Energy from Short Rotation Coppice

Small scale plantations, non-competitive to food production

About pilot sites

- Fast growing willows for energy production
- Short rotation coppice system
- 7 x 3-year rotation cycle (in total 21 years)
- Small parcels < 2ha
- Operational planting and weed management
- No irrigation
- Natural fertilizer application after each harvest

Goal of the pilot installations

- Production of wood for the heating purposes in possibly short time
- Multifunctional use of agricultural and industrial soils (buffer zones, integration with chickens breeding, enhancing natural biodiversity) but no competition with food and feed production
- Creating additional profit from unused land

3-year rotation cycle

Economic facts

- All the installation costs included, heat from SRC wood chips is by 30-43% cheaper than from natural gas and by 45-63% cheaper than from heating oil. SRC wood creates a competitive product to the forest wood chips (cheaper by 25%) if no additional costs of the storage need to be included. It contributes to the energetic independency in the times of continuously increasing fuel prices.
- Creating small scaled SRC plantations contributes to the regional development through creation of green jobs and the local capital binding through the use of locally sourced fuels.

Environmental gains

- Nearly 4 tonnes of Carbon per ha permanently sequestered in the belowground biomass and soil pools after 21 life span of the plantation
- By 46% reduced overall environmental impacts if using SRC chips instead of forest wood chips for heat*
- 27 kg CO₂ emissions avoided per 1MWh heat produced* as compared to forest wood chips use
- Better landscape integration of the industrial premises
- If special measures introduced, increase in local biodiversity

* in 50kW installation, for SRC wood chips mix based on willows, poplars and to lower extent indigenous species
Technical & financial challenges

- Starting capital of 2400€ per ha necessary, followed by the heating installation cost in the 3rd year of plantation
- The costs of heating installation for wood chips higher than for natural gas and heating oil
- In case of necessary investment in wood storage building, the production costs increase by nearly 40% (but still comparable to the costs of wood from the market)
- Planting, management, harvest and removal actions require agricultural know-how and equipment (for some actions very specialized)
- Depending on the region, possible difficulties with the availability of affordable harvest machines – too high harvesting costs can cause non-profitability of the whole endeavour
- High financial risk for the owner of the plantation linked to possible plantation damage by fortuitous events e.g. (severe pest or drought)

How to support SRC?

Information for public stakeholders

- Use of local synergy potentials e.g. by sharing local wood storage spaces with the forest authorities
- Creating access to the low interest rate loans for the involved parties, also those with low personal credit rating
- Reduction of the detaining risks by creating insurance fund compensating loses due to fortuitous events
- Establishing cooperation with local farmers and experts from the regions, where SRC plantation development is much more advanced to develop local SRC know-how

The highest impacts:

- Cooling of the cuttings during the storage prior to planting highly influences freshwater eutrophication, as well as freshwater and terrestrial ecotoxicity
- Weed removal with glyphosate contributes to strong impacts on freshwater eutrophication, as well as freshwater and terrestrial ecotoxicity
- Frequent fertilizing during cuttings production generates high impacts on terrestrial acidification
- Field operations and plantations removal contribute to strong metal and ozone depletion

Optimizing measures:

- Use of locally produced cuttings reduces environmental impacts linked to the transport
- Minimizing the cuttings storage time contributes to reduced energy use for cooling
- Conservative approach towards application of herbicides and pesticides allows reducing impacts linked to their production and use
- Taking precautious decisions on the species to be planted, to reach the highest yields and therefore reduce the overall impact
- Conservative approach towards application of fertilizers (incl. the stage of cuttings production) reduces environmental impacts from ammonia and nitrogen oxides emissions

Literature for more details:

Rugani et al. (2015): Simulation of environmental impact scores within the life cycle of mixed wood chips from alternative short rotation coppice systems in Flanders (Belgium), in preparation

Multifunctional land use: free range poultry and SRC | Source: Inagro