I. Information survey

II. Literature Review of…

Draft of report

World Bioenergy Association (WBA)

Project: **BIOENERGY, CERTIFICATION** and **SUSTAINABILITY CRITERIA**

Working group: *Johan Vinterbäck, PhD (coordinator)*
Svetlana Ladanai, PhD
Department of Energy and Technology
Swedish University of Agricultural Sciences (SLU), Uppsala

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I. Information survey:

How well different criteria are represented within bioenergy issue

Approach:

- among most important human activities
- central actor in a knowledge-based society
- adjusted to the world trends

Publications - significant result of scientific research

256 discipl.

Method:

ISIWOKAD products are high-quality research databases
Analyse Tool of **ISIWOKAD** to discover trends and patterns

The bibliography found with help of ISI Web of Knowledge All Databases (ISIWOKAD) contains materials collected 090804

We have followed all applicable search rules when creating search queries

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Results:

Research problem = world trends

The role of bioenergy as the most important RE for the near/medium future

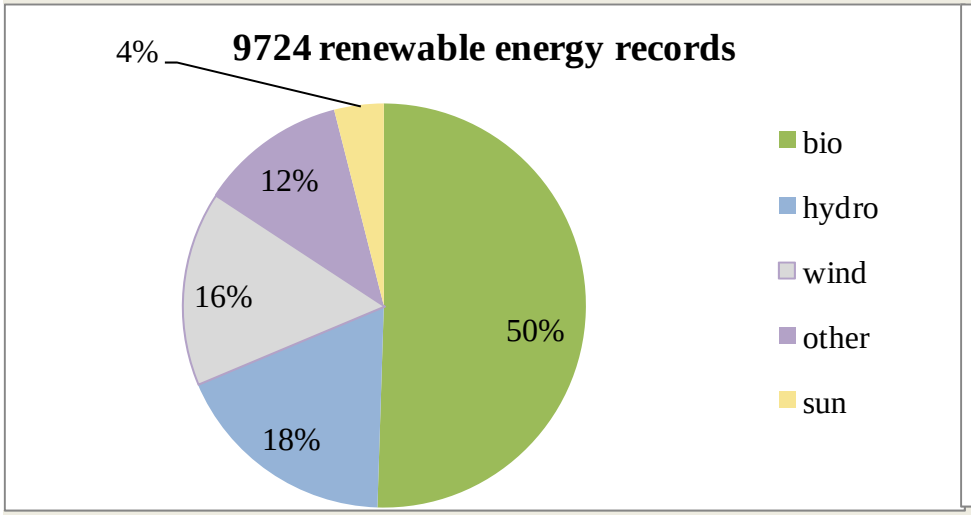

Fig. 2. Relative distribution of renewable energy records

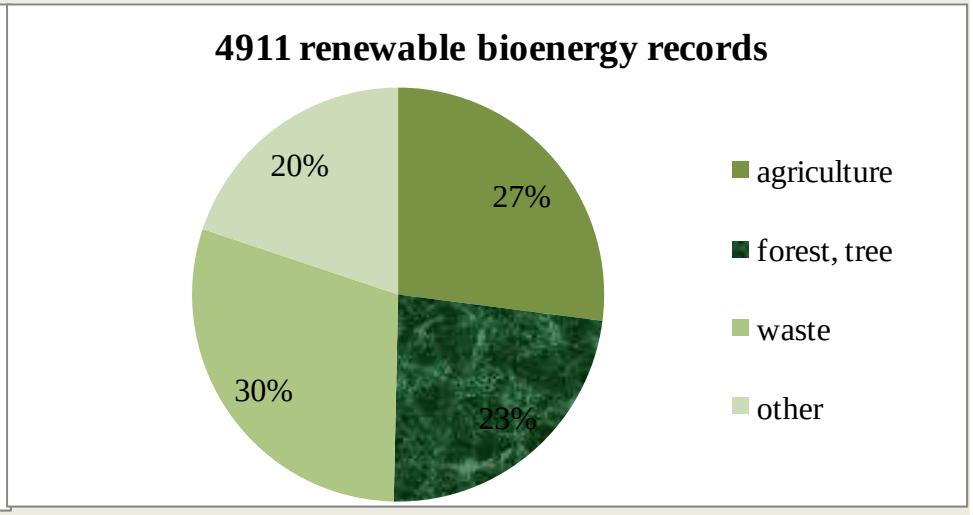

Fig. 3. Relative distribution of 4911renewable bio-energy records

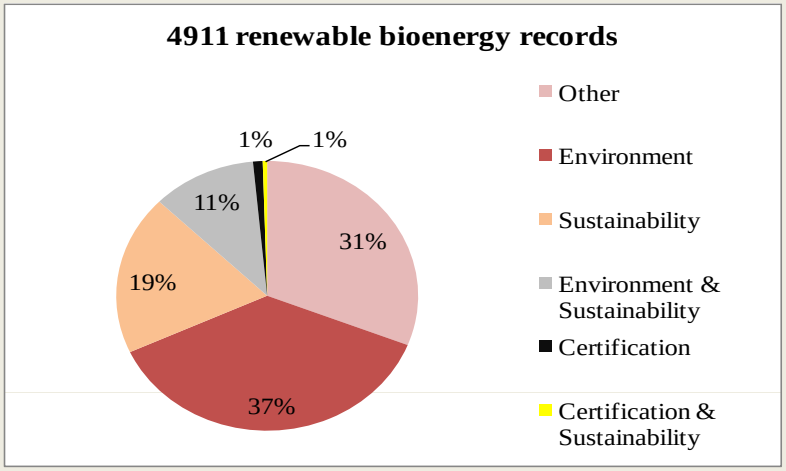

Fig. 4. Relative distribution of records of different criteria within 4911 renewable bio-energy records

Conclusion: **We need more research on sustainability criteria and certification**

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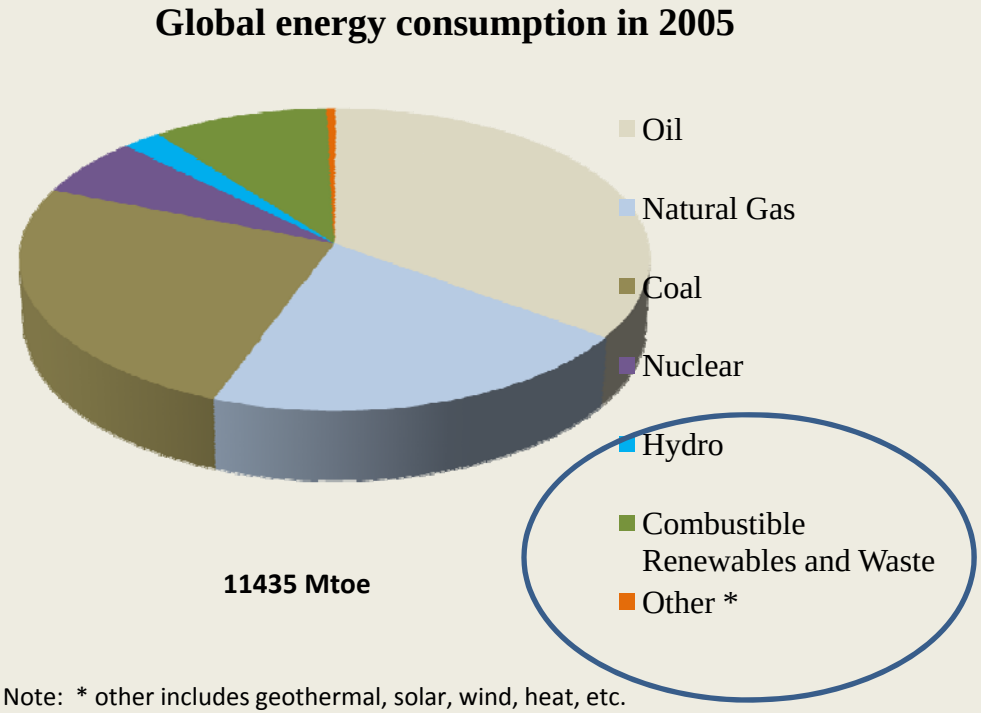
II. Litterature Review:

energy, biomass potential, sustainability, certification

1. Energy - *fundamental for our social and economic development*



Note: * other includes geothermal, solar, wind, heat, etc.

Fig. 5. Constitutes of the global energy consumption in 2005. (Source: IEA, 2007b)

Concern:
- energy shortage
-shortage of material resources
- environmental issues are becoming one of the most important problems

need to change the situation.

-20% of energy from renewables in 2020 in EU

The exploitation of RE sources can help the EU meet many of its environmental and energy policy goals, including its obligation to reduce greenhouse gases under the Kyoto Protocol (EC, 2002a) and the aim of securing its energy supply (EC, 2002b; EC, 2005).

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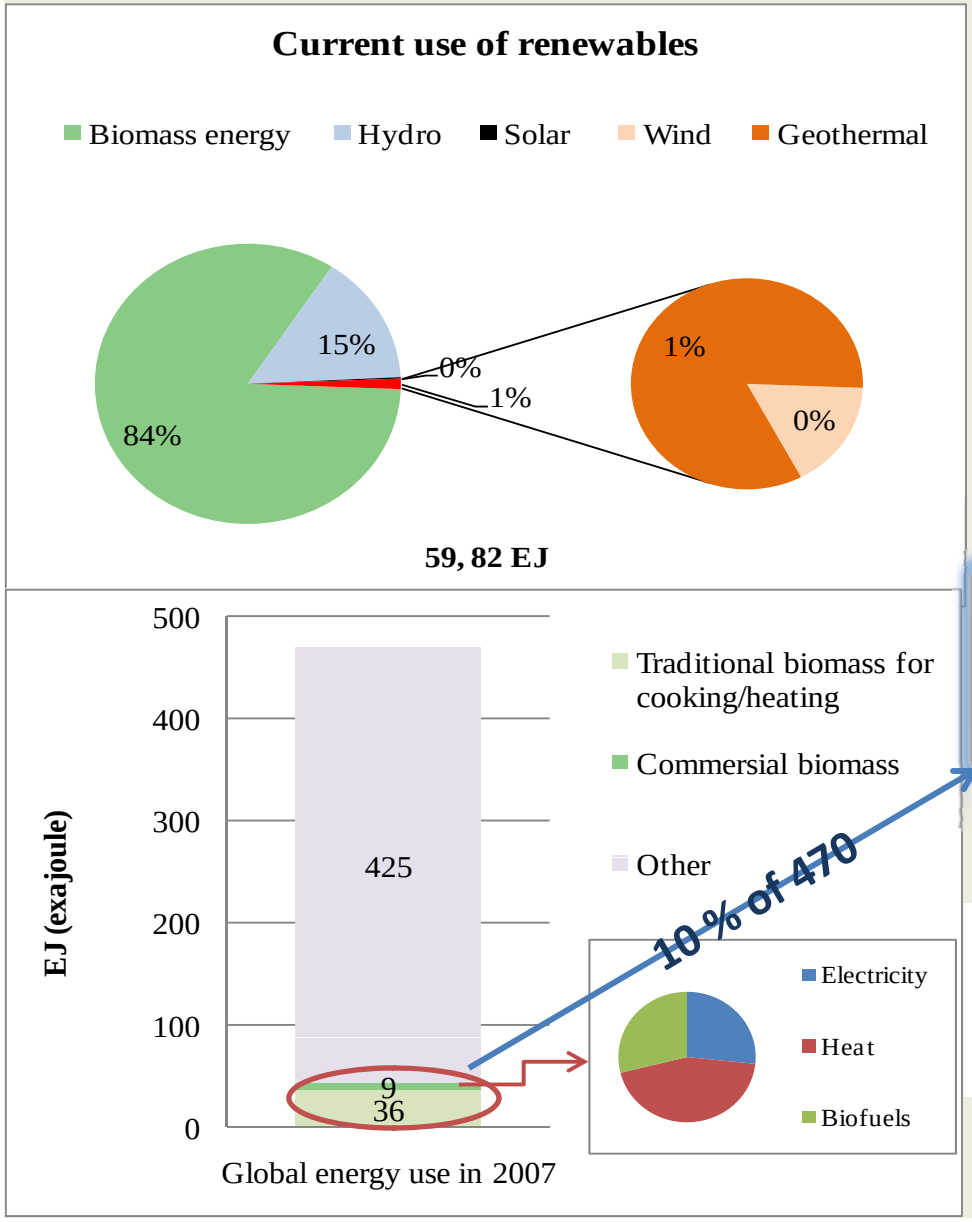
2. Biomass use: Advantage: Underused

Fig. 11. Overview of current use of different renewable energy options (WEA, 2000).



Advantage: the largest renewable energy source today

GPP = 4,500 EJ/yr (Sims2004)

5% of GPP (225 EJ) **50% of 470** (235 EJ)

270 EJ – possible on a sustainable basis (Hall et. al., 1998)

However…contribution of biomass to the global energy use of 470 EJ in 2007 is only 10 %, mainly in the form of traditional non-commercial biomass

Used 10% of 470 …

Possible: 50% of 470 or **5% of GPP**

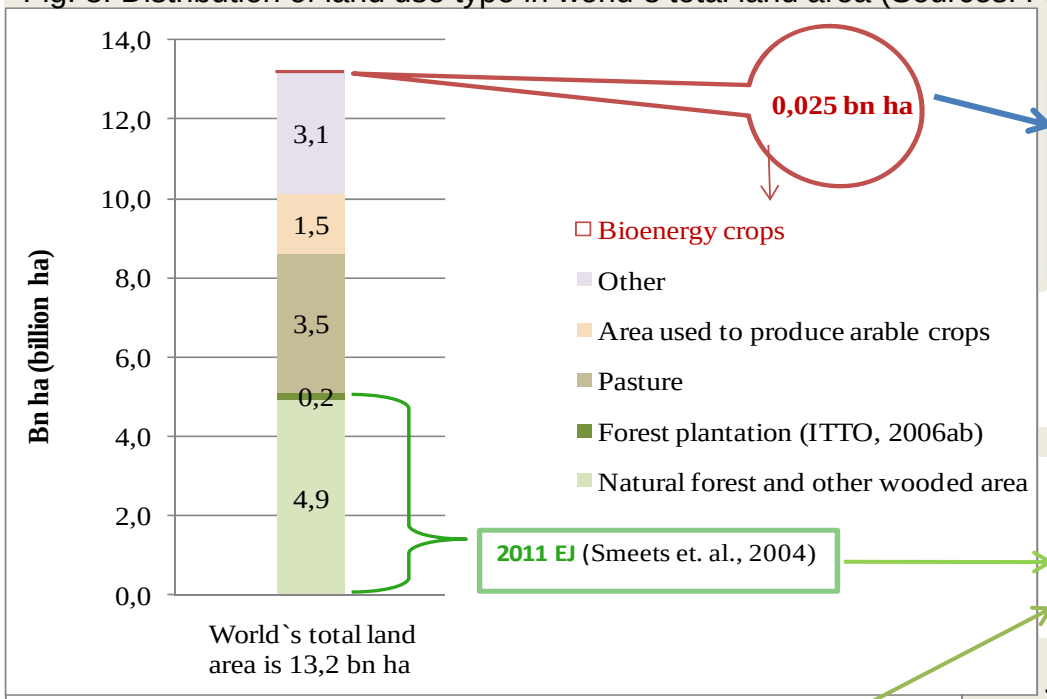
Advantage: biomass can be used in several fields (heat, power, liquid biofuels and biobased products)

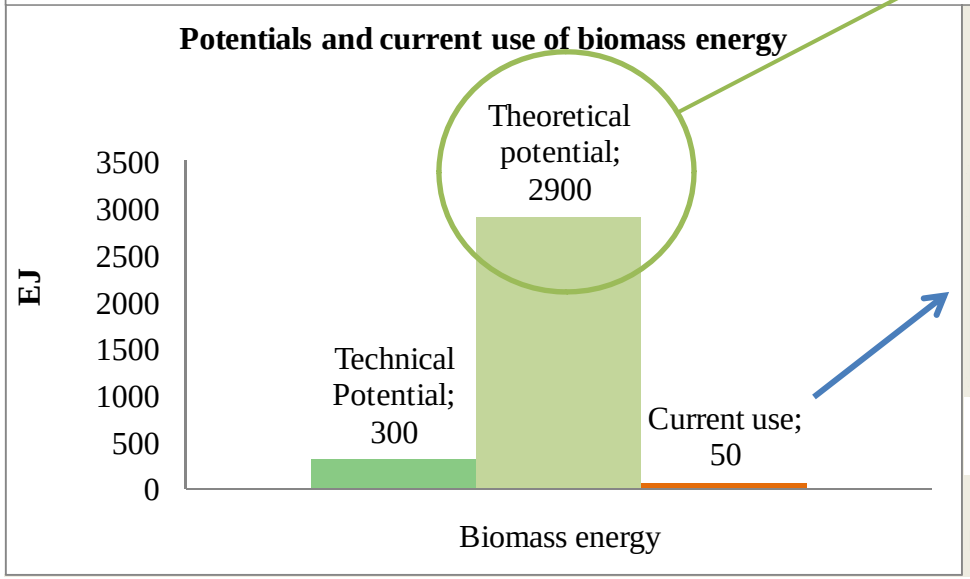
Fig.7. Contribution of biomass to global energy use of 470 EJ in 2007. (Source: Faaij, 2008).

2. Biomass use and potential:

Biomass use – Land availability

Fig. 8. Distribution of land use type in world´s total land area (Sources: Faaij, 2008; ITTO 2006ab, Smeets et. al., 2004).





However…the amount of land devoted to growing biofuels is only 0.19 % of the World`s total land area of 13.2 bn ha

Advantage: World`s total land area is biomass- underused

Current forest standing stock + Theoretical potential of biomass energy =

= **there is a large reservoir of bioenergy**

- Theoretical = 2,900 EJ

-5% of Theoretical (145 EJ) = 50% of 300 (145 EJ) = sustainable

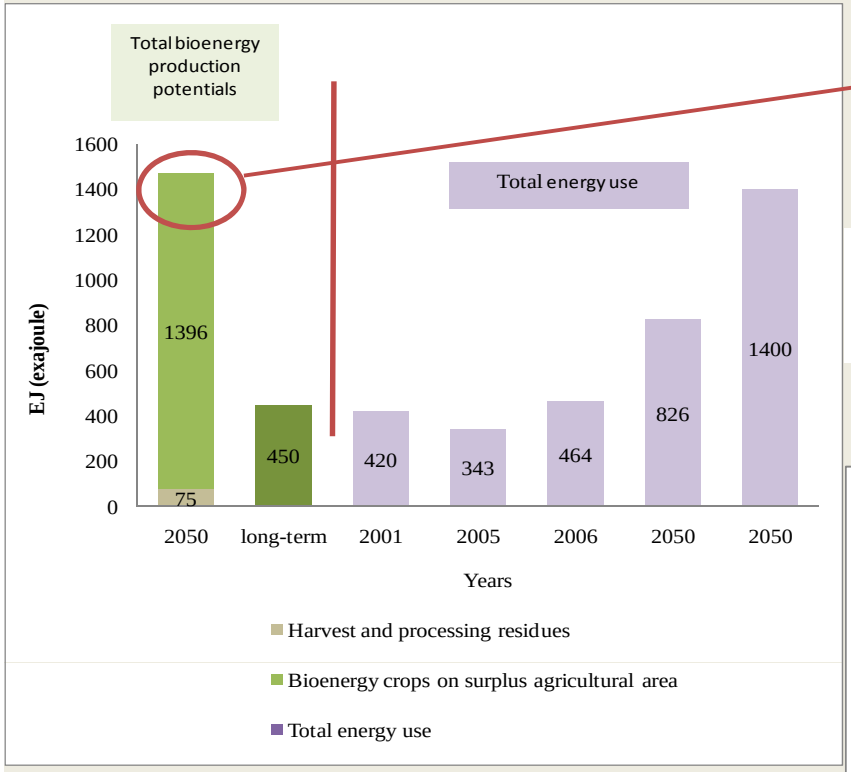
However…current use of biomass energy is only 0.6 % of Theoretical and is only 6 % of Technical potentials …

Advantage: Biomass potential is underused

Fig. 10: Overview of current use, and the technical and theoretical potentials of biomass energy [WEA, 2000].

3. Biomass potential:

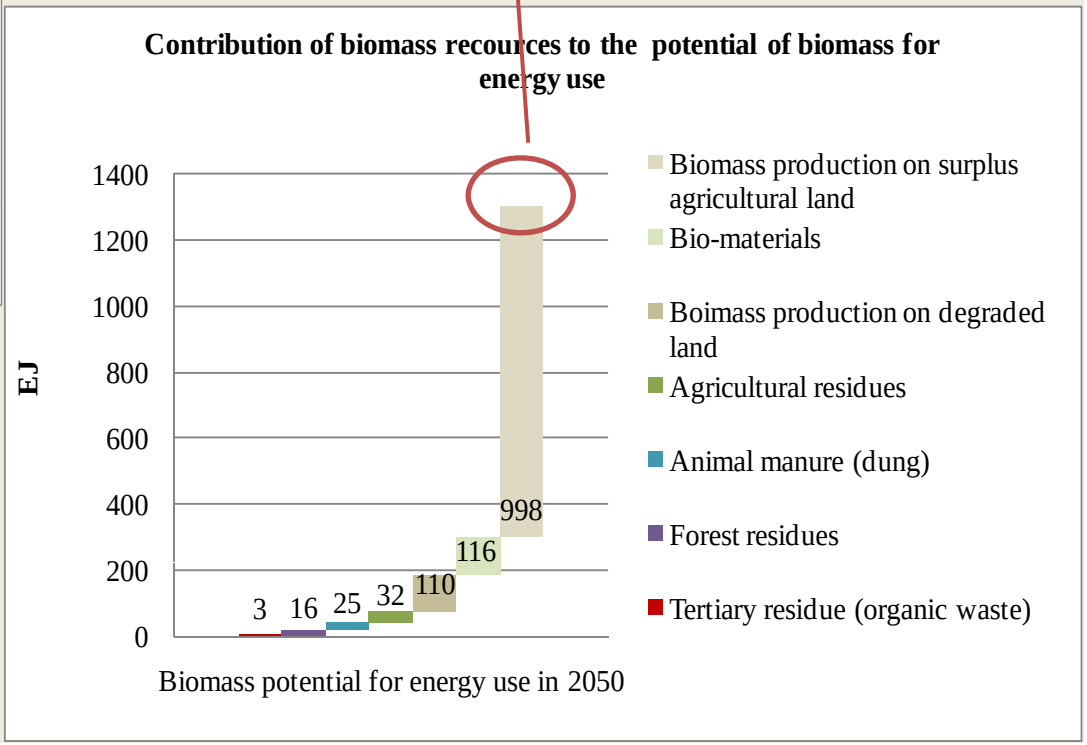
Fig. 6. The total global maximal bioenergy production potential in 2050 and in the long-term perspective and the total global energy use for different years



… these results are in line with each other + with the previous (2900EJ)+ with various other estimates of the bioenergy production potential

…energy crops from surplus agricultural land have the largest potential contributions

Fig. 9. Contribution of each biomass resource categories to the global potential of biomass for energy use in 2050 (Source: Hoogwijk et al, 2003).



… can be a valuable element of a new energy mix

… is large enough to meet the global bioenergy demand in 2050

3. Biomass potential:

Advantage:
Renewability and Versatility

Advantage: large volumes of unused residues and wastes

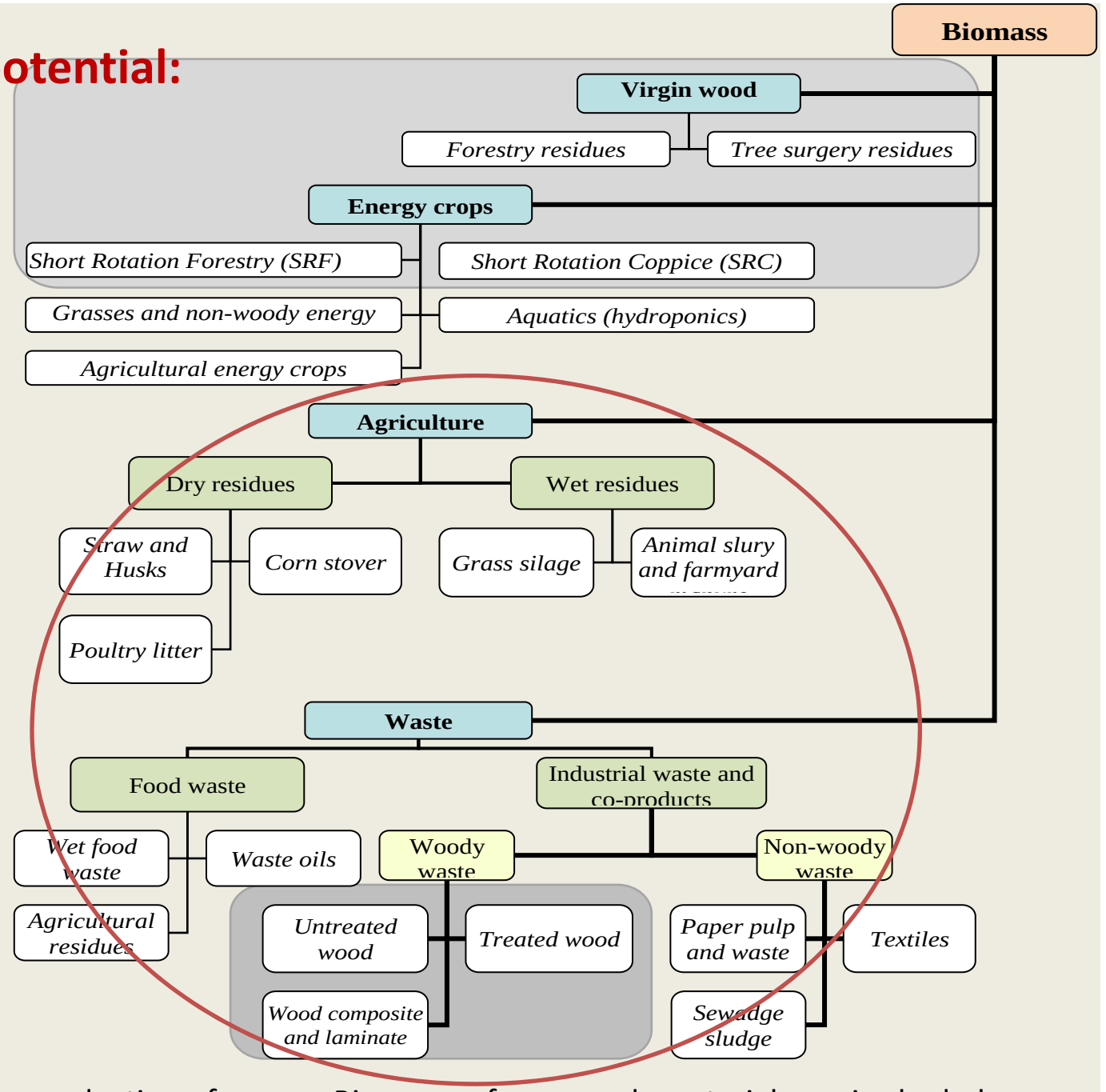


Figure 1. Sources of biomass for production of energy. Biomasses from woody materials are in shaded area.

4. Sustainability, Certification

The experience in For. Sector – most relevant for development of BCS

Table 1. Global, international and national forest certification schemes.

Schemes/ Standards-setting bodies	Country/Region	Abreviation	When the scheme came into existence	Principles that form the basis of the forest certification standard
Forest Stewardship Council A.C. http://www.fsc.org/	Global	FSC		FSC P&C
Pan European Forest Certification	International	PEFC		Pan-European Montreal ITTO Amazon Tarapoto ATO FAO Near East Lepaterique FAO Dry Africa
Australian Forest Certification Scheme	Australia	AFS [a]	1999	Montreal
PEFC Austria	Austria	PEFC Austria		Pan-European

BCS: FSC + PEFC + additional tools and policies.

Principles/standards established for 19 social and economic functions

Abreviation	Principles/Standards Social and Economic functions																	
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
Global/International																			
FSC	-	-	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-
PEFC	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-
National																			
AFS	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	-
ATFS	-	-	+	+	+	+	+	+	-	+	+	-	-	+	-	-	-	+	+
CFCH	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-

Abreviation	Principles/Standards Environmental functions														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Global/International															
FSC	+	+	+	+		-	+	+	+	+	+	+	+	+	-
PEFC	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+
National															
AFS	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
ATFS	+	+	+	-	+	-	+	+	+	+	+	+	-	+	+

Principles/standards established for 15 environmental functions

III. CONCLUSIONS

1. Biomass is the most important renewable energy option at present

2. Biomass has the potential to become the world's largest and most sustainable energy source and will be very much in demand

3. Based on the literature review and analysis of the existing forest certification schemes it is recommended to develop an internationally applicable biomass certification system complementing the existing FSC and PEFC schemes by relevant additional tools and policies. These are the United Nations Convention on the Rights of Children and ILO Conventions and Recommendations.

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Abstract: Biomass is a versatile raw material that can be used for production of heat, power, transport fuels, and bioproducts. When produced and used on a sustainable basis, it is a carbon-neutral carrier and can make a large contribution to reducing greenhouse gas emissions. Currently, biomass-driven combined heat and power, co-firing, and combustion plants provide reliable, efficient, and clean power and heat. Production and use of biofuels are growing at a very rapid pace. Sugar cane-based ethanol is already a competitive biofuel in tropical regions. In the medium term, ethanol and high-quality synthetic fuels from woody biomass are expected to be competitive at crude oil prices above US$45 per barrel. Feedstocks for bioenergy plants can include residues from agriculture, forestry, and the wood processing industry, as well as biomass produced from degraded and marginal lands. Biomass for energy may also be produced on good quality agricultural and pasture lands without jeopardising the world's food and feed supply if agricultural land use efficiency is increased, especially in developing regions. Revenues from biomass and biomass-derived products could provide a key lever for rural development and enhanced agricultural production. Certification schemes are already established to ensure sustainable production of forest biomass and could be adopted to guide residue recovery and energy crop production. Biomass utilisation will be optimised by processing in biorefineries for both products and energy carriers. Given these possibilities, the potential contribution of bioenergy to the world energy demand of some 467 EJ per year (2004) may be increased considerably compared to the current 45-55 EJ. A range from 200-400 EJ per year in biomass harvested for energy production may be expected during this century. Assuming expected average conversion efficiencies, this would result in 130-260 EJ per year of transport fuels or 100-200 EJ per year of electricity.