Grassification

MooV – Mobilisation strategies for verge grass in the 2 SEAS region

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WP3 – Value chain assessment

D3.2.1
Design and development of the supply chain optimisation model

D3.2.2
Testing and validation of the supply chain optimisation model

D3.2.3
Reporting on and dissemination of the supply chain optimisation model

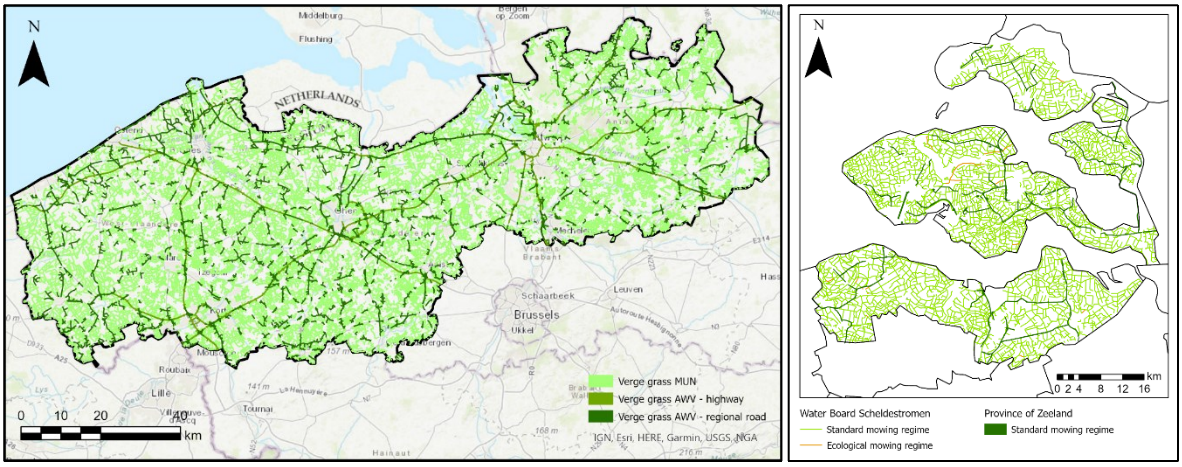
EXECUTIVE SUMMARY

Introduction

Grass on roadsides verges grows back seasonally. Depending on the region/country a “cut-and-collect” or “cut-and-leave” management is applied depending on legislation, road safety rules and/or biodiversity goals. In any case, cutting, collecting and/or processing of roadside grass comes at a significant societal cost.

The European Union sets ambitious goals for further deployment of grass clippings in a circular bio-based economy. Investigating different mobilisation strategies - in which established as well as new grass-based value chains co-exist - is key to assess the impact and realism of these ambitions since the sustainable and cost-efficient management of verge grass remains a challenge. A well-founded value chain analysis increases grass mobilisation rates and reduces risks and costs.

MooV – VITO’s supply chain optimisation model - is used to analyse different mobilisation scenarios in search of the best value chain configuration from harvest over pre-treatment and storage to the end-processor’s site. Within “Grassification, a detailed assessment is performed for two regions; i) the provinces Antwerp, West Flanders and East Flanders (BE) and ii) the province of Zeeland (NL).



Mapped roadside verges in Belgium (left) and the Netherlands (right).

The following scenarios are investigated:

- for the provinces Antwerp, West Flanders and East Flanders (cut and collect management);

AS IS (current)	green composting
TO BE 1 (future)	increased demand by green composting
TO BE 2 (future)	increased demand by green composting and VGF- composting (vegetable/fruit/garden waste).
TO BE 3 (future)	increased demand by green composting and a dry digester added at each VGF-composting
TO BE 4 (future)	increased demand by green composting and VGF-composting and a biomaterial production added for each province.
TO BE 5 (future)	increased demand by green composting and VGF- composting and a biomaterial production at each large-scale composting site

- for the province of Zeeland (cut and leave management);

AS IS (current)	one cut - no collection
TO BE 1 (future)	one cut - increased collection (50%)
TO BE 2 (future)	one cut - increased collection (100%)
TO BE 3 (future)	two cuts - increased collection (100%)

Methodology

The assessment of mobilisation strategies requires to cope with numerous variables, such as the grass quality, the available processing options and specific characteristics and cutting regimes of a region. So, flexibility in the MooV assessment is key to correctly define and investigate all relevant scenarios and calculate the impact of changing variables on the mobilisation cost. The following variables are modelled:

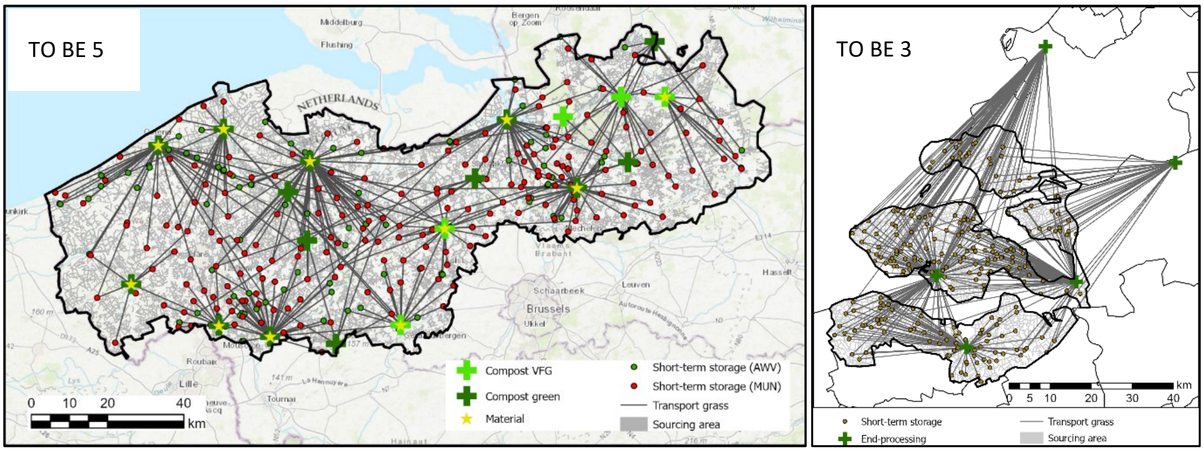
- Products: feedstock typology and potential, intermediate and end-products typology;
- Harvest: harvesting types (flail/rotary), costs (safety cars), capacities, quality;
- Pre-treatment: treatment types, costs, capacities;
- Storage: storage types, costs, capacities, storage effects on grass quality;
- End-processing: processing types, required quality, capacities;
- Transport modes: type, capacity, cost, bulk densities, fresh matter vs. dry matter;
- Time: seasonal growth cycles, long- and short-term storage.

The objective for each scenario is to mobilise the required grass throughout the supply chain at least costs while fulfilling the demand from the end-processors (i.e. composting, digesting and/or biomaterial production). The total mobilisation cost is calculated as the sum of costs related to harvest, pre-treatment/storage and transport by road (i.e. tractor-harvester combination, truck and/or safety cars). Next to the cost, the total transport distance (km) and the number of transport movements are calculated for each scenario.

Results

The technical harvestable quantity ranges between 16-19 ton/ha fresh matter depending on feedstock type. For the three Flemish provinces, the yearly harvestable potential is circa 190.000 tonnes fresh grass. The area represents about 66% of the roads in Flanders. The total is divided over municipal roads (73%), regional roads (16%) and highways (11%). For the Province of Zeeland, the potential is circa 42.300 tonnes if two cuts per year would be organised. Current practice is to cut once a year, resulting in a harvestable potential of 25.300 tonnes per year. However, this cut is dominantly left on the road verges without collection.

Based on the data gathered and the assumptions defined in the DEMO's, an average (optimal) mobilisation cost of between 50 € and 60 € per tonne harvested grass was calculated. Note that this average cost depends on the road density, the density of the storage network and proximity of end-processors. Specifically, when grass is collected in the vicinity of the end-processing facility, mobilisation costs drop below 40 €. Optimising the sourcing area helps to reduce mobilization costs. The quality of the grass constraints the allowed end-processing type. The quality can be influenced by choice of road type (e.g. with minimal amount of litter), mowing type (e.g. flail vs. cut), harvest moment and manner of long-term storage.



Example of an optimal supply chain configuration in a specific mobilization scenario (Belgium (left) and the Netherlands (right)).

Main conclusions

The mobilisation cost is influenced by the quantity, quality and location of the available grass.

Optimising the sourcing area helps to reduce mobilization costs.

On average a mobilisation cost of 55€ per tonne fresh grass seems realistic. If grass is strategically collected in the vicinity of the end-processing sites, the cost can drop below 40€.

The mobilisation mileage averages around 2-2,5 km/tonne fresh grass. If processing sites are strategically located, an increase in processing demand does not lead to an increase of mileage per tonne.

Future scenarios show enough grass potential for the co-existence of established (composting, digesting) and emerging commercial-scale end-processing sites (biomaterials).

Trade-offs between mobilisation cost increase (as a result of increased sourcing) vs. revenue increase (as a result of higher added-value products e.g. biomaterials) could be defined.

The mapped road side verges and related processing sites with differentiation to location, acreage, ownership, capacity, yield and requirements is the best available for Flanders.

GRASSIFICATION consortium

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