

Zeevaarttafel

Development Renewable Fuels for Shipping

7 april 2021

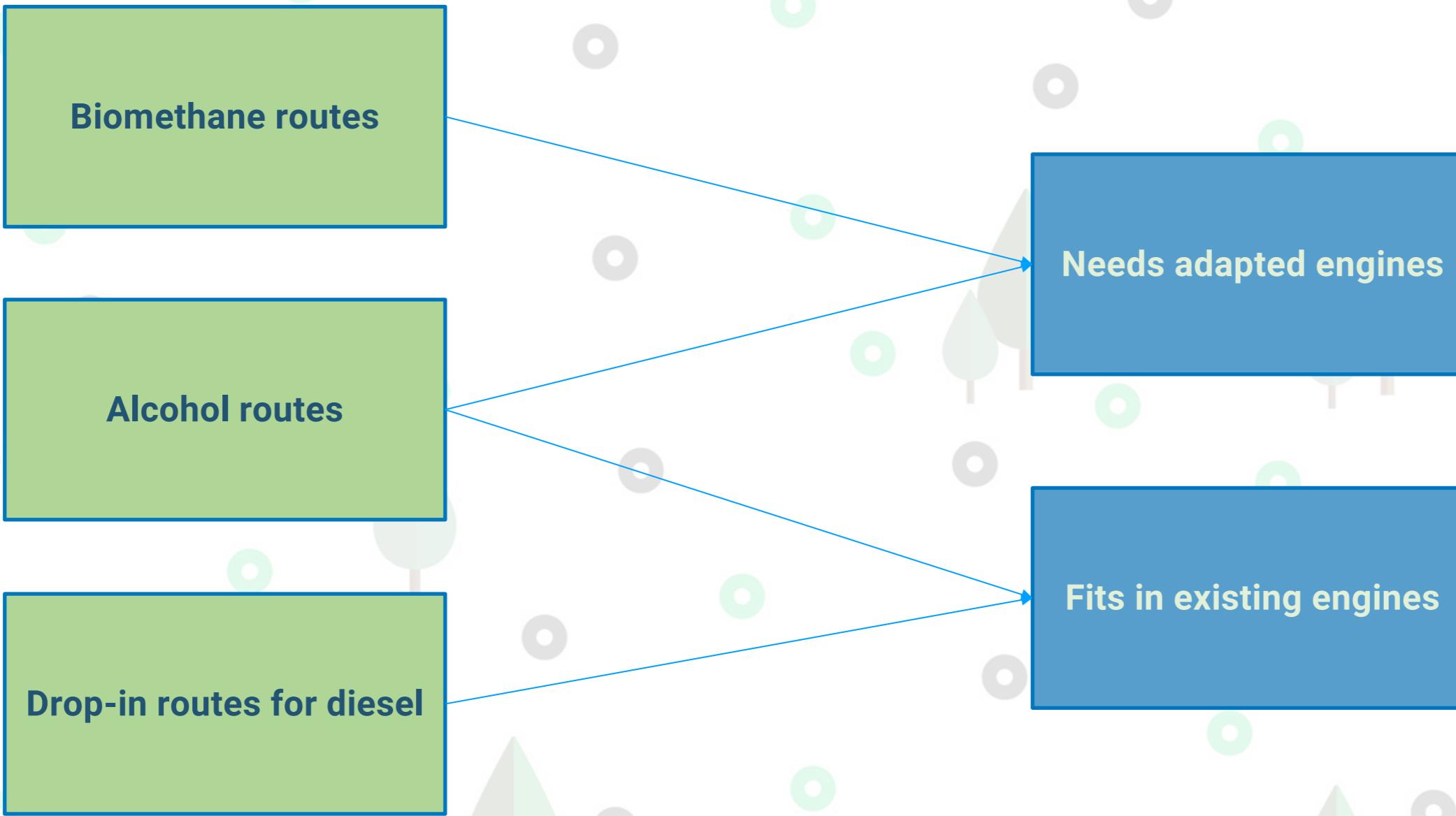
Agenda

- Welcome and introduction, Ministry of Infrastructure and Water Management
- PDB Input for the Roadmap with innovation and investment agenda Min I&W is preparing
 - <https://sustainablepower.application.marin.nl/>
- Presentation CE Delft Research "Study on effects of policy on greening maritime fuels"
Jasper Faber, CE Delft
- Stakeholder discussion
- Current Affairs:
 - IMO, Hermien Busschbach
 - RED II Implementation NL, Marco Ubeda
 - Dutch R&D programme 'zero-emission' shipping
<https://www.maritiemland.nl/maritieme-sector/projecten/masterplan-voor-een-emissieloze-maritieme-sector/>
- Closing of meeting



Context - Loes Knotter

For the Road Map Renewable Fuels: which technologies and fuels can contribute?

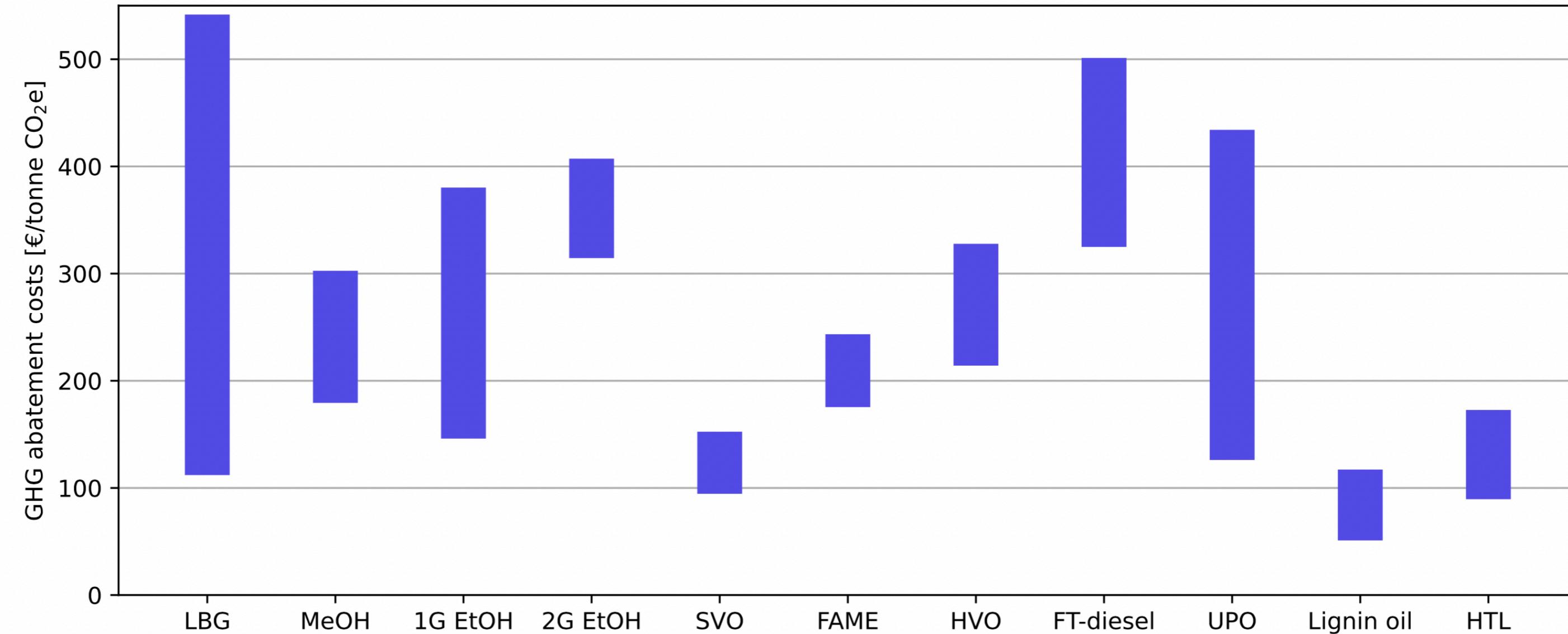


Considerations - table to further develop (work in progress platform working group)(2)

Type	Feedstock	Engine	TRL (fuel conversion)	< 2030	2030 -
Fame	Regulatory Limits EU	Drop-in	Ready	X	x (1)
LBG /Liquid biomethane	new feedstock base	Adpated (LNG-engine)	Ready	X	X
HVO	Regulatory limit EU	Drop in	Ready	X	x (1)
1st generation ethanol	Regulatory limits EU	Adapted(similar to methanol)	Ready	X	X
2nd generation ethanol	New feedstock base	Adapted(similar to methanol)	Step to scale up	-	?
Lignin oil	New feedstock base (combinations with ligno's)	Adaptation (similar to methanol)	Step to scale up	x	X
Syngas 2 X (methanol)	New feedstock base	Adapted / drop in (FT)	Step to scale-up	x	X
Pyrolyse	New Feedstock base	Drop-in	Scale-up	x	X
HTL / biocrude	New feedstock base	Drop-in	In Canada/ Australia scale-up EU: Demonstration/pilot	?	X
Renewable Electricity RNFB0's and H2/ammonia	New feedstock base	New / drop-in (FT)	R&D / pilot	?	x

(1) Sector parties see potential to further increase the feedstock base. Limitation is EU RED. Also demand in other markets tot this type of feedstocks used.
(2) *should infrastructure be part of considerations?

Cost estimates of the various renewable fuel options



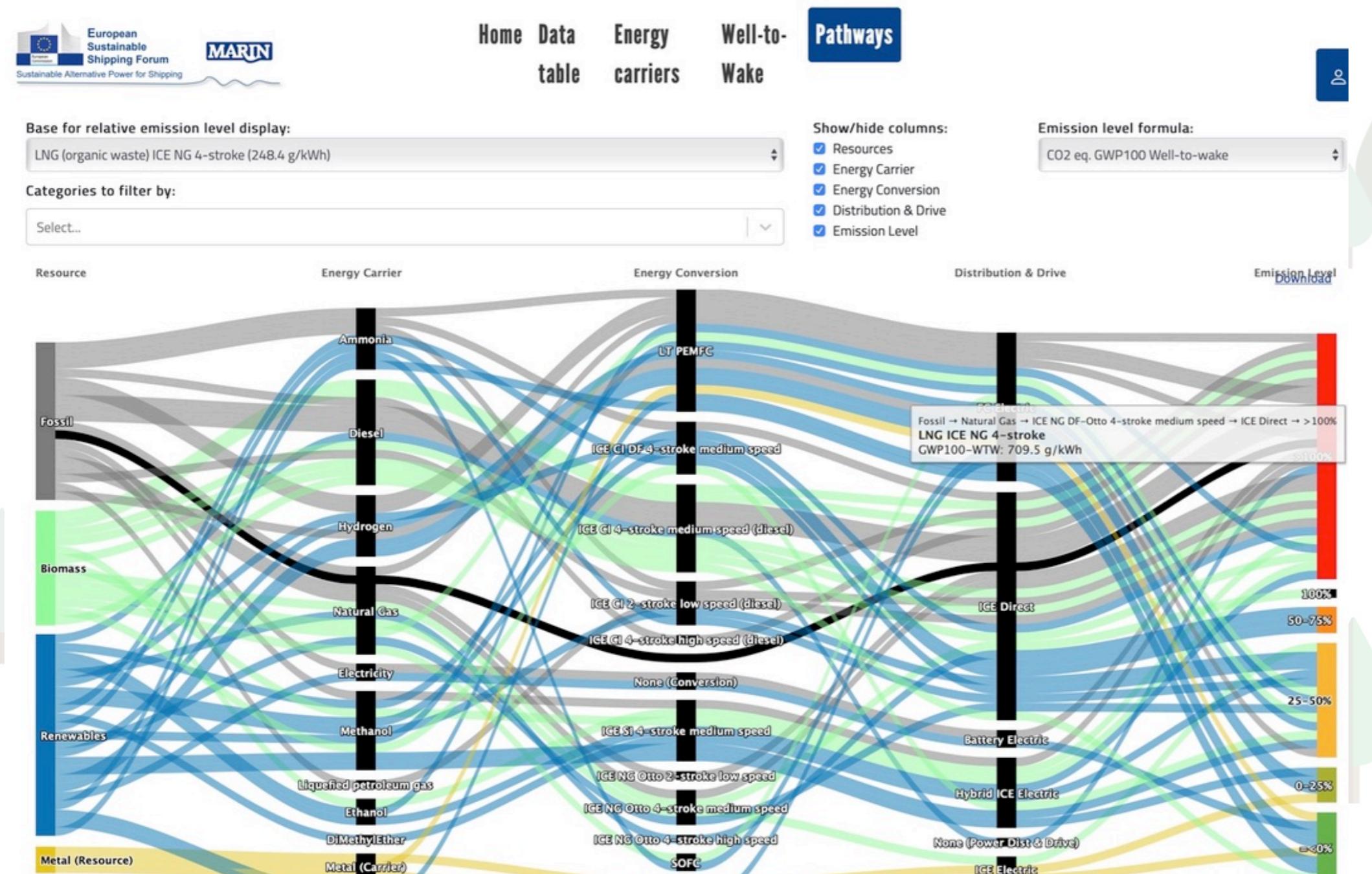
Source: E4tech (2018), Greenea (2020), Neste (2020), Obydenkova et al. (2017), Ou et al. (2015), Platform Members (2020, interviews)

Background data and references

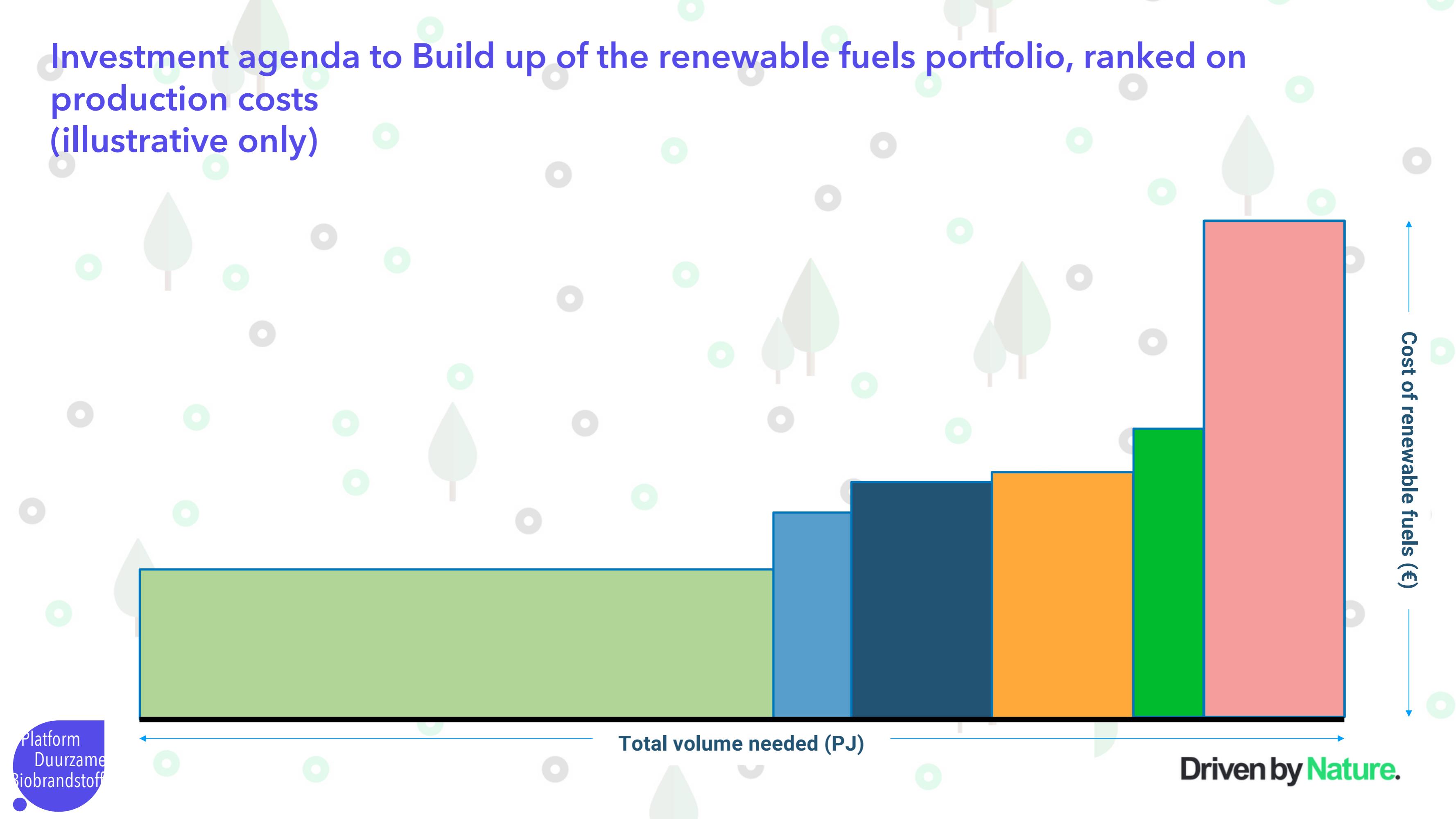
	Price estimate [€/GJ]	Source	GHG reduction estimate (vs. HFO)	Source
LBG	29.9 ± 14.3	E4tech (2018)	77 ± 5 %	E4tech (2018)
MeOH	26.1 ± 4.5	E4tech (2018)	86 ± 2 %	RED II (2018)
1G EtOH	20.5 ± 1.5	E4tech (2018)	55 ± 23 %	RED II (2018)
2G EtOH	34.5 ± 3.3	E4tech (2018)	84 %	RED II (2018)
SVO (UCO)	18.5 ± 2.3	Greenea (2020)	98 %	RED II (2018)
FAME (UCOME)	23.9 ± 2.4	Greenea (2020)	87 %	RED II (2018)
HVO	28.4 ± 4.2	Neste Q3 Market report (2020), S&P	86 %	RED II (2018)
FT-diesel	39.0 ± 6.5	E4tech (2018)	86 ± 2 %	RED II (2018)
UPO	30.6 ± 12.4	E4tech (2018)	93 ± 2 %	PyNe News 42
Lignin oil	12.8 ± 1.6	Obydenkova et al. (2017)	66 %	Interview (2020)
HTL biocrude	17.0 ± 2.7	Ou et al. (2015)	78 ± 2 %	Steeper Energy, Nie and Bi (2018)

For the Road Map Renewable Fuels: assessing the sustainable power database

- <https://sustainablepower.application.marin.nl/>



Investment agenda to Build up of the renewable fuels portfolio, ranked on production costs (illustrative only)



Build up of the renewable fuels portfolio, ranked on production costs (illustrative only)

