DYNAMIC WIRELESS CHARGING VS. FAST CHARGERS

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PROBLEM STATEMENT

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, …

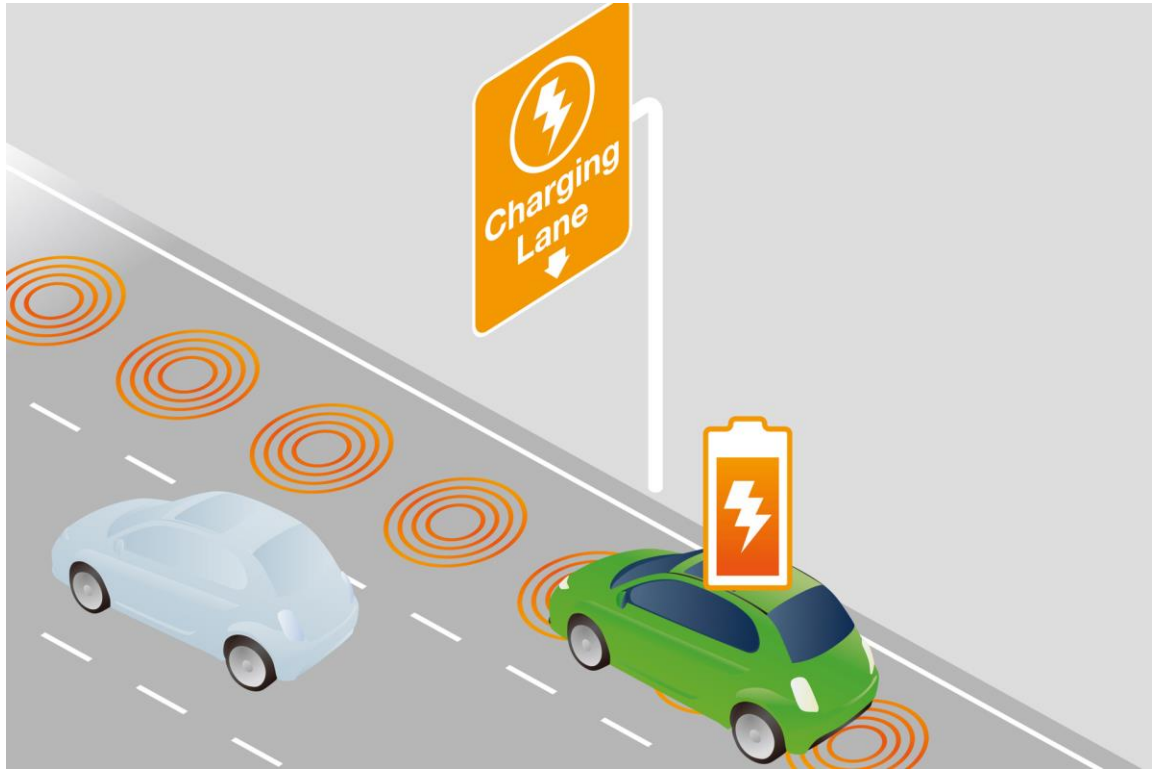
Any feasible alternatives?

POTENTIAL SOLUTION: ELECTRIC ROAD SYSTEMS

Experimentations all over the globe

Different technologies

Vedecom: prototype of a dynamic wireless charging system



https://www.capitole-expertise.fr/2016/08/28/developpement-dun-systeme-de-recharge-par-induction-a-haut-rendement-par-vedecom/

E-HIGHWAY MODEL

Premise: equipment of highways with EV charging infrastructure

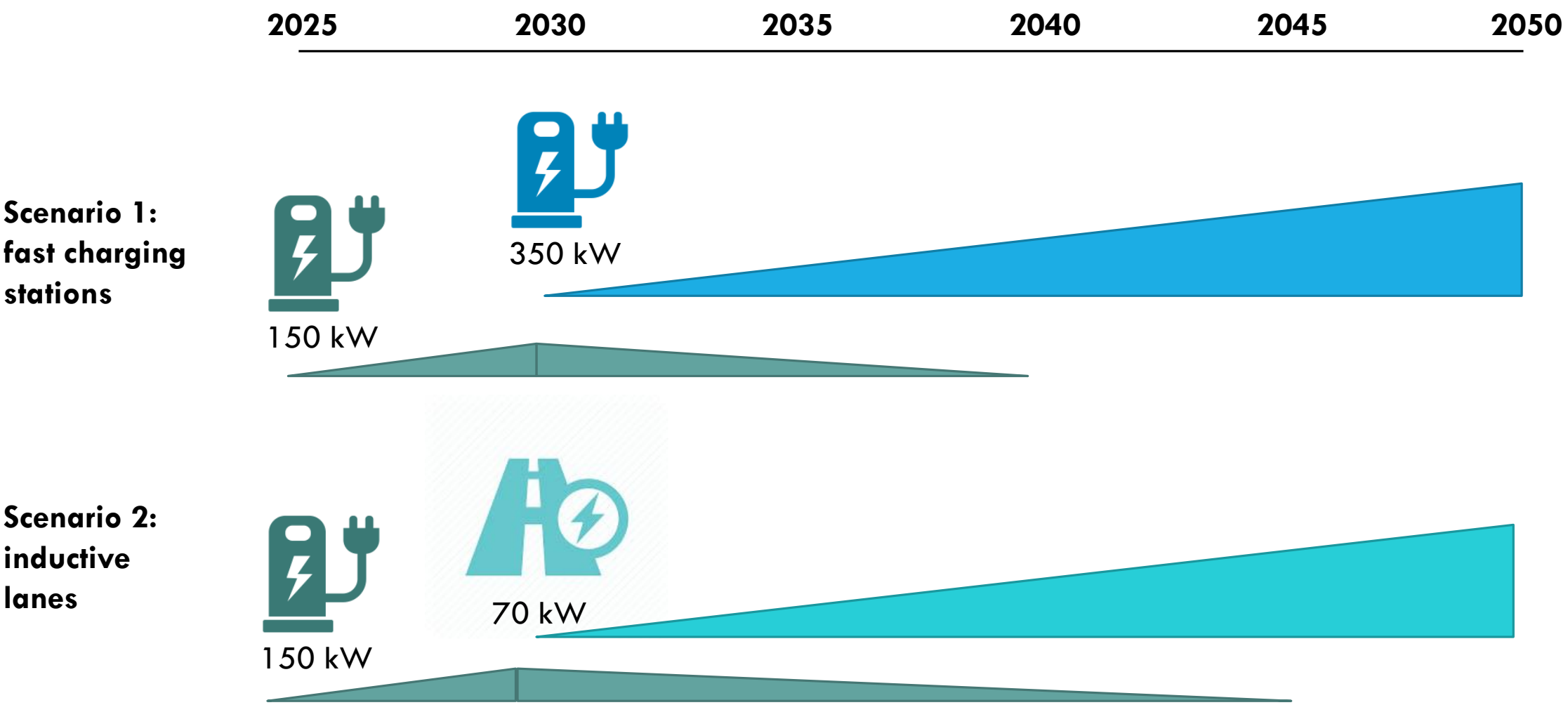
Private investor: in which charging infrastructure to invest?

- Cost of the infrastructure? Net present value, revenue, …?

User: how much does charging cost?

- Charging time, comfort?

Focus: personal light-duty vehicles

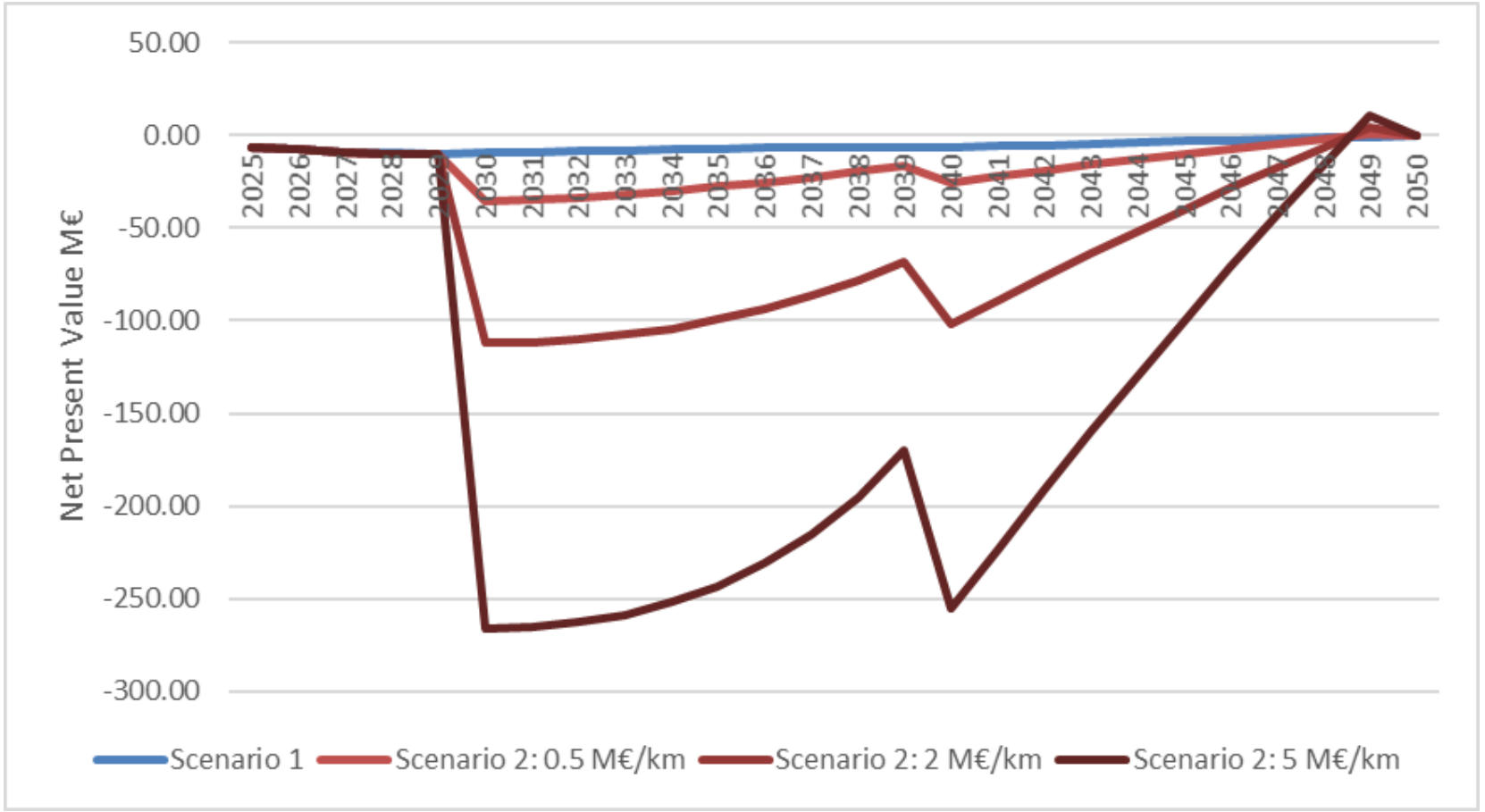

2025
2030
2035
2040
2045
2050
Scenario 1: fast charging stations
350 kW
150 kW
Scenario 2: inductive lanes
70 kW
150 kW

E-HIGHWAY MODEL

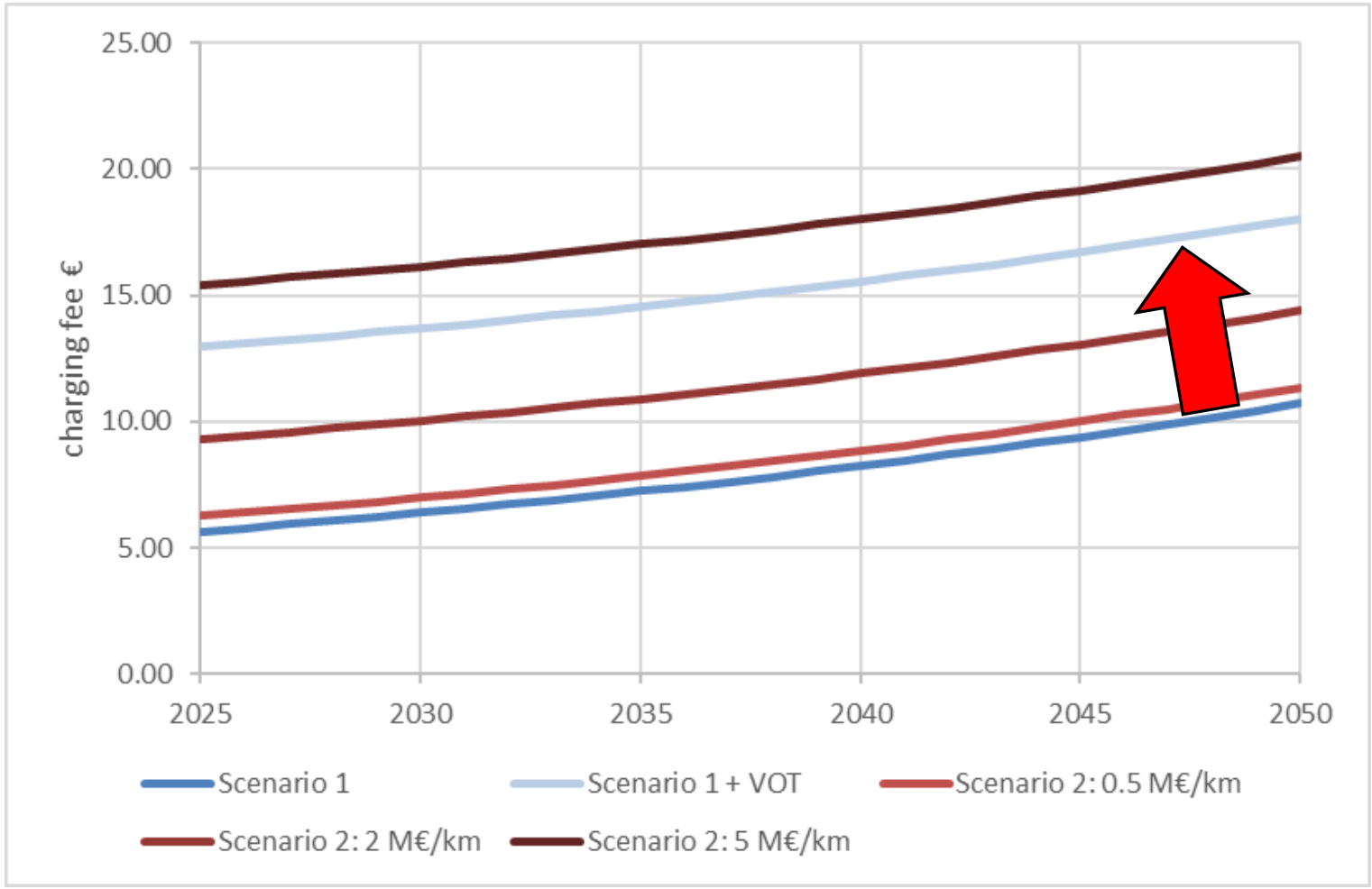
- Traffic: average hourly traffic, peak traffic, % EVs, EV compatibility with induction, average speed
- EV: consumption/km
- Charging points: installation, equipment & maintenance cost; lifetime, failure rate, efficiency
- Charging lane: installation, equipment & maintenance cost; lifetime, failure 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



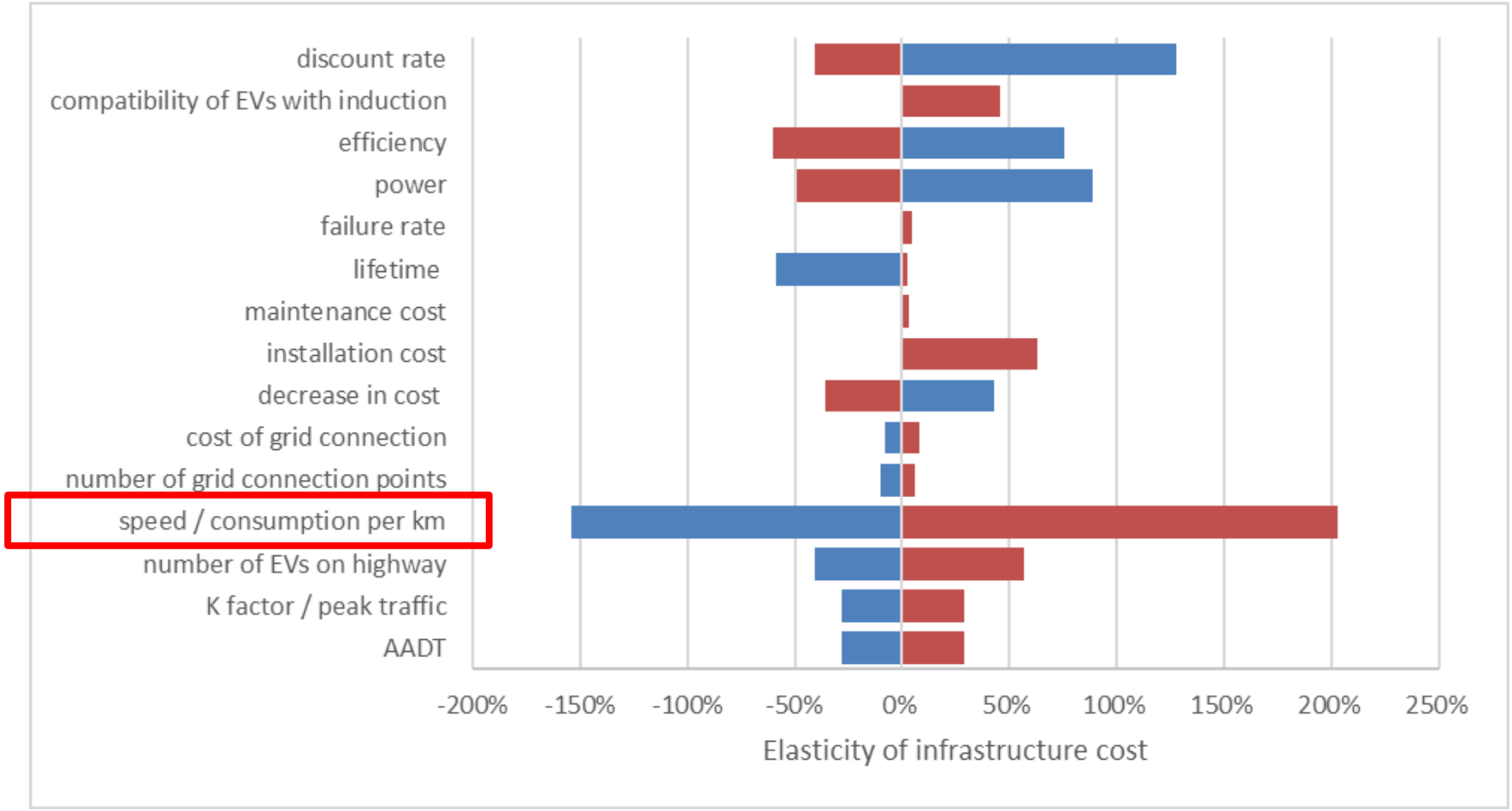
SENSITIVITY ANALYSIS

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?

EP Tender

THANK YOU FOR YOUR ATTENTION!

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