

BIOMASS & ENVIRONMENT

Miroslav Safarik, Ph.D.

Czech Environmental Institute

Dept. of Environmental Economics

Focus on Energy and Environment



**BIO-ENERGY
ENLARGED PERSPECTIVES**

Budapest ,16-17 October 2003

Biomass & sustainable development

Are we prepared to use biomass in a sustainable way?

- or are we only trying to switch to another form of wasting an energy?

There are two key principles of sustainable development concerning the use of biomass:

Biomass & sustainable development

- Exploitation of natural sources must not exceed the ratio of their reproduction in long-term period
 - with respect to their natural growth function
- Emission into nature must not exceed natural assimilation of the environment (capacity of the environment)

Biomass & sustainable development

All factors of the 3 pillars of sustainable development:

- Economic
- Environmental
- Social/individual

should be balanced at every instant.

Main environmental impacts of biomass utilization and their potential solutions

depleting of forests and natural vegetation; biodiversity and landscape impact

- long-term planning of forestry
- complying with the rules of nature protection
- performing the rules of “best practice”

exhausting of soil (of carbon, humus, nutrients, minerals etc.) and erosion

- carbon cycle assessment
- replacement of the relevant part of carbon and other nutrients to the soil
- best agriculture practice
- afforestation

emissions (particular matters, NO_x , SO_2 ,
VOC, C_xH_y , PCDD/F etc.)

- progress of efficiency in energy production, distribution and consumption
- improvement of furnaces, filters, fuel treatment

CO₂ emissions

- utilizing biomass the most effective way, regardless of the fact that biomass combustion has (almost) CO₂-neutral impact on climate change
- logistic planning

emissions of CH₄ and of other GHG

- useful methanisation of the biodegradation of biomass

processing (growing, harvesting, treatment, drying, fabrication, using, disposal...) and transport

- logistic planning
- using the standard of LCA, EIA methods and assessments
- aiming at "zero emission" schemes
- using biofuels when harvesting, treating or transporting biomass

affecting to environmental and human health

- less usage of agrochemicals, pesticides, herbicides and artificial nutrients
- extensive agriculture (energy agriculture), perennial crops and short rotation crops
- usage of best technologies and techniques for biomass utilization

SWOT analysis

SWOT matrix

Internal factors: Strengths & Weaknesses

External factors: Opportunities & Threats

Generation of strategies

Combination of key factors \Rightarrow relevant strategy

SWOT on biomass as source of energy

Strengths

- natural source (raw material) with synergic cross-sectorial effects
- long experience in growing, handling, using...
- biomass can be CO₂ (GHG) neutral

SWOT: Strengths - case study

**evaluation of an elimination of pollution when
heat source is changed**

<u>heating system</u>	<u>value (EUR/GJ)</u>
biomass - central or individual	380
- combined with thermo solar	470
natural gas - central	345
natural gas - individual	320
heat pumps	260
coal - central heating	250
the base - electrical heating (68% coal, 29% nuclear, 3% hydro)	0

SWOT on biomass as source of energy

Weaknesses

- relatively low energy content (energy density)
- emissions of some pollutants (higher than from natural gas, e.g. NO_x)
- *uncertainty of regular yield*
- *„discomfort“ in use*

SWOT on biomass as source of energy

Opportunities

- preference of BAT
- targeting R&D could accelerate new ways to SD
- „Zero emission“ industry (polygeneration)
- *sustainable agriculture and landscape*
- *afforestation*

SWOT: Opportunities - case study

	<u>Support R&D of</u>	<u>Share on TPES</u>
nuclear	70 %	7 %
fossil	20 %	75 %
RES + EE	10 %	8 % (RES)
– of it biomass ?		10 %

What is the share on Climate change and on other environmental risks ?

SWOT on biomass as source of energy

Threats

- Climate change (changes in a biomass yield)
- neglecting principles of sust. development
- *competition with „food and fibre“ production*
- *water use (dry farming)*
- *potentially dangerous emission from biomass combustion*
- *policy, particular interests, legislation...*

Conclusions: decision making

- Usage of multicriterial analysis at any level of decision making
 - through balanced environmental, social and economical criteria
- Usage of cost-benefit analysis
 - calculating of direct as well as indirect impacts (environmental, social and economical) of decisions

Conclusions: techniques and technologies

- Increase of energy efficiency
 - through technology improvement, logistics, behaviour, organisation etc.
- Preference of BAT in public sector investments
- Energy efficiency (GHG emission) should be main criteria for R&D
 - with regard to three pillars of sust.development

Conclusions: society

- Changing behaviour
 - through education, upbringing, exemplariness...
- Cutting energy consumption down to sustainable level
- Continuing multilevel discussion on question what sustainable level means and how to go there...

Through understanding what
sustainable utilisation of biomass
entails
we might understand what
sustainable development really
means...

contact: safarik@ceu.cz

ANNEX - R&D projects in the Czech Republic in progress

Bioelectricity:	development more effective technology
Biogas:	two-step anaerobic digestion (co-fermentation)
Primary source:	1) study to potential of RES to 2050 2) feed sorrel production and testing 3) poplar production and testing
Bioethanol:	bioethanol production from wood-base stuff (lignocellulose)
Other:	chill generation based on biomass combustion

**THANK YOU FOR YOUR
PATIENCE**



HARVESTING OF ENERGY CROPS IN CR