

Building a “resource efficient” biobased economy for Europe

Lignocellulosic biomass cost supply

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Vision for the sustainable and resource efficient biomass use in Europe
01.10.2015



- **Objectives**
- **Challenges (highlighting single issues)**
- **S2BIOM approach (highlighting single issues)**
- **Outlook**

Cost – supply potential team



Issue

- | | |
|--|-------------------------------------|
| • Forestry & Primary Forest residues | Resource EFI -- Cost LUKE |
| • Forestry – Secondary residues | University of Freiburg/ B. Glavonic |
| • Agriculture | DLO |
| • Waste | BTG |
| • Trade | IIASA |
| • Energy crops (SRC and non woody crops) | DLO/University of Bologna |

Country specific data collection

- SDEWES, EU-SEI, UBFME, SFI, ALU-FR, REA, DLO, Forestry Commission, LUKE
- Expert consultants D. Borota, D. Pantic

Scope - what type of biomass



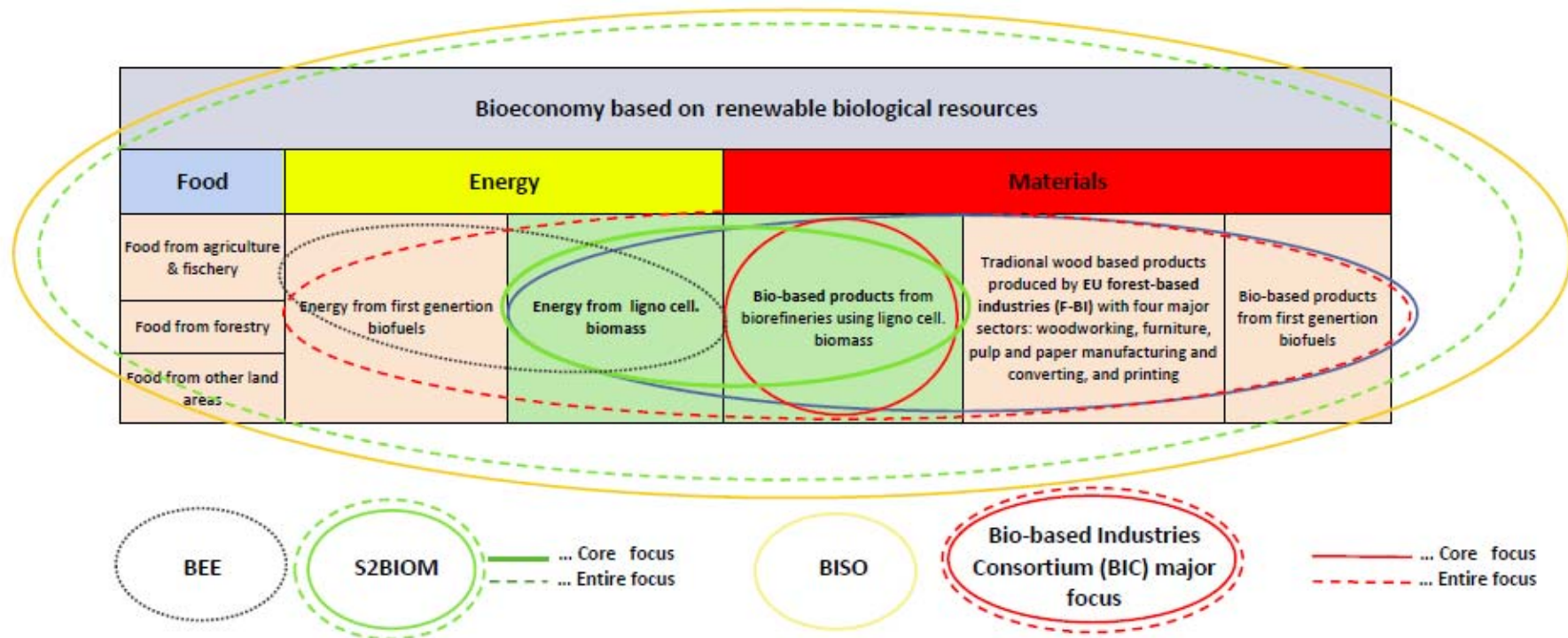
Scope of S2BIOM cost supply data

Bioeconomy based on renewable biological resources					
Food	Energy		Materials		
Food from agriculture & fishery	Energy from first generation biofuels	Energy from ligno cell. biomass	Bio-based products from biorefineries using ligno cell. biomass	Traditional wood based products produced by EU forest-based industries (F-BI) with four major sectors: woodworking, furniture, pulp and paper manufacturing and converting, and printing	Bio-based products from first generation biofuels
Food from forestry					
Food from other land areas					

Scope - differences & similarities



Scope of policies, initiatives and projects



Objective & challenge



Questions to answer on lignocellulosic biomass

- A) How much lignocellulosic biomass is (potentially) available per annum at the moment and where without compromising sustainability and at “reasonable” cost? Now? In future?*
- B) How much of that is not used? Now? In future?*
- C) What is the impact of certain constraints and “what if”/”scenario” assumptions on question (a) and (b)?*

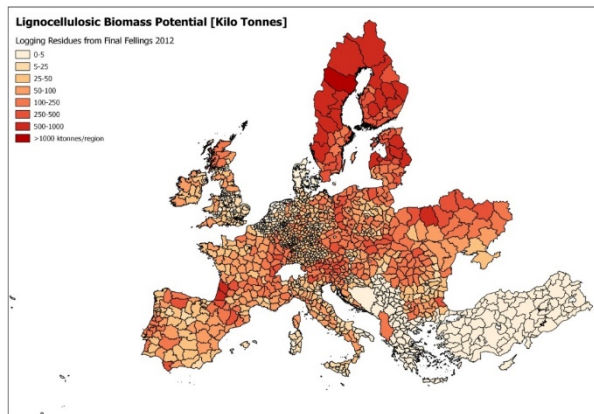
***Provide data input for analysis of further issues in models & tools
(see other presentations)***

Scope - from where?

- Activity origin



- Spatial origin & result units



+ Imports

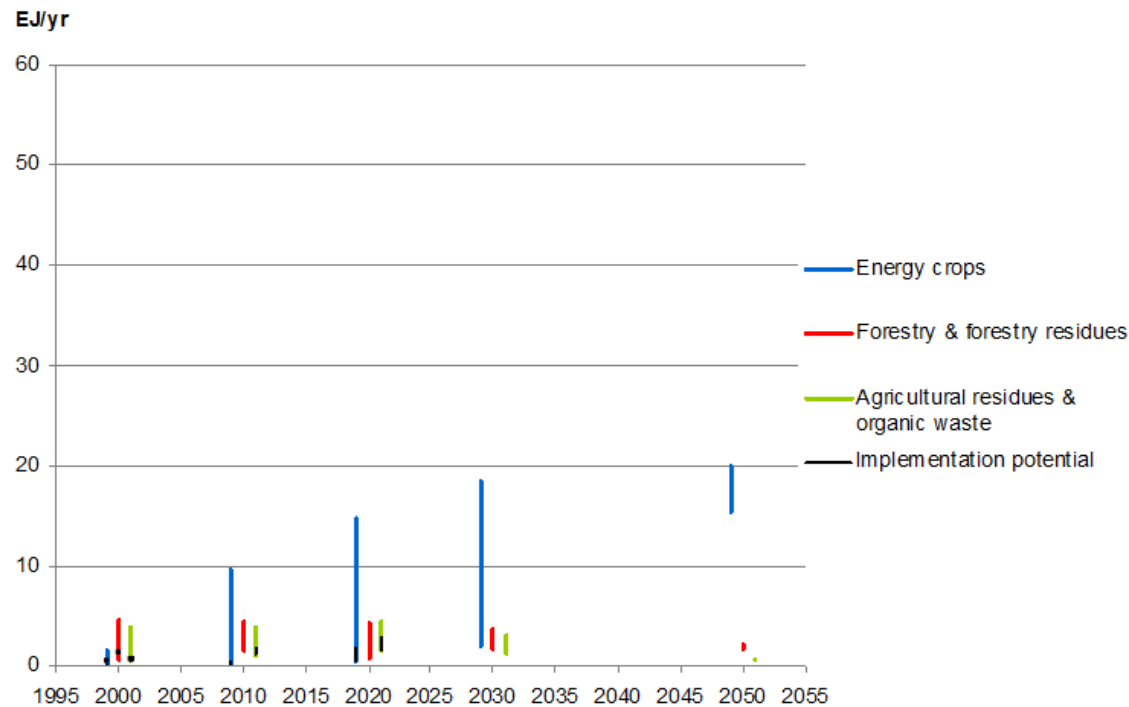
- Level of detail

Origin	Category – Level 1	Category – Level 2	Category – Level 3
1. Forestry	1.1 Primary production	1.1.1 Stemwood from thinnings and final fellings	1.1.1.1 Stemwood from final fellings originating from broadleaf trees
			1.1.1.2 Stemwood from final fellings originating from conifer trees
			1.1.1.3 Stemwood from thinnings originating from broadleaf trees
			1.1.1.4 Stemwood from thinnings originating from conifer trees
	1.1.2 Stem and crown biomass from early thinnings	1.1.2.1 Stem and crown biomass from early thinnings originating from broadleaf trees	
		1.1.2.2 Stem and crown biomass from early thinnings originating from conifer trees	
1.2 Primary residues	1.2.1 Logging residues from final fellings	1.2-1 Logging residues from final fellings originating from broadleaf trees	
		1.2-1 Logging residues from final fellings originating from conifer trees	
	1.2.2 Stumps from final fellings	1.2.2.1 Stumps from final fellings originating from broadleaf trees	
		1.2.2.2 Stumps from final fellings originating from conifer trees	

Uncertainties on study results on user side



Range of results for biomass energy potentials on EU27 level from previous studies



Range of results from sector-focusing assessments
(technical potentials & implementation potentials)

BEE meta study findings

([Status of Biomass Resource Assessments](http://www.eu-bee.eu), www.eu-bee.eu)

Uncertainties on study results on user side



Direct biomass supply from forestry (excluding secondary residues)

(Source: [Status of Biomass Resource Assessments, www.eu-bee.eu](http://www.eu-bee.eu))

How to reduce uncertainties and increase reliability?

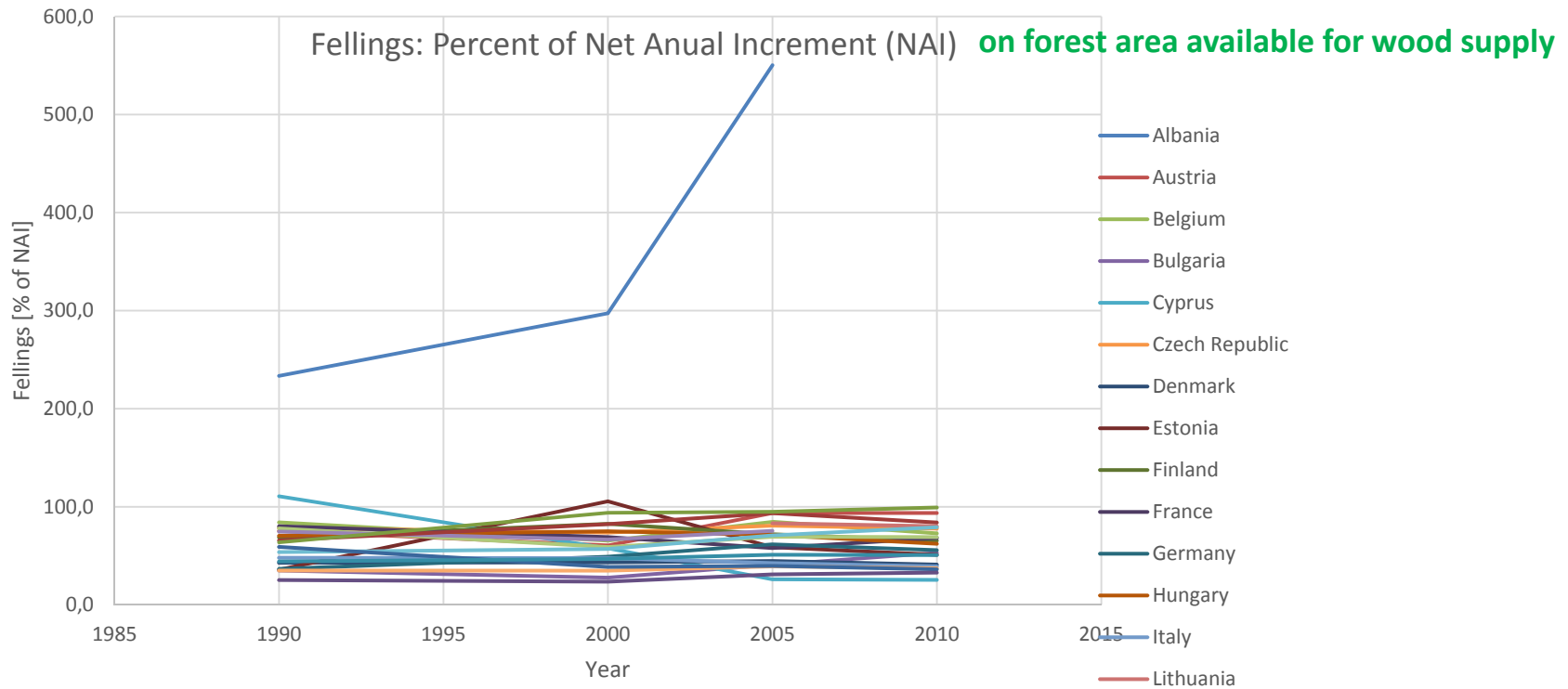
- *Using most up to date data & models*
- *Constraining on likely future scenario assumptions to address most relevant choices and possible developments*
- *Determination of*
 - *technical,*
 - *base and*
 - *user defined potentials*
- *Spatial disaggregation to provide data at high spatial level*

Need to use existing data sources and issues related with them remain

Challenges

- **Assessment of current and future sustainable harvesting potential**
- **Consideration of sustainability on imports**
- **Cost per category and spatial unit**

Forest Europe Sustainability indicator on harvest levels

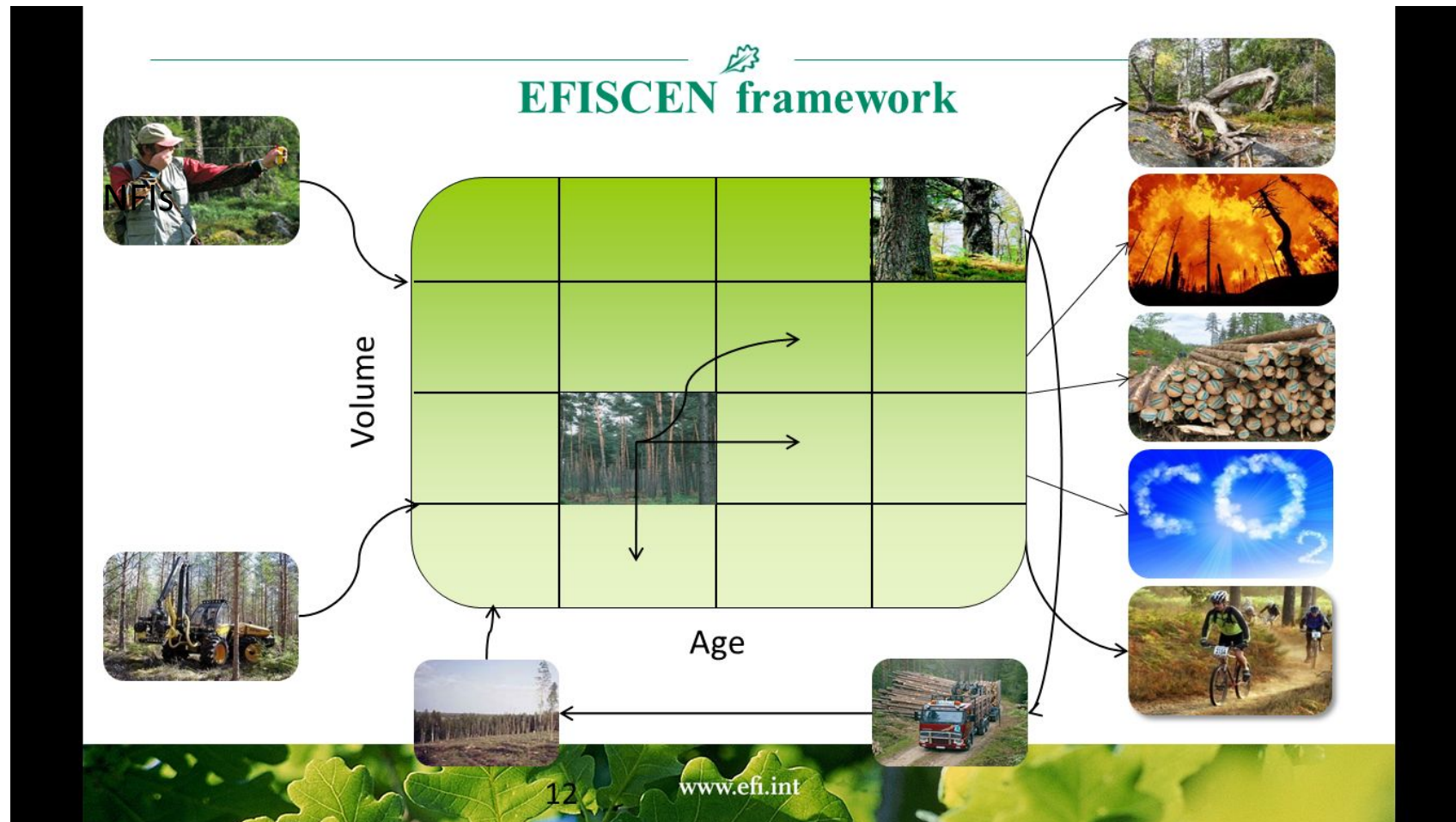


Data source: Foresteurope

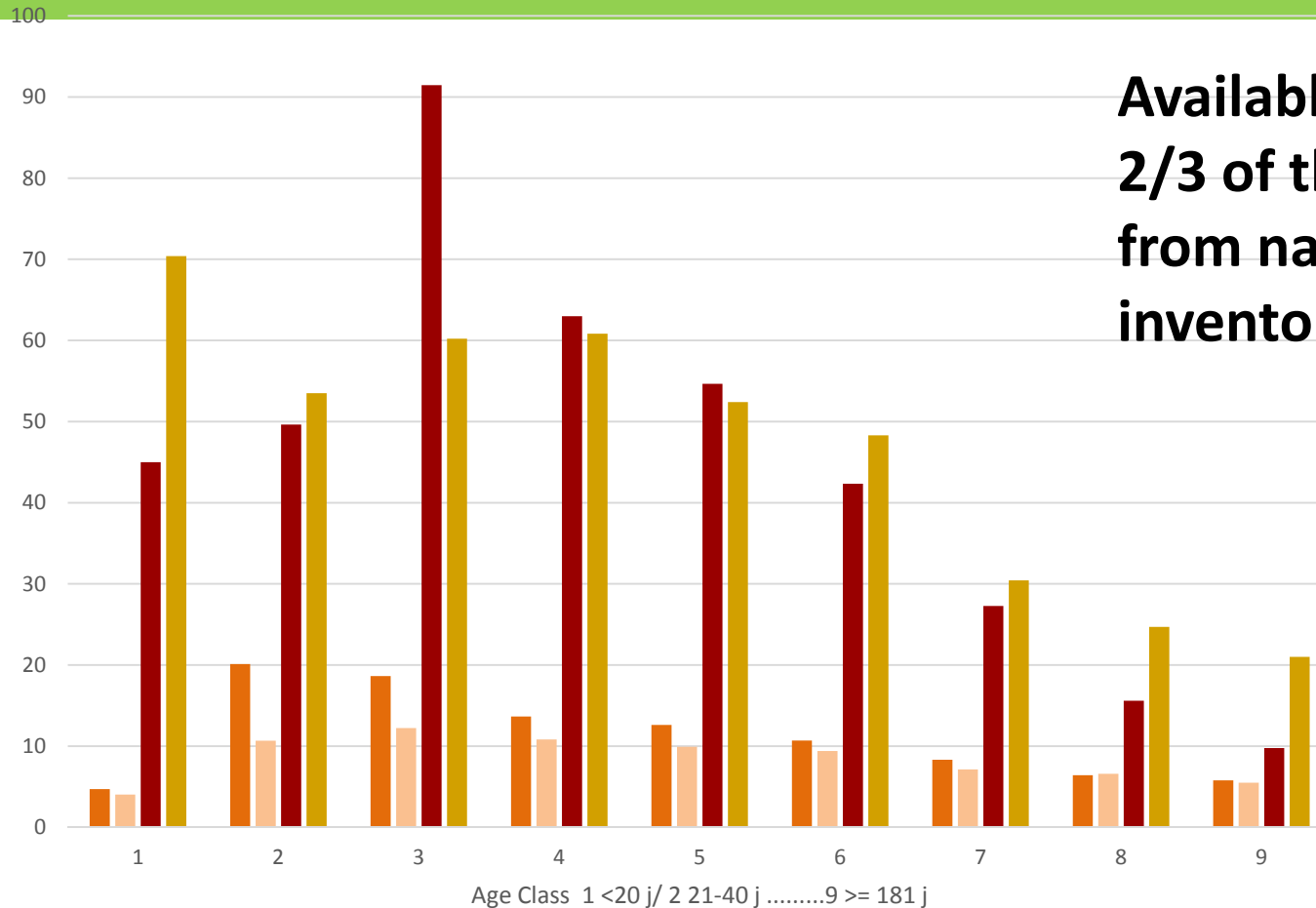
Indicator for a unused potential in European Forests ???



Modelling Forestry potentials



Data requirements from NFIs

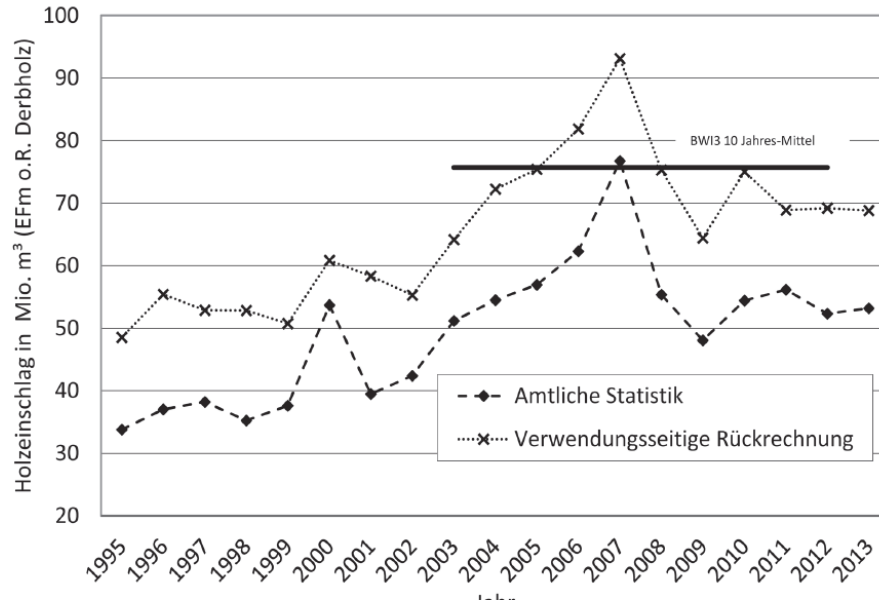


Available for about 2/3 of the 36 countries from national forest inventories

**Data on area and net annual increment in forests available for wood supply by age class & species group are required for spatial units category closest to NUTS 3. Example shown here is an example from Germany on NUTS 1 level: Baden-Württemberg, Germany
Data source: Online portal on German NFI data (Bundeswaldinventur III, <https://bwi.info/>)**



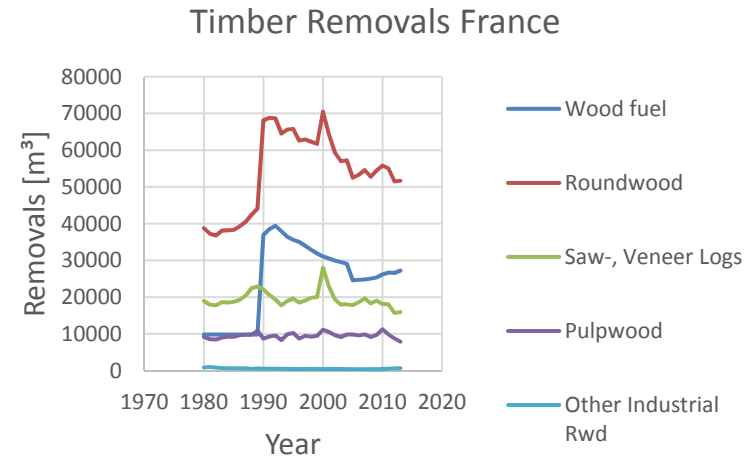
Data accuracy is an issue



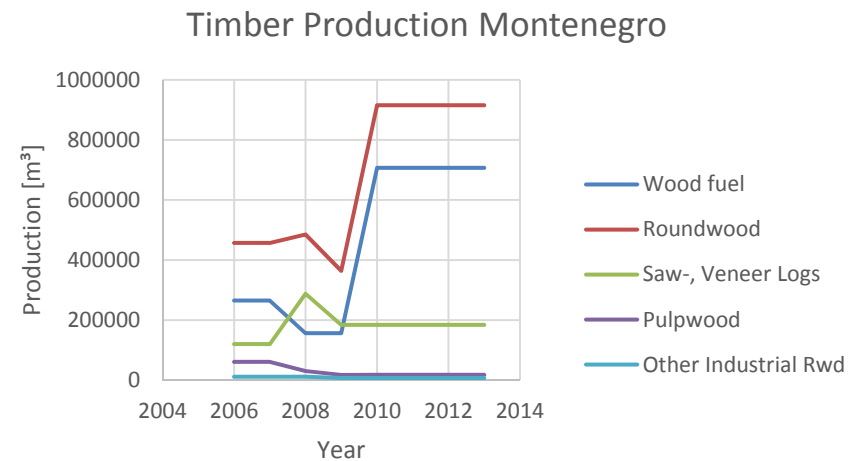
Germany

Source: Jochem et al (2015) Estimation of wood removals and fellings in Germany (Eur J Forest Res 2015)

Uncertainties result from statistics on activity accounting that often underestimate the actual amounts



France, data source: FAOSTAT (faostat.fao.org)



Montenegro, data source: FAOSTAT (<http://faostat.fao.org/>)

Using results from

inFRes

on cost, current and
future harvesting
& supply technology



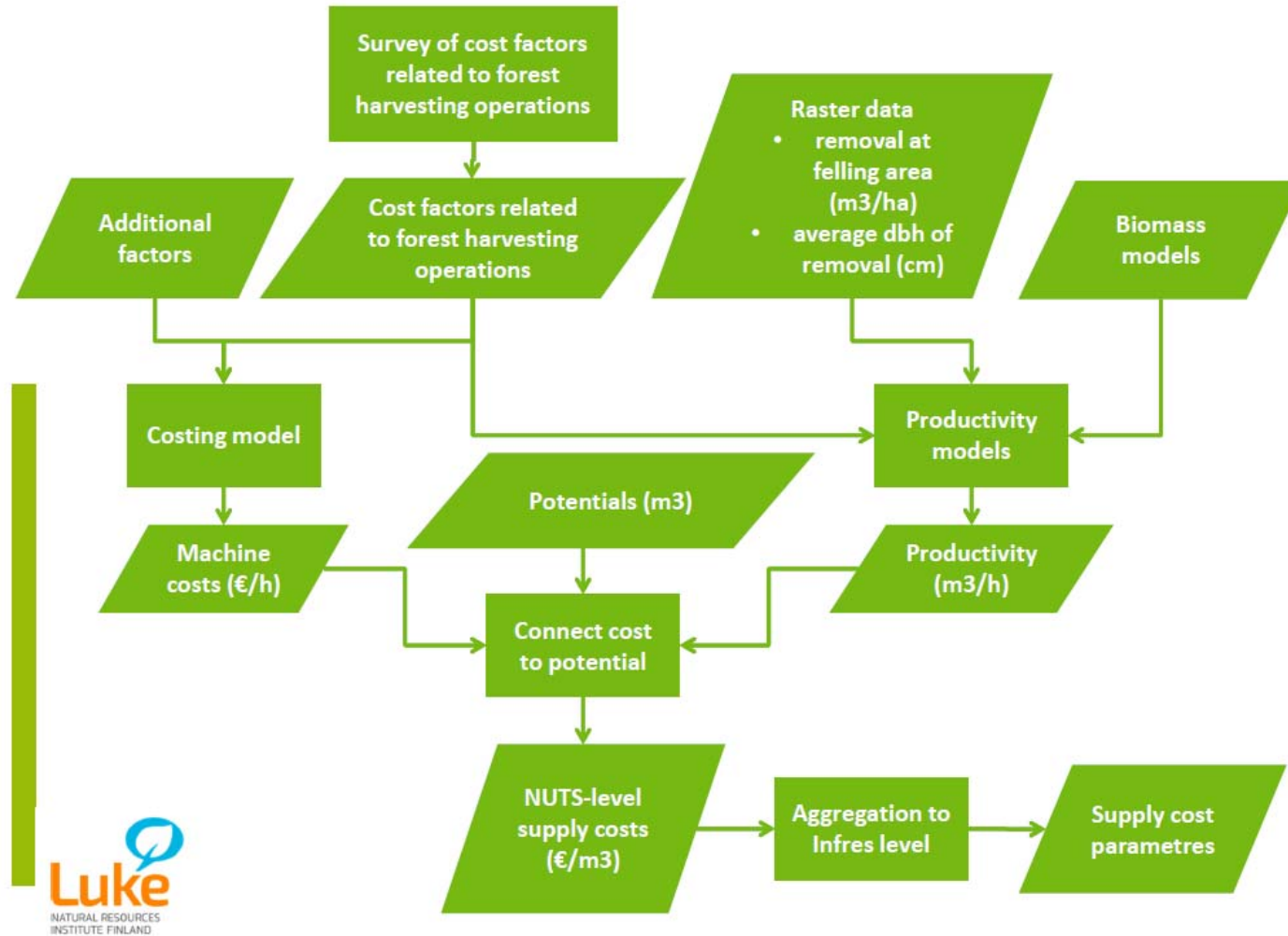
Innovative, effective and sustainable technology
and logistics for forest residual biomass

Summary of the INFRES project results



www.infres.eu

Road side costs



Challenges

- **Area available now, ... in future**
- **Crop selection**
- **Yields now, ... in future**



Energy grasses, annual & perennial crops



- Sweet and biomass Sorghum



- Miscanthus



- Switchgrass

- Giant reed

- Cardoon

- Reed canary grass

Short rotation coppice (SRC)



- Willow

- Poplar



- Eucalyptus

Estimation of biomass crop yield levels in Europe in different cropping systems taking account of climate and soil characteristics



Optimally match to lands available to determine potentials

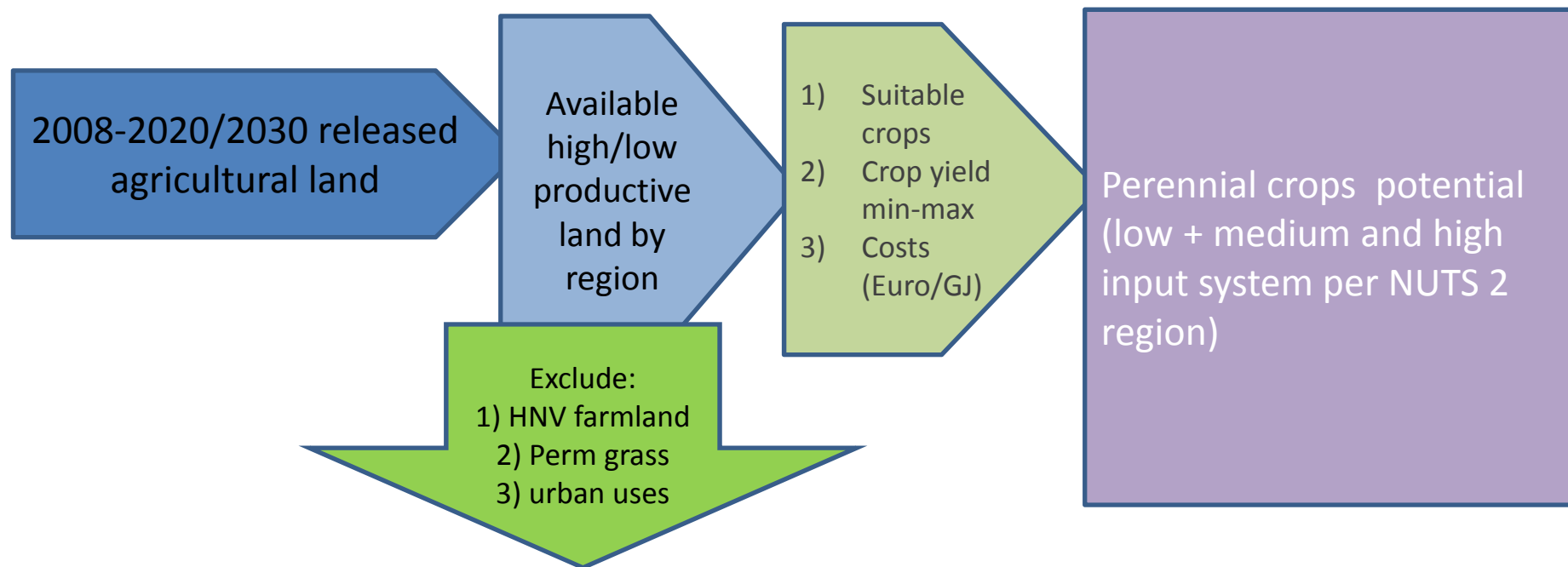


Evaluate environmental and economic performance

Land availability for dedicated crops



CAPRI model simulates changes in agricultural markets and land uses and livestock patterns taking account of Common Agricultural Policies (CAP) and targets for biofuels as implemented at national level.



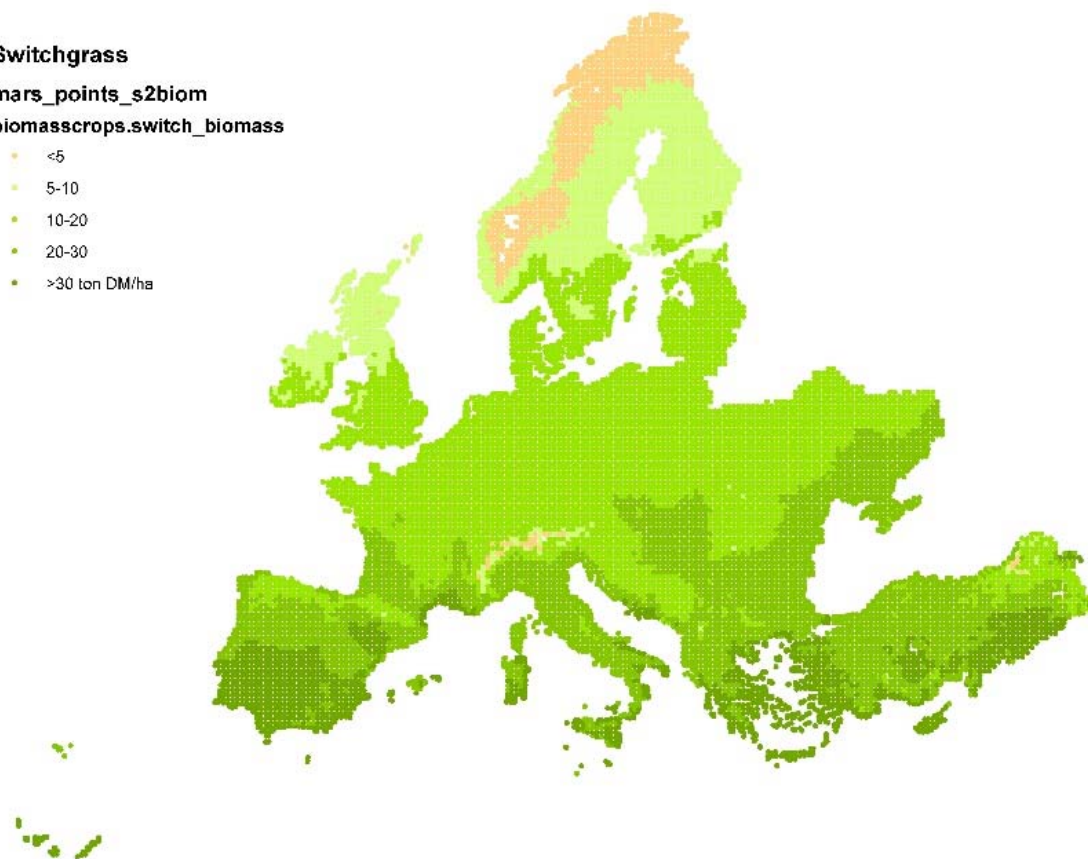
Crop yield response to water

Currently: Changing and checking some parameters

		Switchgrass*
	Temp base	12
	Temp max	40
	Lenth growing season	190 - 210
Fraction of stage	Initial	0,179
	Development	0,308
	Midseason	0,795
	Lateseason	1,0
	Kc range	0,5-1,3
Crop coefficient stage	Initial	0.5
	Development	0.99
	Midseason	1.3
	Lateseason	0.8
	Evapotranspirazione	520-780
	WUE (g l-1)	3,2

Switchgrass
mars_points_s2biom
biomasscrops.switch_biomass

- <5
- 5-10
- 10-20
- 20-30
- >30 ton DM/ha



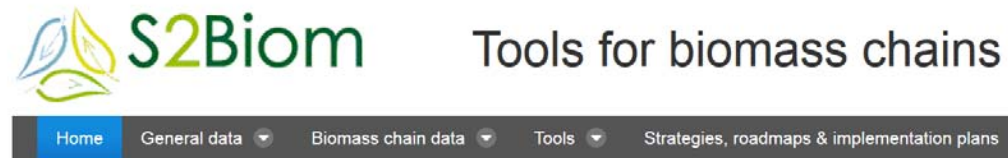
Legend



- **Technical potential**
 - Minimum of technical constraints &
 - Minimum constraints by competing uses.
- **Base potential**
 - Sustainable potential
 - Considering agreed and established sustainability standards
- **User-defined potentials**
 - Vary in terms of type and number of considerations per biomass type
 - Options to choose & combine

- Data available for internal use - 01/2016
- Data available for general public in online tool by early 2016

www.biomass-tools.eu



- Report on methods and challenges for future updates – end of 2016

Thank you for your attention !