Assessment of the potential of green floating filters for bioenergy production

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LIFE Biomass C+

Chemical Process & Energy Resources Institute - (CPERI)

Introduction

State – Problem

The challenge of producing feedstock for bioenergy without using agricultural land consists an innovative concept based on Green Floating Filters (GFF) which has been developed in the framework of the project LIFE BIOMASS C+. The project aims to demonstrate improvements in climate mitigation strategies through the production of sustainable biofuel. It will utilize existing and underused infrastructure and water resources (i.e. irrigation channels, ponds, lakes, river arms) to produce zero-input biomass ***(Typha latifolia),*** with high starch content that will then be converted into bioethanol and eventually biofuel. The project coordinated by the Centre for Research and Technology Hellas (CERTH, Greece).

Demo sites:

- **Greece**: Lake Cheimaditida and irrigation (Location: Western Macedonia, 40 km southeast of Florina)
- **Spain:** Irrigation channels and pods (Location: broader region of Avila, province 150 km east of Madrid)

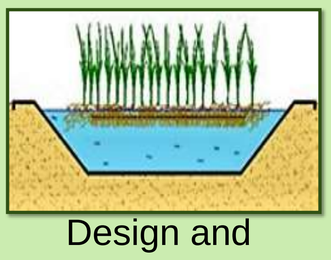
Objectives

- **Demonstration of the applicability of GFF in different climates and water bodies on an industrial scale**
- **Demonstration of the viability of the biomass produced for fuel fabrication**
- **Improvement of water quality and local biodiversity thanks to the filtering effect of GFF rhizomes**
- **Contribution to a positive carbon balance**
- **Chemical and biological improvement of water quality**

Material & Methods

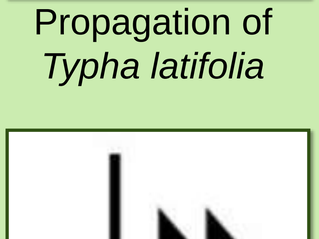
Study area characteristics

Propagation of *Typha latifolia*



Design and application of GFF systems

Harvesting of biomass



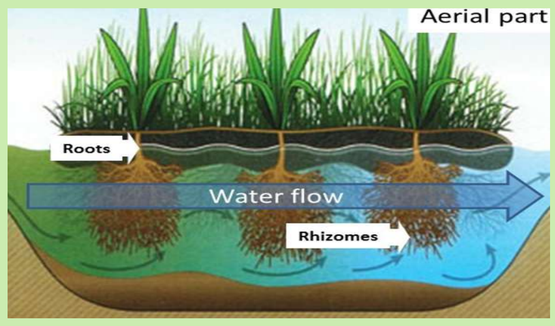
Utilization of biomass

Bioethanol production

Expected Results

Macrophyte plants, as a green filter, will improve water quality of the lake and the biomass produced will provide a great amount of bioethanol be able to blend into biofuel.

Rich in starch that can be converted to ethanol



Macrophytes' mechanism of growth

Flora & Fauna Employment

GHG emissions

Target: 6.14 kg CO_2 per m^2 of installed GFF can be captured by

Biomass can be productively converted into bioethanol and blended into biofuel

Water quality improvement of at least 30% at the demonstration sites

Replication of results and market uptake

Development of an effective business plan

15 t of biomass/h a of GFF

2,600 L of bioethanol

26,000 L of biofuel

EU POLICY

- LAND USE → Scale down rivalry for arable crops
- WATER → Directive for pollution and prevention
- BIOMASS → Fuel quality and biofuels criteria

Conclusions

- The utilization of GFF in multiple water bodies is favorable for:
  - ✓ Better use of natural resources
  - ✓ Improved environmental and climate performance
  - ✓ Total ecosystem restoration
  - ✓ Sustainable land use agriculture and forestry
  - ✓ Low cost bioethanol production
  - ✓ Business plan and investments

Acknowledgments

The authors would like to thank the European Commission for financially supporting the research of the Biomass C+ within the project **LIFE 16 CCM /GR/ 000044 "Low-cost production of bioethanol with a positive carbon balance through innovative Green Floating Filters (GFF) in different water bodies"**.

Project's website:
http://biomasscarbonpositive.eu/

Contact info