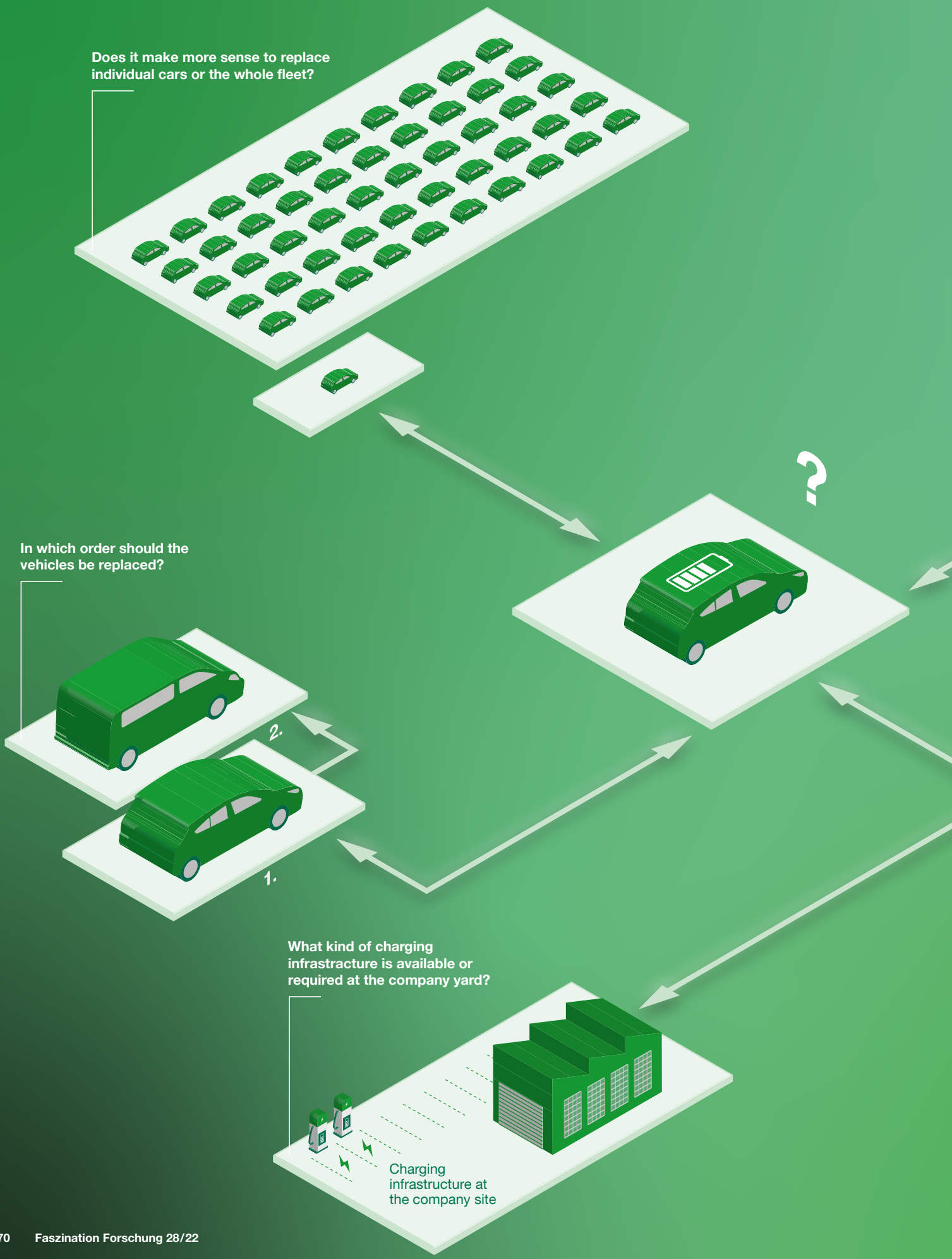
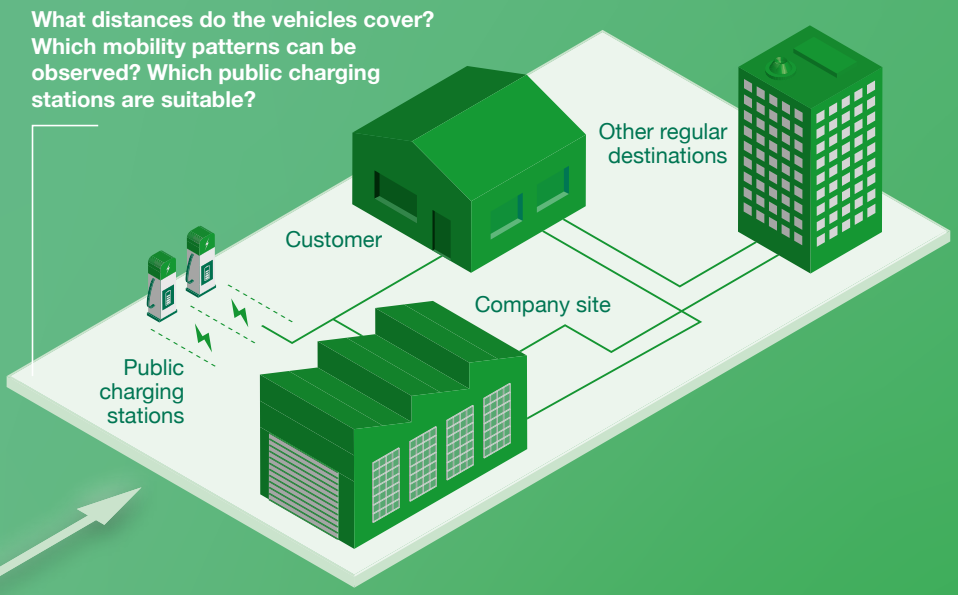

Does it make more sense to replace individual cars or the whole fleet?
?
In which order should the vehicles be replaced?
2.
1.
What kind of charging infrastracture is available or required at the company yard?
Charging infrastructure at the company site



How Much Electromobility Do You Need?

Link

www.mos.ed.tum.de/ftm

Graphics: edundsepp

Gesamter Artikel (PDF, DE): www.tum.de/faszination-forschung-28

Wie viel E-Mobilität darf's denn sein? D

Ist Elektromobilität für mich bzw. für mein Unternehmen sinnvoll und lukrativ? Welche Elektromobilitätslösung bietet sich an? Antworten liefert WATE. Das digitale Beratungstool analysiert anhand des Mobilitätsverhaltens, ob bzw. welche Elektroautos geeignet wären – und steht für Forschungsprojekte parat. □

Would e-mobility be a sensible, lucrative choice for me and my company? Which solutions would be most suitable? WATE has the answers.

Here's a scenario: A Munich-based trade business has nine vehicles, from utility vans to speedy urban runabouts. The managing director is now considering electrifying the fleet – to save costs, reduce emissions and thereby do something good for the environment. It's a decision that needs to be carefully weighed up. WATE, the Web-based Analysis Tool for Electromobility developed at TUM, can provide valuable assistance.

In the first step, WATE records motion data for each of the vehicles. This involves either an app or a data logger. In this case, the manager opts for the data logger, which has also been developed in-house at TUM and records data with even greater accuracy than the app. From the very first day, she can view virtual logbooks and access interactive analyses: How many kilometers are my vehicles driving? Where exactly are they? How long are their journeys, how fast are they driving, and how long are they stationary? After WATE spent a few weeks collecting data, it is time for the all-important question: Would it make sense to switch my vehicles from conventional combustion engines to battery electric vehicles (BEV)? WATE can test out that scenario by conducting simulations. This entails referring to a vast database containing the key energy consumption characteristics of BEV. The manager can now play out different scenarios. What would happen if she replaced the city cars or utility vans with battery electric alternatives? What models are available? Weather is also taken into account, for example; after all, the battery loses energy more quickly in cold temperatures and therefore has a shorter range in winter. WATE, however, not only analyzes the vehicles themselves but also the charging infrastructure. Would private

“WATE is a brilliant tool for playing out what-would-happen-if scenarios.”

Lennart Adenaw

or public charging points be able to provide the EVs with a sufficient supply of electricity? Beyond that, WATE can also forecast suitable charging point configurations in terms of their number and output as well as the potential synergies with an in-house photovoltaic system.

What would happen if we fully embraced electromobility?

“WATE is a brilliant tool for playing out what-would-happen-if scenarios,” as Lennart Adenaw, head of the Smart Mobility Lab at the Chair of Automotive Technology, states. “When it comes to charging infrastructure, in an age when battery capacity and charging performance are improving, there’s a lot of scope for action, which can lead to very different investment plans.”

WATE has been publicly available in various stages of development since 2017. “The feedback has been very positive,” enthuses Adenaw. “A lot of people are amazed about all the insights we can draw from the data.” The findings regarding charging infrastructure are particularly wide-ranging. “We can determine, for example, that a lot of people overestimate the required charging capacity and therefore the number of charging points they need,” says Adenaw. By contrast, the connections for apartment buildings are often undersized, which can result in additional costs if users exceed agreed peak loads. ▷

Graphics: ediundsepp

1

Collecting data

Smartphone

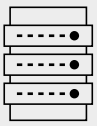
Data logger

GPS

Speed

Acceleration

Data processing

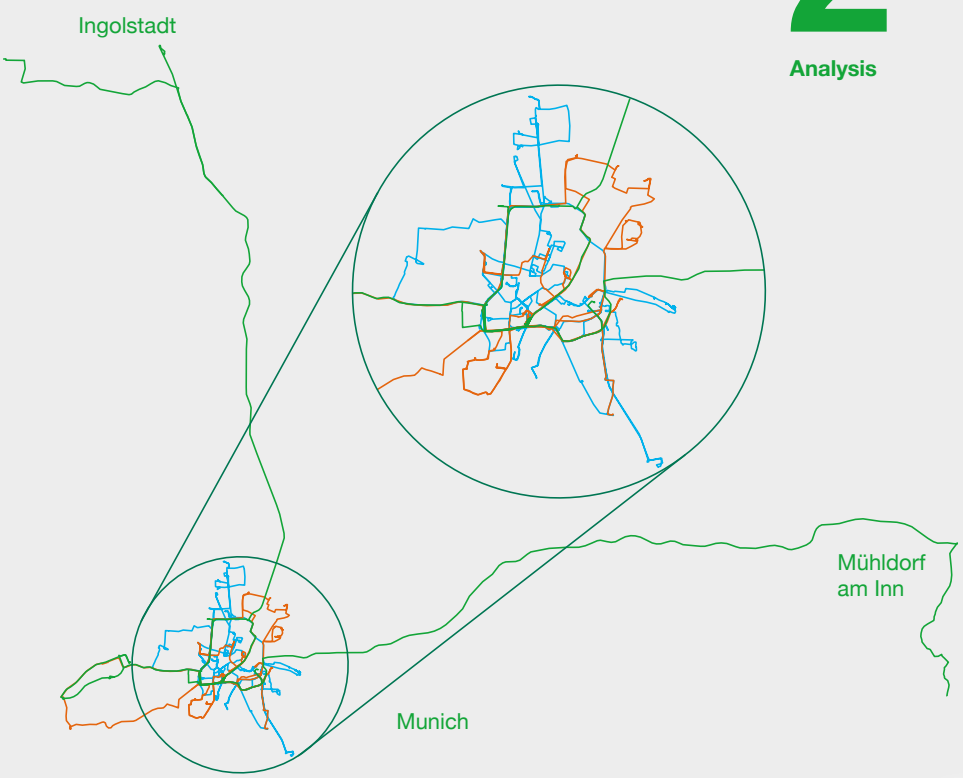


Database

WATE

2

Analysis



Vehicle 1

75 Trips
4.9 km Ø distance per trip
20.2 km/h Ø speed

Vehicle 2

18 Trips
13.5 km Ø distance per trip
16.0 km/h Ø speed

Vehicle 3

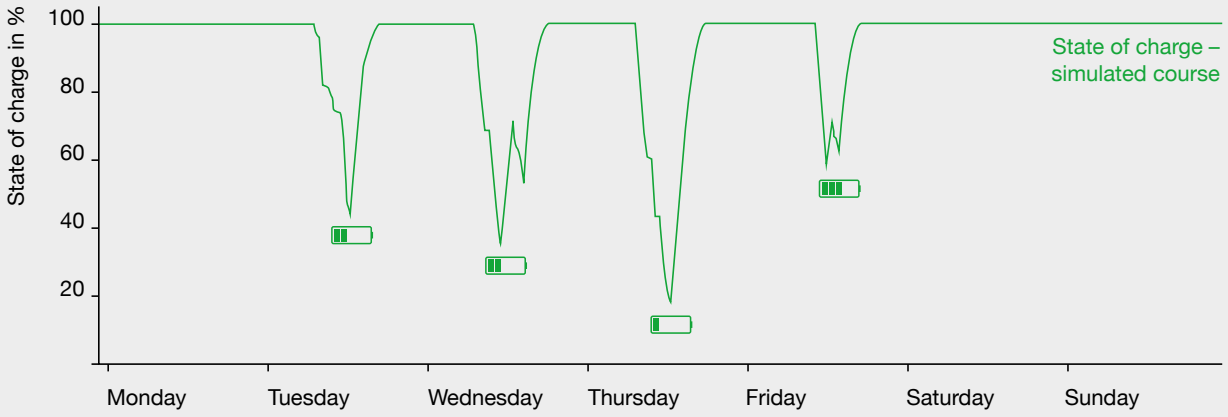
20 Trips
39.8 km Ø distance per trip
50.9 km/h Ø speed

Suitable for numerous research purposes

Not only is the analysis tool useful for the general public, it also assists in research and is available to fellow staff at the TUM Chair for use in their projects and dissertations. The tool was developed in its entirety at TUM, with numerous doctoral candidates, student assistants, and partners from industry and the public sector all playing a part, including the City of Munich and the Chamber of Industry and Commerce for Munich. “Its development required and continues to require wide-ranging knowledge from several specialist fields, from classic automotive engineering to the analysis of complex data volumes,” underscores Adenaw. WATE has already gathered data on seven million kilometers of journeys – and is now being used in many other projects. For example, it has been deployed by the electromobility consultants at the Chamber of Industry and Commerce for Munich. In addition, the data loggers are in use in the vehicles of private individuals, tradespeople and logistics specialists, as well as in prototype vehicles in Africa. As a result, the volume of data collected is growing – and so too is knowledge of electromobility around the world.

Gitta Rohling

Graphics: ediundsepp (source: TUM)



3

Simulation