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Defining food waste as a «double energy waste»

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Background: the food-energy nexus

Historical trend: human and animal power towards mechanical and fossil (Pimentel & Pimentel, 2008):

- ✓ Decrease of agricultural population => manpower for other economic sectors

Present: whole chain reputed to use ab. 10-30% of total, due to several factors

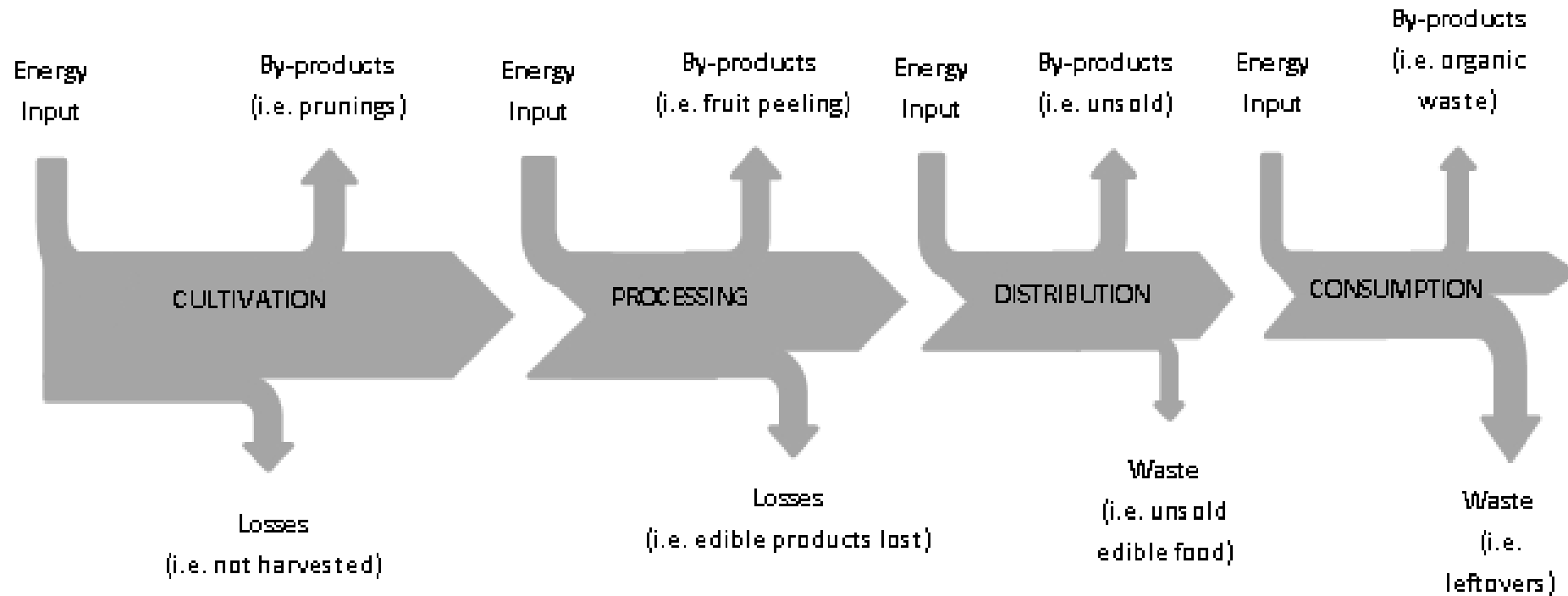
- ✓ Intensive agriculture: higher yield with lower energy efficiency with the use of fossil products and fuels
- ✓ Processing: higher inputs (canning, freezing, packaging) than outputs
- ✓ Transport & distribution: increase of average distance travelled and role of retailers
- ✓ Consumption: direct (electricity and heat) and indirect (diets) effect on the FSC



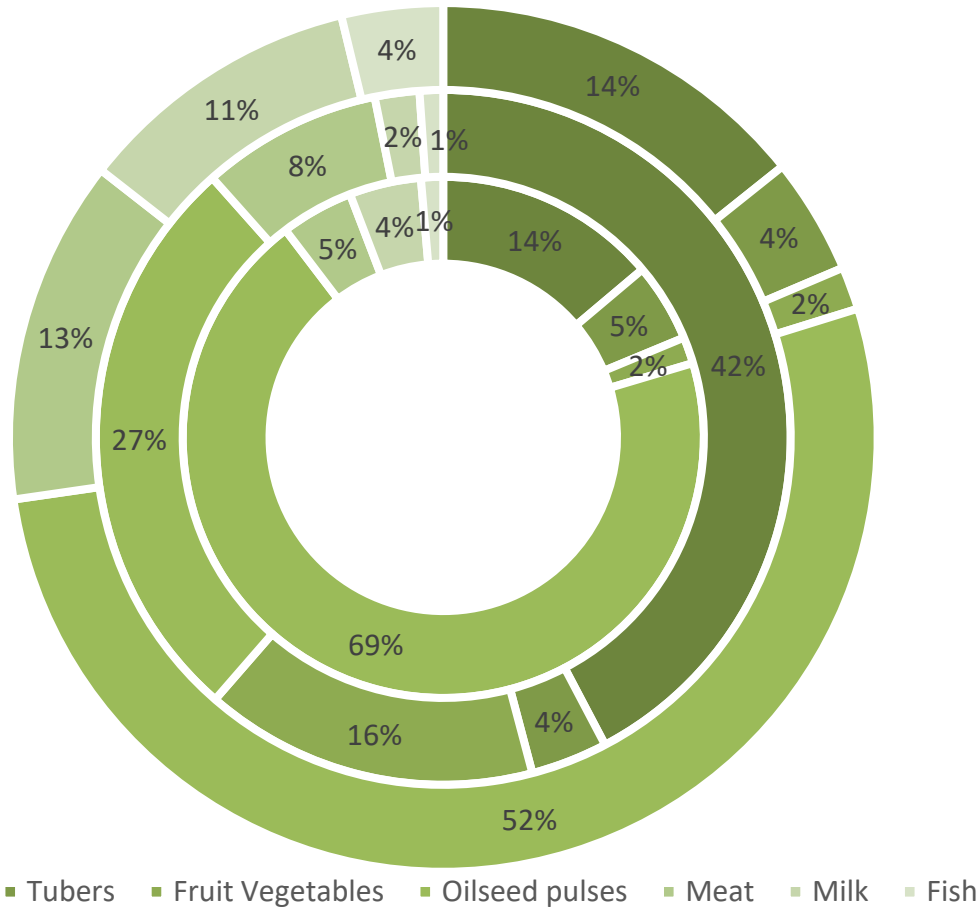
Food waste as a double energy waste

Food waste as a double energy waste

- ✓ Energy waste in the agro-food chain is an excessive use of inputs in relation to the output
- ✓ Wasting food => waste of food energy
=> waste of resources used in LC



The double energy waste in Italy



Almost 60% (or ab. 11 Mtoe) of the energy consumed in the Italian food system could be saved and/or self-produced (ENEA, 2011)

Food losses and waste* as double energy waste:

- ✓ 59.5 million GJ of food energy (21% of the total nutritional energetic output)
- ✓ 78.7 million GJ of embodied energy (10% of energy used in FSC)

*Food consumption not included

Composition of food wasted mass (inner ring), food energy waste (middle ring), and embodied energy waste (outer ring), year 2011

Source: Vittuari, De Menna, Pagani (2014)

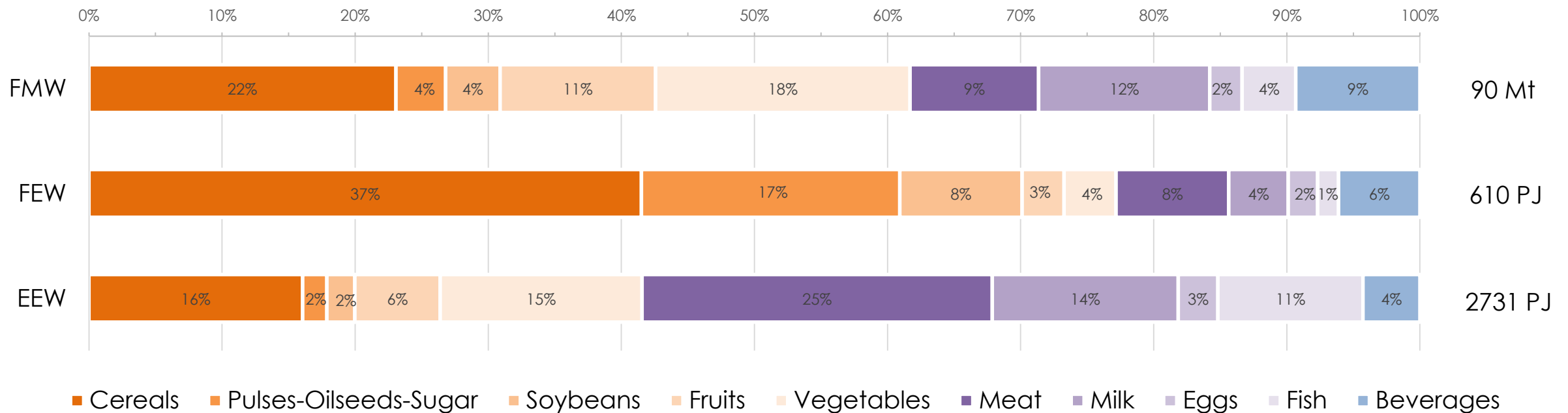


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The double energy waste in US

Food losses and waste as double energy waste:

- ✓ 280 kg/yy/pp of FL (20% losses vs. 80% waste)
- ✓ 610 million GJ of food energy (1244 kcal/day/pp vs. 3600 of supply))
- ✓ 2,7 trillion GJ of embodied energy (17% of energy used in FSC)



Composition of food wasted mass (FMW), food energy waste (FEW), and embodied energy waste (EEW), year 2015,
Source: De Menna, Vittuari, Pagani (to be submitted)

Discussion notes

Problematic definition and estimation of food waste

- ✓ Meaning and perception of «waste» in different contexts/languages
- ✓ Final use or disposal of food waste can have different levels of utility
- ✓ Priorities can shift depending on perspective (e.g. food security vs energy saving)

Byproducts, food waste, and waste: a “working” categorization

- ✓ Edibility: byproducts are usually not edible for humans
- ✓ Preventability: food waste can be minimized with prevention measures
- ✓ Reusability: waste can be strictly defined as the not re-usable share

Several factors influence these features

- ✓ Policies & Market standards (i.e. expiry date)
- ✓ Social and cultural values
- ✓ Productions systems & technologies: potential prevention and reuse
- ✓ Secondary products markets and related added value





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