EVS32 A world of E MOTION 2019 MAY 19 22
INTERNATIONAL ELECTRIC VEHICLE SYMPOSIUM & EXHIBITION
EVS 50th anniversary 1969-2019

International cooperation as a component for successful industrialisation of future transport technologies

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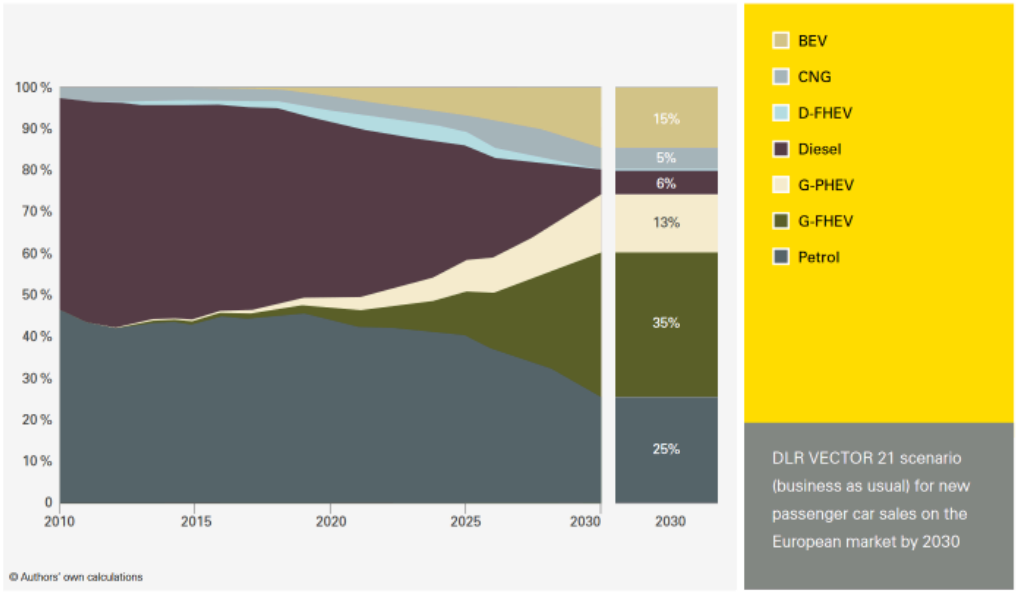
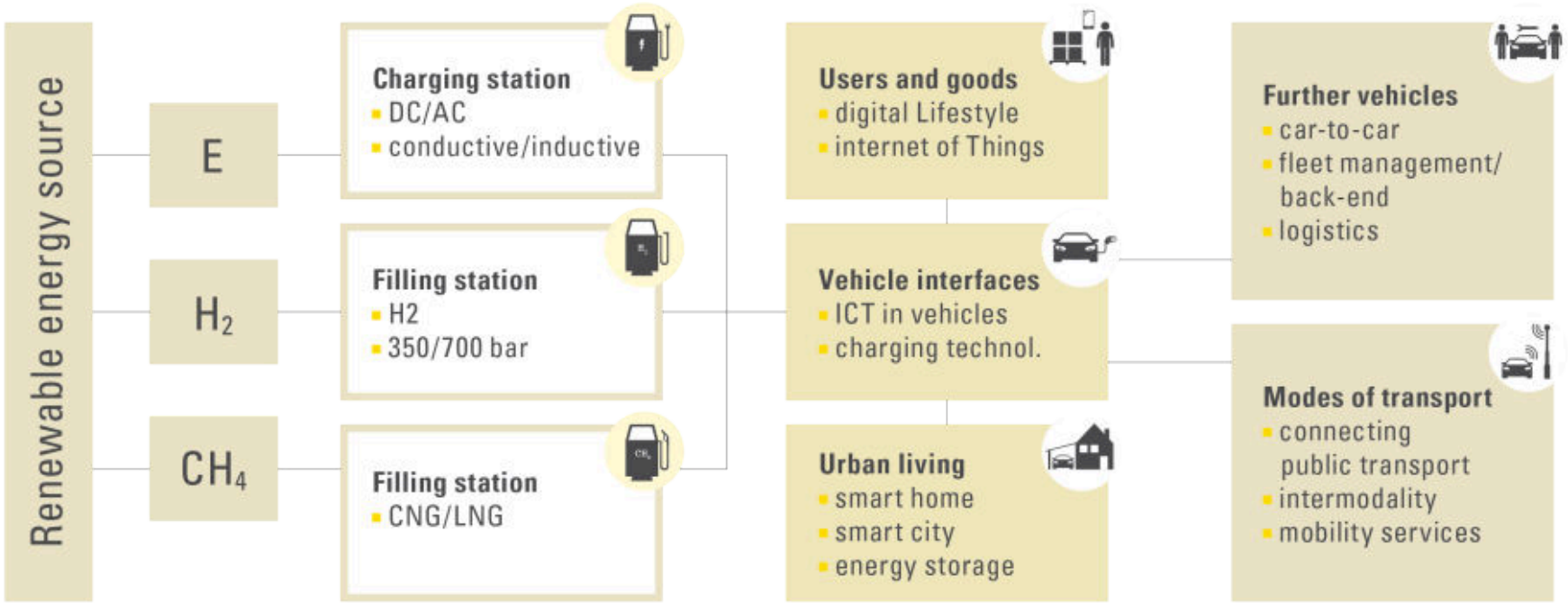
Challenges in the automotive and mobility sector

Electrification



Digitalisation

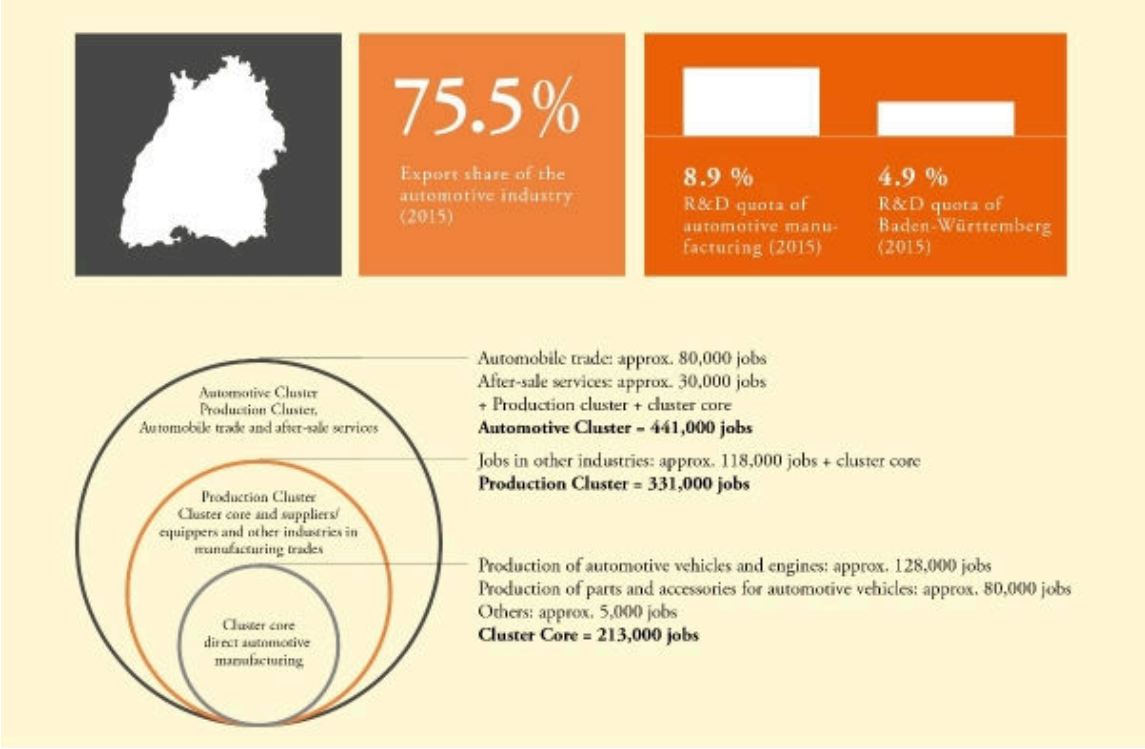
System approach to future transport technologies



Automotive and mobility sector in Baden-Württemberg

- more than 130 years of automotive engineering
- three large OEMs: Daimler, Porsche, Audi
- more than 1000 suppliers to the automotive industry

- 25% of German automotive production
- 6% of active population employed in automotive sector (13% contribution to wage bill)
- export volume: 45.7 billion Euros expo (2017)



Cluster Electric Mobility South-West

- one of the most important regional alliances for future mobility solutions
- vision: “We aim at making Germany’s south-west one of the leading providers of innovative mobility solutions in the global market place and to advance autonomous, connected and electric mobility around the world.”
- more than 140 partners from industry, research and the public sector
- about half of the industry partners are global players, the other half SMEs
- https://www.emobil-sw.de/en/

electric mobility south-west

Cluster Electric Mobility South-West

- Cluster Electric Mobility South-West has been selected as one of fifteen German Leading-Edge Clusters by the Federal Ministry of Education and Research (BMBF) in 2012.
- More than 28 major research and development projects in four fields of innovation
  - vehicle
  - energy
  - ICT
  - Production

- Projects funded in the framework of the German Leading-Edge Clusters program (up to 40 million Euro), national funding programs (BMBF, BMWi) and the State of Baden-Württemberg. Individual engagement of cluster partners in European programs.
- Thematic working groups “Intelligent Move” and “Commercial Vehicles”

Internationalisation strategy

- dedicated internationalisation strategy for exchange and cooperation with clusters and networks in Asia, Europa and North America
- continuously reviewed and adapted by cluster partners and cluster management
- components of the internationalisation strategy:
  - scientific analysis “Elektromobilität weltweit – Baden-Württemberg im internationalen Vergleich” (Fraunhofer Institute for System and Innovation Research ISI) and “Structural Study BW^{e} mobil” (DLR/IMU Institut/bridging IT)
  - continuous monitoring of international developments in the automotive and mobility sector
  - regular trade missions to relevant regions in Asia, Europe and North America as part of a continuous business and technology benchmark
  - specific analyses for certain countries and regions
  - cross-sector working group with representatives from industry, universities and organisations

Internationalisation strategy

Scientific analysis "Elektromobilität weltweit – Baden-Württemberg im internationalen Vergleich"

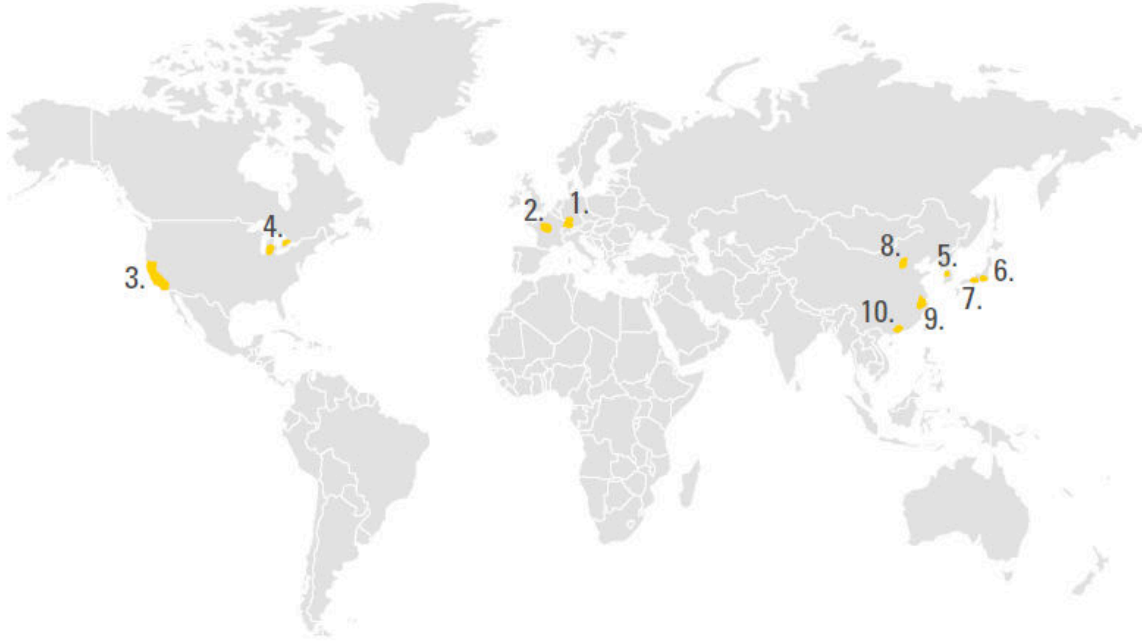
- analysis of 16 international regions with major competences in the automotive and mobility sector
  - in-depth analysis of ten most relevant regions in technology development and deployment
- following the "Innovations Systems Approach" developed by Fraunhofer ISI (taking into account all components and sectors involved in future mobility solutions)
- evaluation of quantitative and qualitative indicators in in depth-analysis
  - quantitative indicators: production capacities (vehicles, batteries), patents and publications, xEV sales, infrastructure deployment, etc.
  - qualitative indicators: political strategies, funding schemes, organisations, networks, etc.
- German version available for download on http://www.e-mobilbw.de (publications section)

Internationalisation strategy

Scientific analysis "Elektromobilität weltweit – Baden-Württemberg im internationalen Vergleich"

Ten most relevant regions identified:

- Baden-Württemberg (1)
- Île-de-France (2)
- California (3)
- Great Lakes (Detroit/Toronto metropolitan region) (4)
- Seoul metropolitan region (5)
- Tokyo metropolitan region (6)
- Aichi metropolitan region (7)
- Beijing metropolitan region (8)
- Shanghai metropolitan region (9)
- Shenzen metropolitan region (10)



Internationalisation strategy

Scientific analysis "Structural Study BW^{e} mobil 2019"

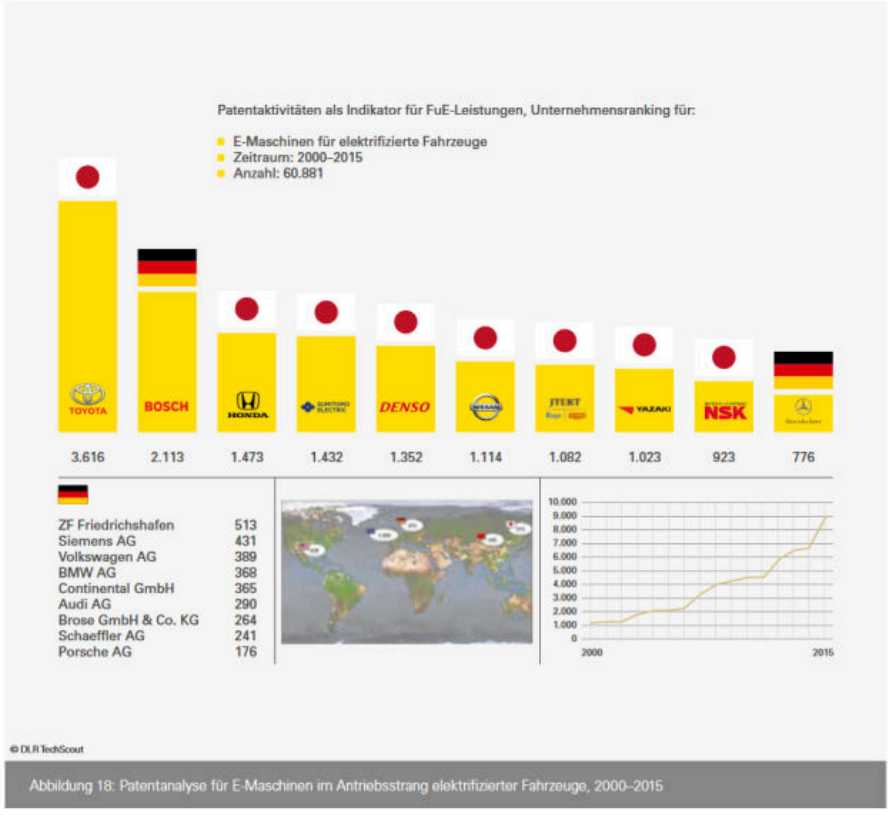
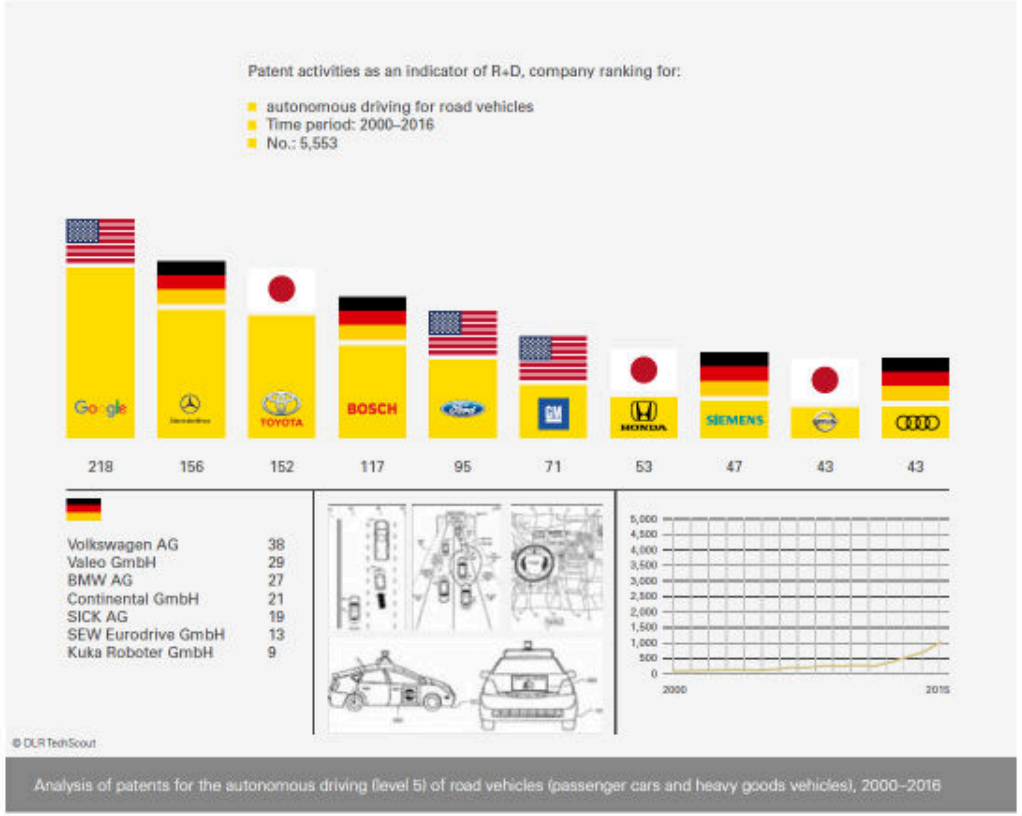


Abbildung 18: Patentanalyse für E-Maschinen im Antriebsstrang elektrifizierter Fahrzeuge, 2000–2015



Analysis of patents for the autonomous driving (level 5) of road vehicles (passenger cars and heavy goods vehicles), 2000–2016

Internationalisation strategy

Scientific analysis “Structural Study BW^{e} mobil”

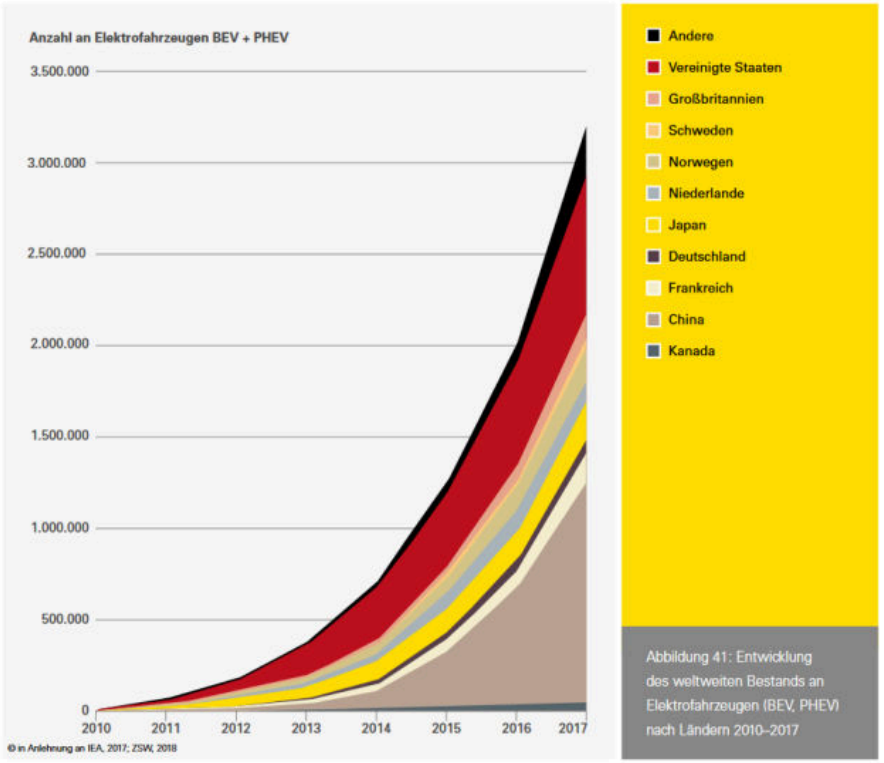


Abbildung 41: Entwicklung des weltweiten Bestands an Elektrofahrzeugen (BEV, PHEV) nach Ländern 2010–2017

First-time EV registrations until 2017 (Proportion of)	98,280 (0.73 %)	125,940 (1.41 %)	149,350 (1.46 %)	121,540 (6.39 %)	187,270 (28.76 %)	751,510 (0.91 %)	201,410 (0.59 %)	4,800 (0.02 %)	1,212,280 (1.37 %)
Target, electric vehicles	2020: 1 million 2030: 6 million	2020: 1.6 million	2020: 2 million	2020 0.2 million 2025: 1 million	-	2025: 3.3 million	2020: 1 million	2020: 7 million	2020: 4.6 million
Purchase incentives	BEV: € 4,000 PHEV: € 3,000	BEV: € 5,150 PHEV: € 2,860	BEV: up to € 6,300 PHEV: up to € 1,000	-	-	Up to € 5,400	BEV: up to € 6,300	Regional subsidies	BEV: up to € 7,200 PHEV: up to € 4,200
Emission limits	2021: 95 CO_2 g/km 2025: 81 CO_2 g/km (15 % down on 2021) 2030: 59 CO_2 g/km (37.5 % down on 2021)				-	2020: 121 CO_2 g/km	2020: 105 CO_2 g/km	-	2020: 117 CO_2 g/km
Regulatory framework	-	Sales ban as of 2040 Driving ban as of 2050	Sales ban as of 2040	Planned sales ban as of 2030	-	Rising quota for electric vehicles in 9 states	-	Vehicle fleet electrified by 2030	Rising quota for electric vehicles (sales ban)
Charging infrastructure 2017	Slow: 22,213 Fast: 2,076	Slow: 11,479 Fast: 2,037	Slow: 14,407 Fast: 1,571	Slow: 32,976 Fast: 455	Slow: 8,292 Fast: 1,238	Slow: 39,601 Fast: 6,267	Slow: 21,507 Fast: 7,327	Slow: 222 Fast: 25 (2016)	Slow: 130,508 Fast: 83,395

An international comparison of market situation and conditions

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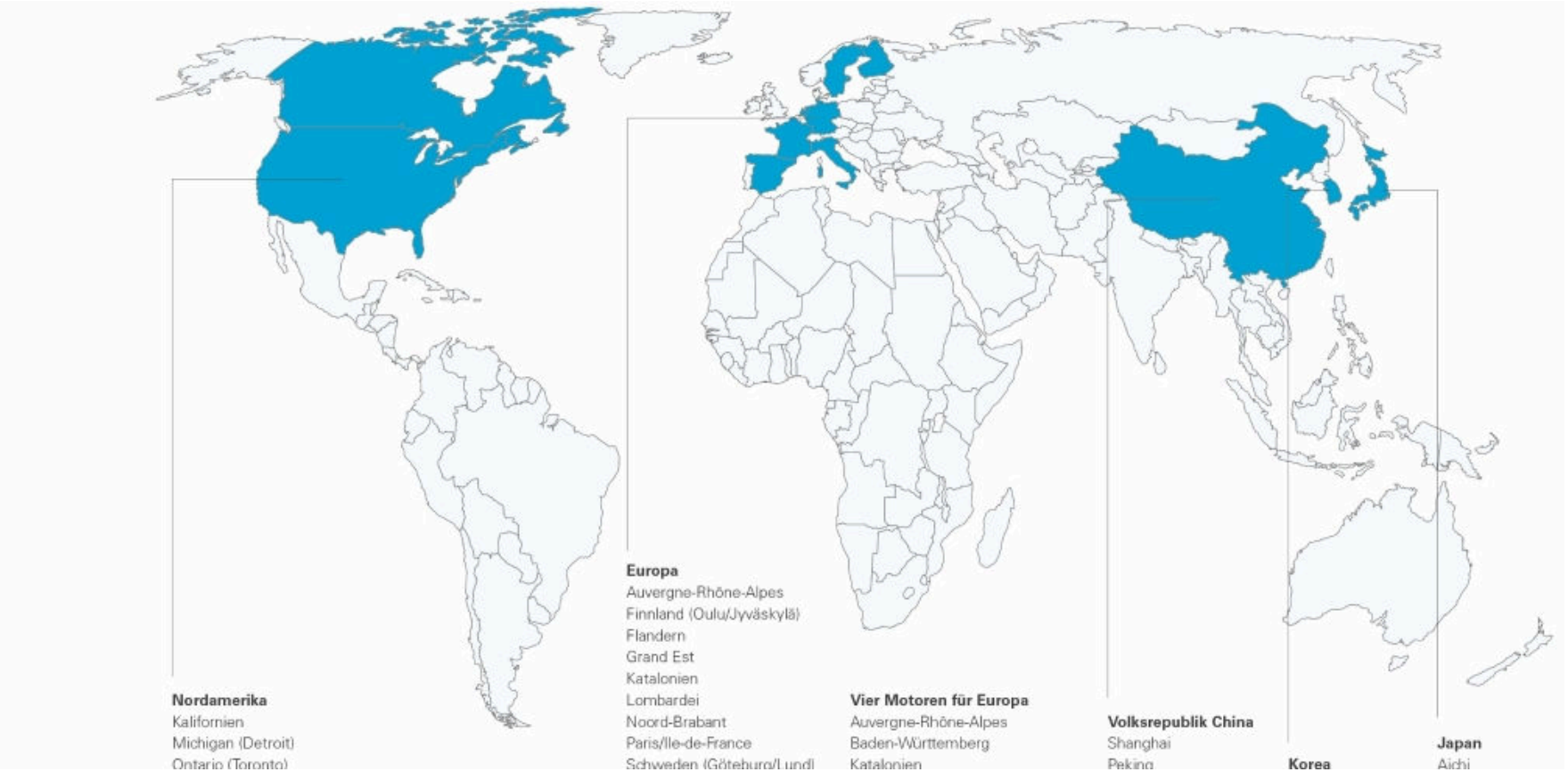
Internationalisation strategy

Portfolio of internationalisation activities:

- business missions with representatives from industry and academia
- organisation of international events and trade fair presences
- participation in international conferences and trade fairs
- support of SME in international cooperation (special interest in European cooperation)
- initiation of cross-border projects
- information and intercultural coaching

Internationalisation strategy

International cooperation network:



Case study: German-French cooperation project AllFraTech

- German-French Alliance for Innovative Mobility Solutions (AllFraTech)
- cooperation initiative by Cluster Electric Mobility South-West (Baden-Württemberg) and CARA (Auvergne-Rhône-Alpes)
- intensification of bilateral innovation partnership on future transport technologies and mobility solutions
- strengthening small and medium-sized companies in the process of internationalization
- funding schemes:
  - Cluster Electric Mobility South-West: Federal Ministry of Education and Research “Internationalisation of Leading-Edge Clusters, Forward-Looking Projects and Comparable Networks (InterSpiN)”
  - CARA: Région Auvergne-Rhône-Alpes “RDI Booster”

Case study: German-French cooperation project AllFraTech

Concept development phase (2017/2018):

- definition of internationalisation concept for long-term international cooperation
- identification of technology fields of interest for both cluster networks
- definition of cross-border R&D project proposals and further ideas for cooperation

Results of concept development phase:

- three strategy and project workshops with players from Baden-Württemberg and Auvergne-Rhône-Alpes
- cross-border workshop on education and training for future transport technologies
- development of four project ideas, resulting in two project proposals
  (focus areas: thermal management and energy efficiency, innovative charging technologies and specific use cases, testing and validation for future autonomous mobility services)

Case study: German-French cooperation project AllFraTech

Implementation phase (2019-2021):

- two cross-border R&D projects with members of both cluster networks.
  - Innovative predictive High Efficient Thermal Management System (InnoTherMS)
  - Efficient Modular Convenient Charging System (EMCC)
- deepening cross-border cooperation on education and training
- developing further cross-border project ideas in bilateral and European funding schemes

Case study: German-French cooperation project AllFraTech

Innovative Predictive High Efficient Thermal Management System - InnoTherMS

- **German project partners:**
  GreenIng GmbH & Co. KG, TheSys GmbH, University of Applied Sciences Esslingen, Fraunhofer Ernst-Mach-Institut
- **French project partners:**
  Saint Jean Industries, Segula Matra Automotive, IFP Energies Nouvelles, INSA Lyon – Laboratory CETHIL, Université Claude Bernard Lyon I – Laboratory LAGEP
- **Project idea:**
  The goal of this project is to develop and test an innovative scalable thermal management system for electric vehicles in urban and suburban transport by using existing energy potentials that would otherwise be lost to the environment. This increases the overall system efficiency of electric vehicles and extends the range.

Case study: German-French cooperation project AllFraTech

Efficient Modular Convenient Charging System - EMCC

- **German project partners:**
  Carmedialab GmbH, CTC cartech company GmbH
- **French project partners:**
  Centum Adeneo, EFI Automotive, Magtech, Laboratoire Ampère
- **Project idea:**
  Today, plug-in connectors are the standard interface for charging electric vehicles. However, these systems have major disadvantages. Wireless and inductive charging are promising alternatives. EMCC consortium aims to develop and test a charging system that is modular, convenient, efficient, cost-effective, and safe.