Planning for EV fleet rollout: triple layer model

Clean Energy & Mobility Conference

Bibi Fabius, 5 June 2019

Agenda

1. EVConsult & our work

2. E-buses: what's new?

3. Triple layer model

4. Lessons learned

1. About EVConsult

Our mission: accelerate the transition towards 100% zero-emission mobility

- **Strategy**, **project management** and **research & innovation**

- 10 years of experience in over **200 e-mobility projects**

- **Growing team** of 25+ experts (technical, economic, legal)

- Based in **Amsterdam**

- **Wide range** of **clients**

- **Worldwide network** of partners

Unique expertise in global field of e-mobility

1. About EVConsult

Experience e-buses

GVB & municipality of Amsterdam

Validation technique choice for ZE-buses
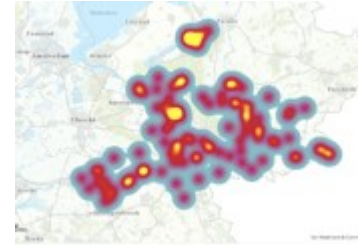for the step-up to ZE bus transport in 2025

Province of Utrecht

Advice on strategic choices charging infrastructure
for the scale-up of 142 e-buses until 2023

Municipality of 's-Hertogenbosch & Enpuls

Study on various alternatives for charging e-buses

Public transport concession IJssel-Vecht

Technical project manager realisation charging infrastructure for opportunity charging

2. E-buses: what's new?

2. E-buses: what's new?

New stakeholder in public transport

Public Transport Authority
(PTA)

Municipality

Public Transport Operator
(PTO)

Distribution System Operator
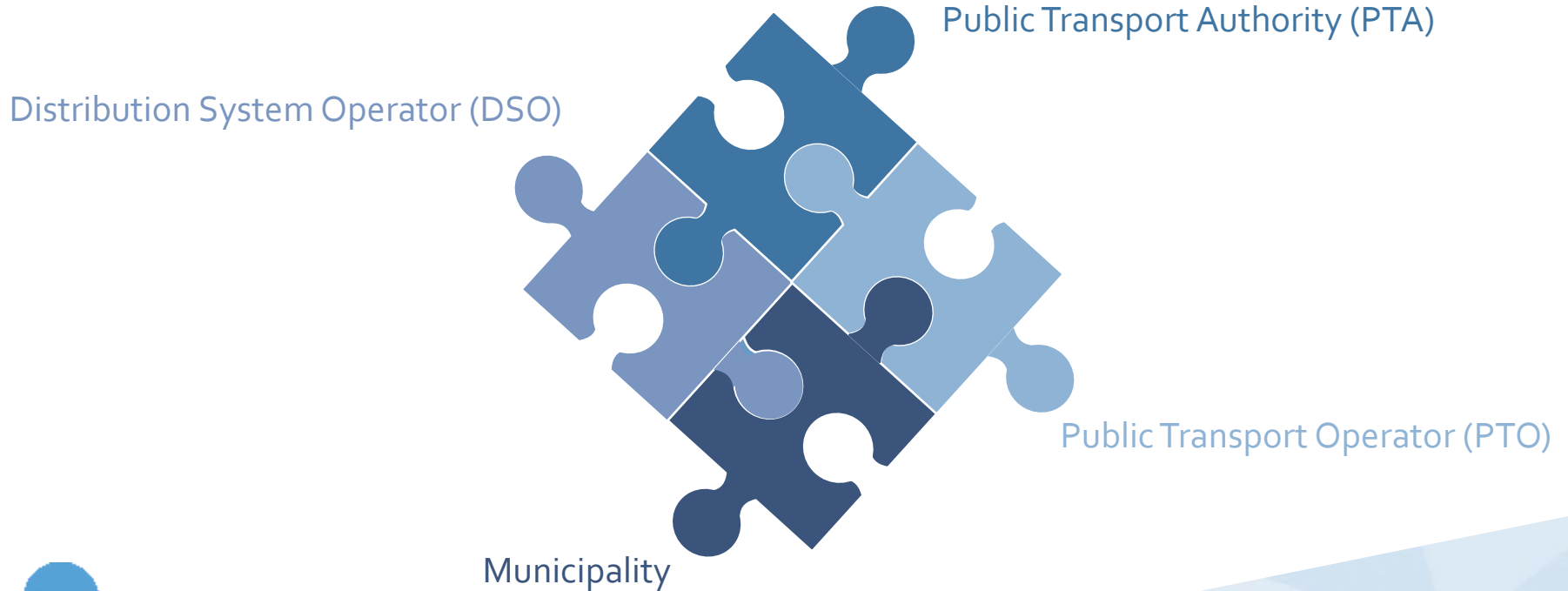(DSO)

2. E-buses: what's new?

You ask for this:

But... also get this:

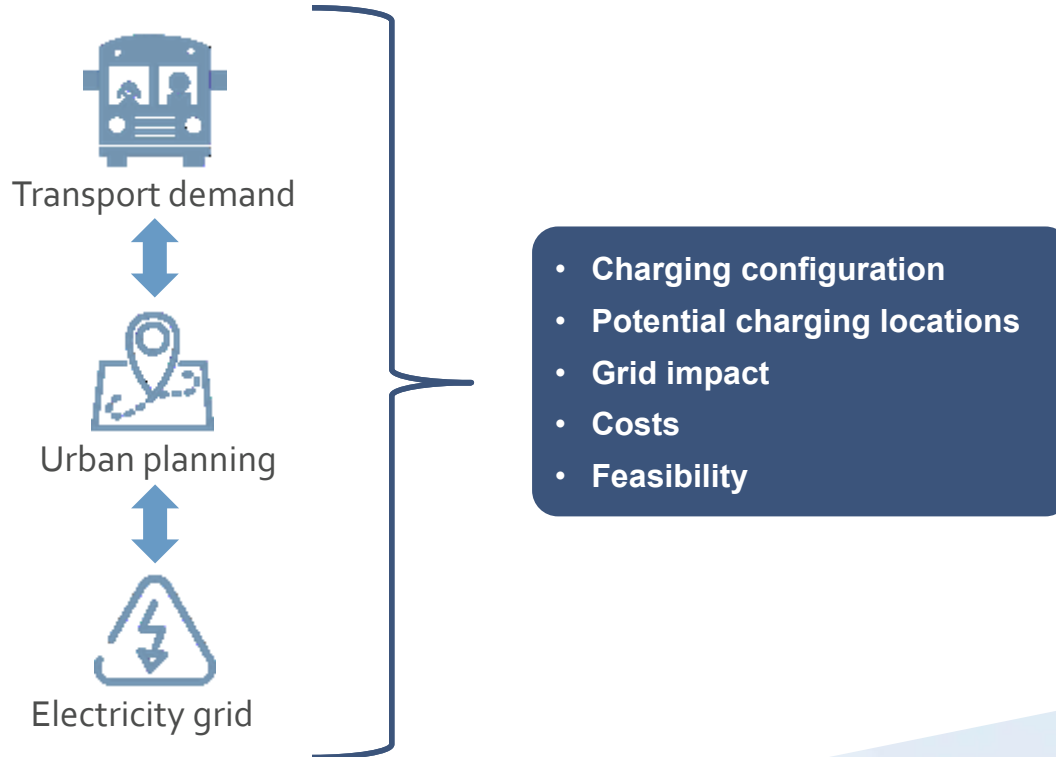# 2. E-buses: what's new?

Cooperation at an early stage is essential

Public Transport Authority (PTA)

Distribution System Operator (DSO)

Public Transport Operator (PTO)

Municipality

3. Triple layer model

3. The triple layer model

Model to develop a sustainable charging network

Transport demand

Urban planning

Electricity grid

- **Charging configuration**
- **Potential charging locations**
- **Grid impact**
- **Costs**
- **Feasibility**

3. The triple layer model

Layer 1: develop charging scenarios

- Define current and future routing
- Analyse charging scenario's (overnight and OC charging)
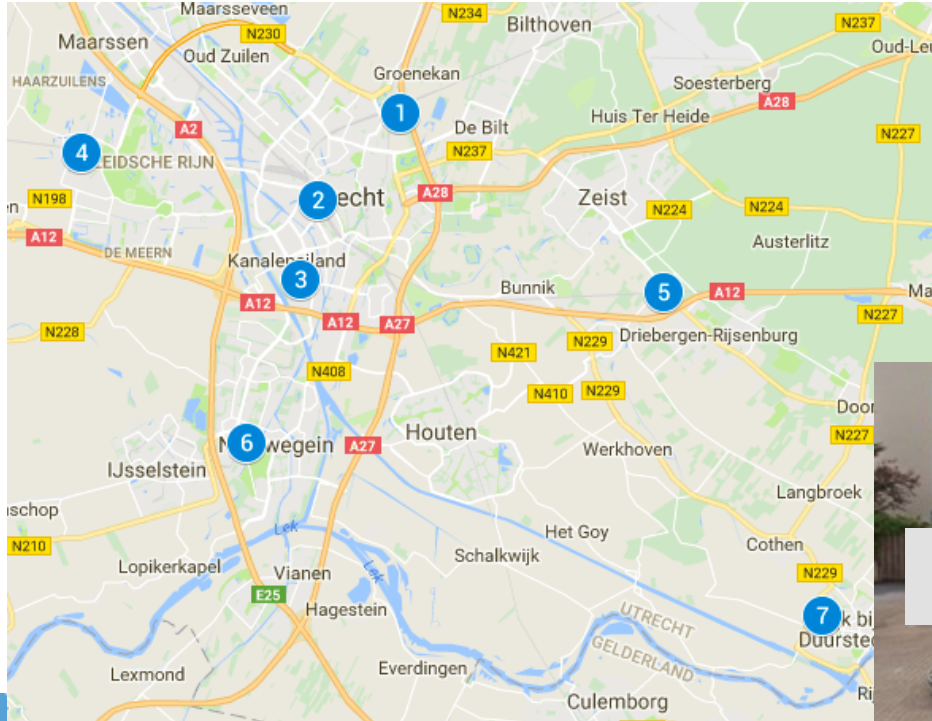- Define configurations of buses, batteries and chargers

Scenario	Battery size	# e-buses	Chargers at end stops	Chargers at depot
1. Opportunity charging	100 kWh	11	2x 300 kW	11x 30 kW
2. Opportunity charging	340 kWh	11	2x 150 kW	11x 80 kW
3. Overnight charging	570 kWh	11	0	11x 150 kW

3. The triple layer model

Layer 2: urban planning

- Room in public space
- Bus route
- Landscaping
- 1 or multiple PTOs
- Scalability

Location transformer?

3. The triple layer model
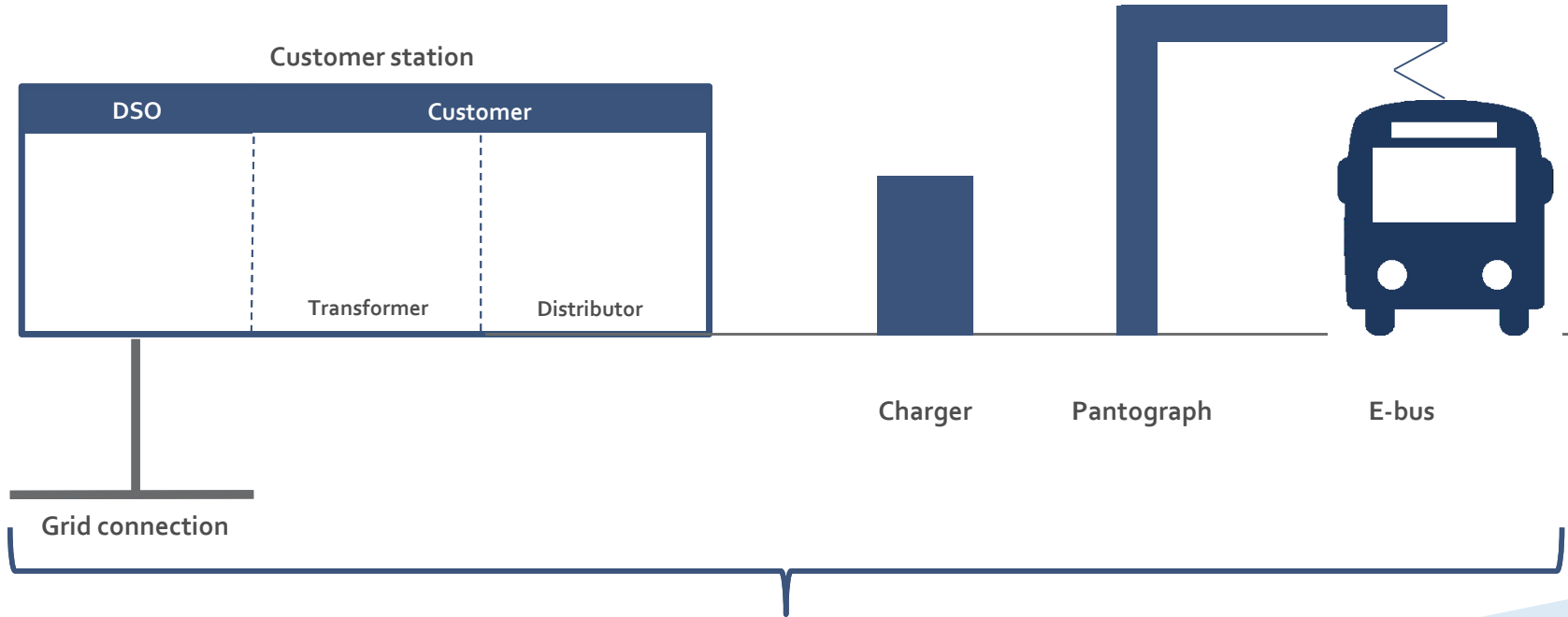
Layer 3: grid connection

Check with DSO:
- Current grid capacity and needed capacity for charging
- Expected need for capacity in future
- Distance of charging location to the grid

3. The triple layer model
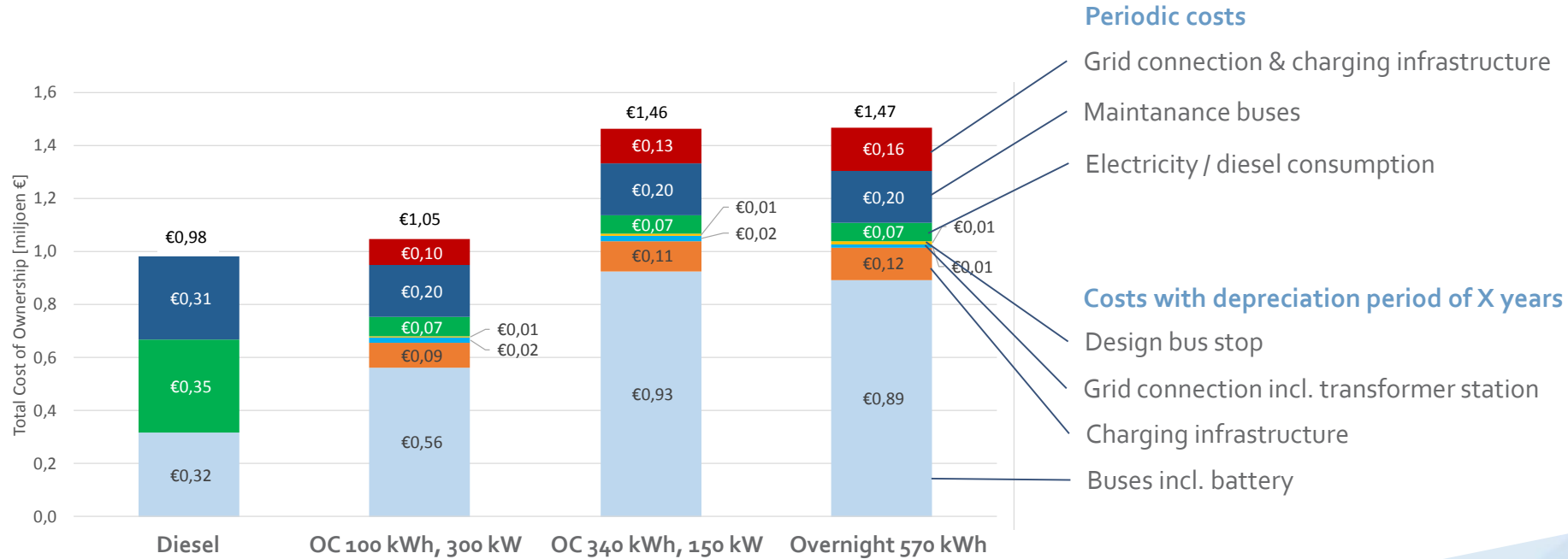
Cost comparison over the entire value chain

Customer station

DSO	Customer	
	Transformer	Distributor

Charger   **Pantograph**   **E-bus**

Grid connection

Compare costs over the entire value chain

3. The triple layer model

Result cost comparison

Periodic costs

Grid connection & charging infrastructure

Maintanance buses

Electricity / diesel consumption

Costs with depreciation period of X years

Design bus stop

Grid connection incl. transformer station

Charging infrastructure

Buses incl. battery
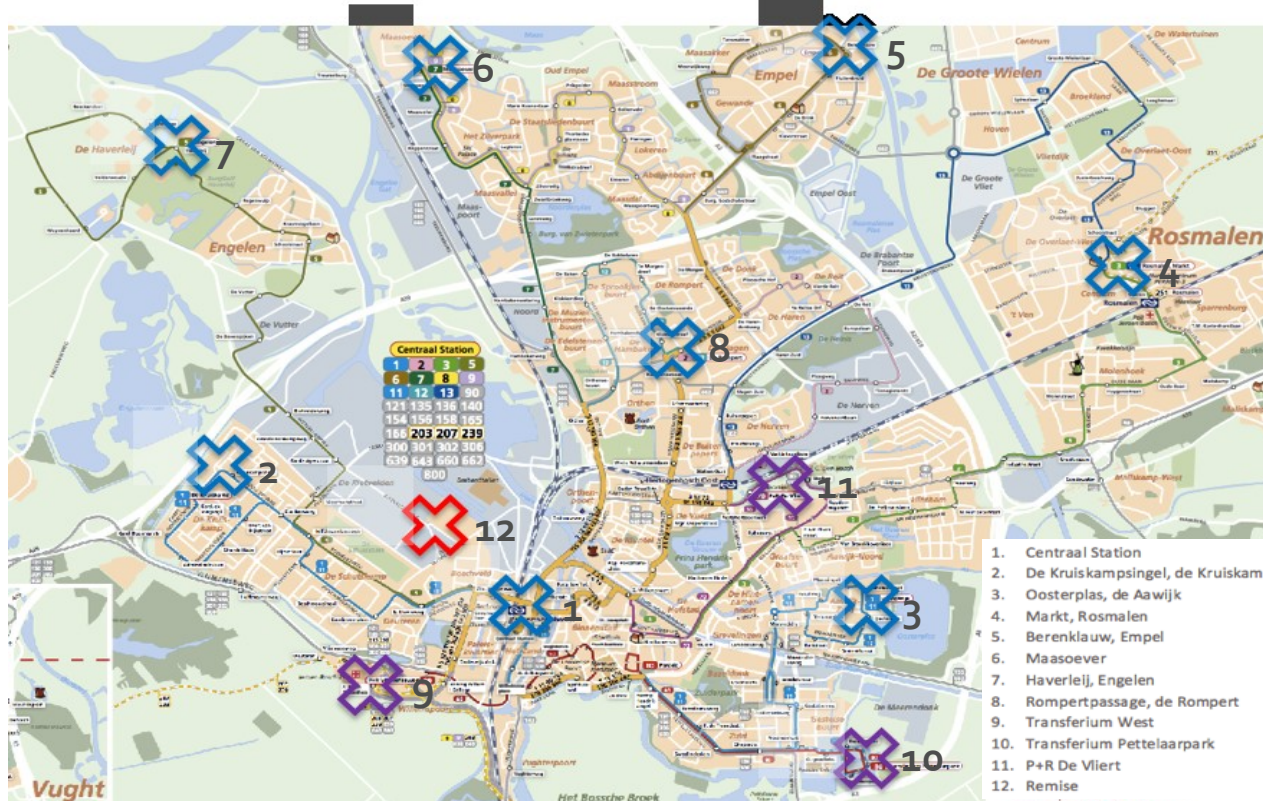
3. The triple layer model

Results

Insight in:
- Charging configuration
- Potential locations
- Grid impact
- Costs
- Feasibility

1. Centraal Station
2. De Kruiskampsingel, de Kruiskamp
3. Oosterplas, de Aawijk
4. Markt, Rosmalen
5. Berenklauw, Empel
6. Maasoever
7. Haverleij, Engelen
8. Rompertpassage, de Rompert
9. Transferium West
10. Transferium Pettelaarpark
11. P+R De Vliert
12. Remise

4. Lessons learned

4. Lessons learned

- Gain knowledge upfront about e-buses and charging infrastructure

- Start discussions at an early phase: cooperation between stakeholders is essential

- Develop a strategy including all three layers and their interests

Questions?

Contact

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