

Bioenergy for Europe

—

Supply scenarios

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BEE – Project Coordinator



Biomass Energy Europe

Policy Dialogue on Potential Sustainable Wood Supply in Europe
European Forest Week, FAO, Rome, Oct 22 2008

Content

1. Introduction
2. BEE-Project
3. Results from an assessment of the status of existing supply studies on the availability of biomass for energy in Europe

with focus on : forest and forest residues in EU 27

4. Conclusions



Introduction

Reliable knowledge of the **biomass potentials for energy**

- is essential basic information to achieve the challenging targets
 - for both policy, e.g. EU 20/20/20 Objective for 2020
What can biomass contribute to the overall targets?
 - and industry & other stakeholders
Is there sustainable supply for investments?
Where are resources located?

Biomass resource potential assessments for energy

- **differ largely** for the same geographic entity from each other



The BEE project

Title: Biomass Energy Europe
Acronym: BEE
Project Type: Coordination & support action
Project Start: March, 1 2008
Project duration: 33 months
Project Website: www.bee-eu.info

Coordination: Prof. Dr. Barbara Koch
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University of Freiburg
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The BEE consortium

University of Freiburg, Germany

Utrecht University, Netherlands

International Institute for Applied Systems Analysis (IIASA), Austria

European Forest Institute (EFI), International Body

Technical Research Centre of Finland (VTT), Finland

Chalmers University of Technology, Sweden

BTG biomass technology group BV, Netherlands

Ifeu-Institute, Germany

Scientific Engineering Centre "Biomass", Ukraine

Macedonian Geothermal Association (MAGA), Macedonia (FYROM)

Instytut Paliw i Energii Odnawialnej (IPIEO - EC BREC), Poland

National Agricultural University of Ukraine, Ukraine

Faculty of Forestry University of Zagreb, Croatia

University of Hamburg, Germany

Centre for Renewable Energy Sources (CRES), Greece

Finnish Forest Research Institute (METLA), Finland



Universiteit Utrecht



BEE objective

To contribute to an increase of the accuracy and reliability of biomass resource assessments

With focus on:

- All biomass categories
- Both national & European scope
- All methodological approaches
- All types of potentials
- All types of categories



BEE major activities

Common analytical studies on

- currently available biomass resource assessments
- available methodologies and datasets

Harmonisation via

- common formulation of **best practises**
- **data source hand book**

Integration of

- empirical data from **earth observation** and **field data** into these best practises
- **sustainability, competitive issues** and other important constraints into these best practises

Illustration cases

- EU 27 / Pan European
- On national level in Ukraine, Finland, Macedonia (FYROM), Croatia



Cooperations

- **FP 7 Project CEUBIOM**

- Funded under the same programme and topic
- Stronger focus on remote sensing technologies

www.ceubiom.org

- **FP 7 Project Aquaterre**

- Focus on mobilisation and assessments

www.aquaterre.info

- **UNECE/FAO timber section**

- Cooperation focus: biomass assessments for energy in the forestry sector

www.unece.org/timber



BEE major deliverables

- Political Framework and User Requirements of Biomass Resource Assessments for Energy
- Status of Biomass Resource Assessments
(10/2008+ updates)

Status

-
- Methods for Biomass Resource Assessments for Energy Version
 - Data Sources Inventory
(4/2009 + updates)
 - Best Practises & Methods Handbook
 - Data Sources Handbook
(Early 2010 + updates)
 - Biomass Assessment Reports & Data
 - Validation Report
 - Executive Summary, Evaluation and Recommendations
(End of 2010)

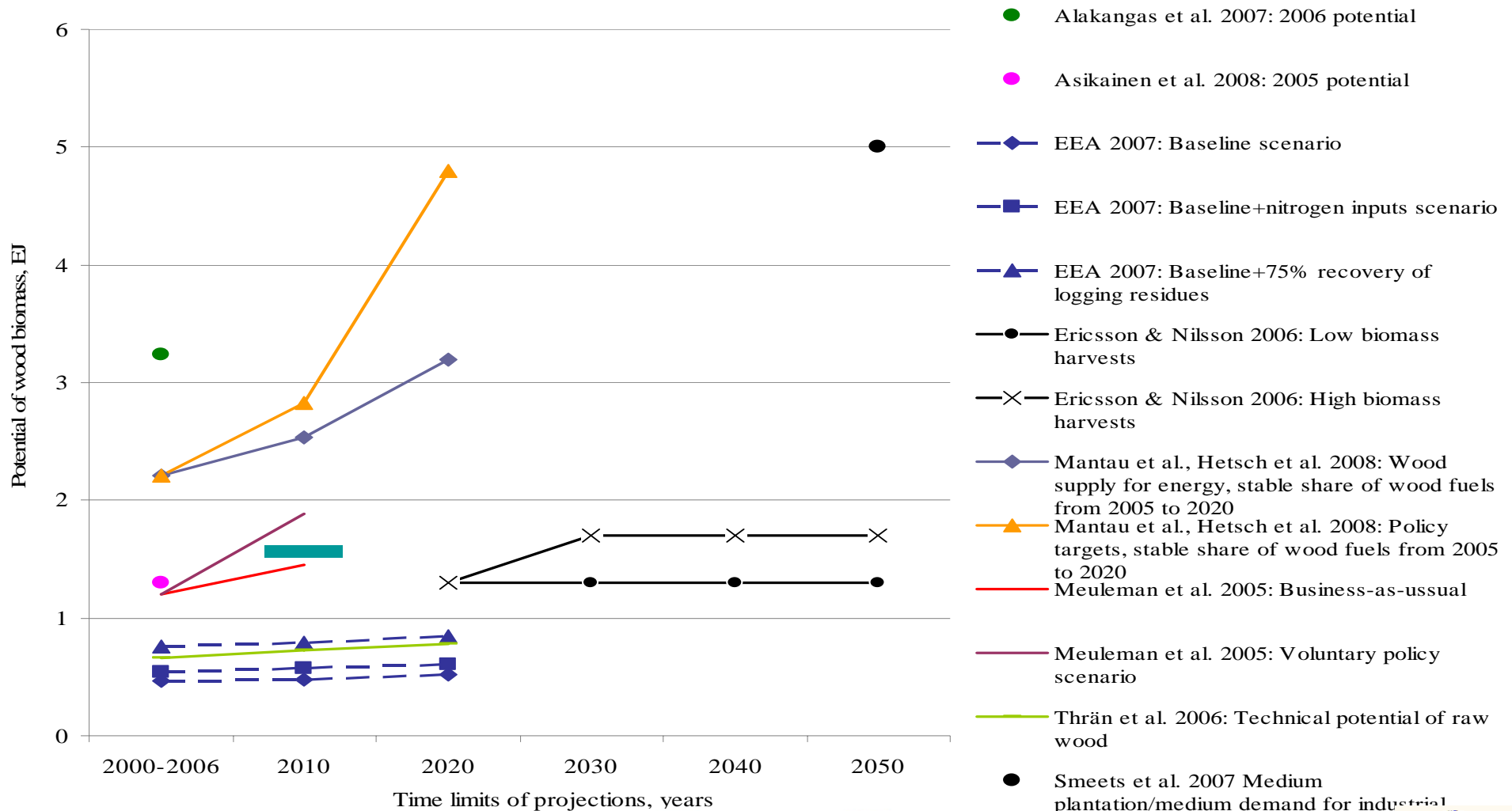
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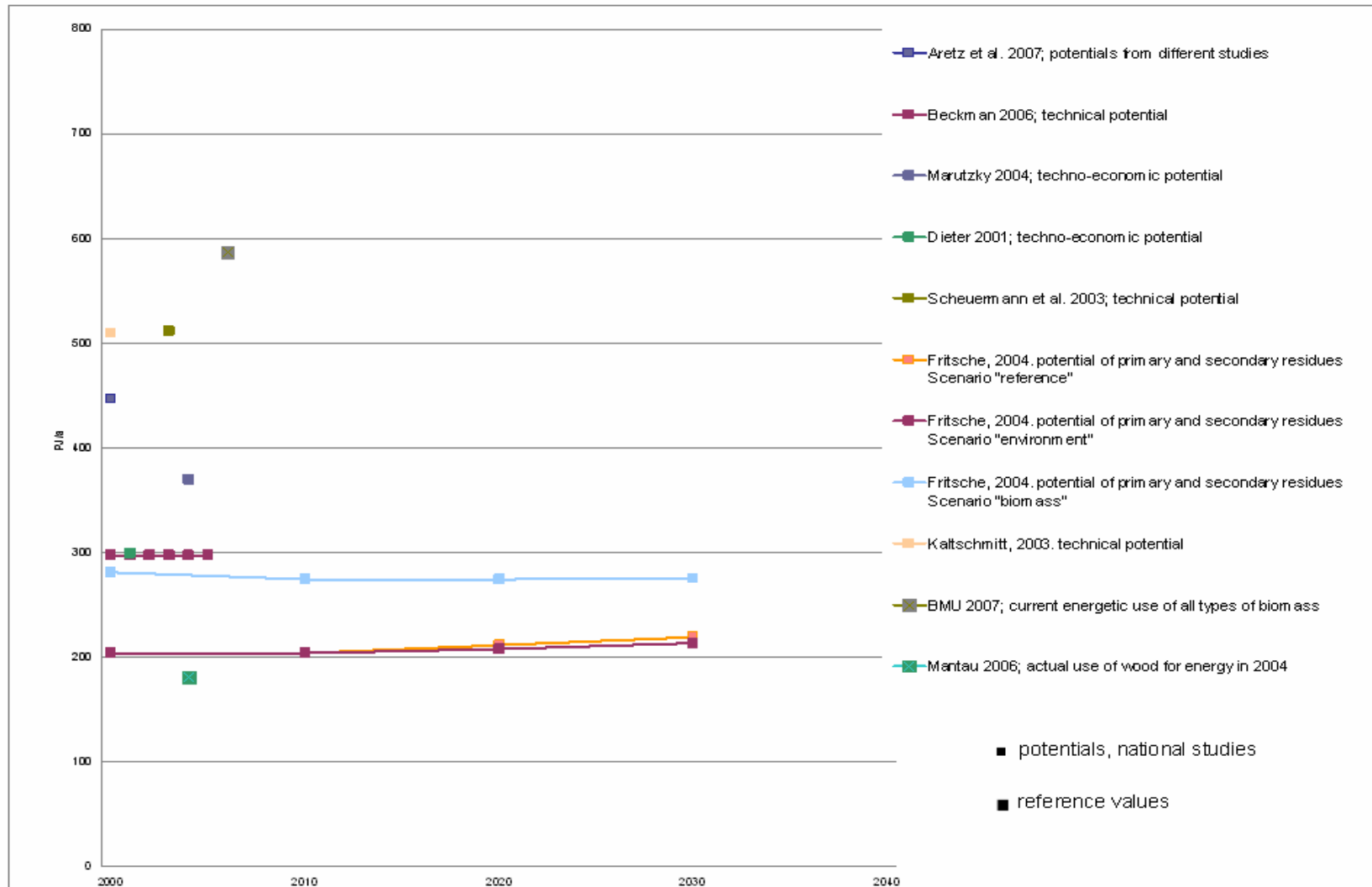
Forestry & forestry residues, European level studies

Study	Potential	Approach	Geographical coverage	Time frame
Alakangas et al.	Technical, economic	Demand-driven	EU20 - EU28	2001-2004, 2010, 2020
Asikainen et al.	Technical, economic	Resource focused	EU20	2005
EEA 2007	Sustainable	Demand-driven	EU25	2005, 2010, 2020, 2030
Ericsson & Nilsson	Technical	Resource focused	EU25 + Belarus + Ukraine	Short (10-20y), medium (20-40y) and long term (>40y)
Mantua et al., Hetsch et al.	Technical	Wood resource balance	EU/EFTA 29	2005, 2010, 2020
Meuleman et al.	Sustainable	Demand-driven	EU15	2002, 2010
Smeets et al.	Technical	Resource focused	11 world regions	2050
Thrän et al.	Technical, economic	Demand-driven	Germany, EU15, EU28	2000, 2010, 2020

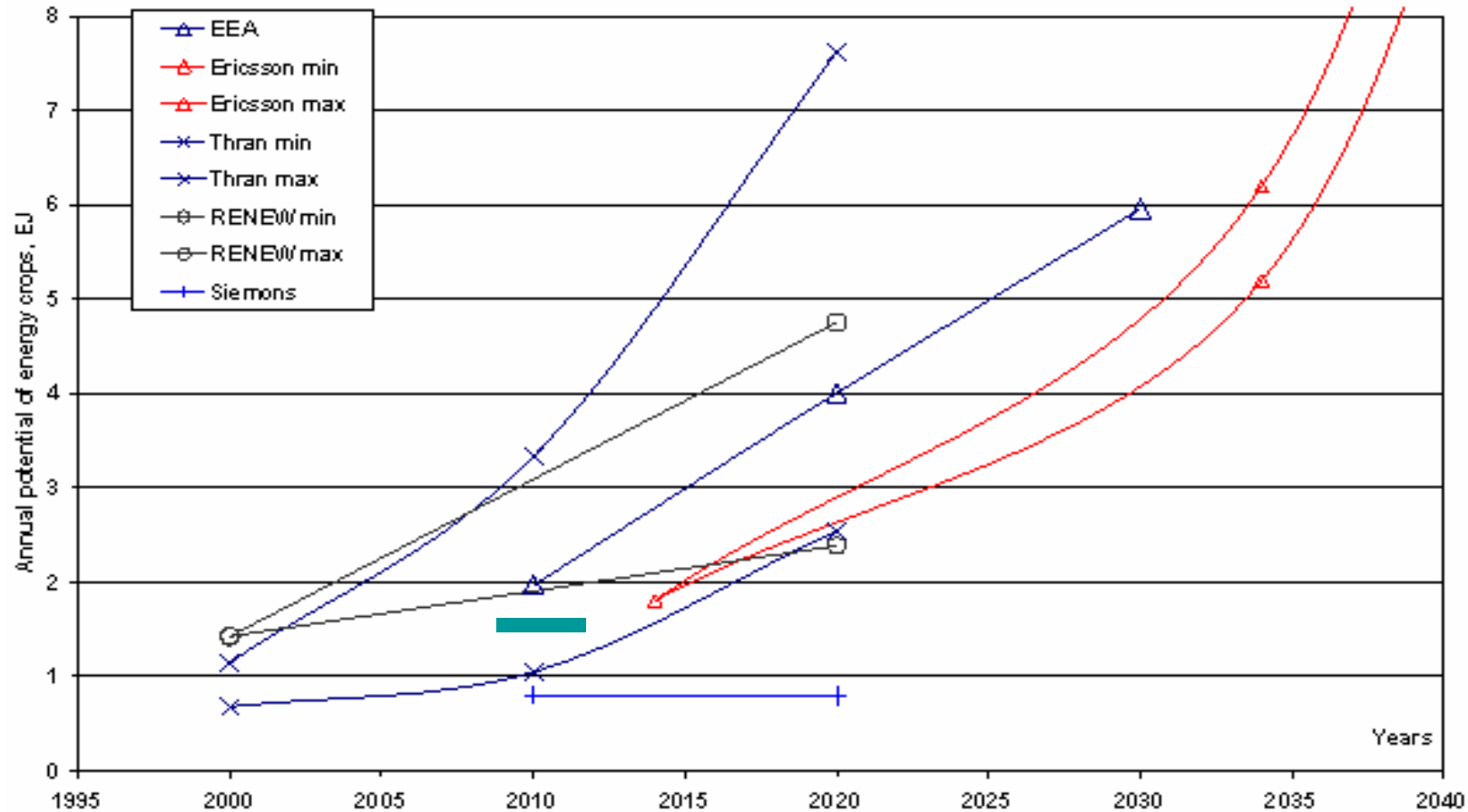
Forestry & forestry residues, European level studies



Forestry & forestry residues, national level studies Germany



Energy crops on agricultural and marginal land, selection of European level studies

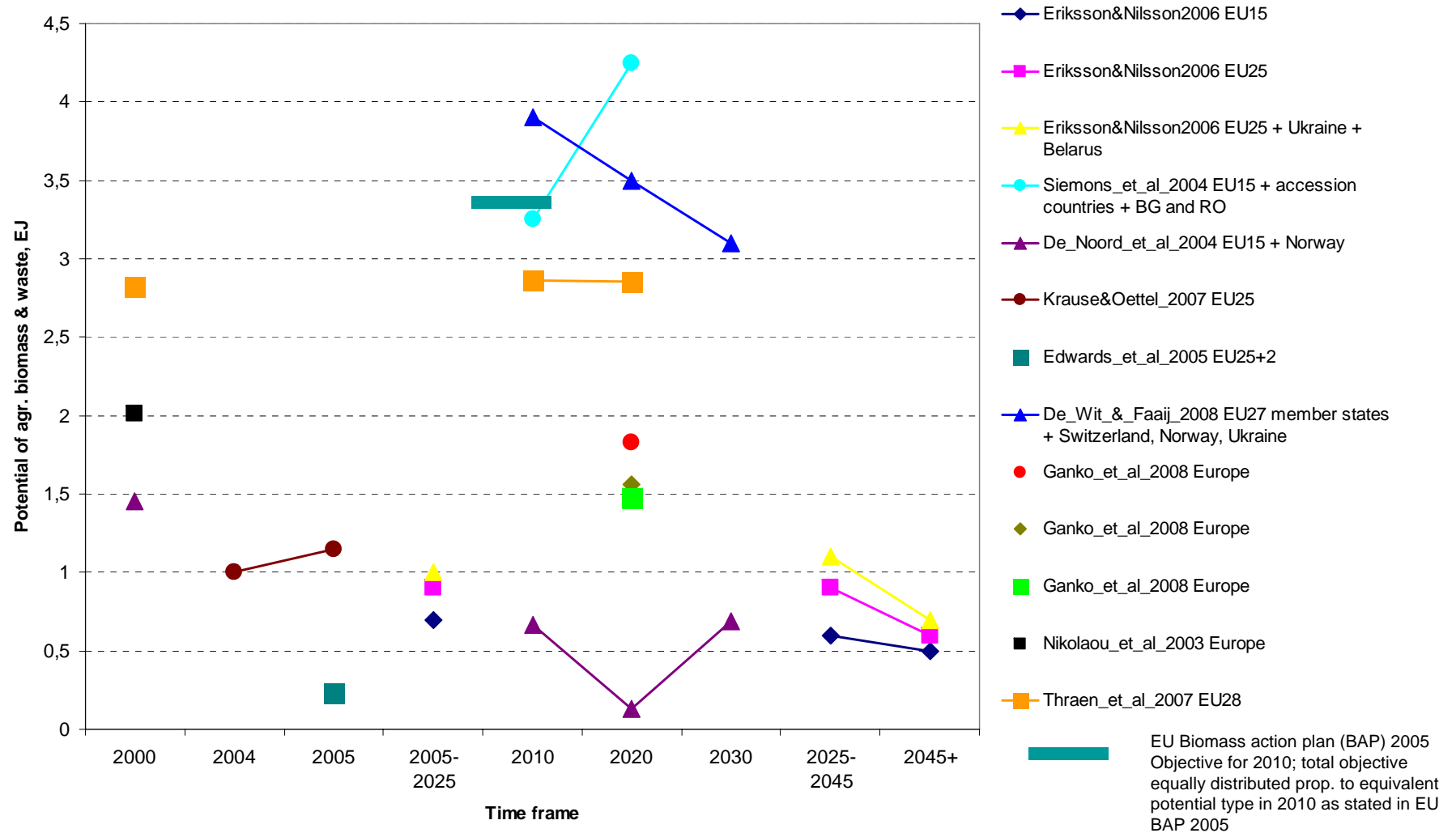


EU Biomass action plan (BAP) 2005 objective for 2010; total objective equally distributed prop. to equivalent potential type in 2010 as stated in EU BAP 2005

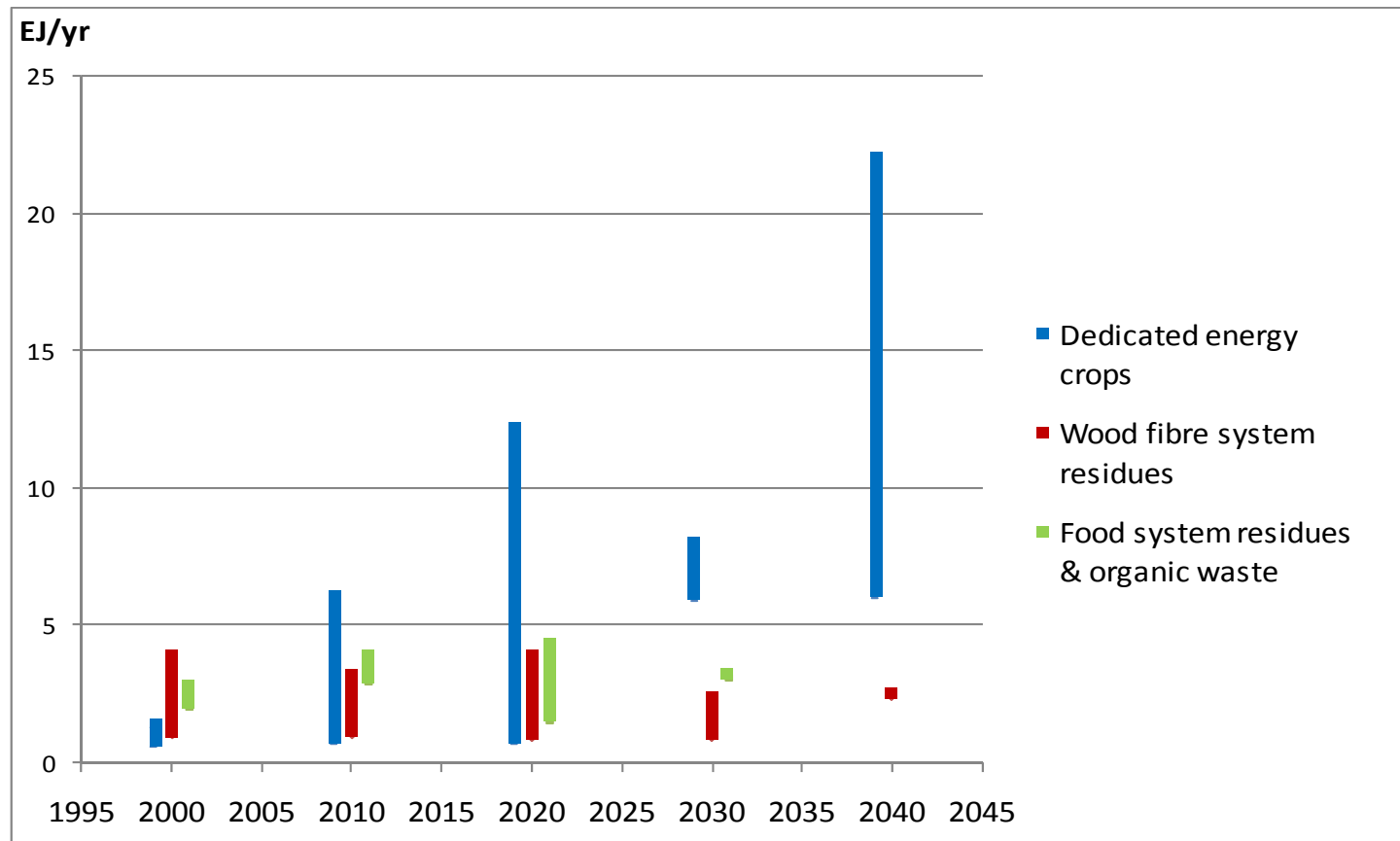
Agricultural residues & organic waste, European level studies

Study	Primary agr. Res.	Secondary agr. res.	Waste - households	Waste - industry & trade	Type of potential
Eriksson&Nilsson_2006	Straw and maize residues				Technical
Siemons_et_al_2004	Cereals, rapeseed, sunflower, olive & vineyard prunings			Wet manure, dry manure), LFG and MSW demolition wood, black liquor	Technical
De_Noord_et_al_2004	Barley, Maize, Oil-crops, Rapeseed, Wheat		Cattle, Chickens, Pigs, Sheep	MSW, LANDFILL GAS, INDUSTRIAL WASTE, SUWAGE SLUDGE	“Realistic”
Krause_&_Oettel_2007	Animal manure	Agricultural residues, solid waste	Landfills	Sewage sludge	Technical
Edwards_et_al_2005	Straw from wheat and barley				Technical
De_Wit_&_Faaij_2008					Technical and economic
Ganko_et_al_2008	Cereal and rapeseed straw				Technical
Nikolaou_et_al_2003	Crop residues	Livestock residues			Technical
Thraen_et_al_2007	Straw	Excrements, other harvest and agricultural residues	Waste wood, commercial and Industrial waste, sewage sludge, organic municipal waste		Technical

Agricultural residues & organic waste, European level



Estimated total biomass energy potentials for EU27: Summary of sector-focusing studies



Total potentials, European level studies (Studies covering all biomass categories)

Study	Potential	Approach	Geographical coverage and resolution	Time frame
EEA 2006	Sustainable	Resource-focused	EU25 member states	2010, 2020, 2030
Ericsson & Nilsson 2006	Technical	Resource-focused	EU25 member states + Belarus, Ukraine	10-20 yrs, 20-40 yrs, 40+ yrs
Ganko et al 2008	Technical	Resource-focused	EU27 member states	2000, 2020
Siemons et al 2004	Economic	Equilibrium of supply and demand	EU27 member states	2000, 2010, 2020
Smeets et al 2007	Technical	Resource-focused	11 world regions incl. W. Europe and E. Europe	2050
Thrän et al 2006	Technical	Resource-focused	EU27 member states + Turkey	2000, 2010, 2020
de Wit & Faaij 2008	Technical	Resource-focused	EU27 member states + Norway, Switzerland, Ukraine	2030

Total potentials, European level studies

Study	Scenario	Time frame					
		2000	2010	2020	2030	2040	2050
EEA 2006			7.9	9.9	12.3		
Ericsson & Nilsson 2006 ¹	Low biomass harvest			4.4	5.3 ²		11.2
	High biomass harvest			n.a.	7.6 ²		16.2
de Wit & Faaij 2008 ⁵	Low-yielding energy crops				8.0		
	High-yielding energy crops				24.6		
	Average				16.5		
Ganko et al 2008		4.5					
	S1			7.9			
	S2			4.9			
Siemons et al 2004		6.7	7.7	8.8			
Smeets et al 2007 ³	System 1						18
	System 2						32
	System 3						49
	System 4						59
Thrän et al 2006	Environmental+	7.5	7.8	9.0			
	Current policy	8.0	10.1	14.2			

All numbers in EJ/year.

¹All potentials refer to EU25 plus Belarus and Ukraine

²Refers to “medium-term” time frame (20-40 years from time of estimate)

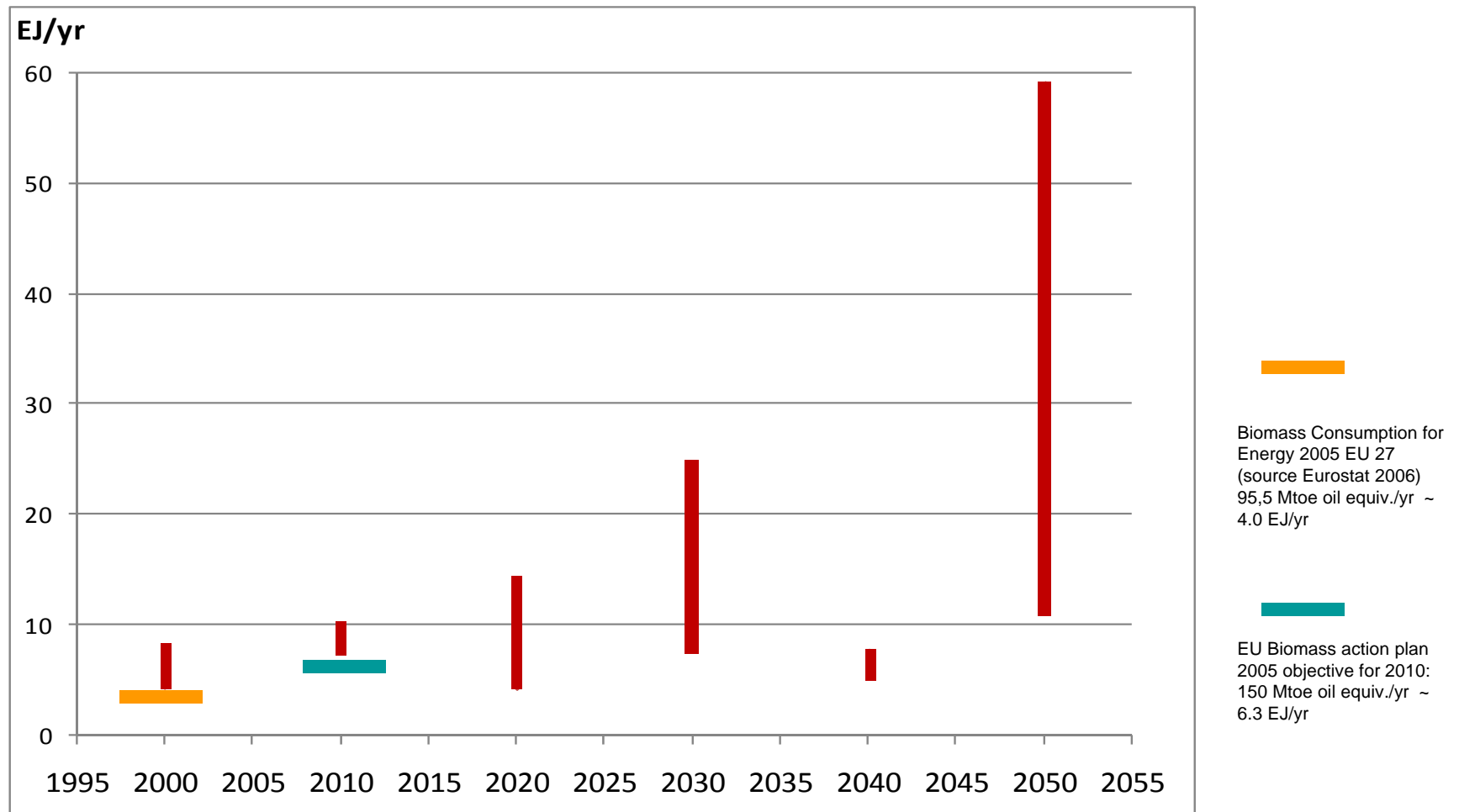
³All potentials refer to “West Europe” plus “East Europe”

⁴All potentials refer to “EU28” (EU27 + Turkey)

⁵All potentials refer to EU27 plus Norway, Switzerland and Ukraine



Estimated total biomass energy potentials for EU27: Studies covering all biomass categories



Uncertainty of estimates on global level

Current use of biomass for energy

50 EJ/a of 406 EJ/a total world energy consumption

Overview on estimates of future potential of biomass for energy

Scenario	Year		
	2025	2050	2100
Shell (1996)	85	200–220	–
IPCC (1996)	72	280	320
Greenpeace (1993)	114	181	–
Johansson et al. (1993)	145	206	–
WEC (1993)	59	94–157	132–215
Dessus et al. (1992)	135	–	–
Lashof and Tirpak (1991)	130	215	–
Faaij (2006)		40-1100	

Source:

Kyriakos MANIATIS & Paul GRABOWSKI, Presentation, Bioenergy Contractors Meeting, 15-16 Oct 2008, Brussels

Detailed comparison (1)

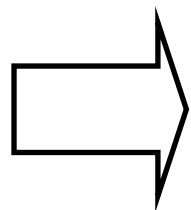
	EEA Report 2007	Asikainen et al. 2008
Approach	Demand-driven	Resource-focused
Spatial focus	EU 25	EU 27
Potential	Sustainable	Technical
Input data	FAO statistics, digital maps	FAO statistics
Method	Modelling	Inventory
Scenario assumptions	Ecological criteria and recovery rates	Availability and recovery rates
Biomass	Felling residues, unutilised round wood	Felling residues, unutilised round wood, stumps
Estimated resources for EU 21, EJ in 2005	1.015 (Min limitations)	1.584 (stumps < 5%)

Detailed comparison (2)

	EEA Report 2007	Thrän et al. 2006
Approach	Demand-driven	Demand-driven
Spatial focus	EU 25	EU 15, EU 28
Potential	Sustainable	Economic, technical
Input data	FAO statistics, digital maps	FAO statistics, EFSOS, TBFRA-2000
Method	Modelling (EFISCEN, EFI-GTM)	Modelling (EFISCEN)
Scenario assumptions	Ecological criteria and recovery rates	Economic and technical criteria
Biomass	Felling residues, unutilised round wood	Felling residues, unutilised round wood
Estimated resources for EU 13, EJ in 2010	Max limitations: 0.484 Min limitations: 0.791	Technical potential: 0.723

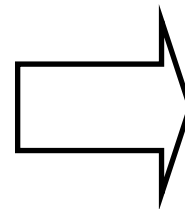
Conclusions

- The difference between the reported wood biomass potentials in some cases is multiple for the same geographic area and time
 - The reviewed assessments are very diverse in terms of approaches, methodology and assumptions
 - Many authors highlighted insufficient quality of available input data
- Creation of a **multi-source snapshot based on available studies of biomass for energy potential** is complicated



Need for detailed analysis of methods to understand differences

Need for harmonisation



Subject of BEE project work in the next two years

Major challenges

- Harmonisation of methods
- Improvements with respect to data sources for the studies
- Development of documentation standards
- Integration of sustainability
 - Specifically of the new EU criteria (expected end of 2008 for biofuels & 2009 for other energy utilisations)
 - Biodiversity
 - GHG balance aspects
 - ILUC
 - Food security and further targets on competition to food production



Thank you!



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