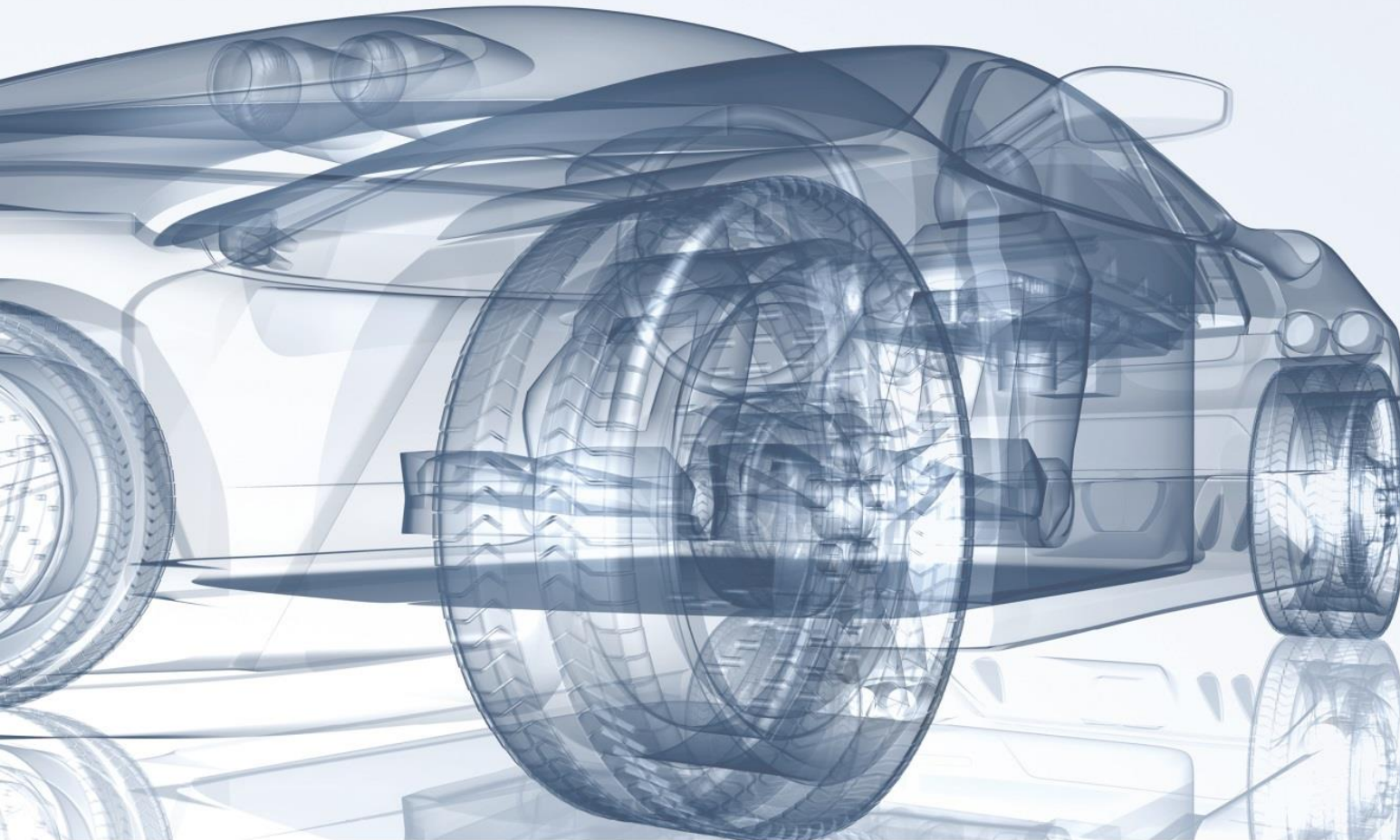


# evs 30



The 30th International  
Electric Vehicle  
Symposium & Exhibition

**October 9–11, 2017**  
Messe Stuttgart, Germany

[www.evs30.org](http://www.evs30.org)

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swarco

Harm Weken, Rob Kroon, Edwin Bestebreurtje FIER Automotive & Mobility

## Agenda

- Introduction FIER Automotive & Mobility
- Introduction Electric Truck projects in Europe
- FREVUE (Freight Electric Vehicles in Urban Europe)
- E-GLM (Electric Green Last Mile)
- Conclusions deployment Heavy Duty EV

# FIER - New mobility business development

We believe in moving from:

- Conventional to smart
- Combustion to electric
- Ownership to mobility as a service

Smart e-mobility & logistics

- International business development
- Support industry, retail/distribution & public authorities
- (EU-) project & consortia development (PPP)



Themes:



EU Project examples:



**eCARSHARE.nl**

**e**lectric Green Last Mile



**Smart Charging in Practice**

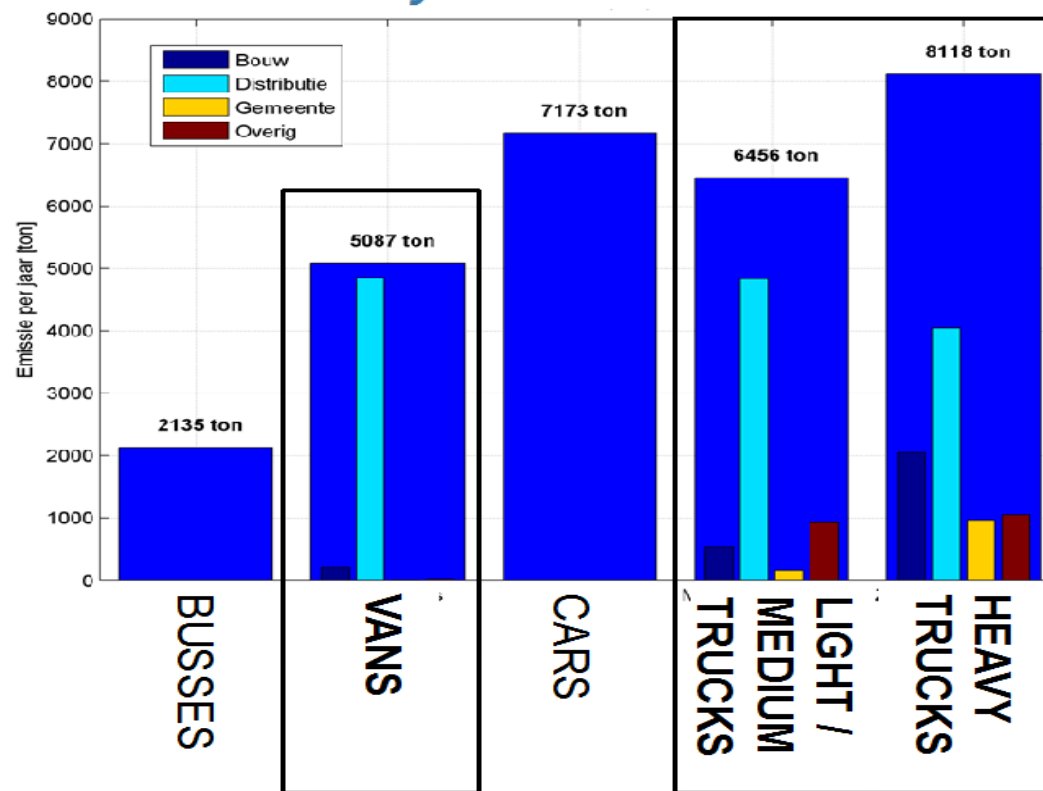
**ENEVATE**



# 3 big polluters



## Urban freight transport Total NOx emissions city traffic in the Netherlands



Estimated total emissions per year per vehicle type for all urban traffic in the Netherlands (TNO, 2015)



Electric mobility, future or past



# ..... the future is now



## Electric Mobility Projects Heavy Duty



- Support the uptake of electric freight vehicles in eight of Europe's largest cities (**Milan, Rotterdam, London**)
- Demonstrating and evaluating innovative urban logistics solutions
- New concepts and business models



- 2014: Feasibility study and preparation for FULL electric truck e Green Last Mile Netherlands - Germany
- 9 fully electric trucks (45t) with network of fast charging points in a cross border project (Germany – Netherlands) for
- Innovative logistical concepts for regional container distribution

# Freight Electric Vehicles in Urban Europe

Demonstrate innovative solutions to use EV's in last mile deliveries  
Provide evidence of suitability

➤ Viable alternative to diesels



Co-financed by the European Commission

**Logistics companies**

2013 - 2017



Demonstrators:

8 Locations in Europe:

- Amsterdam, Lisbon, London, Madrid, Milan, Oslo, Rotterdam, Stockholm
- 75 EV's
- EUR 14.2 mln total investment (FP7)

# TCO calculations

## Rotterdam inner city logistics

- Tailored casestudies
  - Investments in vehicles and charging infra
  - Daily routing
  - Warranties (battery and driveline)
  - Reliability and downtime
  - Service costs
  - Depreciation and residual value

## Some key figures of two case studies with battery electric trucks within FREVIEW in Rotterdam:

- Breytner Transport Rotterdam: EMOSS, weight 19 tons, electric drive range 200 km, battery pack 200 kWh, daily routes 100 – 150 km inner city.
- Technische Unie: EMOSS, weight 19 tons, electric drive range 200 km, battery pack 200 kWh, daily routes 130 km combination highway and inner city.



# Challenges experienced in FREVUE

## Economic feasibility

- High purchase costs
- Currently negative TCO → between -€30.000 and -€75.000 in 8 - 10 years
- Decisions made for marketing reasons / pilots

## Vehicle supply

- Technically possible but not many suppliers / mainly conversions

## Risks / uncertainties e-Trucks:

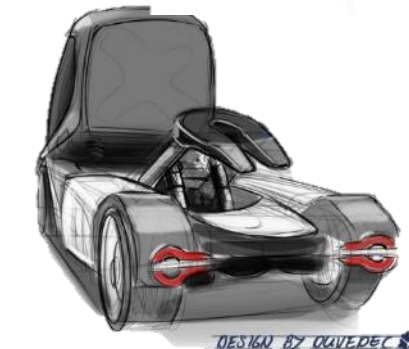
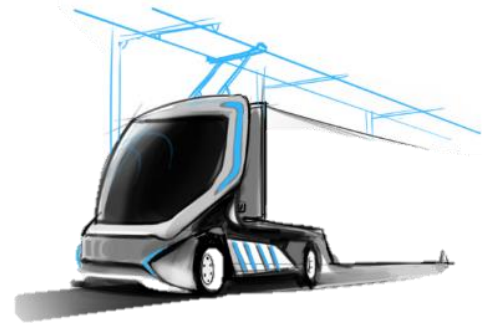
- Residual value / second life
- Repair and maintenance
- Reliability, lifecycle of battery and second use of battery

→ TCO e-Truck needs: more operational years and more kilometres



# eGLM project

- 40t tractor
- Flexibility
- Sharing





## Project

**Positive business case**  
for the exploitation of 100% electric trucks

**Innovation and competitive strength** for the region.  
Create a **cooperation** model between companies  
for **sharing capacity** (e-truck sharing)



## Truck

**100%** electric battery vehicle

- Driving range **150 km**
- Fifth wheel, optional lifting fifth wheel
- Maximum speed 85 km/h - Cargo weight max. 30 tons
- **40/44 ton GVW (DE) – 50 ton (NL)**



## Charging

- Up to 400 kW **fast charging**
- 22 kW – 88 kW **night charging**
- Pantograph or Plug charging system
- Strategic locations will be selected together with partnership and logistic experts
- All partners with an electric will get a



## Budget

3,5 years, period 2016-2020

- € 5.200.000 total budget
- € 3.900.000 – subsidy from Interreg + regional governments



## Aim

- **9 electric trucks , 5 fast chargers**

Bring different planned logistical scenarios in practice to find “best case scenario” for further out roll



# Charging Infrastructure



AC slow charging via a plug



DC fast charging via a plug



Induction charging



Overhead charging (pantograph)



Battery 'swap'



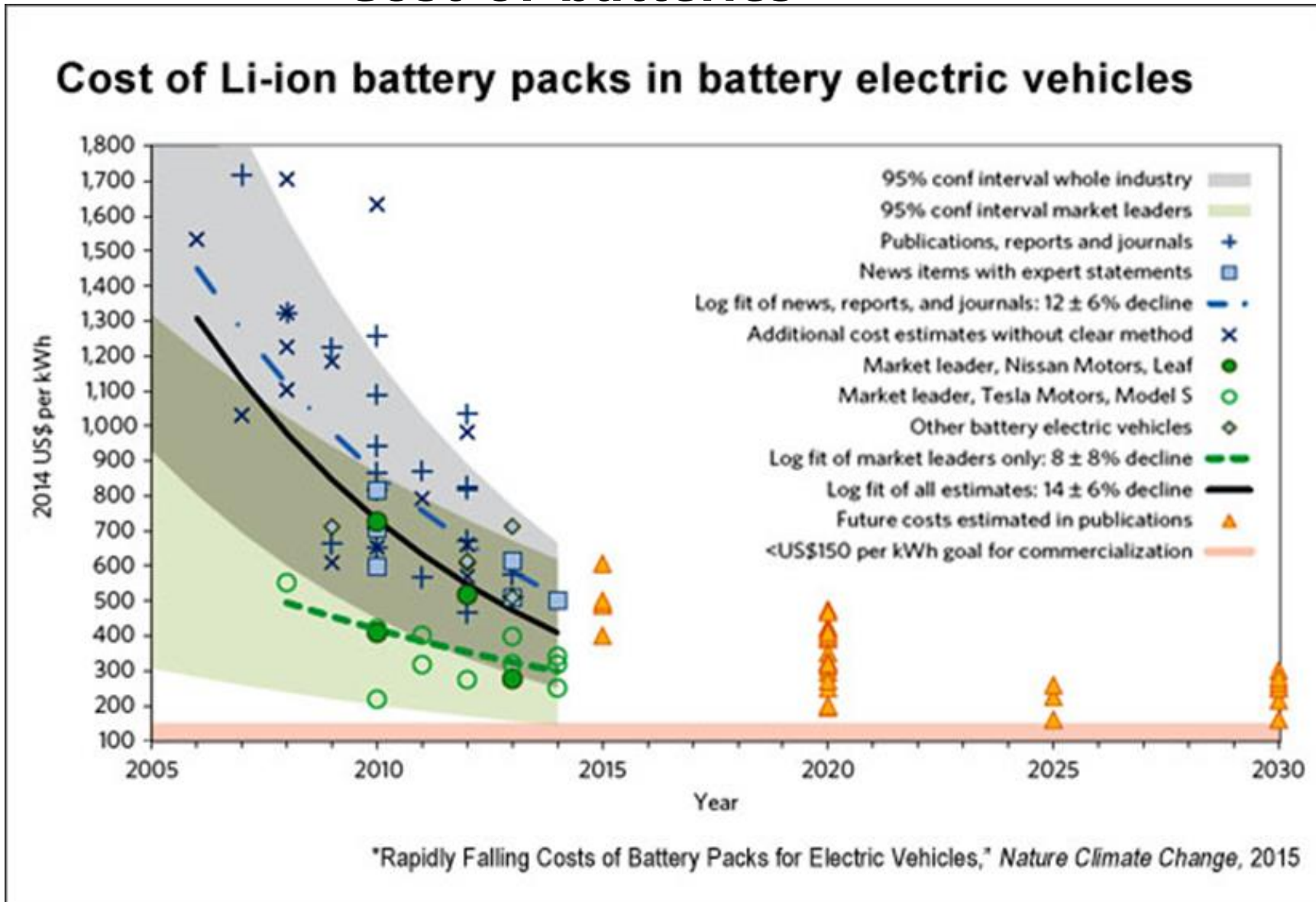
Conductive plate'



## Expectations of the key figures of eGLM

- Truck will drive 200 to 250 km a day;
- Range of the truck will be between 150 to 200 km with a battery between 200 and 320 kWh;
- Night charging will be 22, 44 or 88 kW;
- Ultra-fast charging between 150 and 600 kW;
- GVW +/- 10 tons
- GTW between 40 and 50 tons

# Cost of batteries



# Conclusions deployment Heavy Duty EV

## Already many e-trucks / pilots on the road in Europe

- Positive feedback from companies and drivers
- Decisions made for marketing reasons / pilots

<p><b>Economic not feasible yet</b></p> <ul style="list-style-type: none"> <li>➤ High investment → still negative TCO</li> <li>➤ Low daily distance ← conservative planning</li> <li>➤ Improved economics             <ul style="list-style-type: none"> <li>➤ In right application</li> <li>➤ Adapted logistic models</li> <li>➤ Fast(er) &amp; opportunity charging</li> </ul> </li> </ul>	<p><b>Technical feasible</b></p> <ul style="list-style-type: none"> <li>• Trucks available however mainly conversions</li> <li>• Range is in many applications not an issue</li> <li>• Fast charging solutions available, not yet standardized</li> <li>• Reliability needs improvement</li> </ul>	<p><b>Risks / uncertainties:</b></p> <ul style="list-style-type: none"> <li>➤ Residual value &amp; second life of e-trucks</li> <li>➤ Repair and maintenance</li> <li>➤ Reliability, lifecycle of battery and 2<sup>nd</sup> use of battery</li> <li>➤ Technology innovation: Increased range, lower investments, improved reliability</li> <li>➤ Traditional "one-truck-fits-all approach"</li> </ul>
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