Bioenergy and sustainable development

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Before we start...

- Who is a biomass or bioenergy producer?
- Who is a biomass or bioenergy user?
- Who wants sustainable development?
A Matter of Scale: Biomass & Energy

Source: IINAS calculation for 2010 based on data from IEA and nova
Competing uses of biomass...

**POTENTIALS**
- Biomass cultivation (= land)
- Biogenic residuals
- Wind, water, etc.

**DEMAND SECTORS**
- Heat
- Power
- Motorised transport
- Food & Feed
- Raw materials

**GOALS / CONSTRAINTS**
- Nature conservation
- Climate change mitigation
- Security of supply
- Employment
- Costs
SDGs: all countries are “developing”

Source: https://sustainabledevelopment.un.org/sdgs
15 out of 17 SDGs are directly or indirectly linked to bioenergy, especially:

- 2 (food & agriculture)
- 4 (water)
- 7 (energy)
- 8 (growth, employment)
- 11 (cities)
- 12 (consumption & prod.)
- 13 (climate change)
- 15 (forests, land)

SDG links indicate tradeoffs.

Source: own elaboration based on SDG (2015). Bold text: SDG related to energy; (✓) = partially relevant.
# Sustainability approaches

<table>
<thead>
<tr>
<th>International</th>
<th>Regional level (EU)</th>
<th>National</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Environment and Climate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UN conventions (e.g. CBD, FCCC)</td>
<td>NLBI Forests</td>
<td>EU Bioeconomy &amp; Biodiversity Strategies</td>
</tr>
<tr>
<td>* Forestry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forest processes C&amp;I SFM</td>
<td>Several voluntary guidelines</td>
<td></td>
</tr>
<tr>
<td>Voluntary harvesting guidelines</td>
<td>Voluntary forest certification schemes</td>
<td></td>
</tr>
<tr>
<td>* Bioenergy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GBEP</td>
<td>FAO-UNEP UN Energy Tool</td>
<td></td>
</tr>
<tr>
<td>ISO</td>
<td>WWF/WB scorecard</td>
<td></td>
</tr>
<tr>
<td>IDB scorecard</td>
<td>GEF standards</td>
<td></td>
</tr>
<tr>
<td>Voluntary certification schemes: bioenergy (liquid biofuels and/or woody bioenergy)</td>
<td>EU RED (for 2G biofuels)</td>
<td></td>
</tr>
<tr>
<td>* Biomaterials (&amp;procurement)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Responsible purchasing processes</td>
<td>Responsible cultivation areas</td>
<td>CEN</td>
</tr>
<tr>
<td>* Financing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financing institutions safeguards</td>
<td></td>
<td></td>
</tr>
</tbody>
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Forest biomass & climate effects
Bioenergy in the bioeconomy

- **Not** food vs. fuel but **land** use (agro, forest...) is key: biofuels **can and must** be **part of sustainable food systems & landscapes**

- Wastes (cascading) and residues: **yes**, but consider biodiversity and soil C stocks (straw...)

- Marginal/degraded land: **yes**, but biodiversity and social safeguards → **synergies** (soil, jobs) – yet: **cost**!

- **GBEP Sustainability Indicators** should be used
Sustainable Bioeconomy: a scenario

www.bio-based.eu/nova-papers

IEA Bioenergy www.ieabioenergy.com
OK – but how to make it happen?
It always seems impossible until it’s done

Nelson Mandela
Example: Canada

Complex forest and social ecosystems
- Remote region (>200 km from Quebec main cities)
- Public forests under ecosystem-based management (high level of naturalness)
- Communities historically built on the development of natural resources (hydropower, forestry)
- Active forest industrial network of sawmills and pulpmills
- Presence of First Nations with deep roots into the territory

Source: IEA Bioenergy Intertask project “Measuring, governing and gaining support for sustainable bioenergy supply chains”
Wood pellet production in the southeastern United States

- Pellets <3% of total wood products
- Provide needed rural jobs
- Mitigate climate change by replacing coal & enhance carbon sequestration in forests via improved management

Sources: Hodges et al. (In review) Opportunities & attitudes of private forest landowners in supplying woody biomass for renewable energy. Kline et al. 2018. The importance of reference conditions... In World Biomass 2018-2019 (pp 82-86); DCM Productions U.K.
Beyond UNECE: A sustainable African bioeconomy?

- New cultivation systems – e.g. agroforestry - enrich biodiversity (but no invasive species)
- Bioenergy in waste water management
- Income from landscape/habitat management residues for bioenergy
- Rural development + access to modern energy can reduce deforestation pressure

http://www.thegef.org/gef/video/great_green_wall
Sustainable Bioeconomy: a vision

Key role for biorefineries across sectors

Sustainable food systems
(protein, fibers etc. for food & feed; organic farming, agroforestry, aquaculture, balanced diets, reduced losses)

Sustainable supply of bio-materials
based on feedstocks from forestry, marginal/degraded land, re-use of biogenic residues/wastes

Sustainable supply of bioenergy
(agroforestry, intercropping, marginal/degraded land, biogenic residues and wastes

- Global food security, secure land tenure
- Regional/local employment and value added (rural development)
- Sustainable production in agriculture, fishery and forestry
- Reduction of food losses, recycling of wastes (circularity)
- Conservation of ecosystem services (biodiversity, C sequestration, recreation, soil fertility, water...)

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Way ahead: Transformation!

Oxford Dictionary:
• A marked change in form, nature, or appearance.
• A sudden dramatic change of scenery on stage.
• A metamorphosis during the life cycle of an animal.

Examples:
– From degraded or abandoned land to providing biomass and ecosystem services
– From waste streams to energy carriers
– Pipelines: from fossil power to open networks for renewable gases

But: What will it cost?
Transforming the gas grid?


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It may not be cost-effective to save the world, but we may decide to do so anyway.

Jørgen Nørgaard
Thanks for your attention!

More information:
http://task40.ieabioenergy.com
http://task45.ieabioenergy.com (up from Jan 2019)
http://itp-sustainable.ieabioenergy.com
http://iinas.org

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