Is “Food Waste” waste?

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What is waste?

*EU Waste Directive 2008/98/EC* definition:
“items that people no longer have any use for, which they either intend to get rid of or have already discarded”

- Subjective
- Inconsistent
- Variable state and status
- Ambiguous
- Actors dependent
What is waste?

Life Cycle Assessment conceptualization:

WASTE
What is waste?

LCA conceptualization:
• Input flows drawn from biosphere
• Output flows are wastes that are discarded to the biosphere without subsequent human transformation [ISO14040 (2006)]
• If we limit our idea of “waste” to these output flow is the concept then
  – Unambiguous
  – Objective
  – Actor independent?
Why do we care about the definition?

- Food waste is important

35% ↓ = ↓ 50%

1 kg = 2.8 kg CO$_2$ = 21 km

Waste hierarchy

Does a subjective definition of waste help reduce waste?
Why do we care about the definition?

- Material that is a resource is treated differently
  - Carbon containing waste is now a “resource” for some actors
  - UK government report recommends ministerial responsibility for “waste as a resource” in the bioeconomy
  - Waste hierarchy
    - Prevent
    - Reduce
    - Reuse
    - Recover
    - Dispose

Why do this if waste is a resource? If this is my business surely I want reliable supplies of raw materials?
The upstream concept in waste LCA

Typical “food” LCA – do not consider whether the food becomes “waste”

Typical “waste” LCA – do not consider detail of the “waste” generation
Zero burden assumption for “waste” LCA

Different products have different impacts and avoided burdens

Products have value (€)

Quantify impact of alternative systems

Wasted Food

In₁

In₂

Zero Burden

Energy

Food “Waste” Processing

Atmosphere

Soil

Water

Waste/Landfill

Product
Zero burden assumption for “waste” LCA?

- Lit review shows ZBA used in nearly all food waste LCA studies published recently
- Food waste always assumed to have no impact when making technology assessments
- Food waste is known to be heterogeneous and its composition can be quite unpredictable
- We know there is economic value (via tax, disposal payment, financing, sale of downstream products)
- Many mass flows are only waste in the subjective opinion of the actor, and remain a resources in the system
- No longer clear what the function of the system is…
Is “food waste” waste?

Definition of “waste” and the zero burden assumption treats these the same.
1. Low Mass and Low Value

Arises because there is either little waste produced or the system has been modified to reduce waste. Low value either because the resource has little inherent value or there is too little available to make utilisation worthwhile. As a result, could be forced to class 3. The incentive to reduce is high.

2. High Mass and Low Value

Arises because the system inherently produces too much waste. No real post-process market for outputs. If use found could be forced to class 4 rather than reduced to class 1.

3. Low Mass and High Value

Secondary demand exists because the output is valuable. As the value increases there is a risk that demand will drive the generation of greater mass, forcing to class 4.

4. High Mass and High Value

Should not be considered as waste. As clear market value and demand exist for the product. If part of a waste system, there is significant upstream inefficiency to create the valuable substance. Indicative of sub-system optimization? The incentive to reduce is low.
Proposed terminology for “food waste”

• “Waste(a)” – used strictly to describe those materials that are not utilizable and are disposed of in the biosphere sink – prevent to minimum possible and dispose

• “Residue” – materials that are unavoidable but not consumable. Can be regarded as a bioresource – prepare for reuse, recycle, compost or energy recovery

• “Wasted food/product” – material that has been mismanaged and should never end up in secondary processing – prevent to a practical minimum, then prepare for reuse, recycle, compost or energy recovery
Conclusions

• We need to start avoiding using the word “waste” in a subjective, ambiguous manner
  – Actor independent definition
  – Stable meaning

• “Food waste” is not always “waste”

• The best policy and management solutions for food waste require more strict use of the terminology and due consideration of the role of bioeconomy in primary and secondary resource markets
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