The International Partnership on Bioenergy

Preparatory meeting

Part I – Overview of bioenergy

Rome, 6th September 200

Outline

Objectives and content of the White Paper

Bioenergy uses

Bioenergy trends and potential

The objectives of the White Paper

- To focus on key issues for the development and deployment of bioenergy
- To stimulate discussion on how an IPBE could contribute to the development and deployment of bioenergy in developed and developing countries
- To foster the establishment of an IPBE

The content of the White Paper

Two main topics:

- **Review**
  - description of the status of bioenergy worldwide, advantages and drawbacks, key drivers and future prospects
  - overview of international community efforts

- **Scoping**
  - identification of barriers to bioenergy deployment
  - identification of areas for action to overcome barriers
  - definition of possible roles for an IPBE

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Definitions

Solid biomass: covers solid non-fossil material of biological origin which may be used as fuel for bioenergy production. It comprises:

- Purpose grown wood (from agriculture or forestry)
- Conventional crops (e.g. oil, sugar and starch crops)
- Wood wastes (e.g. from forestry or wood processing activities)
- Other solid wastes (e.g. straw, rice husks, nut shells, poultry litter, biodegradable fraction of municipal solid waste).

Liquid biofuels: liquid fuels, comprising:

- Bioethanol
- Biodiesel (from vegetable oil and syngas)
- Biomethanol
- Biodimethylether
- Biooil

Biogas: a gas composed principally of methane and carbon dioxide produced by anaerobic digestion of biomass, comprising:

- Landfill gas
- Sewage sludge gas
- Other biogas e.g. from anaerobic fermentation of animal slurries and of wastes in abattoirs, breweries and other agro-food industries.

Bio-hydrogen: hydrogen produced from biomass for use as an energy carrier by several routes:

- Gasification or pyrolysis of solid biomass
- Reforming of biogas
- Novel technologies (photosynthetic algae or bacteria, fermentative bacteria)

Source: IEA

Bioenergy already contributes significantly to World Total Primary Energy Supply (WTPES)

In the last decades the contribution has ranged from 10 to 15% (with different figures for developing and developed countries) characterizing biomass as the largest source of energy worldwide after fossil sources.

In 2002 the WTPES could break down as follows:

- Oil 34.9%
- Coal 23.5%
- Natural gas 21.2%
- ***Biomass 10.8%***
- Nuclear 6.8%
- Hydro 2.2%
- Other renewables 0.5%

Note: the contribution of biomass is likely to be underestimated: in developing countries a significant share of biomass resources produced and consumed is outside commercial markets of energy products and therefore unaccounted for

Questions

- *Is the present biomass use environmentally sound and sustainable?*
- *What is the potential contribution of biomass to sustainable energy in different sectors?*

Three main categories of use

- Traditional
- Improved
- Modern

Traditional use of biomass

Traditional use consists of gathering wood and other readily available biomass and burning them indoor in inefficient cook stoves and other domestic devices (thermal yield less than 10%).

Advantages

- Meets the subsistence energy requirements of people in poor regions of the world

Problems

- More than 90% of the biomass energy content is lost Indoor air pollution causing diseases is widespread
- Deforestation and land degradation can occur

mproved use of biomass

Improved use means the use of more efficient and environmentally sound devices for space heating and cooking (thermal yield grater than 25%)

Advantages

Improved conversion efficiency and reduced health and environmental damages

Problems

Slow penetration in developing countries, although in some economy in transition, such as China and India, millions of innovative domestic appliances have been installed

Modern use of biomass

Modern use of biomass means exploiting existing and new types of biomass, adopting efficient, clean and innovative conversion technologies, providing modern energy services and finding new end uses

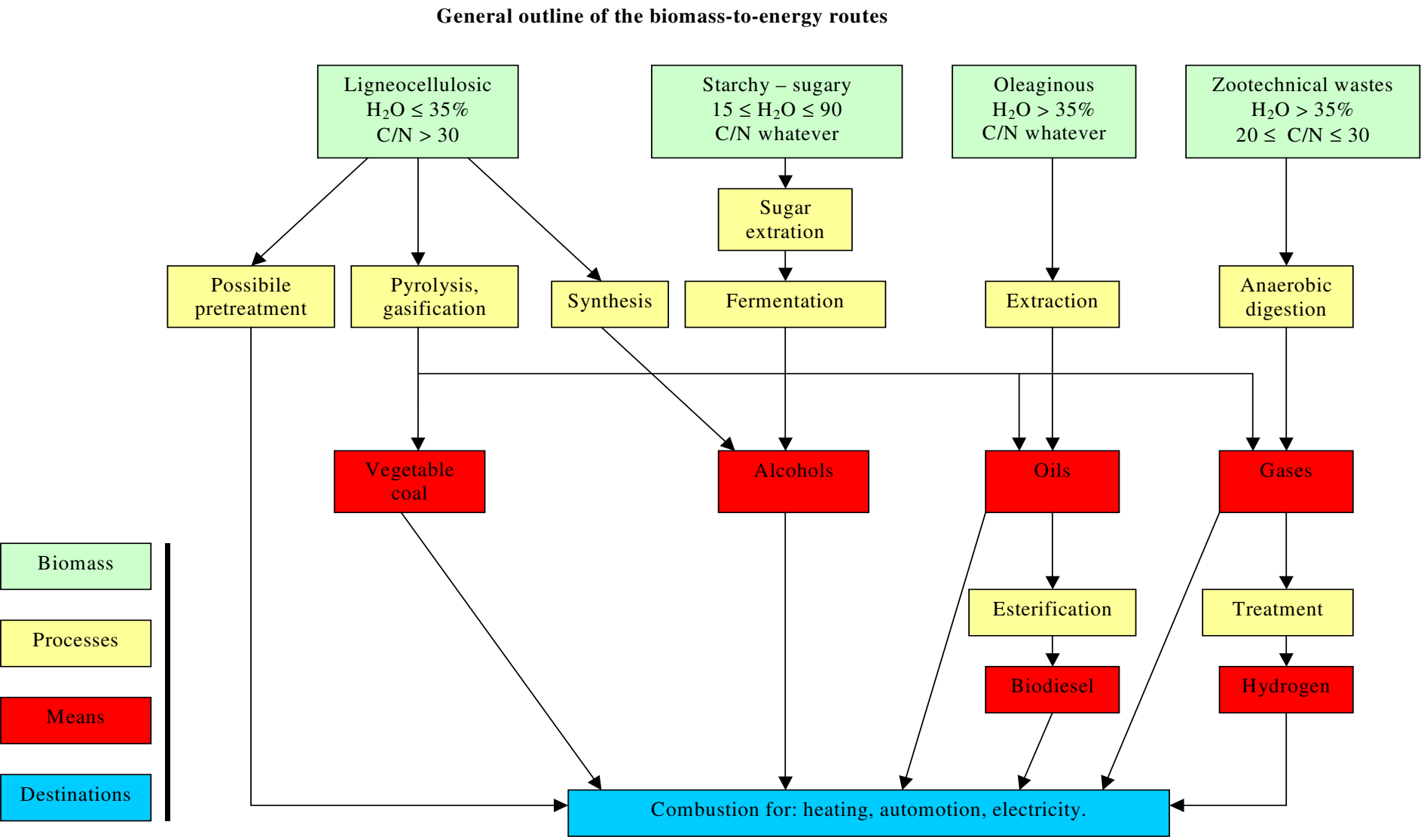
Advantages

- Better exploitation of biomass potential
- Efficient energy services
- Benefits for agro-forestry and local and global environmental systems
- Benefits for energy diversity and security

Problems

Economic, policy, organisation and social barriers

Outline of modern biomass-to-energy routes



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Need for transitions

In order to make bioenergy an environmentally sound, cost-competitive and sustainable system, a gradual transition from traditional to modern biomass use is necessary based on full potentialities of biomass system as well as on successful achievements in three main sectors:

- Heat and power for domestic and industrial uses
- Liquid biofuels for transport
- Hydrogen

Trends – heat and power

- Although the great majority of biomass is burned for generating heat, a total capacity of about 40,000 MWe is now installed worldwide in centralized and decentralized units.
- Biomass district heating and heat and process steam production for manufacturing industries are expanding. In many cases these are combined heat and power plants.
- Co-firing with fossil fuel is also on the rise.

Trends – liquid biofuels

- At present about 30 billion litres per year (equivalent to 1 EJ) of biofuels are commercialised mainly in North and South America and Europe and in some regions of Africa and Asia
- In North and South America - and to a limited extent in some EU Countries (Sweden, Spain and France) - bioethanol is widely used, while in the EU (mainly in Germany, Austria, France and Italy) biodiesel prevails
- Many countries have as a target to substitute 5-6% of all road transport fuel with biofuels by around 2010

Trends – Hydrogen

- Hydrogen is not yet commercially used as a road transport fuel
- Biomass could provide a source of renewable hydrogen
- Studies indicate that hydrogen from biomass could be a cost competitive source of ‘low carbon’ hydrogen

Future bioenergy potential

- Most of the scenarios indicate that bioenergy could contribute between 100 and 200 EJ by 2050; this is two to four times of what is used today
- Modern bioenergy use has not experienced rapid growth: in the last ten years the growth rate of solid biomass has been equal to 1.6% per annum, roughly equal to that of the world total primary energy supply
- A more global and strategic approach for an accelerated development and deployment of sustainable bioenergy is needed
- Although the contribution of biomass to the energy system may be considered marginal, at least in the short-medium time, the management of this natural resource may be beneficial to local and global ecosystem, human health, air quality, land protection, greenhouse effect.

Barriers

- Several barriers still hinder the development and deployment of sustainable bioenergy into the energy market and for the poorer populations of the world.
- The most important barriers are of political nature and concern the lack and inadequacy of energy, environment, agriculture, forestry strategies and policies in relation to bioenergy.
- Technical, economic, organisational, and social barriers also need to be overcome on the way to the widespread deployment of sustainable bioenergy systems.