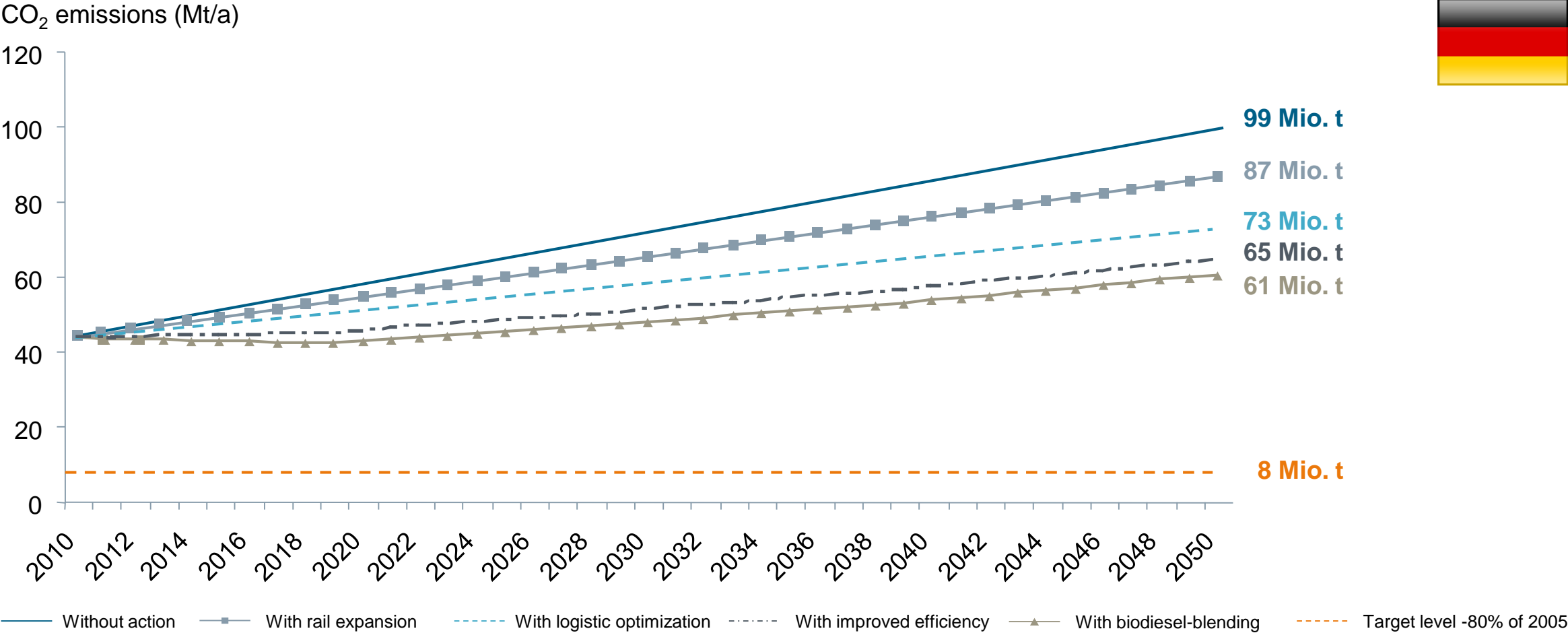


eHighway,

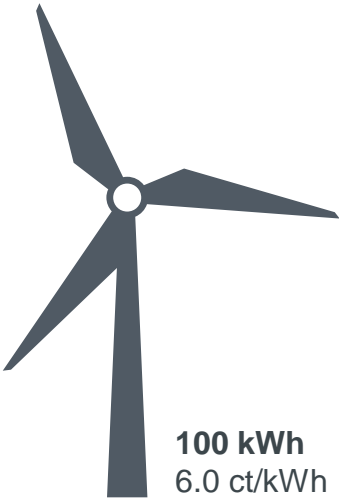
-Innovative solution for heavy road transport

Measures to reduce road freight CO₂ emissions



Source: German Ministry of Environment (BMU), March 2013

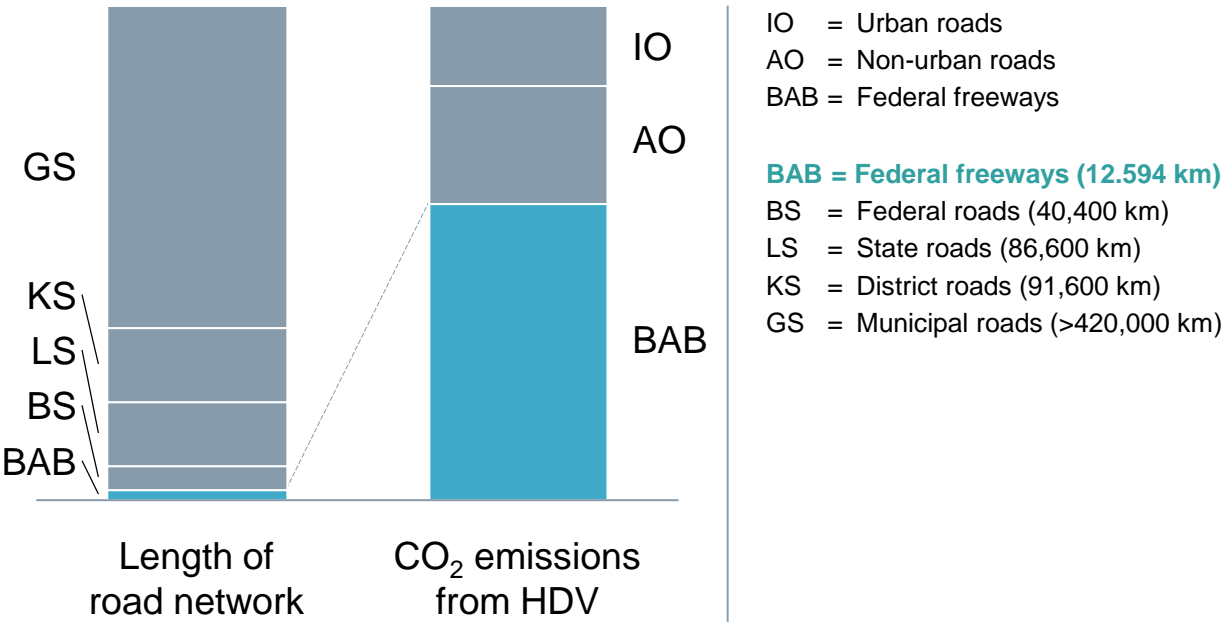
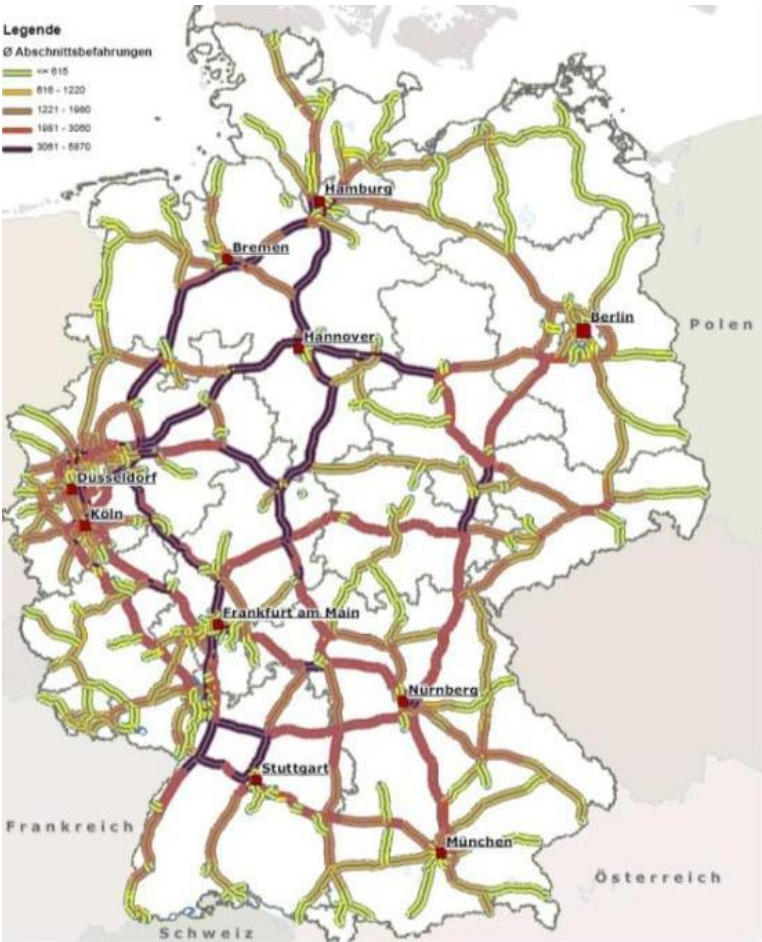
Zero emission are possible with renewable energy, but efficiency varies greatly



Pathway	Range Cost per km	Efficiency WTW	Example vehicle
<div>Electric Road Systems</div> <div></div>	60 km 19 ct/km	77%	
<div>Battery</div> <div></div>	48 km 20 ct/km	62%	
<div>Hydrogen</div> <div></div>	24 km 55 ct/km	29%	
<div>Power-to-Gas</div> <div></div>	17 km 70 ct/km	20%	

1) Including storage
Source: German Ministry of Environment

Infrastructure built on the heavily trafficked roads can address significant part of heavy duty emissions

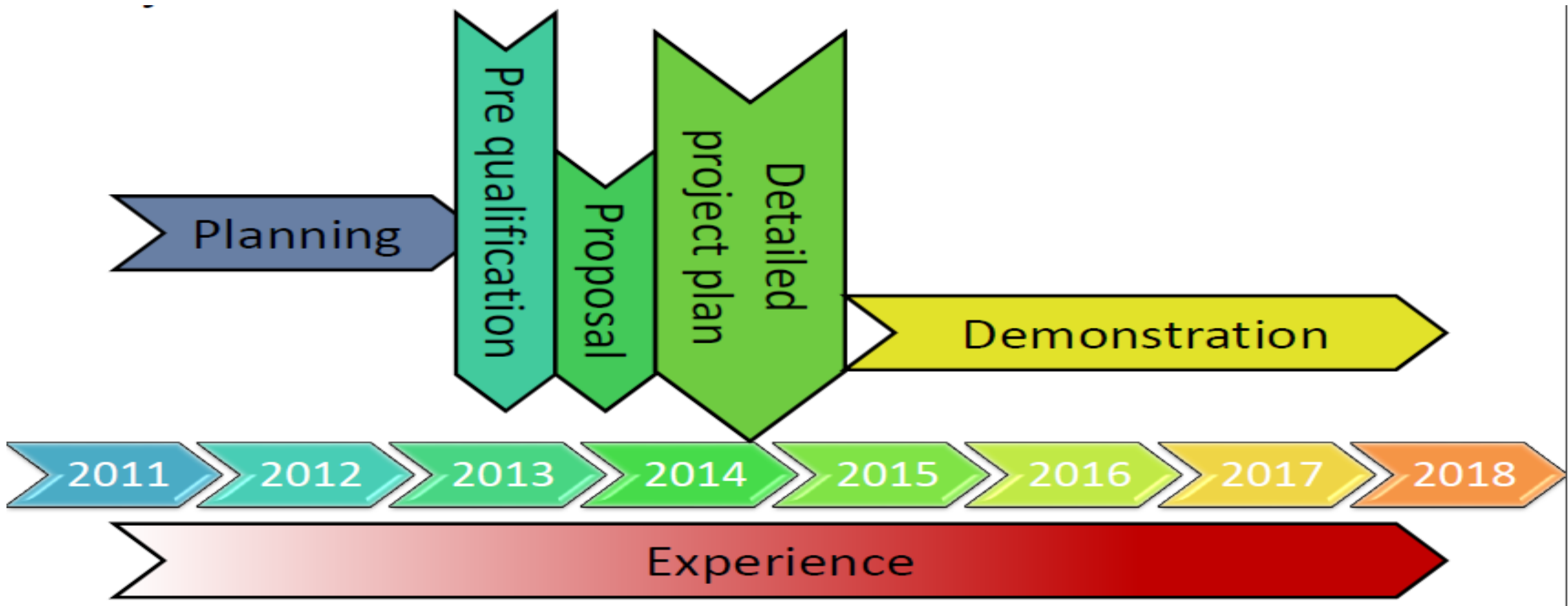


60% of the HDV emissions occur on 2% of the road network (BAB = 12,394 km)

The most intensely used 3,966 km handle **60%** of all ton-km on the BAB

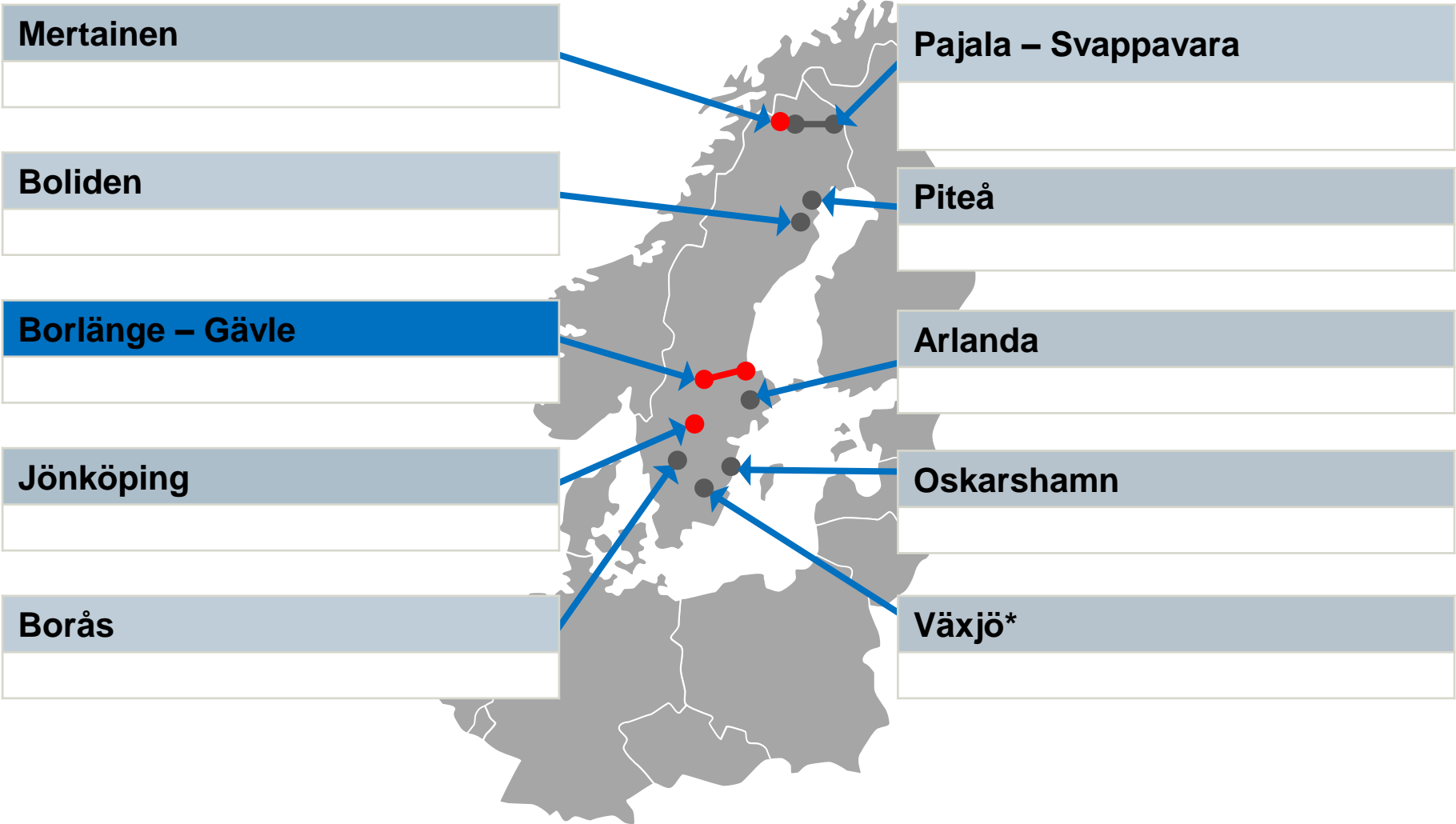
Image: HDV density on BAB-network ; Source: Verkehr in Zahlen 2012; TREMOD 2012

Pre Commercial Procurement of Electric Road System



Pre Commercial Procurement of Electric Road System

- Proposals



Elvåg Gävle, Elvåg E16

Transport service customer

Boliden

SSAB

Sandvik

Outokumpu

Stora Enso

Ovako

Regional public actors

Region Gävleborg

Sandvikens kommun

Sandviken Energi

Gävle Energi

Gävle hamn

Region Dalarna

Gästrikens Räddningstjänst

Forwarding companies

- Ernsts express

National public bodies

- Trafikverket
- Elsäkerhetsverket
- Transportstyrelsen
- Länsstyrelsen
- Polisen
- SOS Alarm

SIEMENS



Region

Gävleborg

SCANIA

SIEMENS

Ingenuity for life





SIEMENS



Region
Gävleborg



SCANIA

<https://www.youtube.com/watch?v=fmcMmYdF6IA>

Experiences so far....

- Region Gävleborg is project owner and combines political, industrial and academic resources .The region will not be part of the future “business” and is well suited to act in a pre-commercial procurement process
- ERS is built and is operated without exceptions from the legal system or existing policies!
- During two years trucks with vehicles up to 60 tons, in test and commercial traffic
- Operation and traffic issues like ”daily operation”
- Two trucks now in operation



Where are we now?

Sweden – Demo operating E16



- **Innovation Procurement Process for demo projects by Trafikverket**
- **Field trial (2 years) started June 22 2016**
- **Overall aim:** evaluate ERS-options prior to introduction on road network
- **Scania as truck OEM**, two trucks in operation

USA – Field trial ongoing



- **eHighway** to reduce emissions of port links on **1-mile** infrastructure near ports in L.A. and Long Beach
- **Cooperation with Volvo Trucks** and local truck converters
- **Contract with South Coast Air Quality Management District** testing throughout 2017.

Germany – field trials



- **R&D Projects (ENUBA) incl. test track in Gross Dölln**
- **5km Field trial on A5 near Frankfurt** awarded to Siemens
- **5km Field trial on A1 by Lübeck Call** issued in August
- **7km Field trial B462 Baden-Württemberg** announced in Sep

Sweden

- Merkel-Löfven Joint Declaration
- Trafikverket (Swedish Transport Administration) aims for a semi-commercial pilot as a next step



Germany

- BMUB: Hendricks endorsement, UBA economic report
- BMVI: Mobility & fuels strategy report, BAST assessment
- BGL (trucking association) strongly in favor
- BDI report (as reported by FAZ) favoring investing 37 billion EUR in contact lines and suitable trucks for autobahn use

Rest of World

- French feasibility project E-Way Corridor
- Norwegian feasibility project ELinGO
- Highways England feasibility study
- FABRIC project of EU Commission
- IEA report: 36% of world's trucks in 2050 use catenary
- IRU report: 40-45% of EU long haul trucking electric by 2050
- T&E report: Need to start piloting ERS straight away

Why Electrical Road Systems?

ERS reduces energy use.

ERS reduces CO2 emissions.

ERS reduces operation cost and can finance the necessary investments in infrastructure and vehicles that way.

ERS utilizes existing infrastructure.

ERS creates a new national field of knowledge and a new industrial branch.

ERS is great field for cooperating between the political, administrative and industrial entities.

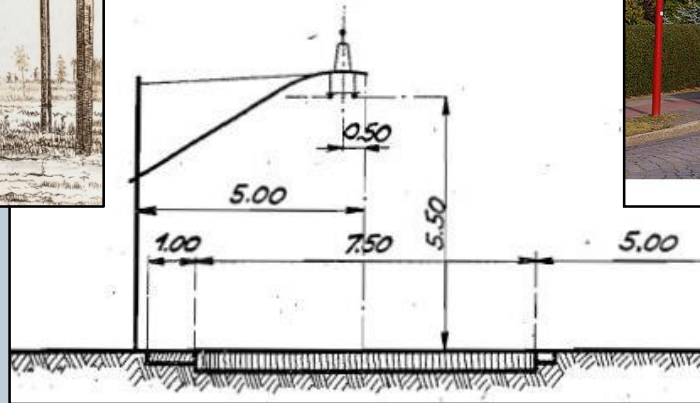


135th anniversary of ERS (Electric Road Systems)



**Siemens Elektromote
(1882)**

**German Highway
Concept (1936)**



**Trolleybus in
Germany**

Electric mining truck



- Road applications date back more than 130 years
- About 300 trolleybus systems (incl. long-distance up to 100 km for inter-city traffic) operative world-wide
- Road applications demand early standardization to allow for common interfaces to base vehicles

- Electric traction systems can be beneficially used on highways as well
- Applicable to trucks/long-distance busses
- May be combined with energy storages
- DC power supply (600 ... 750 V nominal), catenary type contact lines

Thank you for your attention



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