Life cycle assessment of selected edible parts of discarded food in Greek households

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Presentation outline

01 Introduction
What about food waste? Is this a real problem?

02 Data
Data collection, time reference, process

03 Methodology of assessment
LCA Methodology, inventory, selected impact categories

04 Results
Top food waste categories, top impact category

05 Conclusions
Can we mitigate the problem?
Why is Food Waste a problem?

- Greenhouse gases generated from food rotting in landfills (could be reduced to help mitigate climate change)
- In USA, food is the single largest category of material placed in municipal landfills, where it emits methane, a powerful greenhouse gas (USEPA).
- Municipal solid waste landfills are the third-largest source of human-related methane emissions in the USA, accounting for approximately 14.1% in 2017.
- When food is wasted, so too is the land, water, labor, energy, and other inputs that are used in producing, processing, transporting, preparing, storing, and disposing of the discarded food.
About the edible parts of food waste
Edible vs Inedible Food Waste

EDIBLE FOOD WASTE

Edible food waste includes all **edible parts of food produced** with the intention to be consumed by humans, and which ends as waste (including animal feed and byproducts), originating after animals have been slaughtered or plants have been harvested. In short, **any food item that could have been consumed** by humans before reaching a state where it is no longer fit for human consumption.

INEDIBLE FOOD WASTE

Inedible food waste include drink and liquid waste, fish discarded to sea and waste of any materials that are ready for harvest, but which are not harvested. It also includes food items such as fruit and vegetable peels, and egg shells that are normally not consumed.
The survey was conducted in 1,133 households, comprising 3,231 members. Greek households. Dairy, via online diaries for up to 8 days. Data processing with Excel software. Quantitative results, using statistical tools as pivot. Data collection processes include grouping, processing, and recording.
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Data Grouping

Bakery Products
- Flour, wheat
- Bread, wheat, frozen
- Rolls, fresh
- Wheat starch
- Bread, from wheat flour, Bread, wheat, fresh, in supermarket

Fish
- Flatfish, Cod fillet, Herring fillet, Mussels, Shrimps, frozen
- Trout, frozen
- Small pelagic fish, Landed anchovy, Landed tuna

Vegetables
- Fava beans, Onion dried, Corn, Peas green, Carrot, Mushroom, Tomato, Mint, Celery, Coriander
- Cucumber, Lettuce Spinach, Zucchini, Avocado, Cabbage white, Bell pepper, Broccoli, Lemon, tomato, Ginger, Radish, Sugar beet, Garlic, Cauliflower, Onion, Aubergine, Palm kernels, Parsley, Oil palm fruit, orchard/TH Mass

Meat
- Beef minced meat, Beef round, Pork neck, Beef flanchet Turkey, Lamb, Ham
- Chicken, Pork minced meat, Red meat

Fruits
- Pear, Peach, Strawberry Orange, Mandarin, Kiwi, Mango, Apple, Banana, Pineapple, Grape, Palm date, Pomegranate Papaya
Primary data

An average of 280 kg of edible food parts were discarded each day for the total sample.

The most wasted food groups were vegetables, fruits, and bakery products, followed by meat, fish, and seafood. Regardless of price inflation, vegetables, fruits and bakery products have a comparatively lower unit cost (per kilo) than meat and fish. Thus, the purchase of surplus quantity does not significantly burden the financial planning of a household on a daily basis, and it is easier to leave a quantity of these products unconsumed.
Processing

Meat
Heating in conventional oven for about 1hr, for 324 records

Bakery products
The baking process is included in the database used to conduct the evaluation with the help of the SimaPro software.

Fish
Heating in conventional oven for about 20 min, for 180 records
Environmental assessment of edible discarded food

Goal and definition

The case study: GREEK Households

Inventory analysis

Data
Selected food categories

Process
Meat, fish and bakery products

Impact assessment

Impact categories
Characterization
Normalization

Software
SimaPro 9.5.

Method
EF 3.0

16 Impact categories

LCA Results

Interpretation

Adjusted from Pre Sustainability
Results-1

LCA normalization for edible parts of discarded food (kg/day) in Greek households
Chart for edible parts of discarded food at household level in Greece

Results-2
<table>
<thead>
<tr>
<th>Impact category</th>
<th>Unit</th>
<th>Bakery products</th>
<th>Fish (cooked)</th>
<th>Fruits</th>
<th>Meat (cooked)</th>
<th>Vegetables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate change</td>
<td>kg CO2 eq</td>
<td>1419.36</td>
<td>35.39</td>
<td>19.835</td>
<td>261.37</td>
<td>181.20</td>
</tr>
<tr>
<td>Climate change – Fossil</td>
<td>kg CO2 eq</td>
<td>1417.02</td>
<td>35.38</td>
<td>17.897</td>
<td>229.49</td>
<td>175.85</td>
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<tr>
<td>Climate change – Biogenic</td>
<td>kg CO2 eq</td>
<td>0.25812</td>
<td>0.0001</td>
<td>1.8617</td>
<td>28.69</td>
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<tr>
<td>Climate change - Land use and LU change</td>
<td>kg CO2 eq</td>
<td>2.07943</td>
<td>0.0002</td>
<td>0.0761</td>
<td>3.18</td>
<td>2.51</td>
</tr>
</tbody>
</table>
Conclusions

01 Household sector

The top categories of discarded food in Greece are fruits, vegetable and bakery products.

02 Environmental assessment

Environmental impacts are the focus of this study and the main impact categories identified from the analysis are: Marine & Terrestrial eutrophication, Acidification, Climate change, Water use.

03 Greece case study

Food waste is a serious issue worldwide and in Greece. There is a constant need to better inform the public and change consumer behavior by adopting good practices for food management at the household level and beyond.

04 What’s the message?

We can carry the message that the current situation can be improved in the near future to the benefit of humans and the environment.

05 Need for quantities

Measurable data are easier to capture the magnitude of the problem. In addition to numerical data, various research methodologies can be applied to conduct results.


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Thank you for your attention!

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