

# Total cost of ownership and future prospects of battery electric freight vehicles

**German Aerospace Center**

Institute of Vehicle Concepts | Stuttgart, Germany

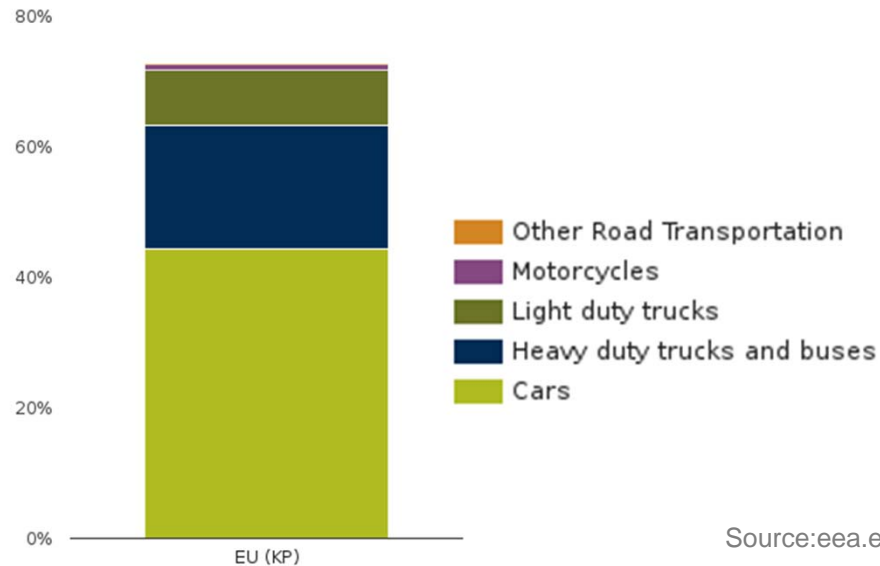
Özcan Deniz | [oezcan.deniz@dlr.de](mailto:oezcan.deniz@dlr.de)



Knowledge for Tomorrow

# Climate targets of the EU

## Share of road transport GHG emissions in EU (2016)



## Proposed EU-Target for light (vans) and heavy duty vehicles

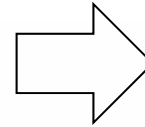
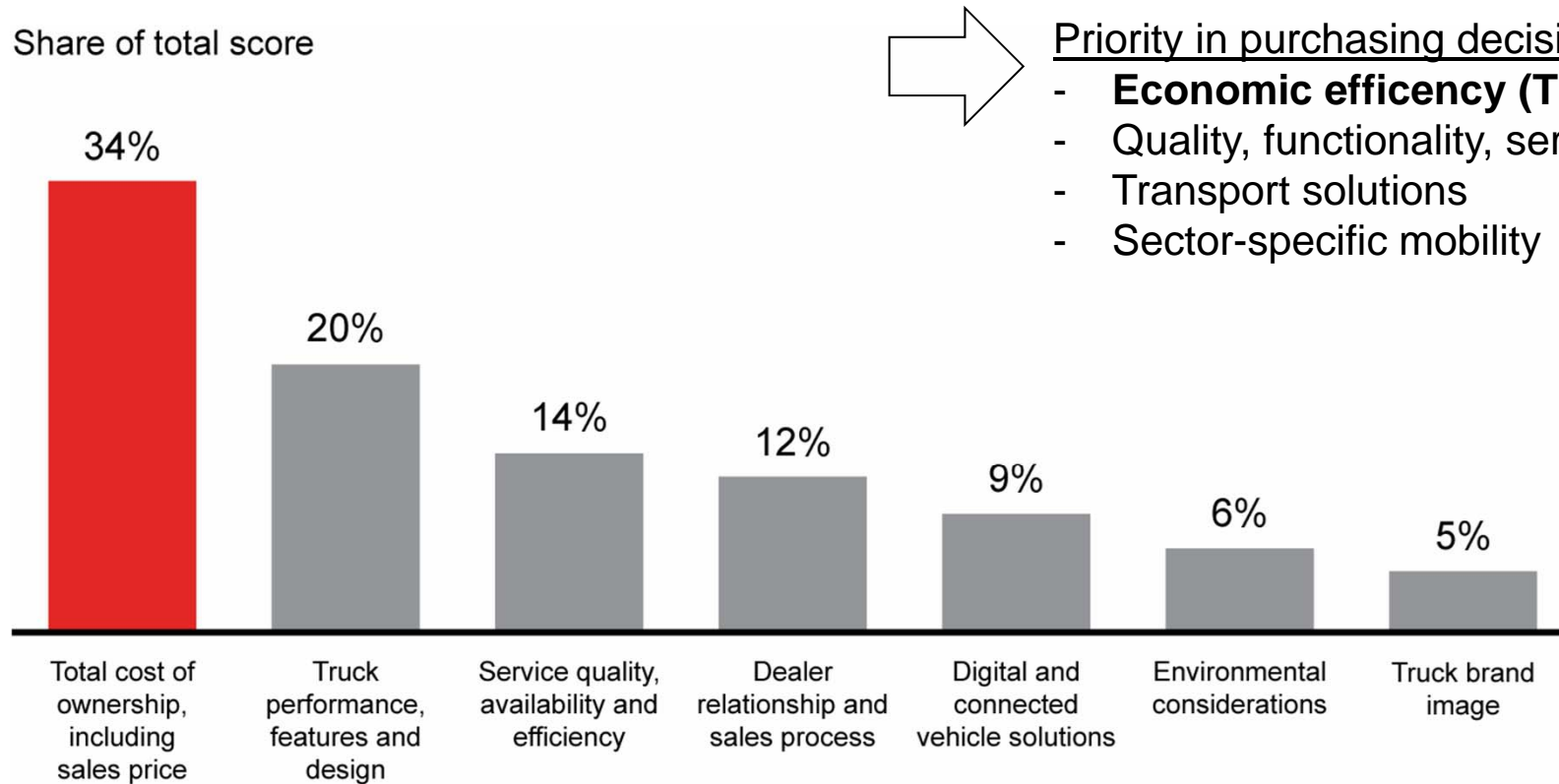
- Different proposals from **EU Commission** and **EU Parliament**
- 2025: **-15%/-20%** of emissions compared to 2019 (LDV) and 2021 (HDV)
- 2030: **-30%/-35%** of emissions
- For LDV in g CO<sub>2</sub>/km and for HDV in g CO<sub>2</sub>/tkm

**Development and market introduction of alternative freight vehicle is essential**



# Purchasing decision criteria of commercial vehicle

Share of total score



Priority in purchasing decision:

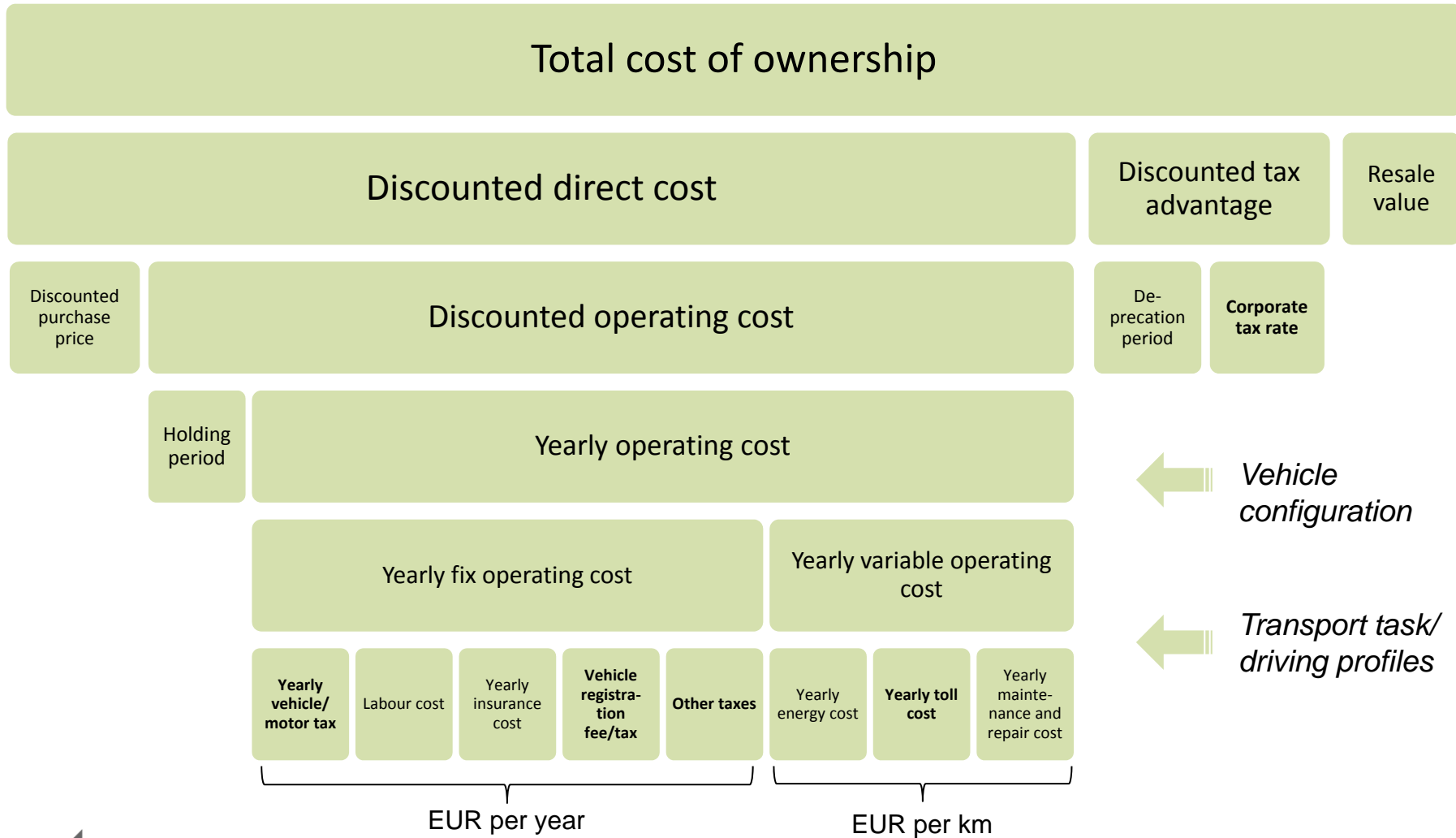
- **Economic efficiency (TCO)**
- Quality, functionality, service
- Transport solutions
- Sector-specific mobility

Note: Respondents were asked to rank their top three criteria (No. 1 criterion weighted by 3, No. 2 by 2 and No. 3 by 1)  
Source: Bain 2018 European Truck Survey (n=533, from France, Germany, Poland and the UK)



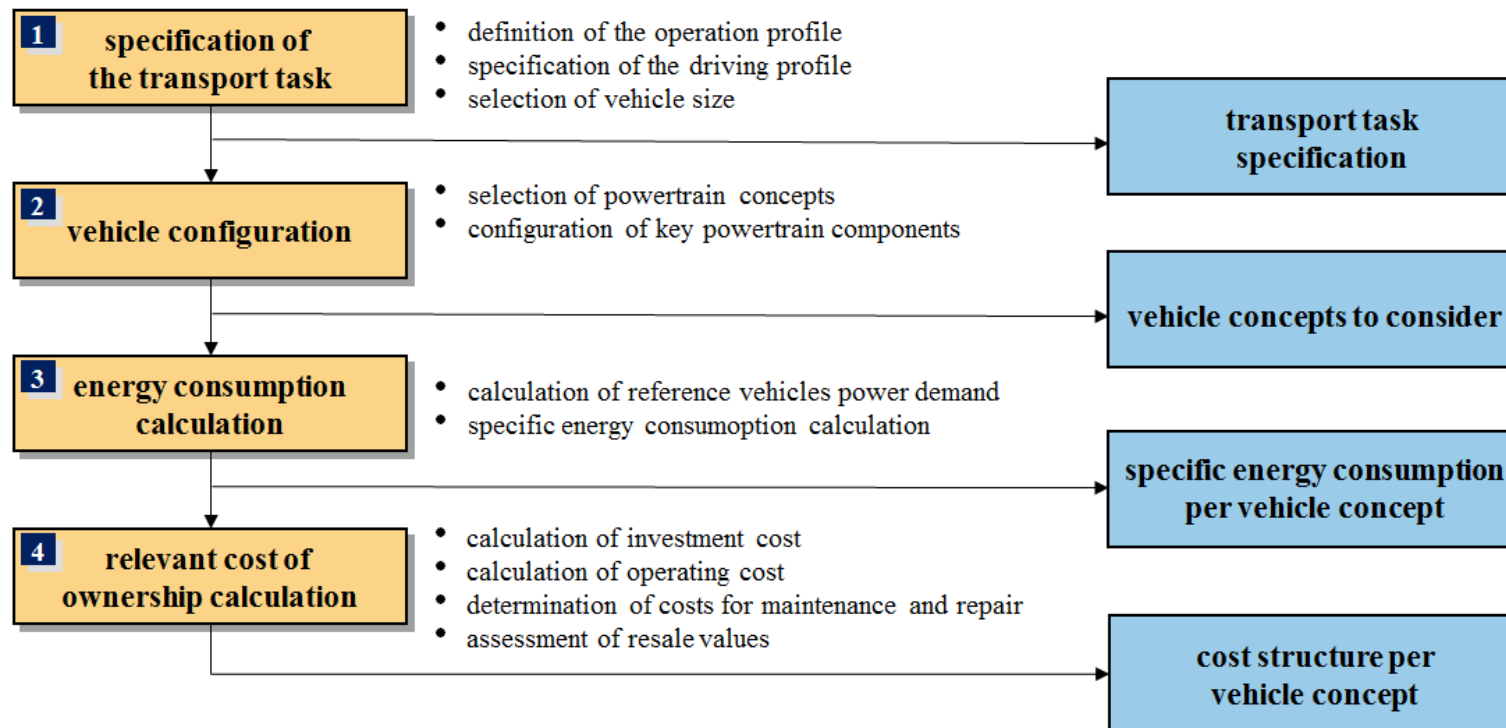


# Total cost of ownership structure



# Transport Application based Cost Model (TACMO)

techno-economic evaluation approach for the assessment of future commercial vehicle concepts coping with the complexity of the road freight transportation sector



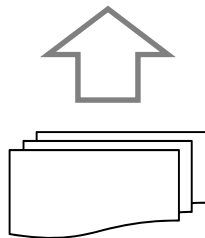
Source: TACMO (F. Kleiner, 2017)



# With the right applications, electric freight vehicle integration can already reduce running costs of fleets.

## EVs in city logistics concepts

- Analyse the economic feasibility of individual cases and sector specific applications including different vehicle types
- Distinction between theoretical operation and real fleet operational by tracking and using user-specific driving profiles



**Fleet composition** (vehicle types / weight class and propulsion technologies) and **driving profiles** of the vehicles (daily mileage, mission times, etc.)





# IAA Commercial Vehicles 2018

The central statement of the IAA 2018 :

*Electric mobility is now on the road, the models go into series! Above all, this applies to the e-vans, and increasingly also to city buses. The medium-weight distribution truck will also be electrified. (Source: iaa.de)*

Mercedes-Benz eVito



Source: mercedes-benz.com

VW eCrafter



Source: volkswagen-nutzfahrzeuge.de

Man eTGE



Source: truck.man.eu

Available

Mercedes-Benz eActros



Source: mercedes-benz.com

VW eDelivery



Source: volkswagen-nutzfahrzeuge.de

Man eTGM

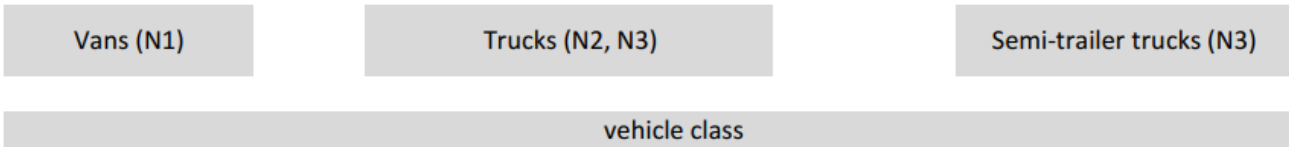
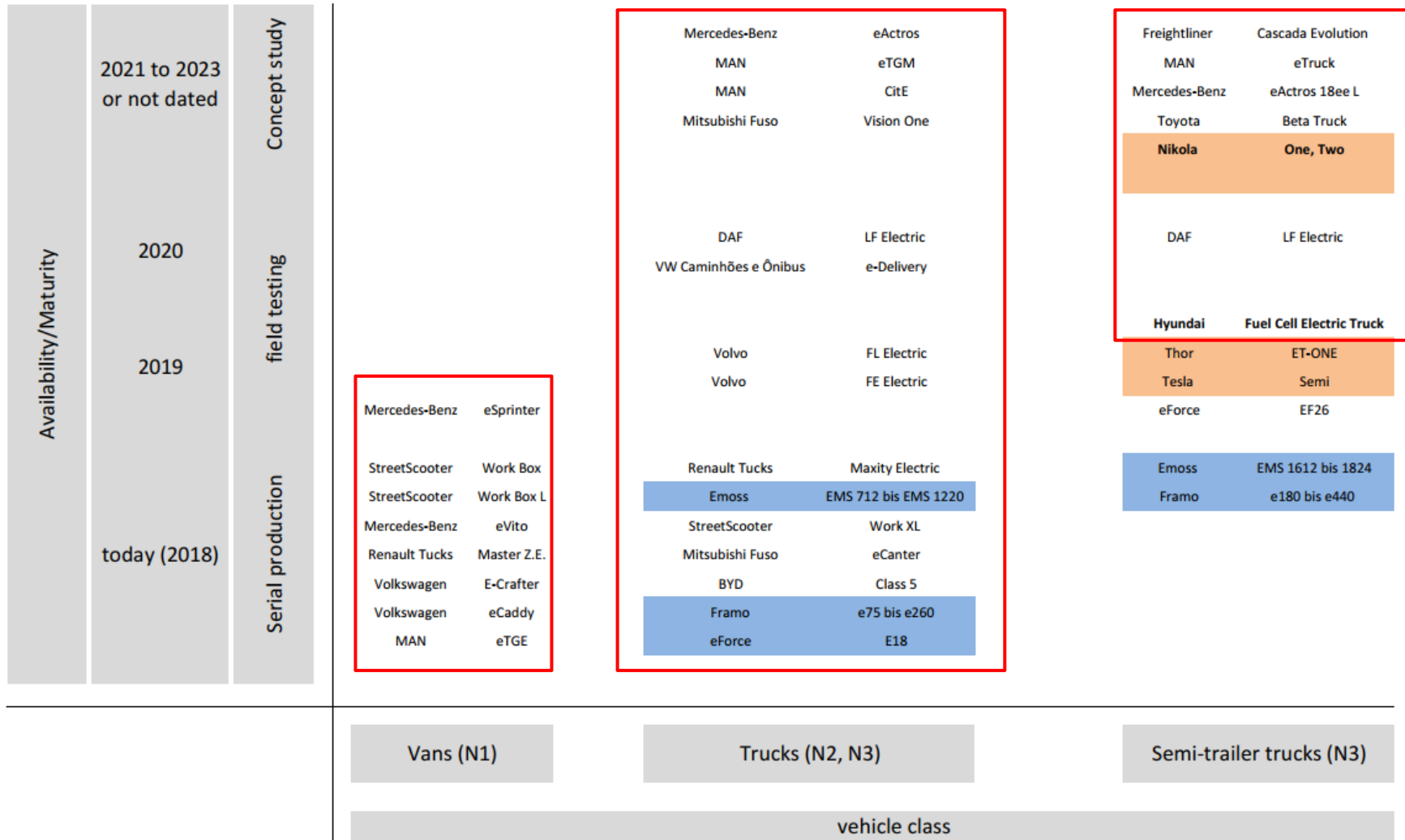


Source: truck.man.eu

being tested



# Roadmap Electric Freight Vehicles



Legend:

- Vehicle modifier
- New manufacturers
- Fuell cell technology





# New prospects in the global truck market

- More and more start-ups especially from the USA entering the truck market with innovative concept vehicles

Tesla Semi (BEV, 800 km)



Source: tesla.com

Thor ET-One (BEV, 480km)



Source: auto-motor-sport.de

Nikola One (FCEV, 1600km)



Source: nikolamotor.com

- Asian manufactures see potential in fuel cells, especially for heavy freight vehicles

Toyota Beta Truck (480 km)



Source: golem.com

Hyundai Fuel Cell Electric Truck (400km)



Source: auto-motor-sport.de



# Thank you for your attention!



**German Aerospace Center**

Institute of Vehicle Concepts | Stuttgart, Germany

**Özcan Deniz** | [oezcan.deniz@dlr.de](mailto:oezcan.deniz@dlr.de)

Telephone +49 711 6862-8637



Knowledge for Tomorrow

