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a consequential LCA

Tonini, Davide; Hamelin, Lorie; Astrup, Thomas Fruergaard

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Bioenergy production from agri-industrial biomass residues: a consequential LCA

Davide Tonini, Lorie Hamelin and Thomas Astrup
dait@env.dtu.dk

**Intro**

Biofuels from residues (of industrial and agricultural production) promise sustainable bioenergy and greenhouse gas mitigation. However, many studies tend to forget that these biomasses are today used for specific purposes (e.g., feeding). Thus, their use for energy may trigger an increase in the international demand of feed products that may finally induce an expansion of cropland into other ecosystems (and/or an intensification). Failing to account for these consequences may lead to results that misrepresent the actual environmental impacts.

**Tools**

- **Functional Unit**: 1 metric tonne of biomass (dry basis)
- **Geographic & time scope**: Europe EU27 (time scope: 2015-2030)
- **Assessment method**: ILCD-recommended: global warming (GW), acidification (AC), aquatic eutrophication (AE)
- **Biomasses investigated**: Whey, brewer’s grain, wheat straw, nature grass, beet molasses, beet top, beet pulp, potato pulp
- **Scenarios**:
  1. Bioethanol production; molasses-for-biogas (CHP)
  2. Bioethanol production; molasses-for-feed
  3. Biogas-for-transport (PSA upgrading)
  4. Biogas-for-CHP

**Materials and method**

**Impact contribution**

iLUC cancels savings from fossil fuel substitution

iLUC impacts also affect AC and AE(N)

**Biomasses**

Straw and grass (from nature) most suitable substrates for bioenergy

**Scenarios**

Biogas-for-CHP best conversion pathway

**General**

Residues with high nutritional value should be preferably used for feed

iLUC is the most important contributor to the induced impacts

**Best biomasses**

Straw and grass promise the highest environmental savings (no competition with feed involved)

**Best scenario overall**

Production of biogas (for CHP) because of higher efficiencies

**Best scenario for transport fuel**

Bioethanol appears better than biogas (considering PSA upgrading)