

# FOOD AND BIOENERGY – REDUCING COMPETITIONS AND FOSTERING SYNERGIES

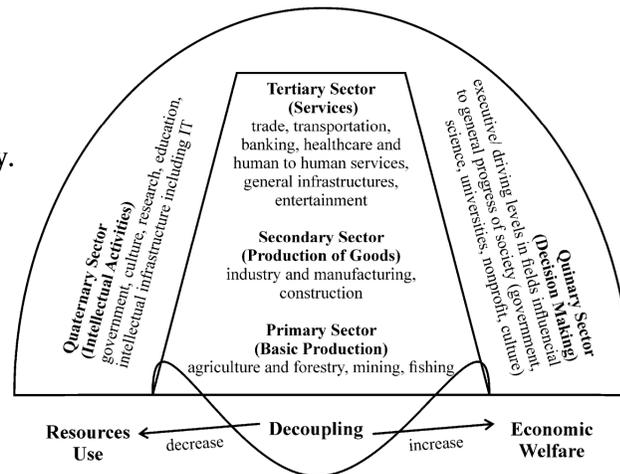
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The requirements of continuous economic growth lead to the overuse of natural resources, and therefore decoupling resources use from further growth is a key challenge in achieving sustainability.

Renewable energy production is one means to advance decoupling. More widespread implementation of bioenergy production is vital to increase the share of renewable energy.

While cultivation of energy crops destined for bioenergy purposes might result in competition to food and fodder production due to limited availability of land, utilisation of organic wastes including residues from food production is a particularly intelligent approach.



Decoupling as aspired baseline to be implemented in the matrix of the economic sectors

Wastage of the resource food:

- Food waste makes up around 20% of the domestic waste stream in the EU, with approximately equal quantities arising from food manufacture and catering outlets [1]
- If food wastes from agro- and food industries are included an estimated total of 200 million tonnes per year is available in the EU [1]
- When looking at the whole production and supply chain, up to 50% (2 billion t per year) of all food globally produced is wasted instead of being consumed [2]



→ Waste management has a major role to play in meeting the growing demand for food in the 21<sup>st</sup> century: complete avoidance of food waste would result in doubling the availability of food

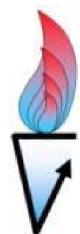
## Specific challenges in different stages of economic development of countries [2]:

- In less-developed countries wastage occurs primarily at the farmer-producer end of the supply chain.
  - Inefficient harvesting, inadequate local transportation, poor infrastructure → produce is frequently handled inappropriately and stored under unsuitable farm site conditions.
- At increasing development level the food loss problem moves further up the supply chain with deficiencies in regional and national infrastructure having the largest impact.
- In fully developed countries more-efficient farming practices and better transport, storage and processing facilities ensure that a larger proportion of the food produced reaches markets and consumers. However, characteristics associated with modern consumer culture mean produce is often wasted through retail (to meet consumer expectations) and customer behaviour.
  - Supermarkets often reject entire crops of perfectly edible fruit and vegetables at the farm because they do not meet exacting marketing standards for their physical characteristics, such as size and appearance. For example, up to 30% of the UK's vegetable crop is never harvested.
  - 30% to 50% of what has been bought is thrown away by the purchaser.

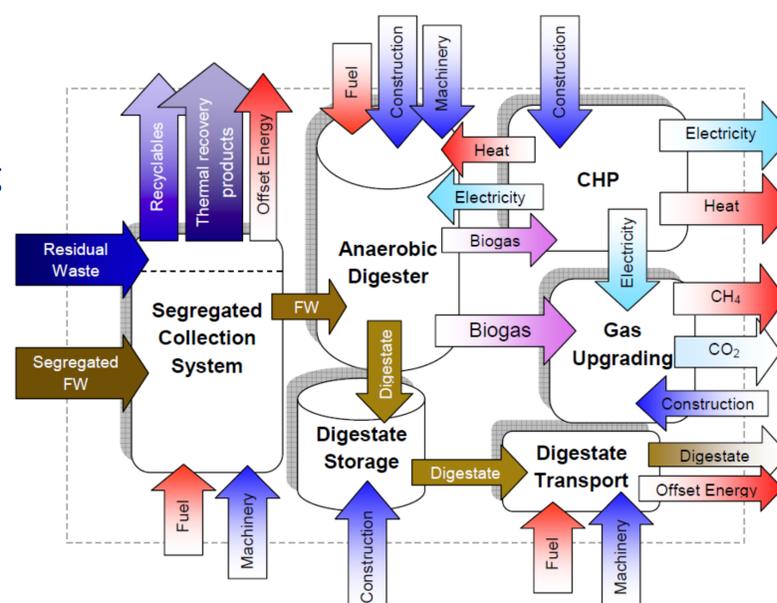
Selected engineering approaches to the topic:

- Modern agricultural machinery and practices (e.g. irrigation methods)
- Efficient storage including e.g. drying to avoid moulds and fungi
- Adapted storage for fruit/vegetables, grain crops, etc.
- Progress to ensuring the cold chain throughout its distribution and storage
- Alternative conservation methods (canning, drying)
- Better engineered facilities for efficient and effective transportation of food
- Consideration of integrated (“virtual”) resources (water, energy, fertilizer) in a holistic approach → more efficient irrigation, energy savings (agriculture, storage, transport, processing)

→ If food waste can't be avoided, its segregation and valorisation is a clear opportunity to contribute to increasing the share of renewable energy



Valorisation of food waste via Anaerobic Digestion with biogas production – the EU project Valorgas [1]  
UNIVERSITY OF Southampton



Particular benefits of anaerobic digestion:

- Energy generation
- Contributes to sustainable waste treatment schemes
- Valuable digestate (beneficial for soil fertility)
- Mitigation of fecal-borne and parasitic diseases, and of plant diseases
- Can be implemented both at household level (→ alleviation of housework) and at industrial scale
- Strengthens rural sector

→ Bioenergy with positive effects on soil productivity, economy, society

- Reducing wastage frequently beyond capability of individual farmer, distributor or consumer, since it depends on market philosophies, security of energy supply, quality of roads, presence of transport hubs – factors related more to societal, political and economic norms, as well as better-engineered infrastructure, rather than to agriculture [2].
- Transfer of know-how to where it is needed, and creating the political and social environment which encourages both transfer and adoption of ideas to take place are vital factors [2].
- Aside of reduction of levels of food wastage, valorisation of not avoided material streams should be in the focus of waste management and engineering approaches. Segregation at source is a prerequisite.
- Organic residues from urban areas have high capacity to be turned into valuable resources for agricultural use if appropriate waste management and treatment schemes are implemented. Increasing urbanization trends emphasize the need for links between urban and agricultural sectors.