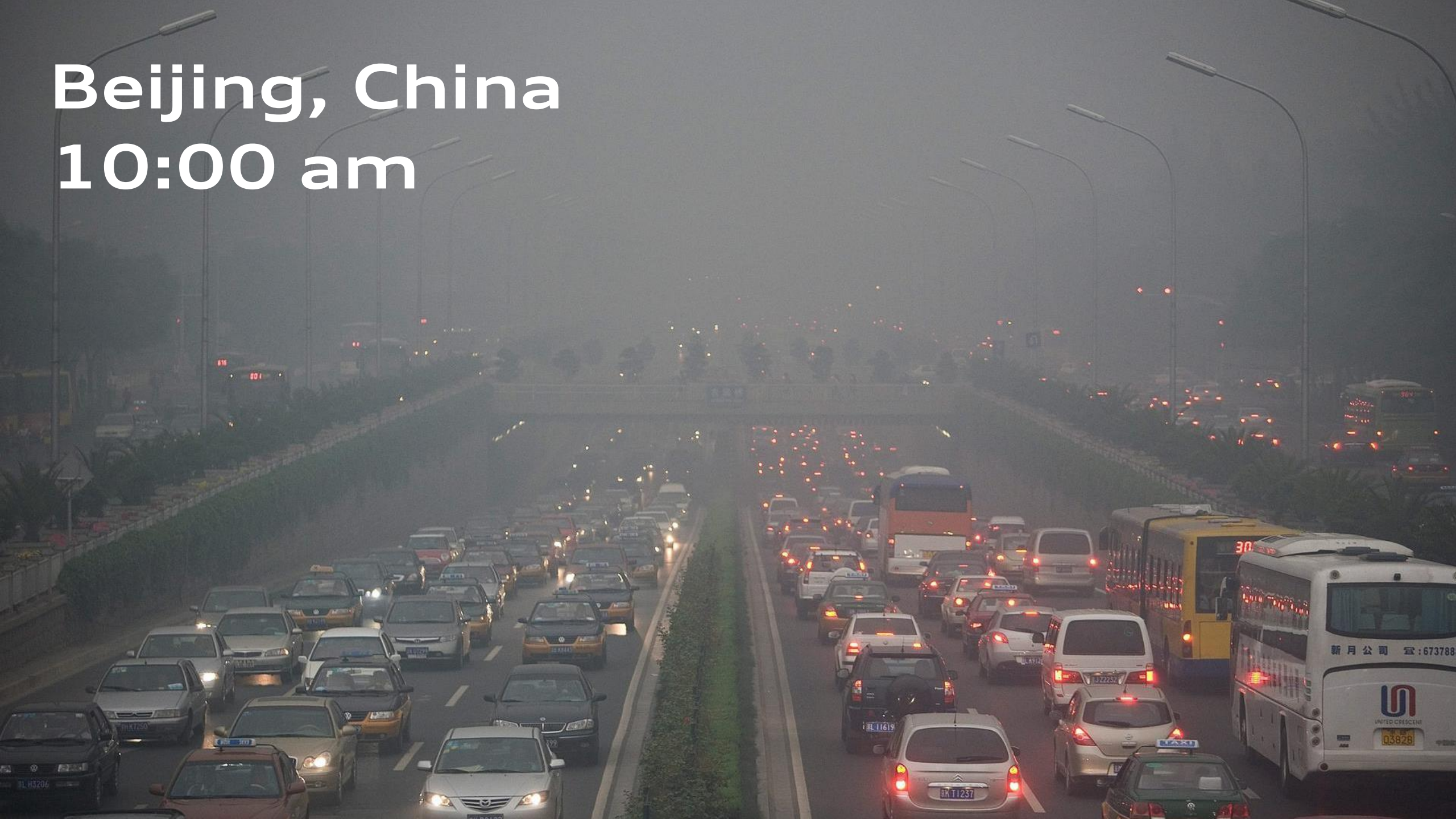
AUDI h-tron - sustainability in future drive concepts

7. Wasserstofftag - DLR

2019-07-04 | AUDI AG | Dr. S. Rank


Beijing, China
10:00 am

A society in flux – megatrends and their impact on industry

Demographic change

Climate Change

Digitalization

Sustainability

Urbanization

Change of the working world

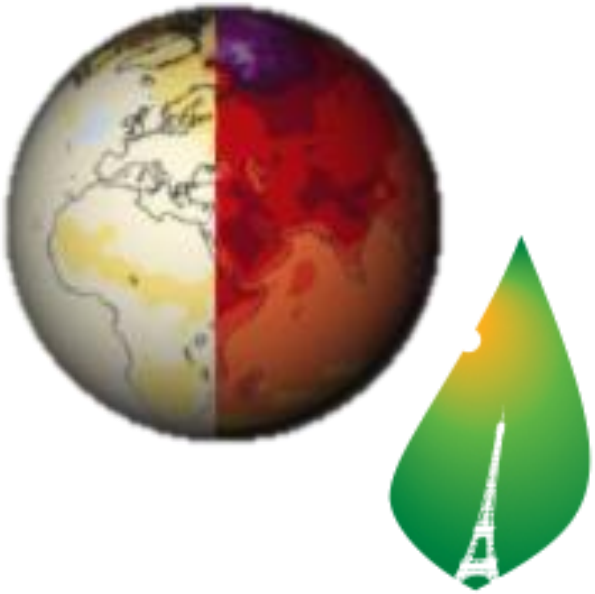
society has a claim to sustainability

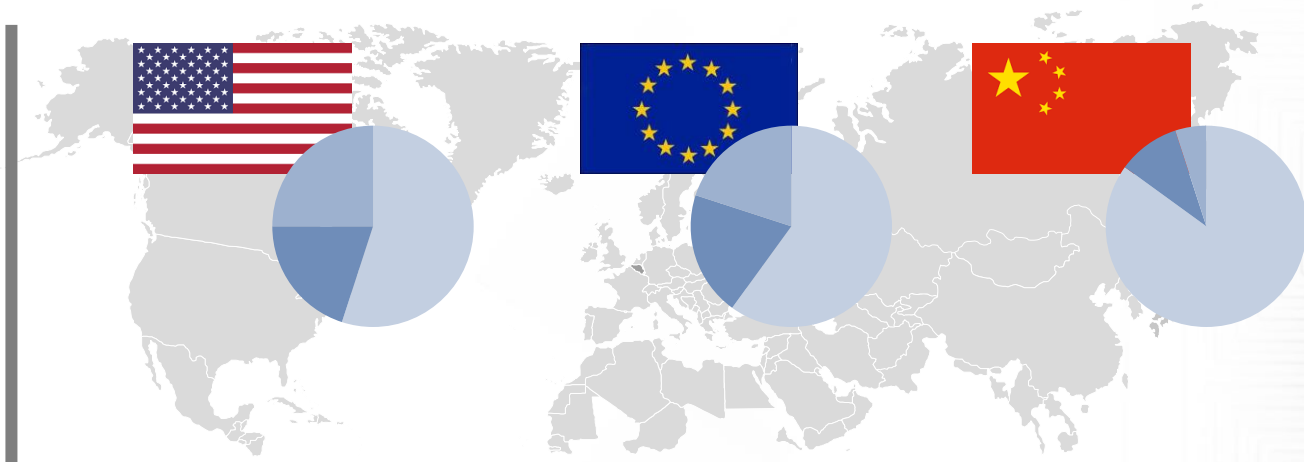
&

companies have a commitment to sustainability

Impact on Mobility

Commitment to the CO_2 objectives of the Paris climate agreement will be reflected in future portfolio





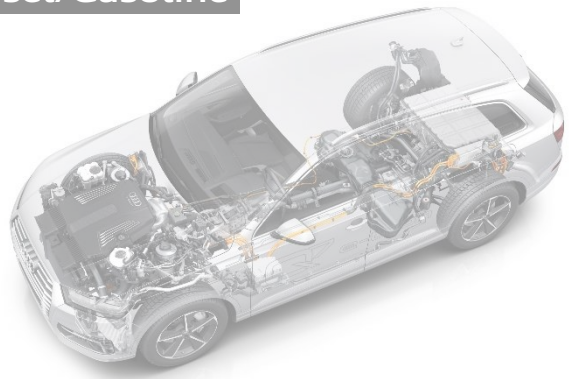
- CO_2 neutrality of the fleet in 2050
- Different market shares of BEV, FCEV & PHEV in different regions expected

Quelle: Volkswagen AG

Our Vision:
ZERO EMISSION

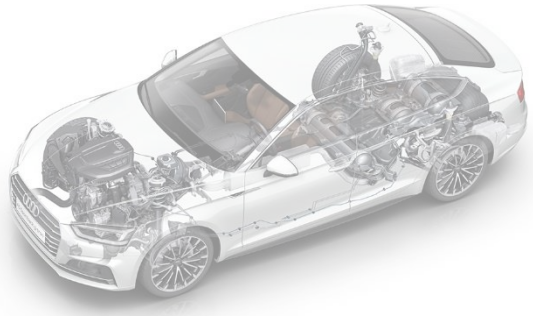
h-tron

Diesel/Gasoline



TDI / TFSI | MHEV | PHEV| e-fuels

e-gas



g-tron | e-gas

BEV

e-tron

ZERO

FCEV

h-tron

Our Vision:
LOCAL ZERO EMISSION

Battery Electrical Vehicle (BEV)

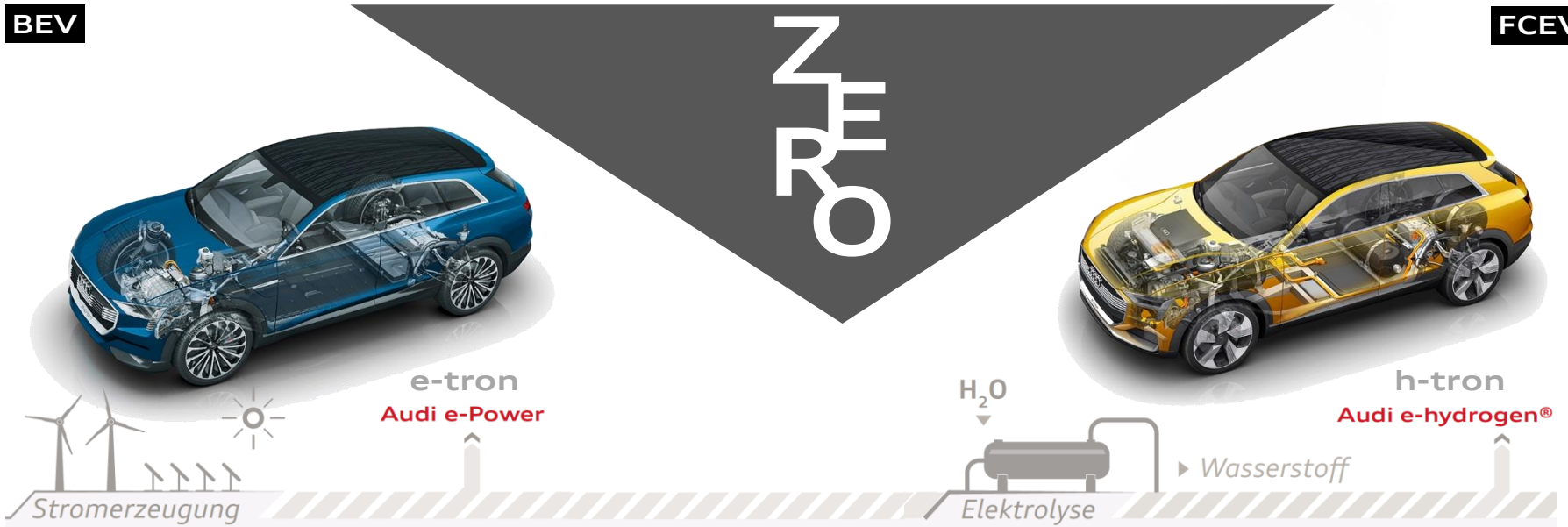
- Local und global zero emissions while employing renewable energy
- Highest efficiency
- Need for both private and public charging infrastructure

Daily driving distance: small – middle
Urban traffic

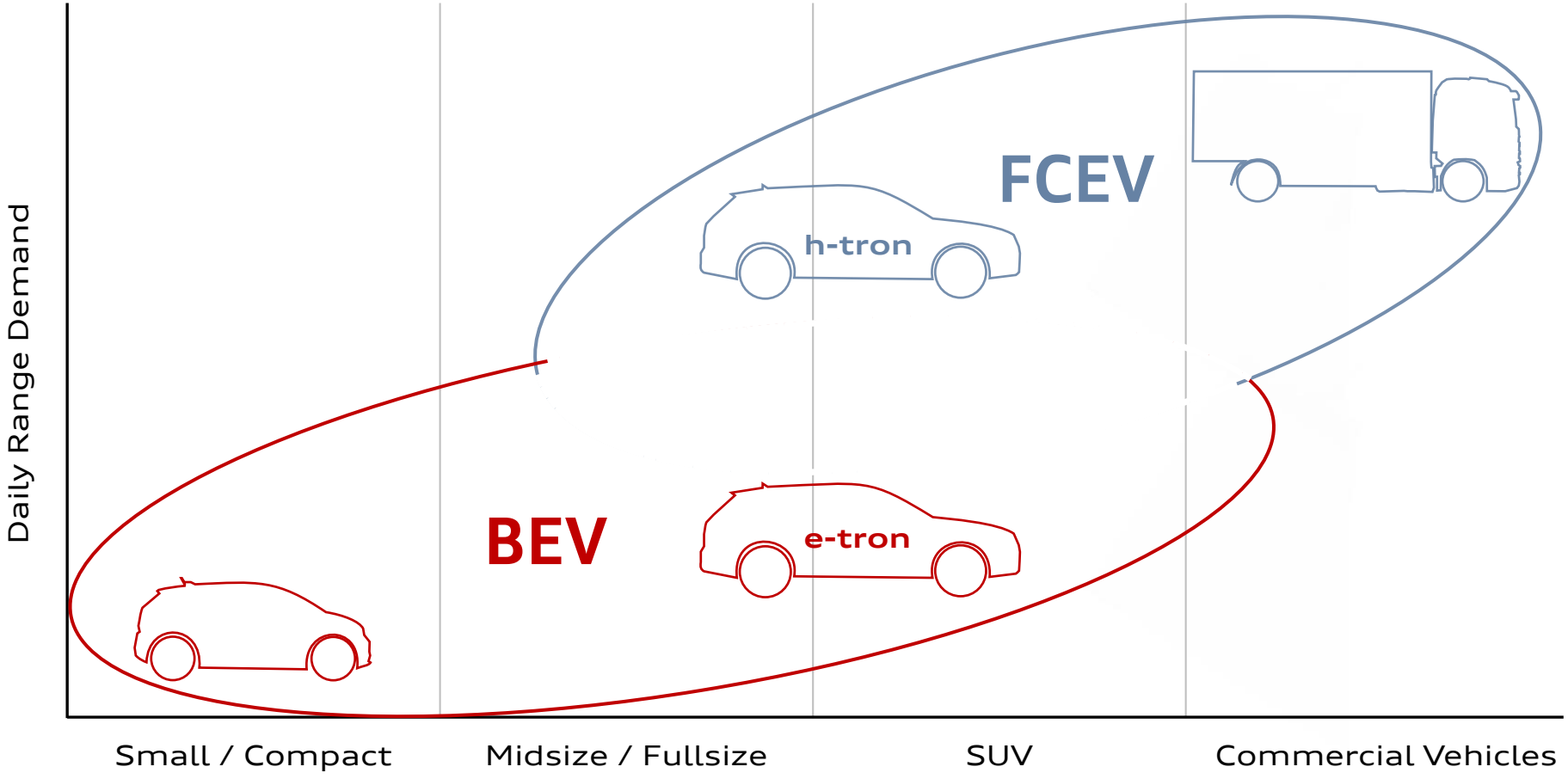
Fuel Cell Electrical Vehicle (FCEV)

- Local und global Zero Emissions while employing hydrogen from renewable energy
- High energy density, low weight
- Fueling time 3 minutes (100% Filling) 24/7 availability
- No significant influence of external climatic conditions on range

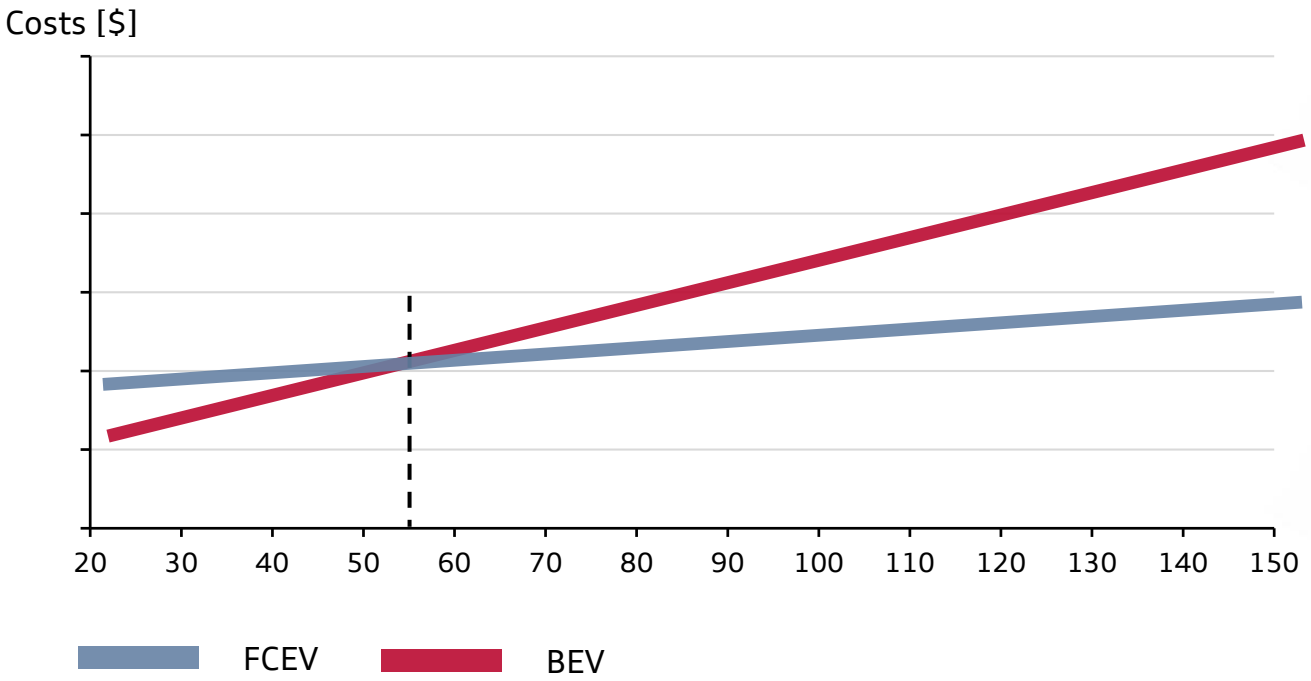
Daily driving distance: high
Large vehicle with high c_w*A



The best fit for each single customer



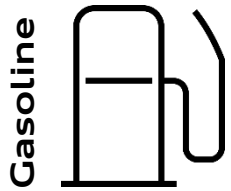
At a certain level of energy capacity FCEV offers cost advantages in a 2030 scenario



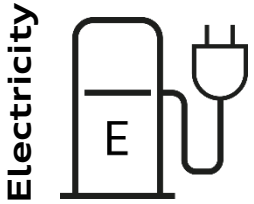
- Above a range of approximately **350 km** (assumption of 15 kWh / 100km) FCEV technology averages out BEV technology in terms of cost in passenger cars

Source: Hydrogen Scaling up – A sustainable pathway for the global energy transition | Hydrogen Council

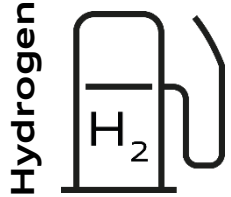
Refueling times Comparison of different types of fuel



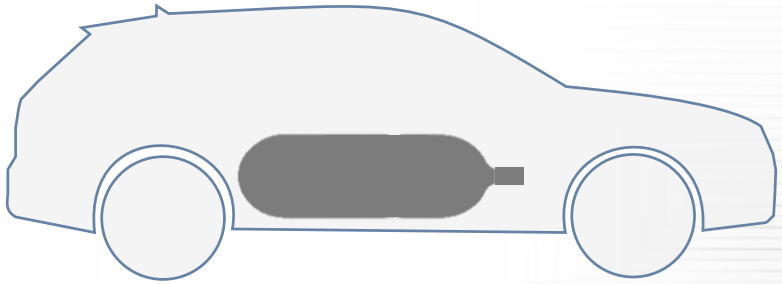
~ 470 km /min[1]



~ 6 km /min[2]



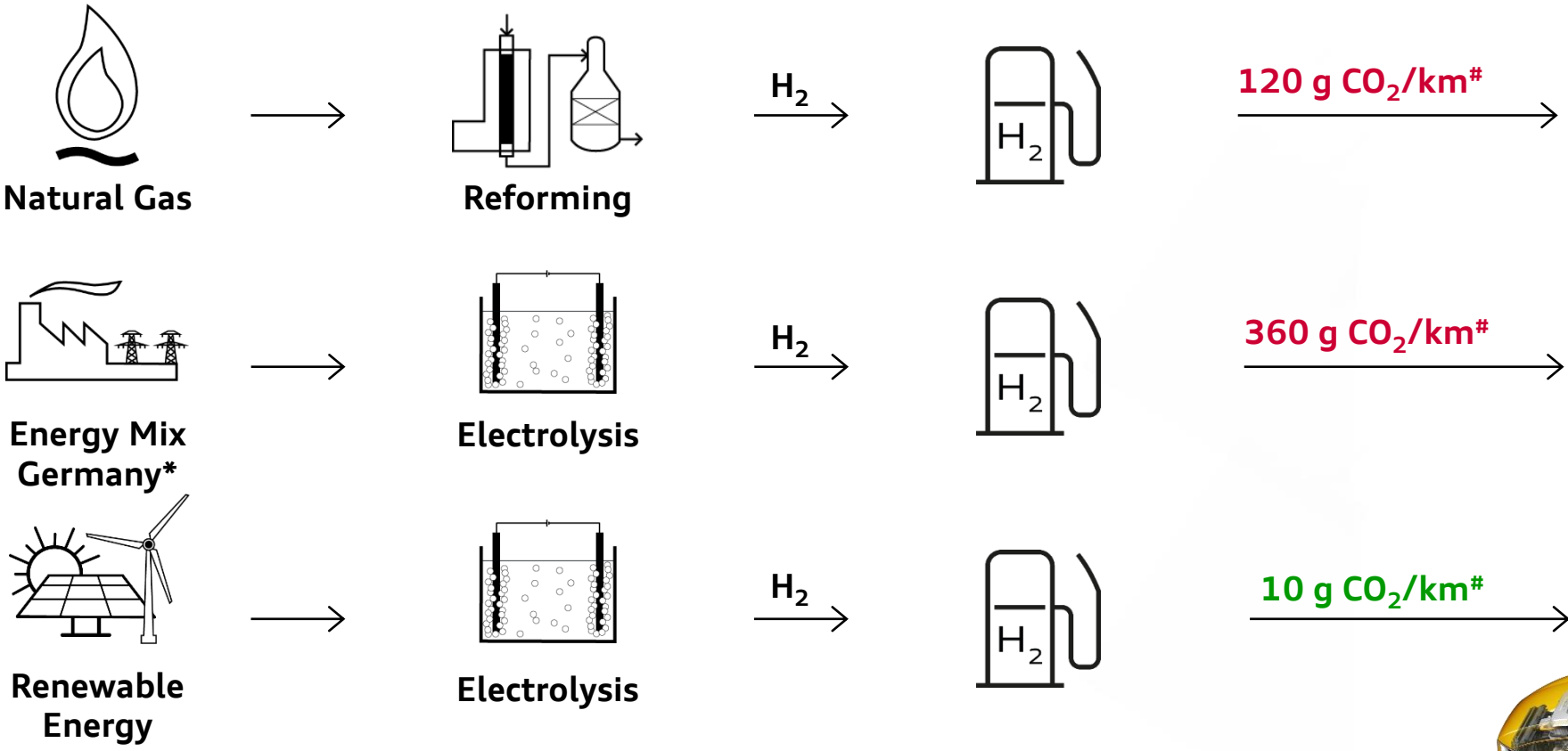
~ 250 km /min[3]



› Depending on H_2 storage capability FCEV are able to reach reasonable ranges within usual refueling times

1 flow rate 35 l/min | fuel consumption 7,4l/100km
2 loading capacity 50kW | power consumption 15kWh/100km
3 flow rate 2,5 kg/min | fuel consumption 1kg/100km

CO_2 foot print of hydrogen production



Audi h-tron

* 20% renewable energy

on the basis of an hydrogen consumption of 1 kg/100 km

Audi is involved in various initiatives to promote hydrogen technology & infrastructure

Hydrogen Council

Clean Energy Partnership CEP

NOW Nationale Organisation Wasserstoff- und Brennstoffzellentechnologie

H_2 MOBILITY WASSERSTOFF TANKEN

e-mobil BW

Hydrogen Mobility Europe

California Fuel Cell Partnership

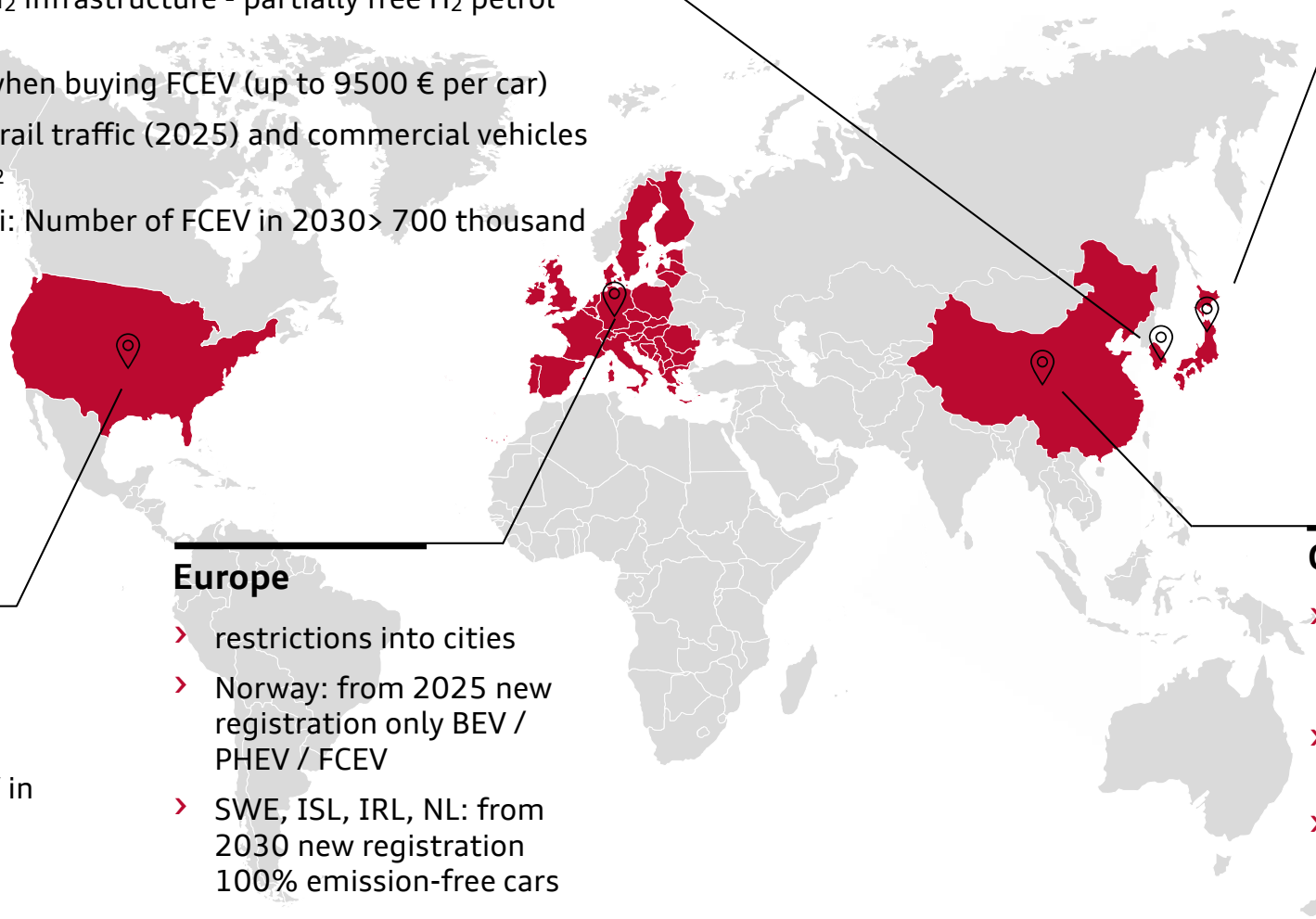
Fuel Cell & Hydrogen Energy Association

Hydrogen Europe

Hydrogen activities in selected markets

South Korea

- Expansion of H_2 infrastructure - partially free H_2 petrol stations
- High subsidy when buying FCEV (up to 9500 € per car)
- Full operation rail traffic (2025) and commercial vehicles (2035) with H_2
- Target Hyundai: Number of FCEV in 2030> 700 thousand



Japan

- Subsidy on purchase of FCEV (up to € 2400 per car)
- Target: number of FCEV in 2030: car > 800 thousand / buses > 1.2 million

USA

- Nationwide H_2 network until 2028
- Target: Number of FCEV in 2030 > 1 million

Europe

- restrictions into cities
- Norway: from 2025 new registration only BEV / PHEV / FCEV
- SWE, ISL, IRL, NL: from 2030 new registration 100% emission-free cars

China

- High subsidy when buying FCEV (~ 25.000 € - 50.000 € per car)
- Building dedicated H2 economic regions
- Target: Number of FCEV in 2030> 1 million

Milestones of AUDIs fuel cell activities

h-tron

2004
Audi A2 H2
1st generation

2009
Audi Q5 HFC
2nd generation

2011
Audi Q5 HFC
3rd generation

2014
Audi A7 h-tron
4th generation

Audi h-tron quattro concept
5th generation

Audi fuel cell serial production
6th generation

Audi h-tron program – the roadmap to serial production

Demonstrator

Small series

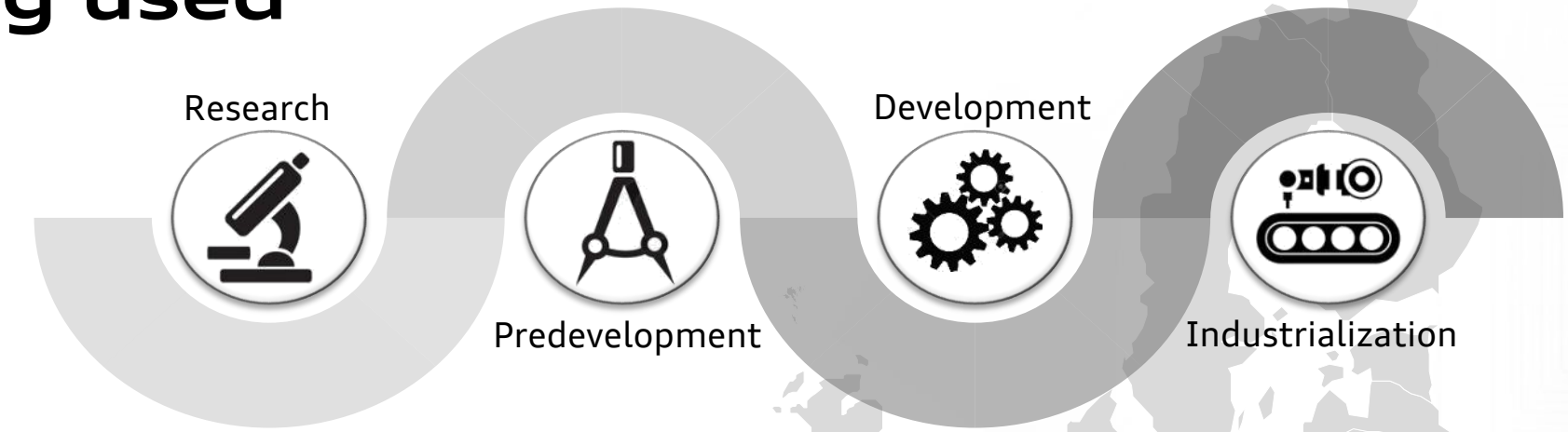
Serial production

Phase 1
Communication and visibility

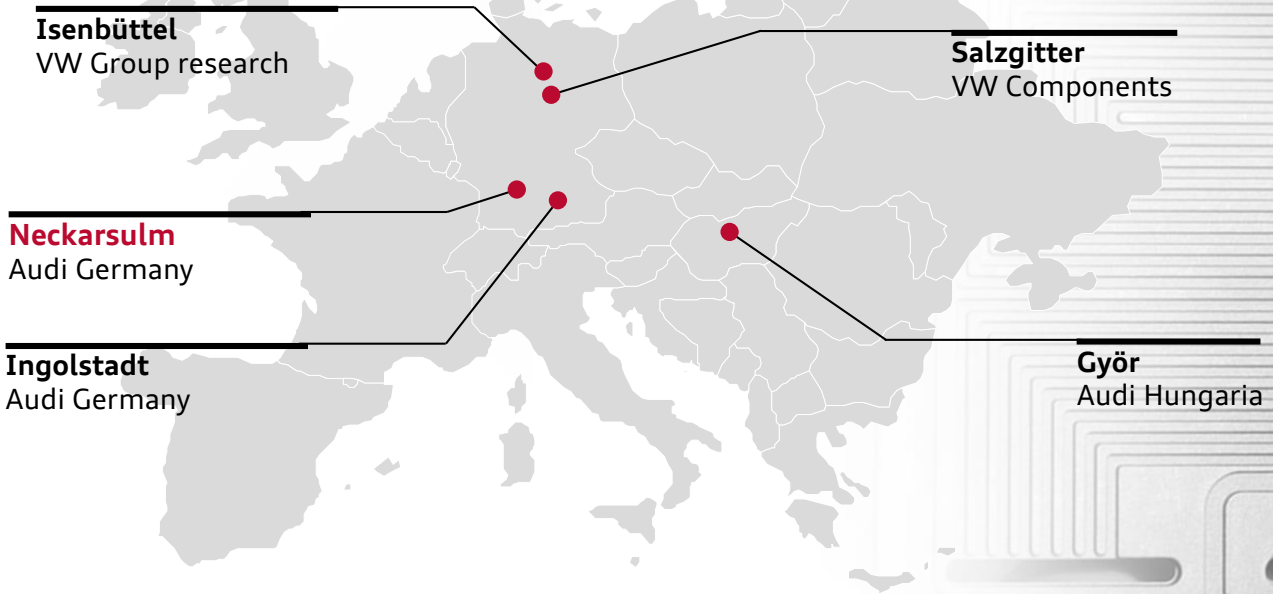
Phase 2
Visibility and experience

Phase 3
Rollout and market penetration

Available group based infrastructure, development- and human resources are being used



- Reduced invest in infrastructural measures at the sides, by **using existing infrastructure**
- **Increased knowledge gain**
- Concentration on dedicated sides
- **Use of existing knowledge** at the different sides – **useful Know-how transfer**



Thank you!