Buffer strips for biomass sourcing

Low-impact agriculture

Source: DLV Plant

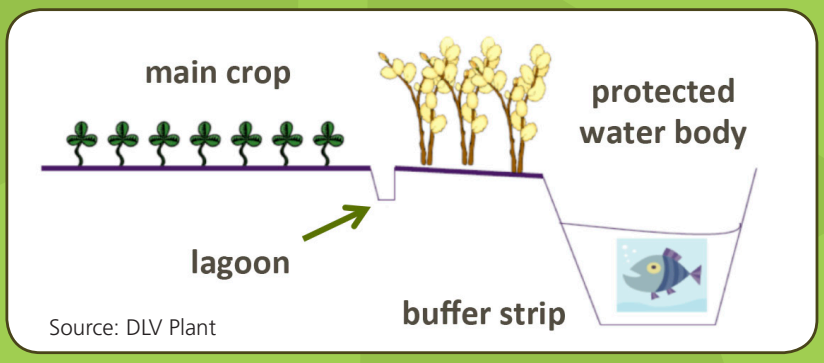
The idea behind

Buffer strips are commonly used for protecting surface water from pollution with minerals and chemicals from agriculture. However, their existence is highly depending on the EU and country subsidy schemes. If the prices of food and consequently revenues from food production continue to grow or the compensation for maintaining green buffer strips will be reduced, farmers in some countries may start reusing these soils for agricultural activities

Goal

Investigate low-impact solution for the buffer strip use, which will:

a) ensure continuity for the water protection
b) activate additional biomass streams
c) possibly help to reduce dependency on subsidies through creation of additional profit from the buffer strip



Source: DLV Plant

Pilot description

- 3 strips 9 m wide and in total 1.7 km long
- Agricultural soils, since 2011 used as buffer strips
- Buffered object: water canal
- Cultivated energy crops: mix of cereals (wheat, barley and rye) and mix of grasses
- No use of pesticides or fertilizing agents
- No harvest (due to legal restrictions)
- Estimated harvest from 1 ha of buffer strip:
  - for energetic use: 5 tonnes of grass silage, 5.7 tonnes of cereal silage
  - for agricultural use: 1 tonne of straw, 0.7 tonnes of grain and 2 tonnes of hay

Compared scenarios

SC 1 Greening: Cultivation, no harvest

SC 2 Energetic use:

Cultivation, harvesting, silage production for digestion

SC 3 Agricultural use:

Cultivation, harvesting hay, grain and straw for animal feeding and bedding

SC 4 Intensive cultivation:

Cultivation and harvesting wheat, potatoes, onions and sugar beets

Costs & possible revenues

Cost/value [€/ha]	SC 1	SC 2	SC 3
Seeds, fertilizers, material	164	183	164
Fuel and machine costs	181	427	359
Manpower	88	134	124
Total cultivation costs	434	744	647
Market value of the product	-	160	210
Total net costs	**434**	**584**	**437**

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Optimizing costs and biomass yield

- Agricultural use generates similar total net costs to greening, while the costs for energetic use are by 35% higher.
- Cultivation of cereals is more profitable than grass due to higher potential market value of the products.
- Use of perennial grasses may contribute to the strong reduction of the cultivation costs e.g. sowing of grass mix only once per 15 years allows reducing cultivation costs by 40-70%.
- Increase of biomass yield from grassy buffer strip can be reached by multiple harvest. Each additional harvest increases the cultivation costs of buffer strip by 117-140€/ha and generates potential incomes of 70-75 €/ha.

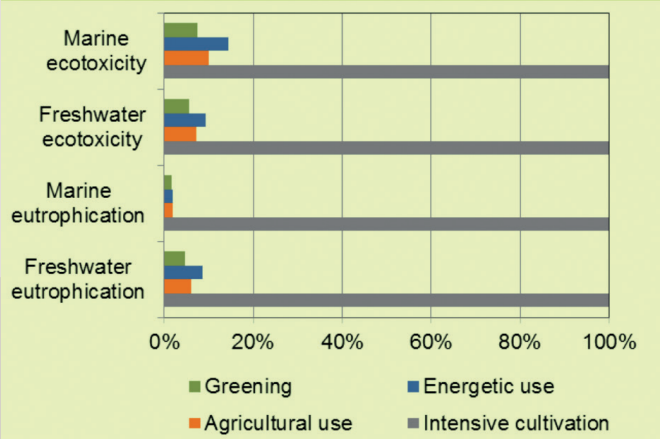
Source: DLV Plant

Impact on water protection

Harvesting biomass increases the impact on the water related categories. Impacts for energetic valorisation path are higher than for agricultural use. However, the re-cultivation in intensive agriculture mode generates 14-57 times higher impacts than greening!

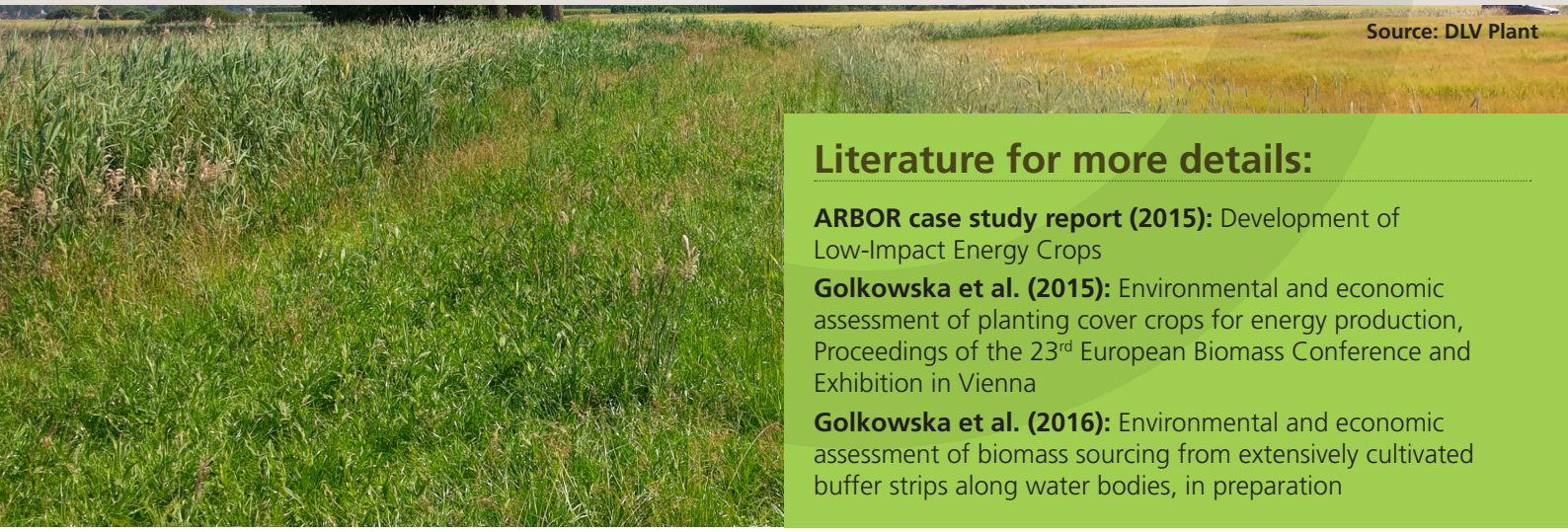
Total environmental impact:

Based on 1 ha of buffer strips, sourcing of biomass increases the impacts per ha of buffer strips by 33% for the agricultural use scenario and by 77% for the energetic use scenario as compared to greening. However, the re-use of buffer strips for intensive agriculture generates 19 times higher impacts than greening. The higher impacts for energetic and agricultural use are mainly caused by the harvesting step (use of machines and fossil fuels).



Recommendations

- Further research for different **perennial cultures** including economic and environmental assessment to identify those fulfilling both economic and environmental criteria for sustainability
- Investigation of **different valorisation paths**
- Change of legislation on the European level: **permission for harvesting** of sustainably cultivated buffer strips within greening measures of the Common Agricultural Policy



Source: DLV Plant

Literature for more details:

ARBOR case study report (2015): Development of Low-Impact Energy Crops

Golkowska et al. (2015): Environmental and economic assessment of planting cover crops for energy production, Proceedings of the 23rd European Biomass Conference and Exhibition in Vienna

Golkowska et al. (2016): Environmental and economic assessment of biomass sourcing from extensively cultivated buffer strips along water bodies, in preparation

Arbor Biomass for Energy

Investing in Opportunities

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INTERREG IVB

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