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European Forest Sector Outlook Study II

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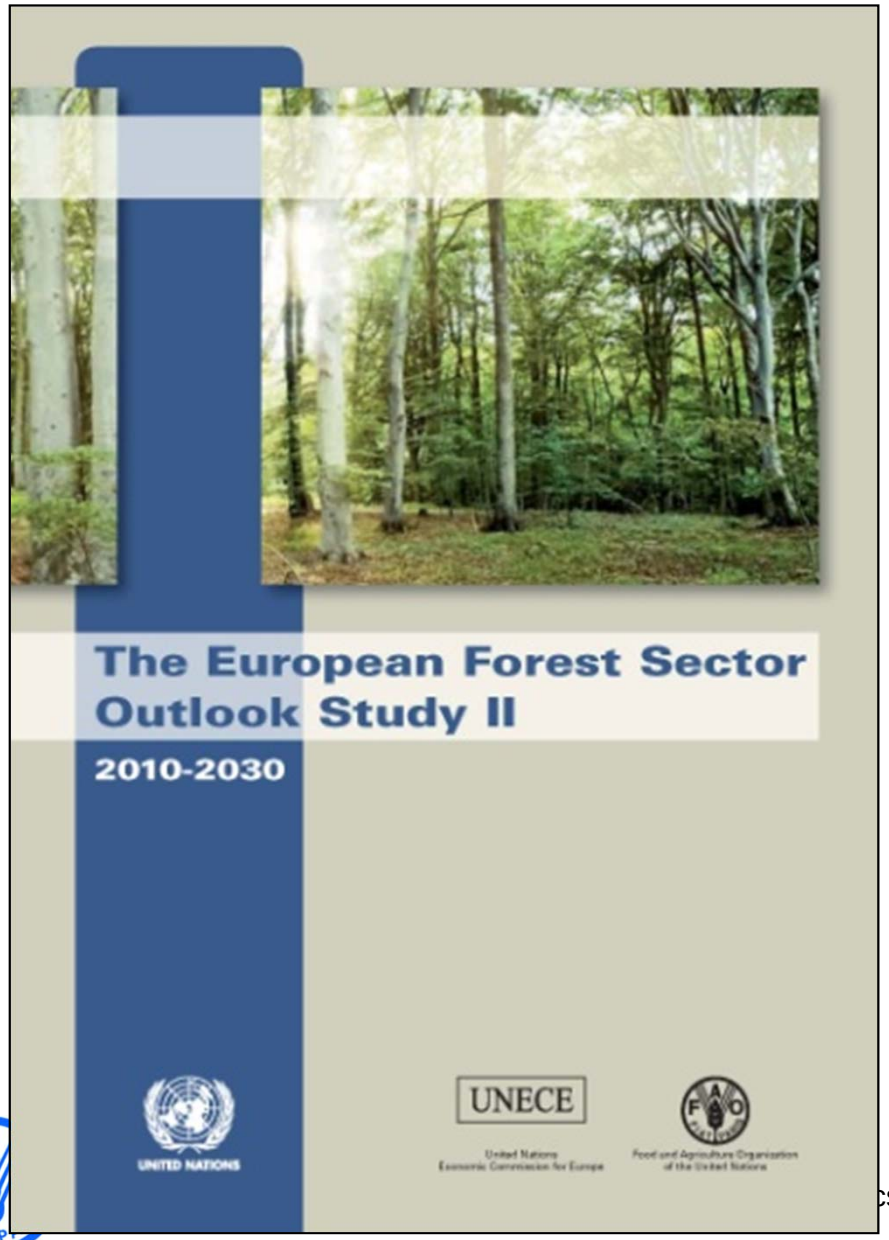
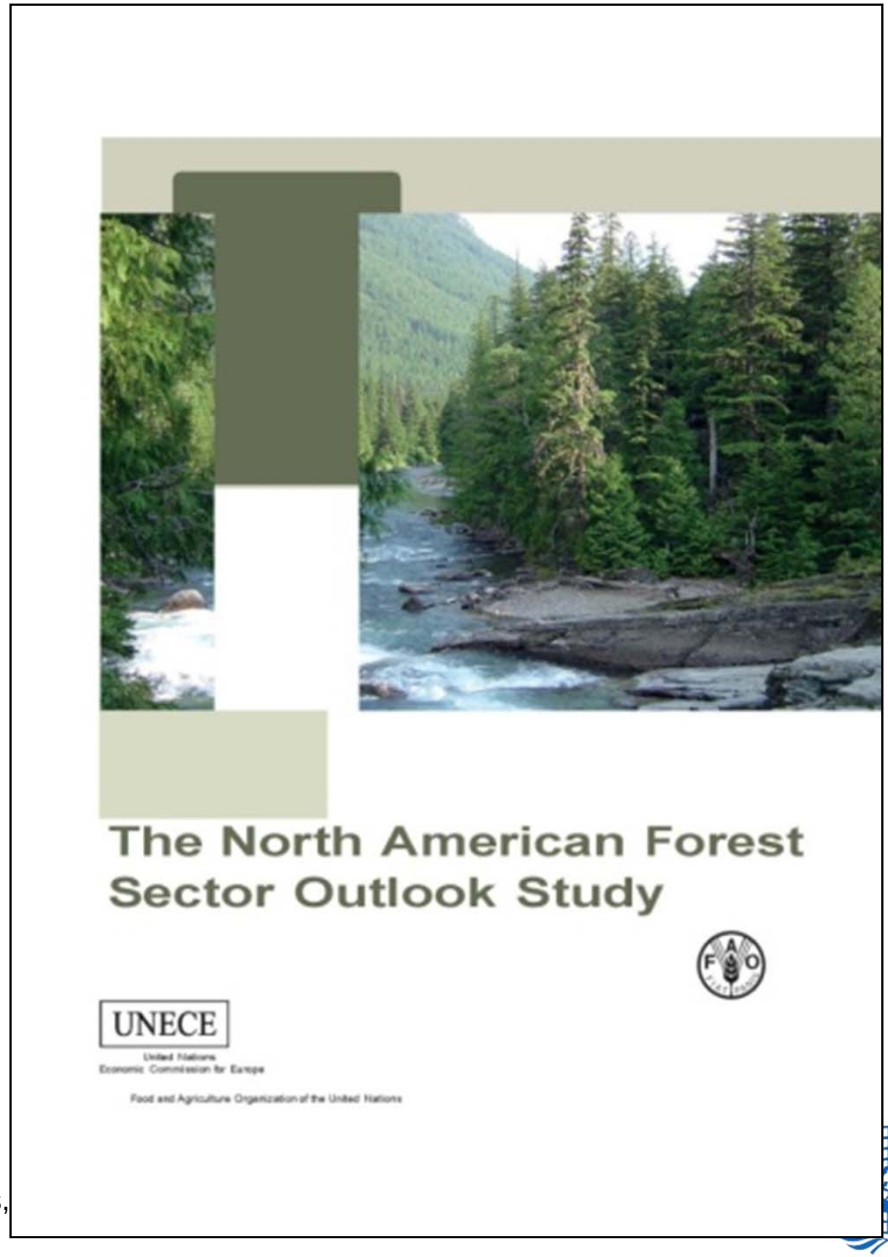
Main output in the last year:





The policy challenges

- How should the forest sector contribute to mitigating climate change?
- How can wood contribute to renewable energy supply?
- Adapting to climate change and protecting forests
- Protecting forest biodiversity: at what cost?
- Supplying renewable and competitive forest products to Europe and the world
- Achieving and demonstrating sustainability
- Developing appropriate policies and institutions

EFSOS II

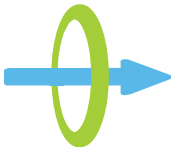
- Structured around scenarios
  - One Reference scenario
  - Four Policy scenarios
- Implemented in modelling framework
- Sustainability assessment in the same way as in SoEF2011
- Detailed outcomes available on the web

Methods Overview

	Wood Resource Balance		
Method	SUPPLY	DEMAND	Method
EFISCEN	Potential supply from forest	Demand for products	Econometric projections
EUwood	Supply of other woody biomass	Demand for wood energy	Trend projections
EFI-GTM	+/- GAP ?		

Scenarios

- Reference Scenario
  - *What if we continue business as usual?*



- Maximizing Biomass Carbon
  - *How much carbon could be stored?*

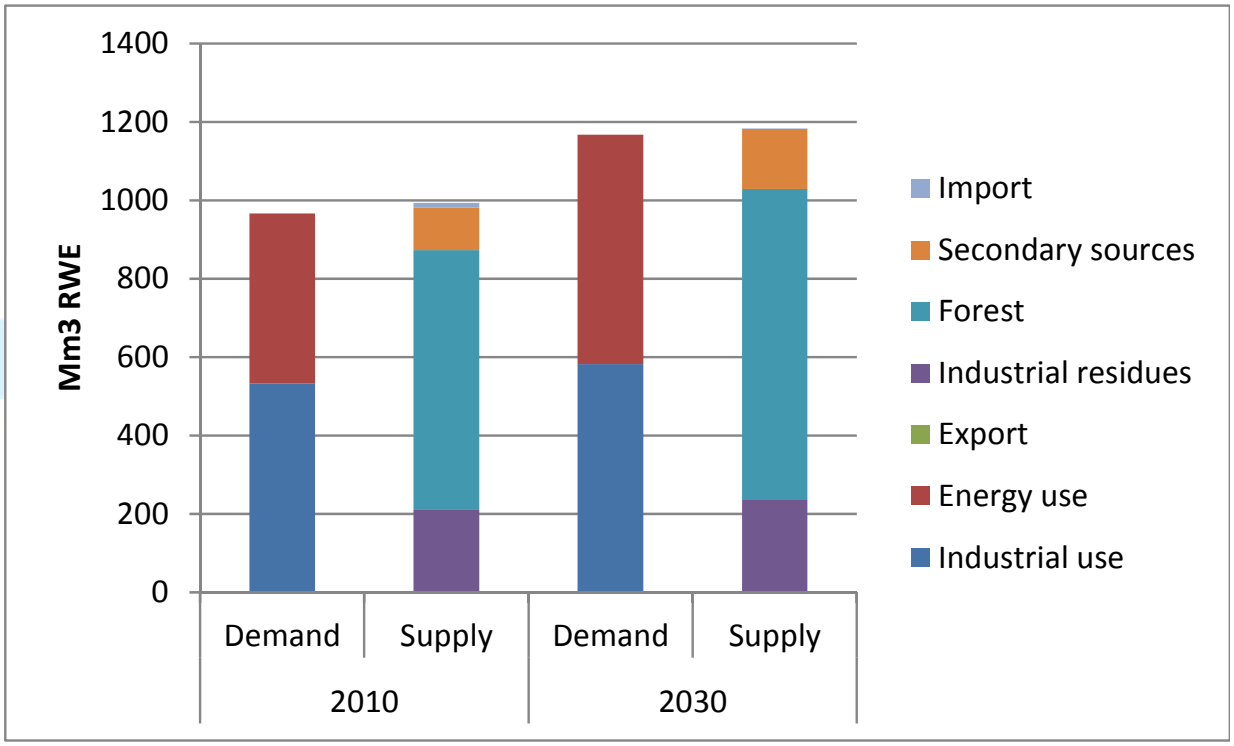
- Priority to Biodiversity
  - *What if we focus on preserving /enhancing biodiversity?*

- Promoting Wood Energy
  - *How to achieve the renewable energy targets?*

- Fostering innovation/Competitiveness
  - *What would a successful innovation strategy lead to?*

Reference Scenario

- Based on **IPCC B2** scenario
- A **gradually increasing demand for wood** over the coming 20 years, especially for energy
- **Increasing supply** including harvest residue extraction and non-forest sources
- **Expansion** of forest area **continues** (0.6 million ha/yr)



Maximising Biomass Carbon

- **Longer rotations** and **increased thinning share**
- **No reduction in supply**

- **Total increment** increases by 14.6%

- **Total growing stock** volume is 7.8% higher

- **Average C sink** is 0.67 tonnes C/ha/yr, +64%

- Somewhere after 2030, maximum **sequestration capacity will be reached** as increment decreases for older stands

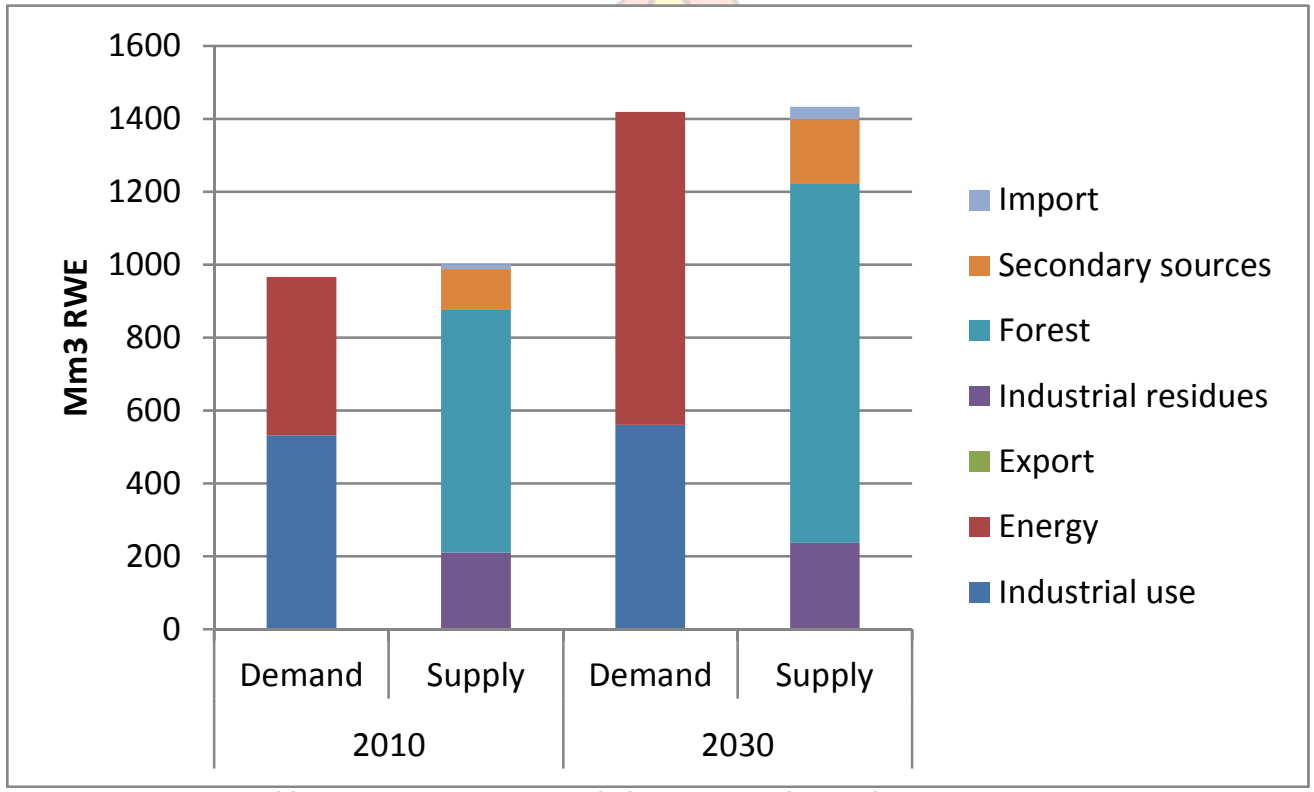
Priority to Biodiversity

- **Dedicated management** on 5% of current FAWS
- **Longer rotations** on remaining 95%, **no extraction of residues**

- **Wood supply decreases** by 12% compared to reference scenario
- The **growing stock** shows considerably higher **increase**
- A shift from younger to **older age-classes** is projected
- **Carbon stock** shows a significantly **positive trend**
- Amount of downed **deadwood** will grow

Promoting Wood Energy

- **To reach the targets, supply** would have to increase by **50%** by 2030
- **Forest residues supply and stumps** together would have a **seven fold increase**
- **Increased supply** from landscape care wood and post consumer wood.
- **Net imports** for other regions would also increase from **12 million m³ wood equivalent** in 2010 **to 33 million m³** in 2030
- **<u>Significant environmental, financial and institutional costs.</u>**



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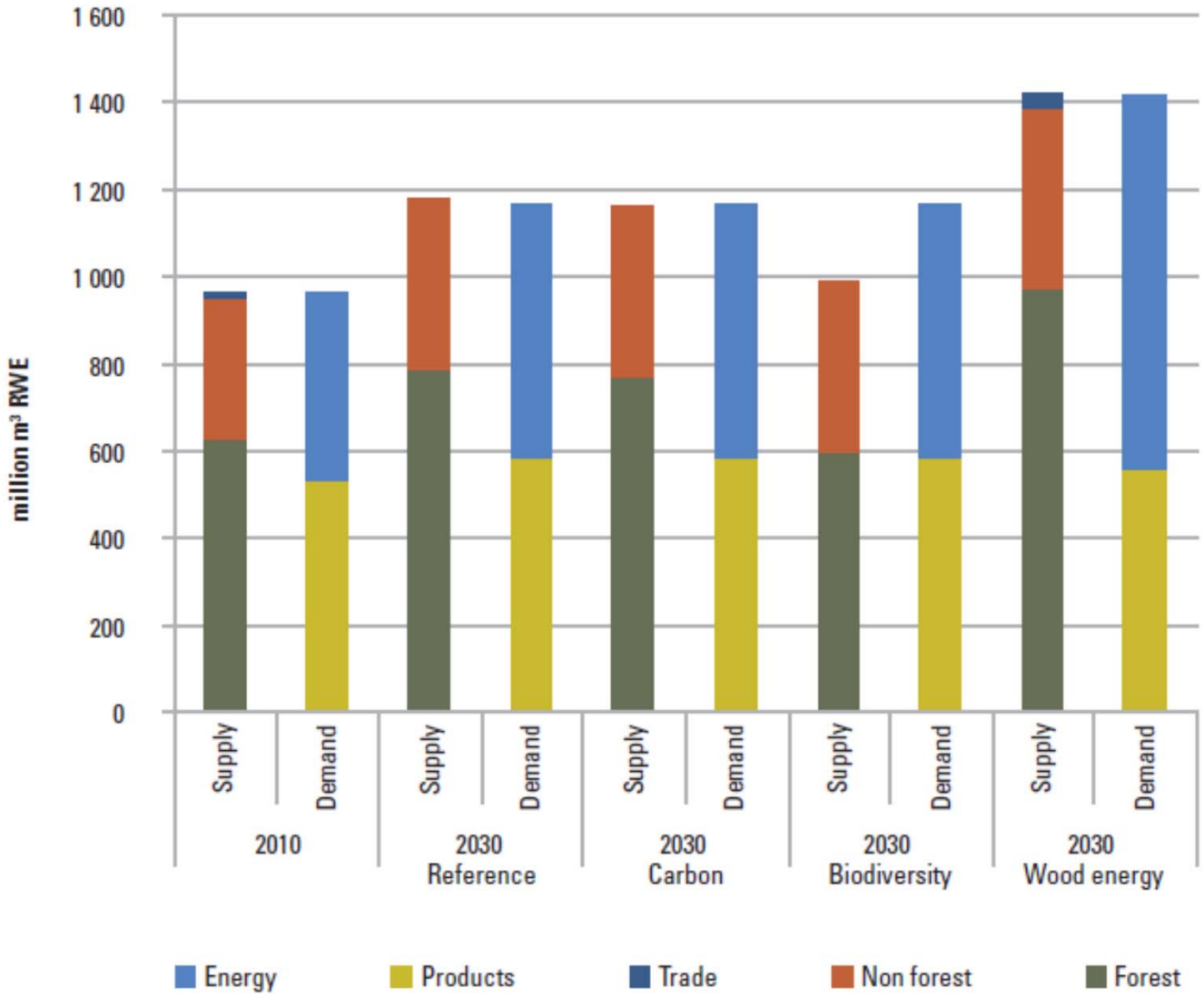
Fostering Innovation and Competitiveness

- **Image** of wood based materials is transformed
- **New products** appear
- Total demand may not be higher than in the reference scenario, although **prices could be higher**
- **New requirements** by bio-refineries might lead to changes in forests management in the long term and changing structures in the wood market in the short term.
- Demand is driven by **innovation** and therefore sensitive to cost. Tightening supply might halt innovation.

Supply and Demand in 2030



Scenarios in 2030 compared to reference

	Max carbon	Biodiv	Wood energy
FAWS	0%	**-5%**	0%
Growing stock	**8%**	8%	-1%
Increment	**15%**	7%	0%
Fellings	0%	**-12%**	2%
Residue extraction	**-15%**	**-100%**	**263%**
Deadwood (per ha FAWS)	-3%	3%	-4%
Product consumption	0%	?	-4%
Wood energy consumption	0%	?	**147%**
Sawlog prices	?	?	6%
Pulplog prices	?	?	15%
Product prices	?	?	3%

Are the scenarios sustainable? Where are the weak points?

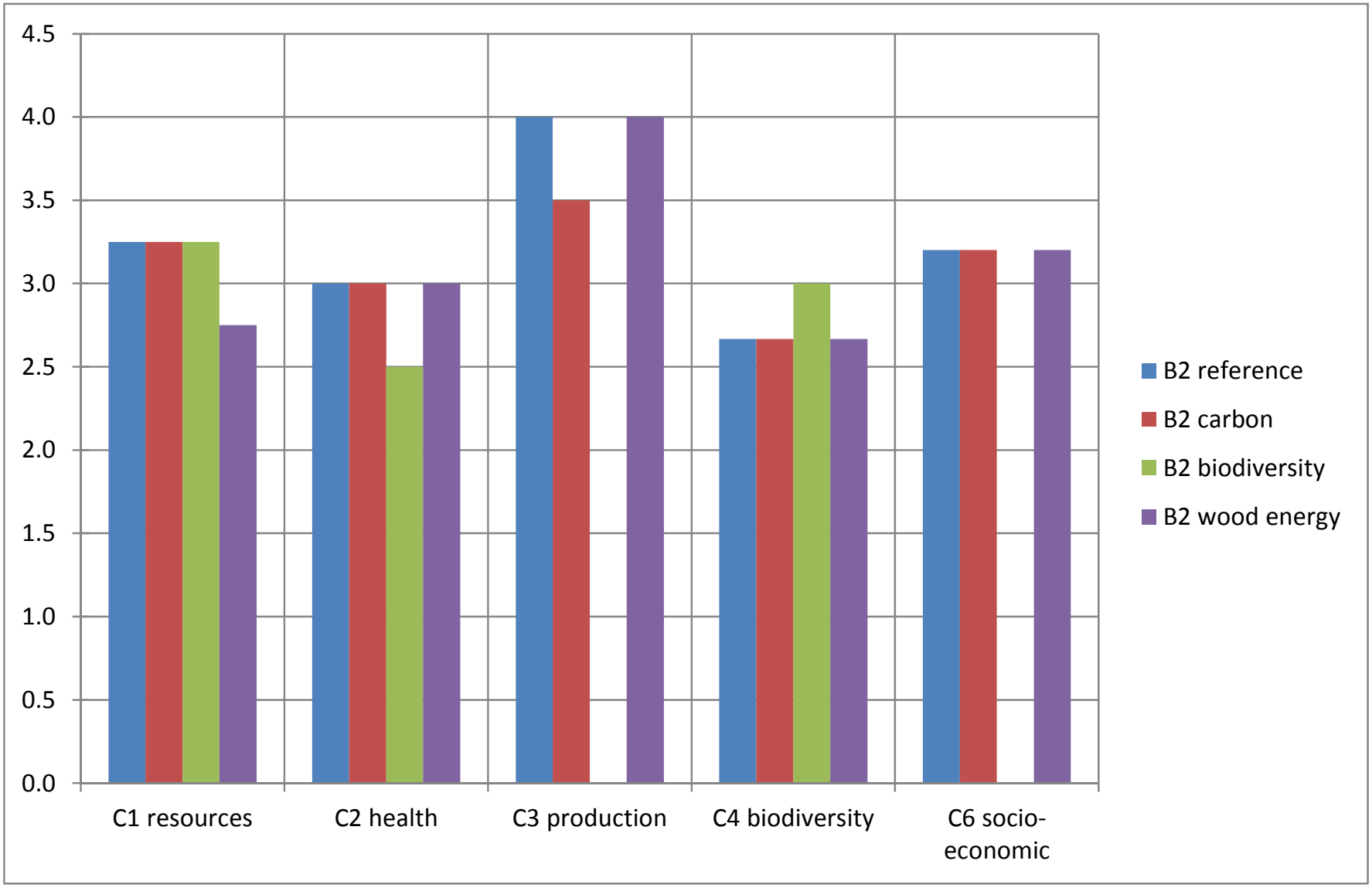
- We adopted the experimental method as developed for the State of Europe's Forests 2011 report.

- Countries' performance for each key parameter was assessed on a scale from one "tree" (🌲) to five "trees" (🌲🌲🌲🌲🌲). We used numbers to allow decimals in averages.

- An assessment was prepared for a limited set of quantitative indicators, by country, country group, and for the EFSOS region as a whole.

Relates to FOREST EUROPE indicator	Key parameter	Unit	Thresholds					Data sources
			1	2	3	4	5	
1.1	annual change in forest cover	%	< -0.2%	-0.2% - 0.0%	0.0 - 0.1%	0.1 - 0.2%	> 0.2%	forest area (EFISCEN), total land area (SoEF 2011)
1.2	annual change in growing stock/ha	m^3ha	< -1.0	-1.0 - 0.0	0.0 - 1.0	1.0 - 3.0	> 3.0	EFISCEN
1.4	annual change in living carbon stock/ha	tonnes C/ha	< -1.0	-1.0 - 0.0	0.0 - 1.0	1.0 - 3.0	> 3.0	EFISCEN
1.4	annual change in soil carbon stock/ha	tonnes C/ha	< -1.0	-1.0 - 0.0	0.0 - 1.0	1.0 - 3.0	> 3.0	EFISCEN
2.4	fire vulnerability/ha in 2030	index/ha	> 4.0	2.5 - 4.0	2 -2.5	1.5 - 2.0	< 1.5	EFISCEN
2.4	wind vulnerability/ha in 2030	index/ha	> 4.0	2.5 - 4.0	2 -2.5	1.5 - 2.0	< 1.5	EFISCEN
3.1	ratio fellings/NAI, 2025-2030	%	> 100%	95% -100	n.a.	<95%	n.a.	EFISCEN
3.2	annual change in ratio of value of marketed roundwood/growing stock	EUR/1000 m^3	< -20	-20 - 0	0 - 20	20 - 40	> 40	value of roundwood (EFI-GTM), growing stock (EFISCEN)
4.5	annual change in quantity of deadwood/ha	t dry matter/ha	< -0.2	-0.2 - 0.0	0.0 - 0.1	0.1 - 0.2	> 0.2	EFISCEN
4.9	FNAWS in 2030 as percentage of total forest area	%	< 5%	5% - 10%	10% - 20%	20% - 40%	> 40%	EFISCEN
	change in share of forest stands >100 years of age	%	< -0.2%	-0.2% - 0.0%	0.0 - 0.1%	0.1 - 0.2%	> 0.2%	EFISCEN
6.2	annual change in share of GDP taken by forest sector	%	< -0.1%	-0.1% - 0%	0% - 0.1%	0.1% - 0.2%	> 0.2%	total added value in forest sector (EFI-GTM), GDP (scenario assumption)
6.7	consumption of wood products (RWE) per capita in 2030	m^3/capita	< 0.45	0.45 - 0.8	0.8 - 1.6	1.6 - 2.9	> 2.9	consumption of wood products (EFI-GTM), population (scenario assumption)
6.8	net import as percentage of apparent consumption in 2030	%	> 65%	20% - 65%	-20% - 20%	-70% - -20%	< -70%	EFI-GTM
6.9	wood energy use (RWE) per capita in 2030	m^3/capita	< 0.45	0.45 - 0.8	0.8 - 1.6	1.6 - 2.9	> 2.9	consumption of wood used for energy (EFI-GTM), population (scenario assumption)

Overall results of sustainability analysis



Sustainability

- **Increased harvest pressure in reference, carbon and energy scenarios**, lowers amount of deadwood and reduces share of old stands.
- **Energy scenario shows a reduction in forest resources** and carbon due to intensified extraction.
- Trade-off between biodiversity and health?

EFSOS II RECOMMENDATIONS FOR POLICY MAKERS, INTERNATIONAL ORGANISATIONS AND RESEARCH

For policy makers (1)

- Climate change mitigation: encourage optimum combination of sequestration, storage and substitution.
- Prevent reduction of carbon stock from fires or pests
- Guidelines on adaptation to climate change + monitoring and extension
- Strategies for wood energy based on inter-sectoral dialogue

For policy makers (2)

- Prepare Guidance on sustainable levels of residue and stump extraction
- Strategies for sustainable rural land use, incorporating short rotation coppice
- Use wood energy efficiently and cleanly
- Implement wood mobilisation Guidance
- Remove constraints for post consumer wood mobilisation

For policy makers (3)

- Identify and implement win-win strategies for biodiversity and wood supply/carbon sequestration
- Develop good conditions for innovation
- Encourage Payment for Ecosystem Services, moving to implementation phase

For policy makers (4)

- Review whether forest sector policies and institutions are equipped for future challenges: instruments should be precisely targeted and linked to obectives
- Develop objective methods of assessing sustainability of forest management
- Develop national/regional outlook studies, and use them for policy formulation

For international organisations

- Adaptation of forest management to climate change (sharing of experience)
- Discuss strategic options for wood energy
- Communicate EFSOS II analysis to biodiversity community
- Share innovative approaches to forest management
- Review factors underlying competitiveness
- Maintain and improve knowledge infrastructure
- Develop approaches to sustainability assessment
- Review, communicate and follow up EFSOS II

For research

- Carbon flows in forest soil, consequences of disturbance
- Strategies for adaptation to climate change
- Forest monitoring for adaptation to climate change
- Ecological/physiological range of forest trees (cause/effect, combined stresses)
- Closer measurement of sustainability of wood supply
- Availability of land for SRC (jointly with agriculture etc.)
- Potential of non-forest wood supply
- Scenarios for wood energy
- Maintain and develop models used for EFSOS II

Availability of results and data

- Outcomes of models and sustainability analysis are available from the UNECE website.
- Containing data at country level, country group level and for EFSOS region as a whole.
- 5 discussion papers are foreseen with more details on methods and outcomes

Many thanks to the team, the country correspondents, and everybody else that contributed in one way or the other

Remarks on sustainability analysis

- Highly sensitive to thresholds
- Some parameters are still rather experimental
- Some parameters are based on uncertain model outcomes
- Extension of parameter set would be useful
- Method should be reviewed by the community for approach and thresholds
- Differences between scenarios are small due to the large size of the region

Carbon stocks and flows in EFSOS II scenarios (2030) (Tg C or TgC/year)

		Reference	Maximum Carbon	Wood energy
Stocks	Biomass	13 214	14 130	13 100
	Soil	15 238	15 319	14 994
Net change	Biomass + soil	+103.5	+152.5	+84.7
	Products	+18.2	+18.2	+17.6
Substitution	Products	NA	NA	NA
	Energy	83.0	83.0	121.7
TOTALS	Stock	28 452	29 449	28 093
	Flows	203.7	253.6	224.0

MITIGATING CLIMATE CHANGE

The best strategy for mitigation in the European forest sector

- Combine
  - Increased sequestration in forest biomass (longer rotations, higher share of thinnings)
  - Steady flow of wood for products and energy
- However
  - In the long run, the sequestration capacity limit will be reached, and the only way forward will be to increase storage in products and substitution

WOOD FOR ENERGY

It is technically possible to meet wood energy targets (1.4 billion m3/year), assuming:

- Energy efficiency
- Faster growth for other renewables
- Major wood mobilisation
- Sixfold increase in use of harvest residues, stumps
- Strong development of non-forest sources
- Reduction of 20 million m3 for industry
- (but no imports or short rotation coppice)

However, this would imply:

- Impoverishment of forest sites (extraction of residues, stumps)
- Social and economic costs of intense mobilisation
- Reduction in biodiversity
- Less attractive for recreation

EFSOS II proposes a balanced approach to expanding wood energy:

- Promote energy efficiency
- Develop non-wood renewables even faster
- Implement Guidelines for wood mobilisation
- Develop non-forest wood (landscape care wood, recovered wood)
- Cascade principle
- Fast growing biomass plantations
- Burn wood efficiently and cleanly
- Import from sustainable sources

ADAPTATION OF EUROPEAN FORESTS TO CLIMATE CHANGE

Adaptation to climate change: threats

- Higher frequency of severe events
- Change in species competition dynamics, negative consequences for those outside their optimum range (e.g. spruce in dry lowlands)
- Invasive alien species: trees, shrubs, but also insects
- Combined effects of climate change and air pollution
- No new « stable state »: high fluctuations and uncertainty will become normal
- NB regional differences (table 22)

Main aim: increase adaptive capacity of forests

- Take regional approaches to:
  - Regeneration (species, method)
  - Tending and thinning: regulating composition
  - Harvesting: age of trees, areas
  - Pest and disease management, fire prevention
- Monitor and document results, adapt approaches as needed and share experience

EFSOS scenarios and adaptation to climate change

Reference	**Assumes no adaptation to climate change. Increased residue use could increase vulnerability, as C and nutrients removed, => lower water holding capacity (carbon) and productivity. Focus should be on reducing risk from storms, insects and drought**
Maximising C	Longer rotations and more natural regeneration would help genetic diversity => higher adaptive capacity. Risk of slow adaptation as rotations longer
Wood energy	Shorter rotations & more harvest promote flexibility, help stand stability (in some regions). Removal of residues improves accessibility, combats insects and fire, but could lead to depleted forests (less diversity, loss of nutrients and water holding capacity)
Biodiversity	Built on more natural adaptation processes, adaptation speed slower. Therefore, artificial regeneration and selection of suitable provenances might be needed

PRIORITY TO BIODIVERSITY

It is possible to improve the biodiversity of Europe's forests

Consequences for wood supply

- Deadwood v. residue use
- Less land available for wood supply
- Longer rotations
- But close-to nature management on protected areas could partly compensate

High carbon accumulation

Recreation, protection, air quality all positively affected by priority to biodiversity

Win-lose: biodiversity v. high wood energy mobilisation

INNOVATION AND COMPETITIVENESS

Innovation and competitivity

- Innovation (or the lack of it) will influence the long term development of the sector in powerful but unexpected ways
- Products (e.g. smart paper), processes (e.g. bio-refineries), above all, attitudes
- Potential for innovation in forest management, led by state forest organisations
- Governments should lead the search for a culture of innovation – not only for forests

ACHIEVING AND DEMONSTRATING SUSTAINABILITY

Achieving and demonstrating sustainability

- Considerable progress: SoEF 2011 (past & present) + EFSOS II (outlook) both assess sustainability in an objective and comprehensive way
- DEVELOP the concepts (also nationally)
- USE the methods to evaluate policy choices
- COMMUNICATE with other sectors and the public in simple and objective terms

POLICIES AND INSTITUTIONS

Policies and institutions: SOEF 2011

- Policies, institutions and instruments in general stable, recent and effective
- NFPs have improved public acceptance
- Total government spending ~ €18.4/ha
- Objectives have been formulated for the main policy challenges, and some instruments put in place
- Challenges are complex and long term, require sophisticated policy making, sharply focused instruments and strong political will