The GRASSIFICATION Project and Value Chain Optimisation of Verge Clippings

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vito

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GRASSIFICATION

Partners in a quadruple helix: Research institutes, Public sector, Private sector, CSO's

University, BE

Local Government

Research Institute (agri and horti)

University College

University

Agri-food consultants

University College

Bio-based materials and products consultants

Research Institute (sustainability and more)

Innovation in nature and economy consultants

Social economy in nature management

Waste company

Conservation CSO

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The GRASSIFICATION project 'in a grass-blade'

- **Valorisation of verge grass clippings**
  - Improving quality of the feedstock and derived products along the value chain to meet criteria

    Verge grass (types/qualities/costs) → **Mowing** (types, qualities, costs) → **Transport** (types, qualities, costs) → **Storage** (types, qualities, costs) → **Conversion** (types, qualities, costs) → **Products and byproducts** (types, qualities, costs and revenues)

  - Evaluating current criteria and policy
- Wide variety of cooperation and research with high and low TRLs along the value chain
- Duration: March 2018 – August 2021
- Budget: 4 421 681 € (ERDF rate 57%)
- https://www.interreg2seas.eu/en/Grassification

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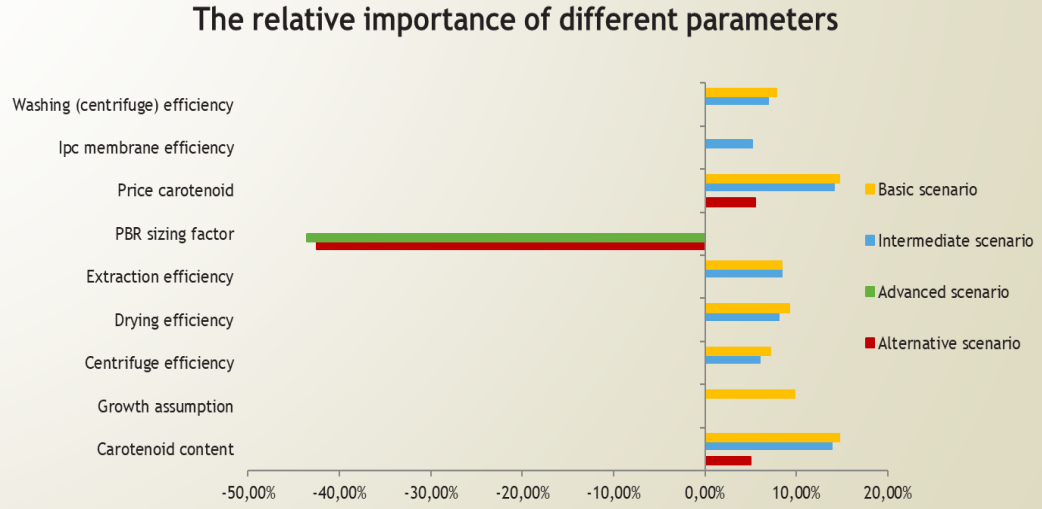
Low-carbon technologies

Value chain optimisation of grass clippings

- **MooV**: optimisation over the whole value chain, including logistics with Mixed-integer linear programming (MILP) based on cost-efficiency and sustainability
  - What is the best configuration? Where is the best location for each step? How do different configurations compare? Which factors have most influence? Which process flows are preferable?
  - Strategic decision-making service

- **TEA**: Techno-Economic Assessment through a dynamic cash-flow model in Excel
  - Input
    - Technical, e.g. efficiency, capacity, catalyst use, storage size, OH, and energy use.
    - Economic, CAPEX with scale effects if available, OPEX (and Revenues).
  - Output
    - Mass&Energy balance
    - Total production cost: €/unit
    - NPV, IRR and PBP (if revenues assumed)
  - Uncertainty analysis



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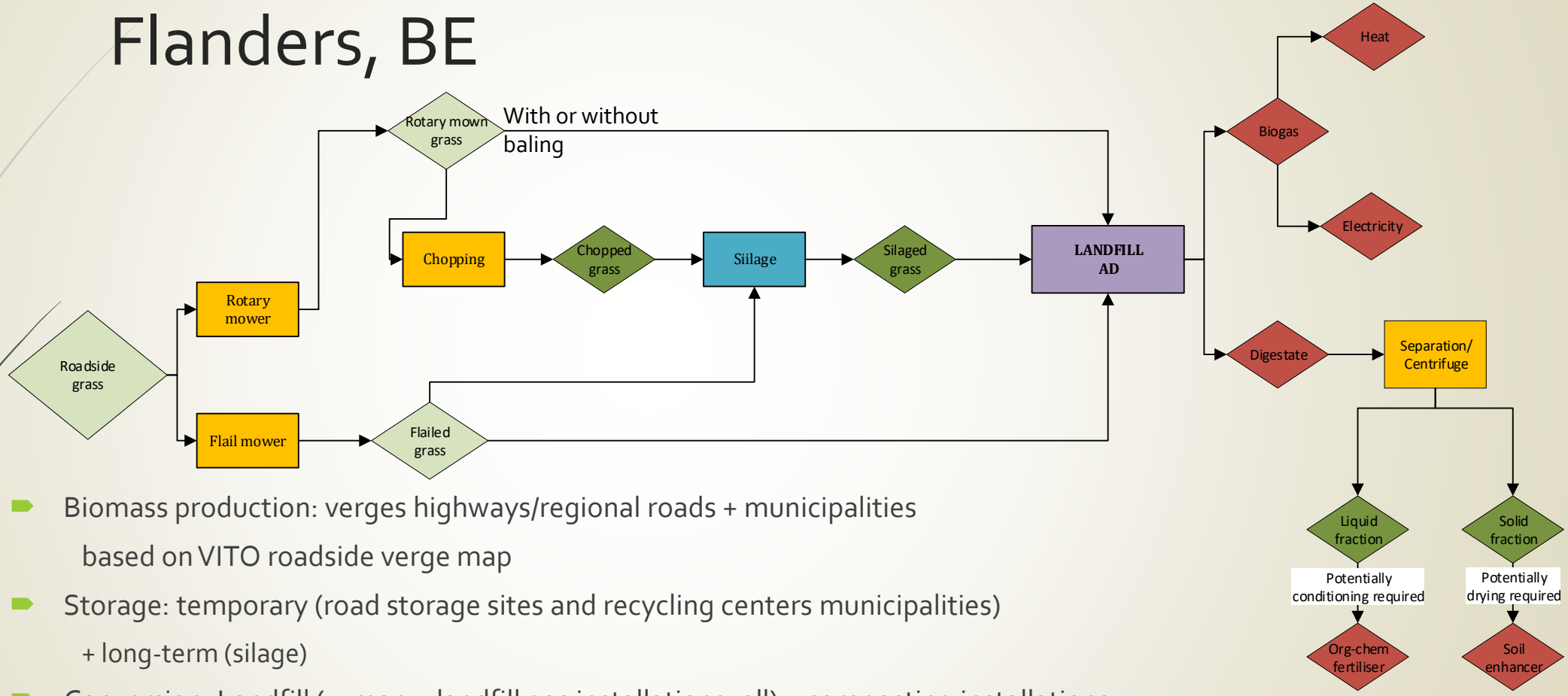
DEMO 1: Landfill Anaerobic Digestion Flanders, BE



- Biomass production: verges highways/regional roads + municipalities
  based on VITO roadside verge map
- Storage: temporary (road storage sites and recycling centers municipalities)
  + long-term (silage)
- Conversion: Landfill (1, many: landfill gas installations, all) + composting installations
- BAU: cut & collect ⟶ let rot (no fee), composting & export (gate fee)

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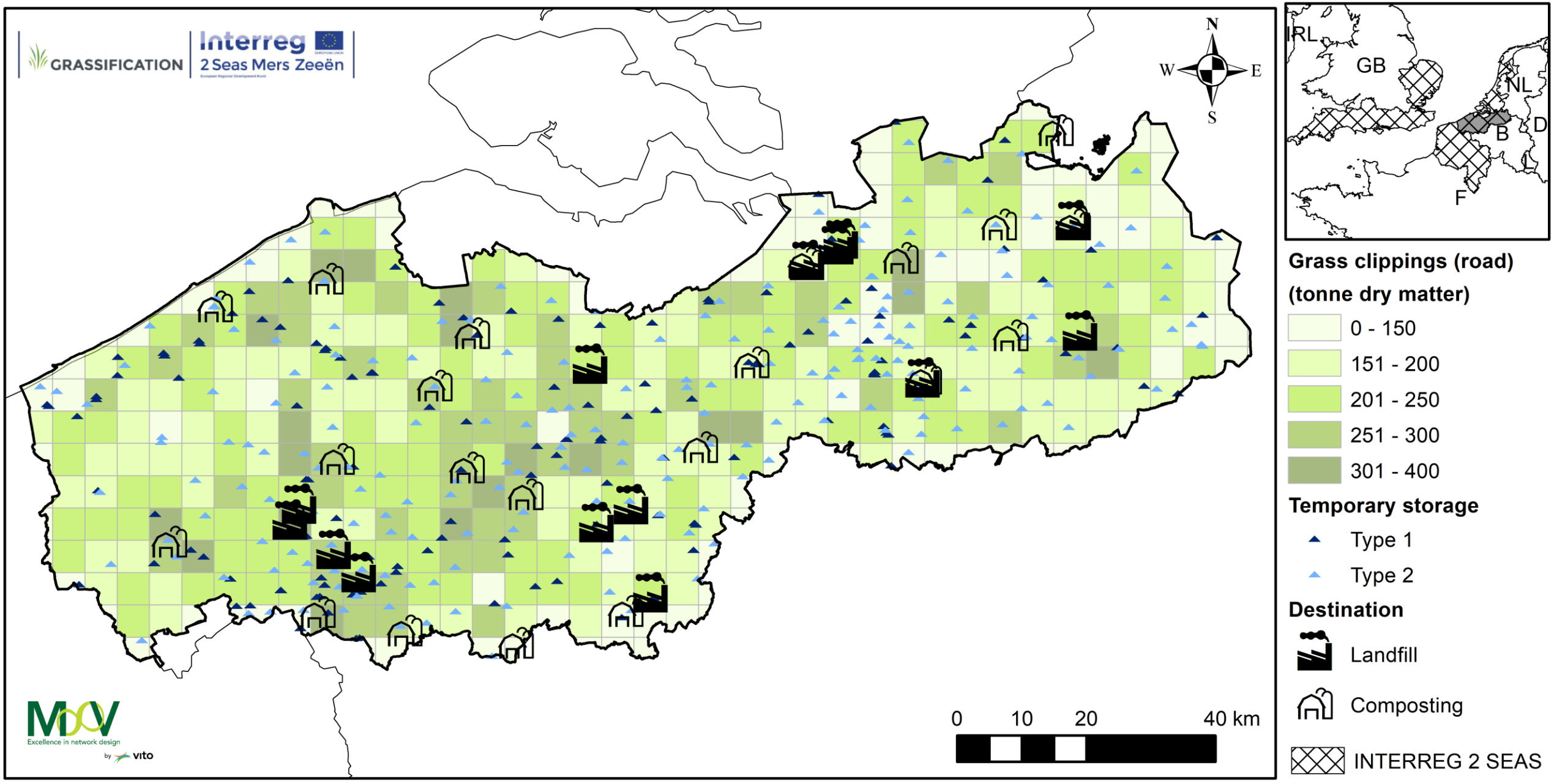
Process flow diagrams still subject to minor adaptations, e.g. digestate valorisation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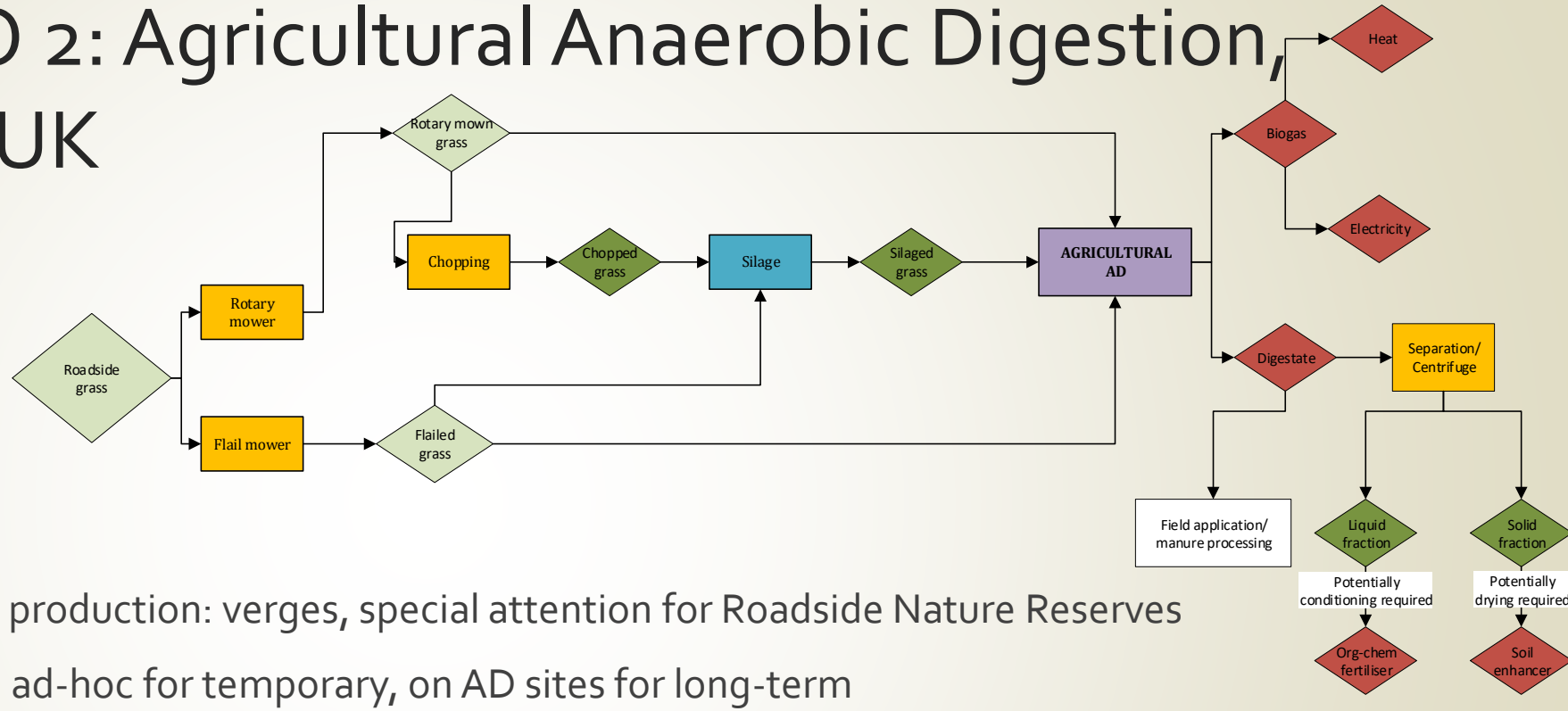
2 Seas Mers Zeeën
N
W
E
S
IRL
GB
NL
B
D
F
Grass clippings (road)
(tonne dry matter)
0 - 150
151 - 200
201 - 250
251 - 300
301 - 400
Temporary storage
Type 1
Type 2
Destination
Landfill
Composting
INTERREG 2 SEAS
0
10
20
40 km
MOW
Excellence in network design
by vito

DEMO 2: Agricultural Anaerobic Digestion, Kent, UK



- Biomass production: verges, special attention for Roadside Nature Reserves
- Storage: ad-hoc for temporary, on AD sites for long-term
- Conversion: 5 large AD sites in Kent
- BAU: Cut (austerity) & leave, so no logistics network available

Process flow diagrams still subject to minor adaptations, e.g. rotary-mowing and baling route

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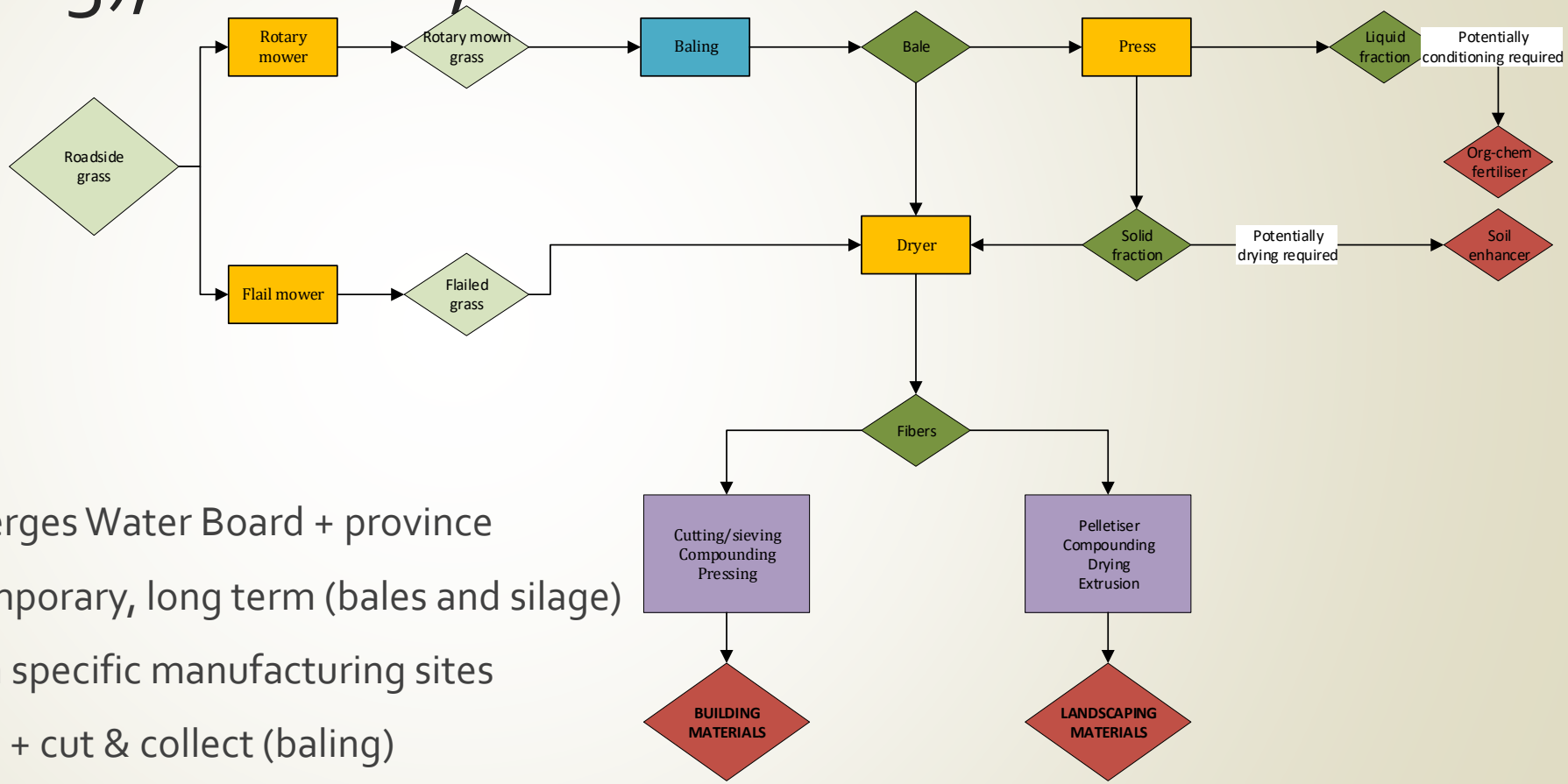
DEMO 3: Biobased Materials (landscaping and building), Zealand, NL



- Biomass production: verges Water Board + province
- Storage: ad-hoc for temporary, long term (bales and silage)
- Conversion: fiber use in specific manufacturing sites
- BAU: cut & leave (98%) + cut & collect (baling)

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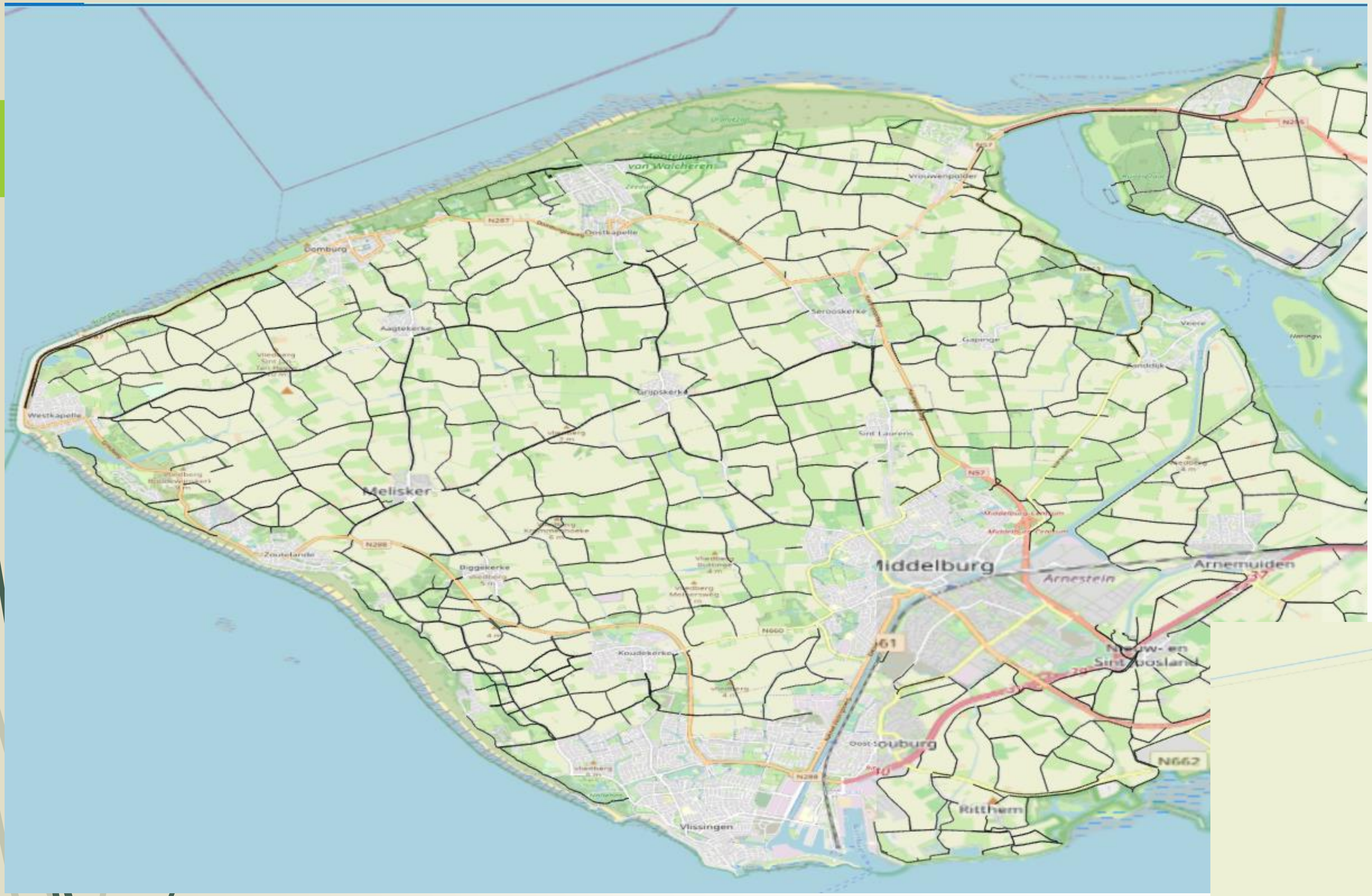
Process flow diagrams still subject to minor adaptations, e.g. potential of flailed grass



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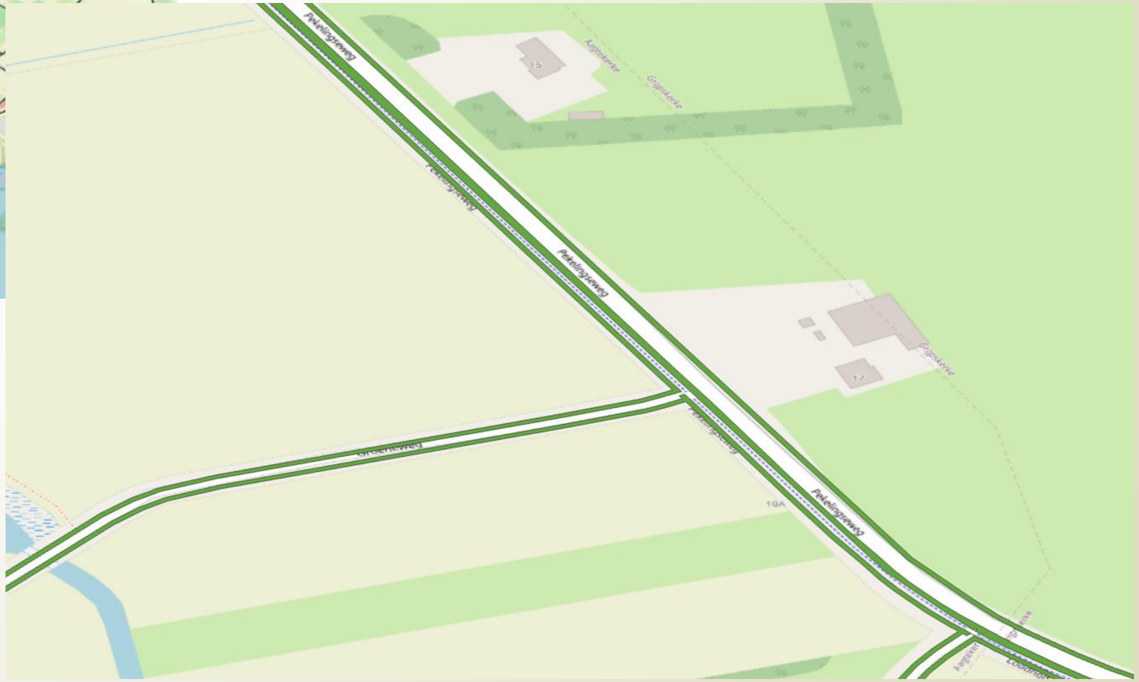

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More information about the project and subscriptions to the newsletter:
https://www.biorefine.eu/projects/grassification#

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