Holistic food: designing sustainable food pathways

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Context

Food supply can be considered as a system that aims at supplying food to human with complex supply chains that goes from photosynthesis (plant growth with the help of the sun) to the mouth and from . . . back to the environment. Developing the future food supply can therefore be conducted as a system design problem that includes the food production and usage and the related waste management. It is important to mention that the organic waste management as well as the food production can be in competition with the heat, electricity and mobility supply related to the energy system.

Objective

The goal of the project is to develop a superstructure based model of the integrated food & energy system for the identification of the most sustainable pathways for the food production. The model will allow to systematically generate alternative food production pathways adopting a holistic approach that will demonstrate the interdependencies between the food supply and the energy system in a given location.

Expected work and results

The first phase concerns the development of the superstructure model to be used in the OSMOSE platform of EPFL (IPESE). The work will concern:

- the development of the needed exchange nodes for the systematic superstructure generation.
• the development of model data base concept to systematically add processes in the superstructure
• the development of sustainability indicators for the supply chains assessment
• the application of optimisation techniques to generate and compare alternative food systems design
• the development of multi-objective based optimisation strategies to generate competing supply chains and identify the most influencing parameters.

Target students are master students with a prior knowledge of system analysis and/or optimisation techniques.

Contact and instruction to apply: student projects: http://ipese.epfl.ch.