

# Towards Zero Emission Public Bus Transport



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# Rapporteur CoR

Rapporteur on behalf of the CoR, advice to the EP

1. Missing transport links in border regions (Febr 2017)
2. Delivering on Low emission mobility concerns 5 proposals (plenary session 5 july 2018)
  - i. Delivering on low emission
  - ii. Combined goods between member states
  - iii. Common rules acces international bus and coach services
  - iv. Clean and energy-efficient road transport vehicles
  - v. Action Plan on Alternative Fuels Infrastructure
3. Streamlining measures for advancing realization TEN-T network (new)

# Headlines advice low emission

- Europa as the world leader in innovation, digitisation and decarbonization. The transition to a low-carbon economy is both an opportunity and a challenge for EU industry
- Not only automobility but also cycling, railway and green shipping
- An interoperable solution for the provision of alternative fuels is needed. Technologically neutral, but each city and region should thrive to attain economies of scale
- Plans for zero emission mobility should go beyond end of tail solutions, but be aligned to a roll out of green electricity production and distribution.
- Refueling should be easy to use and interoperable across borders. This requires European Action in order to create a single market

# Province of Gelderland



Industriepark  
Kleefse  
Waard



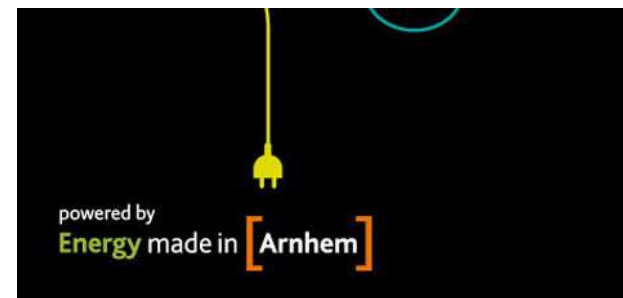
NXP Semiconductors



Sustainable  
Electrical  
Energy  
Centre of  
Expertise



# Province of Gelderland = Sustainable



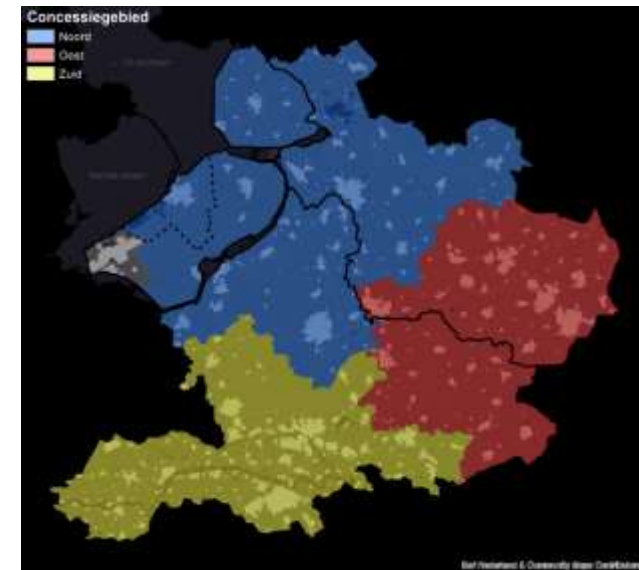


# Public Transport in Province Gelderland

## Administrative Agreement ZE Regional Public Transport by Bus

2025	all new buses ZE
2030	100% renewable energy
2030	all buses ZE

Planning	
2020	Start concession North
2023	Start concession South
2025	Start concession East



# The Dutch Approach

## 1. Set conditions and create market forces

Dilemma: Do we chose to set conditions for a technique or an outcome?

## 2. Well-to-wheel approach

Dilemma: Is this the right approach or is it better to work Tank-to-Wheel?

## 3. Involve parties outside the mobility sector and reach several other goals

Dilemma: How do we finance the extra costs of zero emission public transport?



# Different techniques



**Greengas**



**Trolley 2.0**



**Opportunity charging**



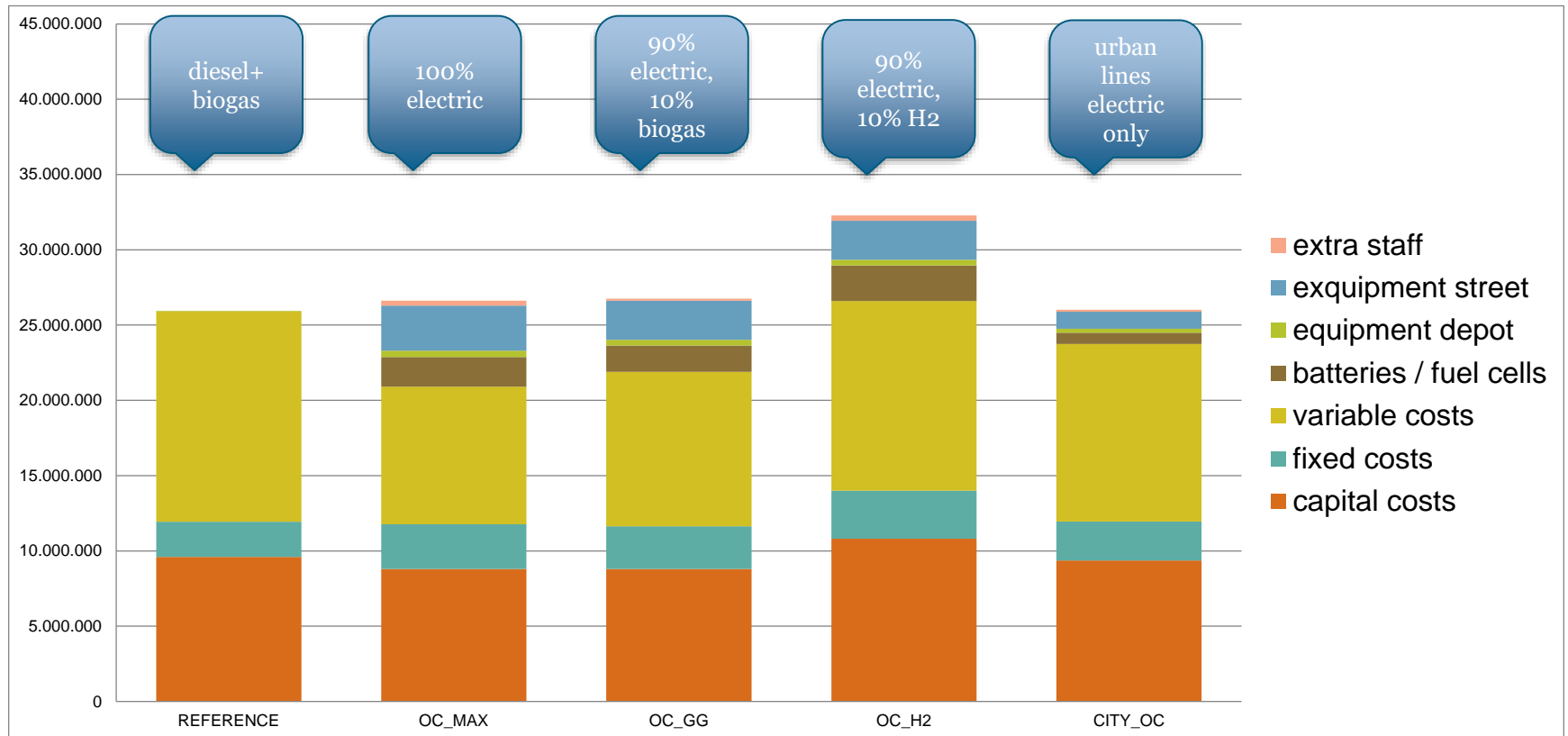
**H2**

# Total Cost of Ownership: cost simulation

- Current bus fleet in upcoming procurement North:
  - 360 buses (117 urban, 183 peri/interurban, 60 mini/schoolbuses)
  - 49 biogas, others diesel
- Replacement scenario's with cost simulation model
- Conclusion:
  - Favoured approach is Opportunity Charging
  - electrification of urban and peri/interurban lines by developing a network of ultrafast chargers on the road (placed mostly at bus and train stations) for battery buses
  - 10% interurban lines is more difficult, options are biogas, hydrogen and bigger battery buses

# Cost simulations of ZE fleet

significant.



Network of OC ultrafast chargers at busstations and other strategic locations 20-25 km apart, supported by overnight depot charging, limits non-productive charging time of buses and reduces the reserve bus fleet to 5-7%. Buses are depreciated over 20 years, charging infra over 20 years. Mini/schoolbuses excluded. *Note: work in progress*

# Conclusions: optimization reduces costs

- Model results show that cost-neutral electrification of a mixed urban and peri/interurban bus fleet is feasible
  - Fast interurban lines are most difficult but manageable using 25% more buses with larger battery packs and longer stops for charging
  - This is cheaper than hydrogen buses (higher capital and variable costs)
- Depreciation period is crucial
  - 20 year depreciation of electric buses and charging infra means operation at costs comparable to diesel buses.

# More information?

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# More Information

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**For info or further questions on this seminar and the activities of the JASPERS Networking Platform, please contact the JASPERS Networking and Competence Centre at the following email:**

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