

Processing alternatives of biodegradable waste – anaerobic digestion, energy & biofuel

LCA for waste management and material flows 21.10.2020

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Comparing three sustainable(?) alternatives for recovering biowaste with LCA methodology

From biowaste

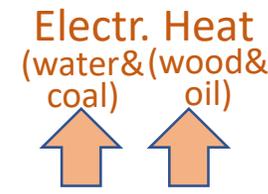
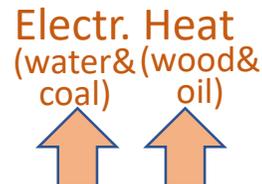
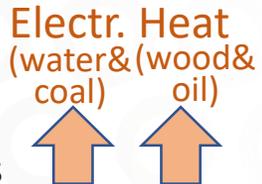
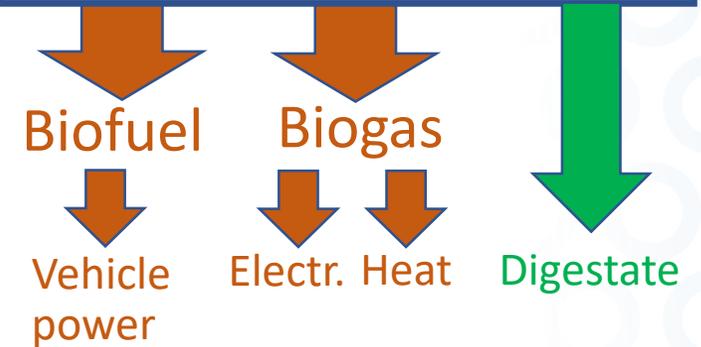
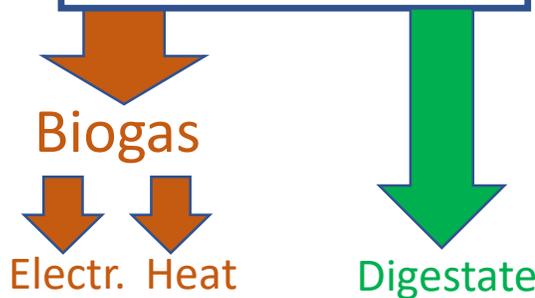
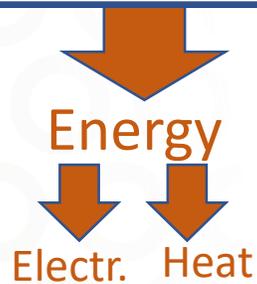
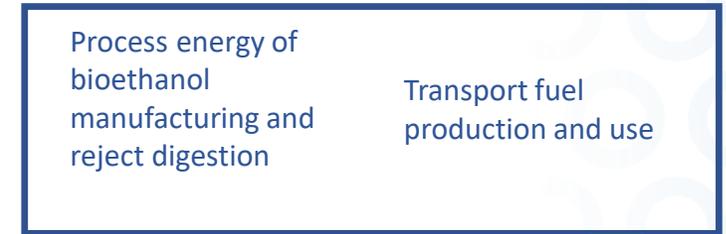
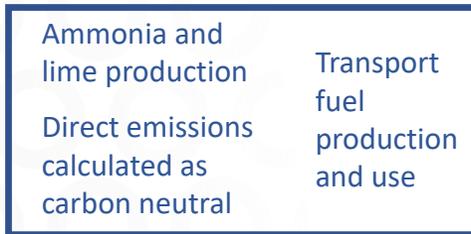


1. to energy in mixed waste?

2. to biogas and digestate?

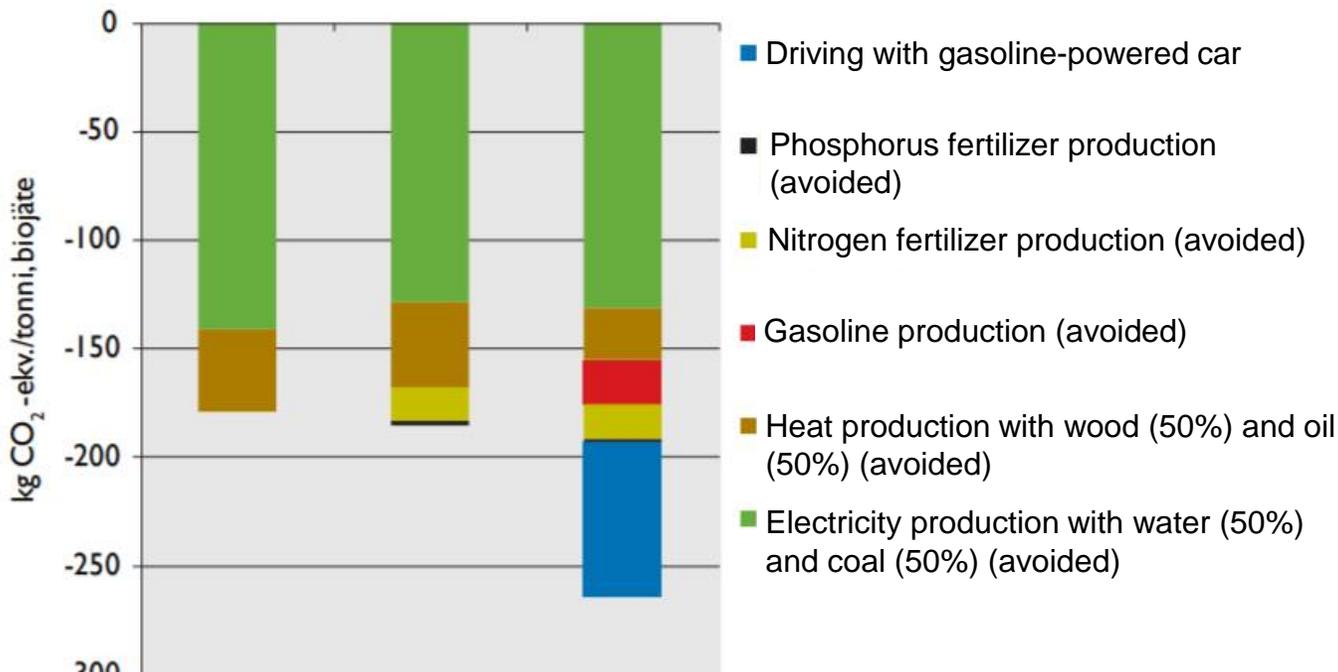
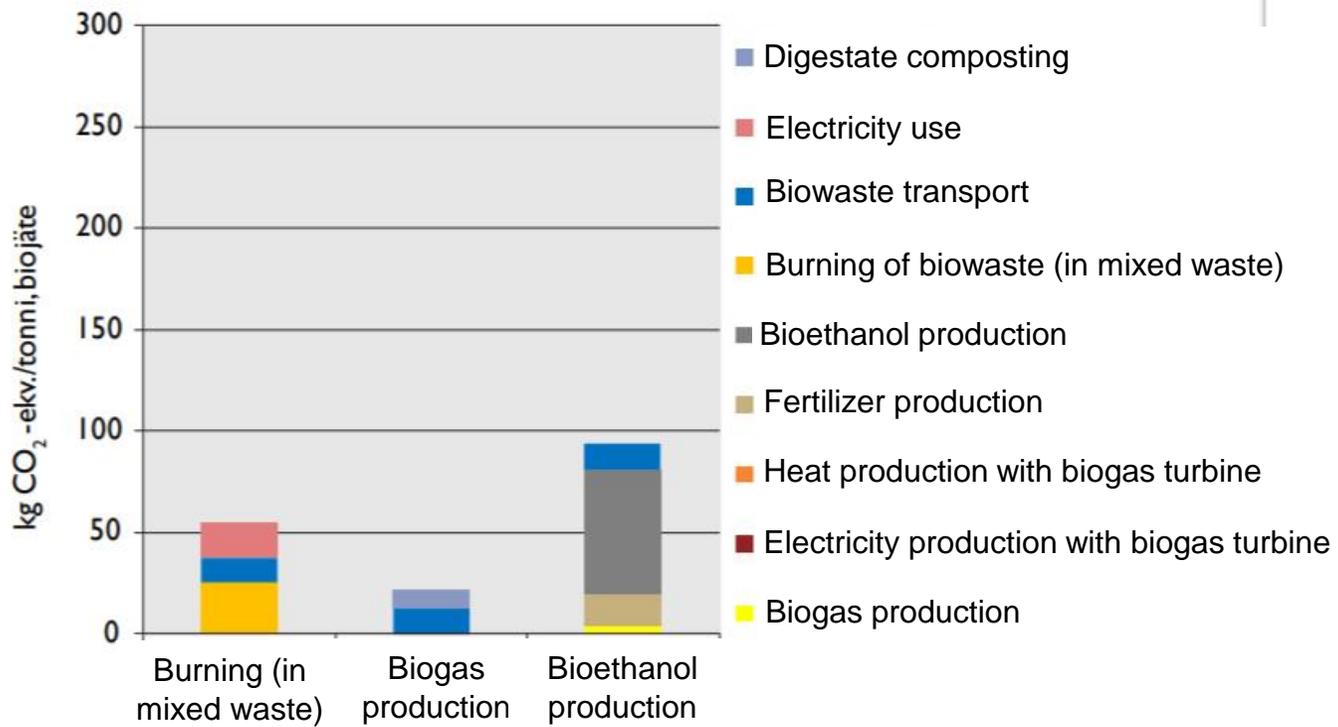
3. to biofuel?

Direct impacts



SYKE
Avoided impacts

LCA results: Climate change impacts of biowaste treatment



- **direct emissions are lower in biogas production than in burning or bioethanol production**
- **the most critical assumption concerns the fuels avoided**

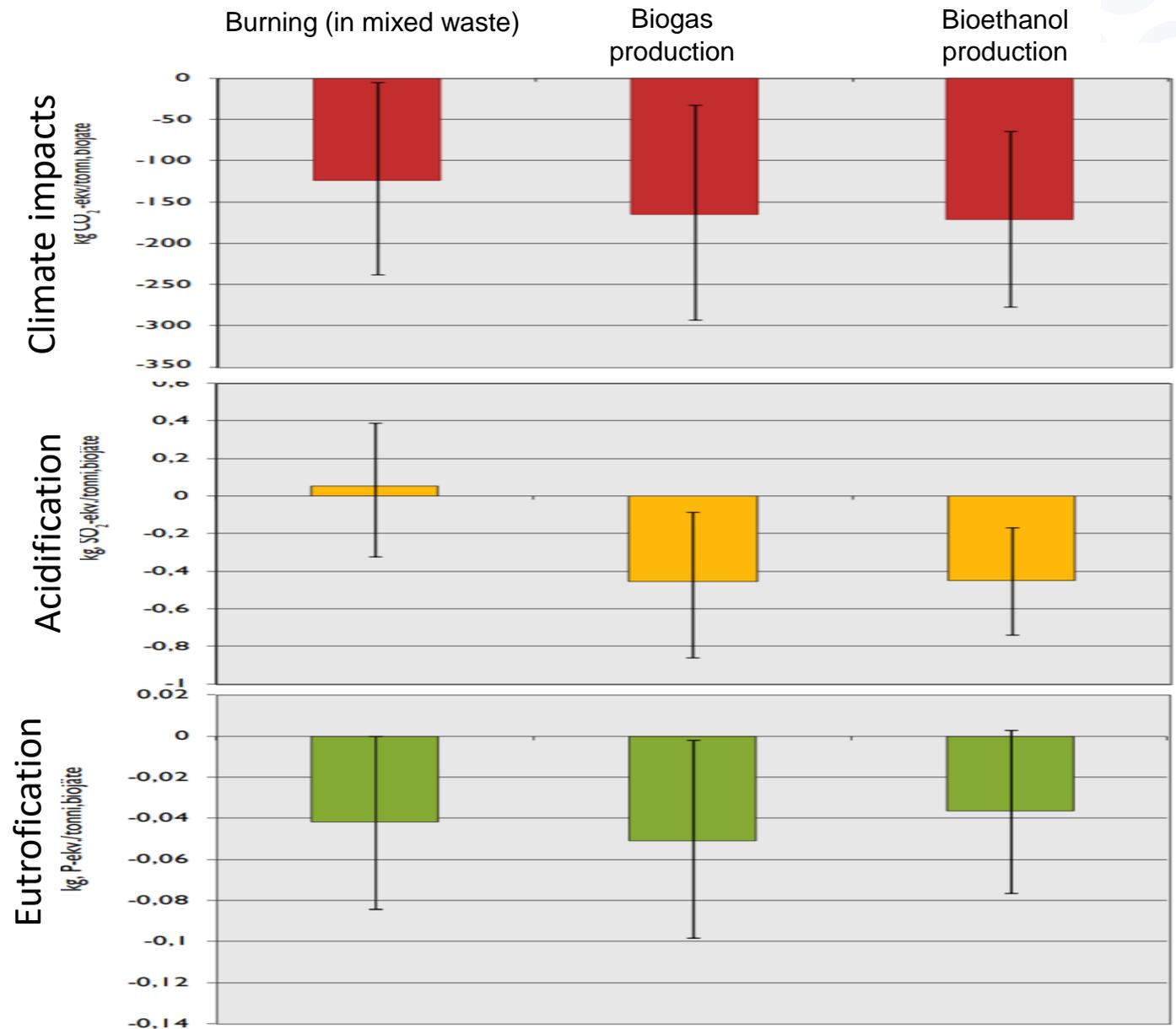
LCA results: Differences in the net impacts are mostly rather small

- The uncertainty analysis shows the methods are almost equally sustainable in climate impacts
- Biogas and bioethanol production are more sustainable in acidifying effects
- Biogas and bioethanol production processes both save the material content of waste
- In Finland, biowaste is produced by source separation and therefore it can be utilized in



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green building



Biogas production from biowaste is strongly supported by the Finnish environmental policy

- During years, LCA results has been used in supporting the strategies and legislation planning
 - LCA comparisons showed the differences of different recovery methodologies when the new technology (bioethanol production) was strongly marketed as superior compared to others
 - In previous LCA studies has already been shown, that anaerobic digestion is much better way for treating biowaste than composting
 - Currently, the ministry of Economic Affairs and Employment is planning to ease the environmental permit processes especially for establishing farm scale biogas plants
- Biogas production has large potential in heat and electricity production but also as vehicle fuel



Thank you for your attention!

More information:

[LCA report on waste management alternatives of biowaste](#) (in Finnish with English summary)