

VOLVO

**Workshop on research strategies for
fuelcells and Hydrogen
Swedish Energy Agency**

Outline

- What are Volvo currently involved in
- What areas of application do Volvo see
- Why are we not engaging more

Activities used as input

EU Projects	
NANOCAT	Design of electrodes to minimize need for Pt.
Immediate	Stack development reducing the degradation of the membranes. Finished
Autostack	Complete stack development
Other Projects	
New Components for Polymer fuelcells	Focus on lifetime of Membranes (PEM)
Improving lifetime and performance of SOFC for trucks	Improved lifetime
ThyRex	Complete vehicle as ZEV concept : Closed
Automotive fuel cell cooling and heat-integration: identifying technical solutions	Focus on system surrounding the stack: New proposal
Networks	
Swedish Techwatch	Steering group seat
FCCJ	Membership with local participation
H2ME	Renault Participating

Outline

- What are Volvo currently involved in
- What areas of application do Volvo see
- Why are we not engaging more

Hydrogen competitive arena

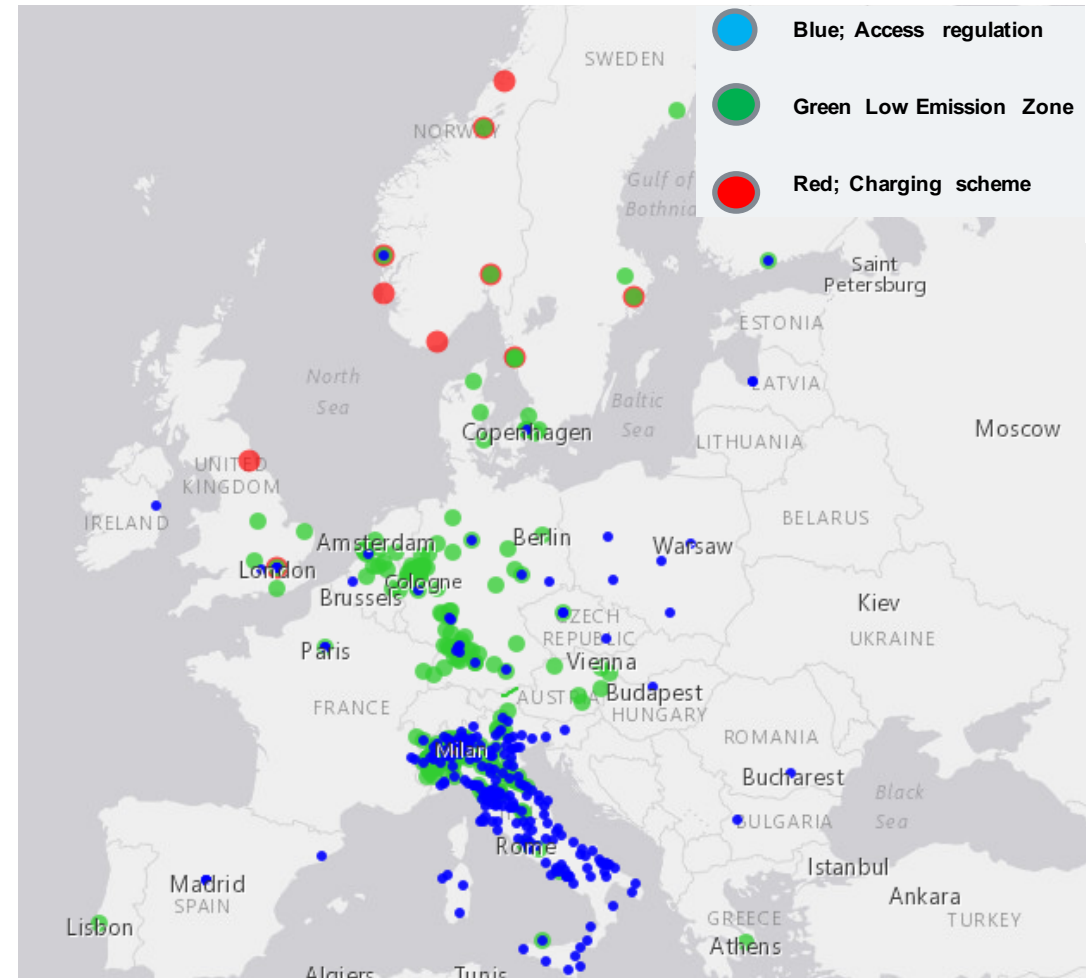
Hydrogen have the benefit of	Makes
High energy density	longer range possible
Zero emmision is possible in some cases	It possible use inside zero emission zones or by zero emission customers
Hydrogen have the backdraw of	Makes
Local infrastructure for hydrogen	Limits the nr of customers interested
Lifetime of the Fuelcell	Limits the application to range extender and Auxiliary power units
Cost of the system	The customer needs to have a need for ZEV and range and limited electric infrastructure for battery charging

Applications

- Trend of zero emission zones are increasing, battery and charging will not meet the range requirement
 - Bus
 - Distribution trucks
 - Garbage trucks
- The increased need for Auxiliary power, idling engine is not an option
 - Long haul trucks
 - Bus passenger climate (1/2 energy needed in warm or cold countries)

Close to zero emission zones in cities

- Initiatives in individual cities promote/require ultra low emissions zones or zero emission city centers
- Push for electromobility
- Access restrictions might be applied for non-zero emission vehicles



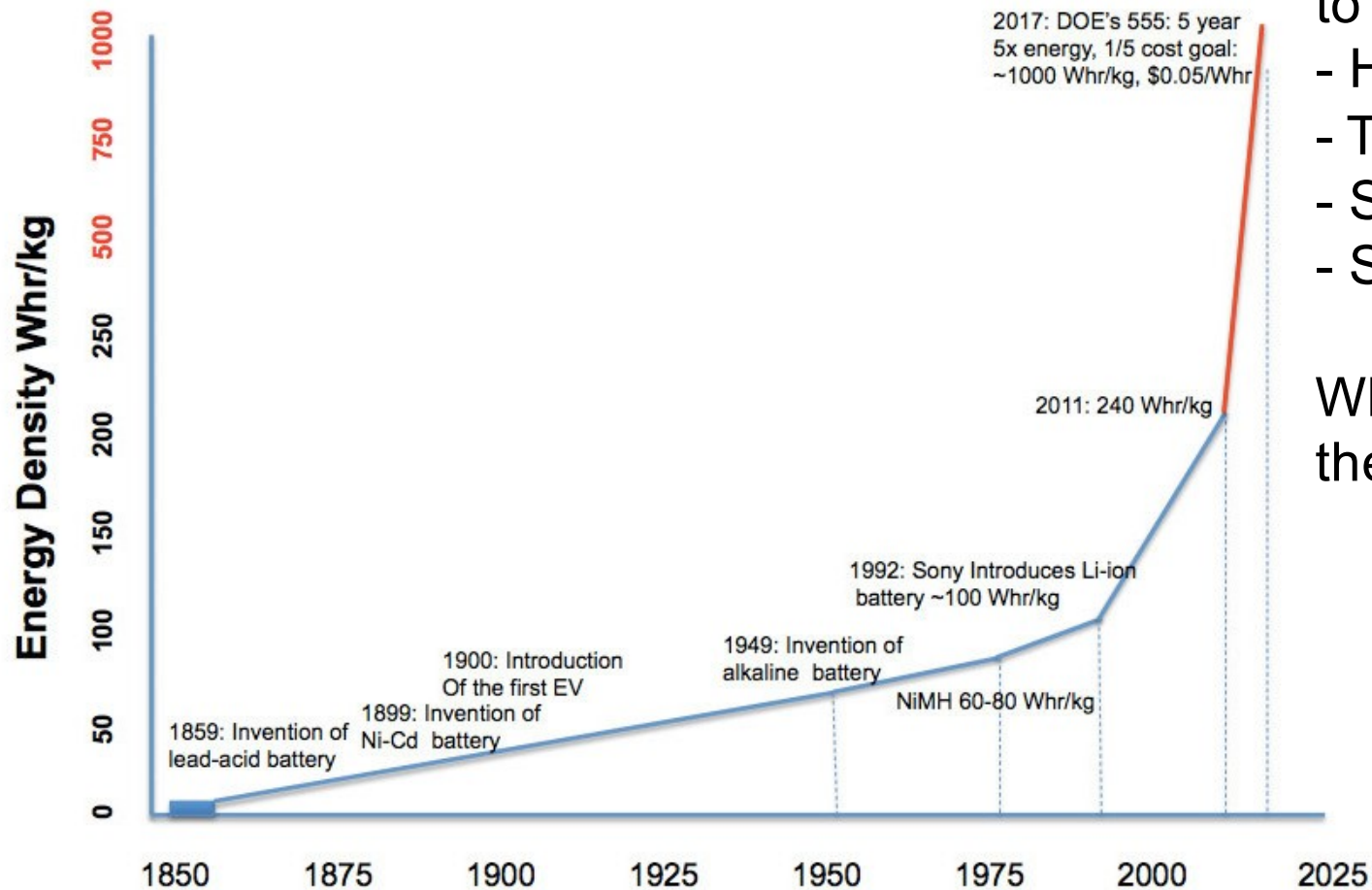
<http://urbanaccessregulations.eu/userhome/map>

Outline

- What are Volvo currently involved in
- What areas of application do Volvo see
- Why are we not engaging more

What Zero emission Solution?

Battery energy storage weight forecasts



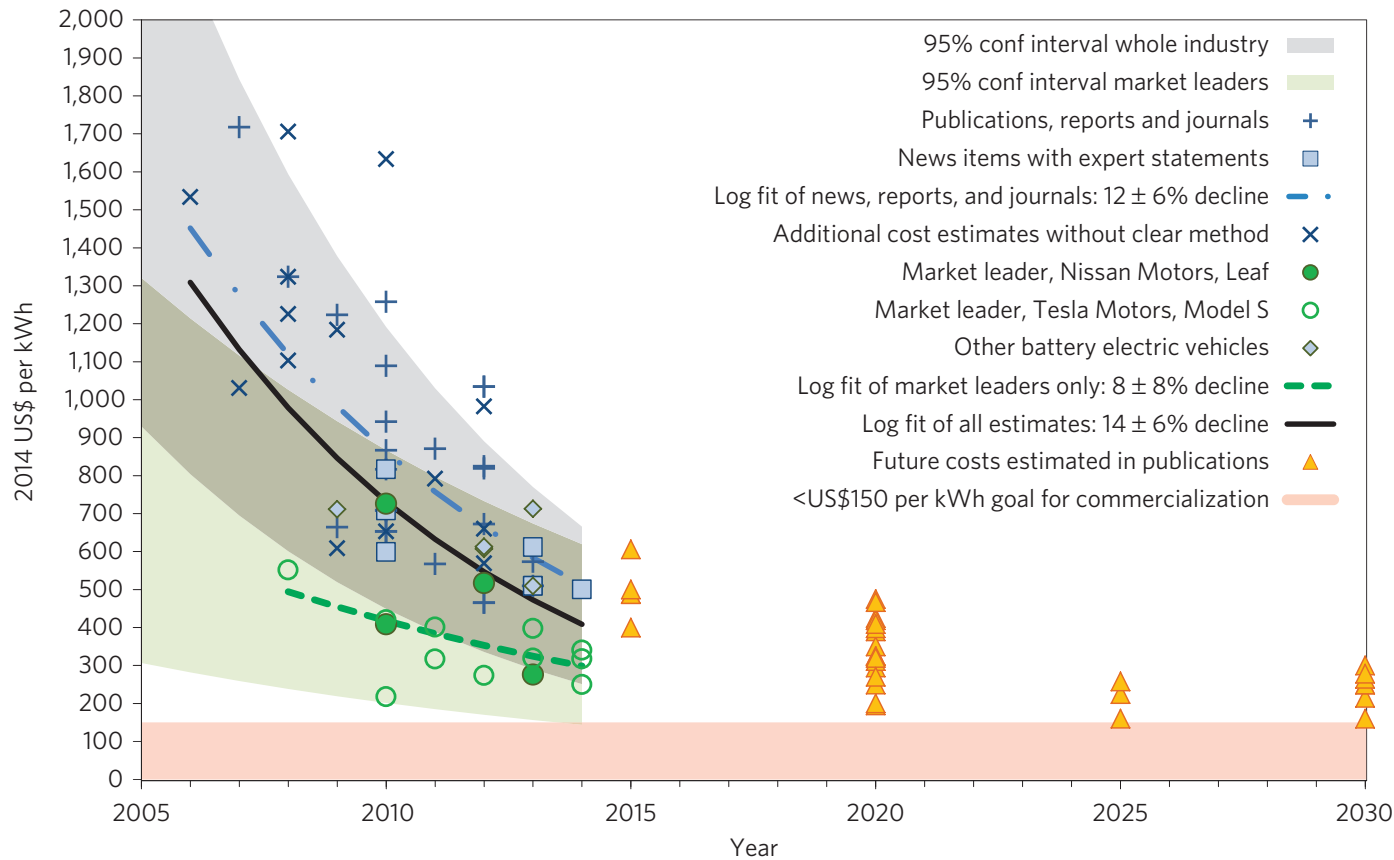
How does this compare to :

- Hydrogen weight
- Tank weight
- Stack weight
- Support system weight

What are the forecast of these

What Zero emission Solution?

Battery energy storage cost forecasts



How does this

compare to :

- Hydrogen Cost
- Tank cost
- Stack Cost
- Support system cost

What are the forecast of these

Conclusions

- Volvo will need help on best available forecast on
 - How hydrogen and fuelcells will compete with the alternatives over time
 - How the infrastructure deployment is going
- What We need from the technology
 - Better lifetime
 - Lower cost