Training Session Clean Vehicles:

- Electric vehicles for cleaner cities -

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SOLUTIONS Training Event

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www.urban-mobility-solutions.eu

Outline

- Background on electric vehicles – What are we talking about
  - Global developments
  - Advantages of EVs
  - Vehicle and charging technologies

- Becoming an EV-city
  - Steps in developing a tailor made strategy

- Example: Barcelona's EV-strategy

- The Urban Electric Mobility Initiative (UEMI) – Mr. Andre Dzikus, Coordinator of the Urban Basic Service Branch, UN-Habitat

Introductory round

- Introduce yourself and your experience with clean vehicles

(c) VeloTal

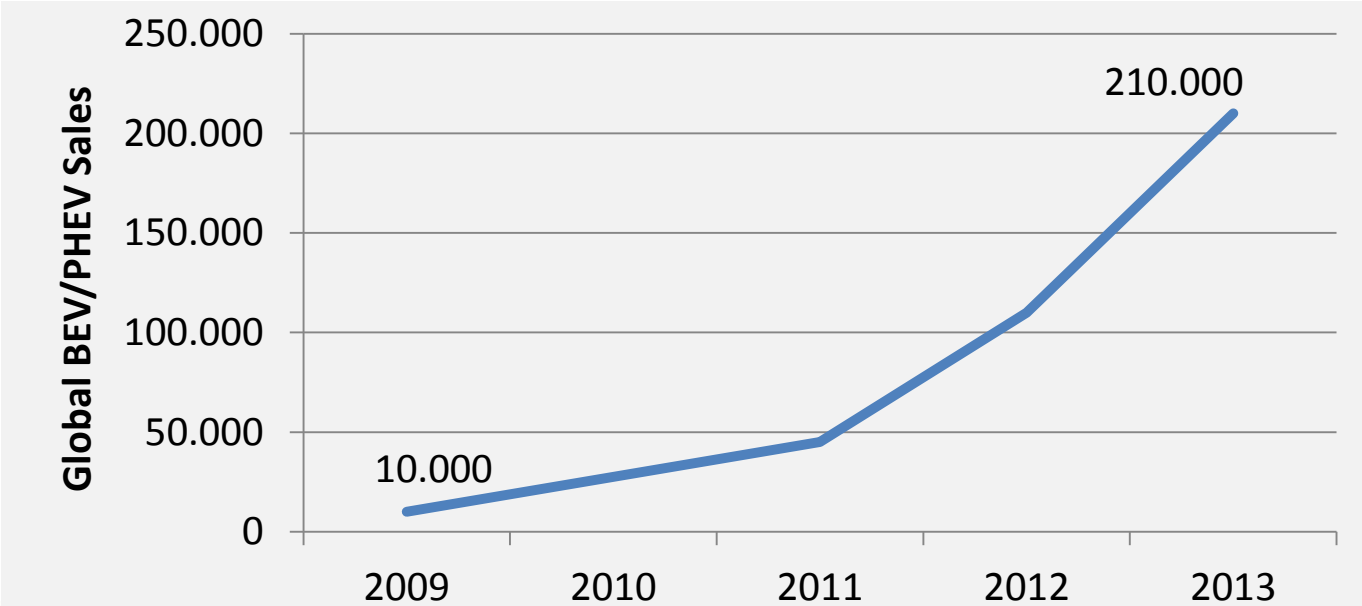
(c) nuujz

(c) Andreas Praefcke

(c) Andreas Fischer

Global development of EVs

- Strong rise in global sales of electric passenger cars since 2011
- National activities
  - Many countries implemented incentives for EVs
  - NEMMP - India
  - 10 cities – 1000 vehicles demonstration project - China

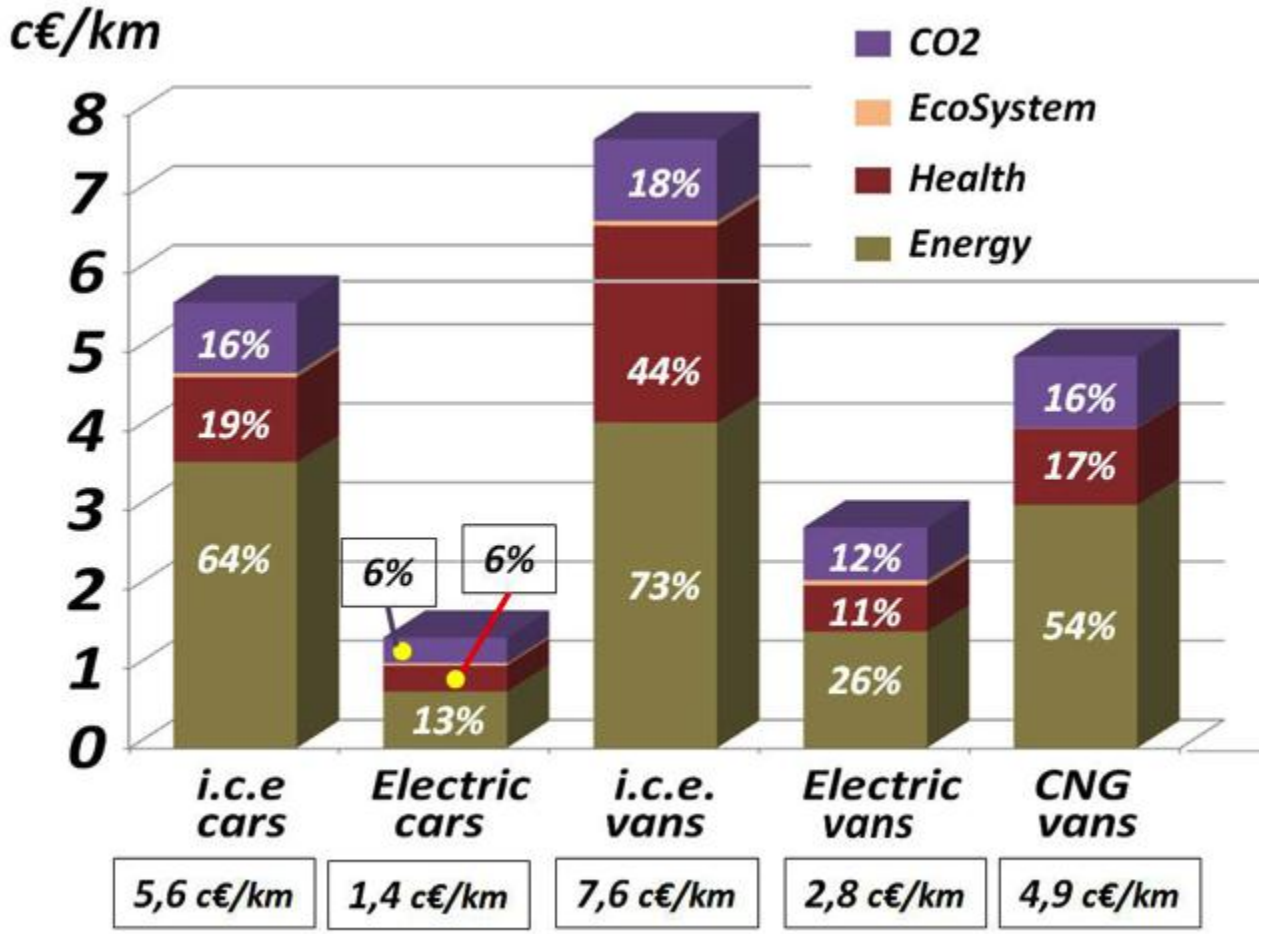


Why electric?

- Most promising option to reduce externalities from motorized transport in urban environments
- Key benefits from driving electric:
  - Zero exhaust emissions
  - Reduced noise pollution at low speeds
  - Independence from fossil fuels / integration of renewable energy
  - Reduction in GHG emissions
  - Proper integration can lead to additional benefits (e.g. reduced congestion)
- Highly relevant for urban transport

Why electric? – cost comparison

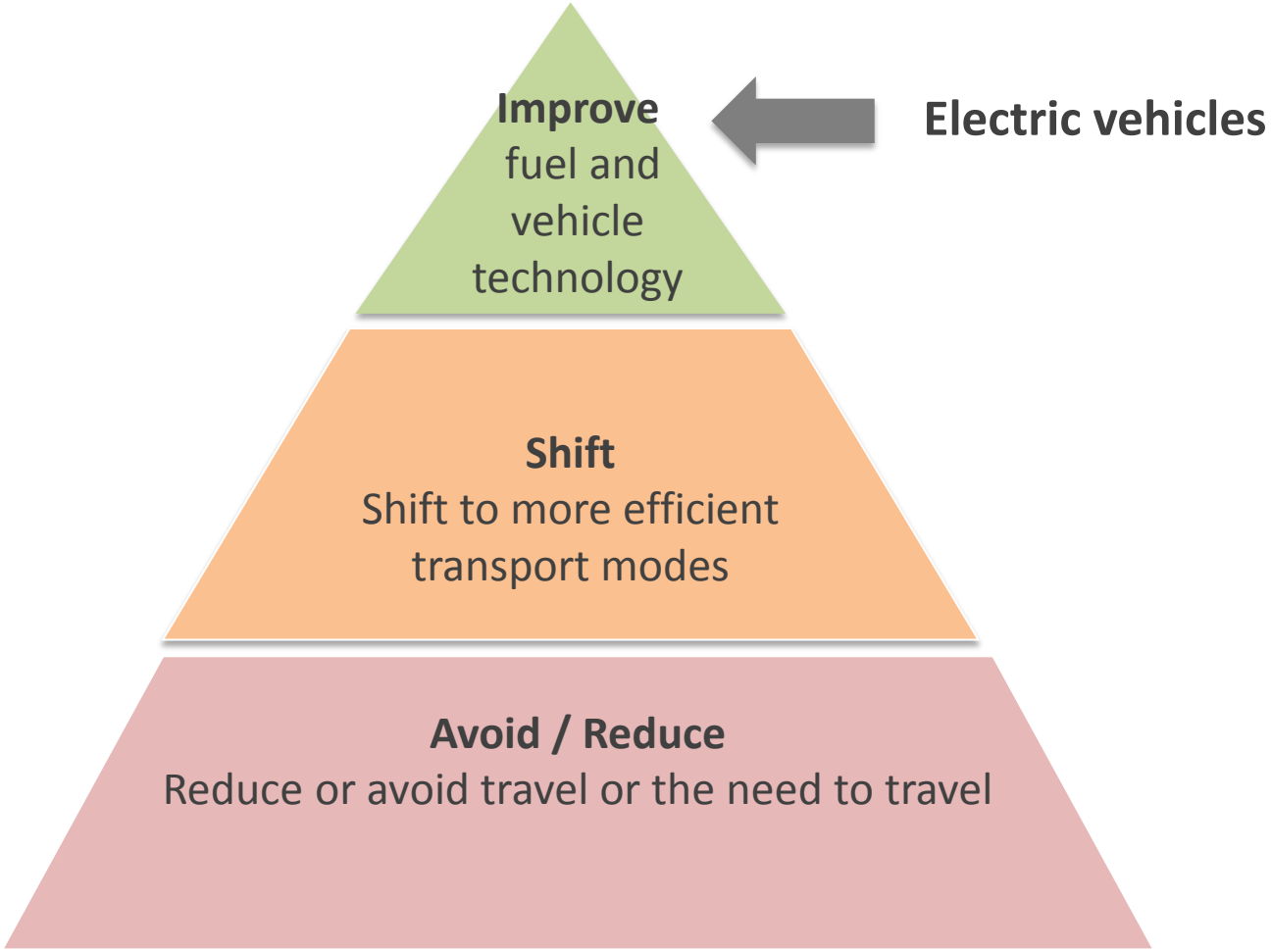
- Comparison of the external costs of different fuels for Italy



Source: Menga, Buccianti, Bedogni and Moroni (2013)

Where does it fit?

Electric vehicles as part of a sustainable urban mobility concept



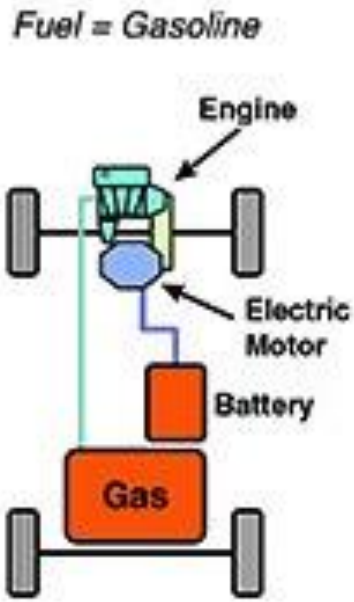
Vehicle Technologies

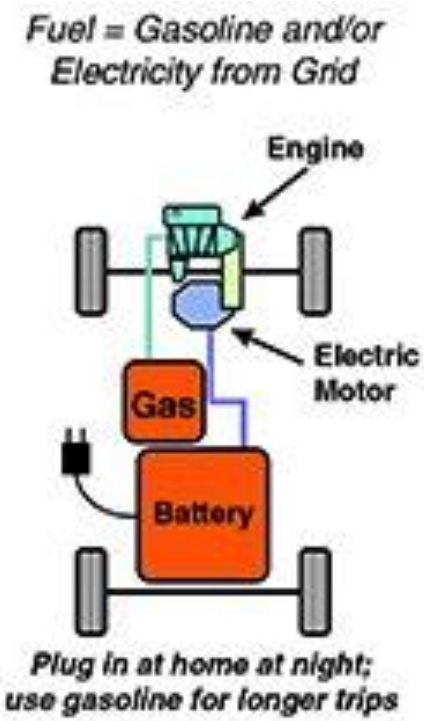
HEV – Hybrid Electric Vehicle

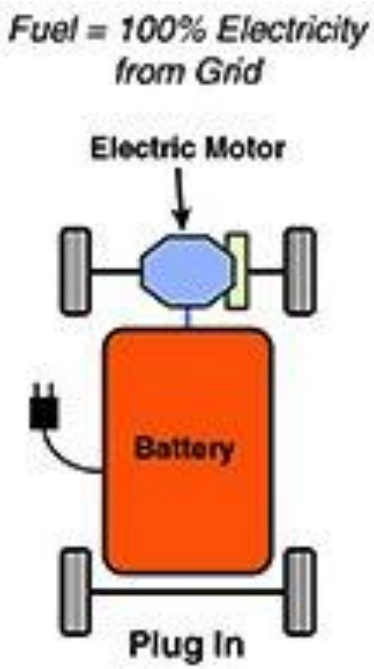
PHEV – Plug-in HEV

BEV – Battery Electric Vehicle

Connected Electric Vehicle







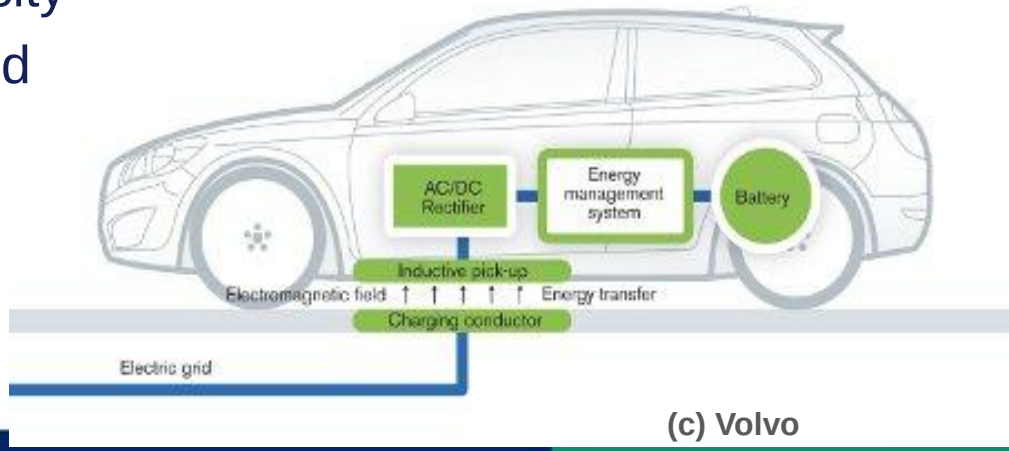
Charging technologies

- **Conductive charging**
- **Inductive charging**
- **Battery swap**

(c) Eberwein

Business models:

- Municipal charging stations
- Selling parking instead of electricity
- Private companies build, own and run the stations
- Vehicle manufacture network



(c) Volvo

Technological challenges

Energy density → range limitations

- Vehicle efficiency improvements (short term)
- Post-Lithium-Ion batteries (medium term)
- Charging technology and infrastructure (short term)

Costs of the battery

- Production improvements
- Adapted battery size
- High annual millage (favourable TCO)

Electric Mobility – mix and match

Fields of application in urban transport:

- Passenger transport
- Goods / freight transport

- Public transport
- Municipal fleets
- Private transport
- Commercial fleets

Vehicles:

- Electric Buses
- Electric passenger cars
- Electric Vans
- Electric two-wheelers

Technologies:

- HEV – Hybrid Electric Vehicle
- PHEV – Plug-in HEV
- BEV – Battery Electric Vehicle
- Connected Electric Vehicle

Examples for EV use

Electric 3-wheelers in Manila

ADB 2011

Electric car-sharing in Paris

Mario Roberto Durán Ortiz

Electric taxis in Barcelona

Hüging

Examples for EV use

Electric bikes in Stuttgart

EnBW

Electric vehicle in municipal fleets in Rotterdam (electric garbage truck)

Electric buses in Shenzhen

World EV Cities

Becoming an EV city

- Cities are seen as catalysts to increase the use of electric vehicles!

- Key steps towards an EV city:

  1. Assess the potential for EVs in your city
  2. Involve relevant stakeholders
  3. Select measures to foster EV-deployment
  4. Formulate an EV-strategy

Becoming an EV city

1. **Assessing the potential for EVs**

- Wider urban transport targets
- Integration with other transport measures
- Characteristics of available EVs
- Charging infrastructure
- Regulative framework
- Maximising benefits
- National support

→ Potential for EV deployment depends on the local context

Potentials for EVs in your city

	Vehicle	Technology	Comments
Public transport	Bus Bus Minibus	HEV BEV (test) BEV	For high capacity buses HEV-buses could replace old diesel buses. ….
Private transport	Two-wheelers Cars	BEV HEV	Due to local context conditions bigger potential is seen for fully electric two-wheelers
Commercial fleets	…	…	…
Municipal fleet			
…. City logistics			

Becoming an EV city

2. Involve relevant stakeholders

- Public transport operators
- Taxi operators
- Commercial fleet owners
- Vehicle manufacturers
- Electricity supplier
- Research institutions / consultancies
- National / regional governments
- Associations
- Public participation
- …

Stakeholder	Role / potential actions	Motivation
Municipality	– Regulative framework for EVs – Providing subsidies – Incentives for EVs, disincentive for conventional vehicles – Participation in demonstration projects – Operation of electric vehicles in the municipal fleet	– Reduction of local air pollution and noise – Contribution to local greenhouse gas emission targets – Improved city image, international recognition – Raising awareness about EVs among citizens
Taxi operator / Public transport operators / private companies	– Operation of electrified vehicles – Driver trainings – Participation in demonstration projects and fleet tests	– Improved image – Unique selling point – Cost savings (charges, taxes etc.) – Increased user comfort – Potential operational advantages (e.g. night time delivery allowance, access to restricted zone)
Vehicle manufacture	– Providing test vehicles – Participate in fleet tests – Offer maintenance and repair	– Raising awareness among potential costumers – Fleet tests, vehicle optimisatio
Electricity supplier	– Providing charging infrastructure – Providing dedicated EV-tariffs	– Charging stations as new business model – Advertisement
Research institutions/ Consultancies	– Research and development of EVs and technological advancement – Feasibility studies – User studies – System optimisation (e.g. optimal location for infrastructure)	– Research interest – Research funding
National/ regional governments	– Providing grants/subsidies – Regulative framework – Tax incentives – Norms and standards – Funding for research and demonstration	– Reduced detriments from local air pollution (e.g. heath care costs, building costs) – Increase the competitiveness o the domestic automobile industry – Greenhouse gas mitigation an environmental commitments – Reduced oil dependency

Potential stakeholders in your case

- Regarding the identified fields for EV-deployment in your city: Who are the key stakeholders that need to be involved?

Becoming an EV city

3. Select measures to foster EV-deployment

Potential measures for municipalities:

- Incentives for EV use (e.g. free parking)
- Disincentives for pollution vehicles (low emission zones, taxation)
- Providing subsidies or loans
- Development of charging infrastructure
- Awareness raising and information
- EVs in municipal fleets
- EVs in public transport…

Measure	Description	Comment (specific to your local
Integration of EVs in the municipal fleet	Electric vehicles are integrated into municipal fleets and/or fleets of municipal entities (e.g. for garbage collection) e.g. via a purchasing quota. Clear labelling as EVs increases awareness.	
Reduced / free parking for EVs	To implement this measures regulations might have to be adapted accordingly and a clear labelling of EVs is required.	
Exemption from city tolls	To implement this measures regulations might have to be adapted accordingly and a clear labelling of EVs is required.	
Access to HOV lanes	To implement this measures regulations might have to be adapted accordingly and a clear labelling of EVs is required.	
Reduced registration tax	For instance, vehicle taxation can be based on emissions. It intends to create disincentives for the acquisition and use of heavy polluting vehicles And can support the penetration of less polluting vehicles (EVs)	
Providing subsidies or loans for (private / commercial) EVs	To address the barrier of higher purchasing cost, some cities or regions provide subsidies or low-cost loans for electric vehicles. Subsidies can be bound to the use of clean electricity etc.	
Low emission zones	Low emission zones are designed to improve the local air quality by restricting the access of specific areas to vehicles meeting a prescribed emission	

[1] A – high priority for implementation ; B – medium, C – low, X – not relevant/not feasible, ✓- implemented

Example: EVs in municipal fleets

Potential instruments:

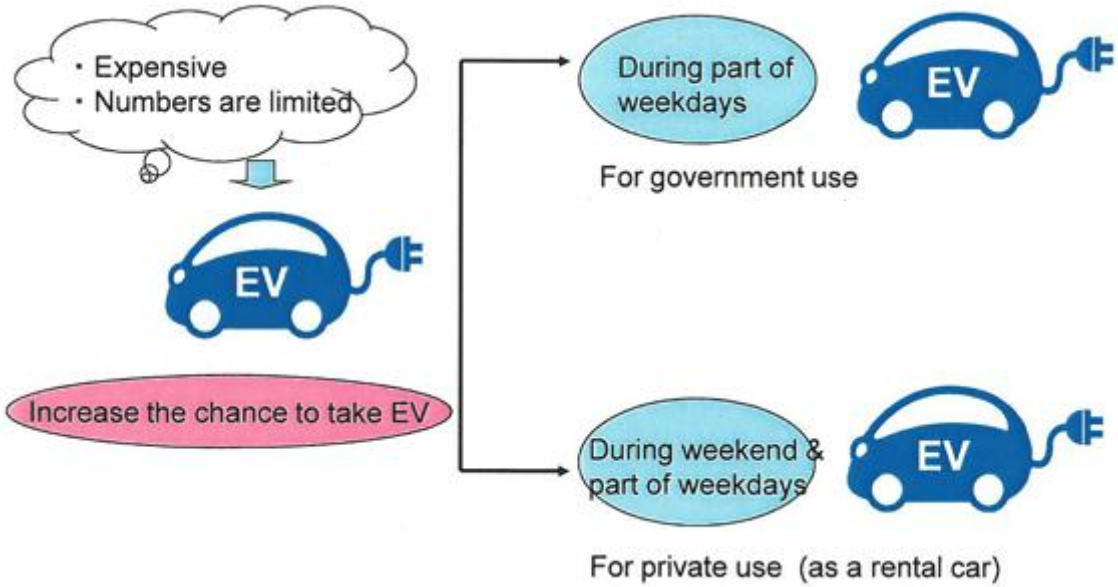
- Public procurement quota for EVs
- Sharing concepts for public EVs (employees, institutions, public)

Requirements

- Management structure for municipal fleet
- Infrastructure availability

Effects:

- Increased awareness
- Municipality acts as a role model
- Demonstrates the feasibility of EVs



Example: Trolley / E-Buses for PT

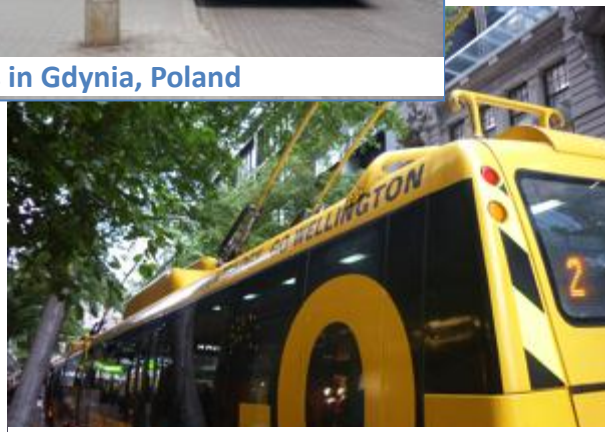
Options:

- HEV/PHEV buses
- Battery electric buses
- Trolley buses
- Combined system (Trolley-hybrid bus)

Example: Eberswalde, Germany

- Run on Li-Ion battery or overhead electricity supply
- Increases flexibility
- 25% more efficiency than traditional trolley bus system

Trolley bus in Gdynia, Poland



Wellington New Zealand

Eberswalde, Germany

Example: local incentives for EV use

Potential instruments:

- Free parking
- Exemption from city tolls
- Use of HOV or bus lanes

Effects:

- Increased attractiveness of EVs for public and private EV users (e.g. commuters, logistic companies)
- Mainly effective for four-wheelers

Requirements

- Existing system in place and enforced
- Clear labelling of EVs (BEV/PHEV)

To consider:

- Induced traffic (e.g. shift from PT)
- Reduced effectiveness of HOV/bus lanes
- Reduced revenues

Potential measures in your case

- What are potential measures that could foster the uptake of EVs in the selected fields in your case?

Becoming an EV city

4. Formulate an EV-strategy

A municipal EV-strategy

- Sets realistic and ambitious targets
- Demonstrates political will
- Increases awareness
- Motivates stakeholders
- Is helpful to raise funding

- Translate the strategy into an action plan
- Integration with existing mobility plans
- Constant monitoring and evaluation recommended

Example EV-city Barcelona

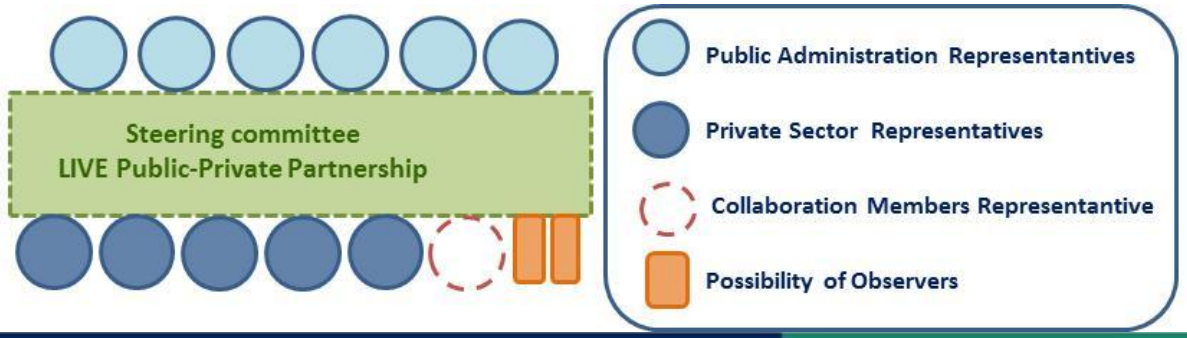
http://www.livebarcelona.cat/

Barcelona's integrated strategy

- Second largest city in Spain (1.6 million inhabitants)

- 2009: Creation of the LIVE platform (Logistics for the Implementation of Electric Vehicles)
- Public private collaboration to
  - coordinate EV-activities
  - disseminate information
  - raise awareness
  - create public private partnerships
- Steering committee and five working groups

http://livebarcelona.cat/



Barcelona's integrated strategy

Incentives and municipal activities:

- Tax deduction for EVs
- Free parking
- Access to HOV-lanes
- Reserved space for EVs in public car parks
- Introduction of EV-targets in public tenders
- Development of public charging infrastructure
- Publication of an EV-user guide
- Cooperation with manufactures to establish BEV-taxis

Barcelona's integrated strategy

Results:

- 300 electric vehicles in the municipal fleet
- 55 hybrid buses and one fully electric bus are operated in the city
- 249 charging points are available
- Operation of electric taxis (HEV, BEV)
- Electric bike sharing system
- Electric scooter sharing system
- Private EV-use (esp. two-wheelers)
- 900 EVs on Barcelona's streets

Transferability of Barcelona’s approach

- Do you think some aspects of Barcelona's EV-strategy are transferable to your city? Which ones?

Conclusion

- Electric vehicles can make cities cleaner and more liveable
- Technologies / vehicles have to fit to local context conditions
- Municipalities play a crucial role to increase the deployment of electric vehicles
- Different measures to support EV-deployment have been successfully implemented in cities around the globe
- Best a joint strategy with public and private stakeholders is developed

→ What can electric vehicles do for your city?

Thank you!

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