Cenex tools

KITE – How can I plan my e-truck depot?

and

TEIDE – If I place a charge point here, how much utilisation will it have?

Dr. Rishabh Ghotge
The Green Mobility Exchange,
Amsterdam, NL
12th May 2026

Co-funded by
the European Union

Transport Decarbonisation Challenge

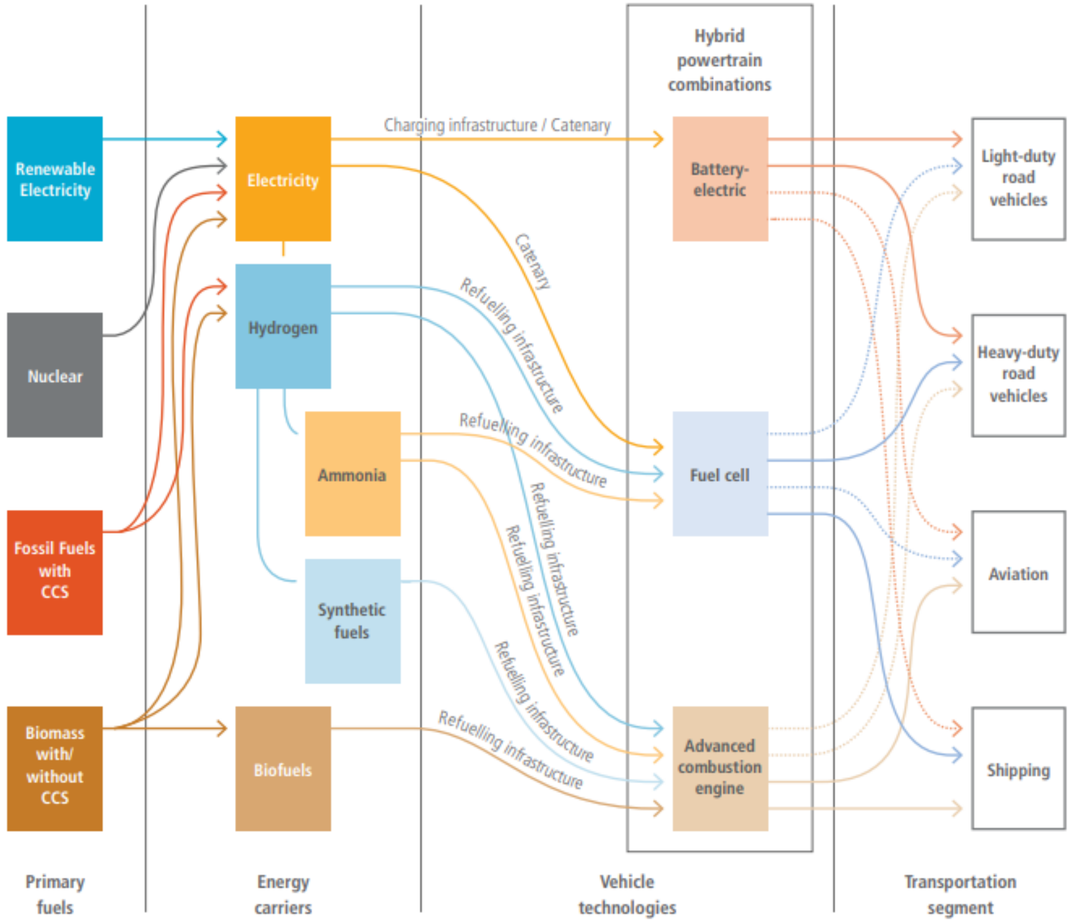


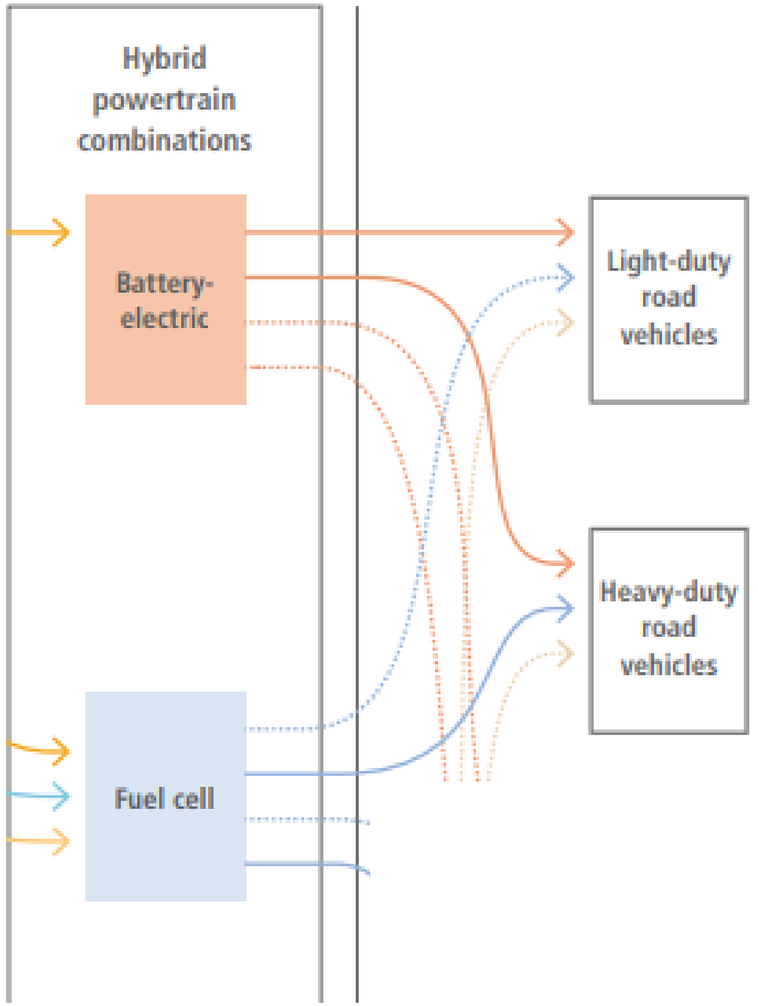
Figure 10.2 | Energy pathways for low-carbon transport technologies. Primary energy sources are shown in the far left, while the segments of the transport system are in the far right. Energy carriers and vehicle technologies are represented in the middle. Primary pathways are shown with solid lines, while dotted lines represent secondary pathways.

Source: Intergovernmental Panel on Climate Change (IPCC)

Truck Decarbonisation Challenge

BEV Challenges:

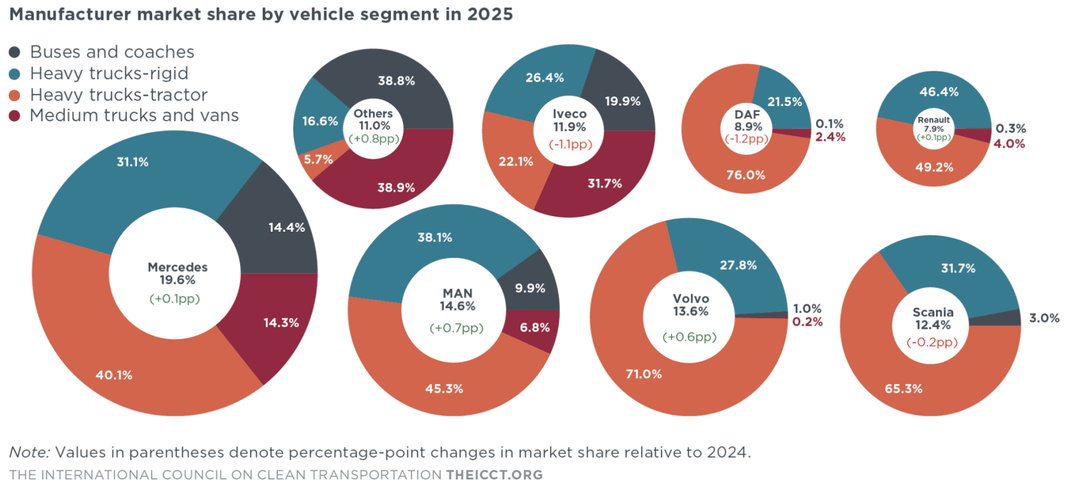
- Higher mileage requires bigger (more expensive) batteries
- Heavier loads require bigger (more expensive) batteries
- Bigger batteries require more powerful chargers for which the grid is not ready
- Strict requirements on the battery weight and volume



Source: Intergovernmental Panel on Climate Change (IPCC).

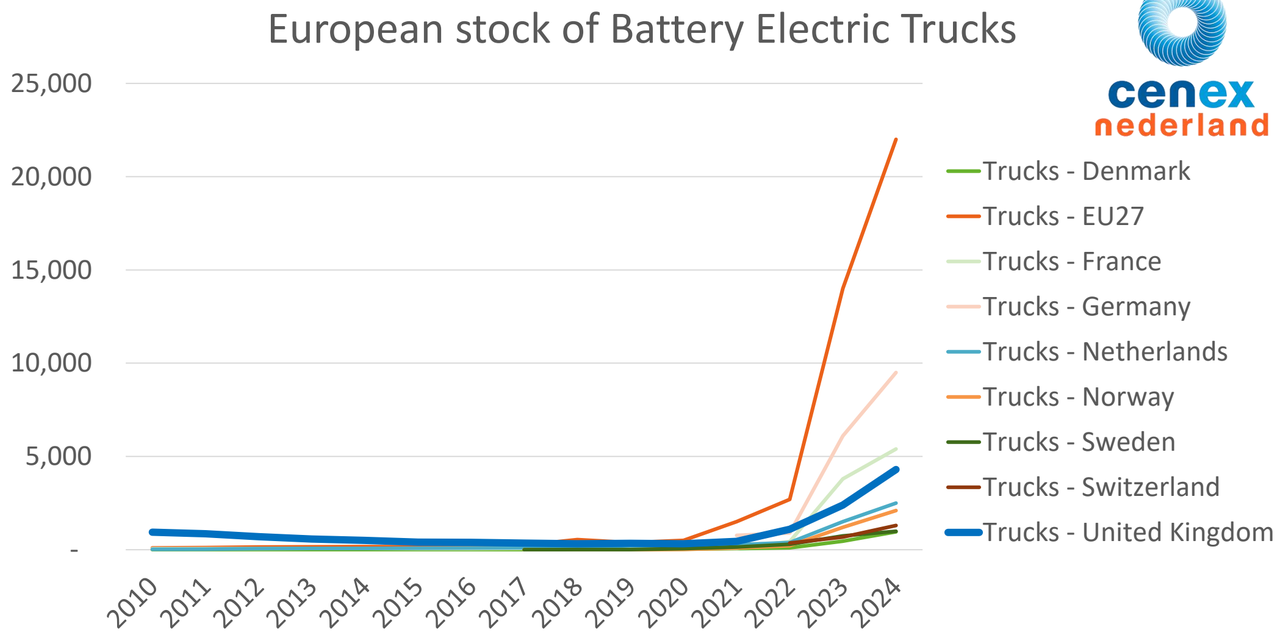
Battery Electric Trucks: Status Quo

- Around 400,000 Battery Electric Trucks globally (as of 2024)
- Most of them in China (360,000 or 90%)
- Big markets in Europe are Germany, France, the UK, the Netherlands, Norway and Switzerland



Note: Values in parentheses denote percentage-point changes in market share relative to 2024.
THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION **THEICCT.ORG**

Source: International Council on Clean Transportation, 2026



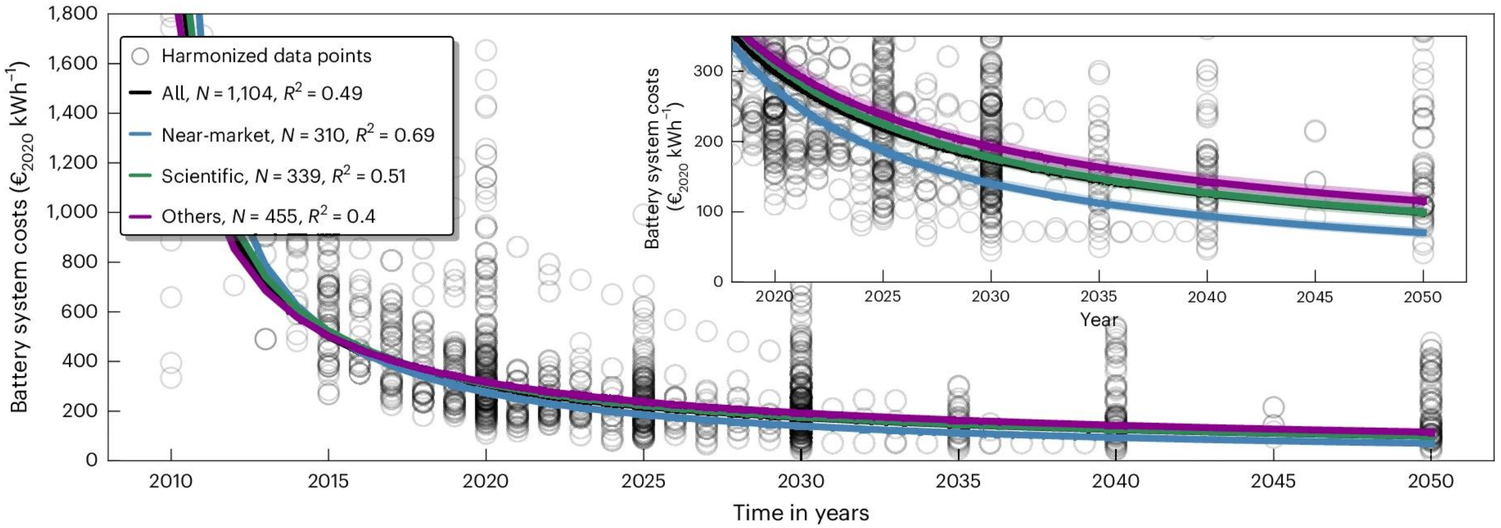
Source: International Energy Agency Global EV Data Explorer (accessed July 2025)

- Traditional players dominate the electrified heavy duty market

What is driving Heavy Duty electrification?

- Rapid drops in battery costs for trucks
- Policies to reduce emissions and urban air pollution
- Requirements for larger companies to report emissions:
  - Streamlined Energy and Carbon Reporting (SECR)
  - Corporate Sustainability Reporting Directive (CSRD) in the EU

Projections for heavy ZET battery system costs

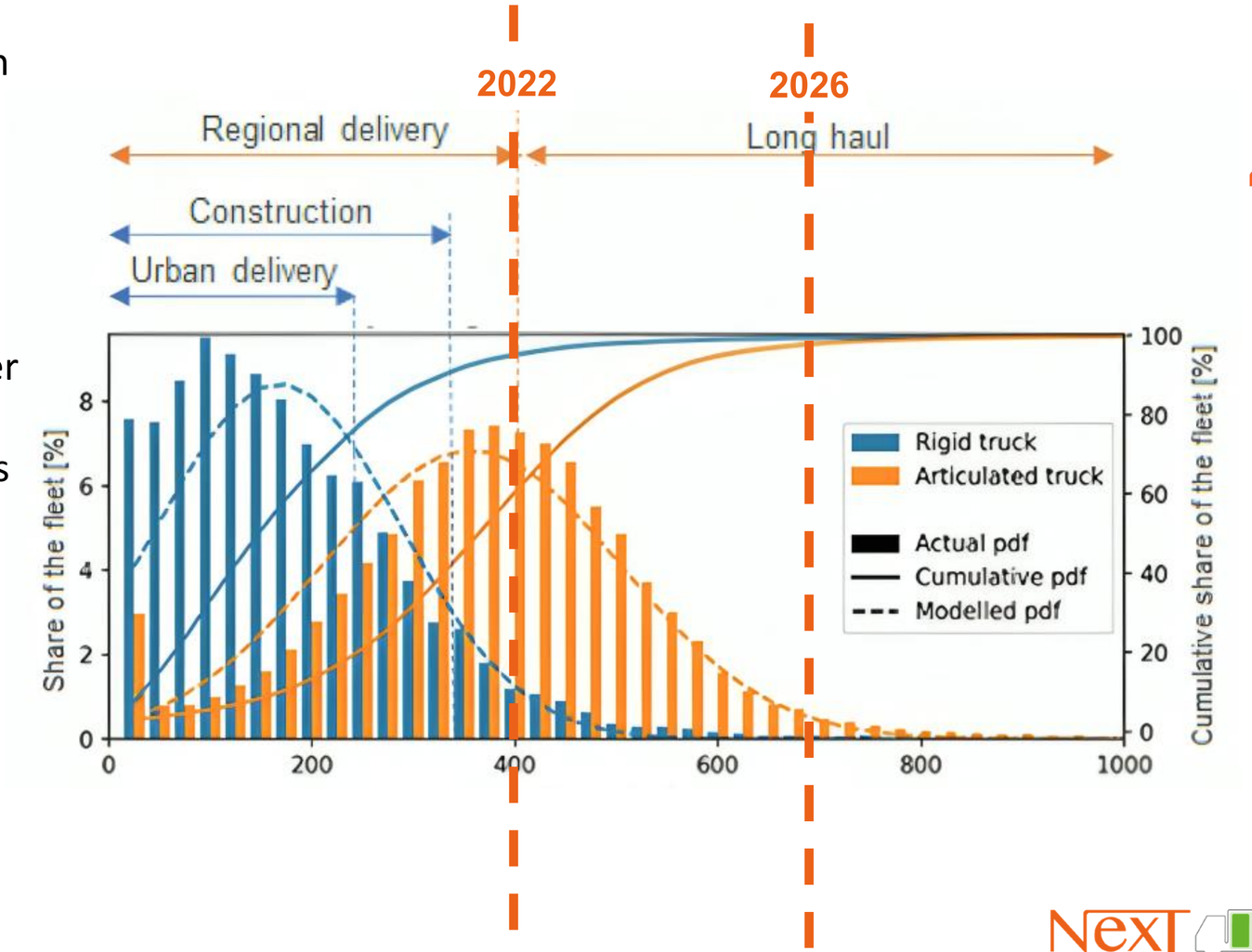


Source: Link, S., Stephan, A., Speth, D. et al. Rapidly declining costs of truck batteries and fuel cells enable large-scale road freight electrification. Nat Energy 9, 1032–1039 (2024). https://doi.org/10.1038/s41560-024-01531-9

What's Possible Today

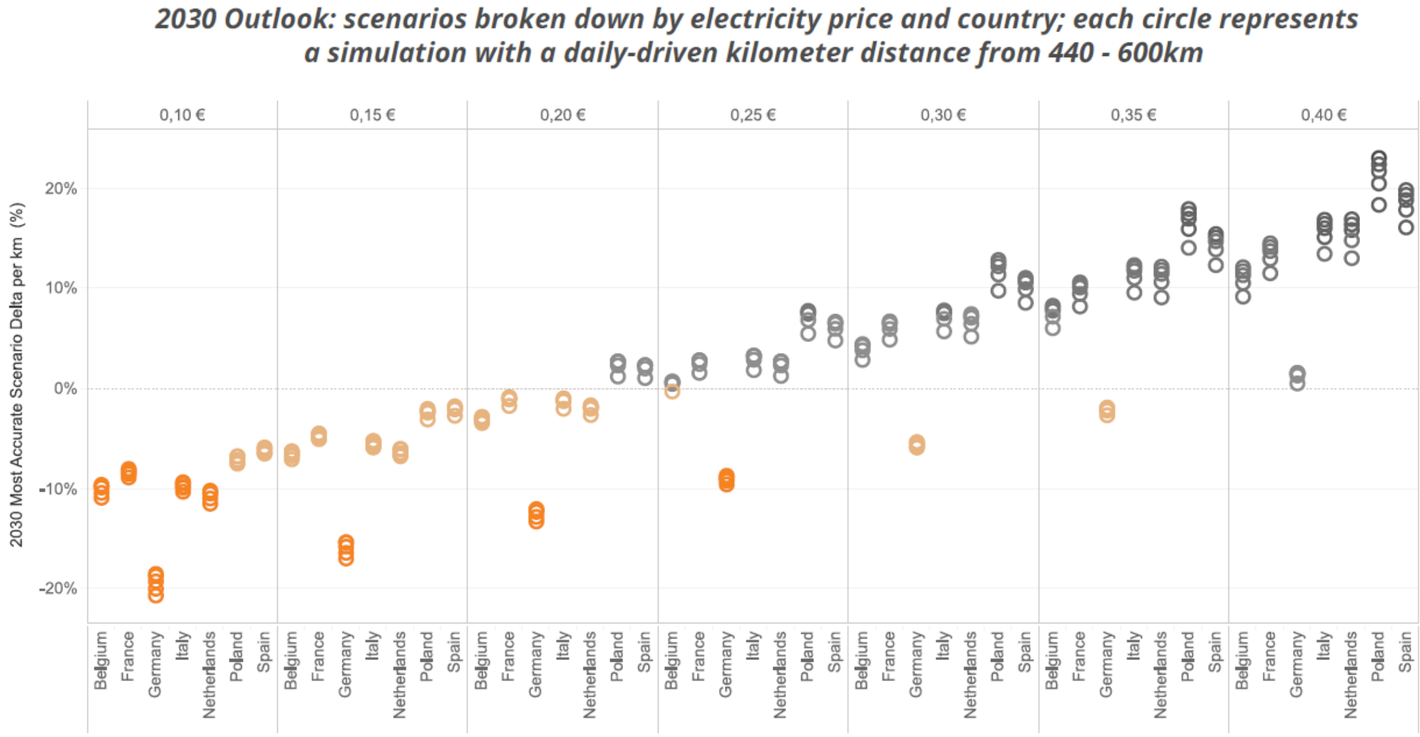
Today's (2026) highest range Heavy Duty Trucks.
New models from Volvo have spec sheet ranges of 700 km.

- BEV range: easier to cover existing urban and regional delivery fleets with lower mileage
- Typical longhaul daily mileage is higher
- Newer Heavy-Duty BEV models can cover the required range for an increasing percentage of typical longhaul applications



Source: Tol et al, Techno-economic uptake potential of zero-emission trucks in Europe (2022)

What's next?



Source: Sennder, 2025

- TCO parity with diesel was expected in the next few years for last-mile, urban applications, even without subsidies. Longhaul applications were expected to achieve parity a bit later.

- Recent diesel cost hikes likely to have made parity already.

Today’s challenges

- Availability of electric trucks
- Access to financing (upfront costs remain high)
- Clarity on current possible range vs fleet requirements
- Reliable information on costs of truck and depot electrification
- Timely & affordable access to grid connections
- Availability of public and shared charging infrastructure
- Development of electricity market knowledge for lowering costs

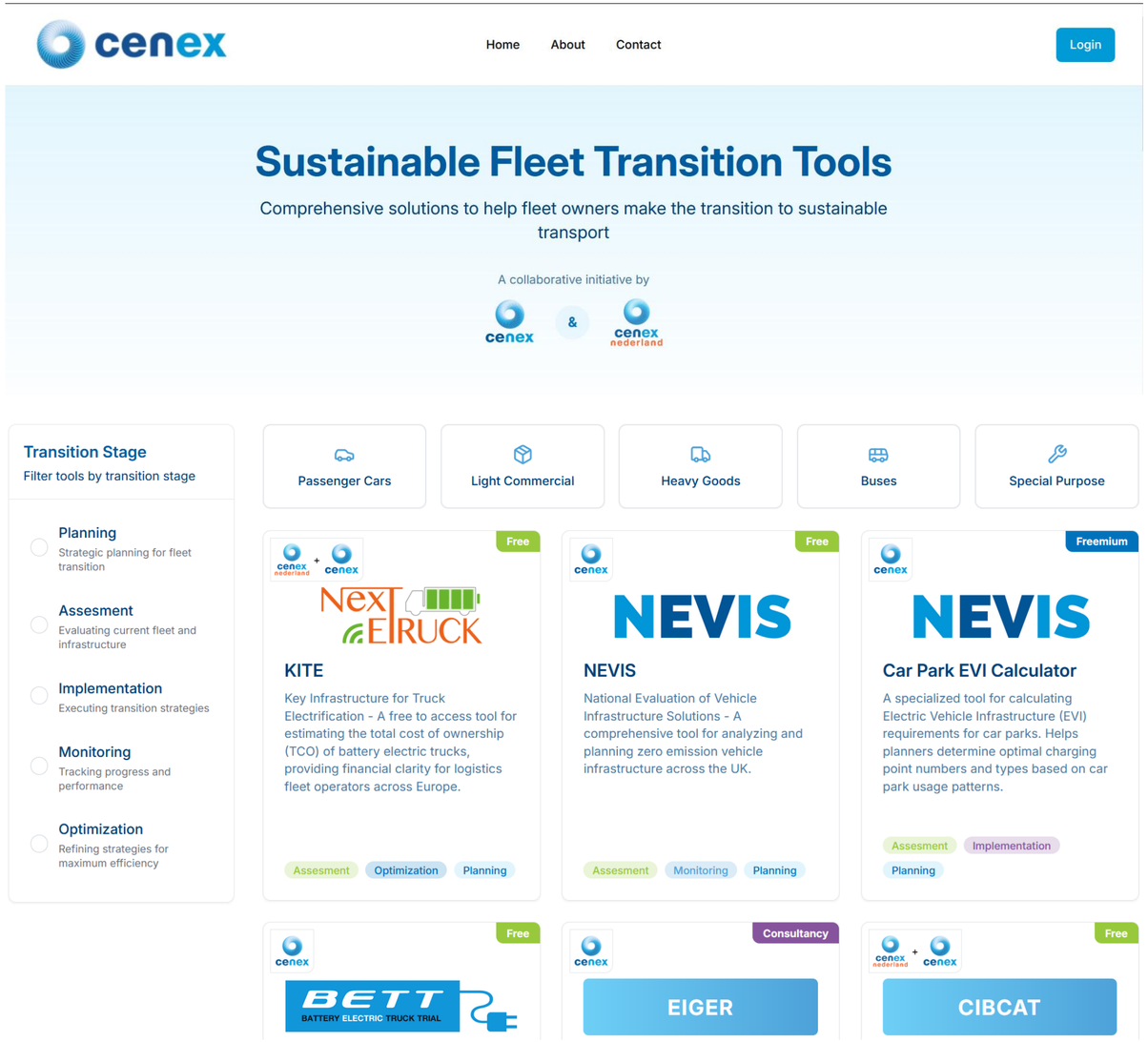
Today’s challenges

- Availability of electric trucks
- Access to financing (upfront costs remain high)
- Clarity on current possible range vs fleet requirements
- Reliable information on costs of truck and depot electrification
- Timely & affordable access to grid connections
- Availability of public and shared charging infrastructure
- Development of electricity market knowledge for lowering costs

KITE

TEIDE

Cenex tools



https://cenex-tools.io/
https://cenex.cademy.io/

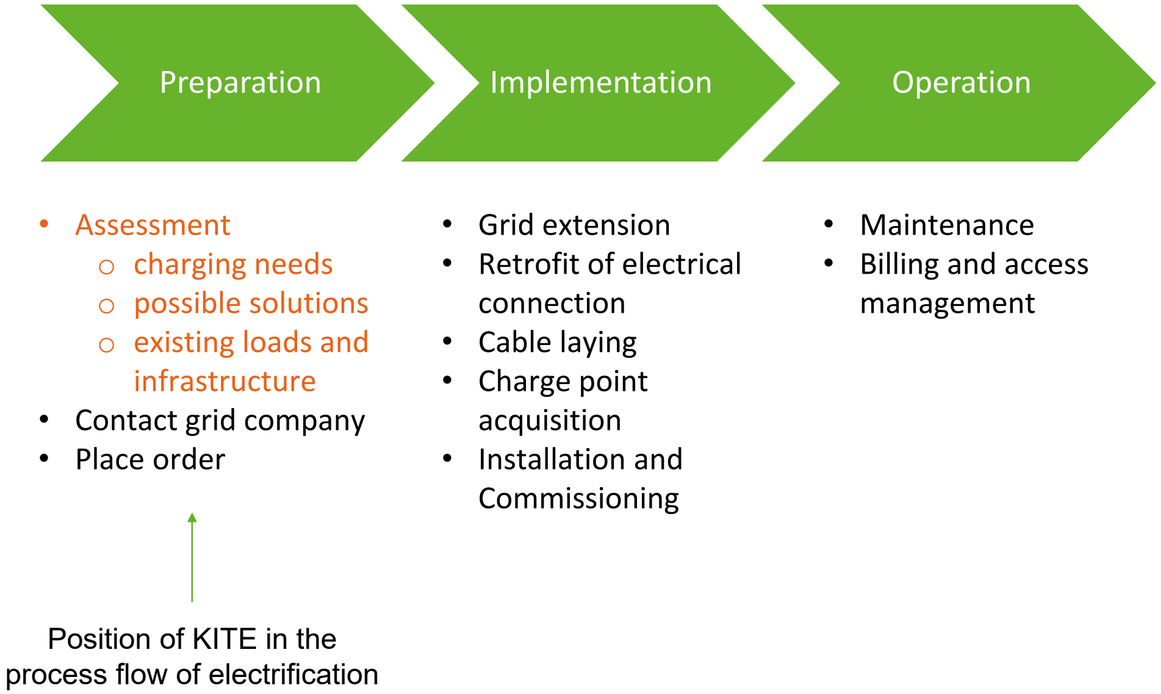
- Range of digital tools to help with various stages of fleet decarbonisation
- Heavy duty, passenger cars, micromobility, shared mobility, etc.
- Many tools are free, created from research projects
- Online course for Continuous Professional Development or general learning

KITE – Key Infrastructure for Truck Electrification

Target audience:
Logistics operators in small companies (<20 trucks) who are planning to electrify their depots

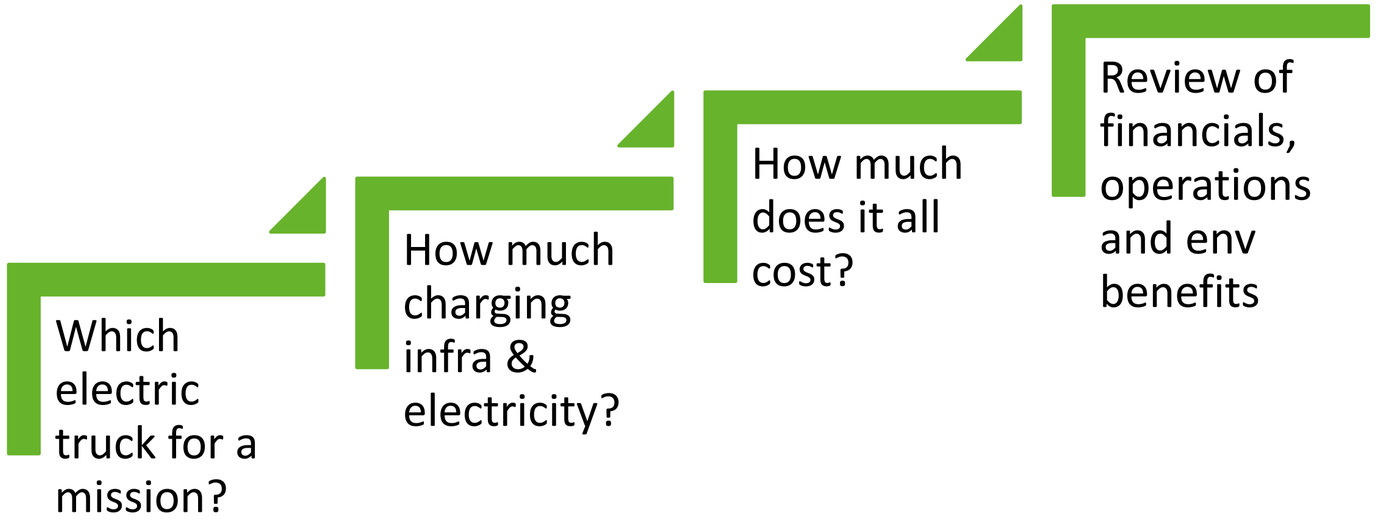
Fully online, no downloading of executables

Free to access

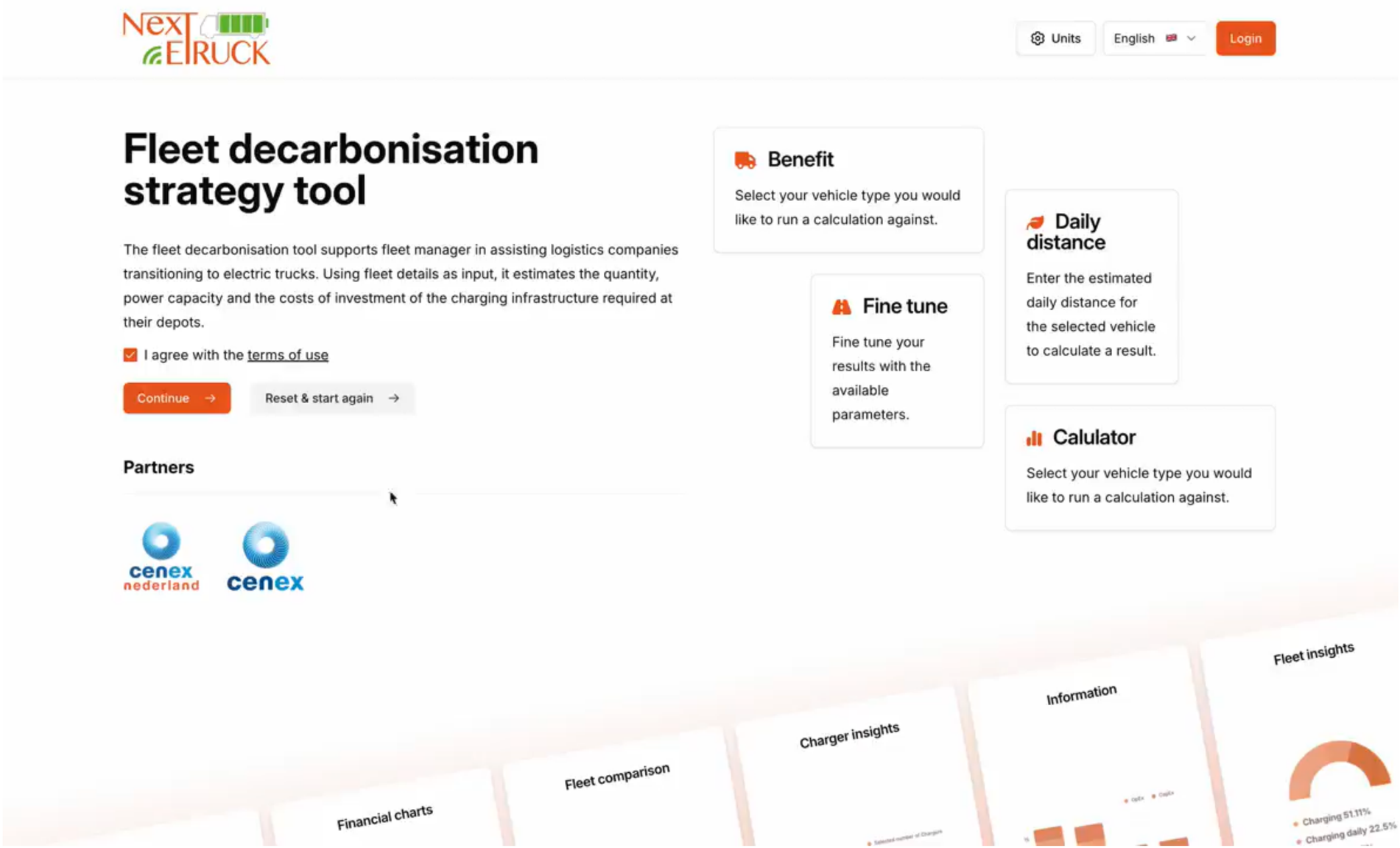


KITE – what can it be used for?

- Check the average capabilities of various types of electric trucks
- Estimate the truck charging infrastructure required
- Estimate the total cost of ownership (TCO)
- Identify truck routes where the TCO of electric trucks is low
- Match truck with lowest TCO route.



KITE – process flow



KITE – main advantages and limitations

Advantages

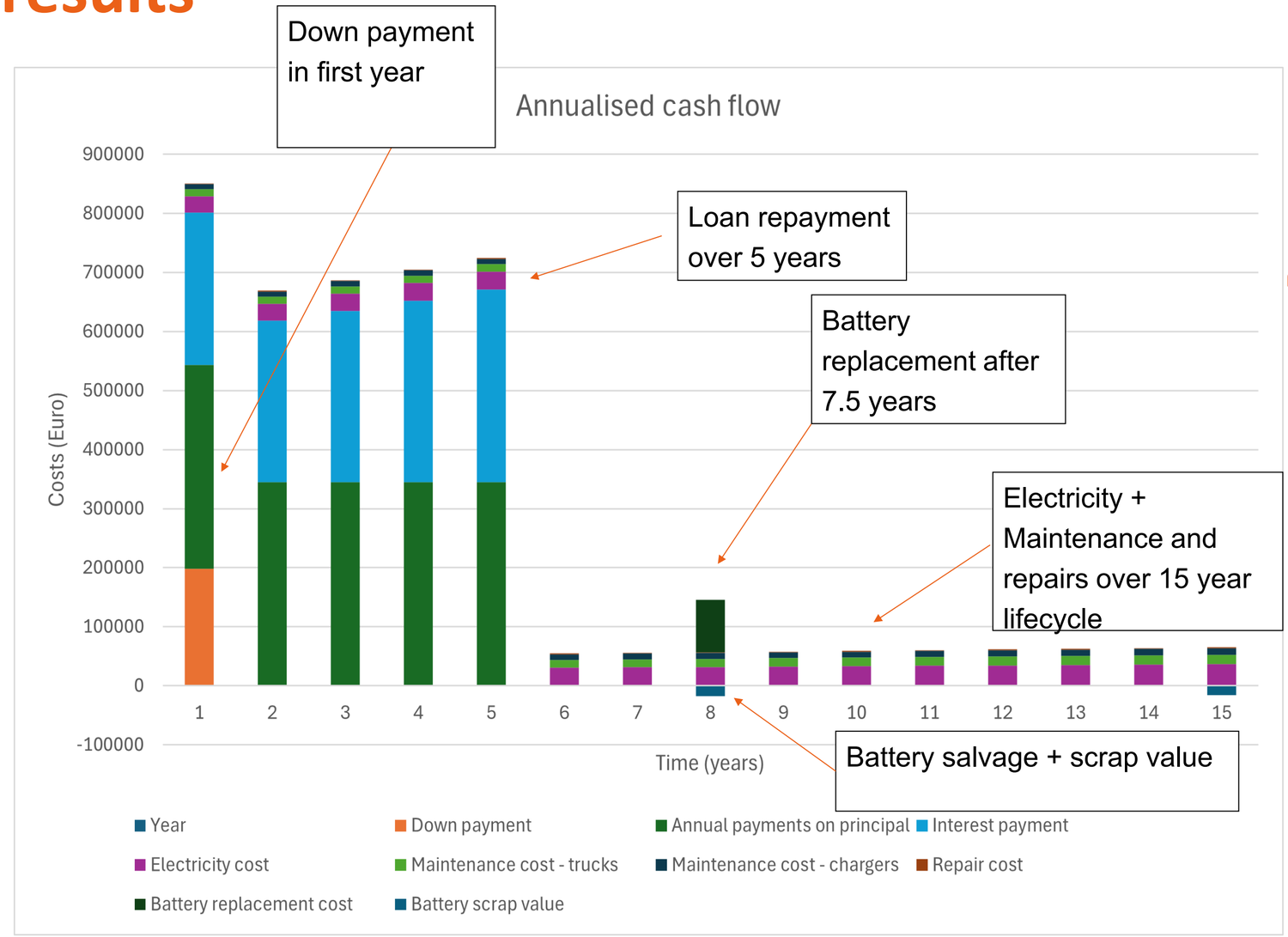
- Includes many features
  - Infra sizing
  - TCO
  - Grid upgrade estimation
  - Battery salvage
  - GHG emissions
- Default values for many European countries
- Highly customisable for local requirements

Limitations

- Mainly focused on depot charging at a single depot.
- No national and sub-national level subsidies
- Does not consider time-of-use tariffs, V2G or stationary battery storage

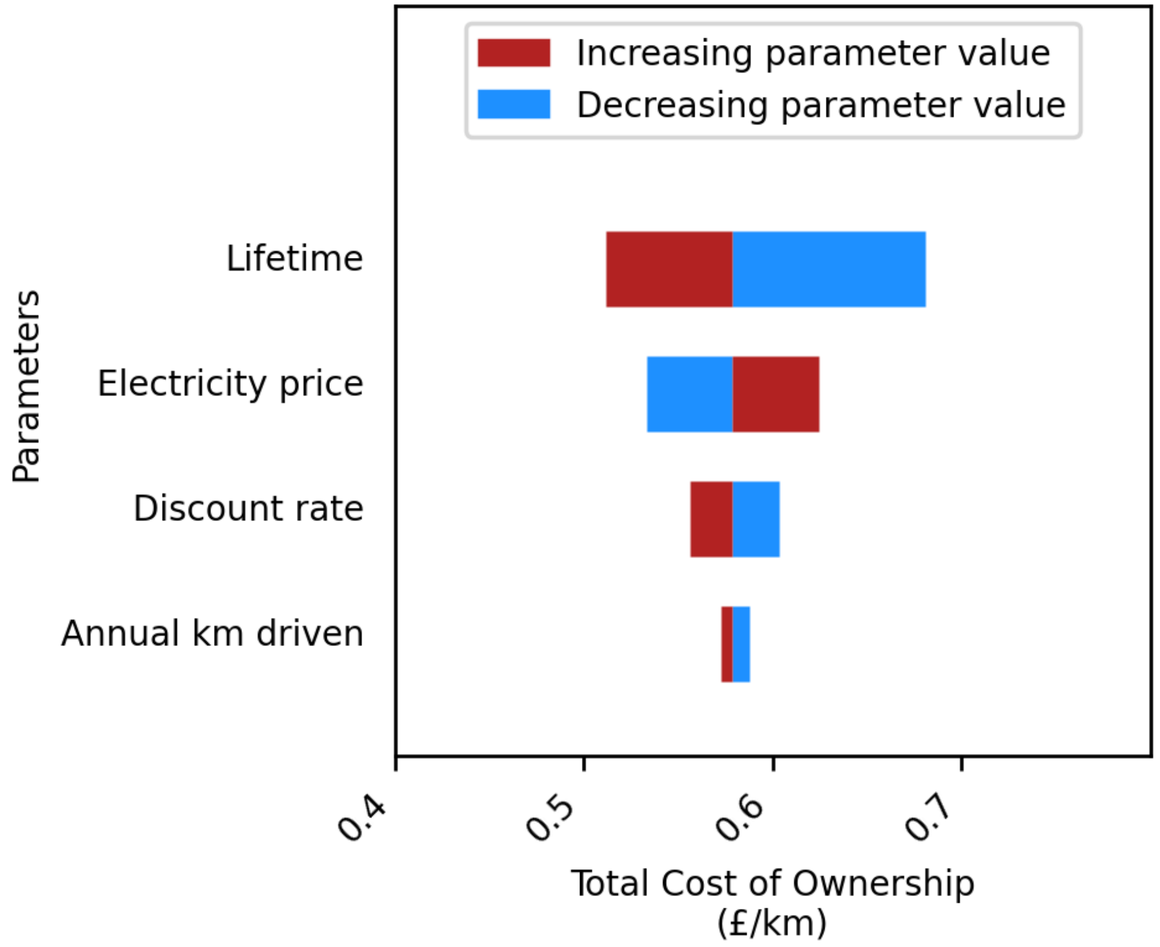
KITE – Analysing the results

- Upfront costs of battery electric trucks remain 1.5 to 3 times as high as diesel.
- Battery replacement is needed around 7 to 8 years
- TCO per km is very sensitive to
  1) Lifetime of operation
  2) Electricity price
  3) Discount rate



KITE – Sensitivity of etruck TCO – UK case study

- TCO/km is sensitive to various parameters
- Longer lifetime, lower electricity price, higher discount rate and higher km driven all reduce the TCO.
- TCO/km is most sensitive to lifetime and electricity prices
- Actual TCO is very sensitive to km per year, effect less visible per km



KITE - Main takeaway messages

- Battery electric trucks are close to diesel in total cost of ownership. For some fleets, battery electric is cost competitive.
- The main reason is lower cost per electric-km.
- The number of fleets for which battery electric trucks are cost competitive will increase.
- TCO/km reduces with longer lifetime, lower electricity prices and longer annual distances.
- There is considerable scope for further reduction in TCO of battery electric vehicles due to vehicle design improvements, battery cost reduction and digitalisation/optimisation of route-planning.
- The KITE tool is freely available to help with planning for electrification.

Today’s challenges

- Availability of electric trucks
- Access to financing (upfront costs remain high)
- Clarity on current possible range vs fleet requirements
- Reliable information on costs of truck and depot electrification
- Timely & affordable access to grid connections
- Availability of public and shared charging infrastructure
- Development of electricity market knowledge for lowering costs

KITE

TEIDE

TEIDE – En route charging

Coverage

Are we enabling all drivers access to equitable EV charging?

Will we meet peak demand without queues?

Utilisation

EV adoption rate

Competition (existing chargers)

How many EV driver pass, visit or stay at or near this location

Will drivers want to or need to charge there?

- Do they have other cheaper charging arrangements? e.g. home charging.
- Is the site safe, well-lit and have accessibility provision?

Installation

Land suitability, accessibility and planning

Pavement widths (on-street charging only)

Grid connection costs, distance to substation

TEIDE – Tool for Evaluating Infrastructure Deployment En Route

Purpose:
To forecast the energy-based utilisation of chargepoints installed at en route locations (journey charging).

Target audience:
CPOs who are planning public charging infrastructure for passenger vehicles and Heavy-duty vehicles

Outputs:
- Future chargepoint utilisation.
- Average daily charging sessions.
- Annual energy delivered.
- Annual margin for the site.

"If you put chargepoints at this en route location, what (energy based) utilisation will you get now, and in the future."

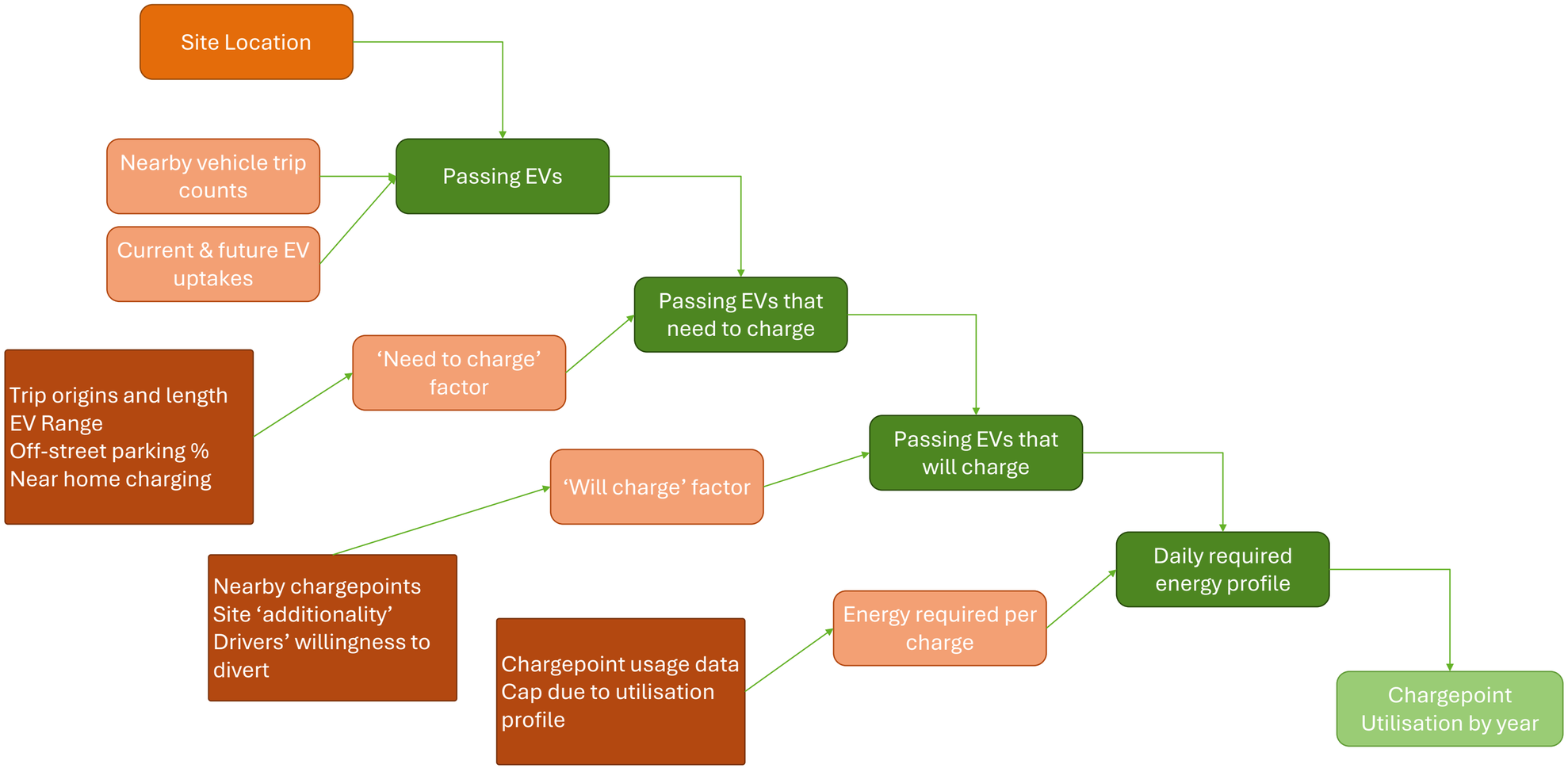
TEIDE – what can it be used for?

- Show how utilisation might vary throughout the day and year (data permitting).
- Provide recommendations of top locations to site en route charging.
- Inform on offer for wider retail revenue.

But TEIDE will not

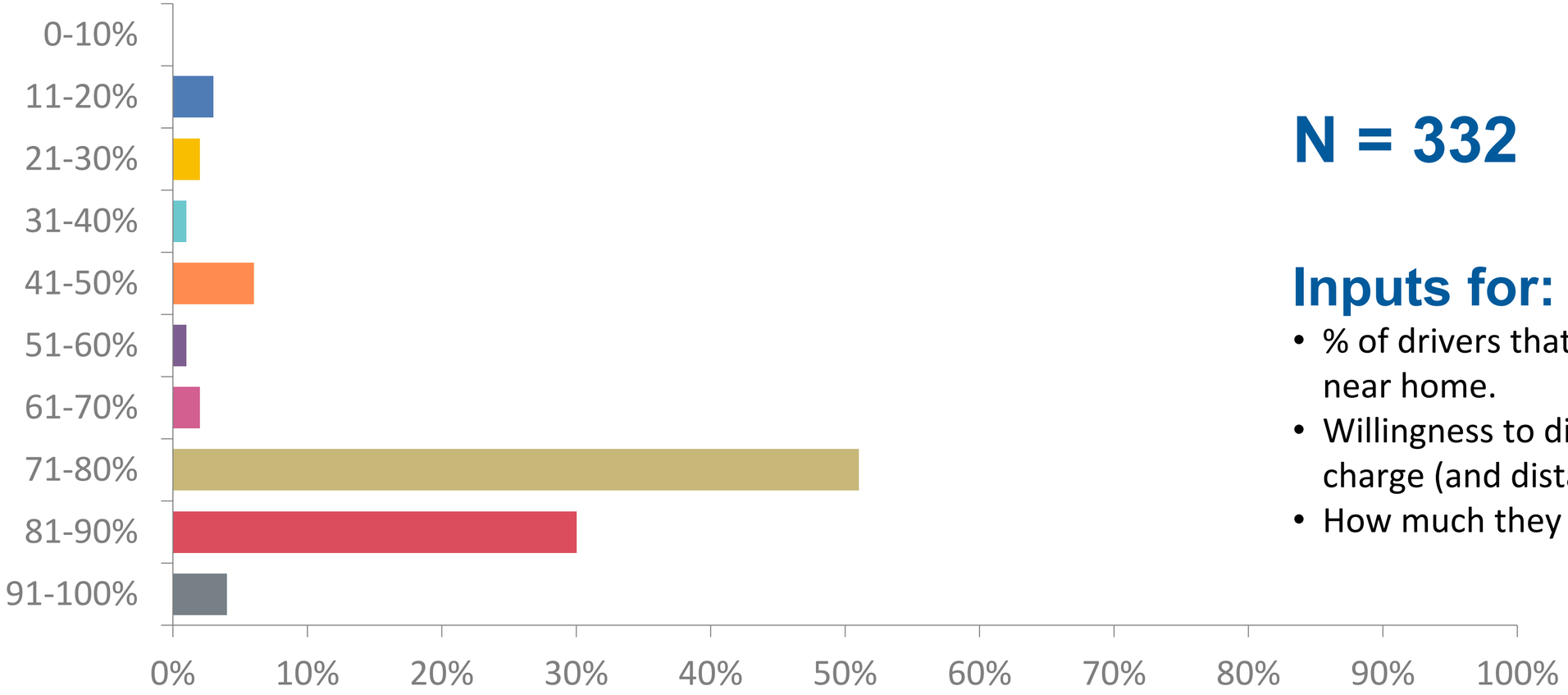
- Say how feasible it is to put charging there (e.g. grid connection).
- Provide the business case for charging (other tools do this).

TEIDE – how it thinks?



TEIDE – modelling of driving behaviour when looking for charging with survey data

Q: On average, what percentage state of charge would you typically seek to charge your vehicle to whilst en-route charging?

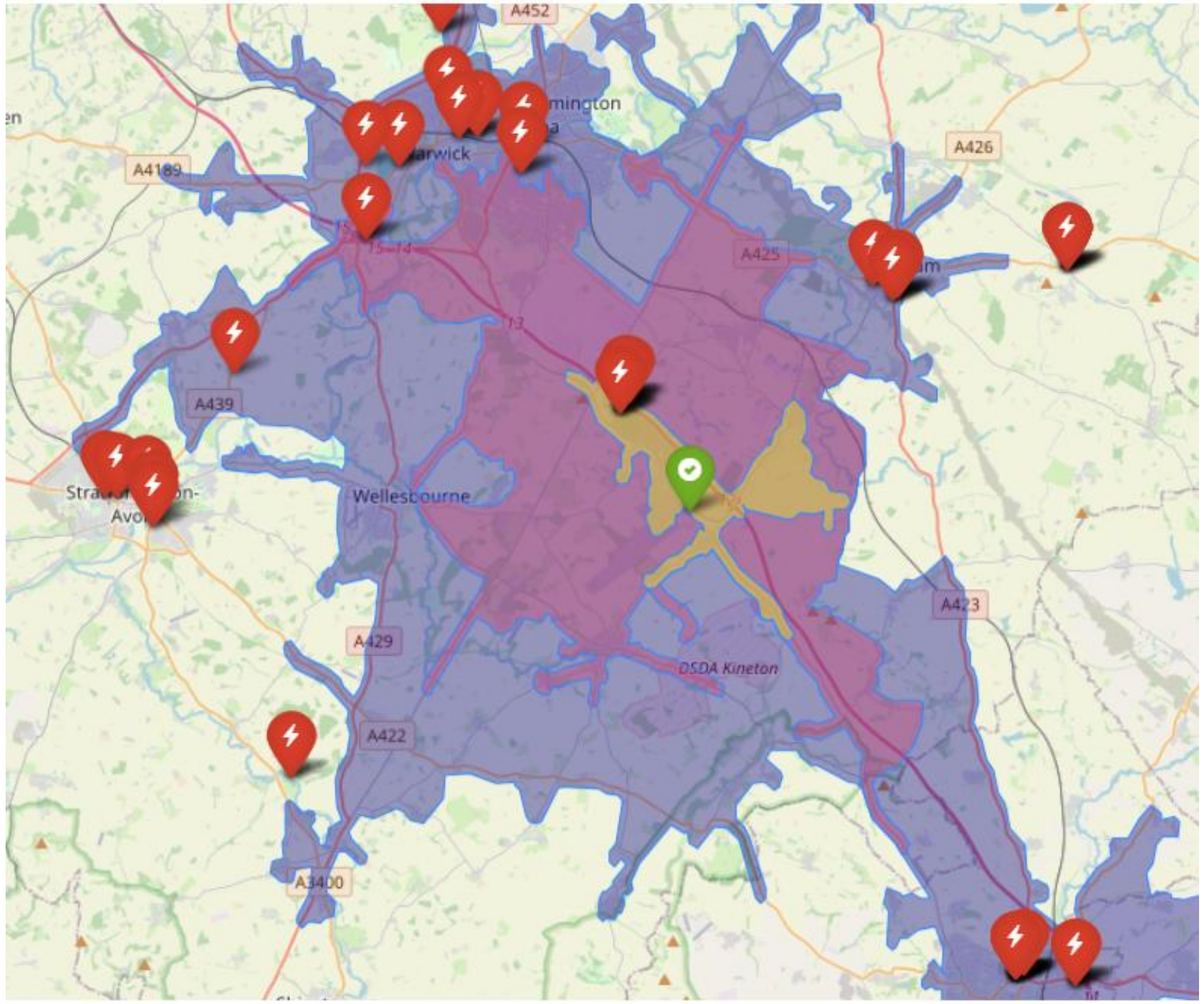


N = 332

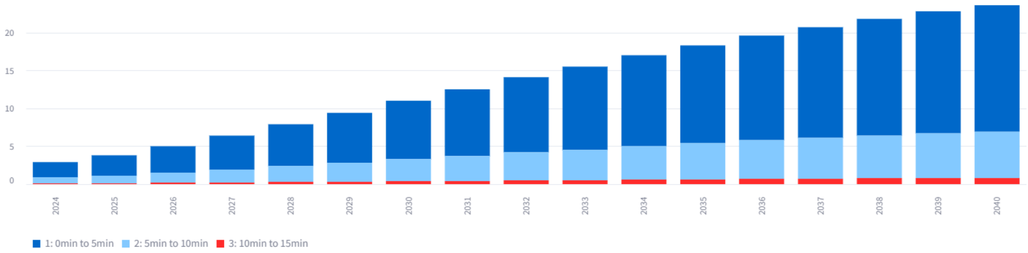
Inputs for:

- % of drivers that can charge at or near home.
- Willingness to divert their journey to charge (and distance).
- How much they recharge by.

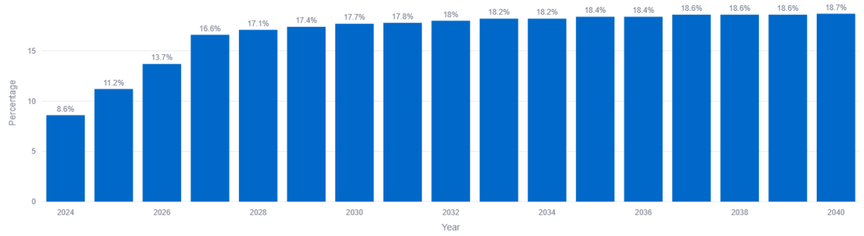
TEIDE – example site at the British Motor Museum



Daily EVs that may charge at site – no future competition

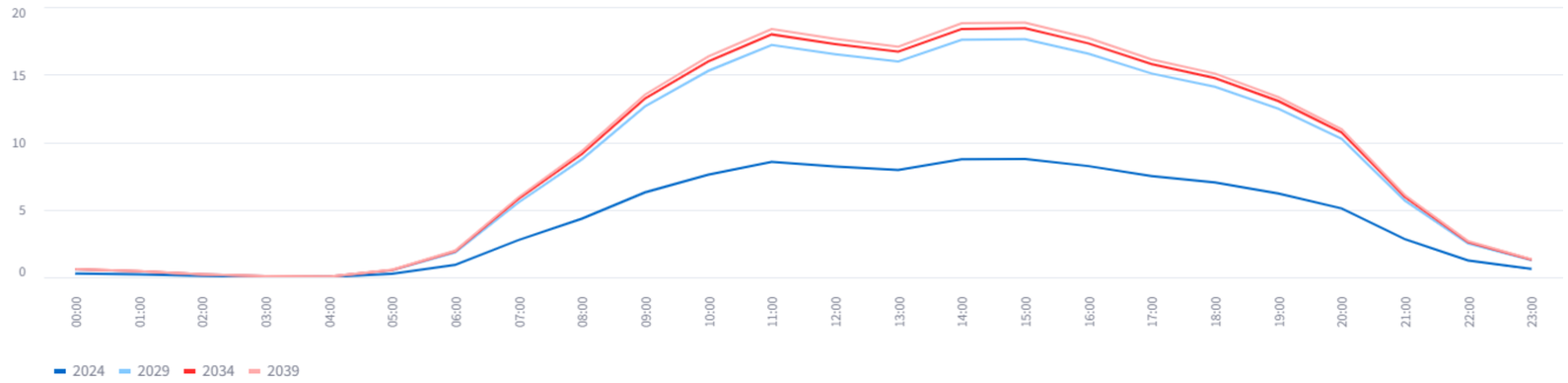


Energy based utilisation – future competition

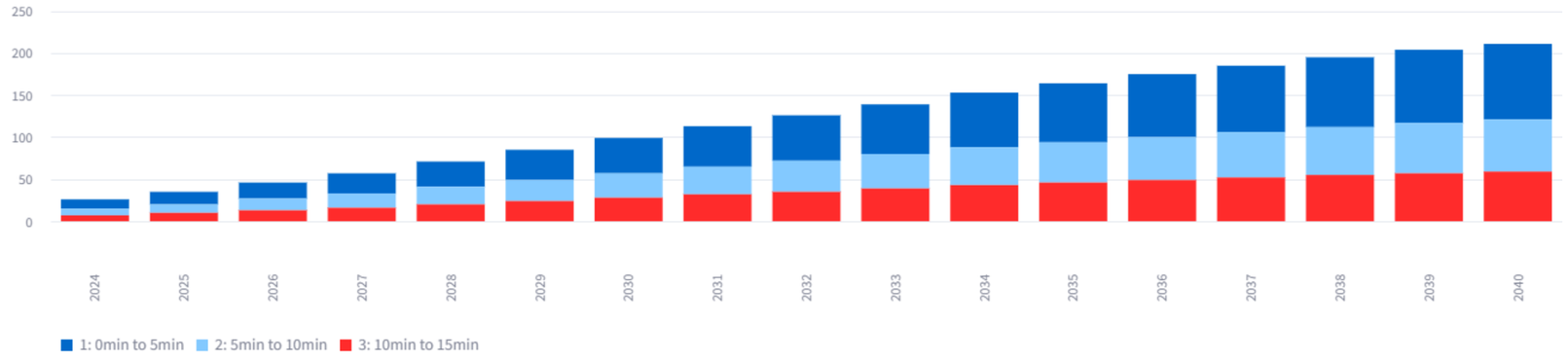


TEIDE – example site at the British Motor Museum

Chargepoint energy profile (kWh)



Required 50kW Chargers in each isochrone at 20% utilisation



TEIDE – main advantages and limitations

Advantages

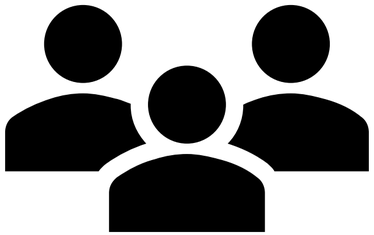
- Traffic-flow based assessment of sites
- Adjustable for EV adoption forecasts (optimistic to pessimistic)
- Applicable to passenger vehicles ans well as Heavy Duty
- Easy replication to new locations (countries), and scalable for batch processing of sites

Limitations

- Validation done at a few sites, but that is not generaliseable to all locations
- Currently enabled only for UK and NL
- Does not consider grid connection, etc. factors for site feasibility study

TEIDE – where can I get one?

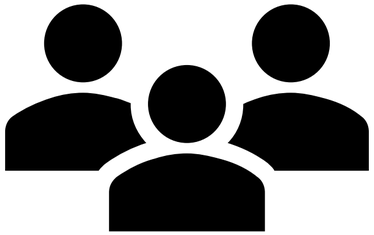
SaaS



TEIDE
subscription

€

Consultancy



Utilisation per location,
site ranking

List of locations
+ €

TEIDE - Main takeaway messages

- Site selection for truck charging is challenging
- There are not a lot of e-trucks now, and these sites are expensive to install
- Utilisation is critical for a successful business case
- Some other factors are important too, but Location, Location, Location
- A site that expects high utilisation does not mean the site is feasible. But it is the necessary pre-requisite for an economically sustainable charging plaza.
- The TEIDE tool can help estimate utilisation at a given site.

Connect with us

Dr. Rishabh Ghotge

With many thanks to Dr. Sophie Naylor & the Bootmine team for KITE and Greg Payne for TEIDE

@nextetruck

NextETRUCK

nextetruck.eu

Co-funded by the European Union