LCA of a rustic process to produce bioethanol from municipal organic waste – A promising way

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Context of the study

- European and French policy support biofuels
  - 5,75% of biofuels in total quantity of fuels in EU in 2010
  - 10% in 2015 in France

- First generations of biofuels pose more problems than resolve them
  - Problems of the occupation of soil for the first generation
  - Problems of cost for the second

→ There is a real need of fuels from an environmental way to realize objectives of policies

Context of the study

- Production of bioethanol from organic waste could be a solution
  - Some processes already exist
  - Some studies show environmentals benefits
  - Economic rentability thanks to the need of bioethanol

- Objective of 1000 units of anaerobic digestion in 2020 in France
  - Use this sector to produce bioethanol
  - Integrate but not replace anaerobic digestion

→ A new way is studied : production of bioethanol from municipal organic waste in an anaerobic digestion process

Methods and assumptions

- Functional unit : to treat 1 ton of municipal organic waste and produce bioethanol

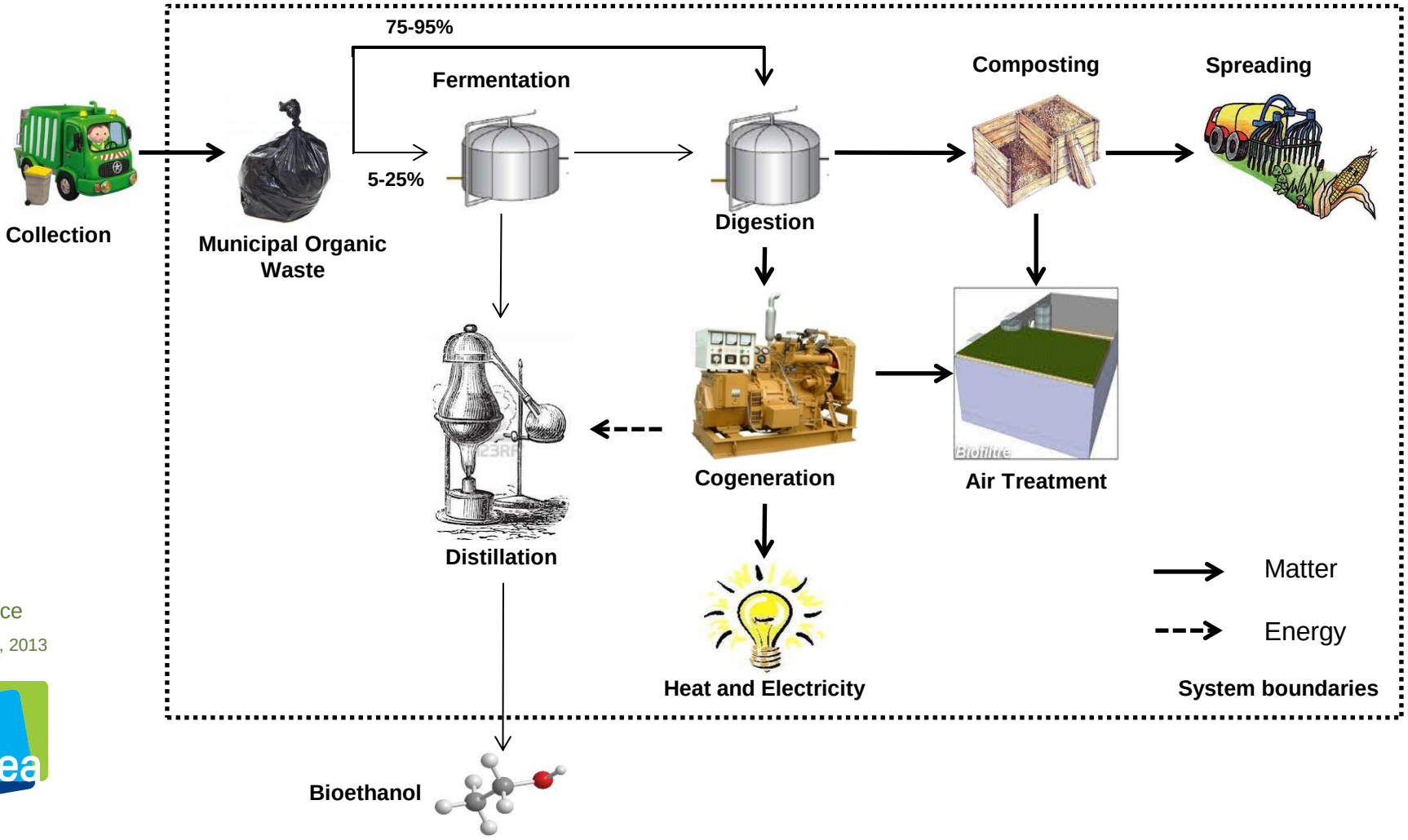
- Two processes are compared :
  - The « coupling » scenario : An anaerobic digestion plant treat waste and ethanol is produced during the fermentation
  - The « reference » scenario : An anaerobic digestion plant treat waste and same quantity of ethanol in coupling scenario is produced from beet fermentation

- Method : CML 2001 (2010 version)
- Impact categories : Global Warming, Eutrophication, Acidification, Abiotic Depletion

- Objective : Determine impacts of these two systems

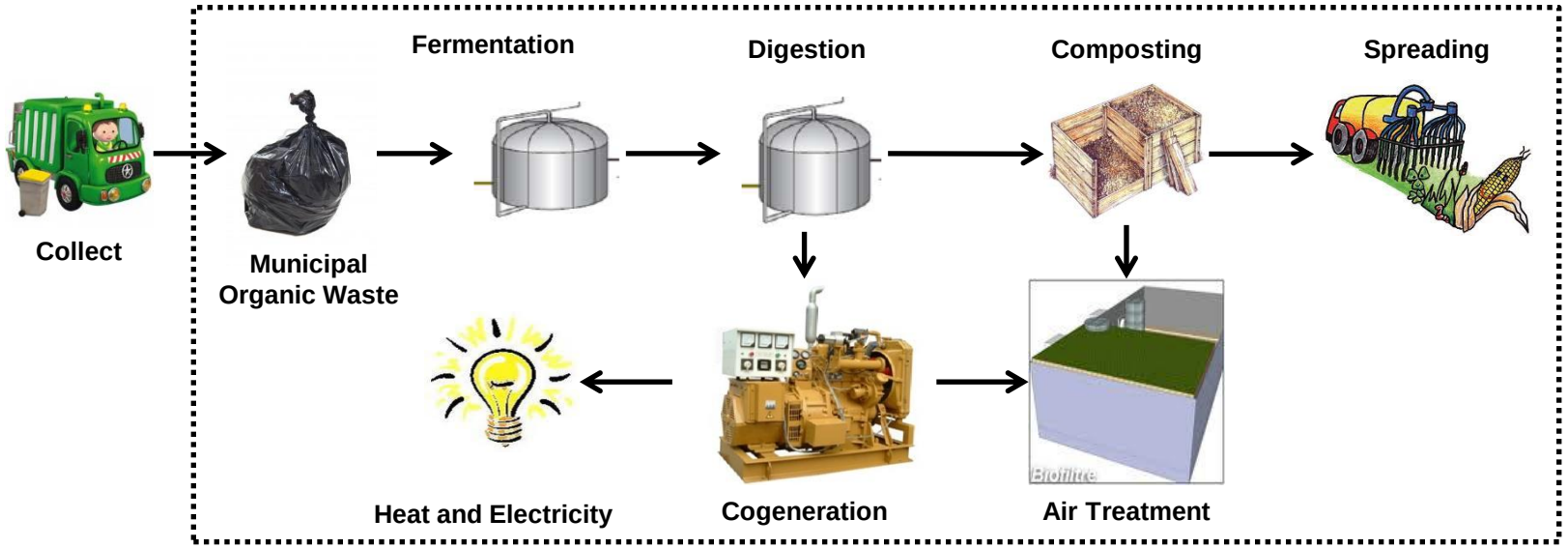
Methods and assumptions

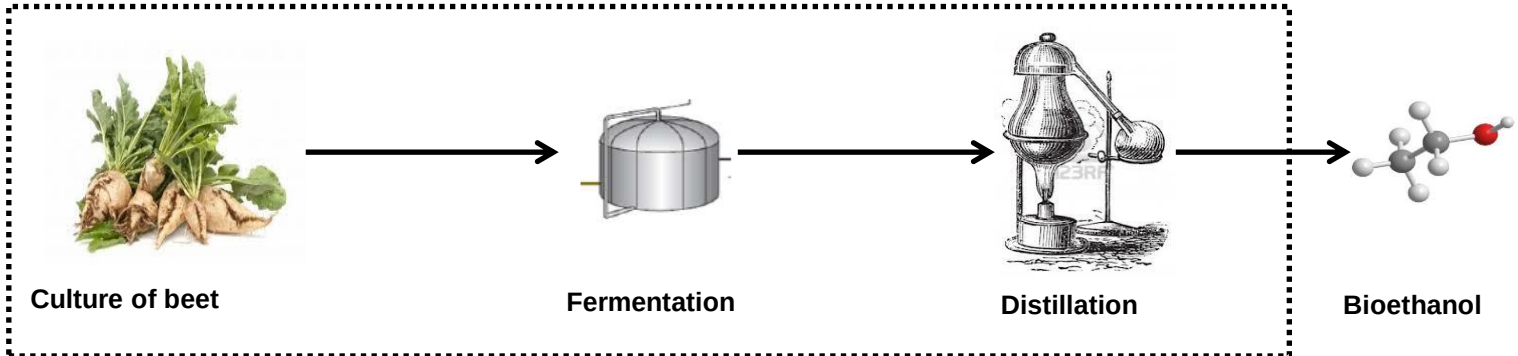
- System boundaries of « coupling » scenario :



Methods and assumptions

- System boundaries of « reference » scenario :

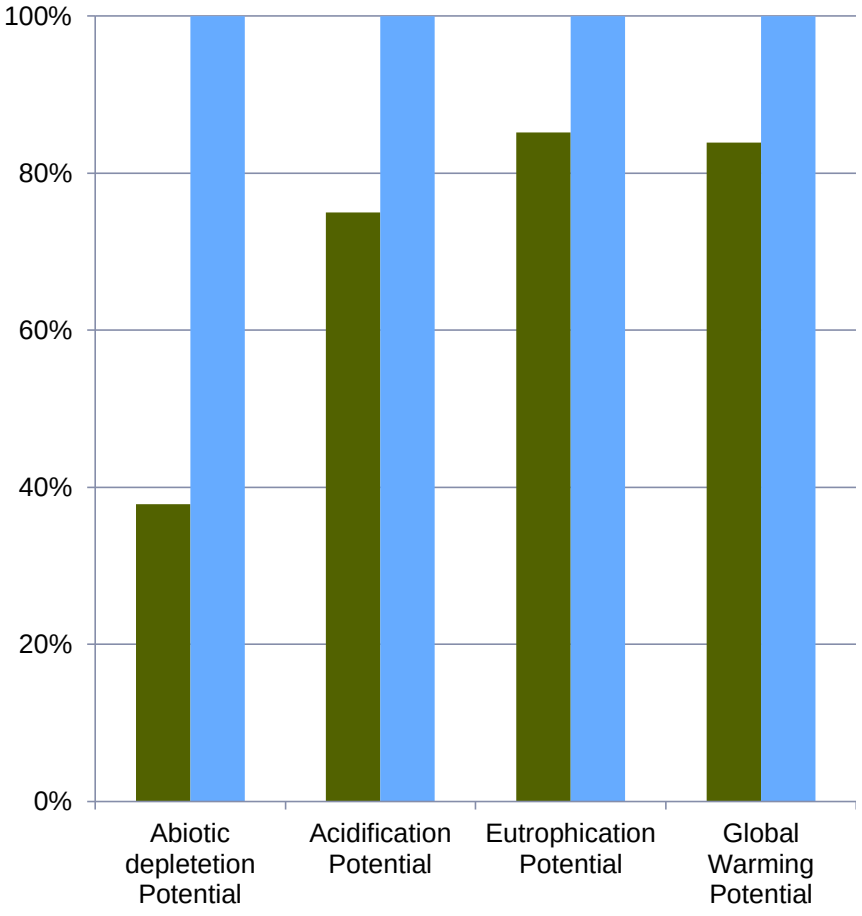




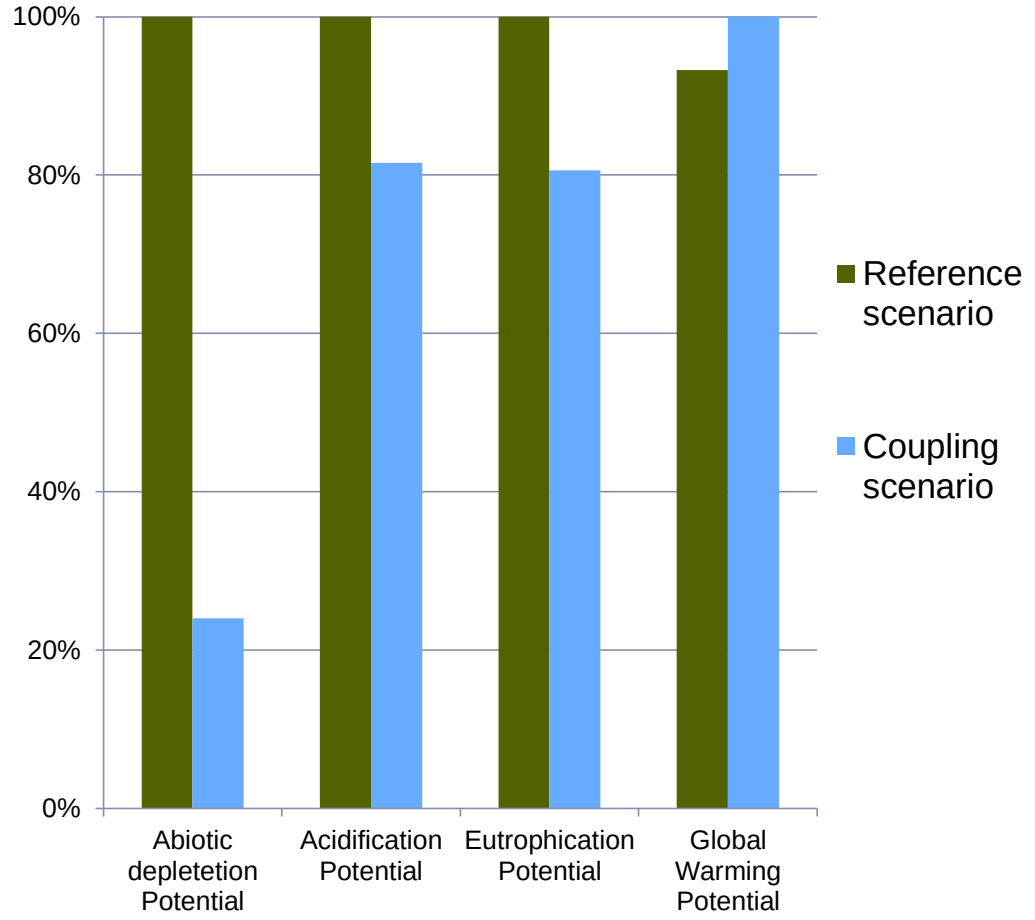
Results

- Generated impacts for both scenarios

5% of total waste in fermentation

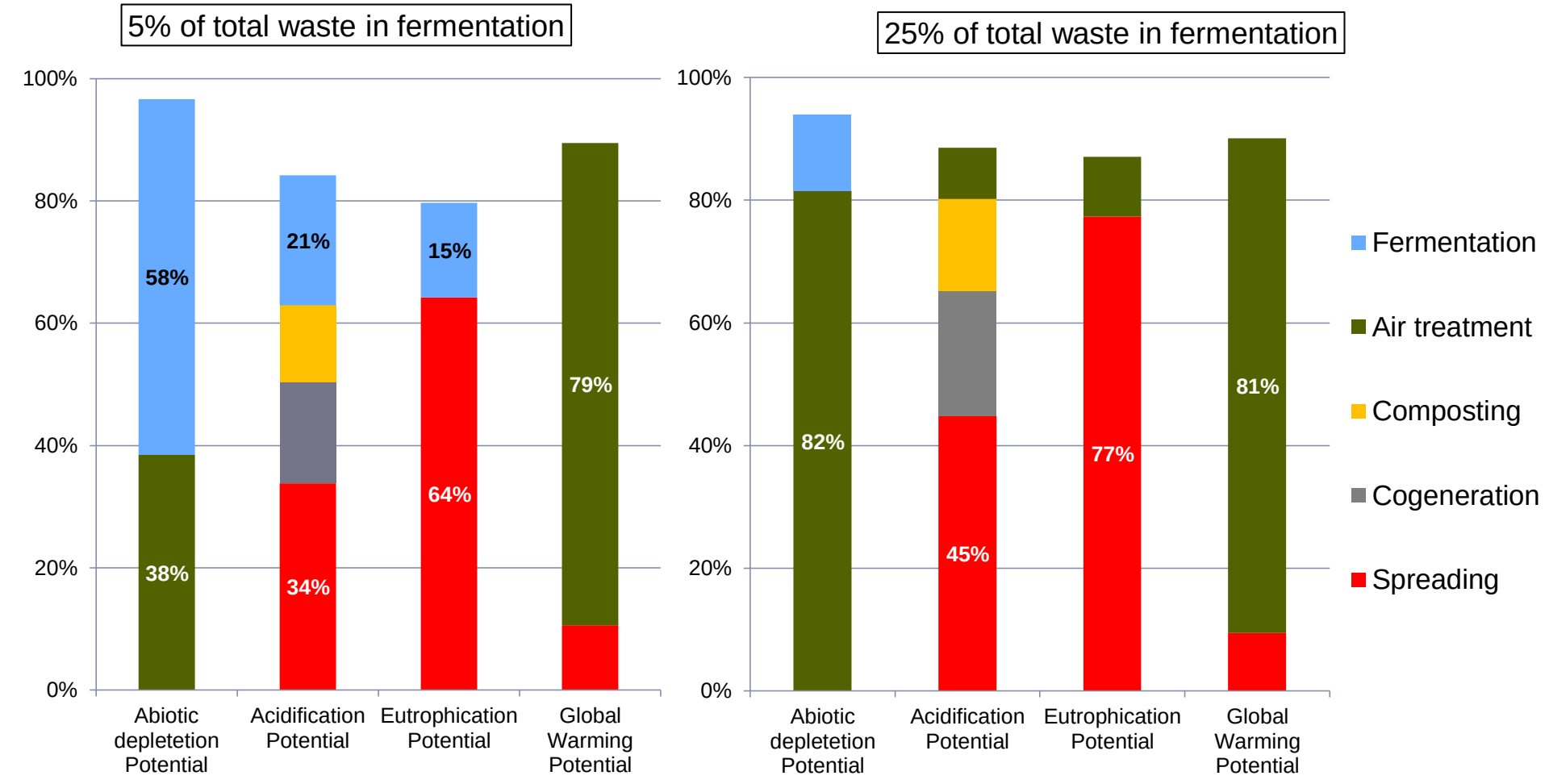


25% of total waste in fermentation



Results

- Focus on processes in the « coupling » scenario with 5% of total waste



Synthesis of results

- All analysis show that the coupling scenario is competitive to the reference scenario
- For a diversion of 25% of waste, it's even better
- The use of chemicals during the fermentation to increase ethanol production is responsible for these differences
- Main objection: All results are extrapolation of laboratory experiment

Conclusion

- Rustic process is feasible and competitive
- A study with a larger scale could confirm these results
- This way to produce bioethanol will have a future

Thanks for your attention

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