



# busworld<sup>®</sup> academy

NORTH AMERICA | JAN. 13-14, 2020

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## Implementation of zero emission buses at Movia



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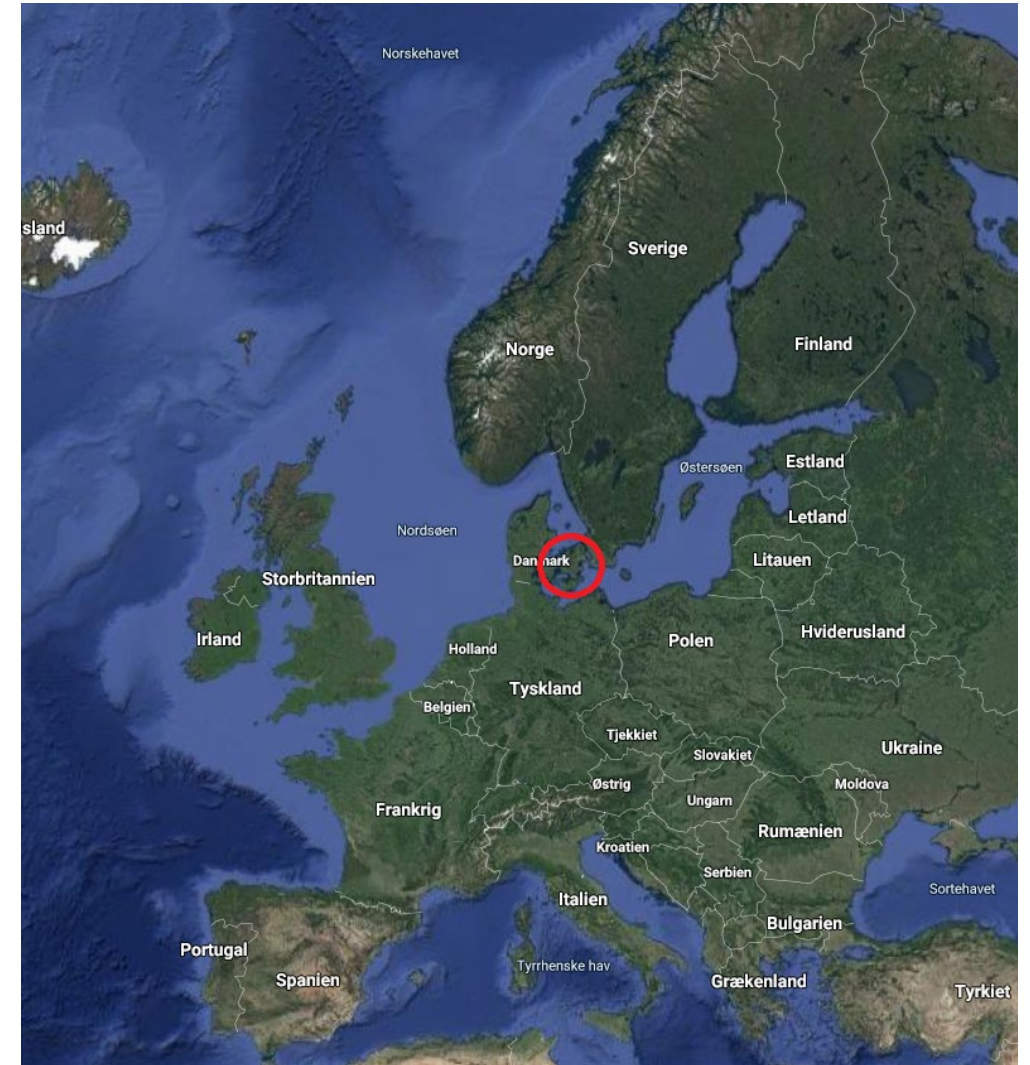
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AMERICAN BUS ASSOCIATION

# About Movia

- Public Transport Authority for Zealand, Denmark
- 2,6 millions inhabitants
- Owned and funded by two regions and 45 municipalities
- 1,430 buses, 2,500 cars and minibuses (demand responsive), 60 local trains
- 2030 target: All bus operations are to be fossil free
- All bus operations are tendered out to private PTOs
- Gross cost contracts
- Normal contract length 6+2+2+2 years
- Contract extended if PTO delivers agreed quality
- Functional demand as key principle



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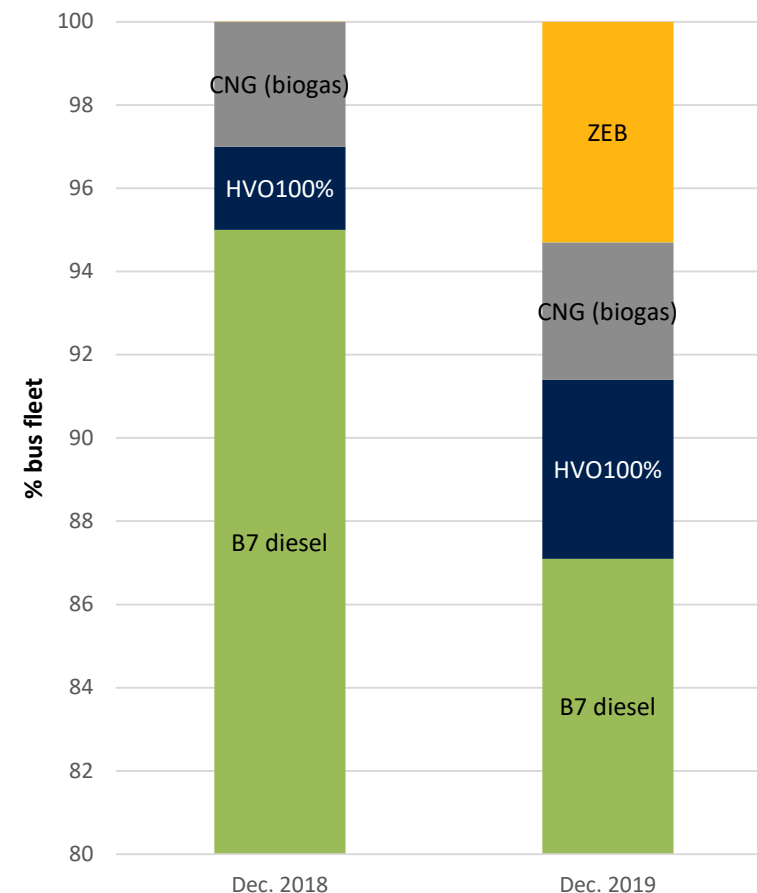
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# Implemented zero emission buses and boats so far

City	Route	Units	Heating	Charging strategy	Additional costs	Inauguration
Roskilde	All city buses	20	HVO heater & electricity	Depot (150kW)	2%	Apr. 2019
Copenhagen & Frederiksberg	2A	21	Only electricity	Opportunity (4x450kW & depot (30kW)	2%	Dec. 2019
Copenhagen & Frederiksberg	18	27	HVO heater & electricity	Depot (80kW)	9%	Dec. 2019
Ballerup & Egedal	147, 157, 156	8	Only electricity	Depot (30kW)	11%	Dec. 2019
Copenhagen	Harbor boats	7	HVO heater & electricity	Opportunity (3x600kW) & depot	1%	Feb.-apr. 2020

Upcoming tenders: 2021: Up to 33 ZEB, 2022: Up to 96 ZEB

Price expectation (from diesel B7, 12 year contract): fossil free 3,5-8 %, ZEB 3-11 %



# Why do Movia implement zero emission buses?

## Customers

- The environment is regarded as the most important political issue at the moment
- The environment is not the reason for choosing public transport

## Municipalities and regions

- Strong political desire for cleaner public transit and cleaner cities
- Political will among cities and regions to take lead – ex. Copenhagen has an ambition of CO2-neutrality in 2025. Only ZEB allowed.

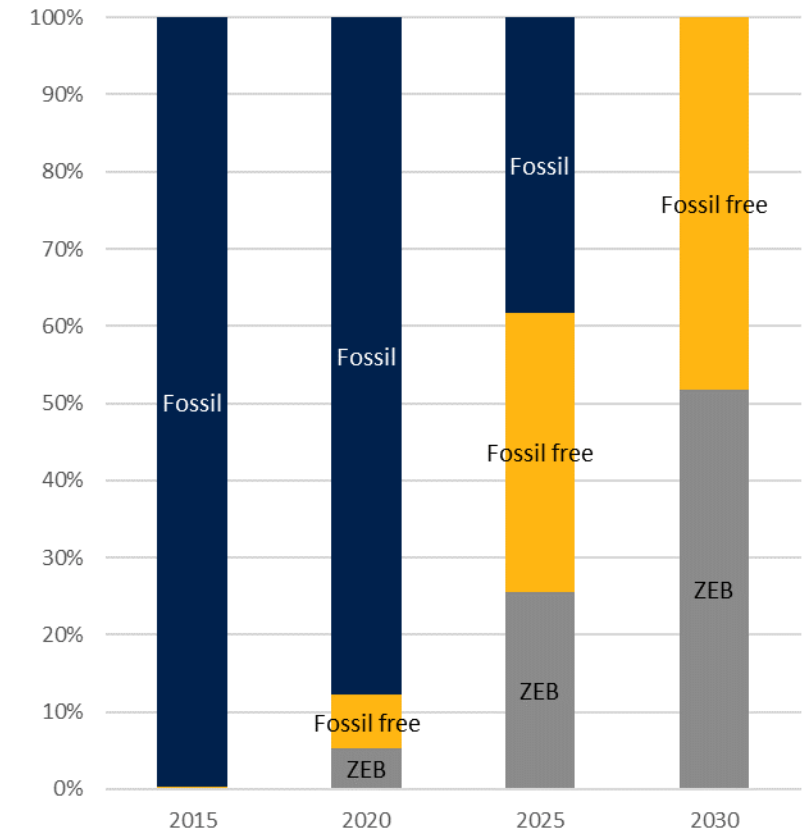
## National

- New legislation has a nationwide 70 % CO2 reduction by 2030 (1990) – all sectors included

## European Union

Clean Vehicle Directive (CVD) sets out mandatory procurement quota (for Denmark):

- June 2021-December 2025: 45% of all new buses must be “Clean” and **22,5% must be zero emission**
- 2026-2030: 65% of all new buses must be clean and **32,5% must be zero emission**



# Actions taken to start the transition

- Objective: to enable a cost efficient and market based transition towards zero emission
- The transition began in 2009 with the 9 electric buses (7 meter), followed by trials with different 12 meter electric buses, as well as other technologies
- Extensive market dialogue with operators to identify and manage risk
- Exchange of knowledge with our sister-PTA in Denmark and the nordic, participating in UITPs JIVE observer group and UITP bus committee
- Future contracts of non-ZEB buses will be shortened from 12 to app. 6 years



# Identified risk and handling

## Risk for the operator

- Guaranteed contract length
- PTA's possibility of changing volume of bus services (hours and number of in-service buses)
- Time period for preparation of tender and delivery of buses
- Reducing energy consumption for HVAC
- Managing charging infrastructure in public space
- Easy start
- Access to bus depot

## Solution (change to tender requirements)

- ✓ 10+2 years instead of 6+2+2+2
- ✓ Compensation when reducing or adding in-service buses, and,  $\geq 10\%$  extension of tendered routing without compensation. More dialogue with operators
- ✓ From 18 months to 24 months; incl. 12 months delivery time
- ✓ HVO heater up to  $+5^{\circ}\text{C}$ . Electrical heating hereafter.  $+16^{\circ}\text{C}$  inside bus in winter (normally 18-22 degrees)
- ✓ Framework agreement made with Siemens.
- ✓ PTO may use diesel year 1 + 2
- ✓ Focus on providing land for new bus depot close to bus route

# Additional implications on PTO operation

- New bus manufacturers especially from China
- New issues to be learned – charging and range strategies, battery management
- Adapting and installing charging stations. Handling power connection
- Driver training, ex. placing at opportunity charge station
- Unknown long term problems – more uncertainty when bidding on public contracts. Diesel buses are very well known



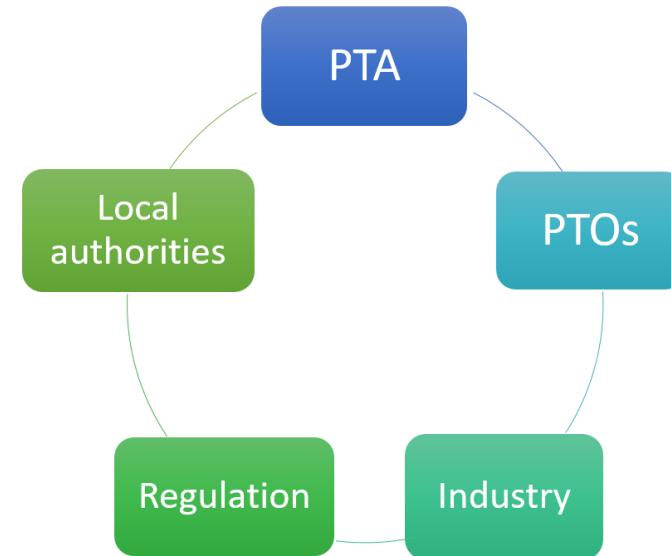
# Implications on PTA operation

- Need for broader political dialog with an understanding of possibilities and consequences
- Internal training for route planners to understand the range restrain with ZEB
- Ressources needed for identifying and establishing infrastructure for opportunity charged buses
- Longer contract negotiation, adaptation of award criterias and the usage of new tender strategies
- Lack of operation history adds uncertainty, risk for the operator and higher prices. The competition between operators is reduced because some operators are getting experience before others



# What to take with you!

- Zero emission bus services are still more expensive than diesel
- Proper risk management is decisive to avoid costly risk premium for zero emission bus services
- A successful transition to zero emission requires that all stakeholders move in the same direction
- A political will to pay a premium for ZEB to push the transition in motion
- The right regulatory framework conditions have to be in place
- A transition towards ZEB will impact large parts of the work at PTA and PTO



# Thank you for your attention!

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