



# E-mobility project T.eBuS – International electric bus test platform in Finland Sami Ojamo PART II T.ebus

## **CONTEXT** Finnish State strategy in transport

The Finnish state has clear mindset to reduce emissions & noise levels. E-mobility is seen as one of the key component along with smart mobility systems

#### Targets for the road transport are:

- To reduce CO2 emissions by 15% from 2005 to 2020
  - Reduction 5% in energy consumption
  - Increase the use of alternative energy sources by economic incentives
  - Increase the use of Public Transport
  - Decrease the use of private cars
- To reduce NOx emission by 25% from 2011 to 2020
- To reduce PM (particle) emission by 20% from 2011 to 2020
- To reduce noise emission (over 55dBA) by 2020
  - 50,000 people should be less "infected" by the noise



### **Transdev Group commitments and results** TRANSDEV HAS SIGNED THE UN GLOBAL PACT AND UITP SUSTAINABLE DEVELOPMENT CHARTER

#### Certification & labelling programs

- ISO 14001 certification policy: 50 certifications to date
  - » Some countries being entirely certified (Portugal, Sweden, Finland)
  - » Dublin, Barcelona, Rabat, Seoul and Mumbai networks
- In partnership with FACE, 300 attributed labels, among which 70 apply to environmental projects

#### Fuel consumption

- 50 PT networks equipped with eco-driving systems
  - » +7 000 vehicles
  - » 4 500 vehicles in the US equipped with safe driving assistance systems
- comfort improvement for passengers

Electric buses

- 97 micro-midi-mini buses in France, Finland and the UK
- 3 standard and 1 double-decker « full autonomous » electric buses in operation (3 in Stanford, one in York)
- 12 e-buses being tested (Finland, NL, US, Portgal and France – Nice, Watt project)
- 45 hybrid buses in France



## PROJECT Transdev electric BuSystem 2011-2016

- T.ebuS: a unique project launched in 2011, providing an experience and expertise to all stakeholders about E-mobility in harsh conditions.
  - Endorsed by UITP and embedded in ZeEUS program
  - Field and laboratory testing and demonstration platform for up to 6 different electric buses in real traffic conditions in Nordic climate
  - Key elements of the project:
    - 1) Energy management at depots (power demand)
    - 2) Cold climate effect to batteries
    - 3) Battery life time estimations
    - 4) Operational reliability
    - 5) New business model evaluations
  - Valuable information gathered regarding electric bus procurement and total cost of ownership calculations



T.ebus



### PROJECT Test fleet

- Ebusco 2.0 (since 2013)
- Caetano Cobus 2500 EL (since 2012)
- BYD ebus 12m (since 2014)
- VDL Citea Electric (since 2014)
- Siemens-Rampini three week test in 2013
- Linkker prototype test run
- Total milage has been more than 100.000 km















### **OPPORTUNITIES AND LEARNINGS – ADDED VALUES MANUFACTURES, CITIES, PTA AND OPERATOR**

Providing to all stakeholders

- Technical competence
  - System level
  - Vehicle knowhow (energy measurements by VTT)
  - Workshop requirements
- Maintenance and repair
  - Safety aspect Dangerous high-voltage
  - Staff education
  - Vehicle repair requires new methodology and mind setting
- Total Cost Ownership modelling
  - Energy consumption
  - Reliability analysis
  - Battery lifetime evaluations
  - Charging system
- Infrastructure responsibility: The operator or PTA or the city
  - Who owns the infra and what is the business model?
  - Who decides what kind of technology is selected for the infra in opportunity charge?



### **Questions**





