

Refining the Vision for a 2035 Heavy-Duty Engines Portfolio

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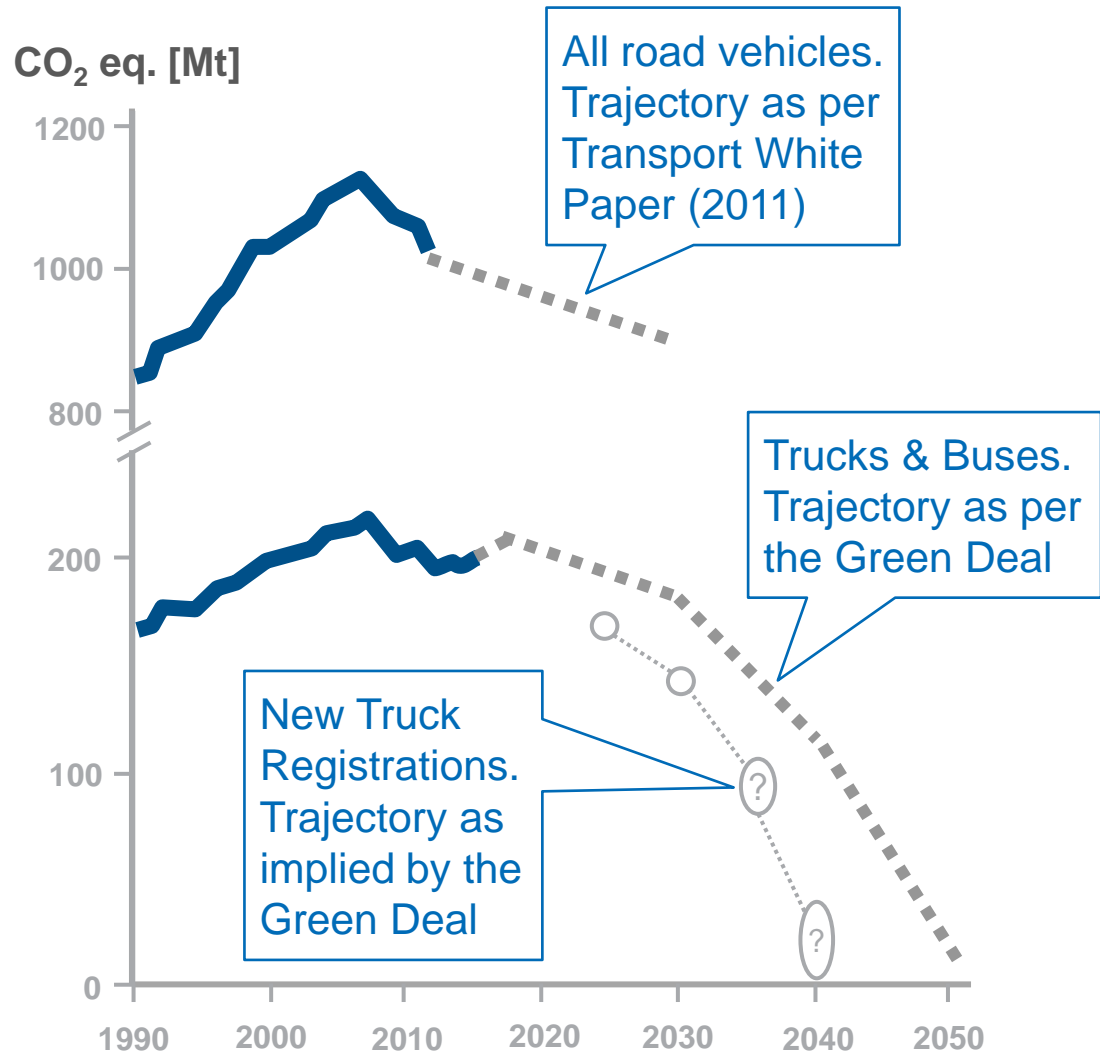
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Contents



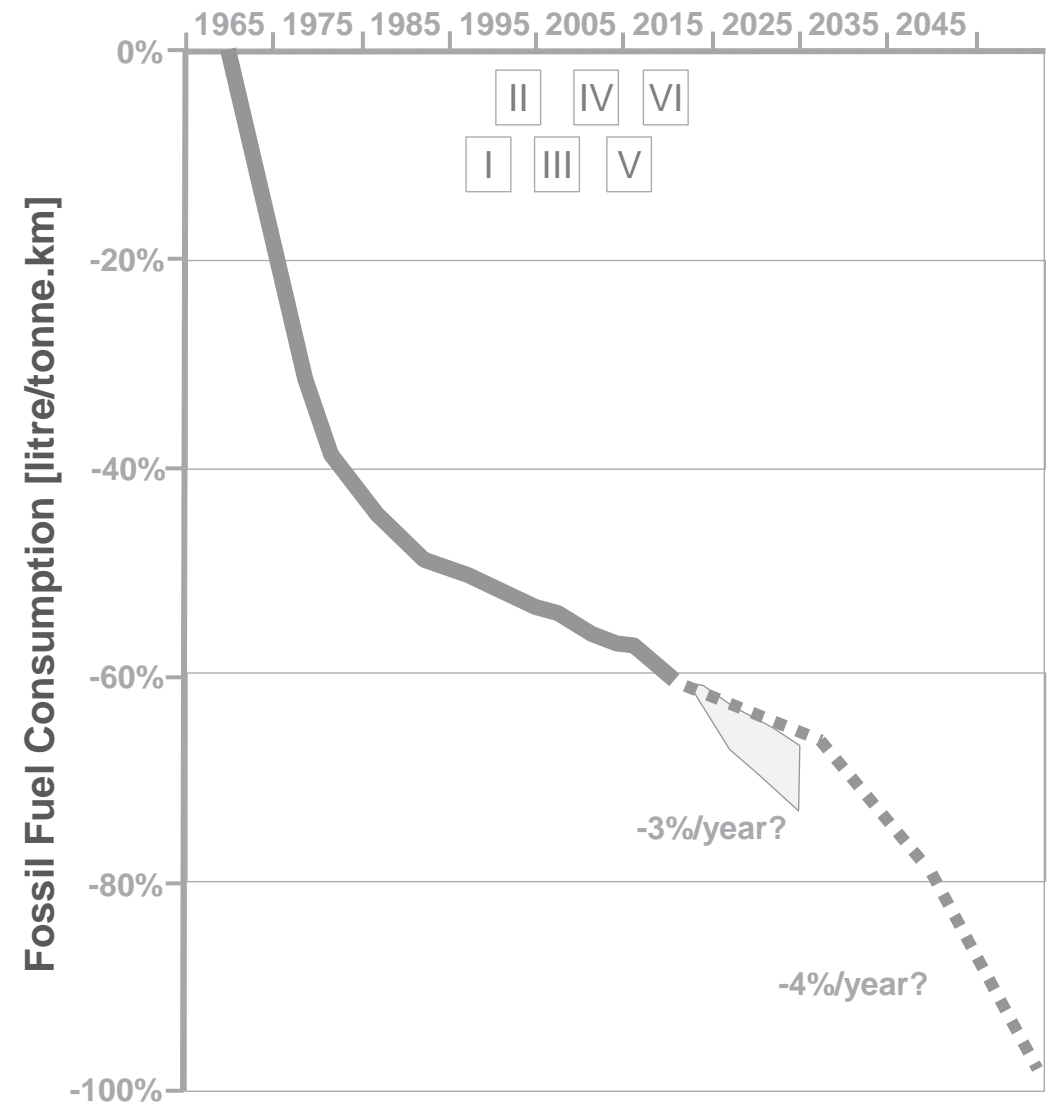
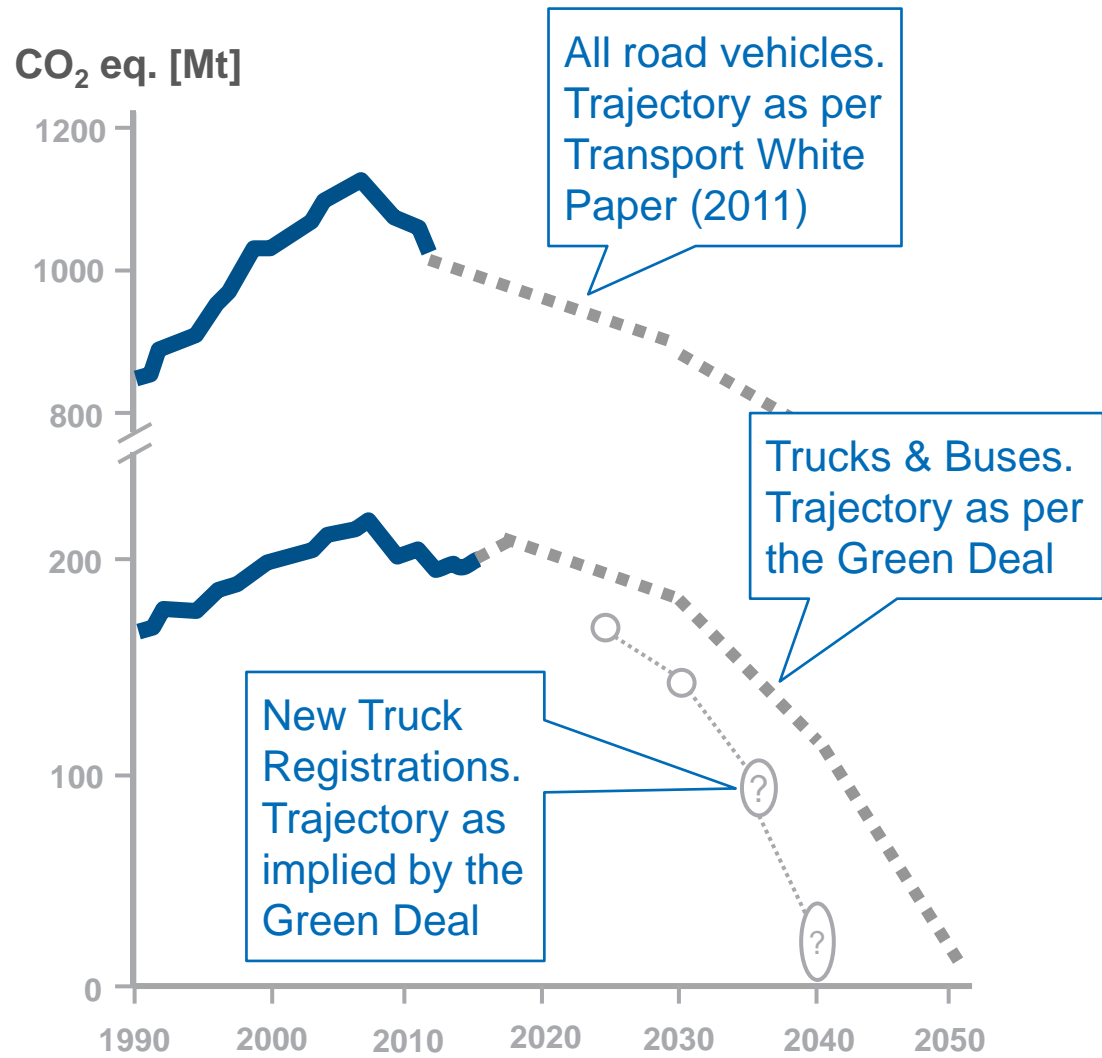
- Introduction
- The (new) Target: Net-Zero at 2050
- The Pivot: 2035
- The Bigger Picture
- Next Steps

Looking specifically at commercial vehicles in Europe



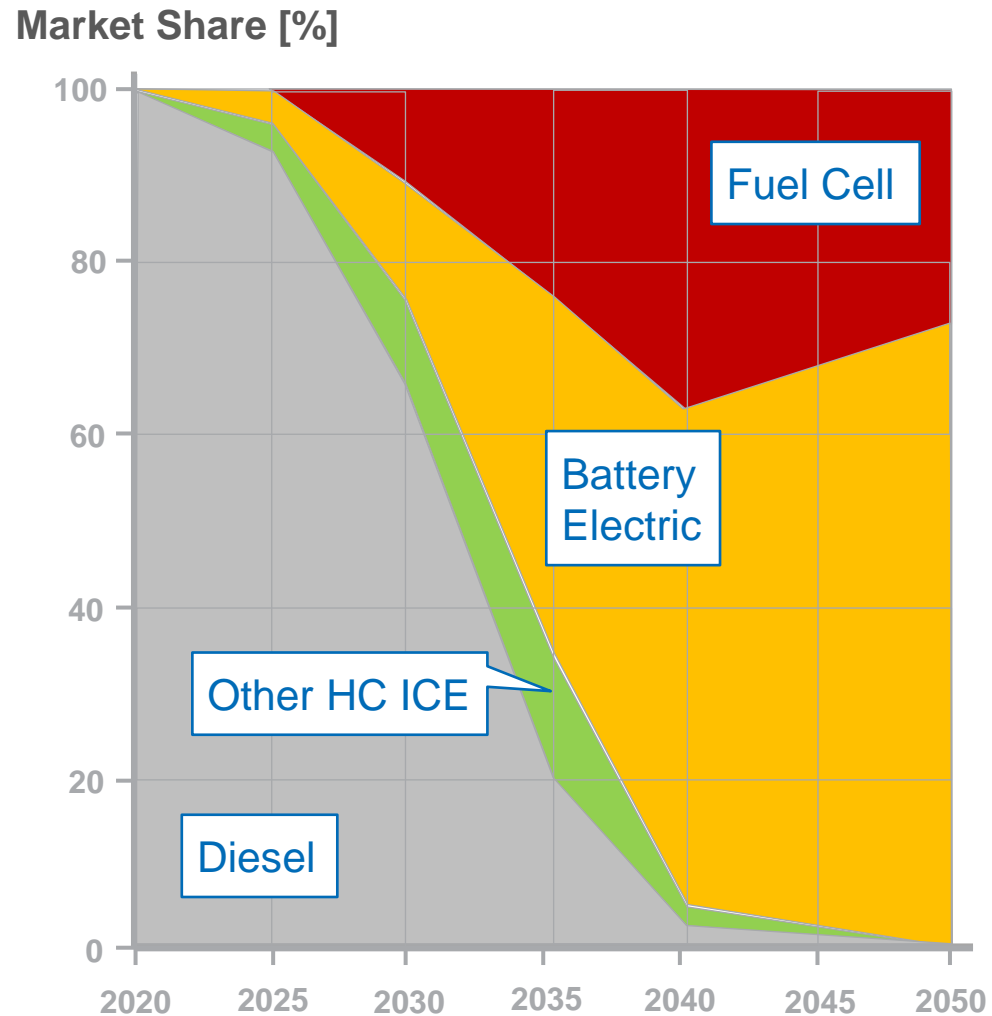
Sources: EEA, 2015; IASA, TSAP; EC 2011; ERTRAC 2018; CONCAWE 2020; Ricardo analysis

Looking specifically at commercial vehicles in Europe



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Considering future market share projections



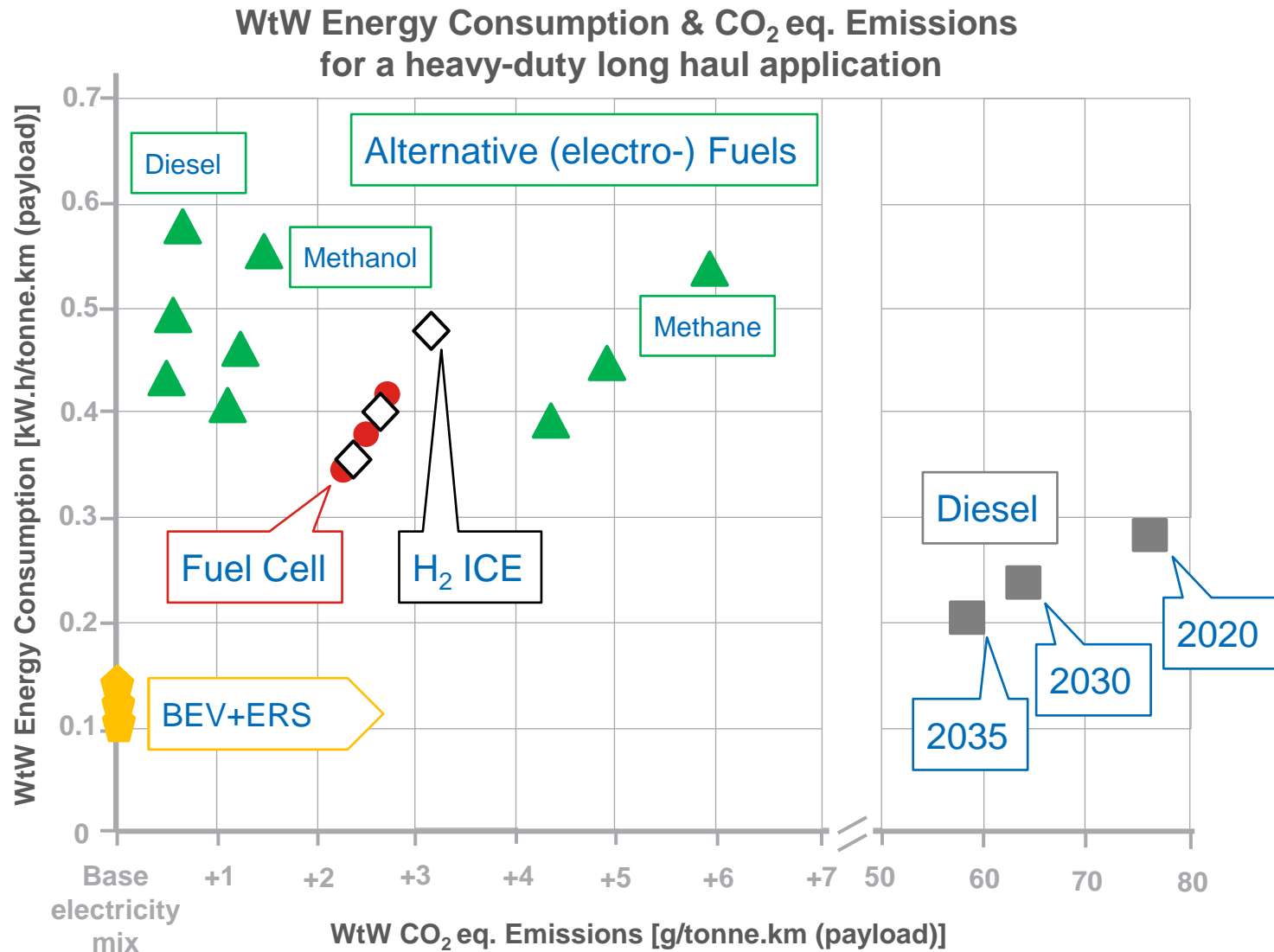
- Based on analysis of market share projections for medium-duty and heavy-duty trucks in Europe
 - New vehicle registrations
 - Data from multiple sources
 - Cumulative mean distribution therefrom shown
- However individual estimations vary widely, particularly in the time period 2030-2040
 - Cumulative effect means that is very little consensus for this critical decade
- Some alternative energy vectors do not register

Contents



- Introduction
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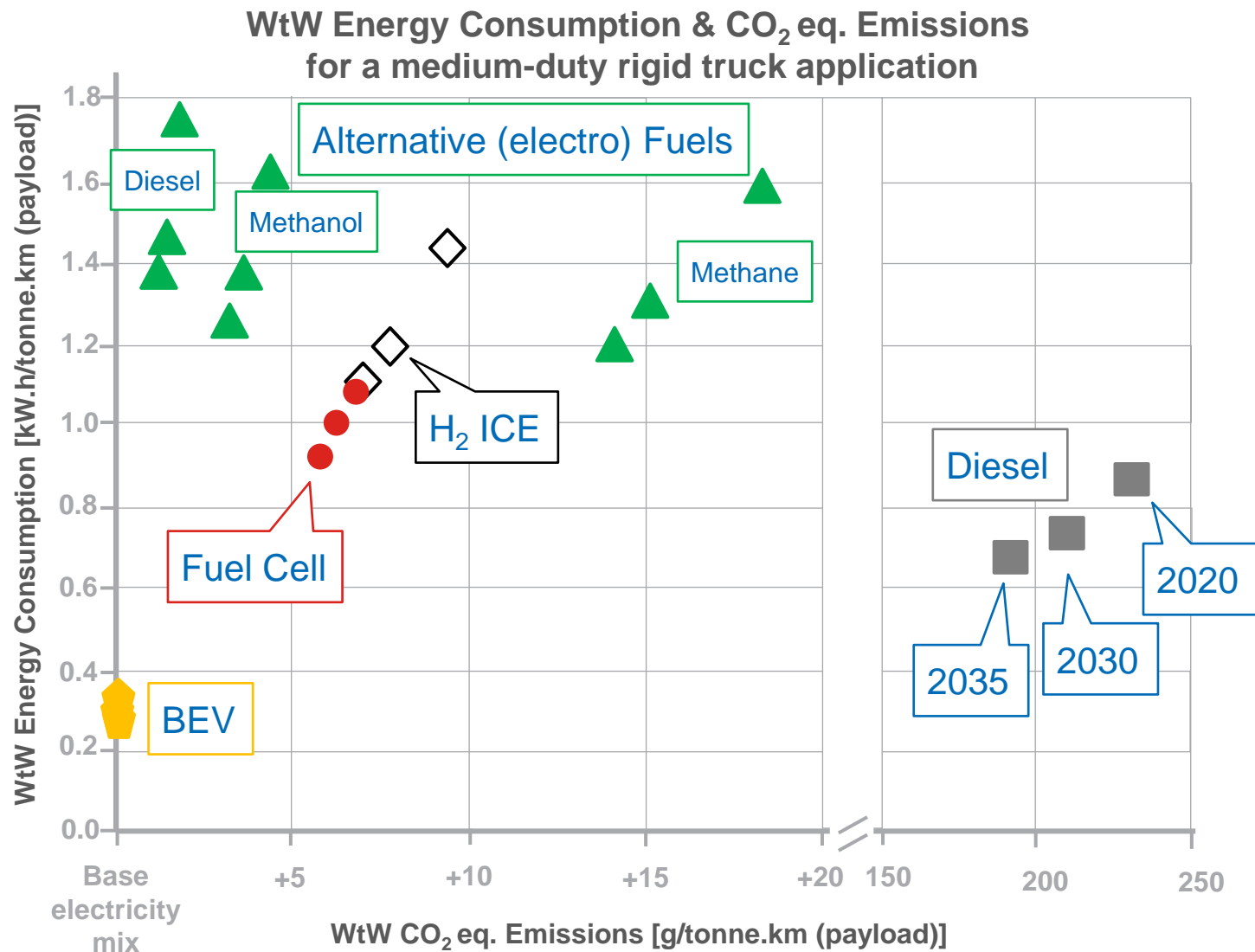
Looking towards 2035 with a well-to-wheels perspective: heavy-duty



- Considering both powertrain and vehicle developments but from a specific energy versus CO₂ emissions perspective
 - Outline vehicle and powertrain specifications plus evaluation cycles given in the paper
 - Renewable electricity supply in the cases considered here
 - Heavy-duty long haul application shown here

Source: Downes, T. and Auld, A.: "A Dedicated Spark-ignited Heavy-Duty Engine for Multiple Future Fuels". ATZ live, On-line (2020). Ricardo analysis

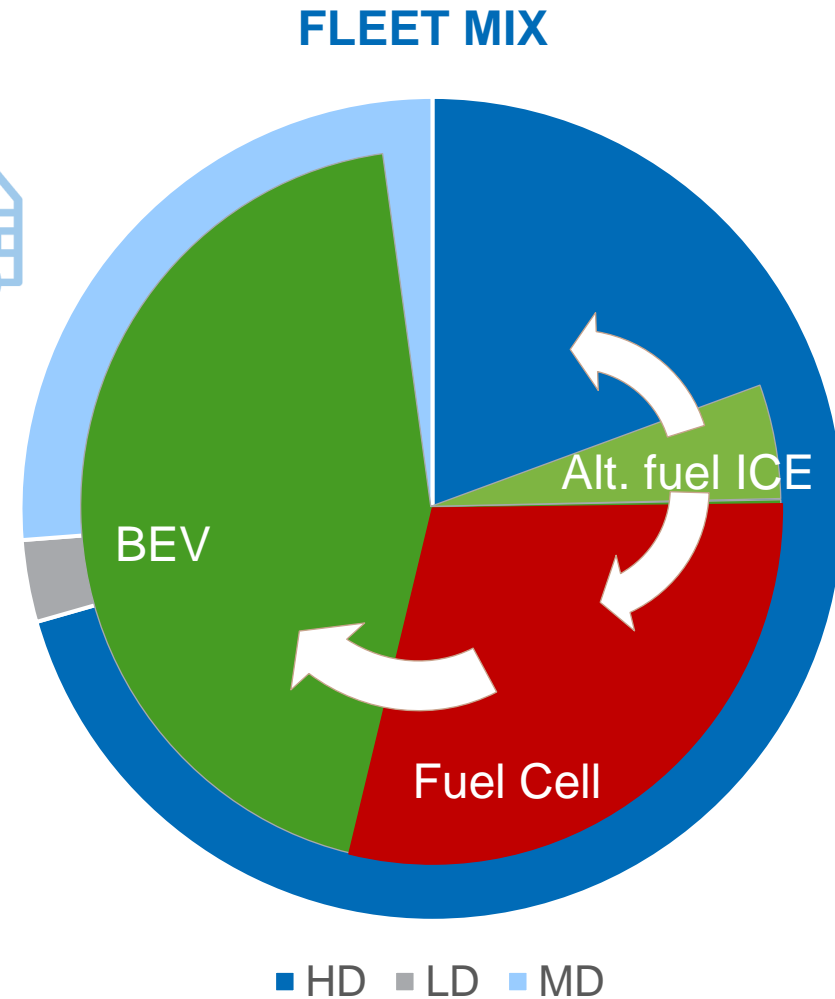
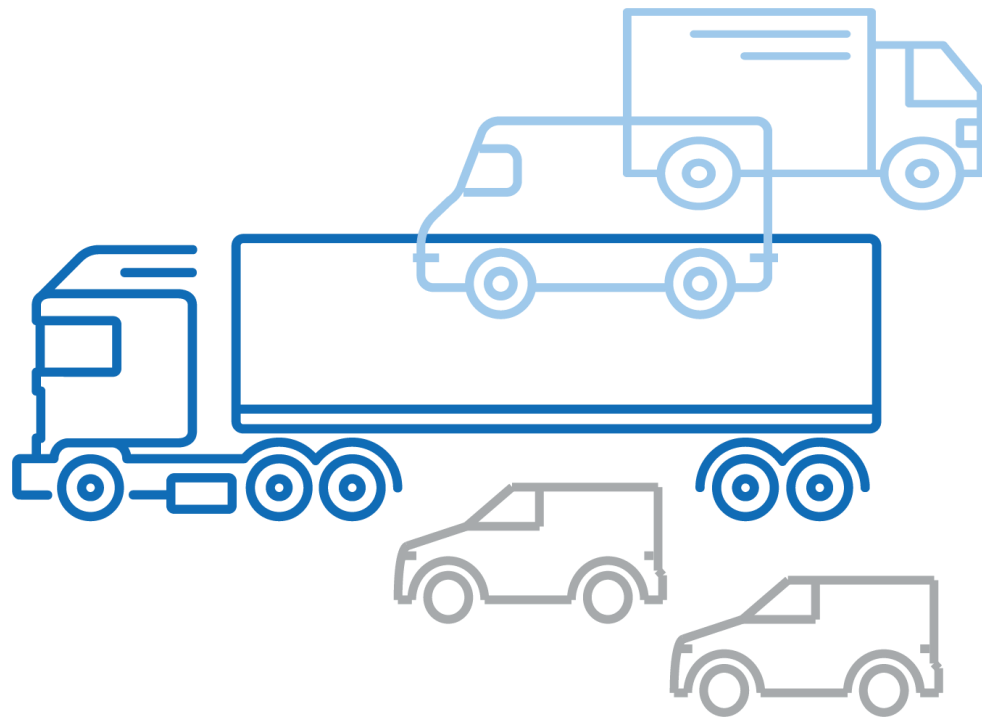
Looking towards 2035 with a well-to-wheels perspective: medium-duty



- Considering both powertrain and vehicle developments but from a specific energy versus CO₂ emissions perspective
 - Outline vehicle and powertrain specifications plus evaluation cycles given in the paper
 - Renewable electricity supply in the cases considered here
 - Medium-duty rigid truck application shown here

A revised portfolio projection for 2035 ...

- New vehicle registrations



Contents



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- The Bigger Picture
- Next Steps

Are there other options to improve the projections?



- Infrastructure investment costs
- Total Cost of Ownership (TCO)
- Life Cycle Analysis (LCA) assessment

Contents



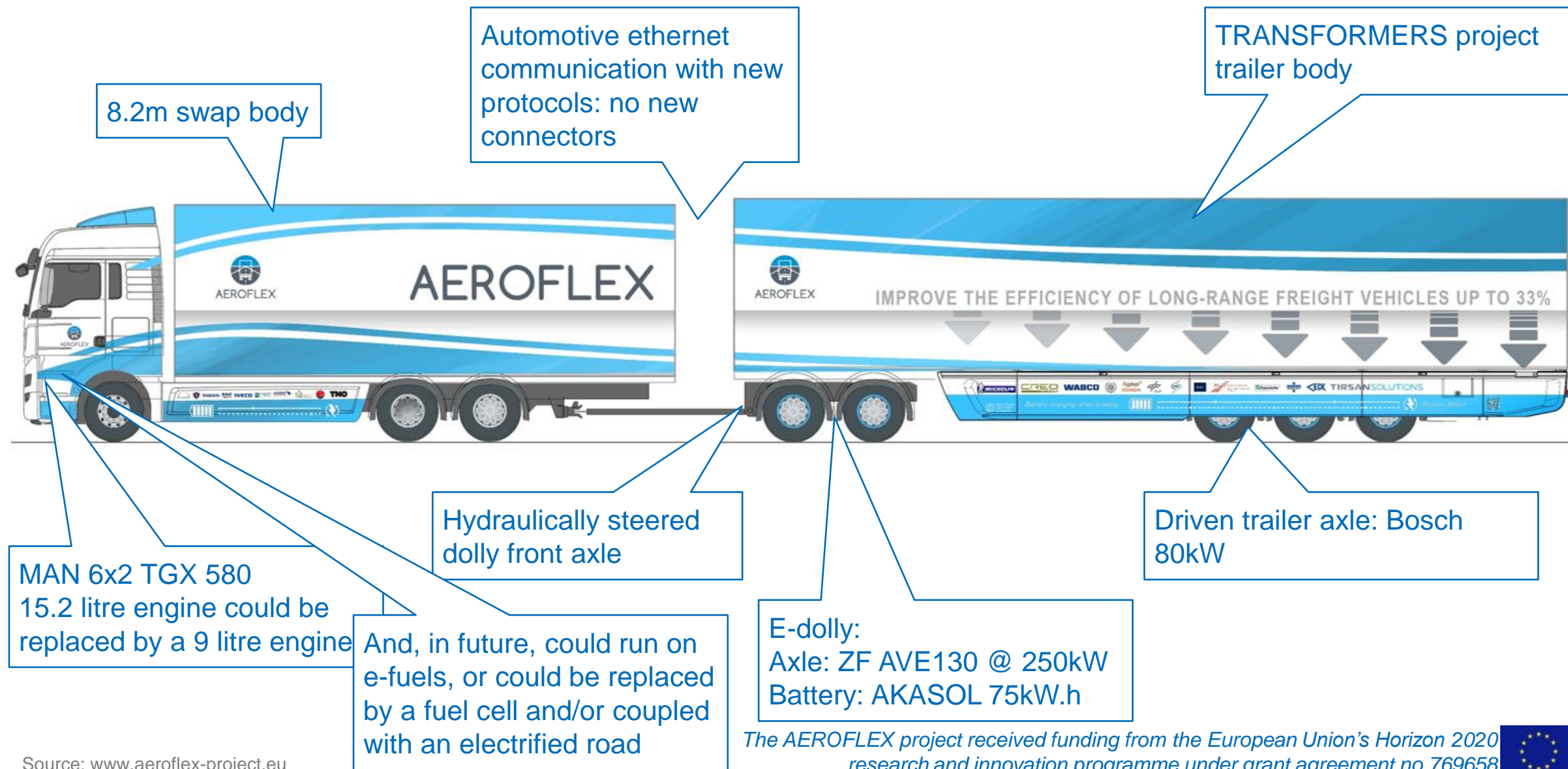
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- The (new) Target: Net-Zero at 2050
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What can be done to validate the projections?




- Technology development
- Analysis tools development
- Incentivised demonstrations

An example of technology development



Source: www.aeroflex-project.eu





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Thank you for your attention

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