

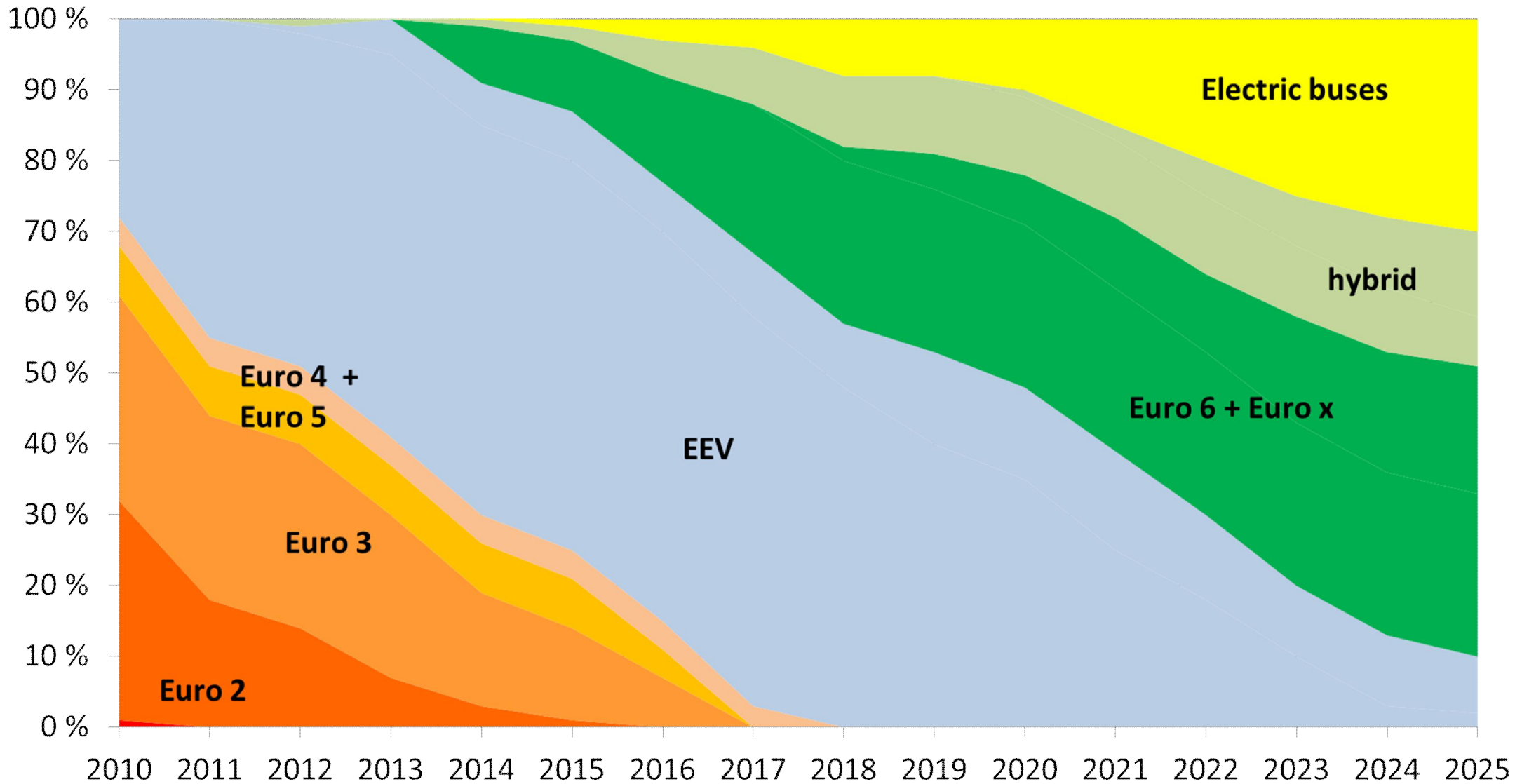


Helsinki region electric bus activities with pre-commercial pilot "ePELI"

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Helsinki Region Transport – fleet strategy 2025

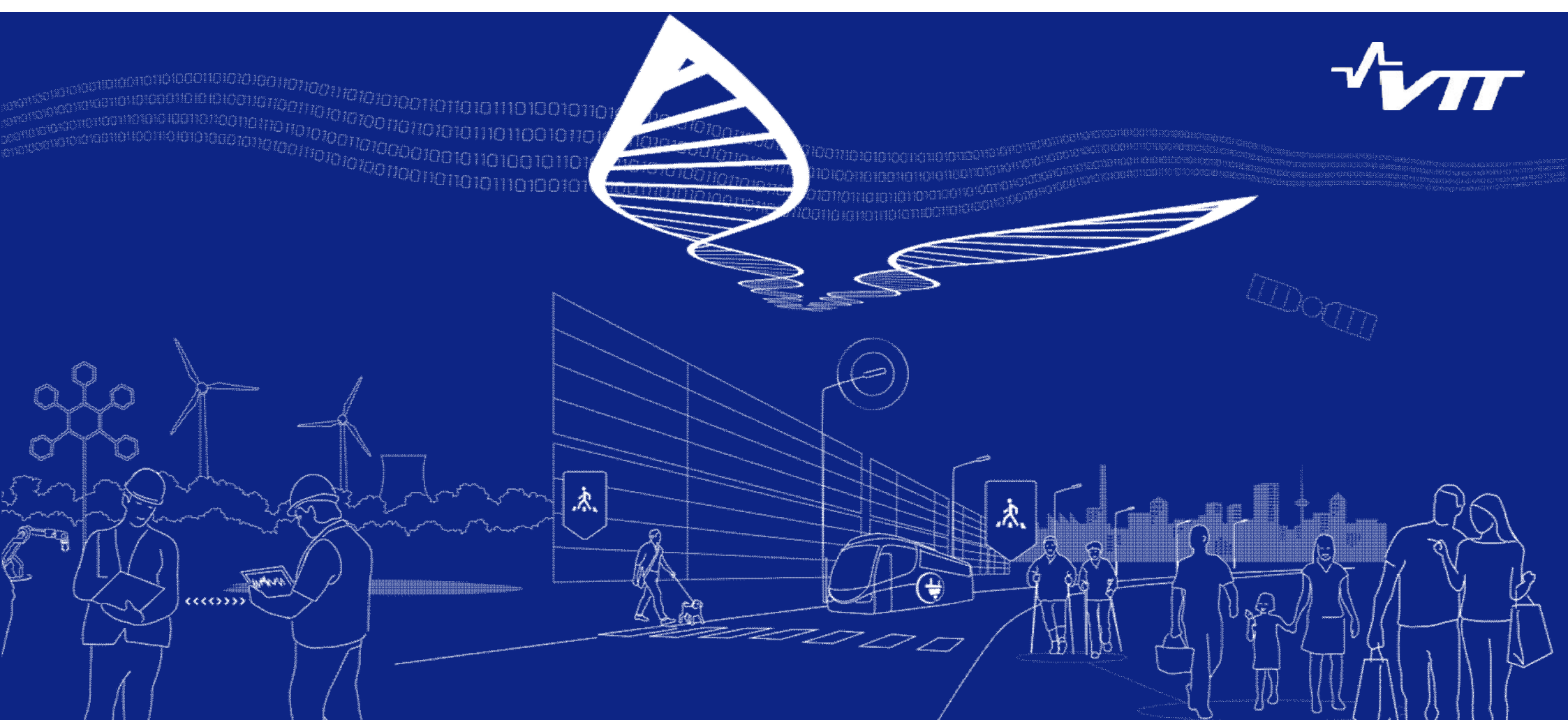


Estimated effect on emissions by 2025 (compared to 2010): reduction of NO_x (-92%), PM (-95%), CO₂ (-90%)

9.10.2015 • For conventional buses, biofuels are phased in and constitute 100% from 2020 onwards

A pre-commercial pilot needed to ensure PTA requirements for a good eBus system

- Productivity: the size of the bus fleet must not be increased when replacing conventional buses with electric ones
- Operability: the operability of the electric buses must be at the same level as that of the conventional buses
- Reliability and comfort: the level of service, reliability and passenger comfort need to be the same or better compared with conventional buses
 - Proven and reliable technology
 - Innovative new concepts and businesses
 - Established value network and actors



Helsinki region electric bus pre-commercial pilot "ePELI"

"Vehicles": ECV-eBus project

- The aim is to find out usability of electric buses in commercial transport
- Field study and laboratory research
 - Electric bus test line 11 Tapiola-Friisilänaukio
 - Four commercial eBuses in operation
 - Vehicle technology analysis
 - Full-size VTT-owned electric bus prototype as a development platform
 - Battery laboratory
 - climatic chambers for components
 - Simulation tools
- Challenging weather conditions
- Part of Tekes EVE programme
 - A major section of ECV national R&D network (Electric Commercial Vehicles)

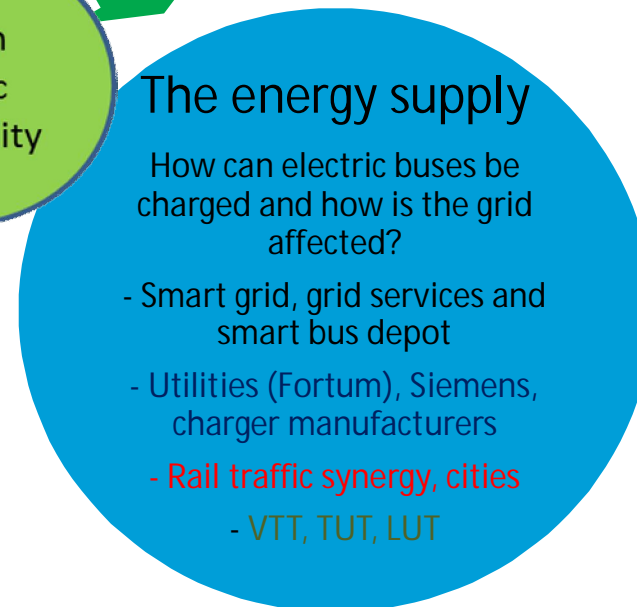
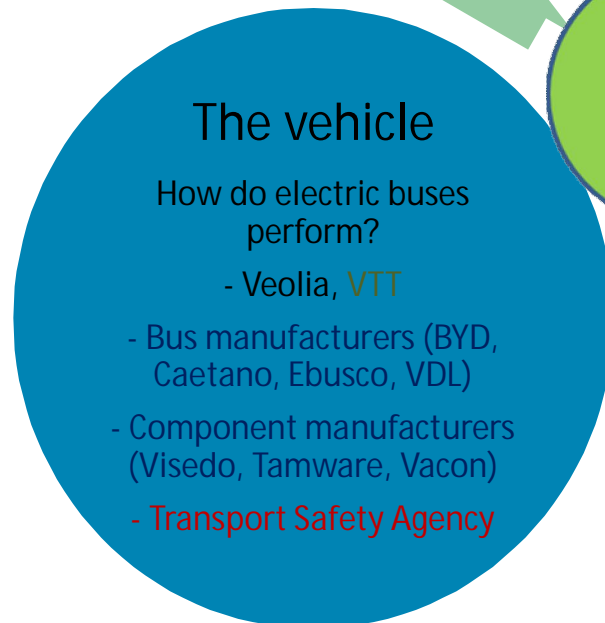
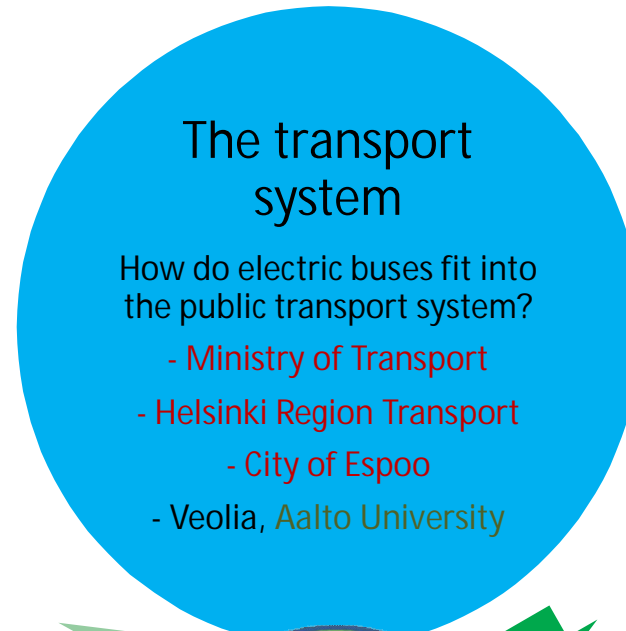


The prototype bus became so good it was operating one week in commercial passenger traffic in 5/2014

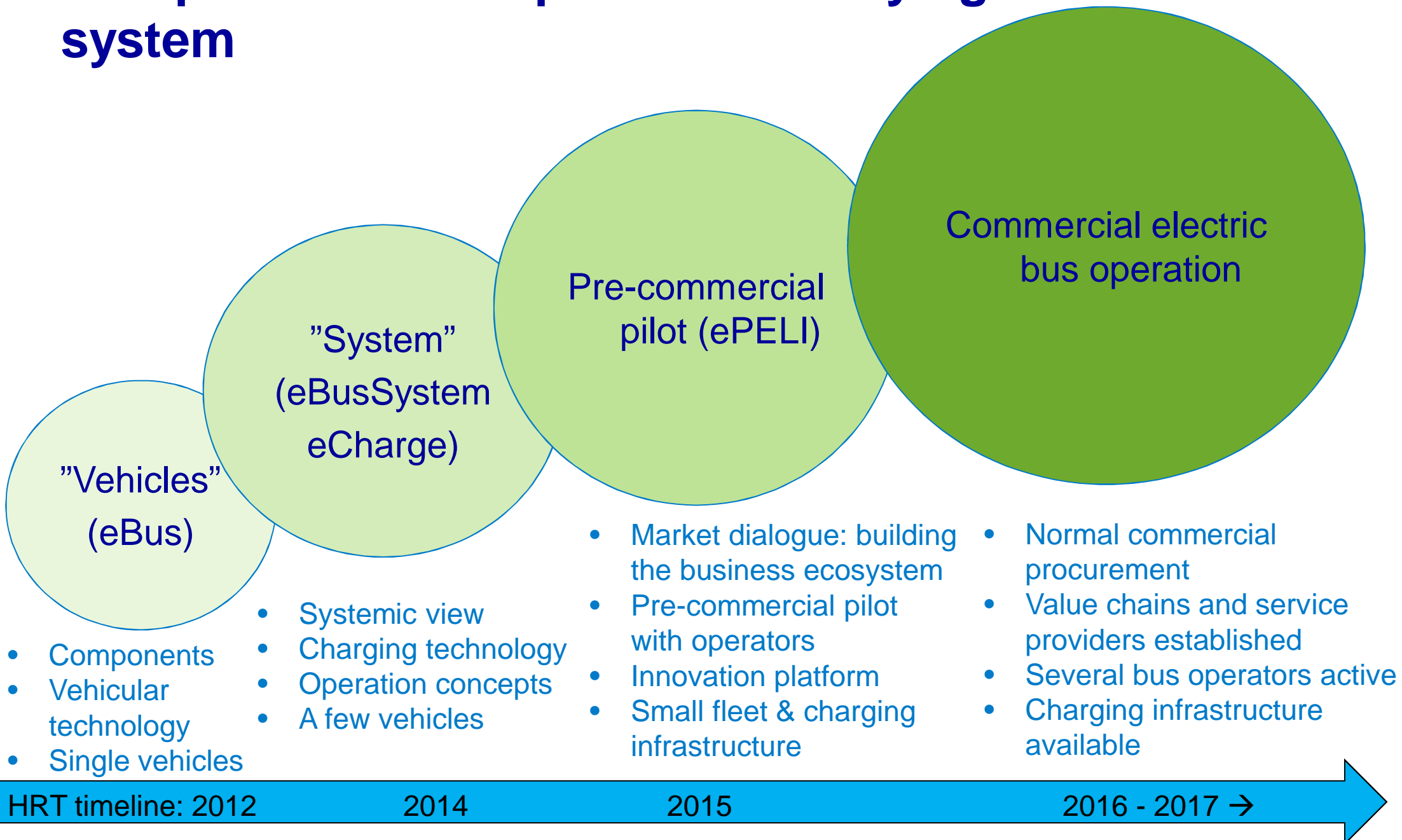
"System": eBusSystem – the Espoo demonstration



Public sector
Private sector
Bus operator
Research



Comprehensive steps into electrifying the bus system



”ePELI” key players

- Helsinki Region Transport (HSL)
 - Direct procurement of 12 Linkker buses
 - Buses to be operated by commercial PTO’s
- City of Helsinki
 - Procurement of charging infrastructure for electric bus pilot operation in Helsinki
- City of Espoo
 - Procurement of charging infrastructure for electric bus pilot operation in Espoo
- A number of enterprises to participate in the market dialogue





Key contents of "ePELI"

”ePELI” Part 1 – Innovative public procurement

- HSL, city of Helsinki, city of Espoo
- Preparing for the market-based entry of electric bus systems
- Key contents
 - Initiating the open market dialogue: bus operators, charging systems, bus manufacturers, system suppliers, service providers
 - Supplier conferences and workshops
 - Ensuring the correct system requirements and specifications
- Pre-commercial step: creation and activation of the ecosystem
- Moving fast towards the market-driven procurement and business

Steps planned in ePELI Part 1 "Innovative public procurement of eBus systems"

1. Procurement and ownership of charging infrastructure
 - Pre-commercial competence building on procurement, requirements
 - Definition of ownership and roles in procurement
 - Market dialogue and moving to first commercial procurements
2. Definition of procurement of charging operations
 - Setting the scene by co-operation of the procuring organisations
 - Defining the business and services as part of ePELI
 - Market dialogue and workshops leading to commercial procurement
3. Procurement of transport services
 - PTA and city co-operation, understanding procurement models
 - Market dialogue between PTA, PTO's and bus manufacturers
 - Moving from pre-commercial phase to the 1st commercial procurement
4. International co-operation and context

”ePELI” Part 2: Ensuring the productivity of the electric bus system

- HSL, city of Turku, close collaboration with Helsinki and Espoo
- Monitoring and ensuring the productivity of electric bus systems
- Key contents
 - System-level performance, energy flow and fleet management
 - Scalability from pilot-phase to commercial roll-out
 - Analysing and improving the attractiveness and acceptance of electric bus systems
 - System performance vs requirements and specifications
 - Syntheses, wider dissemination with stakeholders and international reference & co-operation
- Pre-commercial step: operation and analysis of the 12 eBus fleet
- Moving fast towards the market-driven procurement and business

Steps planned in ePELI Part 2 "Ensuring system productivity"

1. Verifying electric vehicle performance and reliability
 - Collection and analysis of on-line vehicular and component data
 - Verifying vehicle performance in laboratory
 - Assessment of the reliability of vehicles in operation
2. Verifying system-level productivity
 - Collection of real time system-level data and definition of data interfaces
 - Real-time follow-up and analysis of fleet and charging management
 - Key performance indicators, analysis of operational margins
3. Scalability according to strategy
 - Methodology and tools for scalability analysis
 - Operational (GIS) analysis of pilot operation lines
 - Scalability analysis for roll-out strategy



Summary and conclusions

Summary and conclusions

- Electric bus systems are fast emerging
 - Both vehicle technology and charging equipment available
- Electric city buses are heavy duty sweet spot, other use cases and applications will follow
- Designing an efficient ebus system requires systemic approach
 - Optimised vehicle and battery
 - Operation concept analysis and design
 - Charging infrastructure and energy management
- Co-operation of key players required: city, PTA, PTO, energy company, service providers (e.g. charging service)
 - Information exchange and co-creation e.g. at Nordic level?

Summary and conclusions

- The technology is not yet mature and proven at systemic level – careful engineering is required
 - Level of standardisation is low (progressing)
 - Ownership, operation and service models not fully established
 - All actors are not yet active / established
- **We are about to start the necessary "ePELI" activity as the last step before commercial roll-out of electric bus systems**
- **Helsinki region will show the way to market-driven electric bus introduction**



TECHNOLOGY FOR BUSINESS

