WBA Position Paper on
Global Potential of Sustainable Biomass for Energy

Introduction

The purpose of the World Bioenergy Association (WBA) is to promote the increasing utilisation of bioenergy globally in an efficient, sustainable, economic and environmentally friendly way. One prominent item in the WBA Action Plan is to "Initiate and promote a study of the potential of biomass for energy built on already presented research. Consequences for food and forest industry must be seriously treated and analysed".

Hence, the WBA has initiated a project on "Bioenergy, Certification Criteria, Quantifying and Sustainability Criteria & Bioenergy versus Food, Land-use and Water Supply".

The research partner is Swedish University of Agricultural Sciences and the Swedish Board of Agriculture is providing financing for the research project.

The project will result in three World Bioenergy Association Position Papers:

WBA Position Paper no 1: Global Potential of Sustainable Biomass for Energy (Report 013, ISSN 1654-9406, Swedish University of Agricultural Sciences)

WBA Position Paper no 2: Certification Criteria for Sustainable Biomass for Energy

WBA Position Paper no 3: Biomass for Energy versus Food and Feed, Land Use Analyses and Water Supply

All of them will be released in 2009. The first position paper is summarized below.

Conclusions

- The world's bioenergy potential is large enough to meet the global energy demand in 2050. There are no technical problems in shifting the energy mix from fossil fuels to bioenergy.

- In the past decade, the number of countries exploiting biomass opportunities for the provision of energy has increased rapidly. The global use of biomass for energy increases continuously and has doubled in the last 40 years.

- Bioenergy provides an effective option for the provision of energy services from a technical point of view. In addition, the benefits accrued go beyond energy provision, creating unique opportunities for regional development. Bioenergy can be the solution to economic, national, environmental and political security.

- Biomass can be used to produce different forms of energy such as power, fuels, heating and cooling, thus providing all the energy services required in a modern society.

- The future potential for energy from biomass depends to a great extent on land availability. Currently, the amount of land devoted to growing biofuels is only 25 million hectares or 0.19% of the world's total land area.

- Sustainable development of biomass is the major challenge in increasing the production of biomass. Bioenergy is based on resources that can be utilized on a sustainable basis all around the world.

- Certification is judged to be the most suitable instrument for the development of sustainable bioenergy systems. Development and implementation of certification systems is an important tool for achieving sustainable bioenergy.

GLOBAL POTENTIAL OF SUSTAINABLE BIOMASS FOR ENERGY

Renewable Energy

There is no doubt that energy is fundamental for our development. Energy is vital for the internal and external security of a country and energy is at the core of many social, environmental and economical security challenges. Global energy trends, irreversible climate change and demand for energy security highlight the need for a rapid transition to a low-carbon, sustainable, efficient and environmentally benign energy system.

The search for energy alternatives involving locally available renewable resources is one of the main concerns of governments, scientists and business people worldwide. Renewable energy sources need to play a key role in the near future. The worldwide production of renewable energy is expected to grow quickly and its share of the global energy mix will increase.

Many countries have already adopted goals to enhance the role of renewable sources in their energy supply

Biomass as a renewable energy source

Since the beginning of civilization, biomass has been a major source of energy for the world's people. Biomass is the primary source of energy for half of the global population. In the developing world, wood biomass is a major renewable energy source, representing a significant proportion of the rural energy supply.

At present, bioenergy is the most important renewable energy option and will remain so the near and medium-term future. It will therefore play a crucial role in integrated systems of future energy supply and will be a valuable element in a new energy mix. In the past decade, the number of countries exploiting biomass opportunities for the provision of energy has increased rapidly, and has contributed to making biomass an attractive and promising option among other renewable energy sources. Biomass has the potential to become the world's largest and most sustainable energy source and will be very much in demand.

Review of bioenergy studies

There have been many studies performed during the past decades to estimate the future demand and supply of bioenergy. The purpose with this report is to synthesize relevant information of bioenergy potential to determine the "Global Potential of Sustainable Biomass for Energy".

Annual production of biomass

The annual global primary production of biomass is equivalent to the 4,500 Exajoules (EJ) of solar energy captured each year. A mere 10 percent increase in the efficiency of biomass production through irrigation, manuring, fertilizing and/or improved management through the cultivation of idle land, would create energy equivalent to the total current global energy demand. A prerequisite for achieving the great potential of bioenergy in all regions is replacing the current inefficient and low-intensive management systems with best practices and technologies.

Furthermore, the world has access to a huge amount of unutilized biomass through harvesting algae. Currently, there is no algae exploitation taking place.

Land availability

The potential for energy from biomass depends to a great extent on land availability. Currently, the amount of land devoted to growing biofuels is only 0.19 percent of the world's total land area and only 0.5 percent of global agricultural land. From all of these perspectives, the evidence gathered by the report leads to a simple conclusion: the potential of biomass for energy production is quite promising. There are no technical problems in shifting the energy mix from fossil fuels to bioenergy. However, more effort must be put into making the overall systems more efficient.

Comparison between global bioenergy production potential and the primary energy consumption in 2050

It is interesting to compare different references on the total global bioenergy production potential in 2050. According to one global energy scenario (Smeets et al., 2006), the total global bioenergy production potential in 2050 is 1,548 EJ based on scenario 4, where the agricultural management practices applied are similar to the best available technologies in the world's industrialized regions.

These results are in line with other estimates of bioenergy production potential. For example, according to recent studies, rang of the global potential of biomass in 2050 is 1,300-1,135 EJ (Hoogwijk et al., 2005). Energy crops from surplus agricultural land account for the largest potential contributions.

Looking at the global primary energy consumption in 2050, on the other hand, one finds estimates which range from 601 EJ in a low consumption scenario, to 837 EJ in a medium consumption scenario, and on up to 1,041 EJ in a high consumption scenario (Smeets et al., 2004). The references can be found in this report.

If we compare the total global bioenergy production potential in 2050 of 1,135-1,548 EJ with the highest scenario on the global primary energy consumption in 2050 of 1,041 EJ, we see that the world's bioenergy potential is large enough to meet the global energy demand in 2050.

Lack of public awareness of biomass potential

However, the information about the enormous potential of bioenergy is, unfortunately, not part of the public consciousness. As attitudes often shape public behavior, it is very important to spread information widely and let people know of bioenergy's large potential. Supplying the public with important information about bioenergy can equip them to put pressure on politicians to create a framework for increasing the speed with which bioenergy solutions are implemented.

Bioenergy versatility

Bioenergy is attractive at all stages of development due to its potential integration with a wide range of development strategies around the world. Most experts recognize the potential of bioenergy and believe it provides a number of opportunities to address issues other than energy, including serving as a possible solution to economic, national, environmental and political security concerns. Moreover, bioenergy is based on resources that can be utilized on a sustainable basis all around the world and can thus serve as an effective option for the provision of energy services. In addition, the benefits accrued go beyond energy provision, creating unique opportunities for regional development.

Biomass can be used to produce different forms of energy, thus providing all the energy services required in a modern society. Furthermore, compared to other renewable resources, biomass is one of the most common and widespread resources in the world. Thus, biomass has the potential to provide a renewable energy source, both locally and across large areas of the world

Unfortunately, many potential investors in bioenergy projects lack a solid understanding of all the technical, social and environmental issues associated with bioenergy. Thus, bioenergy production generally has a higher capital cost than fossil fuel alternatives. However, the lower cost of the biomass provides a quick commercial payback and increasing savings over the longer term.

Sustainable criteria

It's more important than ever to reliably demonstrate that the advantages of biofuels exceed the cost of the potential environmental damage caused by their production. Therefore, sustainable development of biomass and biofuel is the major challenge in increasing the production of biomass and biofuel.

Generally, the sustainable development debate is based on the assumption that societies need to manage three types of capital (economic, social, and natural), which may be non-substitutable and the consumption of which might be irreversible. There are international efforts underway to regulate the production and

trade of bioenergy by establishing sustainability criteria. Certification is judged to be the most suitable instrument for the development of sustainable bioenergy systems and further development and implementation of certification systems is an important tool. Thus, the next WBA Position Paper will deal with “Certification Criteria for Sustainable Biomass for Energy”. This report will be released in December 2009.

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World Bioenergy Association

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