

ALTERNATIVE MODELS AND ROBUST DECISION-MAKING FOR FUTURE FOREST MANAGEMENT

**European scale expansion of alternative forest management
models: impact on the bioeconomy, carbon sink and biodiversity**

WP2: European Analyses (IIASA)

Nicklas Forsell, Fulvio Di Fulvio, Pekka Lauri, Mykola Gusti, Anu Korosuo

ALTERFOR Final Conference, September 10-11th, 2020

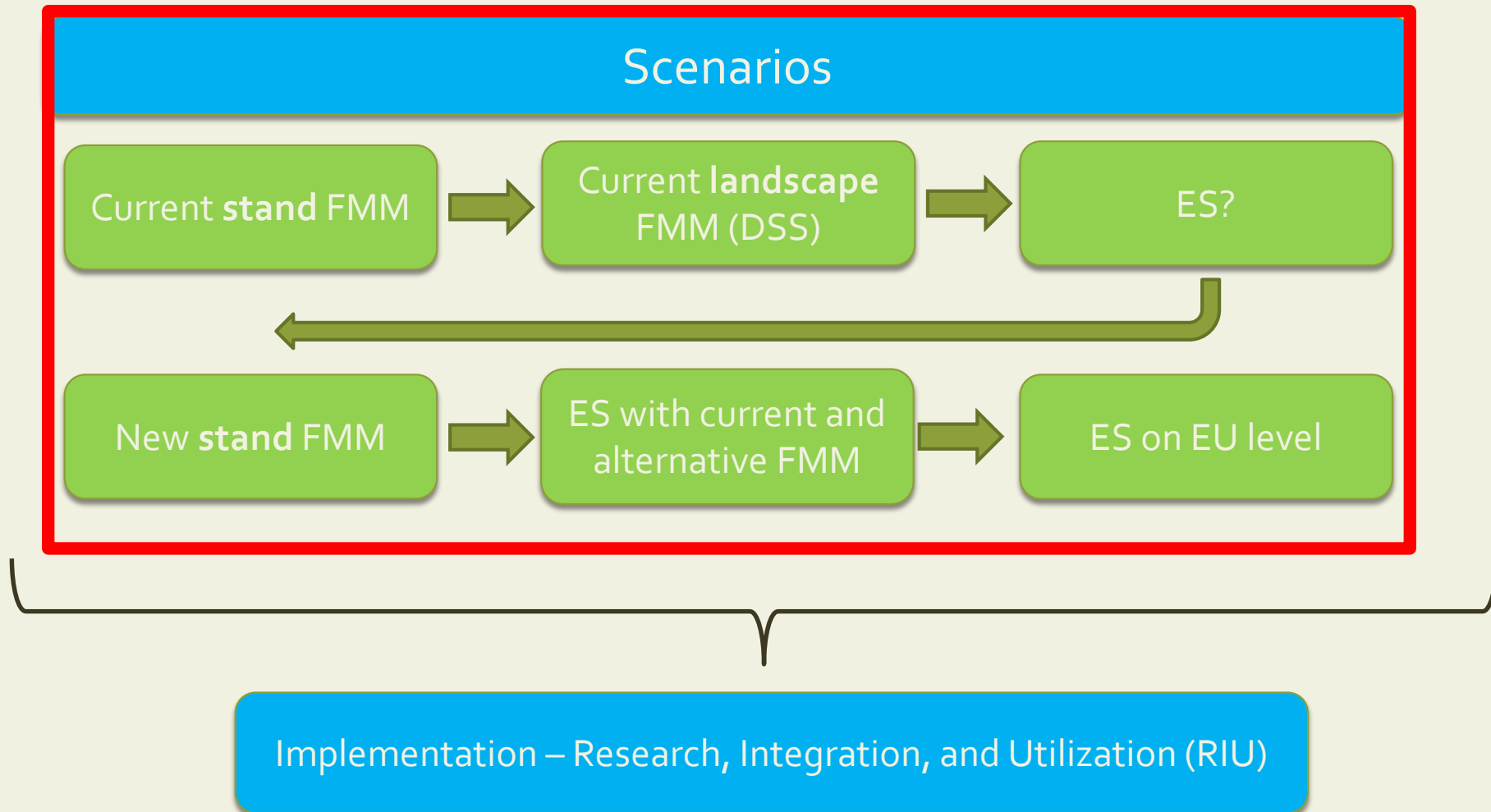


This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 676754.

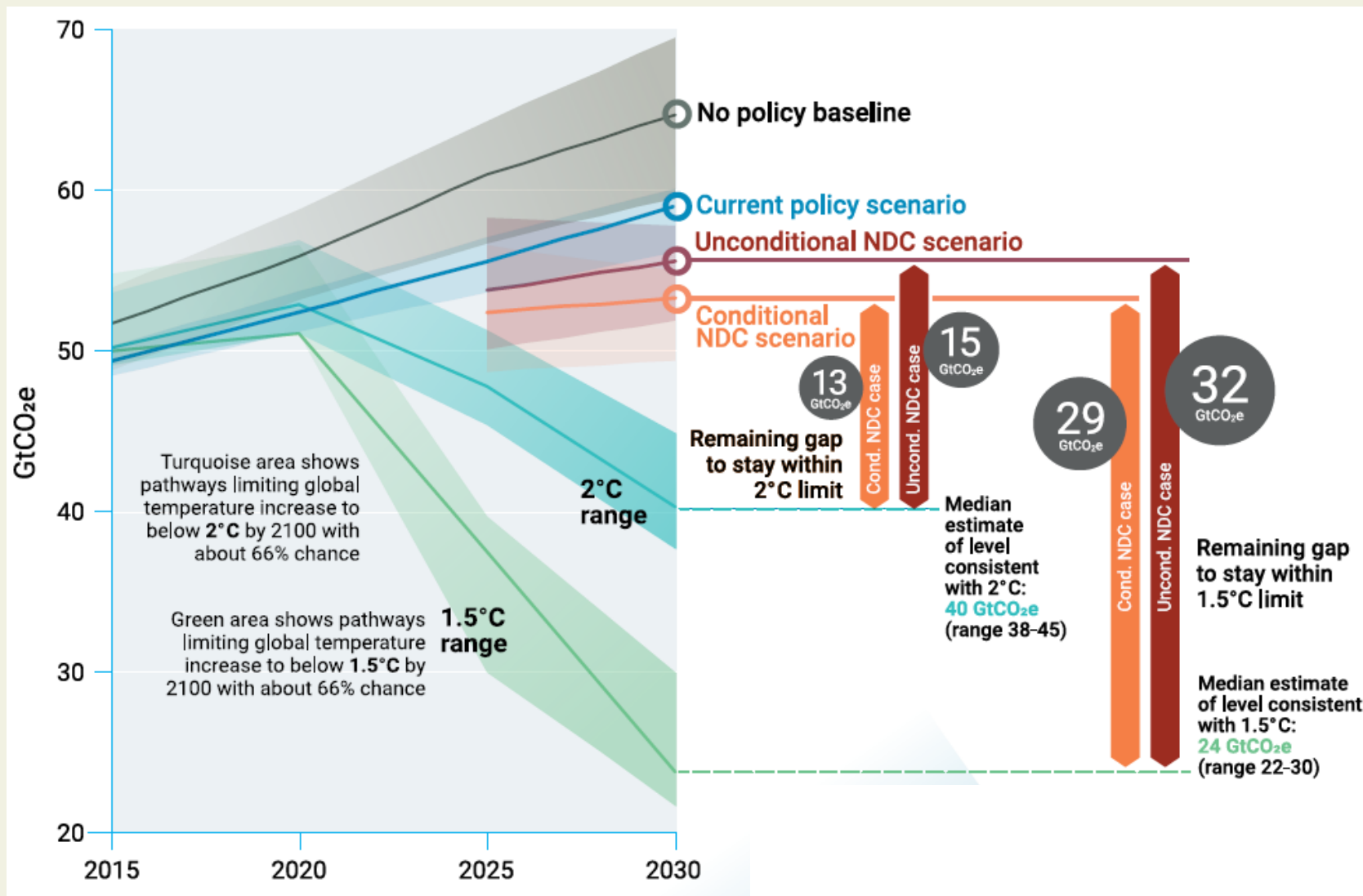


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WP2: European scale expansion of alternative forest management models



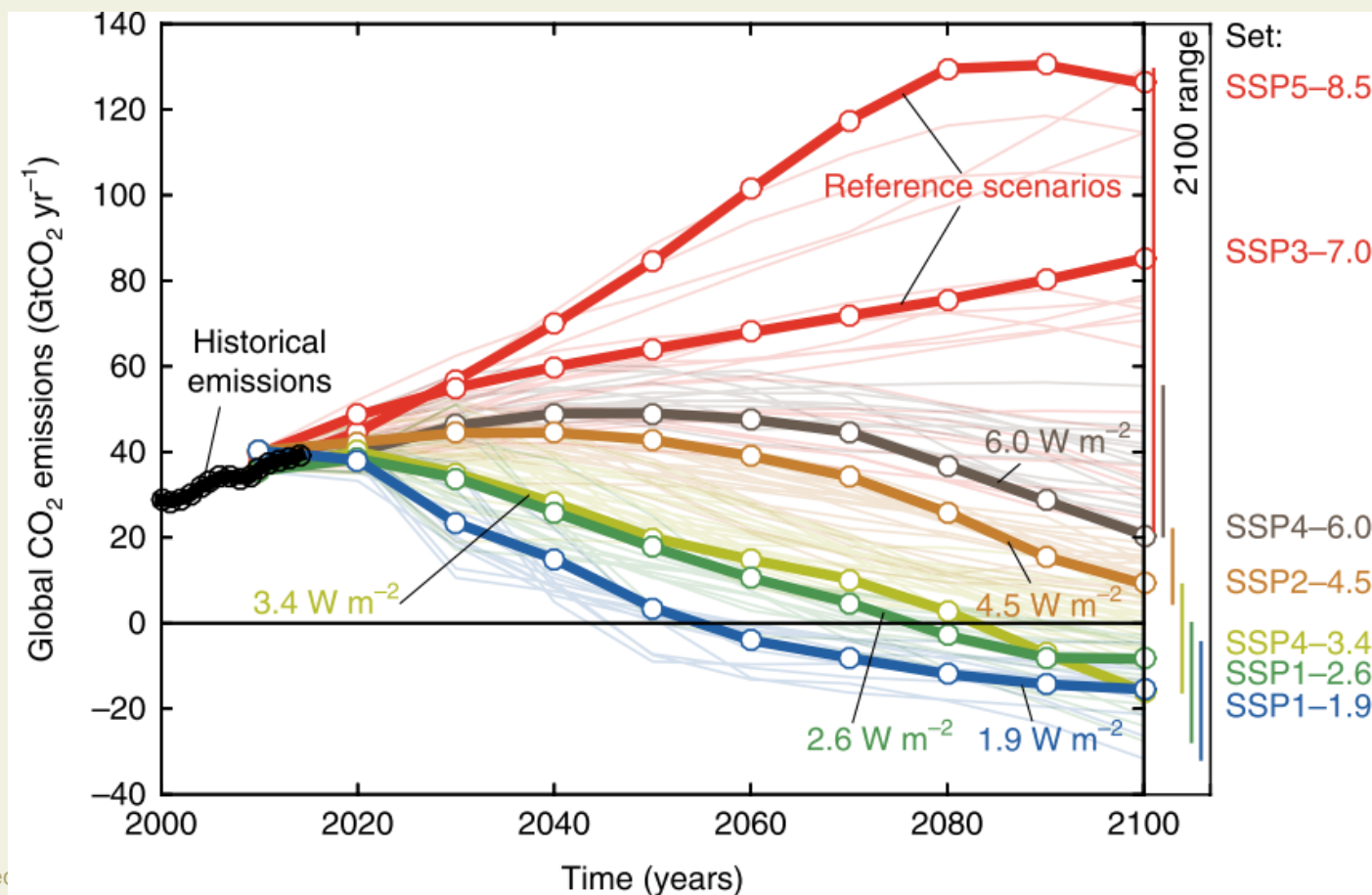
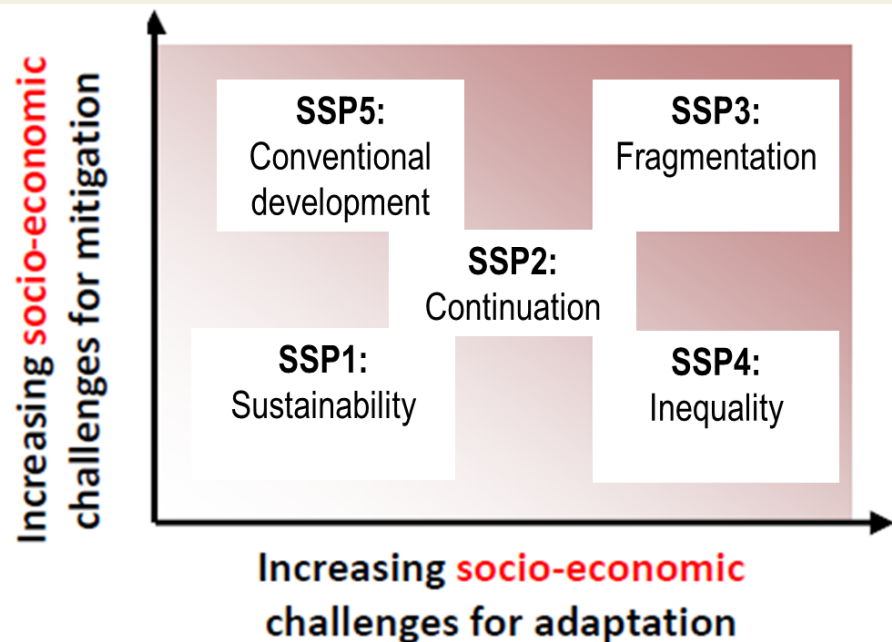
Paris Agreement and the NDC's



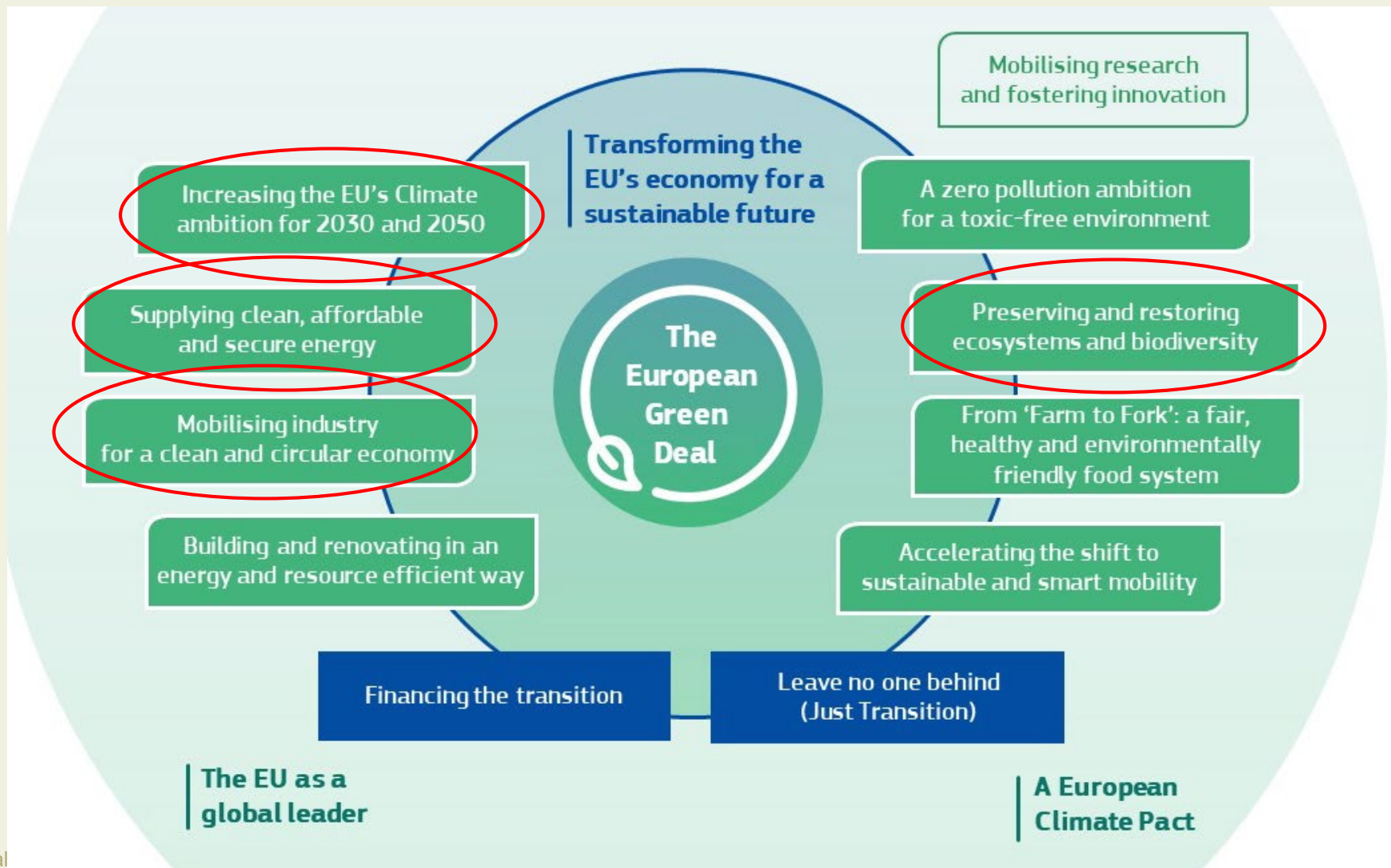
Nationally Determined Contributions (NDCs)

- 196 Parties aiming at limiting global warming to 1.5 to 2 °C above pre-industrial levels

SSPs and RCPs scenarios



Green Deal (EU COM 2019/640) increases the ambition of promoting goals transversal to bioeconomy, climate change and environment with a sustainable transition towards the UN SDGs



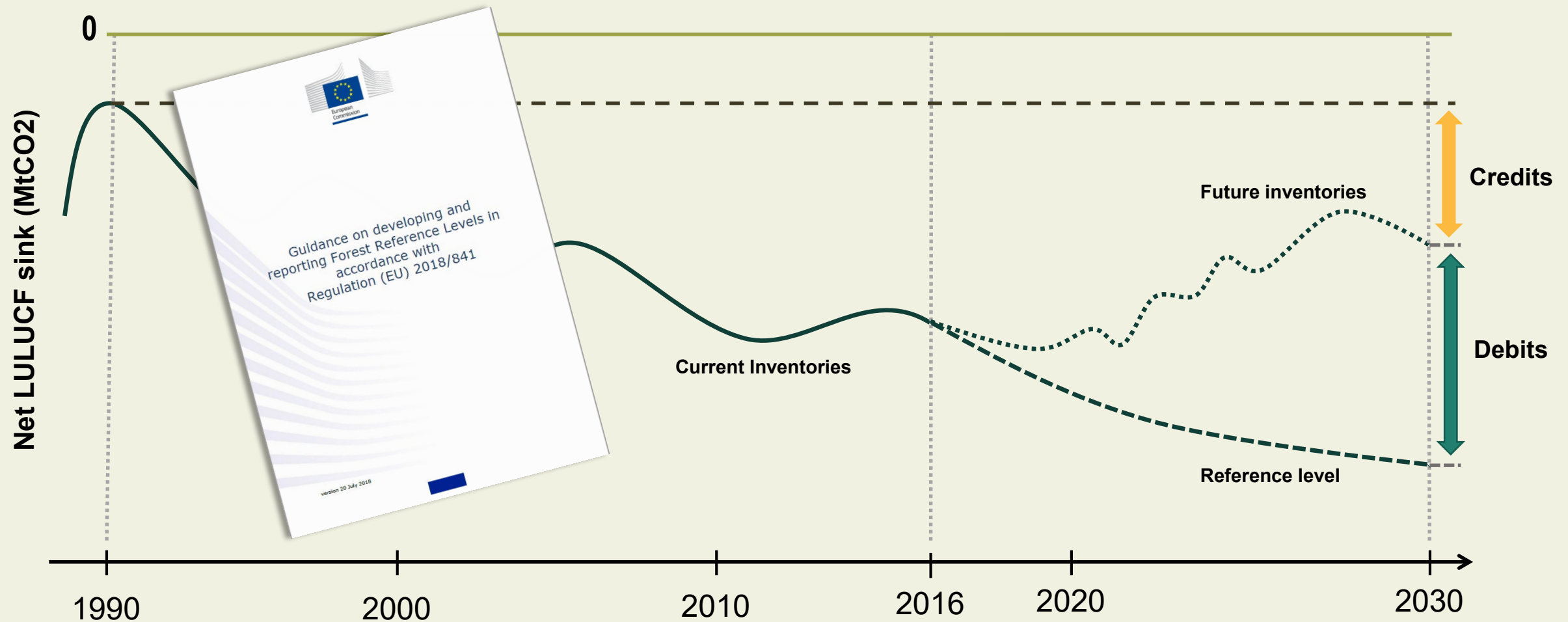
The 2018 update of the Bioeconomy Strategy aims to accelerate the deployment of a sustainable European bioeconomy so as to maximize its contribution towards the 2030 Agenda and its Sustainable Development Goals (SDGs), as well as the Paris Agreement

A sustainable Bioeconomy for Europe: strengthening the connection between economy, society and the environment

Updated Bioeconomy Strategy



LULUCF Regulation (EU Reg. 2018/841): commits member states by 2030 to compensate for land use and forestry sector emissions by CO₂ removals within the sector

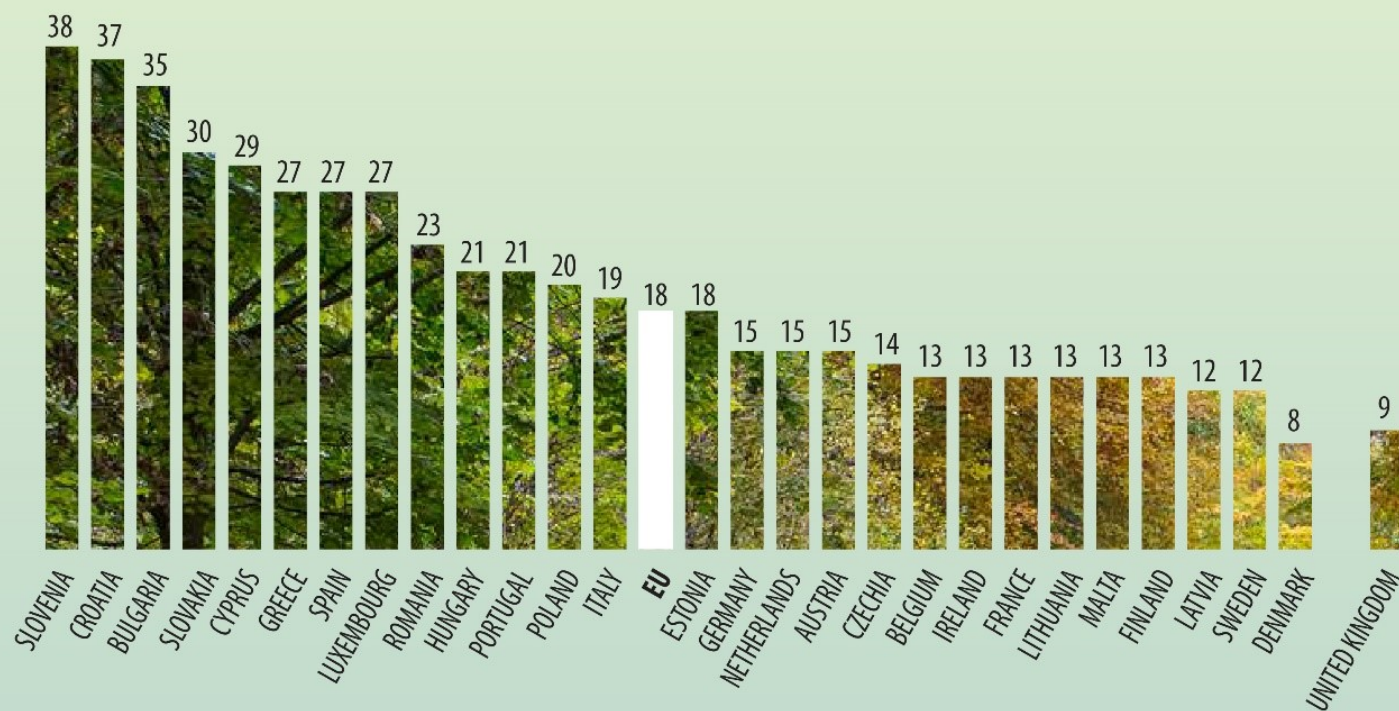


Forest management accounted on a net-net basis against a **reference level**, where the reference level defines what the emissions would have been without changes to management of a reference period 2000-2009

EU Biodiversity strategy (EU COM 2020/380): which aims at a protection of 30% of the EU land area by 2030 and to strictly protect primary and old growth forests in Europe

Protected terrestrial area, 2019

% of total land area



Note: The European Union (EU) includes 27 EU Member States.

Sources: EEA / European Topic Centre on Biodiversity

ec.europa.eu/eurostat 

EU28 expecting an increase of woody biomass demand and harvest

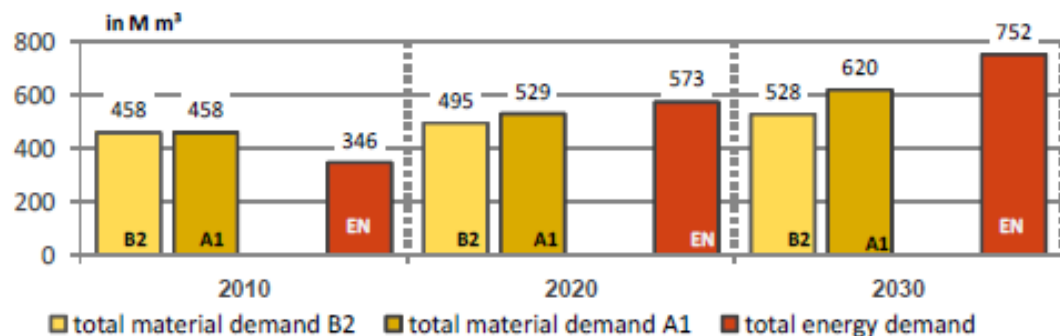
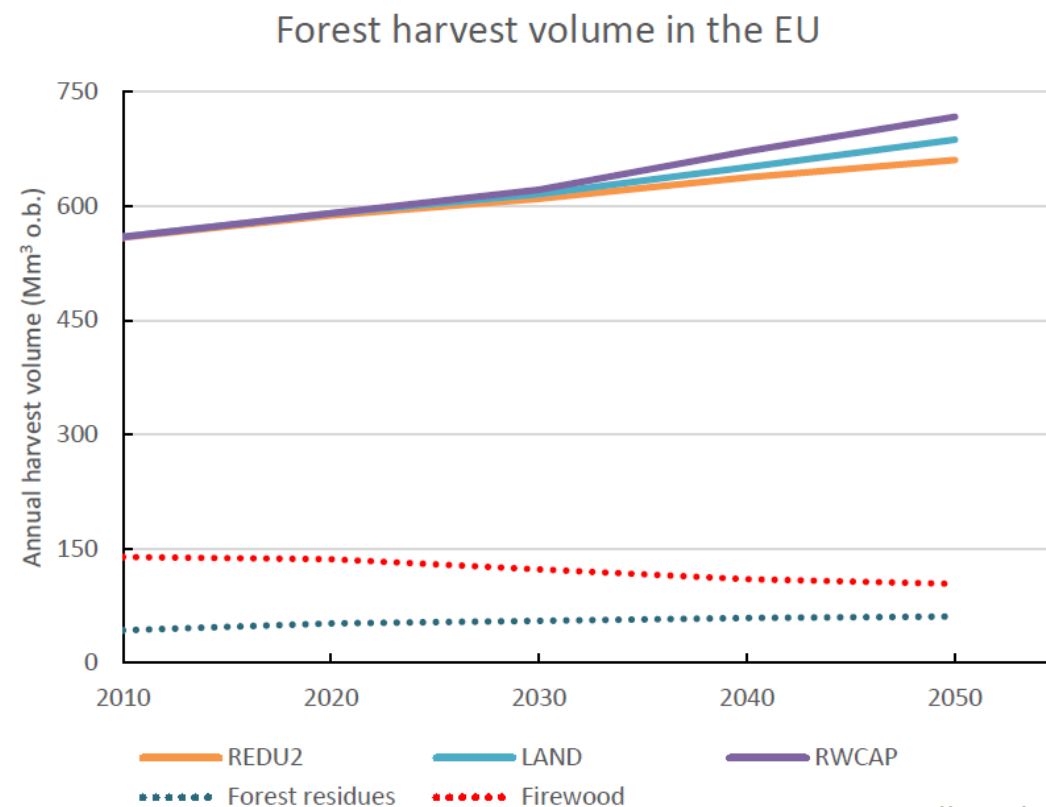


Figure 1-12: Development of material and energy demand

Source: Mantau, Wood Resource Balance, EUwood 2010



Forsell et al. 2016

How do we reach the increasing demand of woody biomass?

- Intensify forest harvest in Europe?
- Increase harvest of forest residues and stumps?
- Import of roundwood and wood pellets?
- Increase Short Rotation Coppice and Perennial Crops?
- Enhancing cascade use of wood and recycled wood?

COMMENT

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OPEN

Europe's renewable energy directive poised to harm global forests

Timothy D. Searchinger¹, Tim Beringer², Bjart Holtsmark³,
Daniel M. Kammen⁴, Eric F. Lambin^{5,6}, Wolfgang Lucht^{7,8}, Peter Raven⁹ &
Jean-Pascal van Ypersele⁶

Scientific debate on forest management in the EU

Article | Published: 01 July 2020

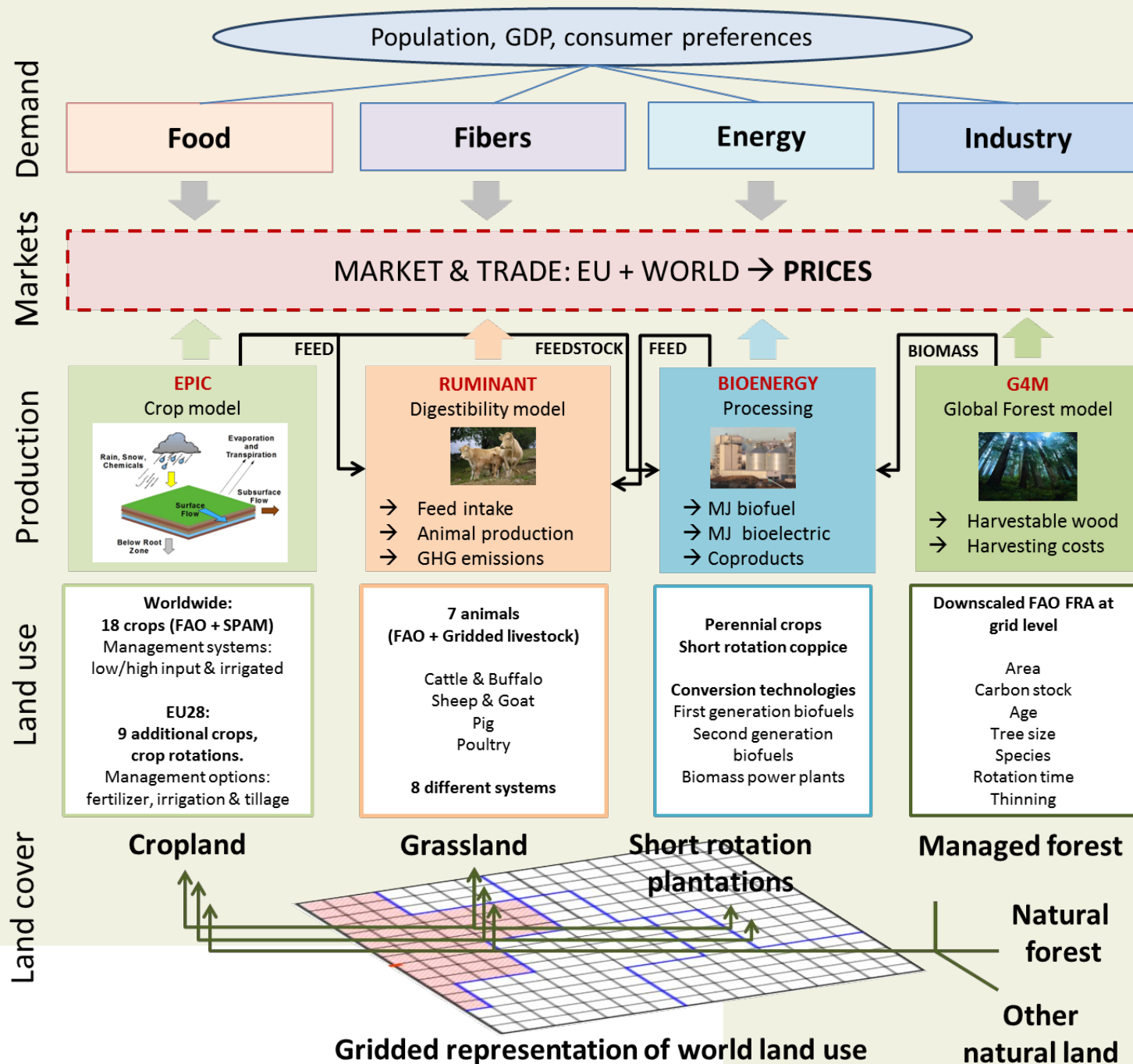
Abrupt increase in harvested forest area over Europe after 2015

Guido Ceccherini[✉], Gregory Duveiller, Giacomo Grassi, Guido Lemoine, Valerio Avitabile, Roberto Pilli &
Alessandro Cescatti

Nature **583**, 72–77(2020) | [Cite this article](#)

How does EU forest management could solve the raising conflict between wood production, climate mitigation and biodiversity conservation?

- What would be the impact of the selected strategy on:
 - Wood production
 - Carbon sequestration
 - Biodiversity
 - Leakage to the Rest of the World



Approaches in GLOBIOM and G4M



WP₁

Arrow legend

- Both approaches
- Approach 1
- Approach 2



Upscaling: which areas in the EU are similar to CSAs

Global frame scenarios with GLOBIOM

Case studies in nine countries

Alternative FMMs on stand level (WP₁)

Alternative FMMs on landscape level (WP₃)

G4M models the aFMM development on the EU level

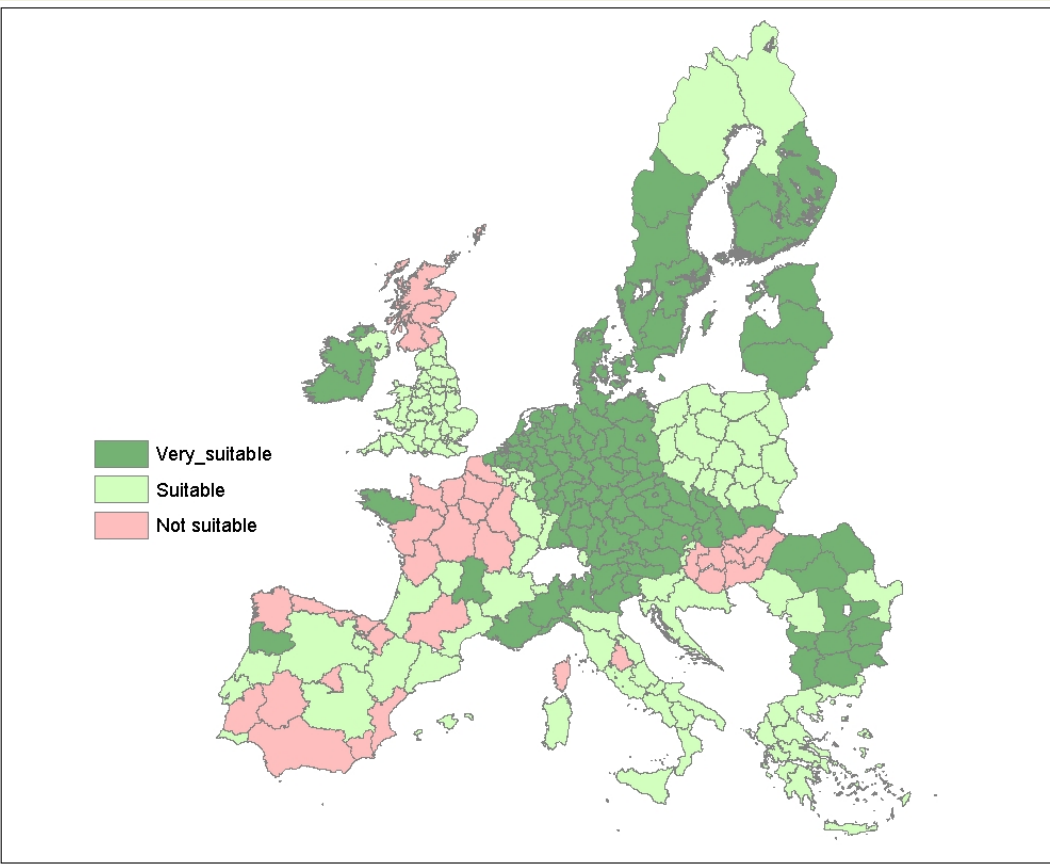
GLOBIOM calculates the aFMM combinations in the EU under future demand projections

Uptake of the alternative FMMs in the EU scale and their impact assessment (EU and global level)

ALTERFOR aFMMs

- Lithuania: Care for deciduous
- Slovakia: Biodiversity
- Ireland: aFMMs
- Sweden: aFMMs
- Portugal: aFMMs
- Germany: Multifunctional forest
- Germany: Nature conservation
- Germany: Production forest
- Netherlands: REFERENCE gfdl
- Netherlands: REFERENCE hadgem
- Italy: Recreational and habitat selective management
- Italy: Uniform shelterwood and coppice

WP₃



Representation of aFMMs and scenarios in GLOBIOM



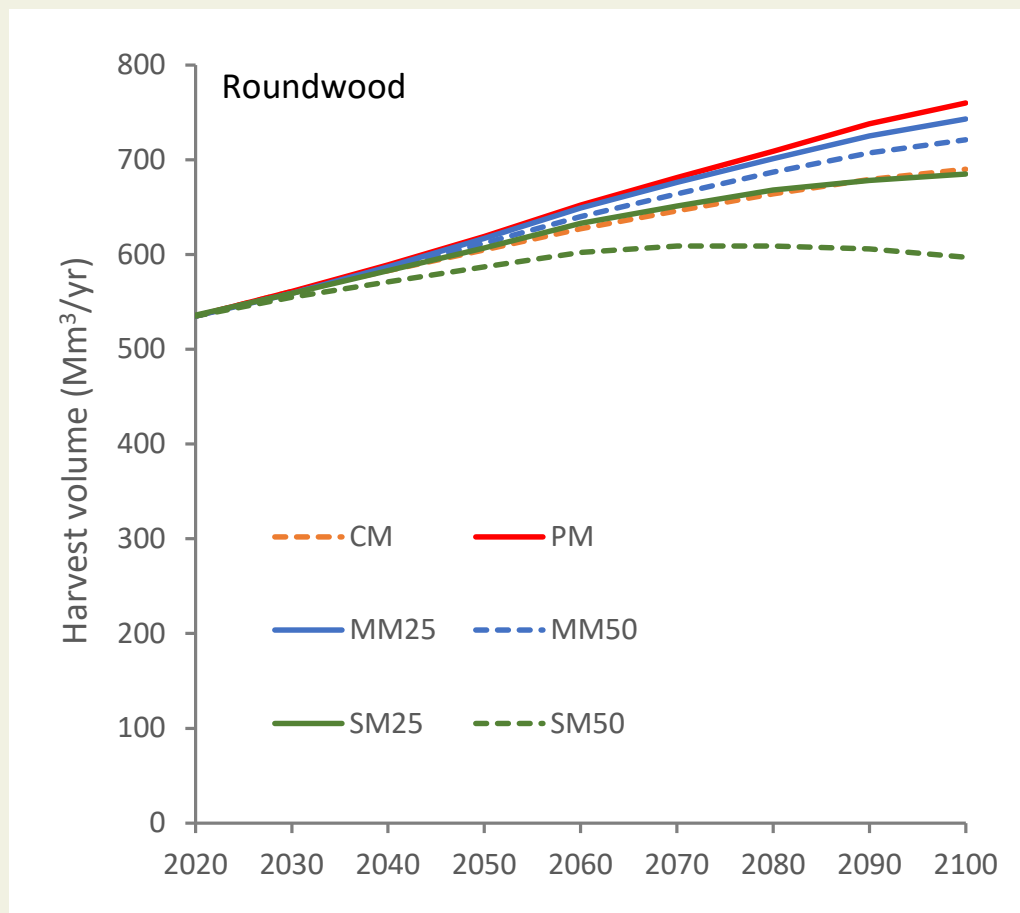
aFMM (ALTERFOR based)	Available roundwood (compared to current)	Available logging residues	NonConifer- share (compared to current)
PM (Productive forest Management)	1.18-1.22	1	0.58-0.91
MM (Multifunctional forest Management)	0.86-0.97	0.5	1.02-1.56
SM (Set-Aside forest Management)	0	0	-

- **SSP2 with Climate mitigation scenarios: RCPref vs. RCP2.6**
- **Forest management scenarios**

CM	Baseline scenario with Current Management
PM	All AFM allowed and no forcing (Production)
MM₂₅	All AFM allowed and MFM forced 25% of suitable area
MM₅₀	All AFM allowed and MFM forced 50% of suitable area
MM₇₅	All AFM allowed and MFM forced 75% of suitable area
MM₁₀₀	All AFM allowed and MFM forced 100% of suitable area
SM₂₅	All AFM allowed and SFM forced 25% of suitable area
SM₅₀	All AFM allowed and SFM forced 50% of suitable area
SM₇₅	All AFM allowed and SFM forced 75% of suitable area
SM₁₀₀	All AFM allowed and SFM forced 100% of suitable area

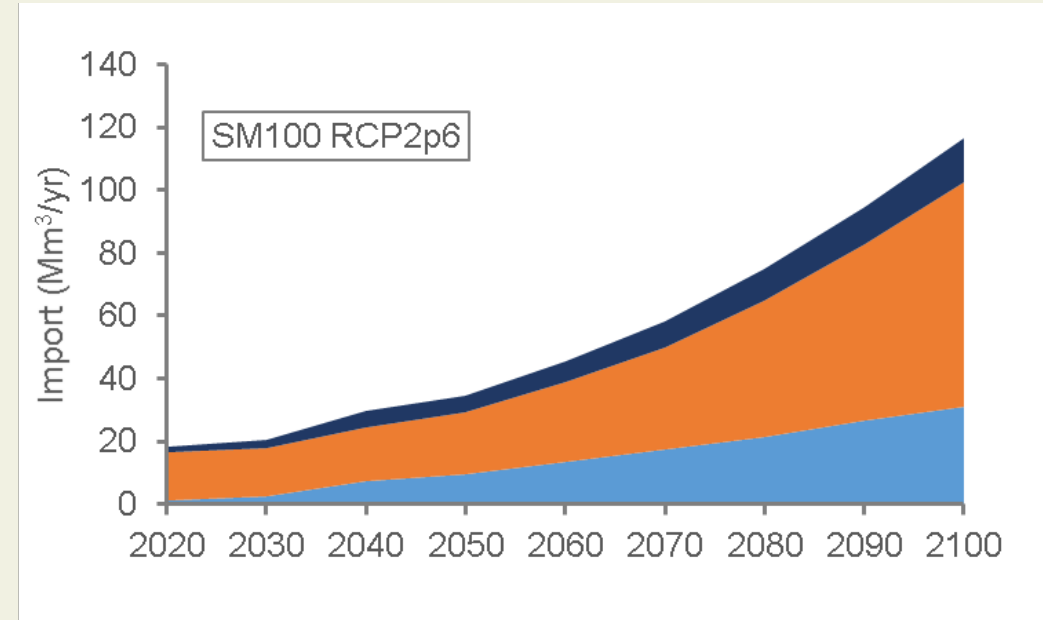
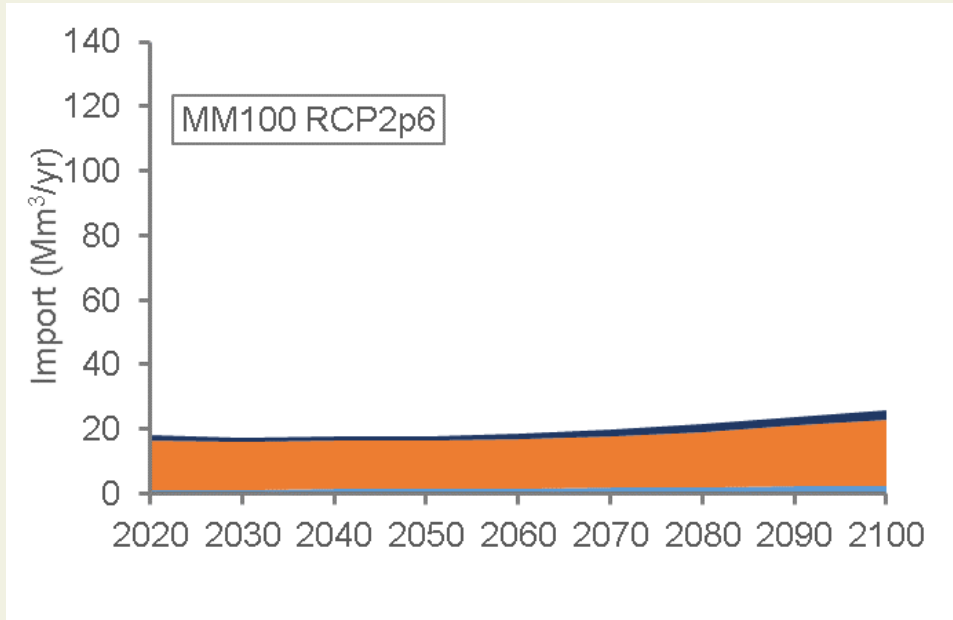
GLOBIOM suitable area: 78 Mha
(ca. 50% EU Forest area)

EU roundwood Harvest



- In all scenarios demand for roundwood continue to increase over time (SSP and RCPs effects)
- It is possible to increase EU wood production through expansion of MM or PM
- Introduction of SM on ca. 40 Mha causes a significant reduction in roundwood supply and extra EU-demand needs to be compensated by import

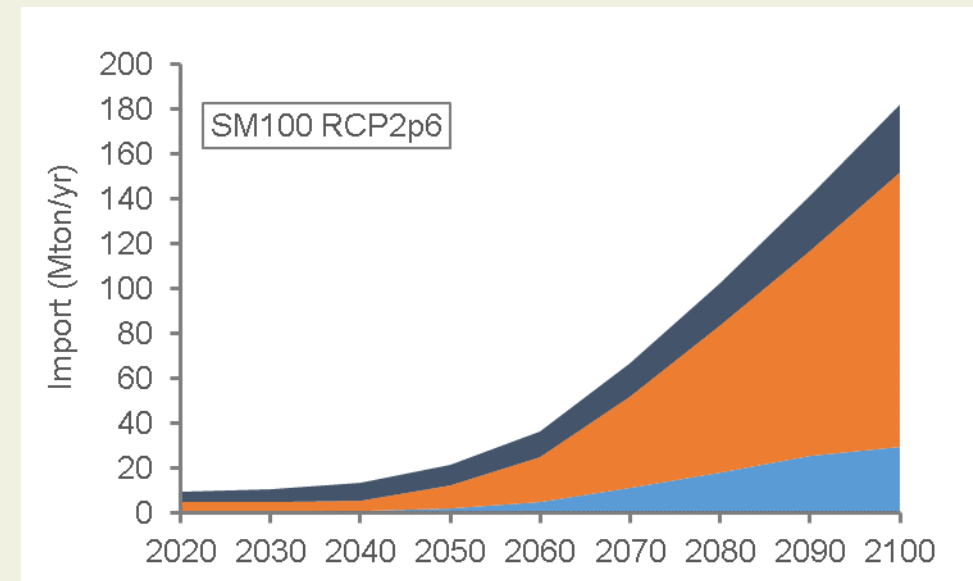
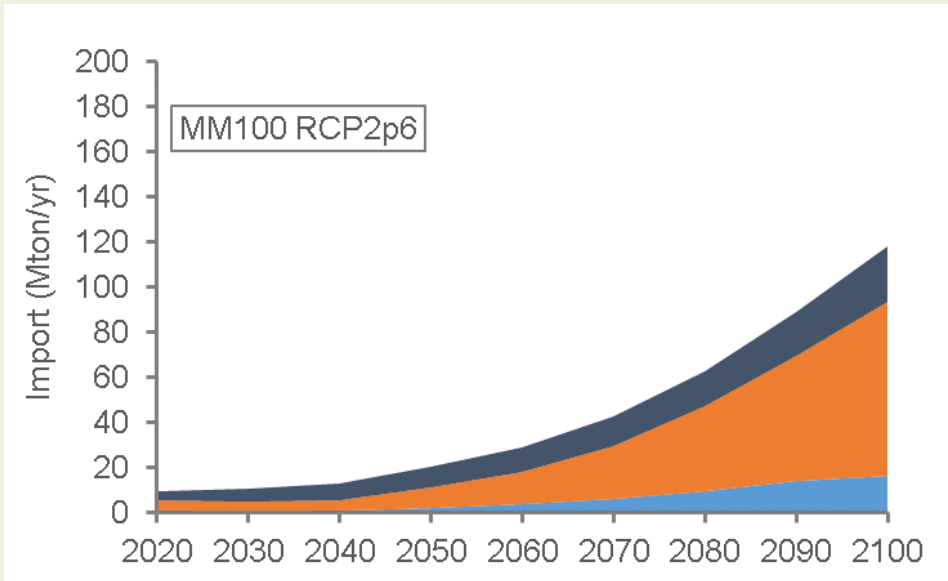
EU roundwood import



■ Tropical zone ■ Boreal zone ■ Temperate zone

- In the MFM scenarios Conifer and Non-Conifer wood substitution in wood industry limits roundwood import
- SFM increases the leakage to tropical forests and plantations

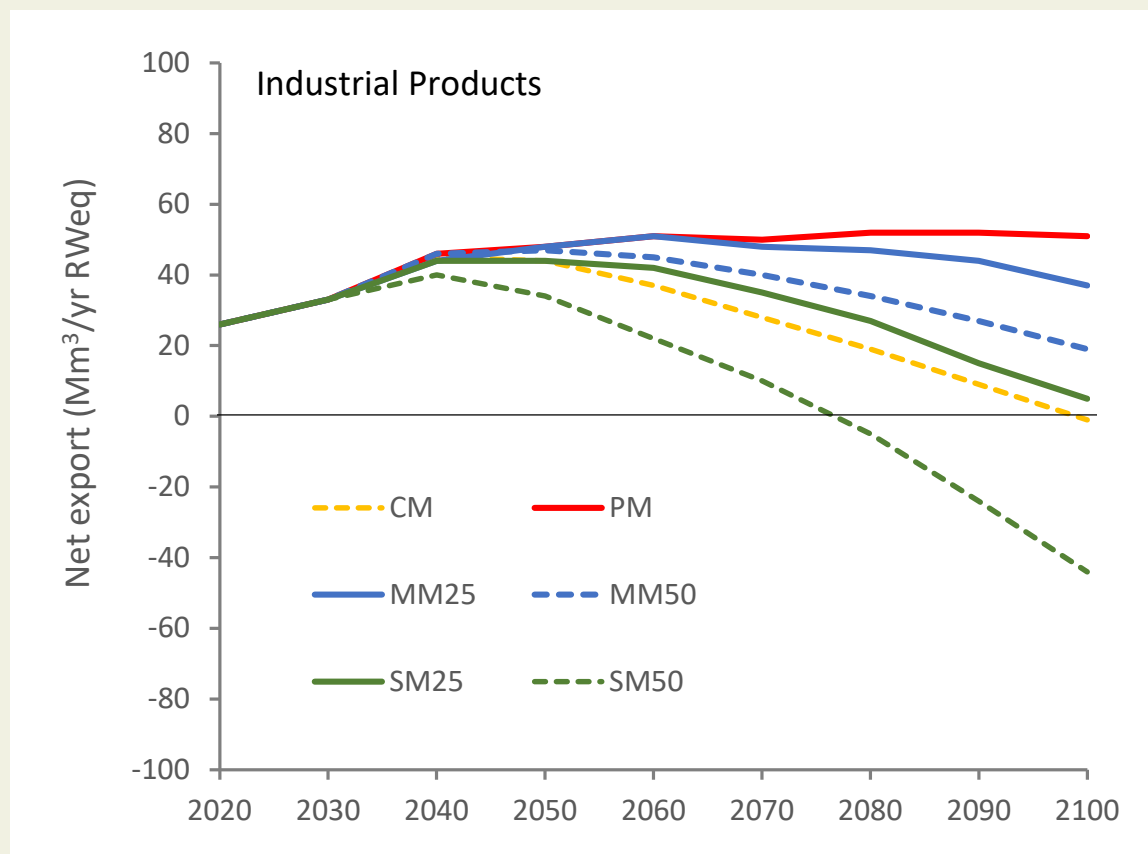
EU wood pellets import



■ Tropical zone ■ Boreal zone ■ Temperate zone

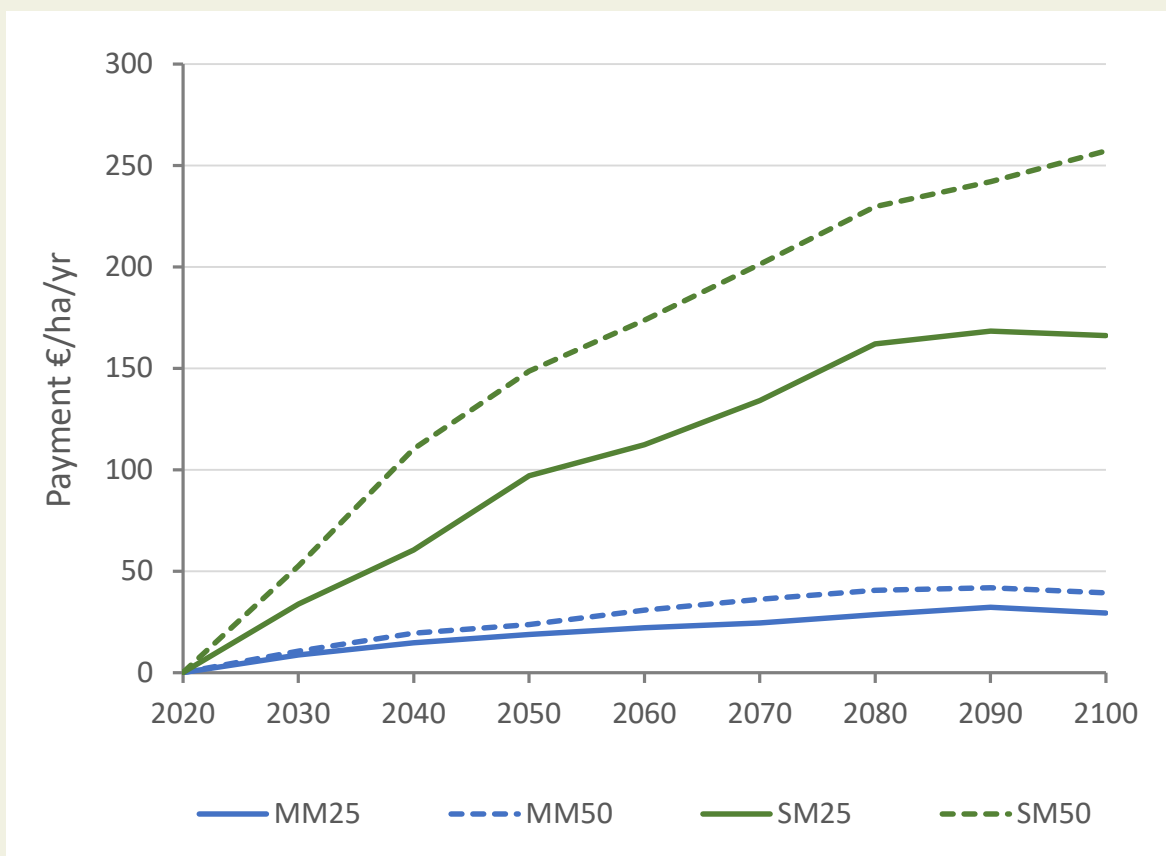
- Significant increase in demand for wood pellets over time
- Less substitution effect for energywood under the MFM
- Significant Increase of wood pellets import both in MFM and SFM

EU wood products and net export



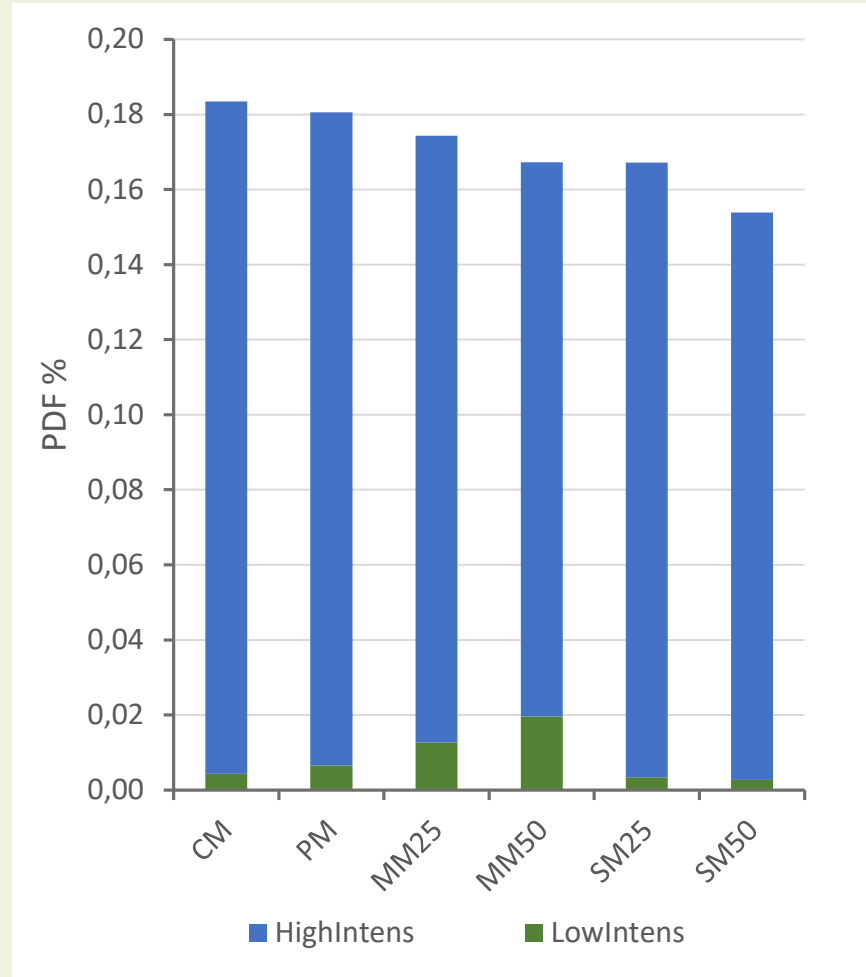
- Industrial products: Sawnwood, Chemical and mechanical pulpwood, Plywood, Fiberboard, Newsprint, Printing&Writing, Packaging, Other paper
- After 2050 a general reduction in the EU wood products trade advantage
- EU reduces its wood products trade advantage especially in case of SM expansion on large areas (SM50)
- Possible loss of employment in the EU forest industry

Landowner economic losses in wood production



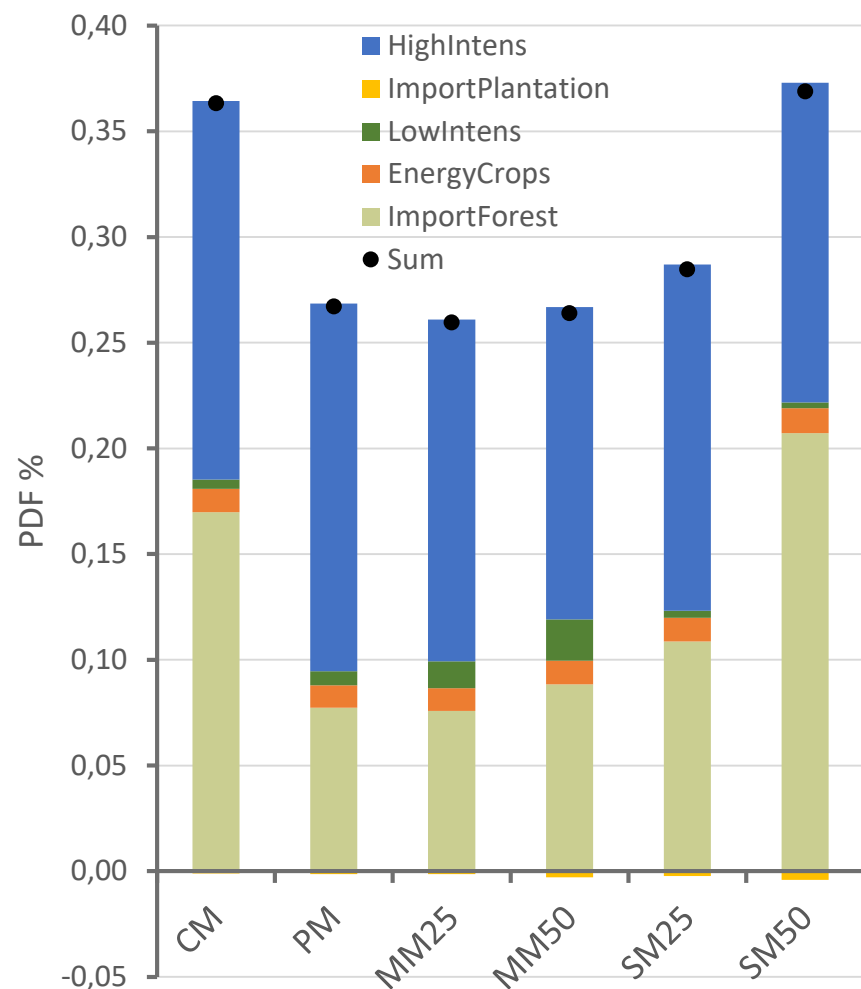
- In the order of 20-40 €/ha/ year for MM
- In the order of 100-200 €/ha/ year for SM
- Potential payment for other ecosystem services?

Biodiversity loss from the EU forest management in the year 2100



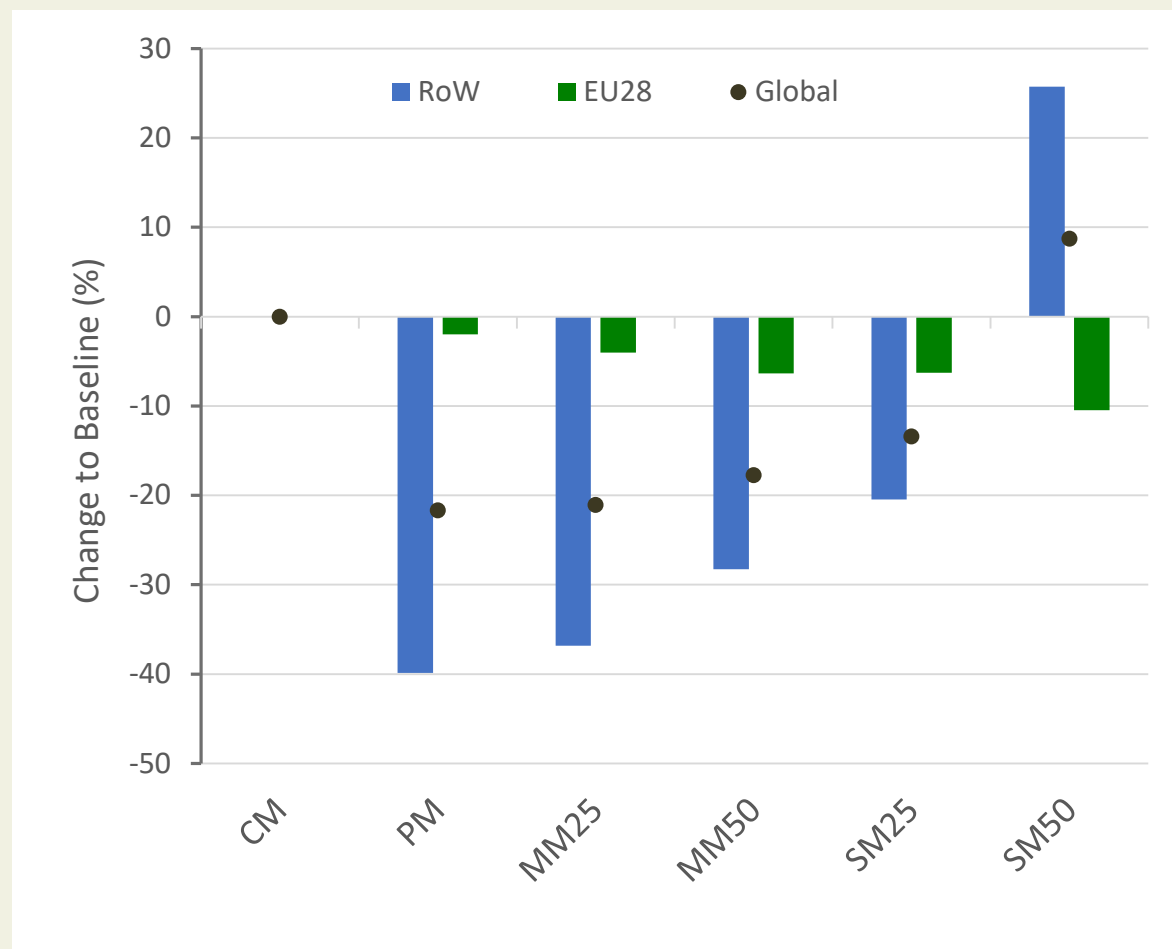
- Significant reduction of species loss with MM
- Major reduction of species loss in the case of SM

Global footprint of EU in the year 2100



- The leakage effects are greater in the SM which increases the global footprint of EU
- The result is driven by the increase of wood imported from tropical and subtropical areas

Biodiversity trade off between EU and RoW in the year 2100



- Intermediate scenarios (MM25-50, SM25) combine EU28 biodiversity benefits and benefits in the RoW

Forest carbon sequestration



forests



Article

The Effect of Alternative Forest Management Models on the Forest Harvest and Emissions as Compared to the Forest Reference Level

Mykola Gusti ^{1,2,*} , Fulvio Di Fulvio ¹, Peter Biber ³ , Anu Korosuo ^{1,†} and Nicklas Forsell ¹

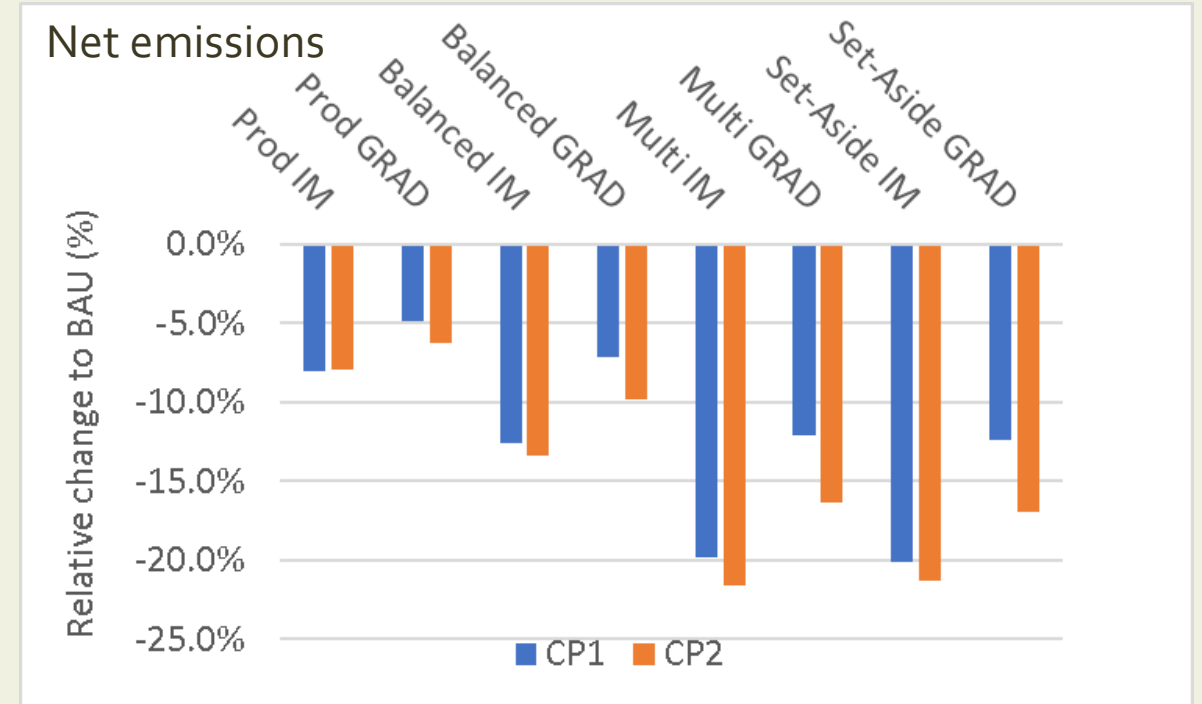
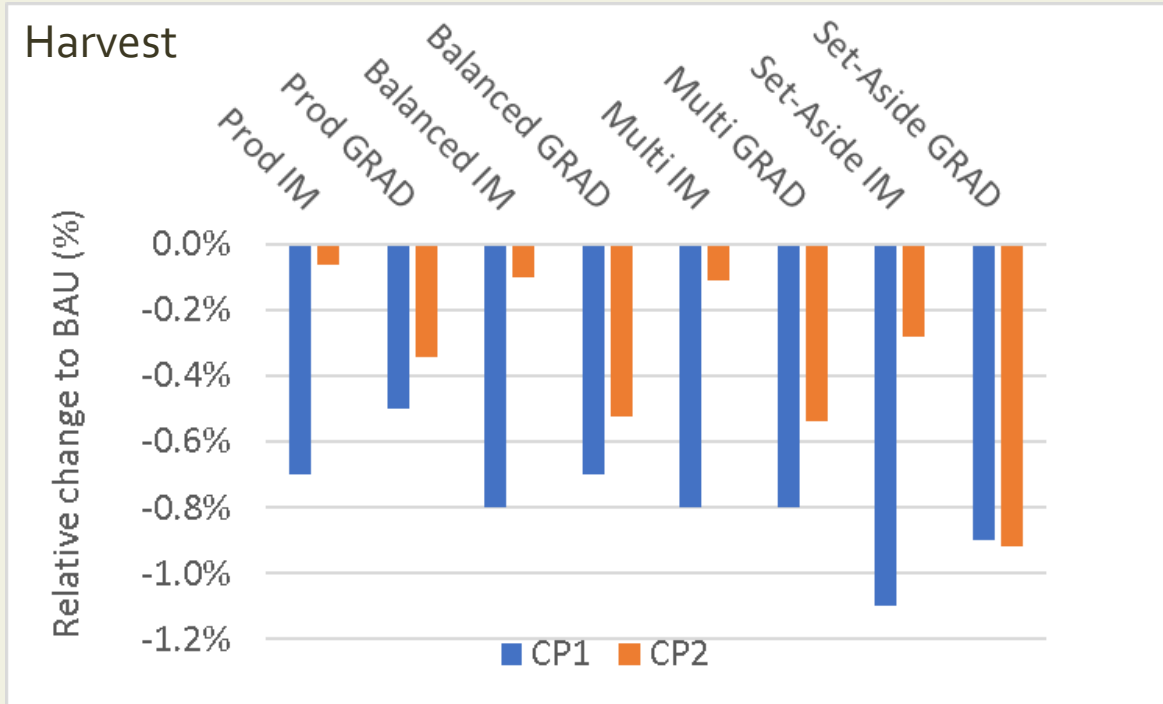
Forest carbon sequestration scenarios



Corresponding Scenario GLOBIOM	Scenario G4M
CM Current	BAU Business as Usual
PM Production	Production aFMMs aimed at wood production, i.e. clearcut and shelterwood logging are prioritized
MM50 Multifunctional	Multifunctional aFMMs aimed at multifunctional forest use: selective logging, high production aimed FM with untouched patches or with species change are prioritized
SM50 Set-Aside	Set-aside aFMMs aimed at biodiversity, wilderness, restoration, stand edge management and other nature protection low-intensity management
-	Balanced all aFMMs are allowed equally, for trying to achieve a harvest close to the BAU-only case

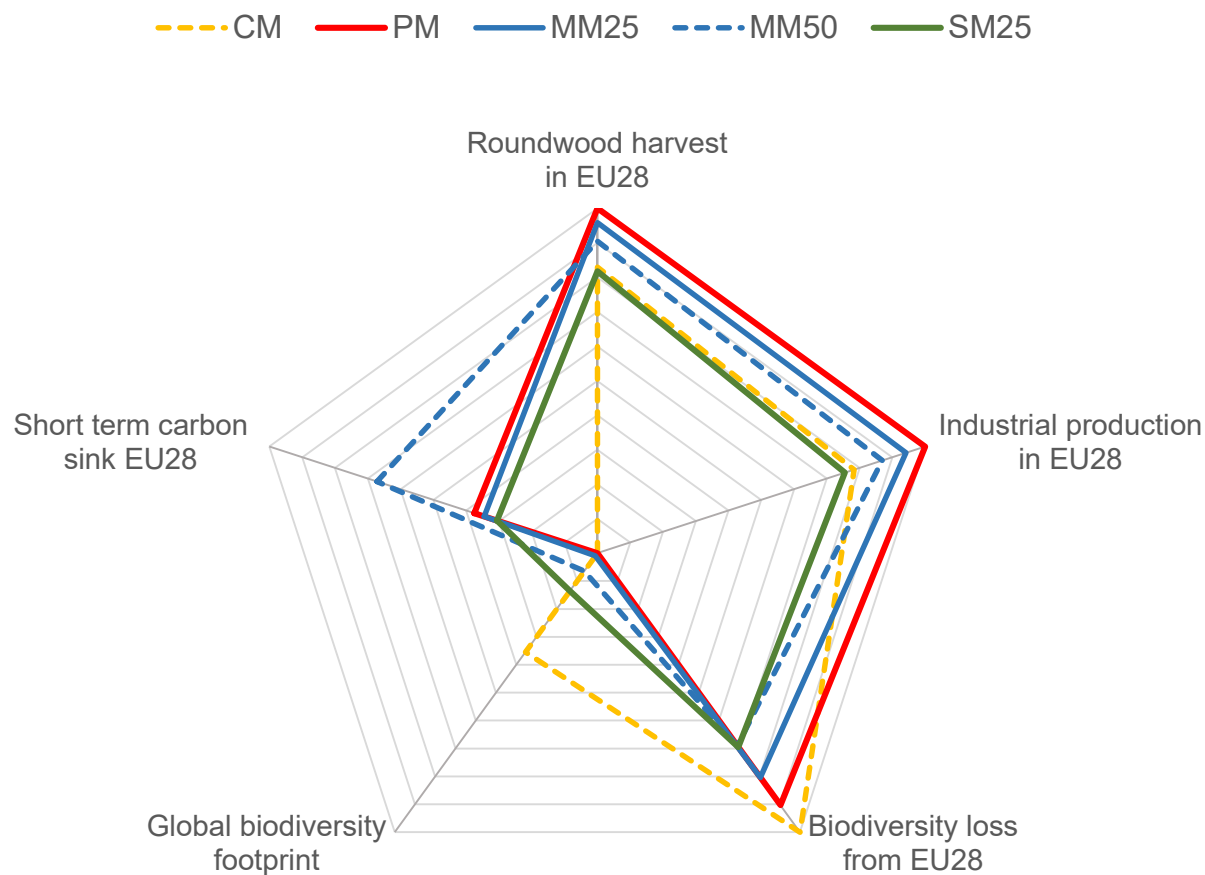
- G4M compared **Immediate** introduction of aFMMs (2020) and **Gradual** (2020-2030)
- Assessment for **CP1** (2021-2025) and **CP2** (2026-2030)

Effect of aFMMs on harvest and net forest emissions



- The introduction of aFMM enhances the forest sink in CP1 and CP2 ,
- A mixture of multifunctional aFMMs (depends on region) could enhance the carbon sink while limiting harvest leakages
- The faster the aFMMs are adopted, the larger their impact on the carbon sink within the timeframe of the LULUCF regulation and its CP1 and CP2

Synoptic view for most promising forest management scenarios



- 25% to be set aside (SM) and still have the same harvest as with current management, if the remaining 75% follows PM.
- Wood production at similar levels as in the baseline could also be achieved using a strategy involving 50% MM and 50%PM
- The combined strategies have:
 - limited impact on wood production
 - decrease required compensation payments
 - Limit leakage effects (potential loss of biodiversity)
 - Improve the forest carbon sink

Final recommendations

- **Win-win outcomes would be possible:** if the expansion of more Multifunctional and Set-Aside aFMMs are appropriately compensated with increasing production in some of the remaining forest areas;
- **Introduction of Multifunctional aFMMs on 40 Mha could have multiple benefits:**
 - ✓ sustain wood harvest and industrial production
 - ✓ contributing to the EU bioeconomy growth
 - ✓ maintaining employment in the Region
 - ✓ avoiding environmental leakages to other global regions
- **it would be possible to Set-Aside up to ca. 20 Mha of productive forests:** if those are sufficiently complemented by increased wood production in the remaining area under management;
- **It would be interesting to further investigate the optimal levels of uptake of aFMMs aiming at increasing Production together with Multifunctional ones and Set-Aside**

Final recommendations

- If harvests are limited to a substantial degree, the EU will most likely enter a situation with net imports, i.e. you export emissions and ecosystem degradation outside the EU
- GLOBIOM assumes a gradual increase of set aside areas and time for introduction of the more efficient alternative production methods (PM)
- An immediate massive increase of protected forests in EU may cause greater negative global effects on biodiversity than implicated by the GLOBIOM analyses
- These considerations are connected to discussions around forest resources outside of Europe that are heavily affected by EU policies as well as trade and consumption patterns

Which aspects, not included in our analyses, would have a significant impact on our results?

Which other studies do you think are needed in order to fully address our questions?

Thanks for your kind attention today and
for all your great work and input during
the ALTERFOR!