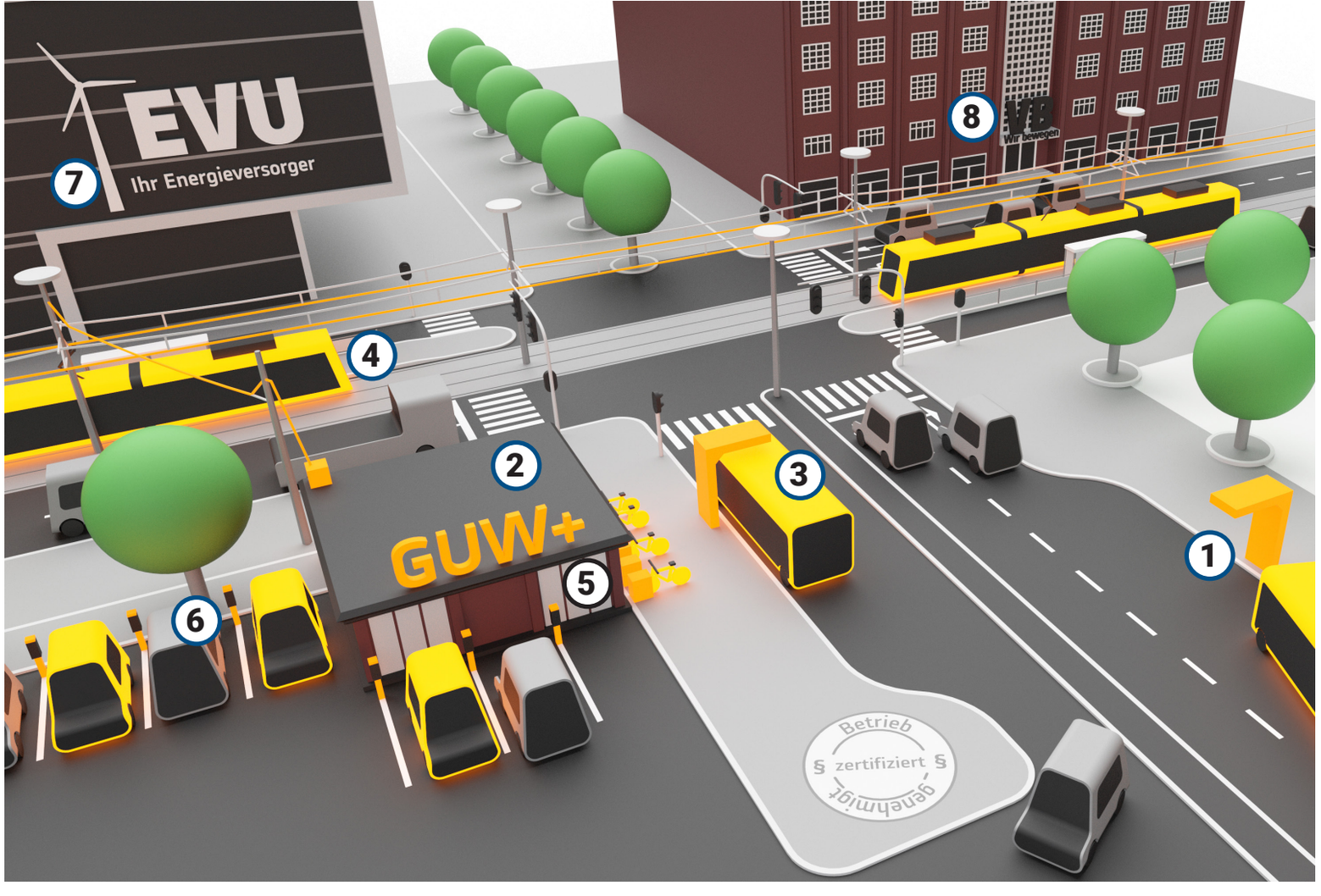
GUW+

An innovative substation concept for the future of the public transport



1. Reduction of the investment and connection costs, minimisation of the town planning procedures
2. More favourable storage through 2nd-use of vehicle batteries
3. Reduction of the peak shaving
   → considerably lower operating costs
4. Braking energy is used better
   → significant energy saving
5. Over-capacities are sold as network service (e.g. control energy)
6. Spreading promoted through lower infrastructure costs
7. Better CO_2 balance through storage of green electricity
8. Emergency reserve (black-out)
   → safe exit of passengers
   → controlled restart

GUW / GW / GLW

Rectifier substation for communal rail transport

GUW+

Extension of existing GUWs or new GUWs to be built for the integration of:

- Bus charging infrastructure, primarily in form of distributed occasional charging
- HESOP (4-quadrant chopper)
  - Feedback of over-capacities into the medium voltage distribution network
  - Dynamic voltage regulation on the DC side
  - Idle power regulation for network relief
  - Active and passive suppression of harmonics on the AC side
- Energy management system
- Electrical energy storage (perspectively second-use batteries of the E-buses)

CHARGING PHILOSOPHIES FOR E-BUSES IN CITIES

Depot charging

- An inexpensive solution in case of small fleets
- Extreme network load, very large vehicle batteries
- Interim solution

Occasional charging

- Lower total costs in case of large fleets
- Network connections very similar to the tram
- Future solution, particularly with GUW+
- Lighter construction for buses

ADVANTAGES OF THE COMBINATION OF SUBSTATIONS WITH E-CHARGING STATIONS AND BATTERY STORAGE DEVICES

- Set-up of stations for occasional charging, spread over the city traffic junctions
  - Use of available systems and capacities
  - Avoidance of additional (medium voltage) connection costs
  - Reduction of energy costs for the E-BUS by approx. 15% through stabilisation
- Increase in the use of recovered braking energy to a degree of use of >95%
- Provision of various network services, which are economically attractive and also toughen up the electricity network for development of renewable energies
- Better control of blackout scenarios (in the event of power failure) through the battery storage system, e.g. further operation of the E-buses and controlled stoppage of trains

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Implementation of the project subject to the proposed promotion through the BMVI.

Bundesministerium für Verkehr und digitale Infrastruktur