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Bioeconomy for urban areas

Exploratory project
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Coordinator
Kamal Kansou (UR BIA)
kamal.kansou@inrae.fr

Key words
Scenario
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INRAE divisions
ACT
AGROECOSYSTEM
TRANSFORM

EDIFICE

Assessment of biorefineries to recover market gardening waste near the city of Nantes

> Improve the creation of biorefineries not only from a technical point of view but also through improved inclusion in the region and through better supply

Context and challenges

Biorefineries are often presented as a major component of the bioeconomy to support regional ecological and energy transitions. Scientific journals report that biorefinery design is guided primarily by operational research (optimisation) and industrial chemical or bioprocess engineering approaches. Studies generally focus on biorefinery processes, production units or supply chains, and assess technical and economic performances (cost/benefit, energy and water consumption, etc.) and environmental indicators witg a global impact also found in LCAs (global warming, eutrophication, acidification, etc.). On the other hand, relatively few biorefineries are operational, and their diversity is limited, as shown by a recent study. Likewise, the production of cellulosic biofuels is off to a slow start despite important technological progress notably in biocatalysis. Research in different fields has linked the slow development of biorefineries to inadequate inclusion in regional bio-economies, which may lead to a lack of involvement in the project by market gardeners.

The challenge is therefore to do a better job in accounting a region's specific characteristics and issues when assessing a project for a biorefinery. One scientific challenge is the lack of studies focussed on this highly interdisciplinary problem and consequently the lack of methodologies to carry out this kind of assessment.

Goals

The goal of the EDIFICE project is to develop a method and tools to analyse "what if" scenarios to help answer the following question: « If this type of biomass were treated in this type of biorefinery, how would it affect the region's sustainability? »

The project also aims to develop an application for a concrete case study that demonstrates the relevance of the method.

The approach chosen involves examining the market gardening sector in the peri-urban region of Nantes. Given the complexity of production systems, the EDIFICE project will concentrate on the development of methodology and tools at the expense of the exhaustiveness of the types of market gardening biomass, the types of biorefineries and possible recovery routes. The case study will focus specifically on managing tomato and cucumber waste from greenhouses.

EDIFICE will apply an integrated interdisciplinary approach to scenario analysis, combining experimentation and modelling as well as steps to bring actors in the production sector and decision makers together.

Project members

INRAE division	Units	Expertise and contributions
ACT	UMR LAE	Choice of indicators, modelling and scenario analysis of regional bioeconomy systems
AGROECOSYSTEM	UMR LAE	MAELIA platform
TRANSFORM	UR BIA	Analysis of region around the city of Nantes, conceptual modelling, multi-criteria assessment, use of a participatory approach with stakeholders Biomass transformation processes, extraction and characterisation of the protein fraction Characterisation of lignocellulosic biomass,