HYDROGEN IN PUBLIC TRANSPORTATION

EXPECTATIONS

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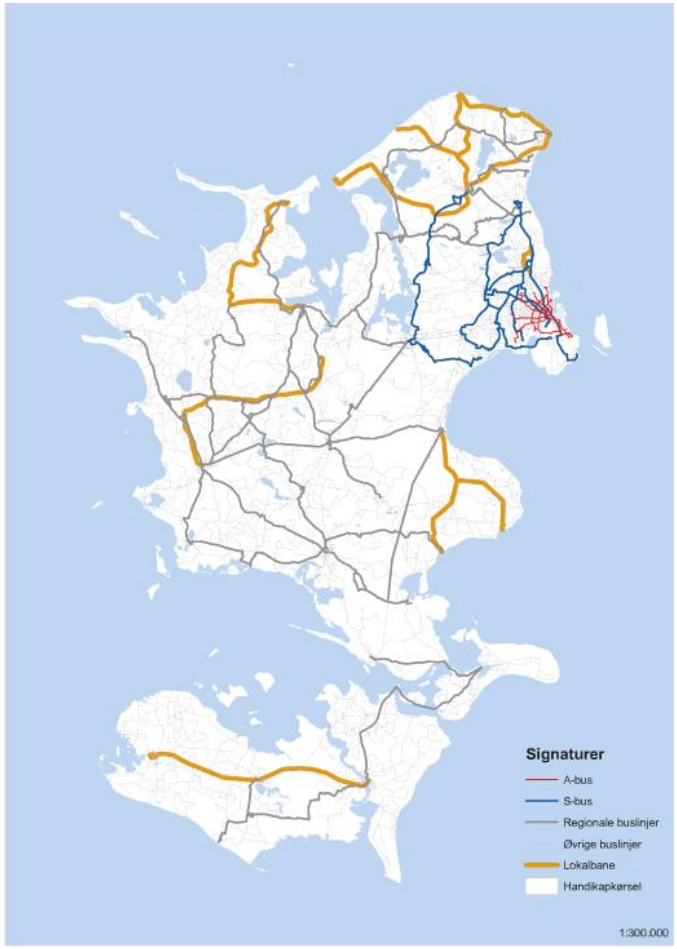
movia

What is Movia?



Ownership

- Owned by the 45 munipalities and two regions on Zeeland

Task

- Responsible for planning of routes and timetables, and tendering to private operators
- Owns and run local railroad on Zeeland

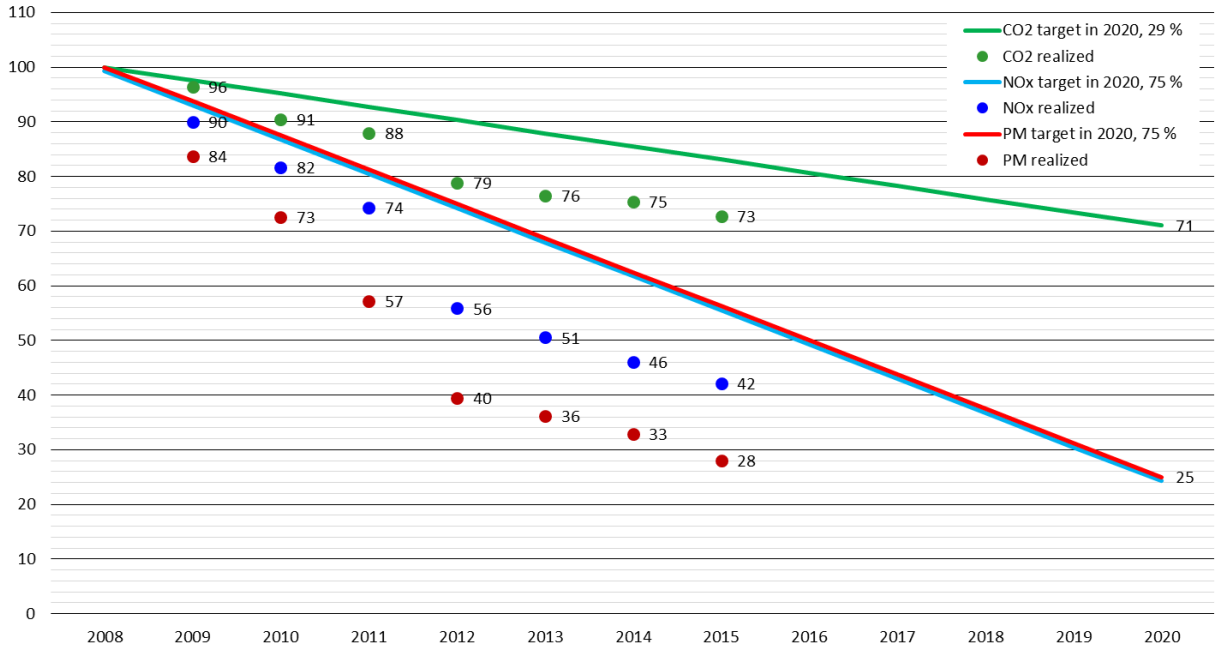
Fact

- Spends 3.5 billions (465 million €) per year on bus services
- App. 1430 buses on app. 450 routes
- 60 trains on nine routes
- App. 2400 cars and minibuses
- App. 210 million passengers
- App. 1 billion passengerkilometers
- Drives app. 120 million km per year

Goals for the future?

Emission target - indexed

Transport plan, 2013-2020



2020 Target (2008 level)

- 29 % CO2 reduction
- 75 % NOx reduction
- 75 % particles reduction

Next step: 2030 Target ?

Principles when tendering

We believe

The market is competive, creative and often have the best insight

→

Our aproach therefore focus on

Technology neutrality, functional demand, output not input

→

The result

The most cost-effective reduction in pollution

What is important to Movia in choosing an operator/technology

Price: 40 %
Quality: 35 %
Bus (e.g. age, seat): 15 %
Environmental performance: 10 %

What is important for the operator in choosing a technology

High uptime – optimal 97-98 %
High number of passengers
A TCO as close to diesel as possible
A fast and trustworthy aftermarket dep.
A well documented technology with no surprices

How does Movia pave the way for new technology?

Movias contract with the operators is very focus on the daily service and not on experimental project. Therefore, Movia facilitates test of new technologies

Recent trials:

- Midi-bus bus
- Natural gas bus
- Ethanol bus
- Eco-driving
- Retrofit
- Hybridbus (parallel/serie)
- 8 meter nightly charged electric busses
- 12 meter nightly charged electric busses
- 12 meter opportunity charged electric busses



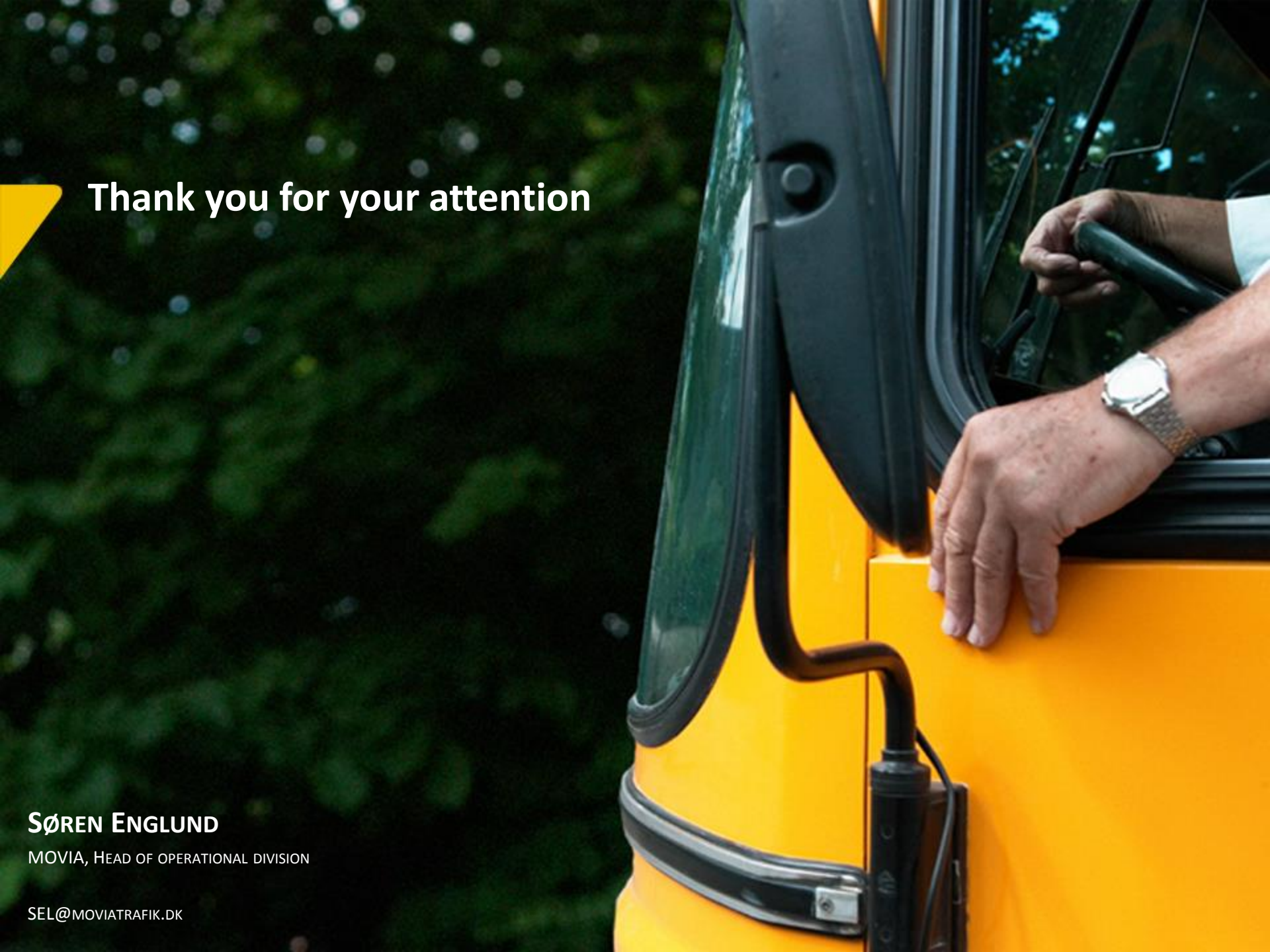

Challenges with current hydrogen buses

The bus

- The latest generation Hydrogen buses has a realiability (uptime) on app. 90 %
- The bus cost 2-3 times more than a diesel bus
- The infrastructure is expensive
- Hydrogen is in short supply and cost app. the same as diesel per km
- The aftermarket has proven it selfes as inmature with only few supliers of spare parts
- There is only very few manufactors of hydrogen buses

Expection regarding hydrogen

- Hydrogen will be in form of an electric bus with a hydrogen range extender
- First trial is expected to begin around 2024-2026
- The technology is expected to becomes competive, especially on longer routes from app. 2027-2028



Thank you for your attention

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