

## **Waste-to-Food Strategies: design, application and sustainability**

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The concept of Waste-to-Food conversion as a new approach to efficiently utilize organic waste and return nutrients in the food chains in as close way as possible to the human consumption. The current principle of cascading use of biomass considers a formation of food and feed, prior to the production of materials and chemicals as well as energy. Cascading use of biomass shall promote efficient use of bio-based resources through dissemination of best practices and support for innovation in the bio-economy and follow the principles sustainability, resource efficiency, circularity, new markets and products as well as subsidiarity. However, existing approaches do not rely on direct utilization of waste biomass for human consumption, but rather for the reuse of nutrients and chemicals through biotransformation or chemical alteration.

Reducing food waste can provide multiple benefits for both society and the globe, being mandatory to find ways to increase the efficiency of the food system, security, and nutrition, and to contribute towards environmental sustainability. Results of a few international and regional projects (e.g., EntoWaste, UpWaste, ClimAqua, AlgoWert) dealing with the application of bio-transforming agents (e.g., microalgae and insects) indicate high sustainable potential for the waste reuse into the safe biomass applicable in food chains. The application of Waste-to-Food concept relies on known and novel solutions focusing on nexus approaches to the utilization of biobased materials and methods. Safe and economically feasible examples include the use of food waste for the heterotrophic microalgae (*Galdieria sulphuraria*) cultivation or insect (*Hermetia illucens*) production. Such approaches allow for the holistic reduction of environmental impact (20-30%) if multiple reuse options are considered. The results also indicated the most feasible options of the Waste-to-Food application options for the industrial symbiosis and circular economy benefits.