From Electric Driving to Electric Flying?

By Maarten Steinbuch

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ELECTRIC FLYING CONNECTION


My first E-Flight ✈
April 2021

Four options for sustainable flying

1. SAF – Sustainable Air Fuels (bio & H2+CO2)
2. Hydrogen
3. Hybrid
4. Battery Electric

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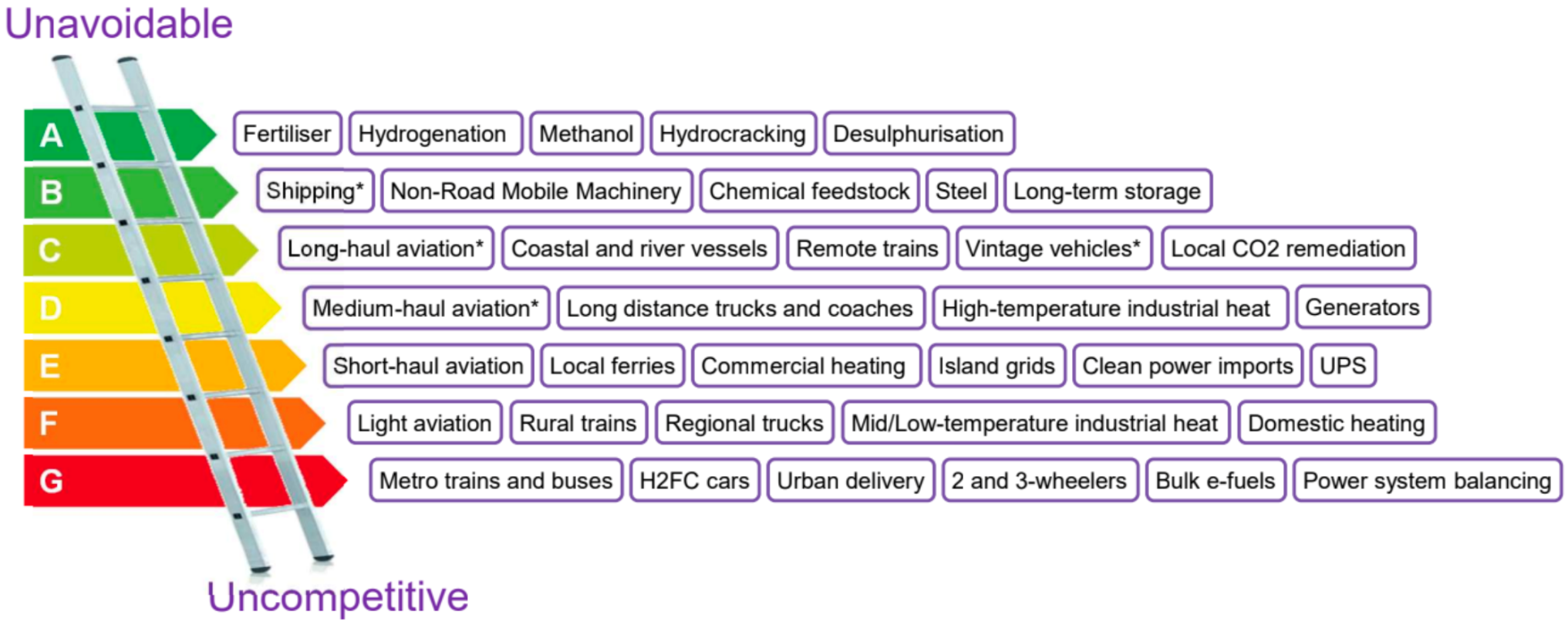
Clean Hydrogen Ladder

Liebreich Associates



** Most likely via ammonia or e-fuel rather than H2 gas or liquid*

Source: Liebreich Associates (concept credit: Adrian Hiel/Energy Cities)

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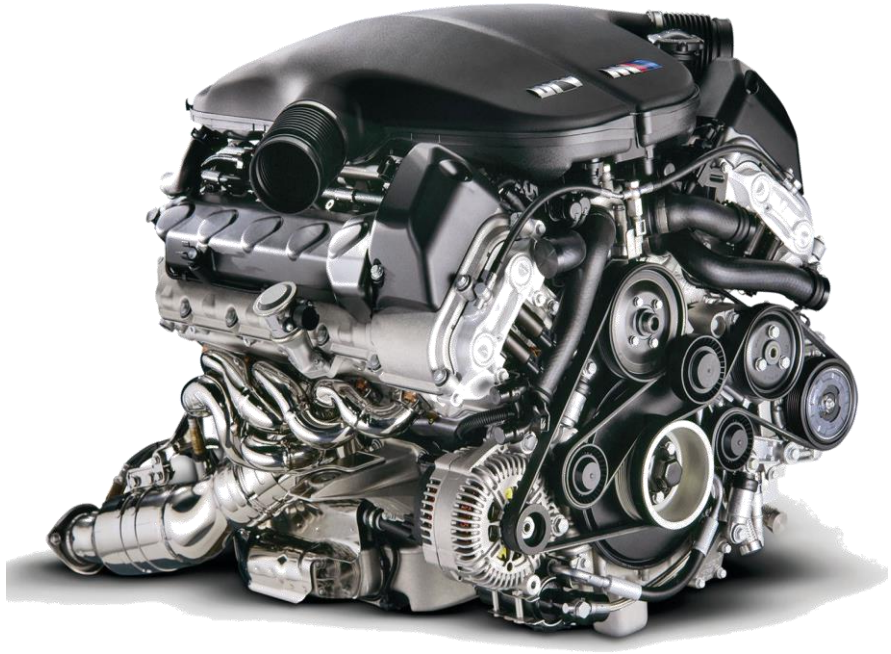
400HP+ The Jurassic way

- 200+ moving parts
- 35% efficient power



400HP+ The 2013 way

- 1 moving part
- No oil
- 88% efficient power
- 40x smaller

Tesla Model S motor

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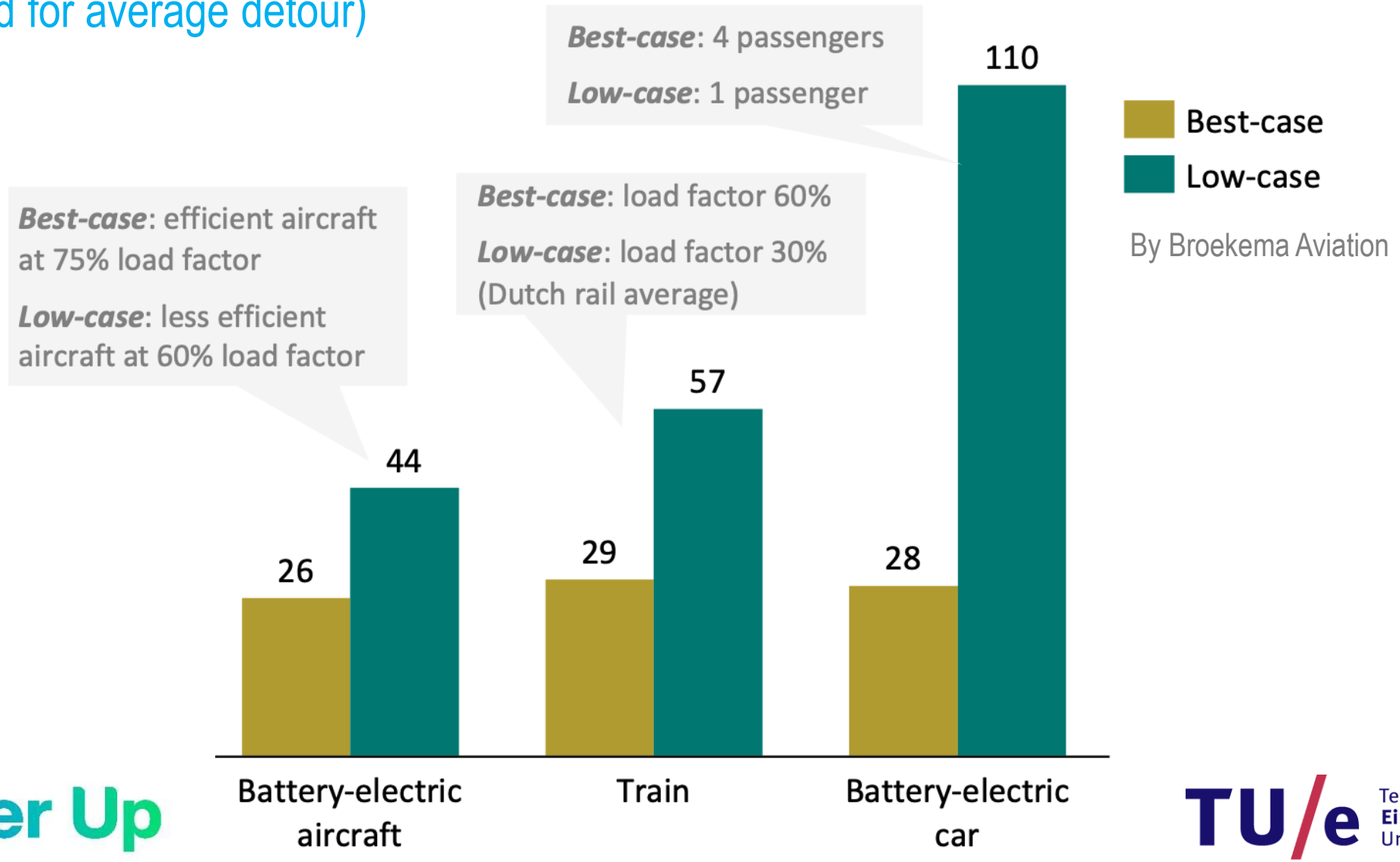
Electricity consumption per passenger for 400 km trip, in kWh

(adjusted for average detour)



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Re-think the mobility segmentation

- Limited range E-Flying is at least as clean as electric driving or train per pkm
- Limited range E-Flying is could be as cheap as electric driving per pkm
- Limited range E-Flying is much more cheap than train/HSR per pkm
- 3000-5000 local airports in Europe!

reformatorisch dagblad

„Streven Rijk elektrisch rijden onhaalbaar”

Wetenschapsredactie 9 april 2009 21:33

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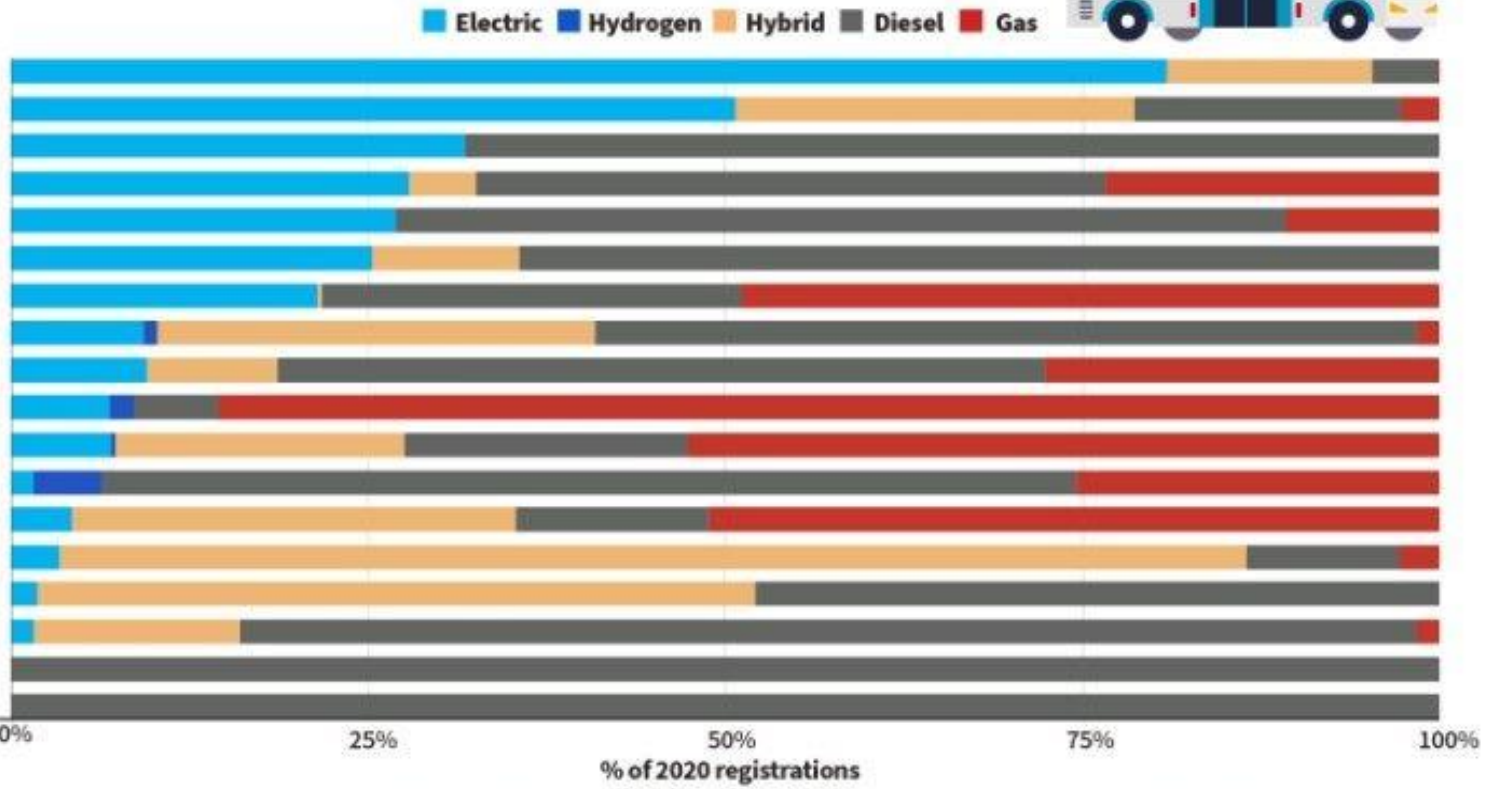
Zero emission urban buses: who leads?

Country	Zero emission %	Total
Netherlands	81%	550
Luxembourg	51%	75
Norway	32%	661
Poland	28%	704
Finland	27%	93
UK	25%	1142
Sweden	21%	963
Germany	10%	3791
Italy	9%	1027
Portugal	9%	117
France	7%	1913
Denmark	6%	63
Spain	4%	985
Belgium	3%	355
Switzerland	2%	392
Austria	2%	262
Ireland	0%	44
Greece	0%	3
TOTAL 2020	16%	
TOTAL 2019	12%	



TRANSPORT & ENVIRONMENT transportenvironment.org

Scope: new urban buses registered in 2020 with GVW above 8t. Trolley buses are not included but make up a small amount of annual registrations (41 in 2020)
Zero emission buses include battery electric ('electric' here) and hydrogen fuel cell ('hydrogen' here)
Source: Chatrou CME Solutions, 2021 update

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Automotive innovation system: coorperation, triple Helix

Coorperation:

- Formule E Team
- ELaad
- Automotive Campus
- Education & Research

Results:

- ww charging protocol is our standard
- Frontrunner
- >6000 jobs and still growing

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Belief Through Experience: Where Seeing is Believing

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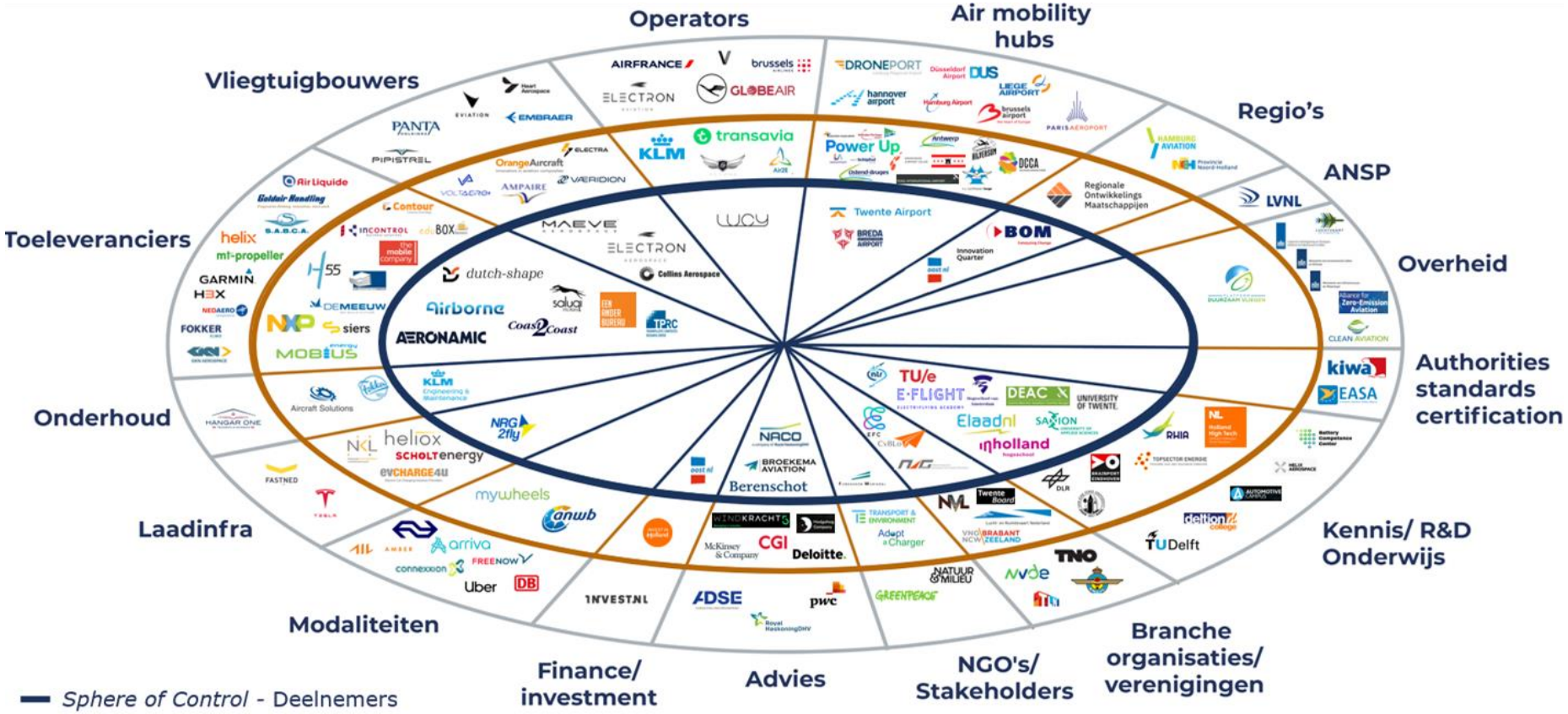
Electric Flying Ecosystem



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The Challenge

- Potentially 100+ different plugs and protocols
- Europe 3.000+ regional airports
- US 5.000+ regional airports
- Airside, landside, batteries, solar
- Unsafe, expensive, unscalable, not open

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Thank you!

By Maarten Steinbuch

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