

# Socioeconomic Analysis of Electric Roads

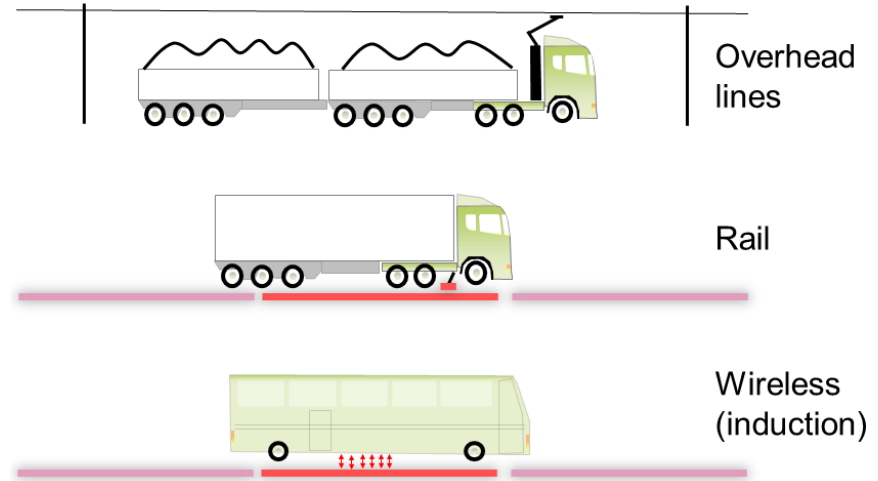
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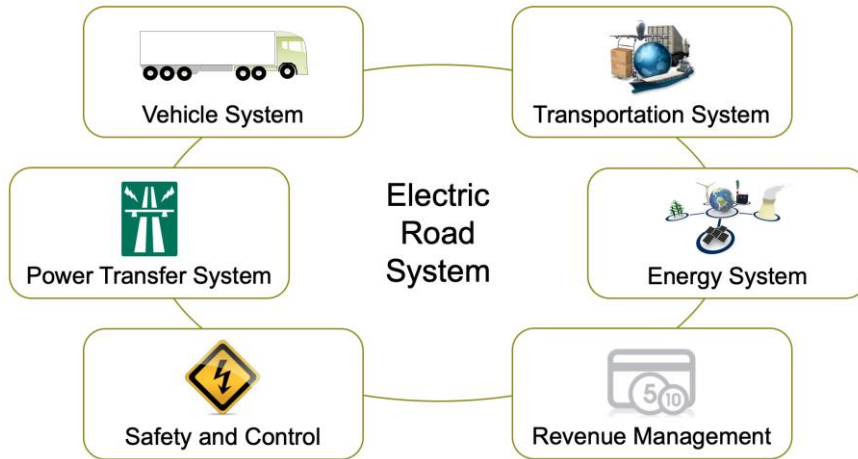
Electric Road Systems Conference 2019

# Electric Road Systems (ERS): Power transfer during movement

- Long range for cars, buses and trucks – various applications
- Reduced need for batteries – less cost for vehicles
- Reduced need for charging stops – increased flexibility
- Direct use of electricity offers the most energy efficient way

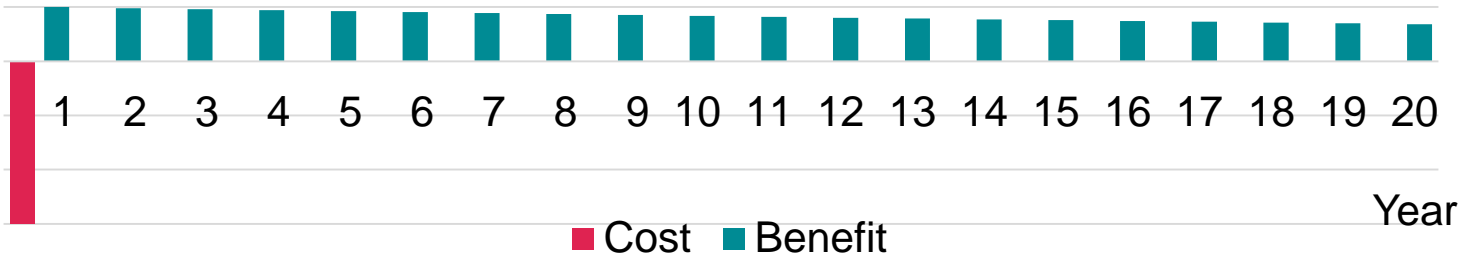


# Cost-benefit analysis of electrified roads



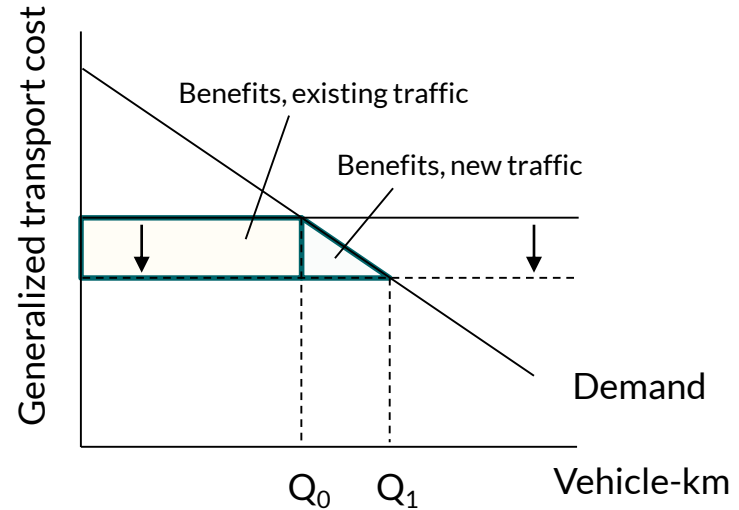
- The implementation of ERS will be associated with large investments
- Important to study the economic impact and benefits for the society
- Cost-benefit analysis of electrification of existing road

# Net present value in a cost-benefit analysis



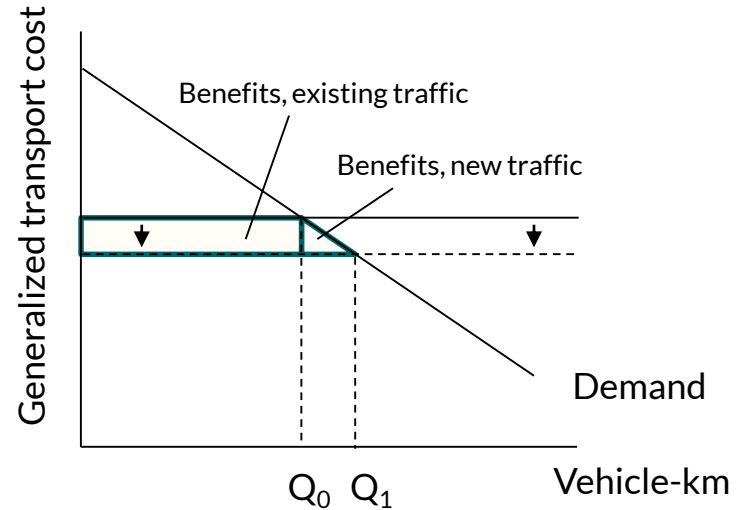
- How large are the gains in terms of cost savings compared with the cost of investing in new infrastructure and new vehicles?
- Taxes and fees do not constitute a net cost to society, only a transfer from private individuals or firms to the government.

# User benefits



- Electric truck → lower transport cost
- If change is small, demand effect can be ignored

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# Wider economic benefits

- User benefits also capture benefits in secondary markets (labour, product)
- If there are market imperfections in secondary market, transport improvements could give additional benefits
- Relevant if project leads to large transport time and/or cost savings, mostly not the case for ERS

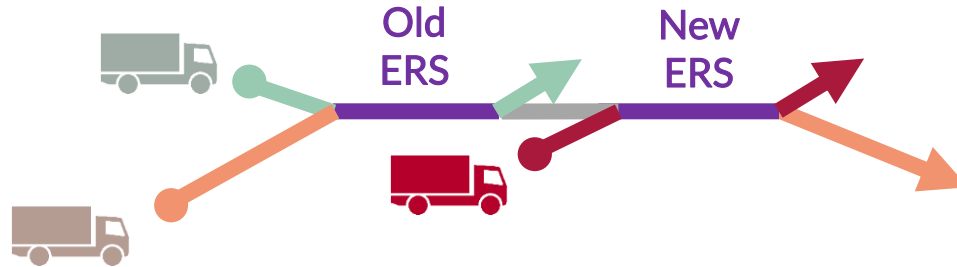
# Business model



- Transport cost savings must cover truck investment
- Depends on share of trip conducted on electrified road



# Spillover effects



- New road can make use of electric trucks on existing road profitable for more transports
- → Private profits and socio-economic benefits depend on existing ERS network

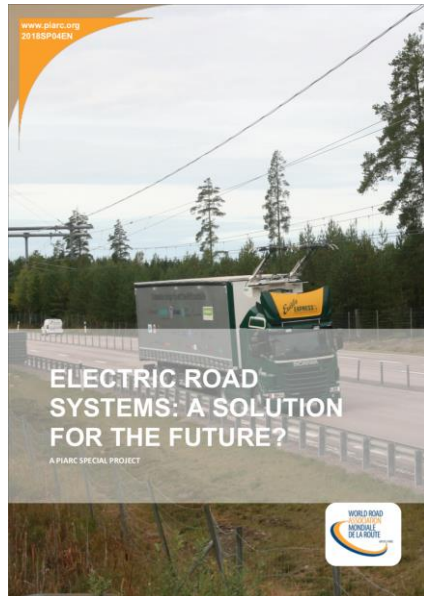
# External costs

- Infrastructure damage, accidents, emissions, noise
- CO<sub>2</sub> emissions and local pollution lower with ERS
- Net present value for society could be positive even if the business model has negative profits

# Needed data

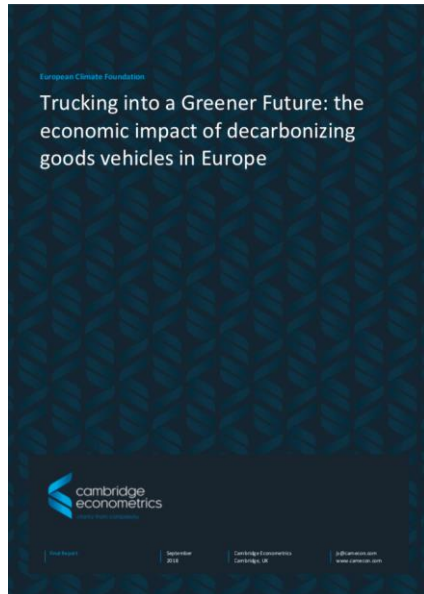
- Road construction costs
- Cost for deployment of ERS infrastructure
- Maintenance cost
- Amount of traffic, electrical and conventional, distributed along the road network
- Distance-dependent driving costs
- Non-distance-dependent capital costs (investment and maintenance)
- Local emissions (and possibly noise) costs
- Costs of greenhouse gas emissions

# Outlook: “Electric road system: a solution for the future?” from PIARC



- TRL Limited has used a CBA model developed in the UK
- “some types of ERS are financially viable if sufficient capital investment can be made, as long as the electricity mark-up and uptake is sufficient”
- ERS technologies that can be used by cars as well as heavy duty vehicles “are more likely to recoup the initial investment”

# Outlook: “Trucking into a Greener Future” by Cambridge Econometrics



- Increase in GDP of 0.07 % and in employment of around 120 000 jobs by year 2030 in zero-emission scenarios e.g. ERS
- The scenarios assume a high uptake of zero-emission vehicles
- Interesting findings, but does not constitute a conventional cost-benefit analysis

# Acknowledgements



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