Sustainable HVO-production potential and environmental impact

Hanna Karlsson (SLU), Kajsa Henryson (SLU),Torun Hammar (SLU)
Sofia Poulikidou (IVL), Julia Hansson (IVL)

THE SWEDISH KNOWLEDGE CENTRE FOR RENEWABLE TRANSPORTATION FUELS

Content

- Short introduction on the project
  - Background and motivation
  - Goal and expected outcome
- First summary report on raw materials for HVO production
  - Method and approach
  - Key findings from the study
- Continuation and time plan

Short introduction on the project

Background

- Hydrotreated vegetable oil (HVO) is now the dominant biofuel on the Swedish market used in the transport sector (EM, 2018)
  - High drop-in potential
  - Stable fuel
- Can be produced from a variety of raw materials
  - different availability potential
  - climate impact is highly affected by the raw materials used
- Use of HVO in Sweden reached 14 TWh in 2018. Though the vast majority (95%) based on imported raw materials (Indonesia (34%), Malaysia (11%), Germany (9%) and USA (7%)).
- Among Swedish raw materials tall oil (a residue from the pulp and paper industry) was the dominant source

Important factors

- Availability of resources and energy security
- Technology maturity
- Environmental (climate) impact and production cost
- Sustainable production processes – Regulatory requirements

Goal and expected outcome

- What raw materials can be considered as relevant candidates that can be produced in Nordic conditions?
- What is the overall environmental and economic potential of those materials?
  - Assessment of raw materials for HVO production - availability and potential (submitted report) (**SLU,** IVL)
  - Environmental Life cycle assessment of two selected pathways (**SLU,** IVL)
  - Technoeconomic assessment of two selected pathway (**IVL,** SLU)
- Increase the knowledge about alternative sustainable raw materials and technologies for HVO production
- Assist and increase domestic production

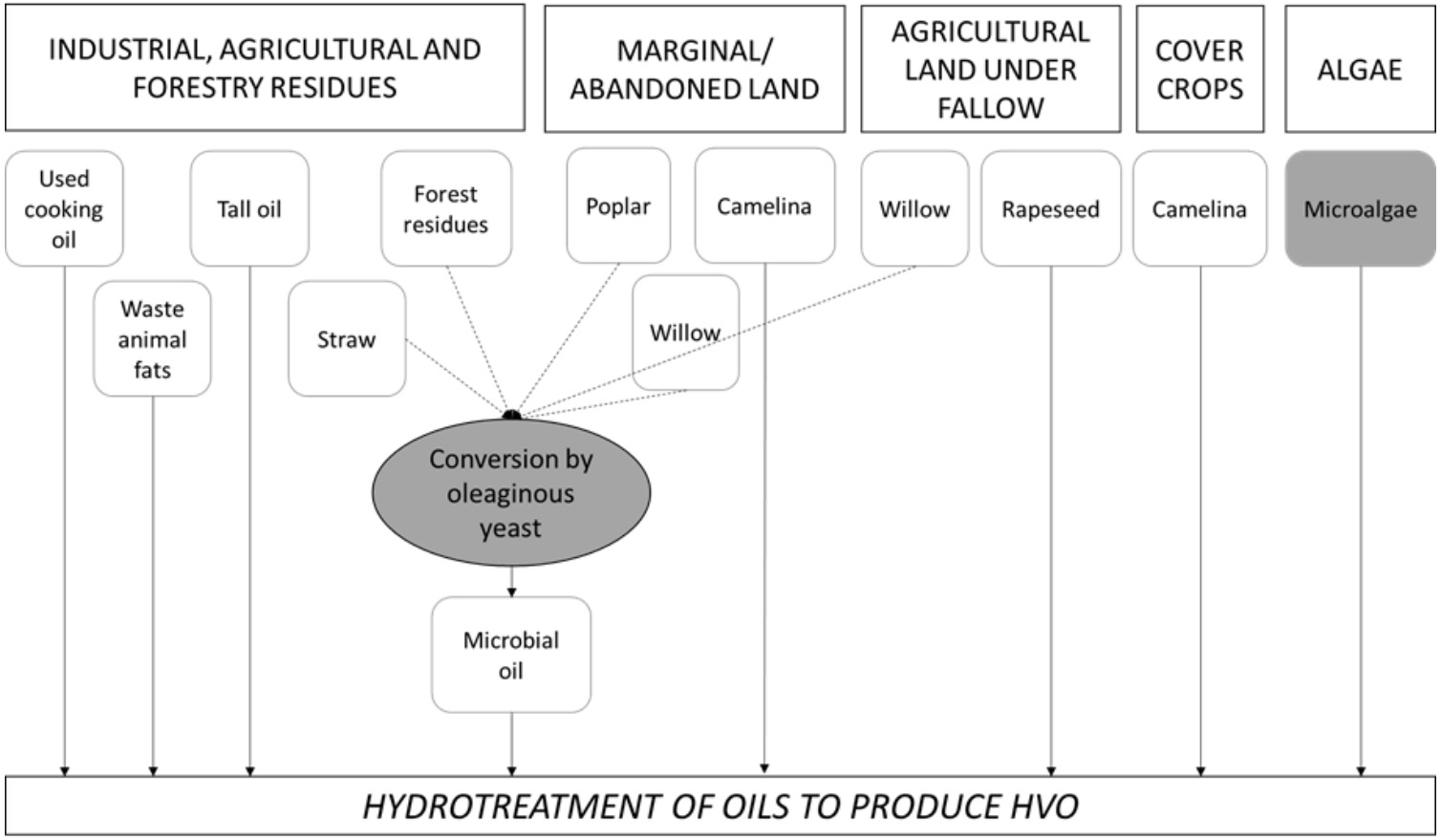
HVO PRODUCED FROM SWEDISH RAW MATERIALS
CURRENT AND FUTURE POTENTIALS

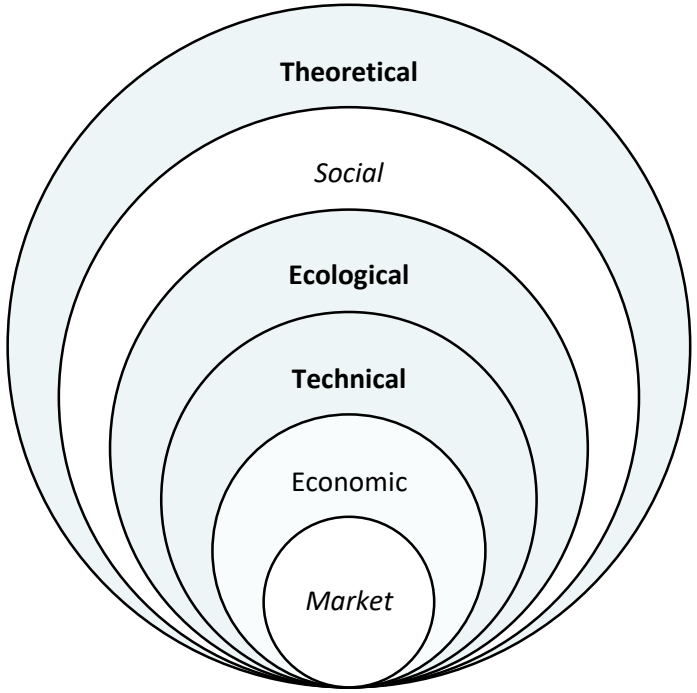
Report submitted for review

Aim and context

- to identify and assess the potential of different domestic raw materials for HVO production in Sweden/under Nordic conditions
- the focus was on materials grown or harvested on agricultural or forest land in Sweden, on co-products, residues or wastes from Swedish industries or households - no imported feedstock
- the theoretical, ecological and technical potentials were estimated (economic potential was assessed when possible)
- short-term perspective (year 2020) and longer-term perspective (year 2050).
- Renewable Energy Directive (REDII) were considered and presented in a qualitative manner

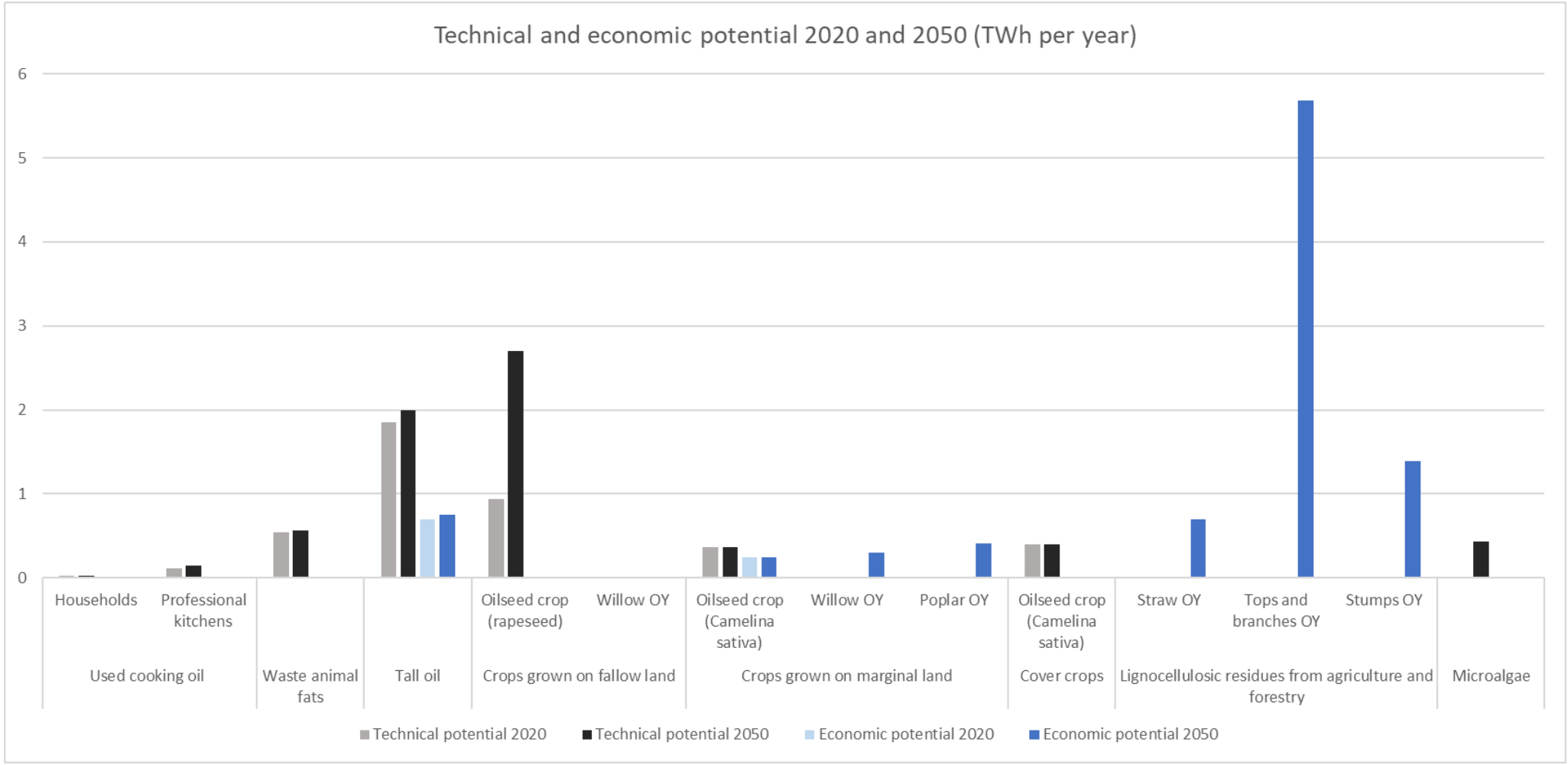
Considered raw materials for HVO production





Potential assessment framework applied which considers different restrictions based on Egnell & Börjesson (2012)

Results
Technical and economic potential



Main conclusions

- Lignocellulosic materials such as forest residues have high future potential for HVO production
- However, lignocellulosic materials require processing into oils and the option considered in this work (oleaginous yeast) is currently not an established technology
- Domestic supply of waste and residual oils, such as used cooking oil from households and restaurants, slaughterhouse waste fats etc., have relatively low potential
- Oilseed crops, grown as cover crops or on marginal land demonstrate a low potential but the demand may increase due to regulation requirements

Continuation and time plan

Continuation

Two interesting raw materials for techno-economic assessment and life cycle assessment has been selected (based also on feedback from the reference group)

- Camelina Sativa on marginal land – relatively low input crop, cover crop, known production process
- Swedish forest residues – availability and relevance for the Swedish context, somewhat less known production process
- LCA based on ISO standard and RED II
- TEA, assessment of CAPEX and OPEX or simplified LCC

Time plan

- Project continues until autumn 2021
- Main work to be performed during spring 2021
- Final report and scientific publication to be submited

Tack för er uppmärksamhet!

Frågor?

Det här projektet genomförs inom samverkansprogrammet *Förnybara drivmedel och system*
som finansieras av Energimyndigheten och f3 Svenskt kunskapscentrum för förnybara drivmedel.

www.f3centre.se/samverkansprogram

Energimyndigheten

SVENSKT KUNSKAPSCENTRUM FÖR FÖRNYBARA DRIVMEDEL