

Greenhouse Gas Balances of Biomass and Bioenergy Systems

Highlights and Work Plan



- international network for coordinating national RD&D programs and exchanging information,
 - set up in 1978 by the IEA, currently 20 countries or organizations are members
 - series of Tasks, each with a defined work program that offers benefits for researchers, industry and policy-makers.
- **Mission:** To facilitate, coordinate and maintain **bioenergy research**, development and demonstration **through intl. cooperation and information exchange.**

IEA Bioenergy Tasks

- **Biomass resources:** Forestry and agricultural products, municipal solid waste,
- **Biomass conversion:** Combustion, thermochemical and biochemical processes,
- **Bioenergy utilization:** Heat and power, transportation fuels,
- **Integrating research themes:** Techno- and socio-economic and environmental analyses, greenhouse gas balances.

Objectives Task 38

- Apply standard methodology to actual case studies
- Emphasis on system boundaries, analyzing overall atmospheric impact
- Aid decision makers in selecting most effective mitigation options
- Address policy relevant issues
- Documentation and dissemination
- Promote international exchange of ideas, models and scientific results

Scope of Task38

- Systems-analytical assessment of GHG (CO_2 , CH_4 , N_2O) balances, flows, stocks, emissions in biomass production, biomass conversion and carbon sequestration systems.
- Carbon pools include: above and below-ground biomass, litter and woody debris, soils, wood products, fossil fuel reservoirs (both materials and energy substitution).

Examples of activities

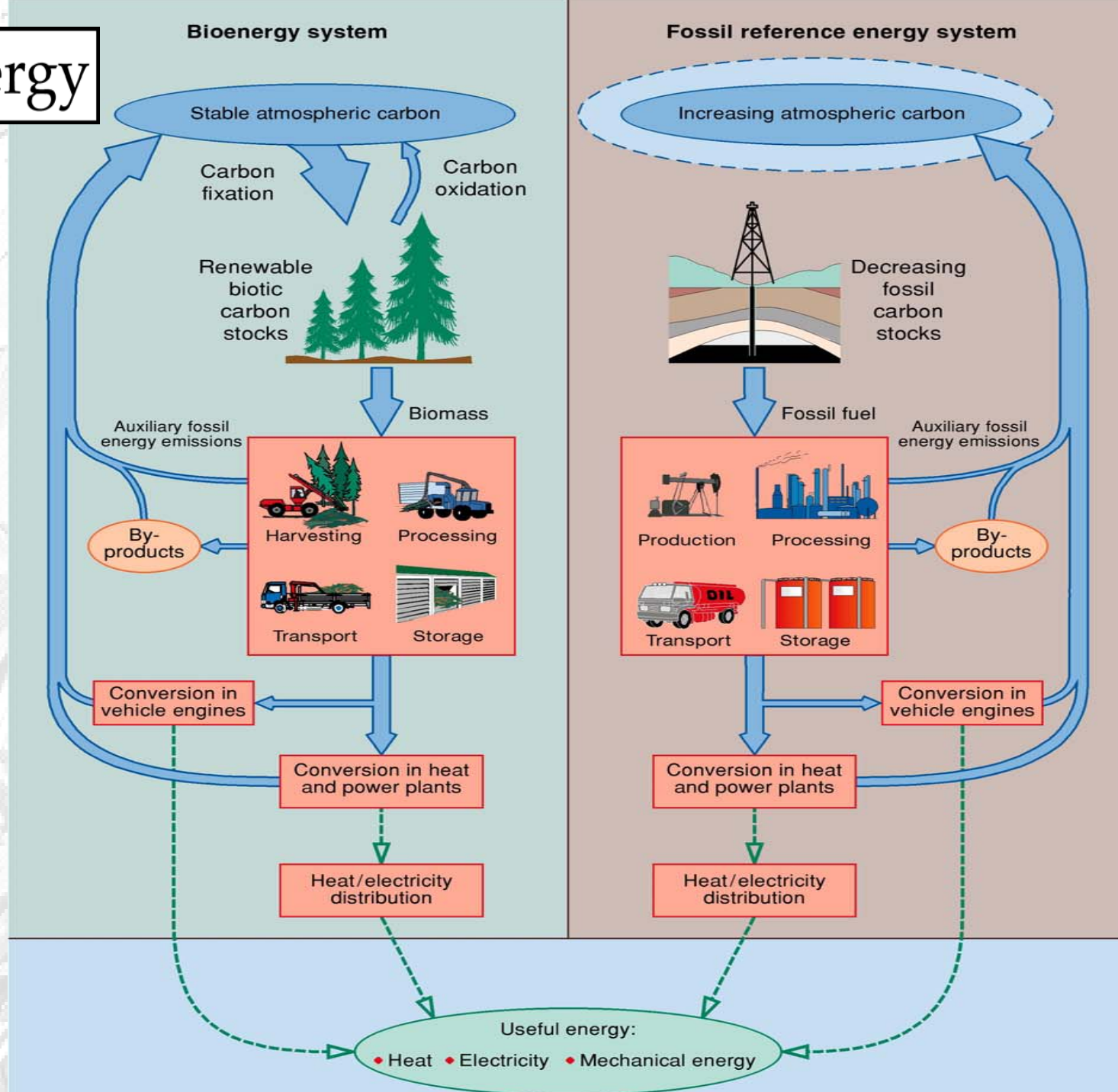
- FAQ
- Standard methodology
- Case studies
- Soil carbon / bioenergy
- Biofuels and HWP in GHG inventories
- UNFCCC submission on permanence of reforestation projects
- Bioenergy and carbon cycle
- Country reports
- Bibliography
- Workshops, dissemination through brochures, website, NTL networks



Methodology for GHG balances

- Compares a biomass energy system with a reference system
- Definition of “service unit”
- Correct choice of system boundary essential
- Fossil energy inputs, emission factors
- Carbon stock changes, alternative uses of biomass / land
- Efficiencies of energy production / conversion
- By-products (expansion of system rather than allocation)

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Case Studies – GHG balances

- **Australia:** co-firing biomass with coal; wood fired power plant using timber plantations;
- **Canada:** pyrolysis plant for bio-Oil production using sawmill residues and thinnings;
- **Finland and Sweden:** use of timber for housing construction and wood residues for energy;
- **Ireland:** peat use for energy
- **New Zealand:** bioenergy CHP plant using sawmill residues;
- **UK:** small scale heating systems using conventional forestry and Miscanthus;
- **Croatia:** biodiesel in the Joint Implementation context
- **USA:** anaerobic digestion

Plan of Work 2004-2006

- Cascading and multiple product systems, biorefinery
- Optimizing the GHG benefits of Bioenergy Systems
- Case studies (new systems, e.g., hydrogen, methanol, ethanol, ...)
- Comparing biofuels trade vs. trade of electricity, green certificates, CO2 credits (CERs, ERUs)
- Work with FAO on bioenergy in developing countries (case study, CDM)
- Link of bioenergy / C sequestration with emissions trading

Plan of Work 2004-2006

- Practicality of measurement and verification of stock changes: cost vs. accuracy
- “Methodological toolbox”
 - **Methods**
 - **Models**
 - **Data**
 - **Case studies**



Optimizing GHG benefits

- Input/output ratios
 - GHG emissions per kWh of useful energy
 - GHG emission reduction per
 - Unit of biomass fuel
 - Unit of land
 - Unit of capital invested
- ➔ **Decision trees, depending on technology, local circumstances, context, timeframe, etc.**

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Task 38

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www.joanneum.at/iea-bioenergy-task38

