 we will consider some sort of policy harmonization.	For other renewable energy sources updated in accordance with the NREAPs Further stimulus for bioenergy production.	Updated in accordance with the NREAPs. Post 2020 we will consider some sort of policy harmonization.
Biomass import (form non -EU)	In line with the PRIMES baseline data	In line with the NREAPs.	A higher figure for import than the NREAP figures ?	?

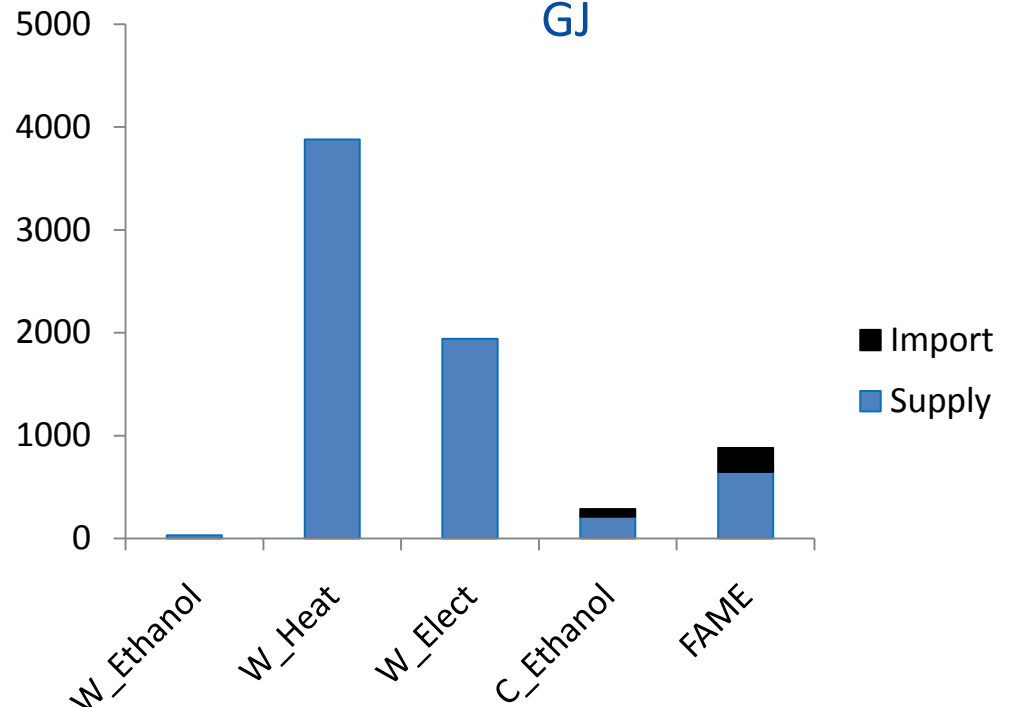
NREAP survey: biomass dominates



NREAP bioenergy targets and trade

- Imports of both, feedstocks and fuels allowed
- Ethanol imports from Australia/New Zealand (25%) and Brazil (75%)
- Biodiesel imports from USA

NREAP targets EU27 in 2020, Mio. GJ



W_Ethanol: ethanol from woody biomass

W_Heat: heat from woody biomass

W_Elect: Electricity from woody biomass

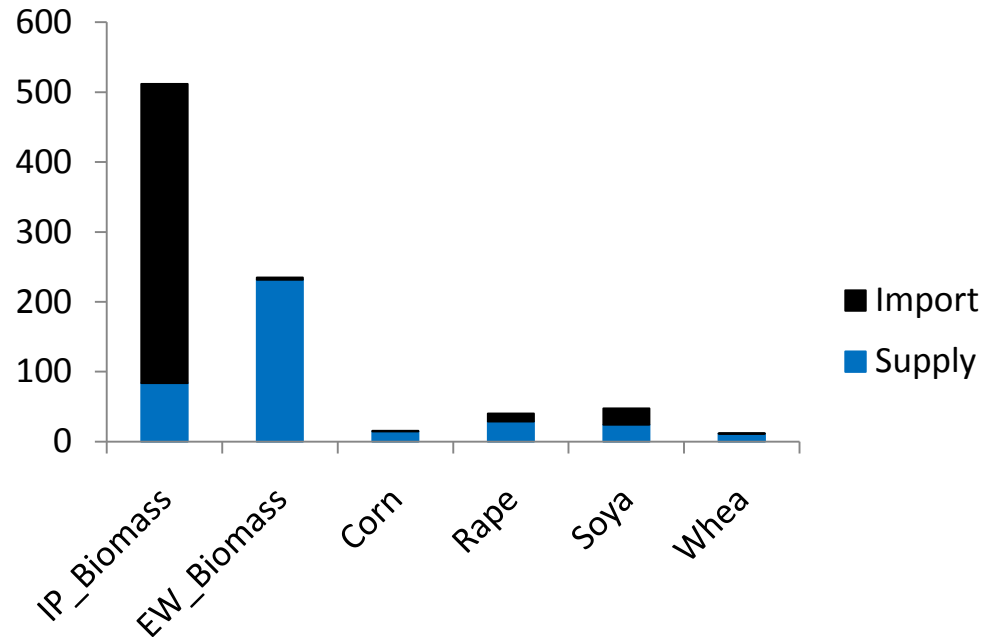
C_Ethanol: from crop feedstocks

FAME: Biodiesel

NREAP bioenergy feedstocks and trade

- Imports of biomass from plantations from Africa, Brazil and India
- Feedstock imports from USA, Canada, ANZ etc.

NREAP EU27 in 2020, Mio. t or m³



IP_Biomass: Biomass from short rotation plantations

EW_Biomass: Biomass from existing forests (traditional fire wood)