

Role of EVs in the energy transition

Prof. Dr. Pavol Bauer, Delft University of Technology



Questions?

- What is an electric vehicle?
- What are the key benefits of electric vehicles over fossil fuel powered vehicles?
- How can electric vehicles enable the energy transition?

Definition: Electric Vehicle

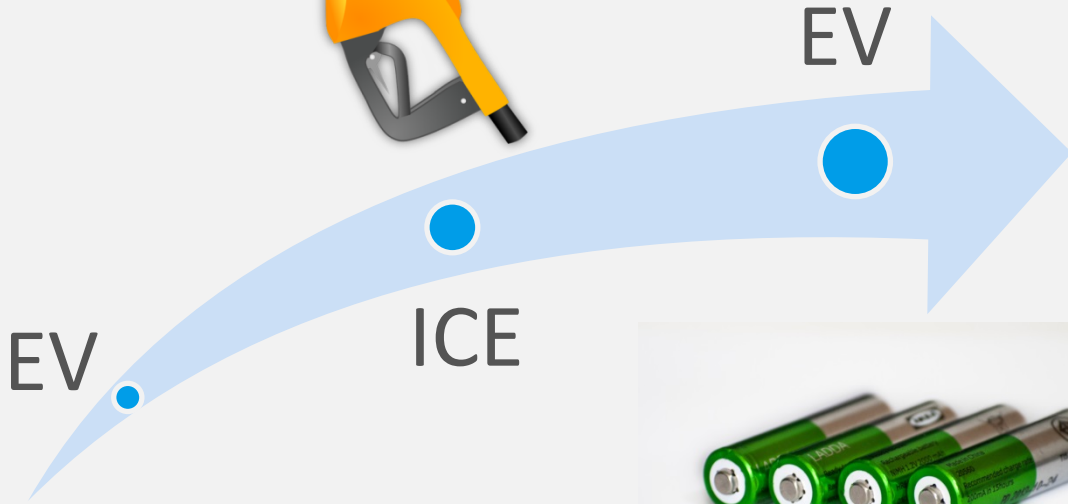
Any vehicle propelled by an electric drivetrain taking power from a rechargeable battery or from a portable, refillable, electrical energy source (like fuel cell, solar panels, etc.), which is manufactured for use on public roads

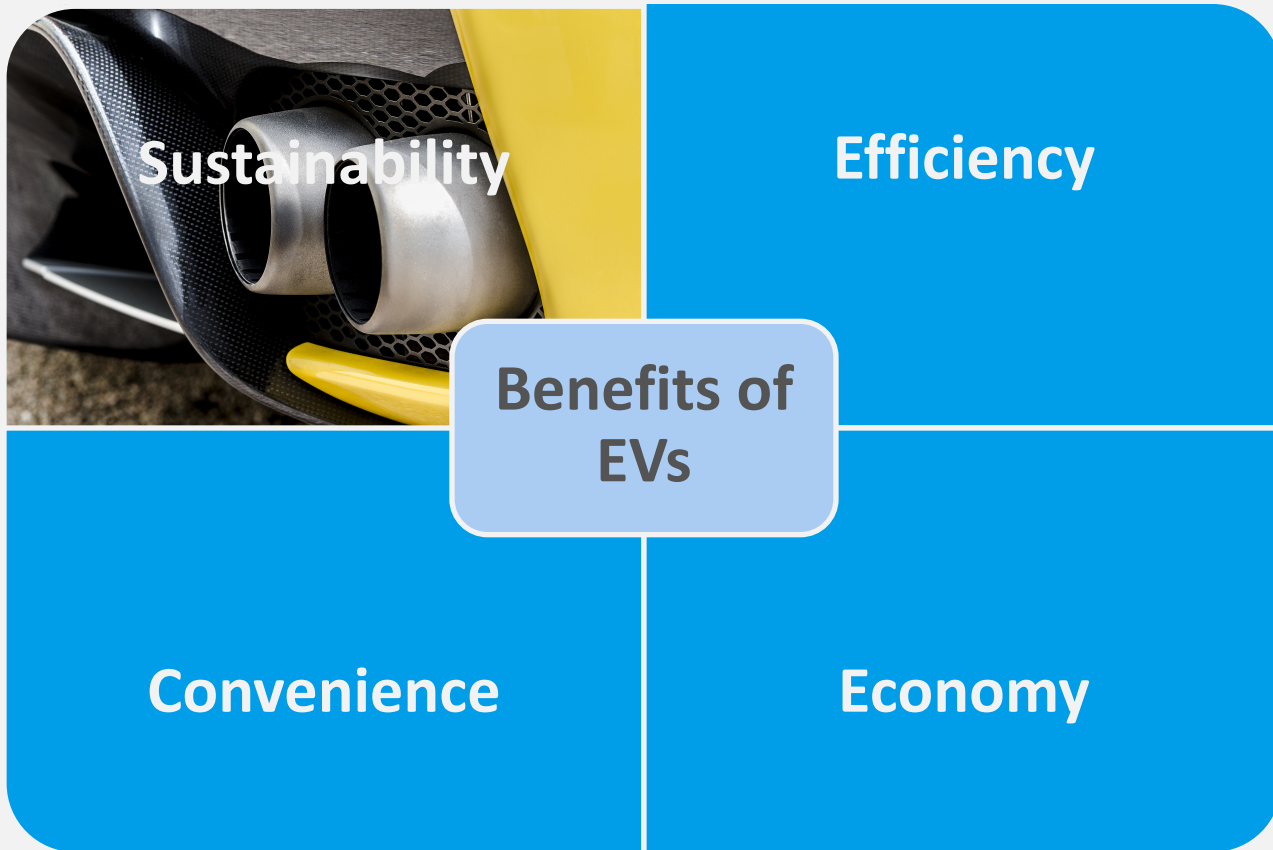


Prediction

World
2016 → 2 million

2030 → ??





Sustainability: No tail-pipe emissions

- EVs have no tail-pipe emission
- Reduced air pollution in cities due to CO₂, SO_x, NO_x, particulate matter



Benefits of EV: Role of EV in energy transition





Sustainability



Efficiency

Benefits of
EVs

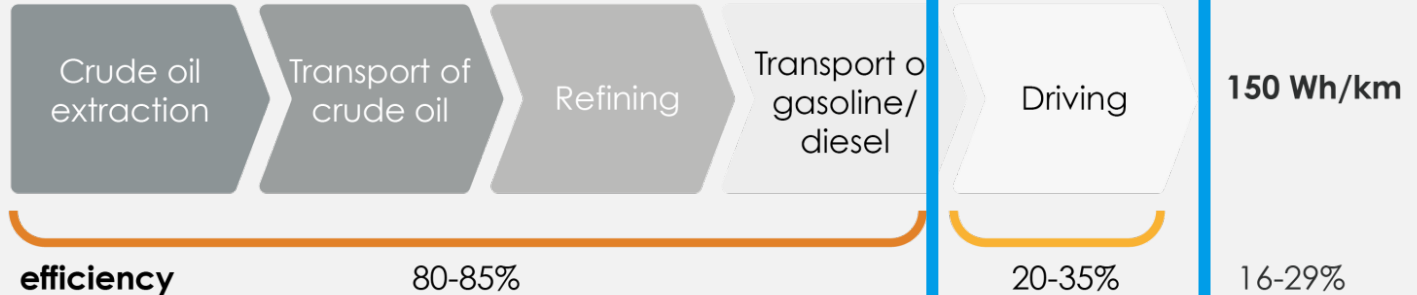
Convenience

Economy

Benefits of EV : Well to wheel efficiency

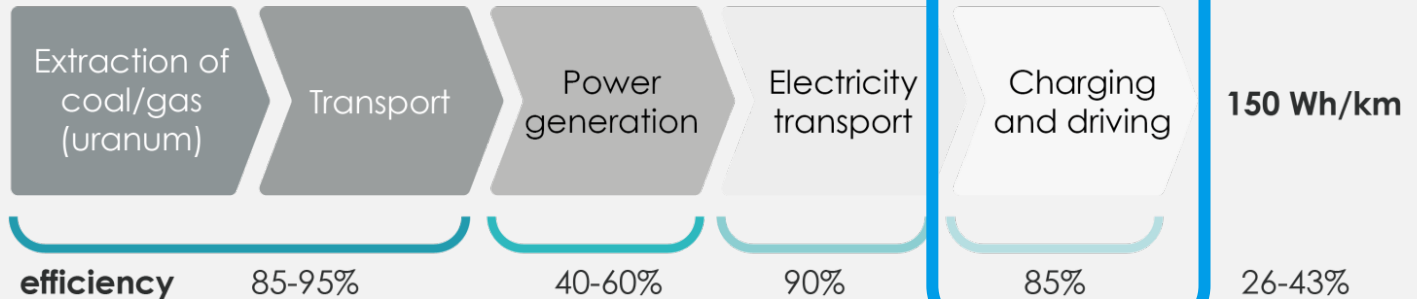
Internal combustion engine (including hybrids)

510-950 Wh/km
145-270 g/km CO₂

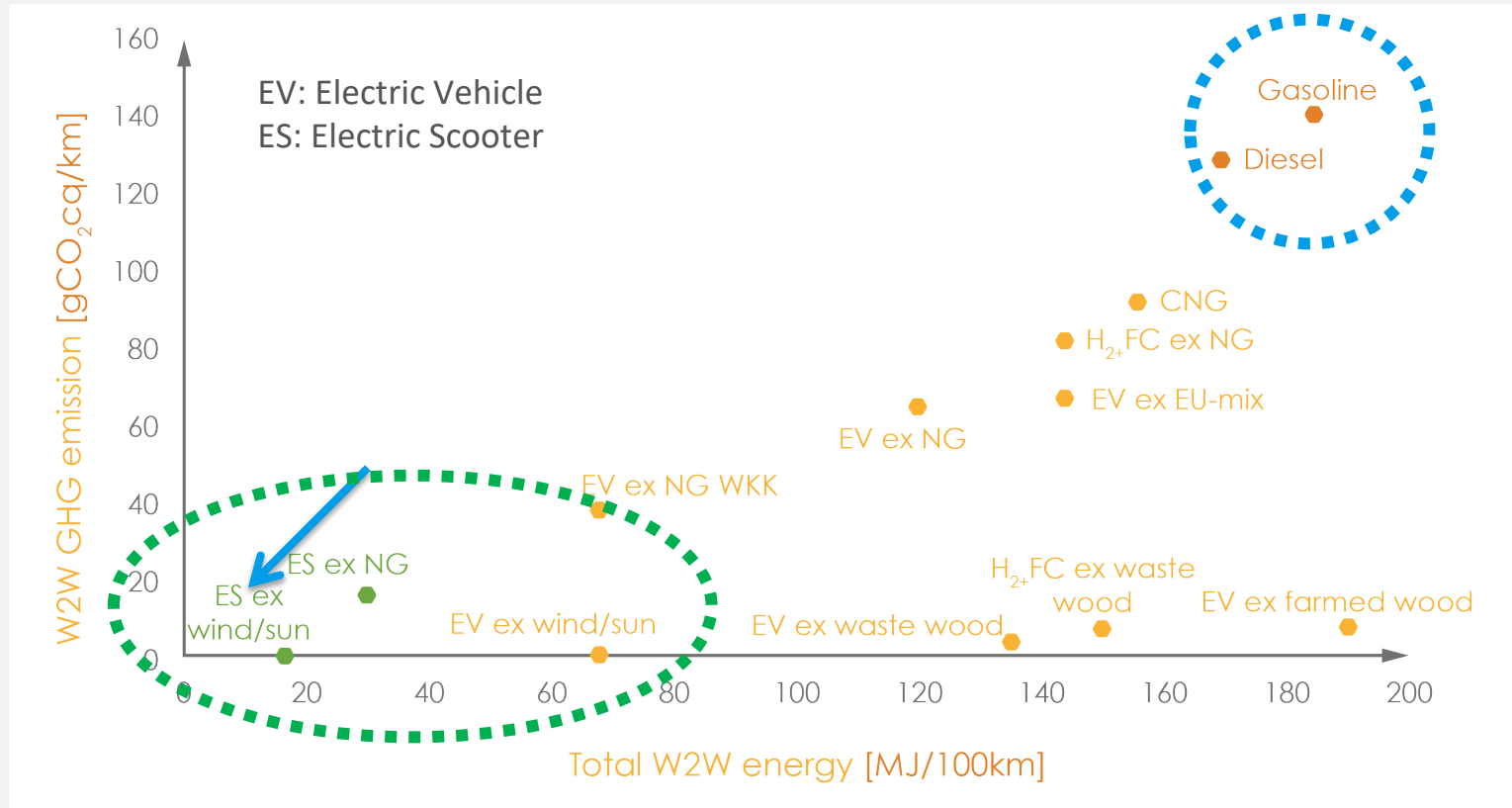


Electric drive

340 Wh/km (gas)
570 Wh/km (coal)
68 g/km CO₂ (gas)
135 g/km CO₂ (coal)



Benefits of EV: health and environmental friendly





Sustainability



Efficiency

Benefits of EVs



Convenience

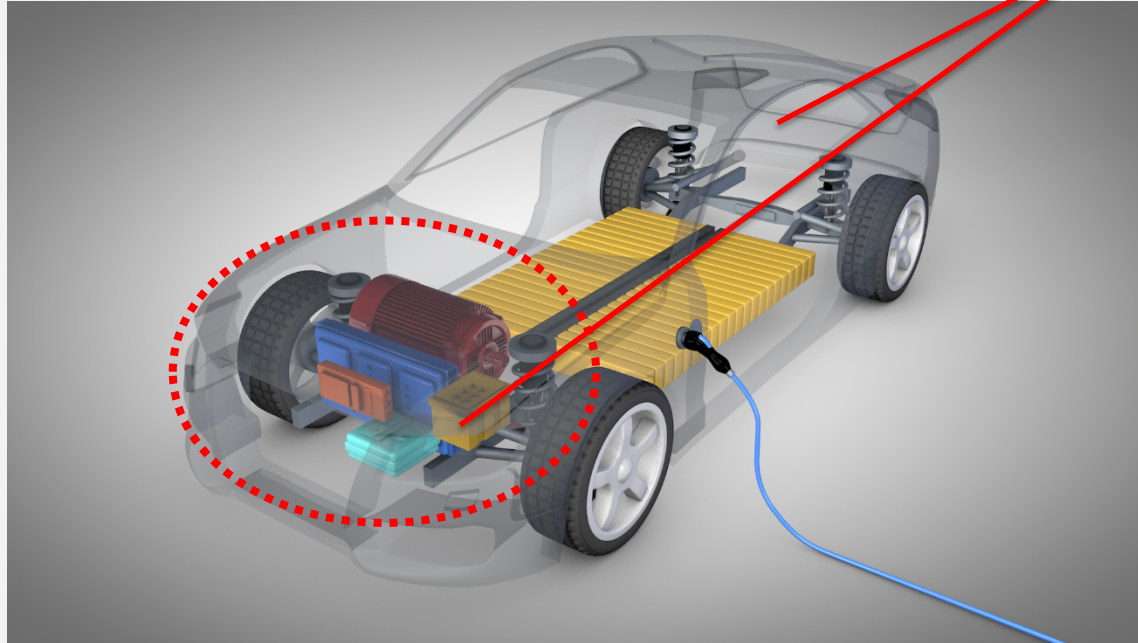


Economy

Benefits of EV : Convenience



Quieter



Large storage
place

Self driving!



Charge @
Home

No gear change

Low components
& maintenance



Sustainability



Efficiency

**Benefits of
EVs**



Convenience



Economy

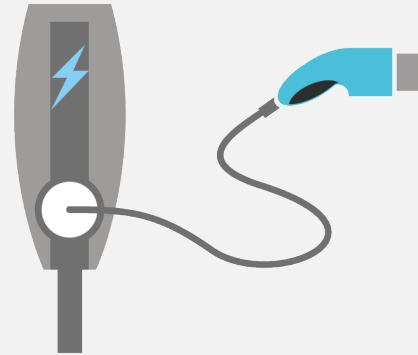
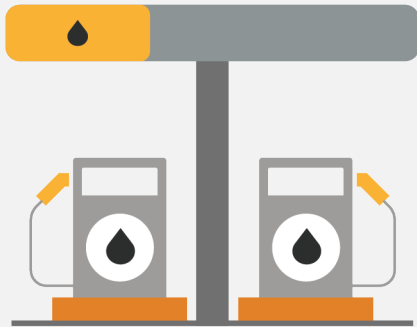
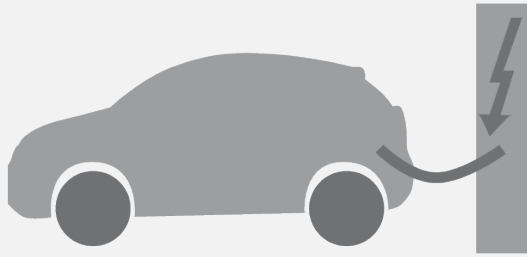
Lower total cost of ownership

Higher purchase price, BUT

- Lower maintenance costs
- Lower taxes
- Cheaper fuel (electricity)
- Govt. subsidy



Technological challenges



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