

Energy crop production combined with phytoremediation for heavy metal contaminated soils.

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In Flanders (Belgium, Europe) large surface areas are diffusely polluted with inorganic pollutants like heavy metals. The currently applied remediation techniques (dig & dump of soil and pump & treat of groundwater) are too expensive for these large areas. On the other hand, due to their contaminated nature, production of food crops on these areas imply certain risks. However this opens perspectives for the energy-farmer.

The project consists of three main topics:

A) Study of energy crop production in combination with phytoremediation

Investigation of the synergism possibilities between energy crop production and phytoremediation to remove heavy metals from the soil and groundwater in the long term.

The increase of the uptake of the heavy metals by the energy crops can be influenced by:

- increasing the bioavailability of the heavy metals by the addition of biodegradable physicochemical factors such as citric acid, micronutrients, etc.
- stimulating the heavy-metal uptake capacity of the microbial community in and around the plant

This faster uptake of heavy metals will result in shorter and therefore less expensive remediation periods.

B) Study of energy crop valorization

Study of the valorization of the energy crops by different energy-recovery-techniques: incineration, gasification, anaerobic digestion and pure plant oil production (see Figure 1).

The energy balances and heavy metal mass balances will be compared for the four studied energy-recovery-techniques. As the valorization of contaminated biomass might have effects on the process of these techniques (flue gasses, slag, microbial organisms) recommendations will be made in order to adjust certain process parameters as well.

C) Economic study

All the obtained information will result in an economic evaluation of the use of phytoremediation combined with energy crop production for the remediation of sites diffusely polluted with heavy metals. This is necessary because the feasibility of the long term strategy of phytoremediation has to be tested against the current remediation techniques.

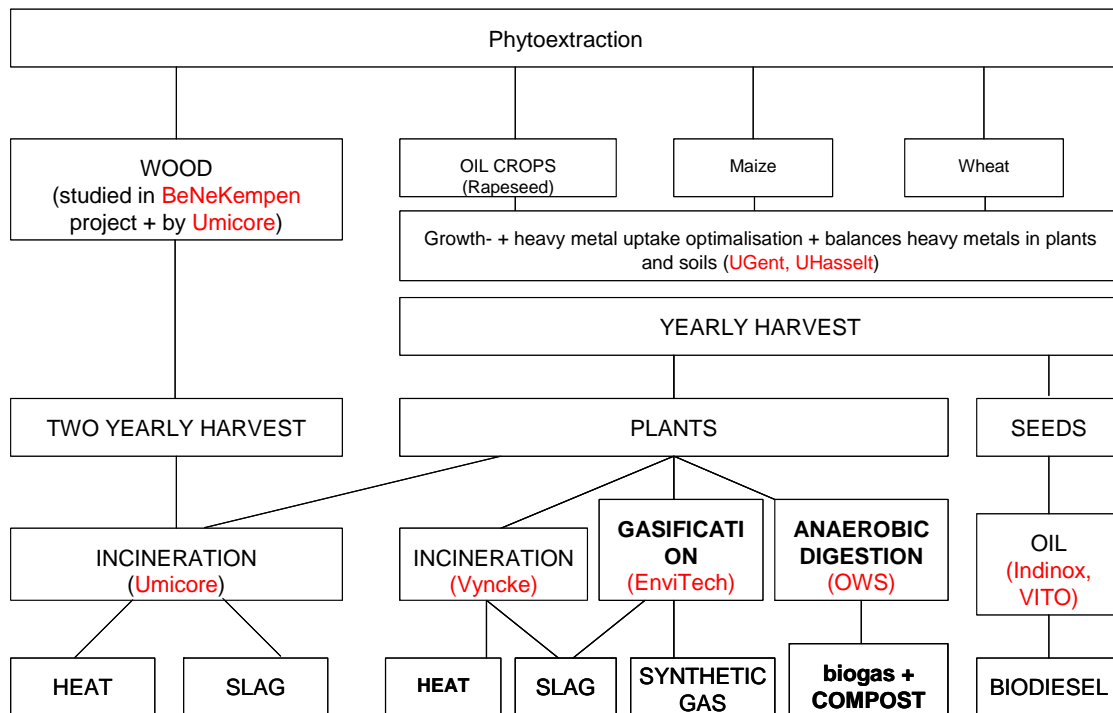


Figure 1: Representation of studied techniques to produce (bio)-energy from energy crops used in the remediation of soils contaminated with heavy metals. The red names indicate the involved partners.



Figure 2: Energy crops evaluated in the project: short rotation coppice, rapeseed, maize and wheat.

Project goals

The overall project goal is to provide an optimal bio energy chain from energy crops applied for phytoremediation. Both the phytoremediation capacity, energy efficiency, material balance and economics of the chain will be taken into account.

Project planning

The project is scheduled to start mid 2007 and will last for 3 years.