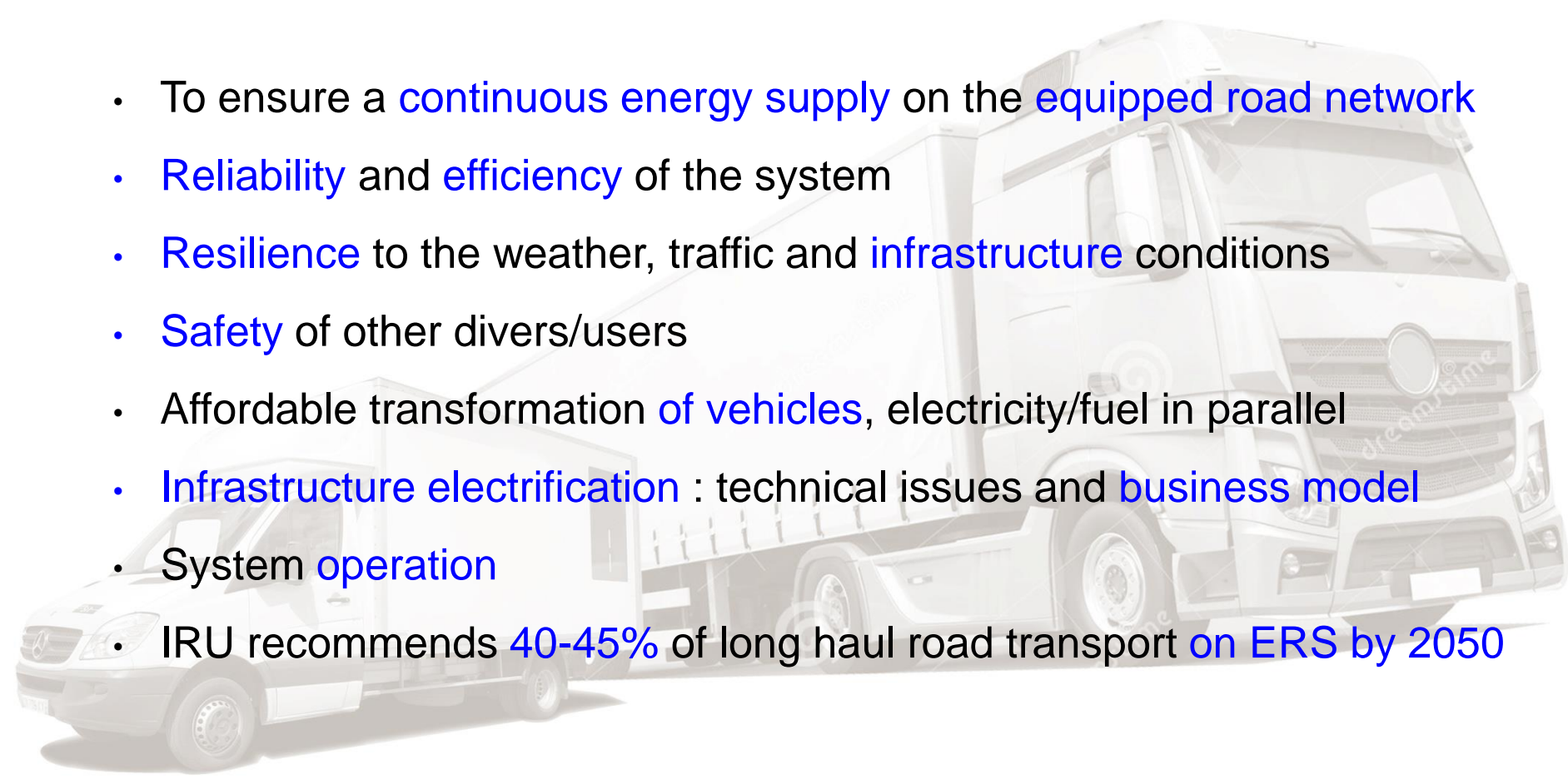


LOW CARBON ROAD OPERATION – ELECTRIC ROAD SYSTEM (ERS)

Bernard Jacob
Scientific Division, IFSTTAR
Technical Committee B4, PIARC

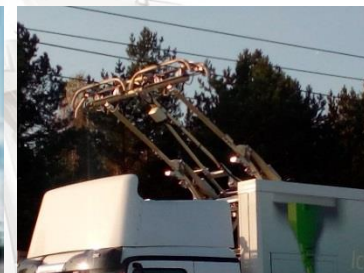


Challenges or the ERS

- 
- To ensure a **continuous energy supply** on the **equipped road network**
 - **Reliability** and **efficiency** of the system
 - **Resilience** to the weather, traffic and **infrastructure** conditions
 - **Safety** of other drivers/users
 - Affordable transformation **of vehicles**, electricity/fuel in parallel
 - **Infrastructure electrification** : technical issues and **business model**
 - System **operation**
 - IRU recommends **40-45%** of long haul road transport **on ERS by 2050**

ERS Technologies

➤ Catenary solution



➤ Ground conductive solution



➤ Ground inductive solution



Catenary (overhead) supply

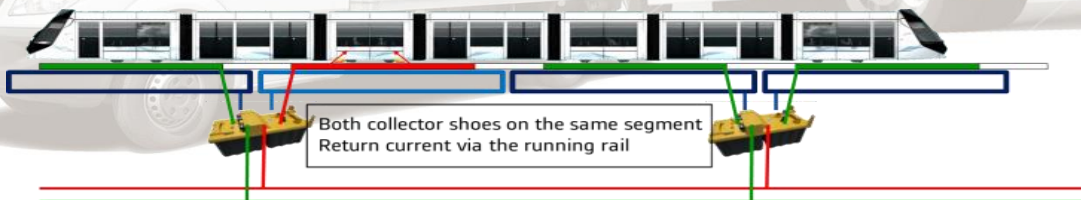
To be presented by P. Akerman



SIEMENS

Ground-level feeding: from rail to road

- Segmented ground feeding system
- APS in operation since 2003 in Bordeaux
 - In 10 cities (in operation or under construction)
 - More than 30 000 000 km run in APS
 - Total: 334 tramways and 141 km of track
 - APS provides same performances than OCS
 - Intrinsic safety and compatible with mixed traffic (crossroads)

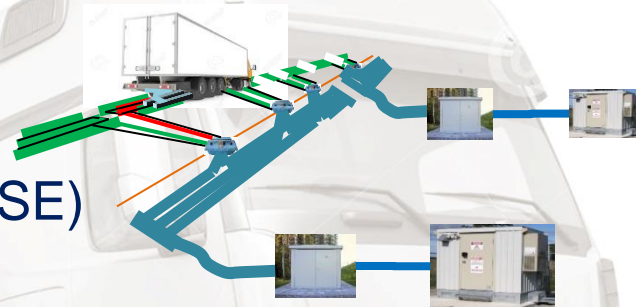


Ground-level feeding

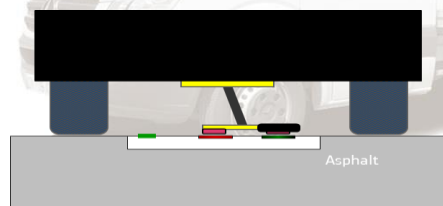
ALSTOM



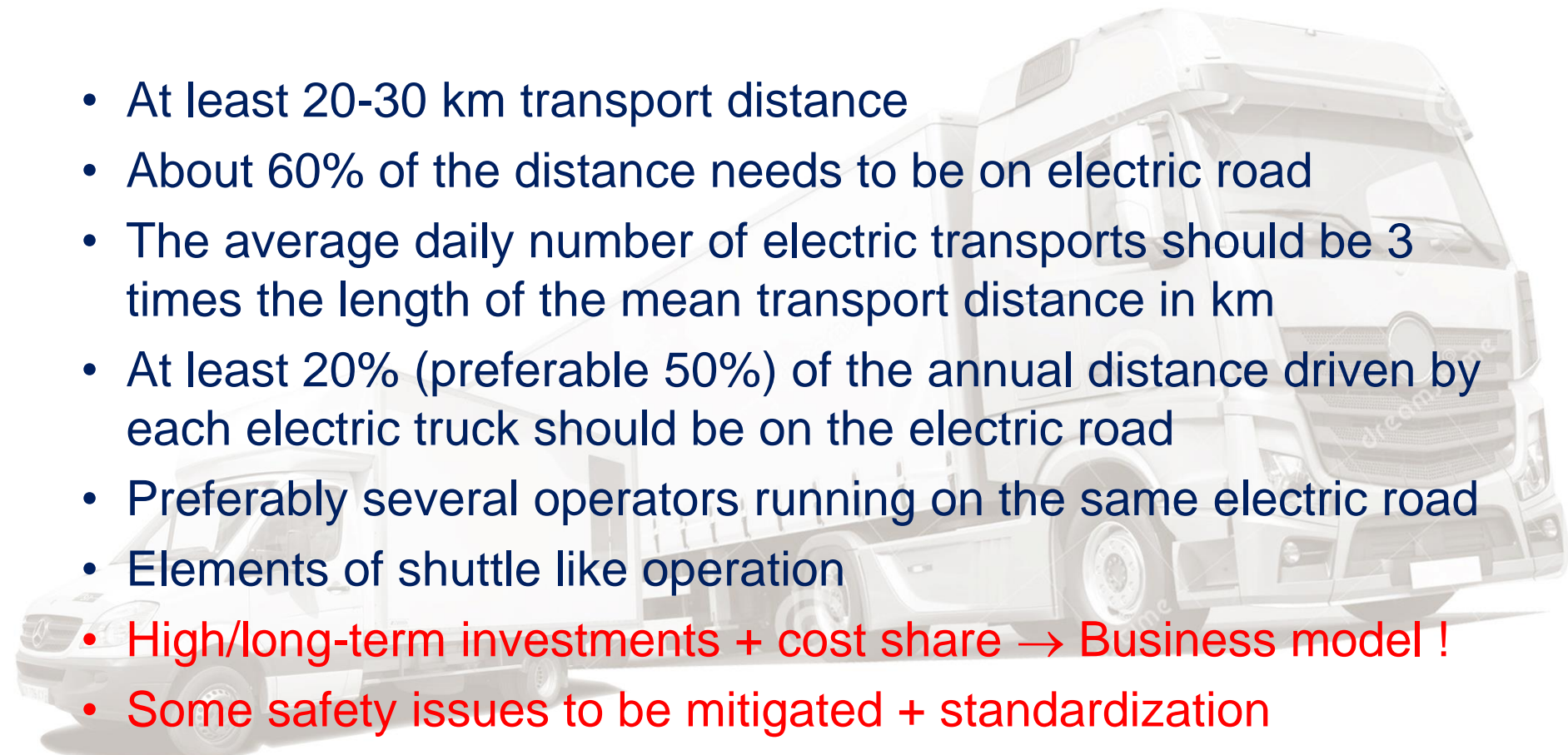
- APS for road: proof of concept (Slide-In project, SE)
- Demonstrator (350 m) built on Volvo test track
- Proof of concept validated
- Improved solution answering road needs under development



Current collection test	Result
126kWatts 180Amps 690VDC transfer	✓
Truck speed more than 80km/h	✓
20km of continuous power transfer	✓
Rainy conditions	✓
Short circuits tests	✓
Track adherence tests	✓

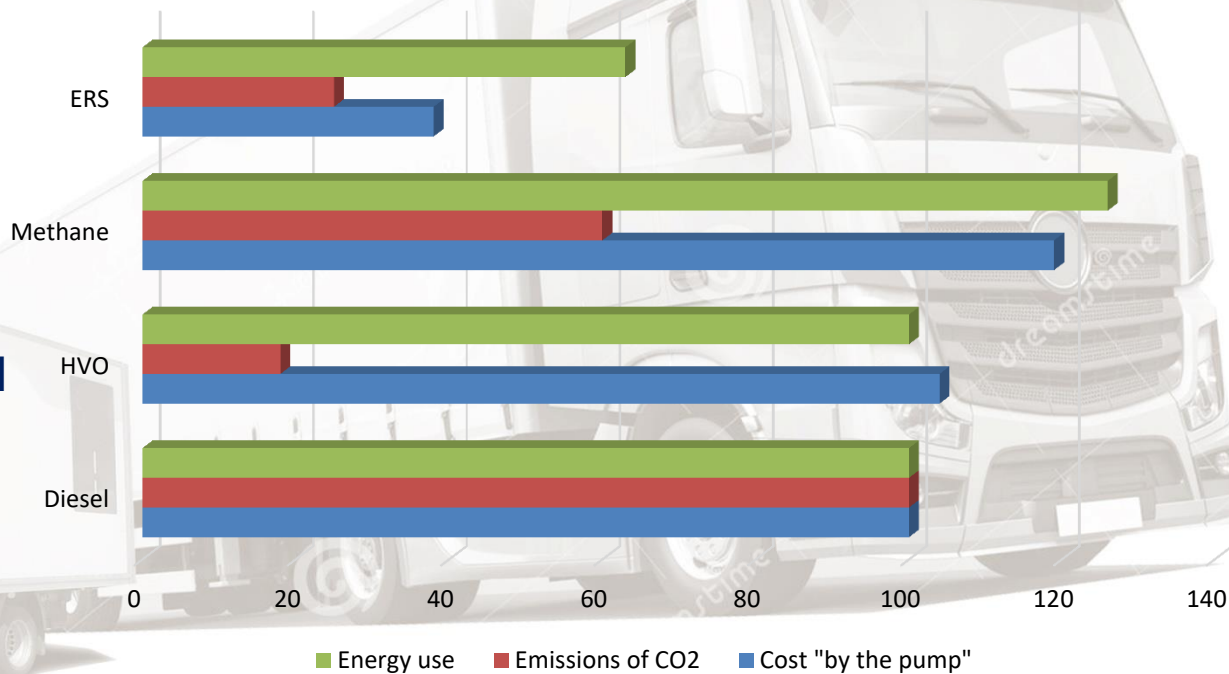


Conditions **and barriers**

- 
- At least 20-30 km transport distance
 - About 60% of the distance needs to be on electric road
 - The average daily number of electric transports should be 3 times the length of the mean transport distance in km
 - At least 20% (preferable 50%) of the annual distance driven by each electric truck should be on the electric road
 - Preferably several operators running on the same electric road
 - Elements of shuttle like operation
 - **High/long-term investments + cost share → Business model !**
 - **Some safety issues to be mitigated + standardization**

Benefit of Electric Road System (ERS)

- reduces energy use
- reduces CO2 emissions
- utilizes existing infrastructure
- creates new field of knowledge and industrial branch
- is a field for cooperating between the political, administrative and industrial entities



Assessment by Carbone 4

Évaluation économique de l'autoroute électrique sur 20 ans Deux cas de figure

Rentabilité intrinsèque

Section de 210 km

Trafic de ~ 14 000 PL / jour

Infra.
320 M€

Gains SPV*
320 M€

Gains
Transporteurs
90 M€

Coûts

Recettes

5

MtCO₂
évitée

850

Millions d'€ d'économies
sur la balance commerciale

Cas avec soutien public 100 € / tCO₂

3 200 km d'autoroutes, 1/3 du réseau

Trafic moyen de ~ 8 100 PL / jour

Infra.
5 Md€

Gains SPV*
2 Md€

Gains
Transporteurs
1 Md€

Soutien public ?
~ 2 Md€

Coûts

Recettes

30

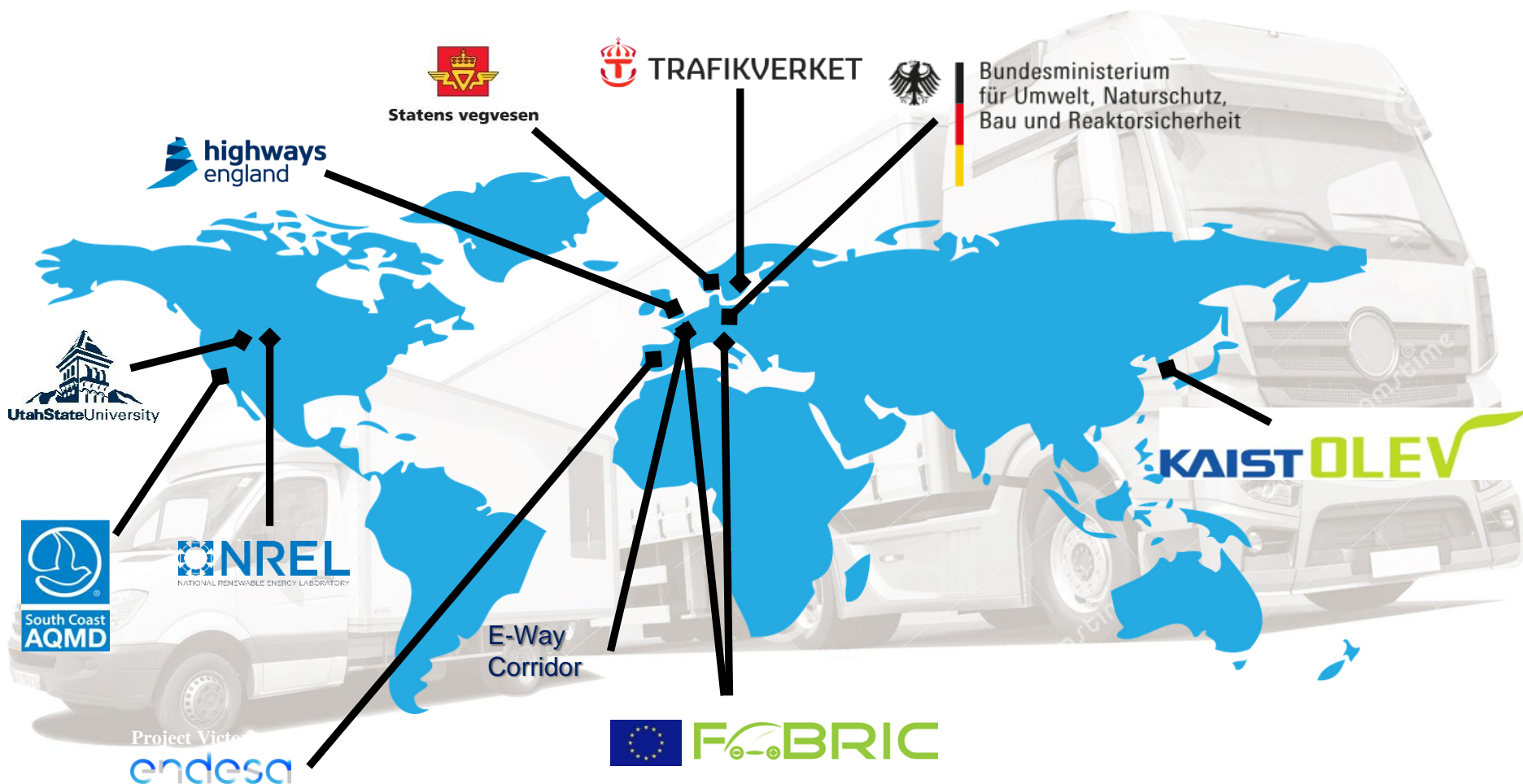
MtCO₂
évitée

5


Md€ d'économies sur la
balance commerciale

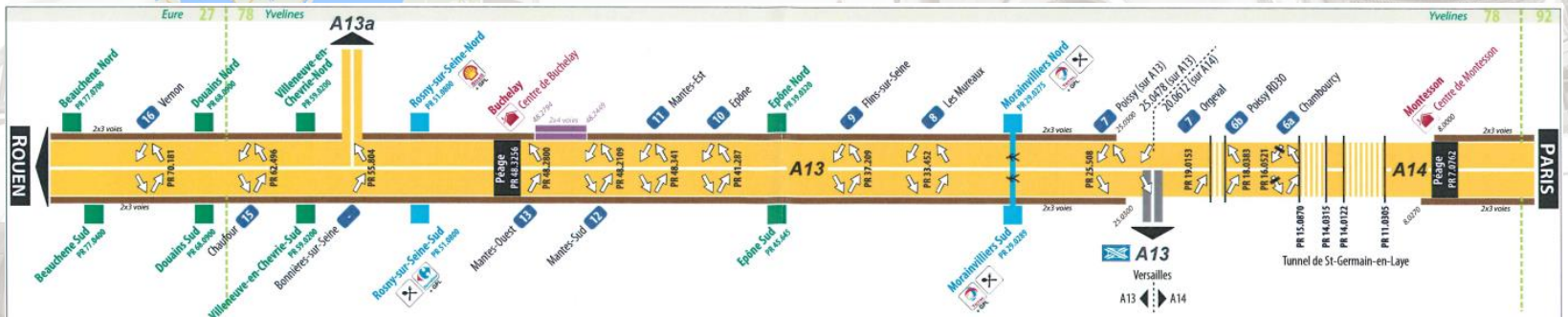
* SPV : Special-Purpose Vehicle, ou société de projet. Il s'agit de la société dédiée qui construira et exploitera les infrastructures de distribution d'électricité le long de l'autoroute.

ERS Technologies and Projects



Way Corridor:

- 
- Paris-Le Havre (A13)
 - Feasibility study
 - Multi-technology
 - Techno-economical
 - ADEME: “Road of the future”
 - OIE, IFSTTAR, SANEF, SPIE, AFNOR, Accenture...



**Thank you very much for
your attention!**



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