DYNAMIC WIRELESS CHARGING VS. FAST CHARGERS

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Long-distance trips are the major concern for EV manufacturers.

Equipment of highways needed, but:

Fast charging infrastructure is expensive, grid impact.

Sizing is based on peak traffic leading to under-utilisation the rest of the time.

Also: charging duration, queues, technical issues, ...

Any feasible alternatives?
POTENTIAL SOLUTION: ELECTRIC ROAD SYSTEMS

Experimentations all over the globe

Different technologies

Vedecom: prototype of a dynamic wireless charging system

Premise: equipment of highways with EV charging infrastructure

Private investor: in which charging infrastructure to invest?
  ▪ Cost of the infrastructure? Net present value, revenue, …?

User: how much does charging cost?
  ▪ Charging time, comfort?

Focus: personal light-duty vehicles
Scenario 1: fast charging stations
- 2025: 150 kW
- 2030: 350 kW
- 2035: 150 kW
- 2040: 
- 2045: 
- 2050: 

Scenario 2: inductive lanes
- 2025: 150 kW
- 2030: 70 kW
- 2035: 150 kW
- 2040: 
- 2045: 
- 2050: 

The chart shows projected kW capacity from 2025 to 2050 for two scenarios: fast charging stations and inductive lanes.
E-HIGHWAY MODEL

- Traffic: average hourly traffic, peak traffic, % EVs, EV compatibility with induction, average speed
- EV: consumption/km
- Charging points: installation, equipment & maintenance cost; lifetime, failure rate, efficiency
- Charging lane: installation, equipment & maintenance cost; lifetime, failure rate, efficiency, power
- Economic parameters: discount rate, price of electricity, learning curves, ...
- Highway corridor: length, distance of charging stations, inductive sections
RESULTS
NET PRESENT VALUE
IMPACT OF VALUE OF TIME

[Graph showing the impact of value of time on charging fees across different scenarios for years 2025 to 2050.]
SENSITIVITY ANALYSIS

Parameters with the biggest uncertainty?
- Cost of inductive lanes (installation & maintenance)
- Failure rates, lifetime
- Number of EVs on highways, compatibility with induction

Parameters with the biggest impact?
CHARGING LANES: SENSITIVITY ANALYSIS
CONCLUSIONS

Inductive lanes are expensive... but their cost might come down

Taking into account the VOT might change everything

Speed and consumption/km very important for inductive lanes

Drawback: one-off deployment when few compatible EVs on the road

Next step: case study for the French highway system?
WHAT IF THERE WAS ANOTHER SOLUTION?
THANK YOU FOR YOUR ATTENTION!
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