e-MOTICON

e-MObility Transnational strategy for an Interoperable COmmunity and Networking in the Alpine Space.

Training «Localization of E-CS»

European Regional Development Fund

Structure of Training

1. Power & speed of E-CS and localization
2. User behaviour
3. Touristic hotspots – Addressing localization in touristic hotspots
4. Measuring the traffic flows and demand
5. Parking policy management
6. Tourism traffic special offer
7. Potential of home E-CS installation vs. Planning public set-ups
8. Bad and good practice examples
9. Capacity of grids

Introduction

- Positioning in urban and rural areas of E-CS infrastructure as main aspect of e-mobility diffusion
- Service providers: Localization highly important – E-CS can even function as **marketing tool**

Goal: support public authorities to plan localization of E-CS considering different aspects of positioning charging infrastructure in environment and help promoting e-mobility for area

1. Power & Speed of E-CS and Localization

- **Integration of local politics** is crucial as it directly links public administration and population
- Local politicians should be encouraged to test e-Vehicles and take on role as opinion leader
- Balancing act: how strong politics should be involved in implementation of project?

Stakeholders

Stakeholder	Task
E-CS Operator	Installing economic E-CS
Population	Demands infrastructure at important points of interests
Car Dealer	Promote installation of E-CS, as well-developed infrastructure promotes sales

Localization & Power of E-CS

- Rising range of vehicles and increasing charging power to 350kW
  → further expansion of public charging infrastructure is clearly set towards high-performance CCS fast charging points
- **But**, high-performance charging infrastructure only required at mobility nodes, as for instance highways, where people need to charge their vehicles fast – at hotels and Park & Ride low-performance charging points are sufficient
- Generally high costs for infrastructure, as respective transformer stations have to be partially rebuilt for required power output

2. User Behaviour

Target User:	**inhabitants of municipality/region and visitors**
Planned charging locations:	Popular points of interest & nearby work
Future goal:	Distribute E-CS more widely and easier to be found
Future development:	Shift from charging cars at home (now) to enabling people to charge cars away from home (future) → potential to cooperate with retail and local companies for semi-public charging stations to keep scarce public spaces free
Key point:	good usability (also depending on location)
Technological Development	Increasing Ranges of EV → user will no longer have to load regularly during day trips but sufficient, to charge overnight

Questions to consider in localization

Can the user find the E-CS easily?

- How is it included in mapping, traffic management system

Is the location convenient?

- places where the user would park the car anyway, necessary detours

How is the “micro”-environment?

- easily accessible from the street, enough space to park

Does the user feel safe?

- No dark and/or dangerous places

(c) ETREL

→ PAs need to have maps and databases informing about range of different E-CS locations and their characteristics

Potential Issues

- **Problem**:

Users might not want to/be able to move car after it is fully charged

  - Person uses public transport to go to city center and leaves car charging at P+R
    → will not move the car when charging is finished
  - Charging car during work
    → very unlikely to move car to non charging parking space during work when it finished charging

- **Solution**:

Make charging more expensive after certain time has passed

BUT not favoured by most customers

Expectations of Future users

01

Adequate charging infrastructure at points of interest or hot spots

02

Free access to E-CS and not increased fees

03

Legal requirements for the construction of charging infrastructure for residential complexes

3. Touristic hotspots – Addressing localization in touristic hotspots

- Factors to consider when planning localisation in tourist hotspots (and many other places)
  - type of E-CS - typology (fast vs. slow)
  - frequency/needs for charging on micro location
  - EV traffic
  - intentions for stopping on a certain micro location
    - whether it is a quick stop: highway, diners, bars
    - long stop: big shopping malls, tourism attractions, lodging, restaurants
- Strategic Planning of Location
  - Facilitate ease of use
  - Ensure cost-effective installation for destination operator
- Localisation in touristic places has to be cooperated with tourism and energy sector to better identify needs and potential

Common Destinations served by EV tourism initiatives

Entertainment & tourist attractions	shopping malls, leisure centres, wineries & museums
Natural sites	mountains, coasts, beaches, gorges & rivers
Leisure	hotels & restaurants
Business tourism	convention centres, central business districts & research parks
Transportation	airports & highways

Influence of parking management in touristic hotspots

01

Potential to **reduce congestion** and lead to **prolongation of stay** in area

02

Offering free chargers **attracts new customer groups** that generate **new revenues** for touristic location

How should spatial planning be addressed?

- **Integration** of development of public charging infrastructure and related activities (e.g. electric bicycle sharing schemes) **into local planning documents** such as urban development concept, traffic development plan, public transport plan
- Recommended**: setting up master plan for electric mobility** & give opportunity to involve relevant local stakeholders
- **Macro Scale**: Locations should be decided in proximity of specific points of interest
- **Micro Scale**: take specific surroundings into consideration
  - Technical requisites must be fulfilled
  - Parking space(s) must be available
  - Implementation of EV charging stations should not conflict existing land use regulations
  - Connection to electricity distribution grid has to be feasible
  - Assurance of basic fire safety
- Locations **depend on users‘ demand** for EV charging
  - Use of sociographic data, employment data, building data, proximity to public transport connections, origin-destination traffic data and parking data
- Demand for charging has to take other factors into account
  - Connection costs, impact of electricity distribution grid and cost or economic of building and/or operating the infrastructure

Cooperation of PAs with electrivity providers

Goal: ensure sufficient grid power in the touristic hot spots

Cooperation to allow cost effective and impact minimizing **connection** of charging facilities to **distribution network**

Consultation with distribution network operator when **planning the locations** of public charging facilities

Localization of E-CS as development towards green tourism

- Plan development of green tourism to protect destinations from traffic, air and noise pollution
  - Option to restrict access for fossil-fueled vehicles
  - Providing e-Vehicle infrastructure
- Example: Zermatt, Switzerland: can only be visited by electric bus or e-taxi

4. Measuring the traffic flows and demand

Why measure traffic flows and demand?

- Data works as basic input for traffic modelling, so investments in infrastructures, like E-CS can be planned correctly

How should it be done and with who?

- Usually carried out by transport planning professionals
  → recommendation: cooperate with research centers or specialized companies
- Transport planning professionals cooperate with road-owning agency, highway patrol, statistical services and other transport data provider

Specifics of Traffic Flow and Demand Measurement

- Traffic Flow Monitoring by specific sensors stored locally or sent in real-time to hub trough data network

Different **traffic sensor technologies vary** according to:

- environment condition
- level of accuracy needed
- maintenance issues
- investment
- operation expenditures:

Different technologies:

- inductive loops
- Radar
- passive infra red
- image motion detection
- pneumatic tubes
- Floating Car Data (FCD): provided by telecommunication provider based on loation data of smarthphone in vehicle

Recommended: best to **combine data from FCD and fixed sensors**

- Direct estimation: very reliable but rather expensive
- Indirect estimation: cheaper but limited reliability

How to use traffic data for planning localization of E-CS

- Calculate **total energy needs per day for study area**
  = Total amount of vehicles * km/day estimated by traffic models and EV fleet data
- **Origin/Destination data**
  = used to identify zones of high attraction/generation of trips to estimate number of E-CS needed and their typology (fast/slow) according to motivation of trip
- **Mean trip length** and its **frequency distribution** can be useful to estimate medium distance between E-CS on a network
- **Global analysis of trip patterns** can give insights if a particular location is affected from **long-distance or short-distance traffic**, which can be useful to determine the appropriate type of E-CS to be installed

5. Parking Policy Management

- Charging e-Vehicles at home is practical and easy to plan
  → important support measure: integration of e-Mobility in (residential) building projects
- Free parking of electric vehicles in city will be an incentive for the use of electric vehicles
- E.g. City Senate of Klagenfurt (2014): in 10% of all parking lots provided, structural provisions need to be made to install 230V/400V power connections for use as an e-charging station for motor vehicles
  - Structural provision needs to be made in a manner that the actual installation of charging stations, does not constitute a significant change or extension of an electric equipment of installation
  - To avoid conventionally fuelled vehicles using parking space dedicated for e-vehicles for charging, full-surface ground markings should be provided

6. Tourism traffic special offer

Tourism traffic special offer = special offer designed to attract tourists of certain profile to destination – in this case EV travellers

- Market of travellers owning or renting EV is increasing, typically they have above-average household income
- Increasing popularity of hybrid and electric vehicles as opportunity

Tourism businesses should have special offers and packages for EV travellers after charging infrastructure and general understanding of EV is fulfilled

Example tourism traffic special offers

- EV rental programmes
- Charging station network programmes (suggested itineraries, roadside assistance, free or discounted charging at partnering locations)
- Discounts for EV tourists at tourists attractions
- EV trial special offer package (hotel and rent e-car from rental company)
- EV Visitor‘s guide

Benefits of offering EV tourist services

By enabling charging for visitor use, the tourism industry is able to engage with growing market while building consumer and brand awareness

Benefits for tourist sector

- Gaining customers
- Increased traffic
- Green image
- Brand awareness
- Competitive advantage of the destination/lodging
- Extra credits (e.g. Trip Advisor‘s Green Leaders Programm)
- Reduction of Gasoline use within/on site or attraction
- Improving public image

Benefits for service providers

- Increased traffic
- Promotion of business

Benefits of EV tourism

1. **Economic**

- Increased tourism spending due to lower fuel costs

2.**Social**

- Connecting communities
- Learning about new technology and decreased dependency on fossil fuel

3. **Environmental**

- Zero tailpipe emissions
- Opportunity to use renewable energy sources like solar power
- Decreased noise pollution
- Developing electric mobility locally can involve development of innovative mobility concepts (e.g. EV and electric bicycle sharing systems & intermodal travel schemes)

4. **Generally**

- Contribute to overall awareness rising by influencing and educating the citizenry
- Raise awareness of locals and positive image gain for city due to charging infrastructure and large-scale use of EVs

Contribution to Solving Seasonality Problem

- With special offers, it is possible to manage seasonal peaks and lows

→Offers need to be planned and their direct and indirect effects must be considered

→Can be oriented towards attracting tourists or towards dispersing them and can help with relieving most packed hotspots or daily peaks

7. Potential of home E-CS installation vs. Planning public set-ups

Private Households/Single-family houses

- Mostly in rural areas
- Easy installation of E-CS

Multi-family houses/Apartment buildings

- Mostly in Urban areas
- Difficult to set up E-CS in house with different owners or rental flats

Influence of potential of home E-CS installation on the localization of the E-CS set-up?

Charging EVs at **home as easiest** and most **cost-efficient** way to charge vehicles reducing the demand for public and semi-public charging infrastructure

Rural areas

Easy to set up charging at home in single-family house

Urban areas

Potential of private E-CS depends on legal framework and availability of space

Evaluation of Potential for possible investments in e-CS infrastructure

Privately owned-single houses

Easy estimation of potential of E-CS: analysing share of inhabitants living in privately-owned single houses

Rental houses and buildings with multiple-owners

PA should define realistic estimation of how many people will be able to install E-CS in their homes when they need permission of all owners and landlords

PA support of set-up of home E-CS installations

- Having more private E-CS reduces demand for public E-CS and therefore installation costs & public space
- PAs can support set up of private E-CS
  - Providing information about costs, types of E-CS, energy tariffs and installation companies
  - Providing special offers (in cooperation with energy utilities)
    - Special tariffs for EVs (night-rates)
    - Subsidies for private E-CS

- PA could provide finanicial inventives to foster electromobility, but if there is choice where funding will go is possible,
  investing in public infrastructure would be more efficient

Influence of private E-CS on households, costs and grid load

- Private E-Cs and charging at home can be beneficial for stability of energy grids as most grids function better when load is rather evenly distributed (temporarily and geographically)
- BUT: Most of household energy demand is concentrated on early morning and evenings
  → charging cars during daytime and at night would be a good opportunity to smoothen the energy demand curves.
- Charging processes can be used to build a buffer for the energy grid providing energy when needed in the grid
  → flexibility could be a way to reduce energy costs for charging even more and make charging at home even more attractive
- In Future, with more people using charger at home, it might not be possible to charge vehicle at any time → need to adjust user behaviour

8. Bad and good practice examples

Behaviour of user

- Pilot project by Next Kraftwerke Jedlix and TenneT is testing possibilities of smart charging approach from beginning of 2019 for two years
- Ability to remotely tap into smart changing network and influence charging up and down as required by the grid
- Customers will have new functionality added to apps allowing drivers to opt-in to program and specify how much flexibility they want to offer
- Will provide customers willing to participate financial incentive
- Success relies on customer behaviour and willingness to participate and not always being in full control of charging process.

Tourist hot spots

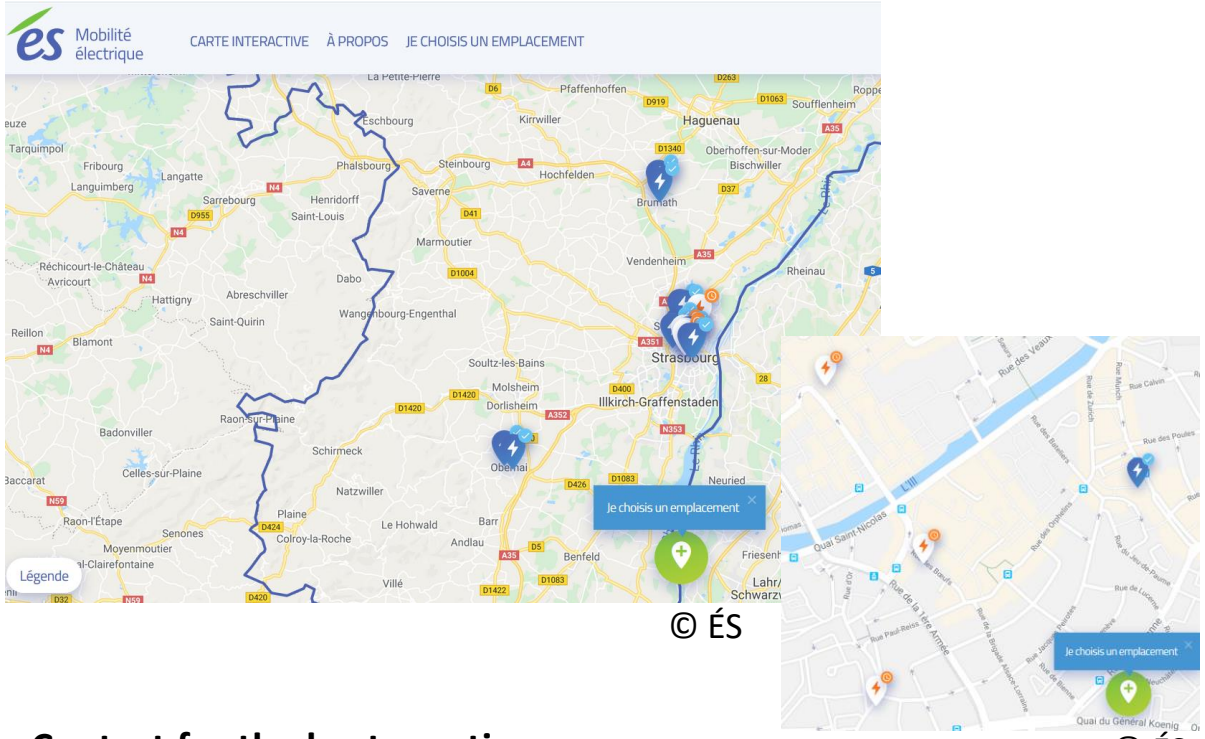
- To keep scarce public space free and use up funding
  → place majority of E-CS used by tourists at hotels, which might profit by attracting more guests
- Address questions in public event to which all stakeholders are invited to learn and participate
- e.g. Bayern Innovative has organised such an event where topics concerning municipalities and tourism sector were addressed

Consulting users for new E-CS locations

ES Energies, the local energy provider in Strasbourg and Bas-Rhin, has launched an internet site and app to allow users ask for a publicly-accessible E-CS in a specific location.

Users can then indicate directly on the map where they'd like to have an E-CS.

If a given location gets enough votes, a real investment will then be considered.



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Contact for the best practice:

https://mobilite-electrique.es.fr/

#localization #userparticipation

Demand-based public charging deployment

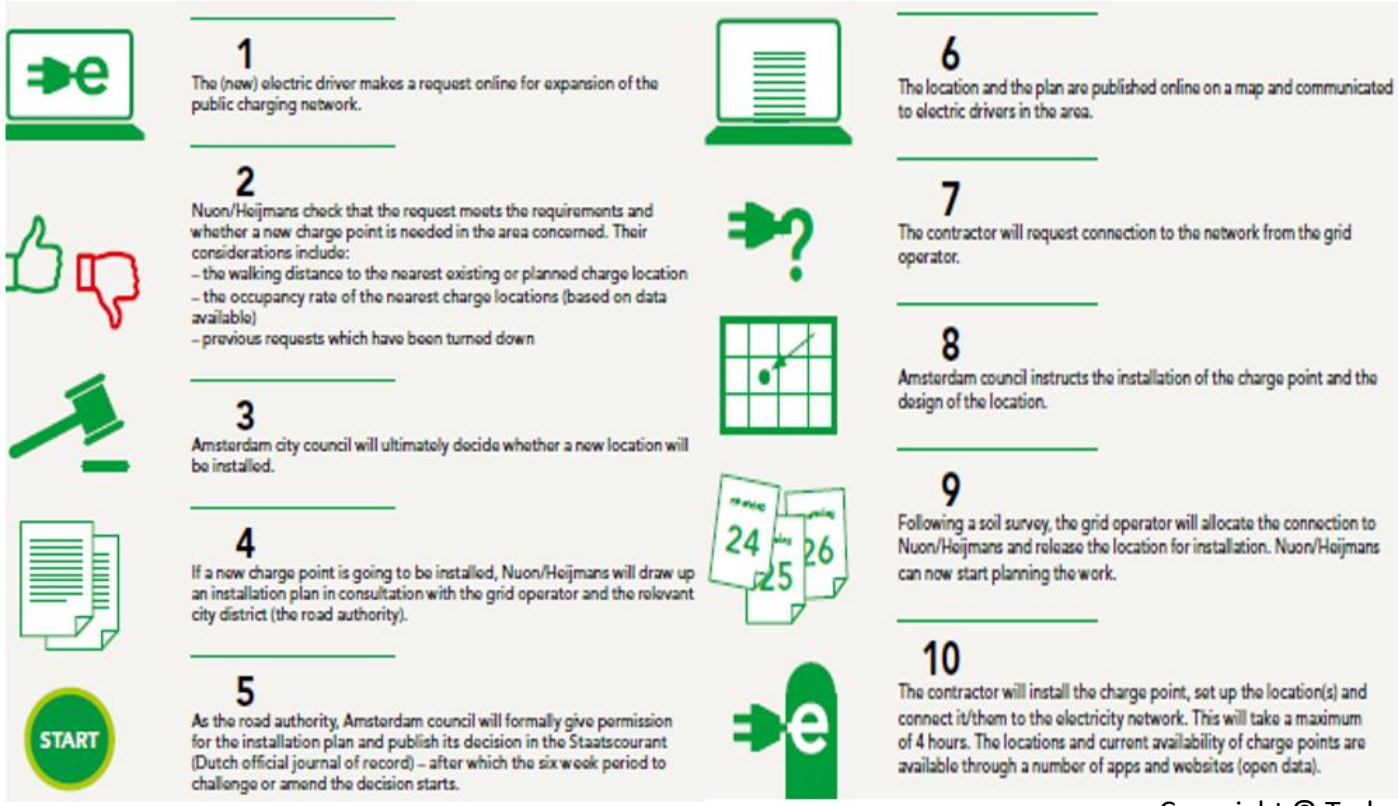
Demand-based public charging roll-out was firstly adopted by Amsterdam and replicated in Italy by **Torino** and **Rome**.

In short, if you live in the city center and buy an **Electric Vehicle (EV)**, without your own parking spot, you can request to have public parking and charging near your apartment.

Installation following actual EV-owner demand rather than randomly deploying charging points and hoping for usage is way more efficient:

- **For EV user**: residents will have charging solutions near their home, making the transition to owning an EV possible. The parking is not personal/private but exclusive for EV owners, and this represents a tremendous non-economic incentive.
- **For the city**: no parking space is lost and parking revenues are maintained. Reliable charging options enables a fast EV adoption and ultimately emission reduction.
- **For the operator**: profitable business case through high utilization rate from day one.
- **For utilities**: slow charging offers a scalable solution almost everywhere.

This system is a best practice and has proven a successful in Dutch cities since it both enabled a consistent growth of charging points and an high utilization rate, fostering EVs uptake.



Contact for the best practice:

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#localization #charginginfrastructure

9. Capacity of grids

- **Power grids Austria**: efficient and well developed, but there are areas where it is not possible to connect to additional consumers, especially in **rural areas with long lines there are problems**
- Each charging infrastructure that is connected to distribution network must be reported to relevant network operator to **check network situation** and network operator has to approve connection or sets conditions or takes measures
- **Problem**: vehicles charging single-phase and high power
  - Can lead to neutral point shifts which can damage or destroy devices

  → Single phase charging only permitted up to maximum power of 3.7 kW in Austria
- Area of underground garages, residential complexes, etc:
  - Increading e-Mobility leads to significant **load peaks**, especially in evenings where peak load is already in the households
    → could lead to collapse of entire power supply of system

  → Need for solution with load management which loads vehicles without allowing too high load peaks

Trends in capacity of grids

Public sector: trend towards high-performance charging infrastructure, especially on high-level road network

- Charging power of up to 350KW per charging point requires its own transformer stations in order to be able to provide the services that can be located at a megawatt location
- Required power is usually available in these cases since distribution is supplied directly from a medium voltage grid

80-90% of energy for e-cars will be consumed at home or at work making these charging points highly important

- Intelligent control of charging points with network-related functions (frequency monitoring, voltage monitoring, load rejection at underfrequency, ramping up after mains voltage recovery) should be established in future

Contact

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