ITALIAN NATIONAL AGENCY FOR NEW TECHNOLOGIES, ENERGY AND SUSTAINABLE ECONOMIC DEVELOPMENT

Biomass Inventories SAHYOG (first steps towards the templates and methodology)

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Objective of the biomass inventory in SAHYOG

To provide information on the type and amount of biomass in Europe/India that can be utilized for the production of energy, biofuels as well as bioproducts.

Biomass

- Woody biomass
- Agricultural crops and crop residues
- Food processing waste
- Animal manure
- Municipal solid waste

Why create a database?

- Biomass resources are widespread and diffuse
- Quantity and localization are key features for biomass
- To deal with biomass heterogeneity and availability
- Complex organization for harvesting, storage, transportation, concentration
- Identify regions/areas suitable for biomass exploitation

This inventory will provide a starting point for legislators, policymakers, industry, entrepreneurs, farmers, researchers, and anyone interested in promoting the use of biomass.

Methodology

Merging existing information on biomass sources into a new free accessible database

Establishing a template for the biomass inventory

Article 4 of Directive 2009/28/EC on Renewable Energy requires Member States to submit national renewable energy action plans by 30 June 2010. These plans, prepared in accordance with the template published by the Commission, provide detailed roadmaps of how each Member State expects to reach its legally binding 2020 target for the share of renewable energy in their final energy consumption.

Template for National Renewable Energy Action Plans of the European Member States

Table 7: Biomass supply in 2006

Sector of origin		Amount of domestic resource[26]	Imported		Exported	Net amount	Primary energy production (ktoe)
			EU	Non-EU	EU/non-EU		
A) Biomass from forestry[27]:	*Of which:*						
	1. direct supply of wood biomass from forests and other wooded land for energy generation						
	Optional - if information is available you can further detail the amount of feedstock belonging to this category:: a) fellings b) residues from fellings (tops, branches, bark, stumps) c) landscape management residues (woody biomass from parks, gardens, tree rows, bushes) d) other (please define)						
	2. indirect supply of wood biomass for energy generation						
	Optional - if information is available you can further detail: a) residues from sawmilling, woodworking, furniture industry (bark, sawdust) b) by products of the pulp and paper industry (black liquor, tall oil) c) processed wood-fuel d) post consumer recycled wood (recycled wood for energy						

Template for National Renewable Energy Action Plans of the European Member States

		Amount of domestic resource[26]	Imported		Exported	Net amount	Primary energy production (ktoe)
			EU	Non-EU	EU/non-EU		
	generation, household waste wood) e) other (please define)						
B) Biomass from agriculture and fisheries:	*Of which:*						
	1. agricultural crops and fishery products directly provided for energy generation						
	Optional - if information is available you can further detail: a) arable crops (cereals, oilseeds, sugar beet, silage maize) b) plantations c) short rotation trees c) other energy crops (grasses) d) algae e) other (please define)						
	2. Agricultural by-products / processed residues and fishery by-products for energy generation						
	Optional - if information is available you can further detail: a) straw b) manure c) animal fat d) meat and bone meal e) cake by–products (incl. oil seed and olive oil cake for energy) f) fruit biomass (including shell, kernel) g) fishery by product g) clippings form vines, olives, fruit trees h) other (please define)						
C) Biomass from waste:	*Of which:*						
	1. Biodegradable fraction of municipal solid waste including biowaste (biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises, and comparable waste from food processing plants) **and landfill gas**						
	2. Biodegradable fraction of industrial waste (including paper, cardboard, pallets)						
	3. Sewage sludge						

IPCC SRREN - Chapter 2 on Bioenergy

Table 2.2 | Global technical potential overview for a number of categories of land-based biomass supply for energy production (primary energy numbers have been rounded). The total assessed technical potential can be lower than the present biomass use of about 50 EJ/yr in the case of high future food and fibre demand in combination with slow productivity development in land use, leading to strong declines in biomass availability for energetic purposes.

Biomass category	Comment	2050 Technical potential (EJ/yr)
Category 1. **Residues from agriculture**	By-products associated with food/fodder production and processing, both primary (e.g., cereal straw from harvesting) and secondary (e.g., rice husks from rice milling) residues.	15 – 70
Category 2. **Dedicated biomass production on surplus agricultural land**	Includes both conventional agriculture crops and dedicated bioenergy plants including oil crops, lignocellulosic grasses, short-rotation coppice and tree plantations. Only land not required for food, fodder or other agricultural commodities production is assumed to be available for bioenergy. However, surplus agriculture land (or abandoned land) need not imply that its development is such that less total land is needed for agriculture: the lands may become excluded from agriculture use in modelling runs due to land degradation processes or climate change (see also 'marginal lands' below). Large technical potential requires global development towards high-yielding agricultural production and low demand for grazing land. Zero technical potential reflects that studies report that food sector development can be such that no surplus agricultural land will be available.	0 – 700
Category 3. **Dedicated biomass production on marginal lands**	Refers to biomass production on deforested or otherwise degraded or marginal land that is judged unsuitable for conventional agriculture but suitable for some bioenergy schemes (e.g., via reforestation). There is no globally established definition of degraded/marginal land and not all studies make a distinction between such land and other land judged as suitable for bioenergy. Adding categories 2 and 3 can therefore lead to double counting if numbers come from different studies. High technical potential numbers for categories 2 and 3 assume biomass production on an area exceeding the present global cropland area (ca. 1.5 billion ha or 15 million km^2). Zero technical potential reflects low potential for this category due to land requirements for, for example, extensive grazing management and/or subsistence agriculture or poor economic performance if using the marginal lands for bioenergy.	0 – 110
Category 4. **Forest biomass**	Forest sector by-products including both primary residues from silvicultural thinning and logging, and secondary residues such as sawdust and bark from wood processing. Dead wood from natural disturbances, such as fires and insect outbreaks, represents a second category. Biomass growth in natural/semi-natural forests that is not required for industrial roundwood production to meet projected biomaterials demand (e.g., sawn wood, paper and board) represents a third category. By-products provide up to about 20 EJ/yr implying that high forest biomass technical potentials correspond to a much larger forest biomass extraction for energy than what is presently achieved in industrial wood production. Zero technical potential indicates that studies report that demand from sectors other than the energy sector can become larger than the estimated forest supply capacity.	0 – 110
Category 5. **Dung**	Animal manure. Population development, diets and character of animal production systems are critical determinants.	5 – 50
Category 6. **Organic wastes**	Biomass associated with materials use, for example, organic waste from households and restaurants and discarded wood products including paper, construction and demolition wood; availability depends on competing uses and implementation of collection systems.	5 – >50
Total		**<50 – >1000**

Notes: Based on Fischer and Schrattenholzer (2001); Hoogwijk et al. (2003, 2005, 2009); Smeets and Faaij (2007); Dornburg et al. (2008, 2010); Field et al. (2008); Hakala et al. (2009); IEA Bioenergy (2009); Metzger and Huttermann (2009); van Vuuren et al. (2009); Haberl et al. (2010); Wirsenius et al. (2010); Beringer et al. (2011).

Biomass categori

1. Biomass from forestry
2. Biomass from agriculture and fisheries
3. Biomass from waste

1. Agricultural crops and fishery products directly provided for energy, materials and chemical production

Optional-if information is available you can further details

a) oil crops

b) sugar crops

b) starch crops

c) short rotation trees

d) other energy crops (grasses)

e) algae

f) other (plea

2. Agricultu … es and fishery by-p… chemicals p…

Optional-if i… …her details

a) straw

b) waste oils

c) animal fat

d) manure

e) meat and …

f) cake by–p… and olive oil…

g) fruit biom… kernel)

h) fishery by…

i) clippings f…

l) other (please define)

1. Biodegradable fraction of municipal solid waste including biowaste (biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises, and comparable waste from food processing plants)

2. Biodegradable fraction of industrial waste (including paper, cardboard, pallets)

3. Sewage sludge

4. landfill gas

To discuss with experts

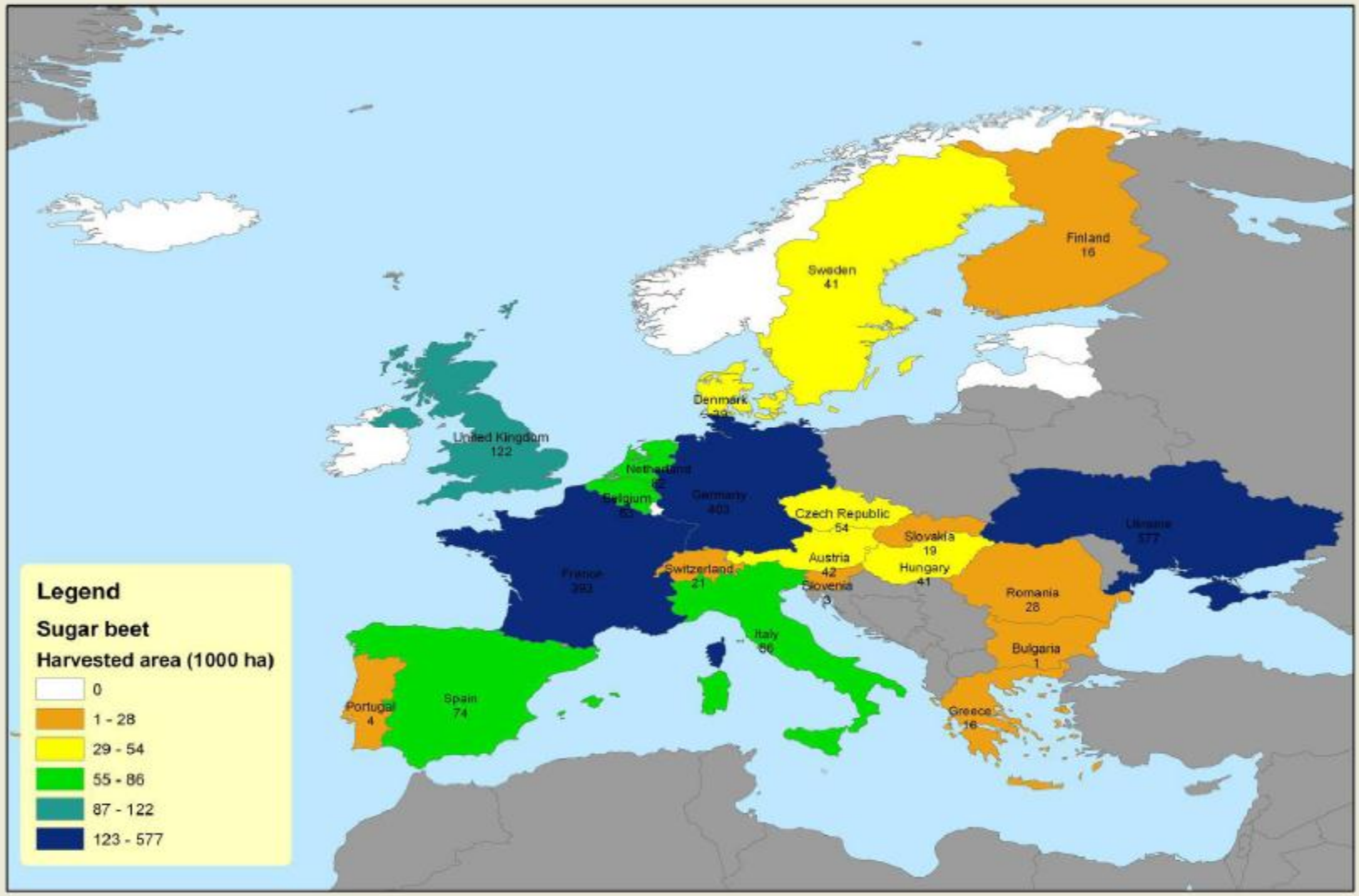
Cut-off limit under which the biomass amount is not significant either for energy, biofuels and bioproducts production

Template for SAHYOG inventory

Biomass resources

Total biomass/ gross potential		Used biomass (%)	Net biomass potential		Energy content			Conversion processes	Geographycal location	Source/link	Reference years	Notes
Tons	m^3		Tons	m^3	MWh	TJ	Ktoe					

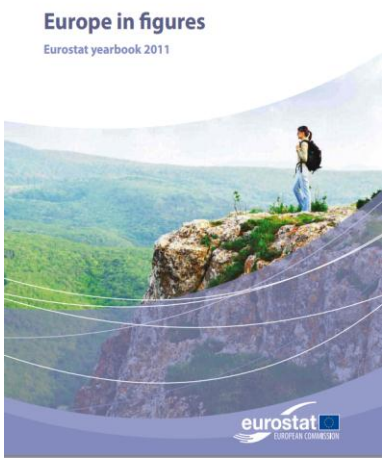
Biomass resources mapping using GIS

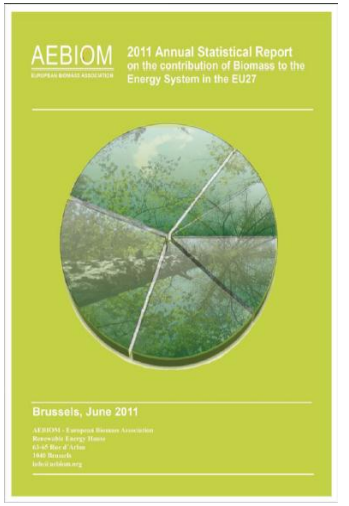


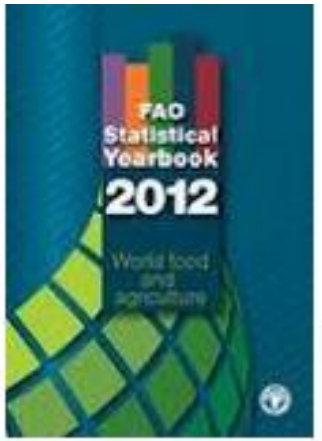
FAO data, year 2007

Existing biomass databases

- **FAOSTAT**
- **EUROSTAT**
- **NREAP**
- **AEBIOM**
- **IEA**
- **ATLANTE DELLE BIOMASSE (ITALY)**
- **OTHERS ?**







Atlante Nazionale Biomasse

European Environment Agency

International Energy Agency

Key World Energy STATISTICS 2011

Questions

- Data accessibility for countries not partecipating in SAHYOG project
- Reference years for data
- Use of GIS or similar softwares for biomass localization
- Connecting biomass and project inventories: should Access instead of Excel be used?
- Updates and maintenance of the inventories

Thanks for the attention!

ENEA Working Group

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