



SCIENCE AND
EDUCATION **FOR**
SUSTAINABLE
LIFE

Potential for HVO production from Swedish raw materials

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The project

Sustainable HVO- production potential and environmental impact

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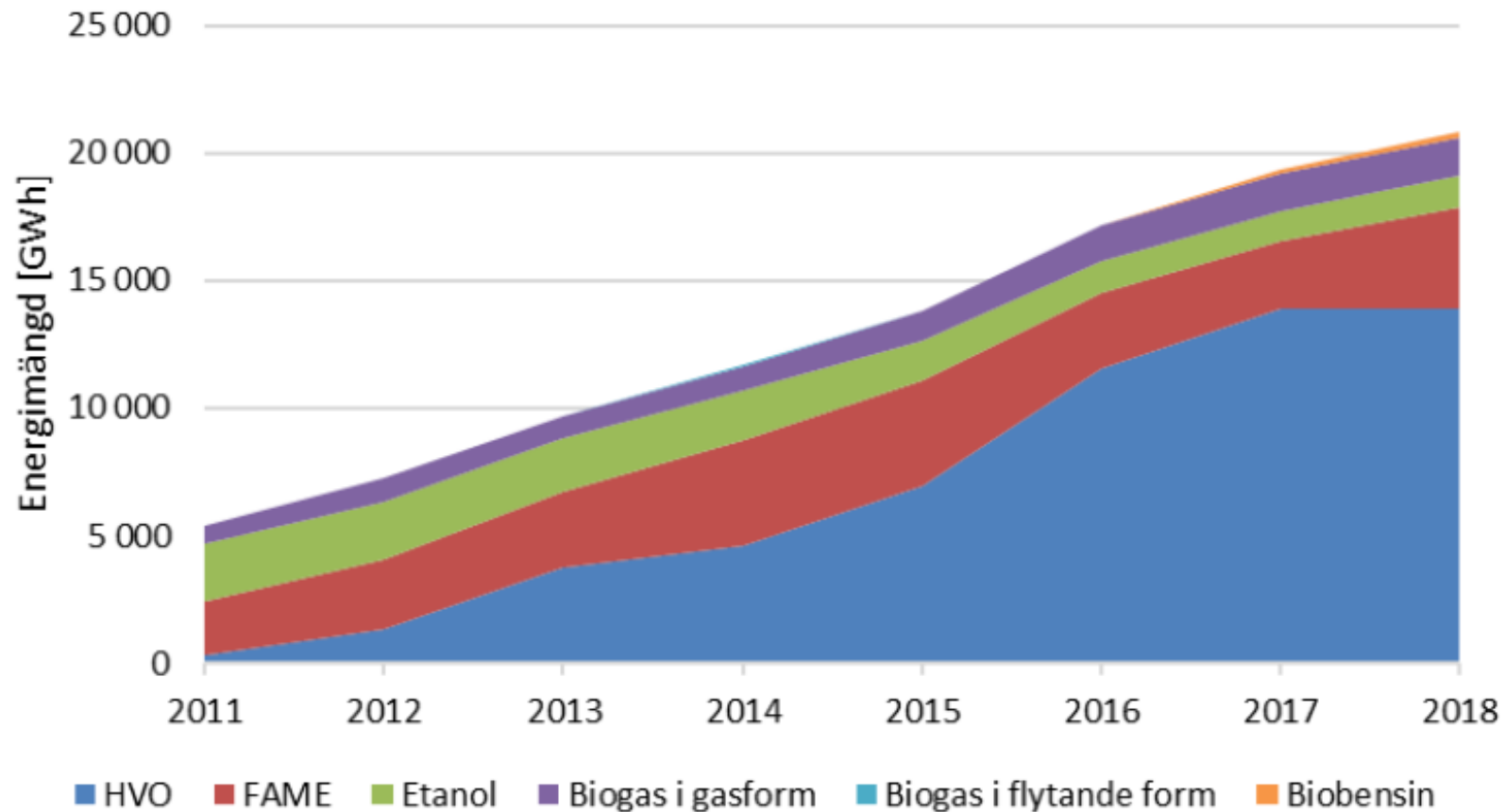
This project is carried out within the collaborative research program *Renewable transportation fuels and systems*, with funding from the Swedish Energy Agency and f3 Swedish Knowledge Centre for Renewable Transportation Fuels.



THE SWEDISH KNOWLEDGE CENTRE
FOR RENEWABLE TRANSPORTATION FUELS

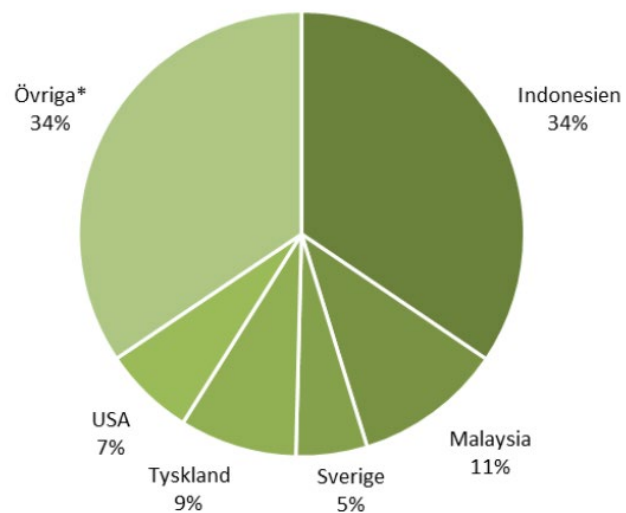
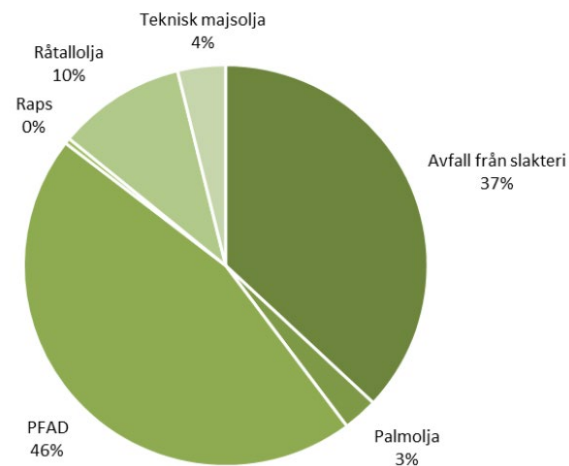
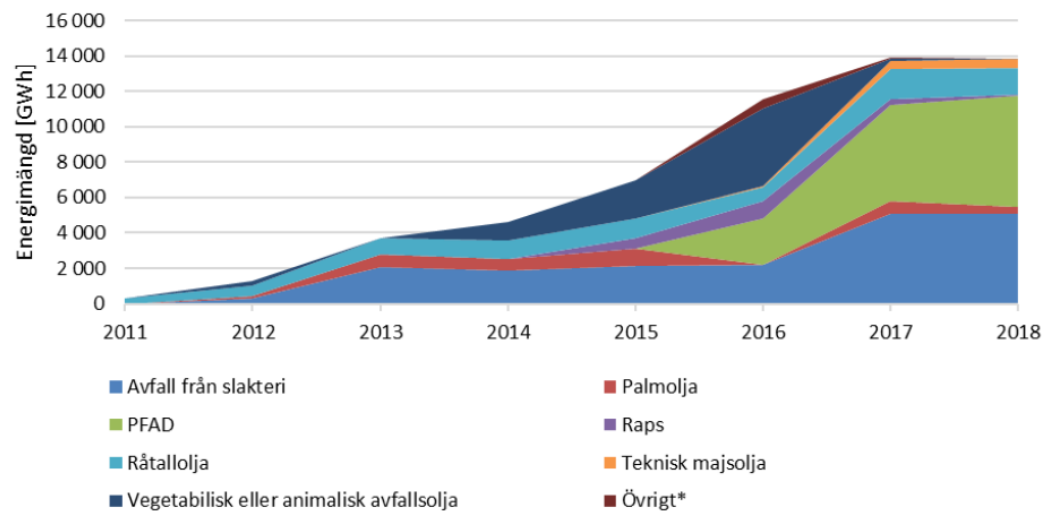


HVO is the main biofuel on the Swedish market



What is HVO made of today?

Råvaror till HVO

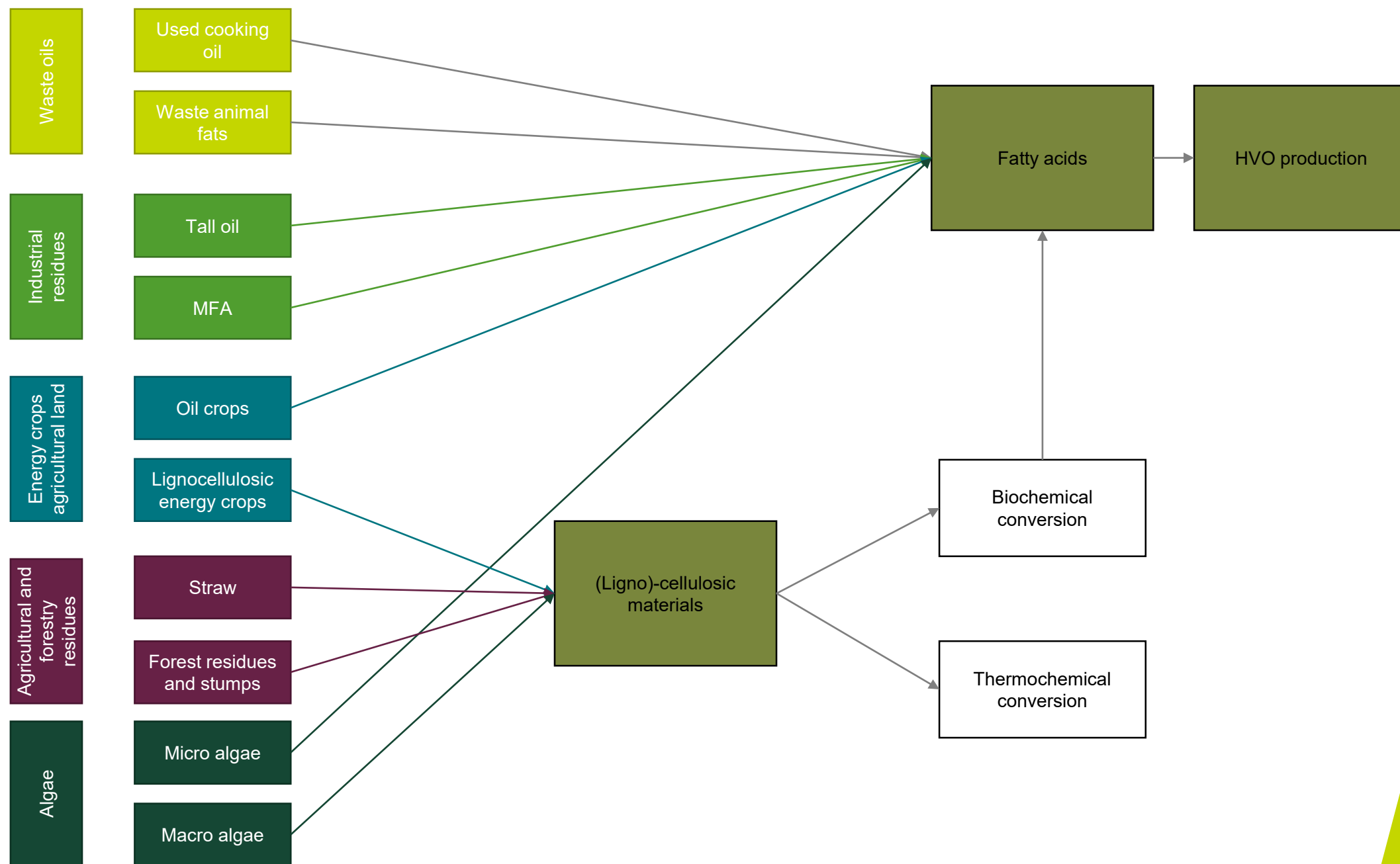


Which are the candidates among Swedish raw materials?

- What can be produce in Nordic conditions?
- What waste streams are interesting and already used?
- Methods:
 - Potential studies assessments based on earlier studies but re-calculated for HVO technology and oil crops. For some raw materials there are little earlier studies, own assessments for some materials (MFA and Camelina sativa as main crop and cover crop).
 - AIM: Market potential for today and for 2050

Market potential: Considers theoretical, social, environmental, technical and economic potential (Egnell and Börjesson 2012)





Selection of raw materials

- Screening for interesting raw materials
- Feedback from the reference group to select interesting and relevant materials and complement the list of raw materials



Raw-materials

	Raw material	Comment
Limited use in RED	Used cooking oil	Already in use
	Waste animal fats	Already in use
	Tall oil	Already in use
	Mixed fatty acids (MFA)	Already in use
	Raw materials from agricultural lands	Accounts for crops on fallows and marginal lands
Limited use in RED	<i>Oil crop (rapeseed)</i>	Fallow
	<i>Camelina sativa</i>	Marginal lands
	<i>Lignocellulosic crops</i>	Marginal lands and fallow land
	<i>Agricultural residues</i>	Biochemical conversion to fatty acids
	<i>Cover crops</i>	Oil crop or lignocellulosic crop for biochemical conversion
	Forest residues and stumps	Biochemical conversion to fatty acids
	Micro algae	

Long-term perspective



Biochemical conversion = Oleaginous yeast

- Can convert sugars (C5 and C6) to lipids
- Lignocellulosic biomass can be used but requires pre-treatment
- Produces considerable amounts of yeast biomass (can possible be used as feed or biogas feedstock)





Marginal lands and cover crop

- Camelina sativa is a relatively low input oil crop
- Winter camelina can be used as a cover crop
- Seeds with about 40% fat content



Raw-materials

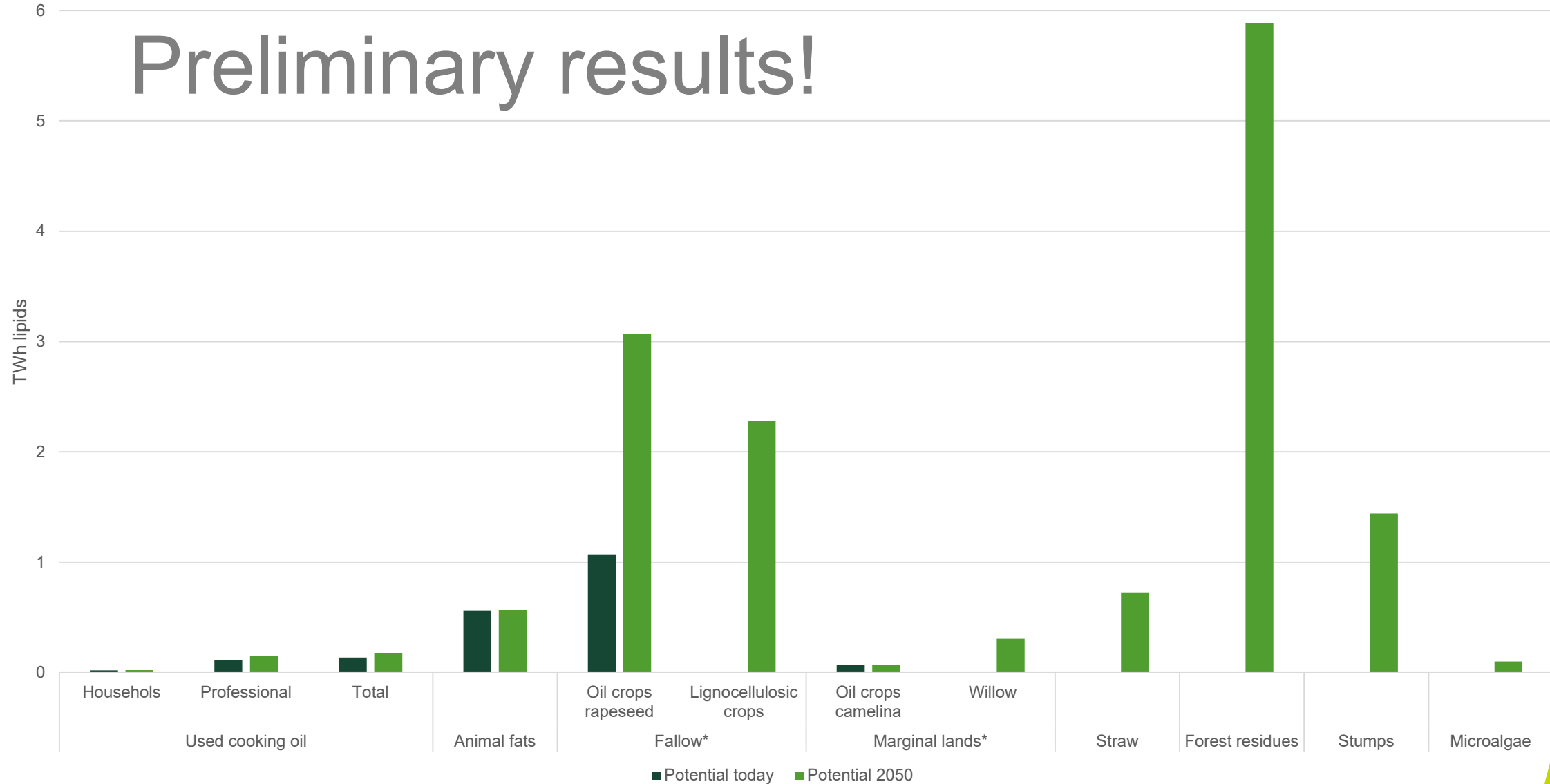
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Long-term perspective



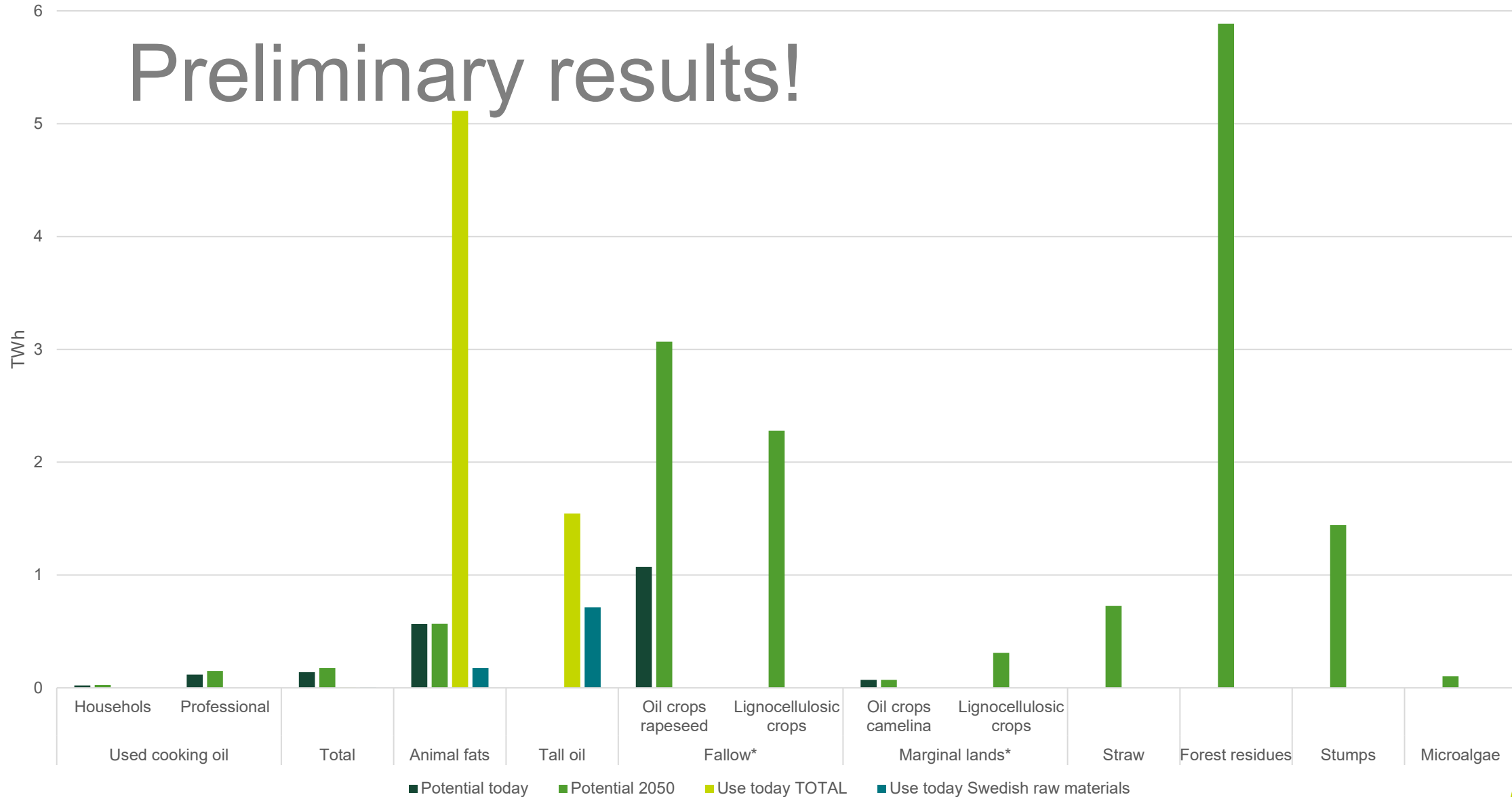
Potentials for fatty acid production

Preliminary results!



Potential and current production of HVO from the selected raw materials

Preliminary results!



What next?

- We continue with the potential study and add the raw materials that are currently not assessed.
- Select the two most interesting raw materials for techno-economic assessment and life cycle assessment (based on feedback from reference group).
- Report and scientific article.



Thank you!

