

An isometric illustration featuring a grid of light blue lines. Various icons are scattered across the grid, connected by dotted lines. These icons include: two wind turbines on a small island, a house with a person standing next to it, a lightbulb, a small airplane, a car at a charging station, a power line tower, a globe showing the Americas, a forklift, a cargo ship, a car at a charging station, a green bus, a person walking with a bag, a person walking with a briefcase, a smartphone displaying 'H2', and two water droplets. The overall theme is sustainable technology and infrastructure.

Annual Report **2020**

NOW
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NOW – Annual Report **2020**

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FOREWORD BY FEDERAL MINISTER ANDREAS SCHEUER MdB



2020 was the beginning of an unprecedented upswing for alternative drivetrains. According to the Federal Motor Transport Authority, the number of newly registered all-electric passenger cars alone increased by more than 200 percent. 194,000 all-electric vehicles were purchased; more than ever before. In total, one in four newly registered vehicles in 2020 was equipped with an alternative drivetrain. This is a wonderful development.

A crucial element to the success of electric mobility is charging: It must be easily possible anywhere and at any time. To achieve this, we are banking on private charging infrastructure on the one hand. We are progressing its deployment, inter alia by providing subsidies for people who install a wallbox in their garage; a funding programme with huge demand. By the start of March 2021, around 250,000 applications for 310,000 charging points had been submitted.

On the other hand, we are adding charging stations to the public network and increasing its capacity. The National Centre for Charging Infrastructure at NOW GmbH, which started operations in October 2020, is supporting these efforts and implementing the Charging Infrastructure Masterplan. The Centre's responsibilities include the development of a general plan for scaling up the charging infrastructure. Its first major project is to deploy a public fast charging system with initially 1,000 locations, as required by the Fast Charging Act.

The Electric Mobility Funding Guidelines are another success story made possible with the help of NOW GmbH. Since 2015, we have been supporting, among other things, the procurement of vehicles as well as the deployment of charging infrastructure. In February 2021, we made available an additional 20 million euros within this framework for local authorities and commercial entities to switch their fleets to battery-electric mobility.

Be it all-electric vehicles or plug-in hybrids, battery or fuel cell, electricity, hydrogen or e-fuels – we are convinced by these technologies and are supporting them. Since alternative drivetrains are on the fast track now, we must stay on course and pick up speed. To do so, we are following on from best practices, for instance, when it comes to tapping the potential of hydrogen in the regions. For this, we have developed the HyLand Initiative, which was launched in 2019 and is coordinated by NOW GmbH. HyLand has been so successful that we decided to do another round. So many great hydrogen projects are already lined up all over Germany. They are making hydrogen tangible on the ground and increasing the enthusiasm for the No.1 element.

The competition for the location for the new hydrogen technology and innovation centre also shows that hydrogen is associated with great hopes for the development of the regions. We have received 15 applications from all over the country. However, I am convinced that many more have thought about the role of hydrogen for their region. This alone is already added value.

Since our numerous and diverse funding programmes have been so successful, we have decided to extend them. Starting this year, we have launched new funding initiatives for the purchase of clean and silent buses, trains and commercial vehicles with alternative drivetrains. In addition, there is funding for the development of renewable fuels and the construction of new or the retrofitting of existing generation plants.

As successful as the year 2020 may have been, the tasks and challenges ahead of us remain ambitious. In cooperation with our proven committed companions in the fields of government and industry, the scientific community and society, in the federal, regional and local authorities, we will master these challenges and gain more enthusiastic supporters along the way. 2020 was a key milestone on the way towards climate-friendly, modern and efficient mobility. Many more will follow. Let us take advantage of this momentum and continue working on it successfully.

Andreas Scheuer, Member of the German Bundestag

Federal Minister of Transport and Digital Infrastructure

FOREWORD BY KURT-CHRISTOPH VON KNOBELSDORFF



NOW GmbH is committed to achieving sustainable mobility in a decarbonised energy system and supporting the technologies necessary to accomplish this. Our targets are the climate targets. We coordinate and support funding measures and networks on behalf of our commissioning federal ministries – the Federal Ministry of Transport and Digital Infrastructure (BMVI – Bundesministerium für Verkehr und digitale Infrastruktur), the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU – Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit), the Federal Ministry for Economic Affairs and Energy (BMWi – Bundesministerium für Wirtschaft und Energie) and the Federal Ministry of the Interior, Building and Home Affairs (BMI – Bundesministerium für Innern, für Bau und Heimat) – and support the federal government’s priority topics in the context of the mobility and energy transition with our national coordinating centres and provide specialist advice to the commissioning ministries.

We are open to all technologies to accomplish this. Ultimately, the path to a climate-neutral energy and mobility system is long and challenging. It can only be achieved with the interplay of different technologies in an overall system with sustainably produced sources of energy, consisting of both electrons and molecules. Each mode of transport and each application has its own unique needs and requirements, all of which result in individual technological solutions. To attain the climate targets in transport, we must harness the potentials provided by electric mobility with batteries and fuel cells, as well as renewable fuels, in the best possible manner. We support the German government in this endeavour with strategies and funding measures that accelerate both the switch to electric power-trains through the provision of funding support for vehicles as well as refuelling and charging infrastructure, and the investment in the production of hydrogen and renewable fuels.

Our guiding principle is an efficient and cost-optimised overall system. This and nothing else must be the benchmark for the development and promotion of technologies using public funds. To this end, NOW GmbH draws upon a network of highly skilled experts with in-depth technical know-how, coupled with extensive connections to industry and research institutions. Our focus on a climate-neutral, cost-optimised overall system for the future demands a sound sense of judgement and considerable perseverance. Technologies with good prospects of making a contribution to this system must continue to be promoted

and advanced in their development, even if they only reach the stage of being ready to be scaled up for the mass market in the medium term.

The public sector's contribution towards the expansion of charging and refuelling infrastructure is crucial.

A reliable, uniform and convenient charging infrastructure that covers demand nationwide is the basis for the widespread take-up of electric mobility. The National Centre for Charging Infrastructure is working towards ensuring that this charging network is established in good time – by bringing together targeted planning, tendering and funding. Our goal is “easy charging”, and we adopt all necessary measures for creating a user-friendly overall system of public and private charging infrastructure. This not only includes having appealing locations where people like to spend time during the charging process, but also far-reaching measures towards the digital networking of charging infrastructure and vehicles. But our task is not limited to just passenger cars. We are also tackling the required market ramp-up of climate-friendly commercial vehicles, buses and rail applications. Here, new and additional requirements arise for the provision, technical capabilities and availability of the refuelling and charging infrastructure, which we are addressing.

The decision on which technology to adopt depends largely on local conditions

and requirements. Decentralised and regional are also important keywords for the transition to sustainable mobility. NOW GmbH's range of information, knowledge transfer and networking services for municipalities and districts, as well as for stakeholders from business and industry who are involved in regional partnerships, is constantly growing. We are therefore contributing the efficient preliminary stage for the BMVI funding programmes coordinated by NOW GmbH, which are the main drivers for the procurement of clean cars, buses, commercial vehicles and trains in Germany.

At the same time, it is clear that the **federal government's strategies are embedded in a European and international context**. This is prescribed by the markets and the necessary energy partnerships. NOW GmbH assumes responsibility at many points in international coordination processes and represents Germany's position. Especially for the provision of green hydrogen and renewable fuels, the international dimension of energy supply for the transport sector becomes clear. In addition to domestic production, the import of energy will also be necessary in the future, for which uniform standards and requirements are needed. Together with our partner organisations, we are supporting the German federal government in the implementation of the National Hydrogen Strategy at the new Coordination Office for Hydrogen.

At NOW GmbH, you will encounter professionals who are passionate about what they do.

As a Managing Director who joined NOW GmbH in 2020, I am able to confirm with a fresh eye, that the people are highly committed, possess a wealth of experience and expertise concerning both the technological fields of sustainable mobility and the opportunities the federal government offers for shaping these fields, and that they are highly capable in their roles of coordinating, communicating and advising. Over the past year, the increasing political importance of the issues NOW GmbH is committed to has led to the expansion of the thematic portfolio and consequently of the NOW team. We are tackling the challenges associated with this development in a dynamic and positive manner. Because alongside experience and expertise, another distinguishing characteristic of NOW GmbH is its pleasant atmosphere, which I trust you will also recognise in the pages of this annual report. I hope you will enjoy reading it, and I thank you for your interest!

Kurt-Christoph von Knobelsdorff, Managing Director (Chair)



NOW GmbH

The guiding principle of NOW GmbH is the climate-neutral society. We support the German government in its climate and industrial policy goals by advancing sustainable technologies and innovative concepts. While our focus is on the mobility sector, we also take the adjoining sectors into account in the sense of an integrated energy system. In addition to implementing and coordinating funding programmes, we accompany strategic stakeholder processes on behalf of federal ministries, shape international cooperation projects and are directly active on site in raising the awareness and acceptance of alternative technologies by the general public.

Our founding mission in 2008 was the National Innovation Programme Hydrogen and Fuel Cell Technology (NIP). Since then, NOW GmbH's portfolio of activities has continuously developed and expanded – most recently due to the increasing social, economic and political importance of clean, efficient mobility based on renewable energies. In technological terms, the tasks of NOW GmbH today embrace the areas of hydrogen, fuel cells, batteries, liquefied natural gas and power-based fuels – both in regard to drive systems and fuels, and also in terms of infrastructure.

In 2020, NOW GmbH assumed two new tasks that are pivotal to the success of electric mobility and the transformation of mobility: With the National Centre for Charging Infrastructure, which commenced operations in 2020, NOW GmbH is driving the expansion of charging infrastructure forward and, to this end, coordinating the continuation and extension of the funding guideline for public charging infrastructure of the Federal Ministry of Transport and Digital Infrastructure (BMVI), which expired at the end of 2020. And with the National Coordination Office for Hydrogen, which NOW GmbH is establishing and operating on behalf of the BMVI together with other organisations, NOW is actively involved in implementing the measures of the National Hydrogen Strategy that was adopted in 2020. In addition, NOW GmbH continues to coordinate and manage the federal government's National Innovation Program Hydrogen and Fuel Cell Technology (NIP) and the BMVI's Electric Mobility Funding Guideline.

On behalf of the BMVI, NOW GmbH also supports the further development of the Mobility and Fuels Strategy (MFS) as well as the implementation of EU Directive 2014/94/EU concerning the development of alternative fuels infrastructure (Clean Power for Transport, CPT). Specifically, NOW GmbH is involved in the development of an overall strategy taking into account the individual fuel options, analyses the positions of relevant stakeholders and coordinates projects with German participation, such as those within the scope of the Trans-European Transport Networks (TEN-T). On behalf of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU – Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit), NOW GmbH supports the Environmental Technologies Export Initiative in the field of hydrogen and fuel cell technology and the German-Japanese cooperation in the field of power-to-gas technology.



THE NATIONAL CENTRE FOR CHARGING INFRASTRUCTURE

The National Centre for Charging Infrastructure (Nationale Leitstelle Ladeinfrastruktur) actively promotes the development of charging infrastructure throughout Germany. Various means are used for this purpose: it conceives and accompanies funding and financing programmes, develops and uses innovative and practical planning and training tools, is involved in regulatory matters and establishes networks of important stakeholders. Its goal: a nationwide, demand-oriented and user-friendly charging infrastructure system for Germany. The “Charging Infrastructure Master Plan”, which was adopted by the German federal government in November 2019, represents the foundation for the rapid expansion of the charging infrastructure and upon which the National Centre for Charging Infrastructure was established. The National Centre for Charging Infrastructure is the central point of contact for the federal government and all ministries on the subject of charging infrastructure.

The sharp rise in the number of new registrations of electric cars and plug-in hybrids occurring since the end of 2020 has also contributed to greater momentum in the field of charging infrastructure and thus once again underscored the pivotal position of the National Centre for Charging Infrastructure in the market ramp-up of electric mobility.

It is against this backdrop that the acceleration of the development of private charging infrastructure through financial support and better legal framework conditions represents one of the central tasks of the National Centre for Charging Infrastructure. Andreas Scheuer, Federal Minister of Transport and Digital Infrastructure, together with Kurt-Christoph von Knobelsdorff, Managing Director (Chair) of NOW GmbH, launched the start of the operational phase of the National Centre for Charging Infrastructure on 6 October 2020. At the event, Johannes Pallasch and Dagmar Fehler (Heads of the Centre for Charging Infrastructure) provided details on the status of implementation and presented the Federal Minister with the first publication of the National Centre for Charging Infrastructure, the thesis paper “Einfach laden” (“Easy Charging”). The Minister also announced funding support for private charging stations with the Charging Infrastructure at Residential Buildings federal funding programme.

With its work the centre is now laying the foundations for the expansion of electric mobility in Germany in quick succession. In just three years – by the end of 2023 – a new fast-charging network is to connect all regions of Germany under the name of “Deutschlandnetz” (“Germany Network”). And by the end of 2021, 50,000 publicly accessible fast and normal charging points are to be available for the convenient charging of e-vehicles. In addition, the public charging infrastructure is to become more user-friendly than ever before – with easy-to-find charging points that function reliably and charge transparently via all common payment methods.

PARADIGM SHIFT IN FINANCING: TENDERING AND FUNDING

This acceleration in pace has been achieved thanks to a paradigm shift. For the first time, the National Centre for Charging Infrastructure is pursuing an approach that combines funding for individual charging locations and the tendering of a charging network. Ultimately, the charging infrastructure is an overall system that comprises public and private fast and normal charging options.

To achieve this, the centre is working on improvements in several areas. One key measure is the “Deutschlandnetz” (Germany network), which is to be implemented through a tender process and will cover the charging needs for medium and long-distance mobility on trunk roads by the end of 2023. For this purpose, the federal government is inviting tenders in 2021 for the construction and operation of a Germany-wide fast charging network of 1,000 locations, each with several charging points and at least 150 kW power per charging point. The National Centre for Charging Infrastructure is leading the coordination of the tender.

FEDERAL FUNDING PROGRAMME CHARGING INFRASTRUCTURE AT RESIDENTIAL BUILDINGS

At present and in the near future, the majority of charging processes do not take place in public spaces, but privately, i.e., at the workplace or at home. On 6 October 2020, the new federal funding programme “Charging Infrastructure for Electric Vehicles – Residential Buildings” (“Ladeinfrastruktur für Elektroautos – Wohngebäude”) was published. In the course of spring and summer 2020, the National Centre for Charging Infrastructure developed the programme’s content on behalf of the Federal Ministry of Transport and Digital Infrastructure (BMVI) and coordinated it with relevant stakeholders, in particular with the project manager KfW.

Since 24 November 2020, the federal government has also been providing funding support for private charging stations for electric vehicles at residential buildings for the first time. Tenants and homeowners can apply for a flat-rate subsidy of 900 euros for the installation of private charging stations on their car parking spaces. The new funding programme has been in high demand since the application process was launched. As of 31.12.2020, 136,575 applications for the procurement of 165,590 charging stations had been submitted to KfW. By early March 2021, this figure had even risen to over 310,000 charging points. For this reason, the BMVI increased the available funding to 250 million euros at the end of 2020 and then again to a total of 400 million euros at the end of February 2021.


FEDERAL FUNDING PROGRAMME CHARGING INFRA- STRUCTURE FOR ELECTRIC VEHICLES IN GERMANY

After six funding calls, the current BMVI Charging Infrastructure Funding Guideline (LIS) concluded in 2020 with a total volume of 300 million euros. More than 30,000 charging points were approved. Preparations are currently underway for a new funding guideline to be launched in spring 2021 with a volume of 500 million euros.

FUNDING PROGRAMME FOR COMMERCIAL CHARGING INFRASTRUCTURE

From summer 2021, charging facilities in employee car parks, for fleet charging, at car-sharing companies, etc. will be eligible to apply for funding support amounting to a total of 350 million euros.


Approved Normal (NCP) and Fast Charging Points (FCP) in the federal funding programme Charging Infrastructure for Electric Cars in Germany (as of January 2021)

 NCP ≤ 22 kW FCP > 22 kW	Approved		In operation
	NCP	FCP	NCP and FCP cumulative
Baden-Württemberg	4,473	1,402	2,208
Bavaria	2,944	1,675	1,574
Berlin	124	220	38
Brandenburg	468	391	234
Bremen	116	99	100
Hamburg	644	191	503
Hesse	1,458	861	512
Lower Saxony	2,842	1,021	1,527
Mecklenburg-Western Pomerania	284	169	14
North Rhine-Westphalia	2,878	1,826	1,988
Rhineland-Palatinate	1,178	583	957
Saarland	306	78	169
Saxony	975	388	597
Saxony-Anhalt	335	243	154
Schleswig-Holstein	1,041	317	586
Thuringia	446	258	328
Total	20,512	9,722	11,489

NCP = Normal Charging Point, **FCP** = Fast Charging Point



**Federal funding programme for Charging Infrastructure at Residential Buildings:
Approved subsidies by federal state (as of 31.12.2020)**

	No. of applications	No. of charging stations applied for
Baden-Württemberg	25,084	30,659
Bavaria	28,649	35,666
Berlin	1,886	2,234
Brandenburg	3,414	4,156
Bremen	449	510
Hamburg	1,429	1,658
Hesse	12,212	14,843
Lower Saxony	23,465	27,750
Mecklenburg-Western Pomerania	1,355	1,653
North Rhine-Westphalia	15,547	18,470
Rhineland-Palatinate	9,161	10,988
Saarland	1,699	2,042
Saxony	3,316	4,233
Saxony-Anhalt	1,820	2,231
Schleswig-Holstein	5,347	6,356
Thuringia	1,742	2,141
Total	136,575	165,590



Federal Ministry
of Transport and
Digital Infrastructure

NATIONAL HYDROGEN STRATEGY – COORDINATION OFFICE FOR HYDROGEN

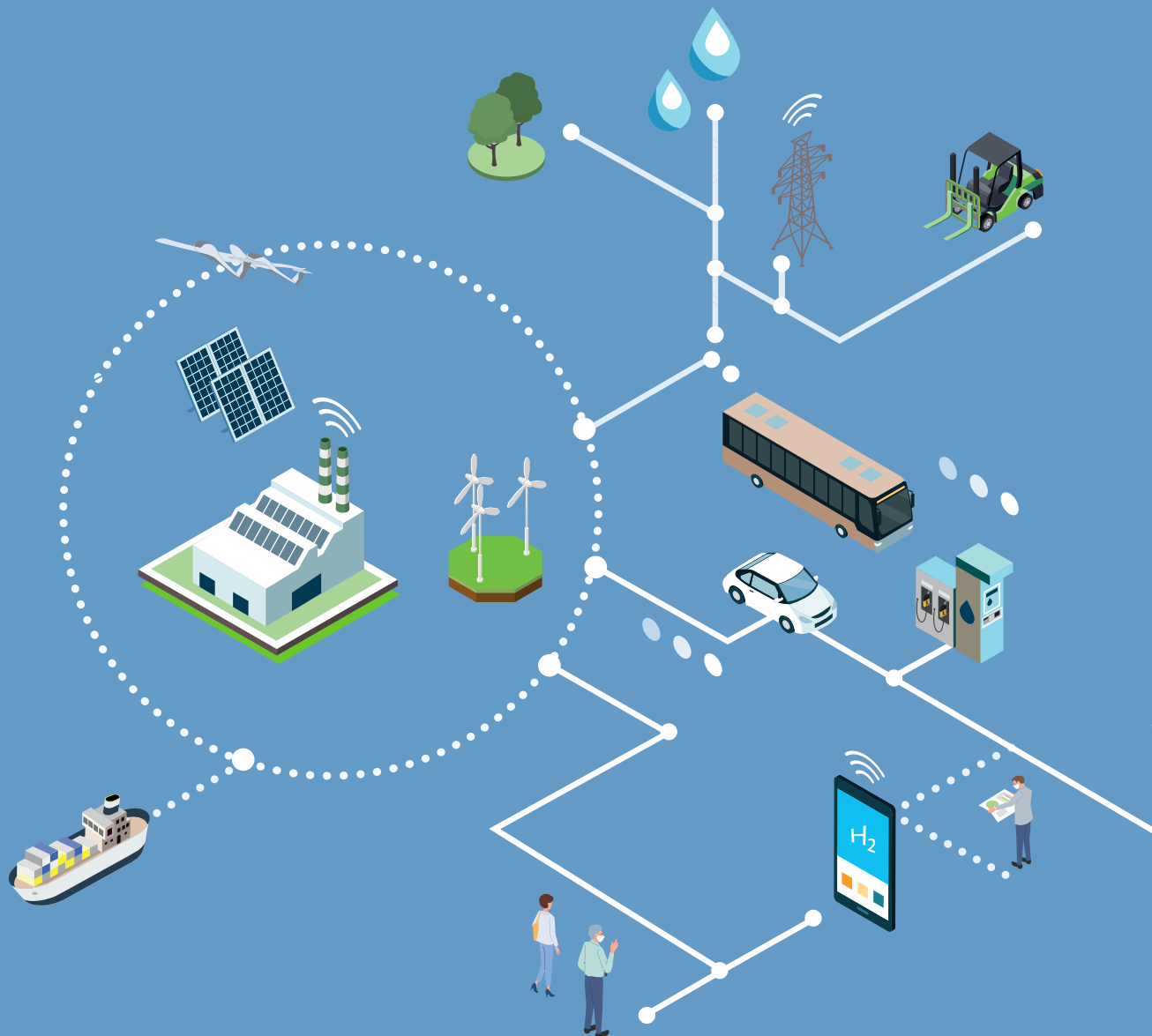
With the National Hydrogen Strategy (NHS), the German government is elevating the 2020s to the decade of hydrogen: In doing so, it is declaring that hydrogen will be a key factor in the future issues of climate protection and energy transition in transport and industry. To this end, the NHS formulates a broad framework for action both for the production and transportation as well as for the utilisation and further application of hydrogen. It defines the measures and stages for building a hydrogen economy, which in turn will contribute to achieving set climate goals, create new value chains for the German economy and further develop international energy policy cooperation. The smallest and lightest element of the periodic table thus becomes a factor comparable to digitalisation: a game changer that will put conventional pathways to the test and fundamentally change the existing energy system along with its regulatory and infrastructural framework. And it places all this in an international context when it newly formulates and propagates worldwide networking and strategic cooperation on the basis of hydrogen as an energy medium.

NOW GmbH has contributed decisively to the point reached today. Since 2008, it has supported the federal government in implementing the National Innovation Programme Hydrogen and Fuel Cell Technology (NIP I & II). Over the past twelve years, numerous hydrogen and fuel cell applications, particularly in the transport sector, have been brought to market maturity within the framework of funding measures in research and development as well as market activation. As a result, the transport sector is now the ideal starting market for the ramp-up of a hydrogen economy in terms of the breadth of applications. For this reason, NOW GmbH was closely involved by the federal government in the preparations for the NHS from the very outset.

NOW GmbH also applies its knowledge, expertise and experience at a central point in the implementation of the NHS. In addition to the ongoing activities within the framework of the NIP, NOW has been commissioned by the Federal Ministry of Transport and Digital Infrastructure (BMVI – Bundesministerium für Verkehr und digitale Infrastruktur) to establish and operate the new Coordination Office for Hydrogen. The office supports the ministries involved in the NHS: The Federal Ministry of Education and Research (BMBF – Bundesministerium für Bildung und Forschung), the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU – Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit), the Federal Ministry of Transport and Digital Infrastructure (BMVI – Bundesministerium für Verkehr und digitale Infrastruktur), the Federal Ministry for Economic Affairs and Energy (BMWi – Bundesministerium für Wirtschaft und Energie) and the Federal Ministry for Economic Cooperation and Development (BMZ – Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung) in implementing the measures of the NHS. It also supports the National Hydrogen Council

(NWR – Nationaler Wasserstoffrat) to formulate and advise on recommendations for action, organises topic-specific task forces of the ministries and conducts regular monitoring of the implemented measures of the NHS.

Against the backdrop of the cross-sectoral NHS, the federal government and the National Hydrogen Council can draw on a broad range of expert knowledge at the coordinating office: In addition to NOW GmbH in its leading role, the German Energy Agency (dena – Deutsche Energie-Agentur GmbH), Zukunft - Umwelt - Gesellschaft (ZUG) gGmbH, Project Management Jülich (PtJ) and the German Society for International Cooperation (GIZ – Deutsche Gesellschaft für Internationale Zusammenarbeit) are involved in the project, which will run until the end of 2023. This creates a solid basis for a consistent and comprehensive implementation of the NHS to provide a powerful kick-start to the decade of hydrogen for a climate-friendly and sustainable energy system.





Federal Ministry
of Transport and
Digital Infrastructure



Federal Ministry
for Economic Affairs
and Energy



Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety



Federal Ministry
of Education
and Research

NATIONAL INNOVATION PROGRAMME FOR HYDROGEN AND FUEL CELL TECHNOLOGY

Through the NIP, the German government has been supporting efforts to prepare the market for hydrogen and fuel cell technology since 2006. As part of the government's Hydrogen and Fuel Cell Technology programme 2016 to 2026, the inter-departmental NIP ensures continuity in research and development and addresses the readiness of first products for series production needed for a market ramp-up. The NIP is implemented through relevant measures of the federal ministries involved.

The Federal Ministry of Transport and Digital Infrastructure (BMVI – Bundesministerium für Verkehr und digitale Infrastruktur) is allocating 660 million euros to support hydrogen and fuel cell technology for the period 2016 to 2024. Through the funding guidelines "Measures for research, development and innovation" and "Measures for market activation within the framework of the National Innovation Programme for Hydrogen and Fuel Cell Technology Phase 2 (Focus on sustainable mobility)", the BMVI supports the development of products that are technically ready for the market but are not yet competitive in the market ramp-up phase.

The Federal Ministry for Economic Affairs and Energy (BMWi – Bundesministerium für Wirtschaft und Energie) is continuing its funding of hydrogen and fuel cell technology in the field of applied research and development within the scope of the federal government's 7th Energy Research Programme with annual funding of around 25 million euros. In addition, the BMWi launched a funding programme for the acquisition of fuel cell heating devices for private customers in 2016 as part of the National Action Plan for Energy Efficiency (NAPE – Nationaler Aktionsplan Energieeffizienz).

As in the first NIP phase, the Federal Ministries for the Environment (BMU – Bundesministerium für Umwelt) and for Education and Research (BMBF – Bundesministerium für Bildung und Forschung) continue to be actively involved in shaping the strategic framework of the NIP through the structures of NOW GmbH.

BMVI funding support 2017 – 2020

AREA	FUNDING AMOUNT/€
R&D	239,247,748
MARKET ACTIVATION	205,198,952
HYLAND	6,751,466
STUDIES	3,242,597
CLUSTER	914,810
TOTAL	455,355,573

BMWfunding support

AREA	FUNDING AMOUNT/€
TRANSPORT	31,755,004
INDUSTRY	12,844,734
HOUSEHOLD ENERGY	5,422,736
INTERDISCIPLINARY	22,061,067
SPECIAL MARKETS	1,537,597
HYDROGEN PRODUCTION	1,333,231
TOTAL	74,954,369

“TECHNOLOGY AND INNOVATION CENTRE FOR HYDROGEN AND FUEL CELL TECHNOLOGY” SITE COMPETITION

The competition is a call for tenders by the Federal Ministry of Transport and Digital Infrastructure (Bundesministerium für Verkehr und digitale Infrastruktur), jointly conducted by NOW and Project Management Jülich (PtJ – Projektträger Jülich), with the aim of finding a suitable location for a “Technology and Innovation Centre for Hydrogen and Fuel Cell Technology”.

Consortia were invited to apply by 20 January, 2021, with a concept paper describing their proposed site and their ideas for such a centre. A selection of sites will be made from the applications in 2021 for which detailed feasibility studies will be conducted on behalf of the Federal Ministry of Transport and Digital Infrastructure. These studies will primarily analyse and clarify the legal and economic issues for the operation of the future centre. The main objective of the studies is to identify the most suitable location and to provide a concept for the subsequent establishment and operation of the “Technology and Innovation Centre for Hydrogen and Fuel Cell Technology”.





Federal Ministry
of Transport and
Digital Infrastructure

LOCAL ELECTRIC MOBILITY (ELEKTROMOBILITÄT VOR ORT)

NOW continued supporting the Federal Ministry of Transport and Digital Infrastructure (BMVI) in the field of battery-electric drives in 2020 with the implementation of the “Elektromobilität vor Ort” funding programme for local electric mobility (Electric Mobility Funding Guideline of the BMVI). The climate policy objective of the programme is the shaping of an energy-efficient and environmentally compatible transport sector by exploiting renewable energy sources in transport. As far as electric mobility is concerned, the declared goal is to keep driving the market ramp-up in Germany and to pave the way for the full market penetration of electric vehicles. As such, electric mobility is a pivotal element of a sustainable transport system and is essential for achieving the climate protection goals for transport described above. Not least, it also provides important industry policy opportunities for Germany as a key business location.

With this objective in mind, three main funding pillars were initiated in 2015 with the Federal Ministry of Transport and Digital Infrastructure’s Electric Mobility Funding Guideline: Funding for procurement, funding for concepts and funding for research and development (R&D). With this approach, a broad range of funding opportunities was created at an early stage, optimally supporting the desired market ramp-up and generating continuously high demand. The Electric Mobility Funding Guideline also serves as an overarching funding basis for the Federal Ministry of Transport and Digital Infrastructure’s measures within the programmes of the federal government, including:

- The standard funding programme for local electric mobility **“Elektromobilität vor Ort”** (2015–2020), which addresses the three funding priorities – focusing in particular on municipalities and municipal fleets and with an annual budget volume of approx. 25 to 30 million euros.
- The **“Clean Air Immediate Action Programme”** (2017–2020) focusing on procurement funding for cities and municipalities with high nitrogen dioxide pollution. The total funding volume amounts to 1.5 billion euros, of which approx. 750 million euros are reserved for the electrification of transport and approx. 50 % of which fall within the BMVI’s area of responsibility.
- The federal government’s **“Economic Stimulus and Crisis Management Package”** (for 2020 and 2021) with a total volume of 130 billion euros to combat the economic consequences of the COVID-19 pandemic, with a special focus on strengthening the municipalities and federal states, including a future package of 50 billion euros to promote research and the increased use of alternative drive systems.

In 2020, it was again possible to respond to market requirements in a targeted manner through annual funding calls. In late summer 2020, for example, the call for funding for electric commercial vehicles for craft enterprises and small and medium-sized enterprises (the so-called “Handwerkercall”) was published with a total volume of nearly 70 million euros and a funding share of approximately 30 million euros (Fig. Budget Overview, p. 21). This call supplements the 14 previous calls for funding over the last five years. In total, 15 calls for submissions with 1,014 projects and a total volume of 725 million euros and 379 million euros in funding were implemented via the BVMI’s Electric Mobility Funding Guideline (Fig. Approvals by Standard and Immediate Programme, p. 21).

Due to the guideline’s approach for supporting the further market ramp-up of electric mobility, the main focus is on procurement funding. This is accompanied by targeted R&D and preliminary analyses within the concepts. Overall, approximately 18,400 vehicles and 8,500 infrastructure units were approved through the standard and special programmes. These units have been put into operation within the implementation years or will be successively put into operation in 2021. Despite the COVID-19 pandemic, 2020 proved to be an extremely dynamic and can be regarded as a breakthrough year for electric mobility in Germany in terms of the overall passenger car market. A detailed analysis of this can be found in Part II, Chapter V, Accompanying Research and Monitoring in the thematic area of Framework Conditions and Market.

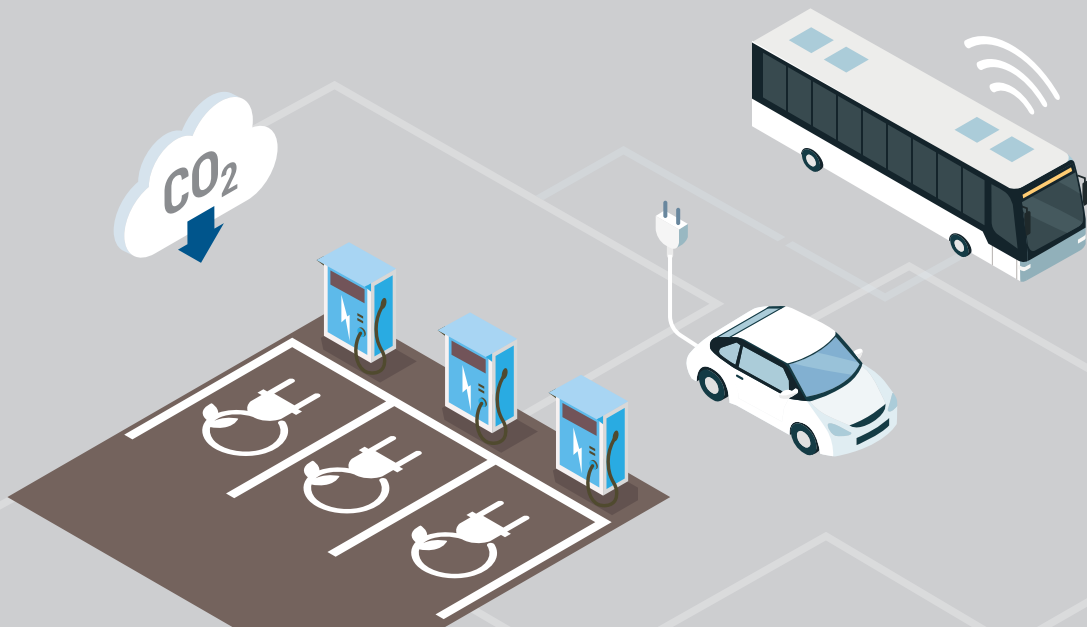
The original basis for the Electric Mobility Funding Guideline expired at the end of 2020 following five successful years. Due to the continuing need for funding, a new funding guideline with market-relevant extensions was developed in 2020. This was published in the Federal Gazette (“Bundesanzeiger”) on 24 December 2020 and, with a term extending to the end of 2025, follows seamlessly on from the previous funding phase. Similar to the first, the current funding guideline provides for three funding pillars (procurement, concepts, R&D) and contains extensions in the direction of commercial users and strengthens the part of the conceptual preliminary analysis through consultation.

Insights gained from the implementation of the programme will be applied in a targeted manner with the help of the BMVI’s programme support, which is coordinated by NOW GmbH. The findings are also used to respond to market requirements in the funding calls that are open to all technologies and modes of transport. In particular, the central data monitoring, which has been implemented by NOW GmbH since the beginning of 2020, allows information from funding programmes, the market and technology to be processed directly and thus integrated into cross-programme dialogue.

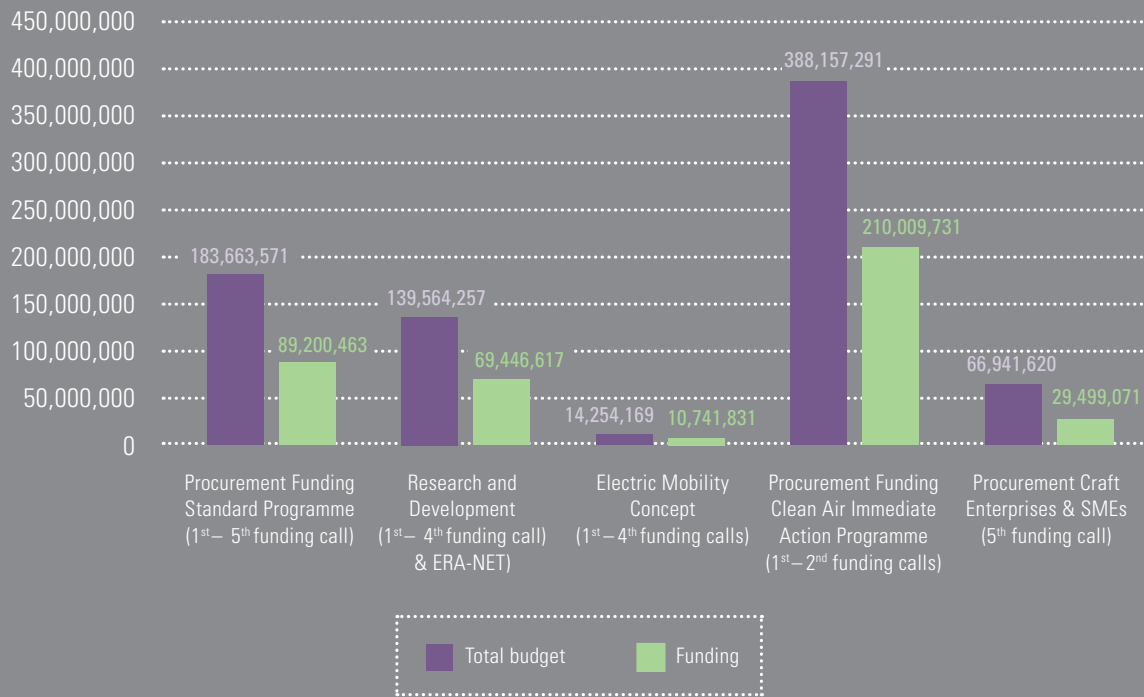
➤ **7 calls in the area of procurement funding support (772 projects, 4 in the standard programme (369 projects), 3 in special programmes (403 projects)): approx. 571 million euros total volume, approx. 300 million euros funding**

➤ **4 calls in the area of concept funding support (200 projects): approx. 14 million euros total volume, approx. 11 million euros funding**

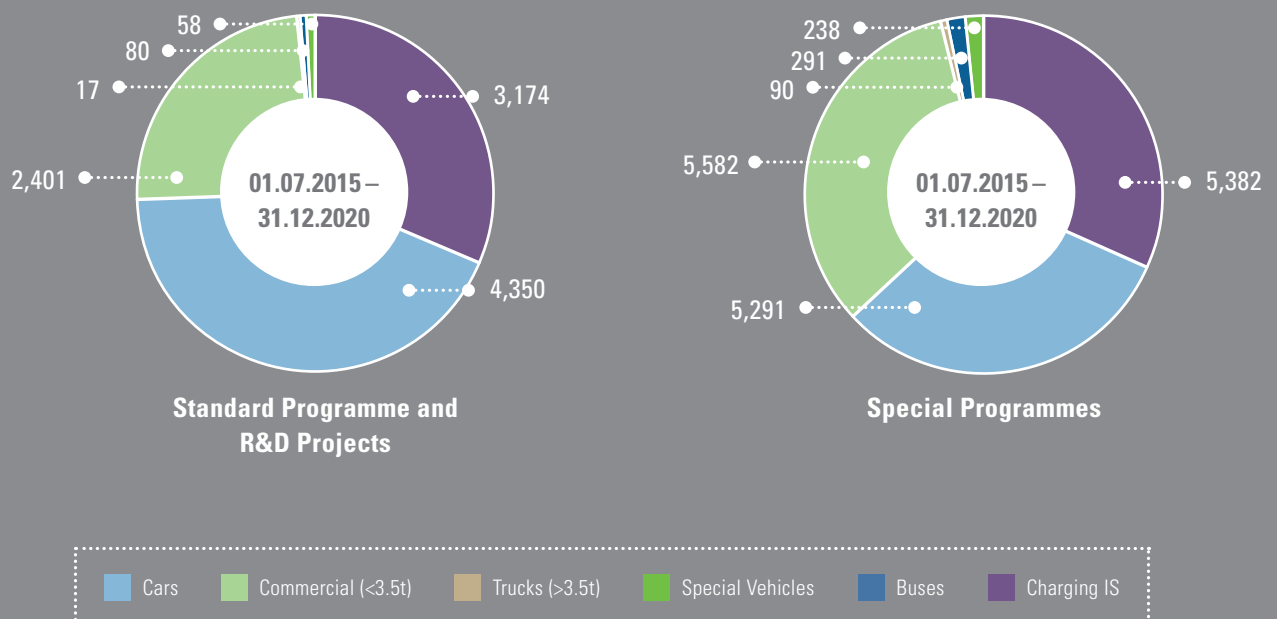
➤ **4 calls in the area of research and development (33 projects): approx. 140 million euros total volume, approx. 69 million euros funding**



Budget Overview (cumulative): Electric Mobility Funding Guideline Project (01.07.2015 – 31.12.2020)



Approval of Vehicles and Charging Infrastructure (Market Activation)



NAKOMO:

NATIONAL COMPETENCE NETWORK FOR SUSTAINABLE MOBILITY

S NOW GmbH has been supporting the National Competence Network for Sustainable Mobility (NaKoMo – Nationales Kompetenznetzwerk für nachhaltige Mobilität) in the area of communication and networking since spring 2020.

NaKoMo, which was established by the Federal Ministry of Transport and Digital Infrastructure (BMVI), the state of Saarland as representative of the German federal states and the Association of German Cities (Deutscher Städtetag), interlinks municipalities, federal states and the federal government with each other as well as with experts from relevant stakeholder groups throughout Germany. The aim is to efficiently assist the federal, state and local players on the path towards sustainable and climate-friendly mobility and to support them in their leadership and coordinating roles. In doing so, NaKoMo serves as a central point of contact for questions and funding opportunities relating to the topic of sustainable mobility.

Fostering active exchange is an essential aspect of the network. This is where the NaKoMo events play an important role. More than 500 participants attended the annual digital conference on the topic of “Mobility between urban and rural areas” in November 2020. In addition, workshop series were conducted on topics such as “Innovative Logistics”, “Alternative Drives and Fuels” and “Redistribution of Public Space”. Wide-ranging kick-off workshops were followed by thematic workshops, with the opportunity to discuss issues in depth – and to develop tangible approaches towards creating solutions.

Alongside the events, the www.NaKoMo.de platform supports further digital networking. Here, in the NaKoMo social network, over 800 members have registered in the course of the year. Members post events, are informed about new funding opportunities, can read the latest articles and exchange ideas in groups on specific topics.

NaKoMo represents a systemic and cross-modal approach that puts those taking action in the foreground. The idea being: We can achieve more together.

➤ www.NaKoMo.de



Speakers of the second NaKoMo annual conference "STADT.(UM)LAND.VERKEHR. Mobility between urban and rural areas", which took place digitally in November 2020



MOBILITY AND FUELS STRATEGY OF THE FEDERAL GOVERNMENT

In implementing the Mobility and Fuels Strategy of the federal government (MFS) and the measures from the Climate Action Programme 2030, the focus lies on a broad market ramp-up of alternative drives and fuels in all areas of application. In 2020, implementation on the part of the Federal Ministry for Transport and Digital Infrastructure was also persistently driven forward and further developed. The MFS team within NOW GmbH supports the BMVI in this task, e.g. in formulating and implementing market incentive programmes.

Aside from the measures already underway, the focus is particularly on the thematic areas of "Climate-friendly commercial vehicles" and "Renewable fuels". In this context, NOW GmbH supports the BMVI in creating and designing new funding measures for a speedy market ramp-up.

For environmentally-friendly onboard and mobile shoreside power supply, in 2020 a new BMVI funding guideline was published that is now also supported scientifically and technically by NOW GmbH in terms of its implementation. The second call for funding in the area of LNG equipping and retrofitting of seagoing vessels is the continuation of the funding programme which was due to expire at the end of 2020. By extending it by another year, a market-oriented funding framework for LNG drives in maritime shipping can continue to be provided.

In addition, various cross-technology and cross-market investment and pilot projects are being implemented to update the MFS. The focus of new projects here is increasingly on projects to reduce greenhouse gas emissions in heavy road freight transport.

Fundamentally the pilot and investment projects that are subsidised cover the technological spectrum of the MFS. In addition to funding future-oriented projects in the area of alternative drives and fuels for shipping, projects in the area of public transport and road freight transport in particular are also being implemented, as well as renewable fuels.

The year 2020 was also characterised by discussions on strategic aspects of implementing climate goals in transport. In addition to the National Hydrogen Strategy, there was the development and presentation by the BMVI of the “Overall concept for climate-friendly commercial vehicles”, which was supported in terms of content by NOW GmbH in its development and also further implementation. The measures of the commercial vehicle concept aim to support the vehicle ramp-up and the coordination of the build-up of refuelling and charging infrastructure as well as the accompanying regulatory framework. In the area of renewable fuels, NOW GmbH also supports formulating funding measures for the development of renewable fuels as well as investments in generating plants and the market ramp-up of the fuels. Corresponding funding programmes will be implemented over the course of 2021.

In addition to funding, the regulatory framework in particular represents a central basis for the market ramp-up of alternative drives and fuels. In 2020, primarily the revision of the German Renewable Energy Sources Act (EEG) mentioned in the National Hydrogen Strategy and the national implementation of the European Renewable Energy Directive (RED II) were important milestones in this regard.



Available BMVI funds for funding concepts in the following areas:



COMMERCIAL VEHICLES:

UP TO 2024, THERE WILL BE AROUND 1.3 BILLION EUROS MADE AVAILABLE IN SUPPORT FOR PURCHASING COMMERCIAL VEHICLES WITH ALTERNATIVE DRIVES AND A FURTHER 5.4 BILLION EUROS FOR SUBSIDIES FOR THE CONSTRUCTION OF REFUELLING AND CHARGING INFRASTRUCTURE (CARS & TRUCKS).



SHIPPING:

The funding of LNG drives in shipping is financed by the BMVI from the MFS budget title "Investments for market activation of the use of alternative fuels and in the development of the associated refuelling and charging infrastructure". From the expenditure in this title, 50% will be used for investments in the LNG field, with both federally-owned and other ships being equipped and retrofitted for LNG use. Ships that are not federally-owned are funded through the LNG funding programme for seagoing vessels.

UNDER THE 2021 FEDERAL BUDGET, MORE THAN 200 MILLION EUROS OF BUDGETARY FUNDING ARE ALLOCATED TO THIS TITLE. TAKING INTO ACCOUNT THE 50% PROVISION, A TOTAL OF MORE THAN 100 MILLION EUROS WILL THEREFORE BE USED FOR LNG AS A SHIPPING FUEL.

The BordstromTech funding programme is financed by the BMVI from the MFS budgetary title "Subsidies for investments to support environmentally-friendly onboard and mobile shoreside power supply for seagoing and inland waterway vessels".

ACCORDING TO THE 2021 FEDERAL BUDGET, OVER 7.5 MILLION EUROS OF BUDGETARY FUNDING ARE AVAILABLE UNDER THIS TITLE FOR THE BORD-STROMTECH FUNDING PROGRAMME.

The budget titles can cover each other so that in principle, higher funding amounts can be granted.



RENEWABLE FUELS:

A TOTAL OF 1.54 BILLION EUROS IS AVAILABLE. 640 MILLION EUROS OF THIS IS ALLOCATED TO DEVELOPMENT AND DEMONSTRATION PROJECTS FOR RENEWABLE FUELS AND 900 MILLION EUROS TO THE CONVERSION OR NEW CONSTRUCTION OF GENERATION PLANTS FOR ADVANCED BIOFUELS AND ELECTRICITY-BASED FUELS AS WELL AS THE MARKET RAMP-UP OF ELECTRICITY-BASED KEROSENE.

INTERNATIONAL COOPERATION

In international terms, 2020 was overshadowed by the global COVID-19 pandemic. International trade fairs and events had to be cancelled or hosted digitally. Nevertheless, the momentum of recent years in the field of hydrogen technology and sustainable mobility increased substantially once again in 2020. In the field of battery-electric mobility, a clear rise in registrations of battery-electric and plug-in hybrid vehicles was recorded despite the corona pandemic. In addition, numerous new national hydrogen strategies were presented, including in South Korea, Netherlands, Norway, Portugal, Spain, Chile, France, Finland and Canada, as well as the EU's hydrogen strategy. The German government also presented its National Hydrogen Strategy in 2020. The strategies vary widely in terms of their depth of detail and the specific measures to be implemented. In this context, the German National Hydrogen Strategy is to be highlighted as a positive example. Concrete objectives and measures are outlined in the European and international context. The goal of "proactively advancing key dossiers on the topic of 'hydrogen'" is underscored by measures to establish sustainability and quality standards as well as the development of European regulations, codes and standards (RCS) across different application areas. Explicitly mentioned here is the preparation of legislative packages on the design of the gas market, expected in 2021. Furthermore the federal government commits itself in the National Hydrogen Strategy to conducting an "Important Project of Common European Interest" (IPCEI). According to the strategy, the creation of an international hydrogen market is to be driven forward as well. The topic will be emphasized more in existing formats, including in the energy the energy partnerships, but also in international organisations. Furthermore, pilot projects will be carried out in German development cooperation partner countries and in nations that currently primarily act as fossil fuel exporters in particular. NOW GmbH is already involved in implementing the relevant measures through the Environmental Technologies Export Initiative.

Within the framework of international organisations and initiatives, more meetings of the International Partnership for Hydrogen in the Economy (IPHE) ([↗ www.iphe.net/](http://www.iphe.net/)) were held in 2020. The coalition of 22 countries and the European Commission, which welcomed new member countries Chile and Switzerland in 2020, has been the central interface for coordination and harmonisation in the global hydrogen technology sector for more than 17 years. As part of the activities of the IPHE, global sustainability criteria for clean hydrogen and the topic of regulation, codes and standards have especially progressed. NOW GmbH was represented in these working groups as well as in the biannual meeting of the steering committee. The Federal Ministry for Economic Affairs and Energy was also represented at a high-level at the IPHE Policy Forum for the first time by State Secretary Andreas Feicht. Furthermore, as part of the Innovation Challenge 8 (IC8) for renewable and emission-free hydrogen, NOW GmbH worked together with international partners on exchanging findings on the use of hydrogen technologies. In the national context, this includes primarily the real-world laboratories of the energy transition. In terms of multilateral events and coordination, the 7th International Workshop on Hydrogen Infrastructure took place in Tokyo in 2020.



EUROPE

On the European level, the year's activities were marked by the German Presidency of the Council of the European Union. NOW GmbH supported the German Presidency in the organisation of several high-level events. At a virtual event in September, the requirements for an interoperable infrastructure for alternative fuels were discussed. Together with the Fuel Cell and Hydrogen Joint Undertaking (FCH JU) and the Federal Ministry of Transport and Digital Infrastructure (BMVI), the PrioritHy conference took place during European Hydrogen Week. Participants included Federal Transport Minister Andreas Scheuer, ministers from Chile and Morocco as well as representatives from EU institutions, who came together to discuss regional funding of hydrogen projects, such as the HyLand programme, as well as the global value chain. With 4,000 participants, the conference was an international success.



PrioritHy online conference (November 2020), welcome by Kurt-Christoph von Knobelsdorff, Managing Director (Chair) of NOW GmbH



Priorithy online conference (November 2020), keynote by Bart Biebuyck, Managing Director of the Fuel Cells and Hydrogen Joint Undertaking (FCH JU)



Dr. Sunita Satyapal, Head of the Hydrogen and Fuel Cell Technologies Office, U.S. Department of Energy

Hydrogen IPCEI in the European Economic Area EEA

- Participating Member State
- Lead Member State
- Non-participating Member State

On 8 July, the European Commission published both its Hydrogen Strategy for a Climate-neutral Europe as well as the EU Strategy for the Energy System Integration. In addition, the Commission announced the establishment of the European Clean Hydrogen Alliance (ECH2A), which NOW GmbH joined. On the CEO level, the ECH2A will support the establishment of major European projects (including IPCEIs) in six key thematic fields as well as the formulation of the necessary regulatory proposals. NOW GmbH is represented at Managing Director level at the roundtable on clean hydrogen for mobility. (www.ech2a.eu/)

In 2020, the preparations for implementing an IPCEI on hydrogen took concrete shape. A hydrogen IPCEI under Article 107 of the Treaty on the Functioning of the European Union facilitates funding beyond the normal framework of state aid law. 23 countries in the European Economic Area have committed to implementing the IPCEI. A large majority of these countries began issuing calls for expressions of interest in 2020. Over the course of the year the federal government offered the other member states to assume leadership of the project development. NOW GmbH is tasked by the BMVI with supporting IPCEI implementation in the area of mobility.

ENVIRONMENTAL TECHNOLOGIES EXPORT INITIATIVE

As part of a commission from the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), NOW GmbH has developed a concept for the funding of hydrogen and fuel cell technology within the Environmental Technologies Export Initiative. The focus is on the provision and testing of systems that facilitate a low-CO₂, off-grid or decentralised power supply. Priority is given to international pilot or demonstration projects in which German technology companies, collaborating with research institutes, contribute to the Sustainable Development Goals (SDGs) as well as to general knowledge increase and thus an opening of the market. Preparatory measures, like for example, feasibility and conceptual design studies are also eligible for funding.

In this context, in 2020 NOW GmbH formulated a concept for funding hydrogen and fuel cell technologies for decentralised and off-grid power supply in emerging and developing countries. This is to give German SMEs the opportunity to tap into new markets internationally. The development and testing of applications or the operation of demonstrators will be funded, also in order to establish the necessary initial supply chains locally and support knowledge transfer. With the knowledge gained, every project is expected to raise the overall visibility of the technologies and their applications. NOW GmbH supports the initiation of projects through networking players in Germany as well as internationally through preparing and communicating market and technology information and providing detailed advice to potential applicants.



The application spectrum of hydrogen and fuel cells in decentralised or off-grid power supply is large.

In order to guarantee long-term and sustainable use, some of the most important factors are integrating the projects or the technology applications in local structures, training specialist personnel and establishing supply chains. To this end, NOW GmbH has entered into a cooperation agreement with DIHK Service GmbH, a project company of the Association of German Chambers of Industry and Commerce. The knowledge and technology transfer will support German companies in identifying market potential at an early stage. In terms of implementation, the local networks of the foreign chambers of commerce will be used for the development of an international hydrogen economy.

ASIA

Japan

As part of the German-Japanese partnership, in 2020 the 7th International Workshop on Hydrogen Infrastructure took place in Tokyo. The exchange traces back to a Memorandum of Understanding between NOW GmbH and NEDO (New Energy and Industrial Technology Development Organization). Experts from the US, Japan, South Korea, China and the EU participated (in part via teleconference) in the expert exchange on technical topics. Some of the key themes were safety and the refuelling of heavy commercial vehicles.

China

Despite reports to the contrary, China's activities in the area of electric mobility proceeded unabated at a very high level. For instance, state subsidies for the private purchase of battery-electric vehicles were extended to the end of 2022 in China instead of expiring at the end of 2020 as originally planned. The funding was capped at 2 million vehicles per annum. In 2021 and 2022, the funding is to be reduced by 10 % compared to the previous year. Battery cars with a range of less than 300 km are now no longer eligible for subsidies, however PHEVs with a minimum purely electric range of 50 km are. Private individuals are entitled to the full subsidy of a maximum of 3,200 euros for pure battery cars with a range of over 400 km, while commercial buyers receive only 70 % of the maximum funding amount.

Electric mobility with batteries and hydrogen fuel cells in China

NOW GmbH and CATARC (China Automotive Technology & Research Center) also continued their collaboration within the framework of the Sino German Electro-Mobility Innovation and Support Center (SGEC). New heads of thematic areas were appointed, for example in the fields of H₂ FC mobility and the integration of renewable energies. As part of the RCS cooperation with China on hydrogen in mobility, a workshop was held at which regulatory gaps and need for action in relation to Chinese standards were identified and the possibilities for NOW GmbH to support CATARC in the further development of the Chinese RCS roadmap were discussed. Furthermore, calls for the compilation of project ideas in the thematic areas were launched. This ensures the continued exchange of knowledge and research between German and Chinese partners in the future.

COMMUNICATION, KNOWLEDGE MANAGEMENT AND MUNICIPAL NETWORKS

The technological-economic measures coordinated and implemented by NOW GmbH in the various technology areas are supported by targeted media and public relations activities. These are aimed at raising the acceptance and visibility of alternative drives and fuels on a broad scale and promoting the formation and expansion of network groups.

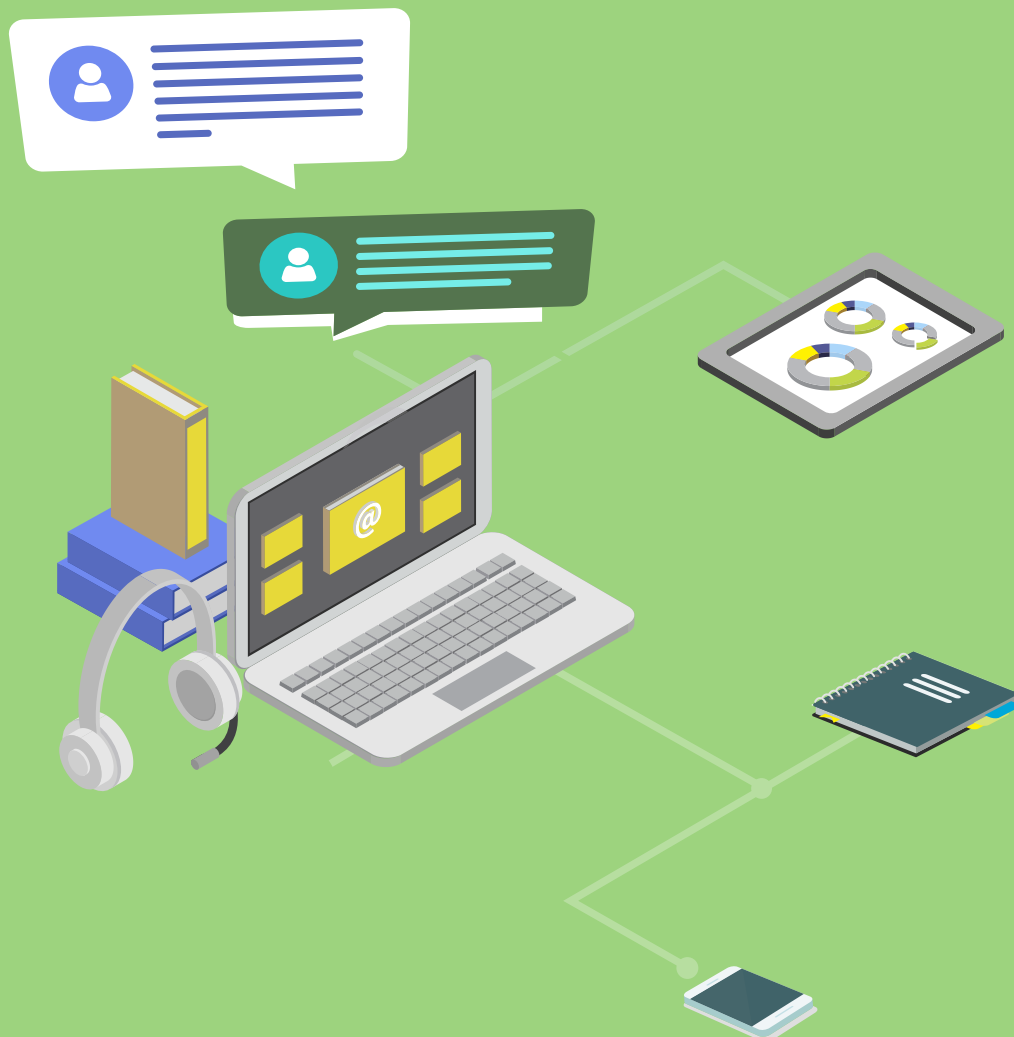
In addition to establishing, maintaining and expanding contacts with the media and the general public, all of NOW GmbH's thematic areas are represented at trade fairs and conferences. Primarily, this concerns the deployment of emission-free mobility and logistics on road, rail, water and air. Complementing the activities are partner workshops, major conferences and other networking events – in the COVID year of 2020 in both face-to-face and digital formats – which provide information on current projects and technology trends.

The Knowledge Management area at NOW GmbH brings together the body of existing programme, project and specialist knowledge, making it accessible and usable for increasing acceptance and visibility, both for sector-relevant specialist networks and for the wider public. Besides many specialist publications, infographics and regularly published statistics provide answers to current questions concerning clean mobility from an expert's perspective.

(Electric) mobility demands the involvement of municipalities. The NOW GmbH municipal network therefore promotes the development and expansion of practical expertise in alternative drives and fuels at the local level. The aim is to provide municipalities with practical assistance and concrete measures for the development of local holistic mobility strategies. These are drawn from the federal government's overarching funding programmes on electric mobility with batteries and fuel cells, on charging infrastructure, and from the mobility and fuels strategy, and are aligned with the specific needs of the local municipalities. The NOW GmbH knowledge management team develops tailor-made measures, including web seminars, workshops and conferences, for the dissemination and discussion of the contents and the transfer of knowledge within the network.

The measures successfully established as part of the Electric Mobility Starter Set (Starterset Elektromobilität) and the Electric Mobility Roadshow (Roadshow Elektromobilität) were continued in 2020 despite the COVID-19 pandemic. An additional information service ([🔗 www.now-gmbh.de/en/news/newsletter](https://www.now-gmbh.de/en/news/newsletter)) for municipalities and regions provides target group-specific information on events, important publications, news from the Electric Mobility Starter Set, interesting tools and practical examples.

In addition, the regular exchange with the municipal umbrella organisations – Deutscher Städtetag (Association of German Cities), Deutscher Städte- und Gemeindebund (Association of German Cities and Municipalities), Deutscher Landkreistag (Association of German Counties) as well as the Verband Deutscher Verkehrsunternehmen (Association of German Transport Companies) and the Verband kommunaler Unternehmen (Association of Municipal Companies) – is of great importance in the networking activities pursued by NOW GmbH.



OVERVIEW OF NOW EVENTS


 2020

DATE	EVENT	PLACE
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January 2020		
13 January 2020	“H ₂ hub Hamburg – Will the hanseatic city become a hydrogen metropolis?” – Pfeiffer. fragt – Der Polit.talk Event partnership	Hamburg
20–21 January 2020	17 th International Conference on Renewable Mobility “Fuels of the Future 2020” Event partnership	Berlin
22–23 January 2020	VDE Workshop: Electric Mobility with Batteries and Fuel Cells Event partnership	Frankfurt (Main)








Presentation of the funding certificates for the Electric Mobility Funding Guideline by Steffen Bilger, Parliamentary State Secretary at the BMVI

February 2020		
04 – 05 February 2020	11. VDV Electric Bus Conference 2020 Event partnership	Berlin
05 February 2020	Opening of hydrogen filling station in Heidelberg	Heidelberg
14 – 15 February 2020	Roadshow Electric Mobility Mobility day: Electric mobility dialogue and roadshow	Cottbus & Görlitz
11 February 2020	Presentation of funding certificates for the Electric Mobility Funding Guideline by Steffen Bilger, Parliamentary State Secretary at the Federal Ministry of Transport and Digital Infrastructure	Berlin
26 February 2020	Federal-State meeting on charging infrastructure	Berlin
26 – 28 February 2020	The 16 th International Hydrogen and Fuel Cell Expo	Tokyo
27 February 2020	Roadshow Electric Mobility 14 th Steinfurt Bioenergy Conference on the topic “Hydrogen – New Perspectives for Energy and Environmental Technology”	Steinfurt

March 2020		
03 March 2020	Get-together of the AG Bus working group	Cologne
05 March 2020	Changing Transport Conference of the GIZ Event partnership	Berlin
10 – 11 March 2020	ENERGIE.CROSS.MEDIAL 2020 Event partnership	Berlin

April 2020		
08 April 2020	Online network meeting of HyLand (HyPerformers and HyExperts)	Berlin
22 April 2020	NOW online seminar: Market ramp-up of power-based fuels – need for action and future funding instruments	online 
28 April 2020	Online seminar of the DIHK and NOW on the use of hydrogen and fuel cell technologies in an international context	online 
29 April 2020	NOW online seminar: Alternative drives in road freight transport	online 

May 2020		
06 May 2020	29 th Electric Mobility Strategy Circle	online 
06 May 2020	NOW online seminar: Alternative drives in rail transport	online 
13 May 2020	NOW online seminar: 5th funding call charging infrastructure	online 
13 May 2020	Networking meeting of the accompanying research for the Electric Mobility Funding Guideline	online 
28 May 2020	Online seminar of NOW GmbH and the Mittelstandsinitiative Energiewende und Klimaschutz (SME Initiative Energy Transition and Climate Protection): Hydrogen and fuel cell technology in Germany – technology, areas of application, funding opportunities – for beginners & advanced players	online 



DATE	EVENT	PLACE
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June 2020

03 June 2020	NOW online seminar: HyLand and NaKoMo – Supporting municipalities and regions in the mobility transition	online
05 June 2020	“Green Deal instead of corona bonds: Is green hydrogen the new EU economic miracle?” – Pfeiffer.fragt – Der Polit.talk Event partnership	online
06 – 14 June 2020	Hydrogen Week North digital Event partnership	online
10 June 2020	Mobile with hydrogen – technology, strategy and federal funding – online seminar as part of the Hydrogen North digital week in Bremerhaven	online
10 June 2020	NOW online seminar: Alternative drives in bus transportation	online
16 June 2020	NOW project check: Autostack Industrie – Evolution1	online
17 June 2020	NOW online seminar: BordstromTech funding programme	online
17 June 2020	NOW online seminar: Measures of the National Hydrogen Strategy	online
24 June 2020	NOW online seminar: Data insights from the “Elektromobilität vor Ort” funding programme for local electric mobility	online
30 June 2020	NOW project check: H2Fuel	online

July 2020

01 July 2020	NOW project check: ShipFuel	online
07 July 2020	Start of the eFarm project – Press event	Reußenköge
23 July 2020	“Hyways for Future” (HyPerformer): Date as part of the summer press tour of Minister of Economic Affairs Bernd Althusmann, Lower Saxony	Oldenburg
29 July 2020	NaKoMo online workshop: Evaluation of the funding processes under the Clean Air Immediate Action Programme 2017–2020 in cooperation with the Alliance for Modern Mobility and the German Association of Cities and Towns.	online

August 2020

10 August 2020	“No Green Deal without Green Steel: How to achieve the transition in industry?” – Pfeiffer.fragt – Der Polit.talk Event partnership	online
12 August 2020	Ceremony for the start of regular operation of the plug-in hybrid ferry of the “E-Fähre Kiel” funding project (MS Gaarden)	Kiel
21 August 2020	Presentation of the hydrogen buses of the RVK and inauguration of the hydrogen filling station	Meckenheim
25 August 2020	NaKoMo online workshop: Urban commercial transport	online
27 August 2020	E-MetroBus: Inauguration of BVG’s line 200 (electric articulated buses)	Berlin



Jan Philipp Albrecht, Minister for Energy Transition, Agriculture, Environment, Nature and Digitalisation, Astrid Damerow, Member of the German Bundestag, and Andreas Scheuer, Federal Minister of Transport and Digital Infrastructure, inaugurate the eFarm together with representatives of GP JOULE

September 2020		
03 September 2020	BMVI online specialist conference "Turning the page: the next chapter for electric road transport"	Brussels
05 September 2020	Electric Mobility Roadshow Environmental market	Wolfenbüttel
07 – 08 September 2020	Future Mobility Summit Event partnership	online www
11 September 2020	9 th HYPOS Dialogue "Green hydrogen, safely!" Event partnership	online www
14 – 18 September 2020	Flotte! Der Branchentreff (Fleet industry meet) 2020 Digital	online www
15 September 2020	NOW project check: Smart eFleets	online www
16 September 2020	World premiere of the BMVI supported project "Poseidon – decarbonisation of heavy goods road transport in Germany with the aid of H2-FC 40 tonne trucks" (Daimler)	Berlin
21 September 2020	Constituent meeting of the National Centre for Charging Infrastructure's advisory board	Berlin
21 September 2020	NOW online seminar: Hydrogen technology from a regional perspective	online www
28 – 29 September 2020	#24H2Challenge: German 24-Hour Hydrogen Rally	Germany-wide
29 – 30 September 2020	f-cell 2020 – Impulse summit for hydrogen and fuel cells Event partnership	Stuttgart



The NOW GmbH team at the start of the 24-hour hydrogen rally in the city of Konstanz



From left to right: Kurt-Christoph von Knobelsdorff, Managing Director (Chair) of NOW GmbH, Andreas Scheuer, Federal Minister of Transport and Digital Infrastructure, and Johannes Pallasch, Head of the National Centre for Charging Infrastructure

2020

DATE	EVENT	PLACE
October 2020		
01 October 2020	DMT Arena – New Mobility Event partnership and Electric Mobility Roadshow	Hanover
02 October 2020	Electric Mobility Roadshow 2 nd Day of Electric Mobility Central Germany	Nordhausen
03 October 2020	Event partnership 2 nd Energy Forum – Climate-friendly on the move in town and country	Nordhausen
05 October 2020	DWV Parliamentary Evening “Economic Stimulus Package National Hydrogen Strategy 2030” Event partnership	Berlin
06 October 2020	Opening of the National Centre for Charging Infrastructure by Federal Minister of Transport Andreas Scheuer	Berlin
08 October 2020	Mission Hydrogen Online Conference Event partnership	online www
13 October 2020	NOW project check: Zukunft-DE	online www
20 October 2020	NOW project check: BOB Solingen	online www
27 October 2020	NOW project check: Betriebshof Hamburg Alsterdorf	online www
27 October 2020	Fuel Cell Forum Hessen Event partnership	Frankfurt (Main)



Steffen Bilger, Parliamentary State Secretary at the Federal Ministry of Transport and Digital Infrastructure, opens the second NaKoMo annual conference with a welcoming speech



DATE	EVENT	PLACE
November 2020		
06 November 2020	Regional Workshop Aschaffenburg	Aschaffenburg
09 November 2020	Online seminar week I The National Centre for Charging Infrastructure introduces itself: Kick-off of the online seminar week	online www
10 November 2020	Online seminar week I Digital demand planning: tools and data for the expansion of the charging infrastructure	online www
11 November 2020	Online seminar week I The Centre's know-how on all aspects of charging infrastructure	online www
12 November 2020	Online seminar week I The Centre as a think tank: We examine charging infrastructure closely	online www
13 November 2020	Online seminar week I Federal, state and (local) government: The Centre as a hub for charging infrastructure	online www
11 November 2020	BMVI Commercial Vehicle Summit: Towards zero-emission logistics on the roads with alternative drives	Berlin
12 November 2020	H2.0 Conference (watt_2.0): "Green hydrogen economy in the regions" Event partnership	Rendsburg
17 November 2020	NOW project check: fitting and upgrading ferries with LNG (online seminar)	Berlin
18 November 2020	2 nd NaKoMo annual conference: Stadt(Um)Land.Verkehr. – mobility between urban and rural areas	Berlin
20 – 22 November 2020	Center for Hydrogen Safety Europe Conference 2020	online www
24 November 2020	Stop of the ID.3 Germany tour at NOW GmbH	Berlin
25 November 2020	PrioritHy: How hydrogen and sectoral integration can bring recovery, growth and jobs for Europe – Jointly organised conference by the NOW GmbH and FCH JU, with the support of the European Commission, and in cooperation with the German Federal Ministry of Transport and Digital Infrastructure as Presidency of the Council of the European Union	online www
27 November 2020	"Fuel from electricity instead of battery power: Are green fuels the answer for the mobility transition?" – Pfeiffer.fragt – Der Polit.talk Event partnership	online www

December 2020		
01 December 2020	Online seminar “Charging infrastructure after 2025/2030: Scenarios for market ramp-up”	online www
02 December 2020	Online seminar: Applications for the Hydrogen Technology and Innovation Centre	online www
02 December 2020	Virtual forum of the DIHK: International markets and cooperation for green hydrogen Event partnership	online www
08 December 2020	30 th Electric Mobility Strategy Circle	online www
08 December 2020	Online seminar: Use of the www.flaechenTOOL.de	online www
11 December 2020	“Green hydrogen or black oil: How can the energy transition at sea succeed?” – Pfeiffer.fragt – Der Polit.talk Event partnership	online www
11 December 2020	Presentation of the HY4 hydrogen aircraft	Stuttgart
16 December 2020	BMVI web seminar “Funding support for hydrogen mobility projects within the framework of a Hydrogen IPCEI”	online www

The list contains events that were organised and conducted by NOW GmbH as well as other events in which NOW GmbH was involved in the organisation and realisation.



Participants of the Aschaffenburg regional workshop with three fuel cell cars (FCEV) in front of Johannsburg Castle

NOW PUBLICATIONS IN 2020



NOW GmbH issued numerous new publications in 2020 either alone or in cooperation with partners. These include annual and results reports, studies, information brochures on specific funding programmes as well as guidelines and manuals on the four programme areas of the National Innovation Programme for Hydrogen and Fuel Cell Technology (NIP), Charging infrastructure (LIS – Ladeinfrastruktur), Local electric mobility (Elektromobilität vor Ort), the Mobility and Fuels Strategy (MFS) and on the area of international cooperation. All publications are available in German and some also in English and can be downloaded from the website:

➤ www.now-gmbh.de/en/knowledgefinder



**Standards and regulations
for hydrogen electric
mobility in China**
Factsheet



**KBA report Dec. 2020
Numbers & data on electric
mobility with batteries
and fuel cells**
Factsheet



**Charging infrastructure after
2025/2030 incl. factsheet
on study**
Brochure



KBA rapid report
Factsheet



NaKoMo
Brochure



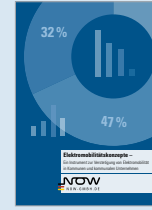
**Battery-electric mobility
in China**
Factsheet



**Thesis paper:
Easy charging – a user
journey**
Brochure



**Clean mobility in
Germany – key figures and
projects (June 2020)**
Factsheet



**Electric mobility concepts –
An instrument for consolidating
electric mobility in municipalities
and municipal companies**
Brochure



**Electric mobility in
practice**
Brochure



**ZOOM impulse sheet:
Sector coupling with
renewable energies**
Brochure



**Hydrogen and fuel cell
technology in China**
Factsheet



**Market analysis of urban
commercial transport
in Germany**
Study



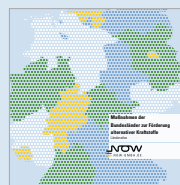
Electricity-based fuels
Brochure



**Market analysis of
alternative drives in
rail transport**
Brochure



India factsheet
Factsheet



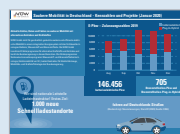
**Measures taken by the
Federal States to promote
alternative fuels**
Brochure



**Electric mobility concepts in
municipalities and
municipal companies**
Data sheet



**Zero-emission buses in
Germany 2019/2020**
Brochure



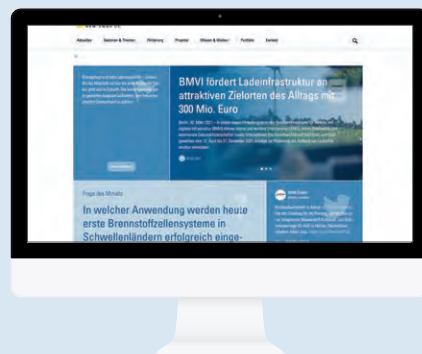
**Clean mobility in
Germany – Key figures and
projects (January 2020)**
Factsheet



**Electricity-based fuels
for fuel cells in inland
navigation**
Study

NOW DIGITAL

Content provided by NOW GmbH on the internet is enjoying ever-increasing popularity. In 2020, the NOW website underwent a relaunch: it now has more functions and reflects the growing range of NOW GmbH's tasks. In total, several hundred written articles, images, animations and videos were published on NOW's website and posted on social media, where they were liked and shared thousands of times. Over 40 events for information and discussion were also successfully established and implemented at short notice as new online formats.



- [Now-GmbH.de/en](https://www.now-gmbh.de/en)
 - [Nationale-Leitstelle.de/en](https://www.nationale-leitstelle.de/en)
 - [Starterset-Elektromobilitaet.de](https://www.starterset-elektromobilitaet.de)
 - [Roadshow-Elektromobilitaet.de](https://www.roadshow-elektromobilitaet.de)
 - [NaKoMo.de](https://www.nakomo.de)
-



- [LinkedIn NOW GmbH](https://www.linkedin.com/company/now-gmbh/)
www.linkedin.com/company/now-gmbh/

- [LinkedIn National Centre for Charging Infrastructure](https://www.linkedin.com/company/nationale-leitstelle-ladeinfrastruktur/)
www.linkedin.com/company/nationale-leitstelle-ladeinfrastruktur/



- [Twitter NOW GmbH](https://www.twitter.com/news_nowgmbh)
www.twitter.com/news_nowgmbh



- [Youtube NOW GmbH](https://www.youtube.com/channel/)
www.youtube.com/channel/

Animations released in 2020

➤ **Sector coupling**

www.now-gmbh.de/sektoren-themen/sektorenkopplung/



➤ **Hyland**

www.youtube.com/watch

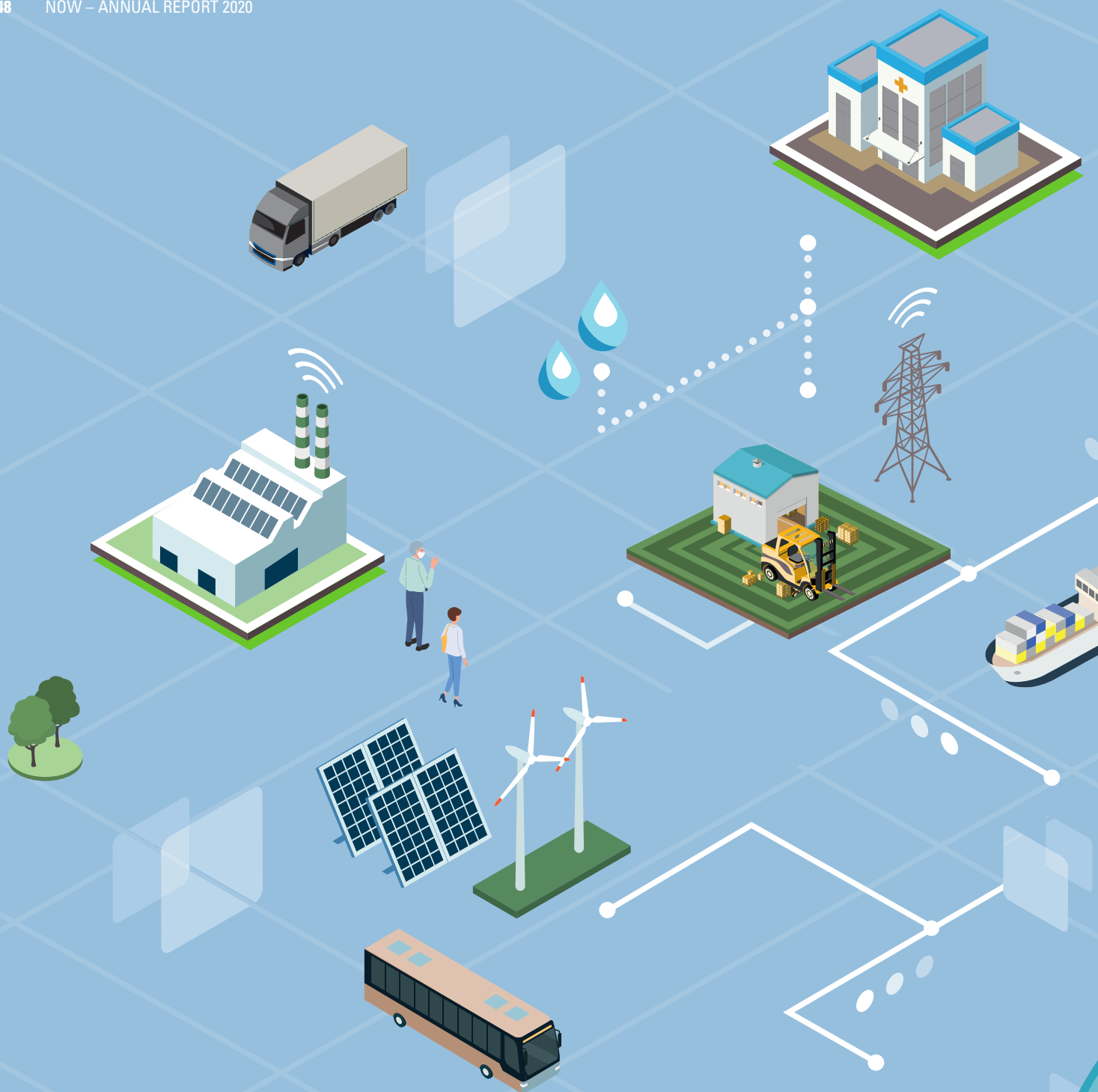
➤ **NaKoMo**

www.youtube.com/watch

➤ **National Centre for Charging Infrastructure: Easy charging**

www.youtube.com/watch





I. NIP – FEDERAL FUNDING HYDROGEN AND FUEL CELLS



THE NIP

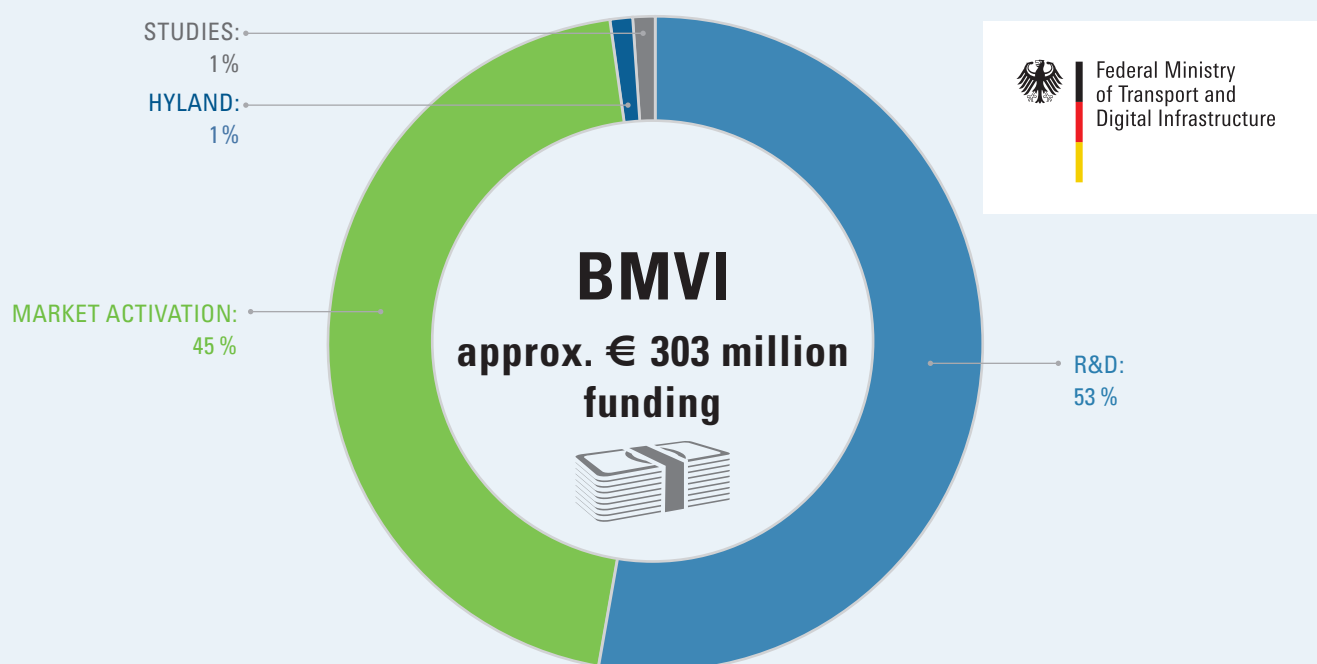
To accelerate achieving market maturity of hydrogen and fuel cell technologies in different application areas, in 2006 the federal government, federal states, industry and science launched the ten-year National Innovation Programme Hydrogen and Fuel Cell Technology (NIP), which had a funding volume of 1.4 billion euros. The federal cabinet adopted the hydrogen and fuel cell technology governmental programme in September 2016 for the period of 2016 to 2026. The second phase of the successful NIP (NIP II) has thus begun. The continuation of the interministerial programme ensures continuity for research and development and promotes market activation through corresponding product developments. A total of around 660 million euros is available for the NIP in the period from 2016 to 2024.

The Federal Ministry for Economic Affairs and Energy (BMWi) is continuing its funding of hydrogen and fuel cell technology in the area of applied research and development under the 7th Energy Research Programme with around 25 million euros annually. Since 2016 the BMWi has also been supporting stationary fuel cell heating systems in the 0.25 to 5.0 kW_{el} (electrical output) range with the KfW programme: “Energy-efficient construction and renovation – fuel cell subsidy” (programme number 433). The funding is for new and existing residential and non-residential buildings. Since the start of the funding programme, there has been a steady increase in demand for residential buildings and non-residential buildings, both for new construction and renovation. For example, the number of subsidy commitments in 2019 rose overall (4,767) by around a third compared to the previous year (3,626). Most recently in 2020, there were 5,264 commitments issued with a funding volume of 66.5 million euros.

The federal ministries for the Environment, Nature Conservation and Nuclear Safety (BMU) as well as Education and Research (BMBF) are actively involved in the strategic shaping of NIP, as was already the case during the first NIP phase via the structures of NOW GmbH.

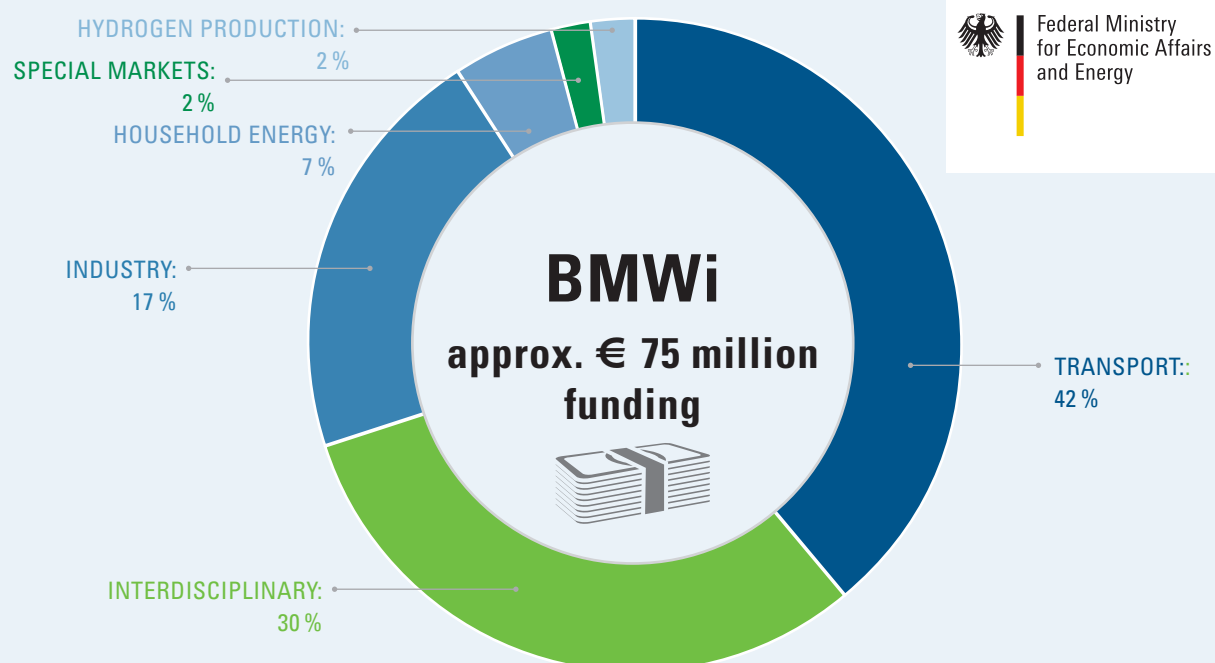
The National Hydrogen Strategy introduced in 2020 assigns the NIP the role of a key measure for implementing the National Hydrogen Strategy in the transport sector. In addition to market activation and research and development, the establishment of hydrogen regions in particular is to continue to be advanced in the framework of the HyLand initiative.

APPROVED BMVI PROJECTS 2017 – 2020



AREA	FUNDING AMOUNT/€
R&D	239,247,748
MARKET ACTIVATION	205,198,952
HYLAND	6,751,466
STUDIES	3,242,597
CLUSTERS	914,810
TOTAL	455,355,573

APPROVED BMWi PROJECTS 2017 – 2020



AREA	FUNDING AMOUNT/€
TRANSPORT	31,755,004
INTERDISCIPLINARY	22,061,067
INDUSTRY	12,844,734
HOUSEHOLD ENERGY	5,422,736
SPECIAL MARKETS	1,537,597
HYDROGEN PRODUCTION	1,333,231
TOTAL	74,954,369



Federal Ministry
for Economic Affairs
and Energy

In 2020 the following projects were approved under the BMWi funding priority of the NIP



PROJECT TITLE	PROJECT START	PROJECT END	FUNDING AMOUNT	PARTNERS
			[€]	
GrabaT	01.07.2020	30.06.2023	2,189,043	Robert Bosch GmbH
	01.07.2020	30.06.2023	275,150	Coperion GmbH
	01.07.2020	30.06.2023	307,590	Stuttgart University
	01.07.2020	30.06.2023	402,693	Matthews International GmbH
H2-Druck Sens	01.07.2020	30.09.2022	396,556	htw saar, University of Applied Sciences Saarbrücken
	01.07.2020	30.09.2022	155,425	Ceramaret GmbH
	01.07.2020	30.09.2022	138,080	JUMO GmbH & Co. KG
ISEHM	01.10.2020	30.09.2023	441,420	German Aerospace Center
ProStrom	01.09.2020	31.08.2023	372,264	Schaeffler Technologies AG & Co. KG
	01.09.2020	31.08.2023	241,953	Bender GmbH Maschinenbau- und Streckmetallfabrik
	01.09.2020	31.08.2023	489,035	University of Applied Sciences Karlsruhe
	01.09.2020	31.08.2023	466,411	Zentrum für Sonnenenergie- und Wasserstoff-Forschung Baden-Württemberg (ZSW)
	01.09.2020	31.08.2023	601,604	Karlsruhe Institute of Technology (KIT)
smartVessel	01.03.2020	28.02.2023	210,000	RWTH Aachen University
	01.03.2020	28.02.2023	406,306	fibrisTerre Systems GmbH
	01.03.2020	28.02.2023	180,934	Wölfel Engineering GmbH & Co. KG
	01.03.2020	28.02.2023	417,433	Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e. V.
	01.03.2020	28.02.2023	162,104	F. A. Kümpers GmbH & Co. KG
	01.03.2020	28.02.2023	209,500	SimpaTec Simulation & Technology Consulting GmbH
	01.03.2020	28.02.2023	170,230	heracle GmbH
BReCycle	15.03.2020	14.03.2023	672,383	Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e. V.
	15.03.2020	14.03.2023	97,942	PROTON MOTOR Fuel Cell GmbH
	15.03.2020	14.03.2023	133,133	MAIREC Edelmetallgesellschaft mbH
	15.03.2020	14.03.2023	81,634	Electrocycling GmbH
	15.03.2020	14.03.2023	208,049	KLEIN Anlagenbau AG
POREForm	01.10.2020	30.09.2023	1,235,778	Forschungszentrum Jülich GmbH
	01.10.2020	30.09.2023	245,899	Friedrich-Alexander-Universität Erlangen-Nürnberg
	01.10.2020	30.09.2023	279,118	Technical University of Munich
	01.10.2020	30.09.2023	507,501	Max-Planck-Institut für Kohlenforschung
	01.10.2020	30.09.2023	1,311,647	Umicore AG & Co. KG
	01.10.2020	30.09.2023	248,287	Technical University of Darmstadt
Lifetime- SELOX	01.10.2020	30.09.2022	171,393	WS Reformer GmbH
	01.10.2020	30.09.2022	132,709	inhouse engineering GmbH
	01.10.2020	30.09.2022	142,532	DBI – Gastechnologisches Institut gGmbH Freiberg
Total			13,701,736	

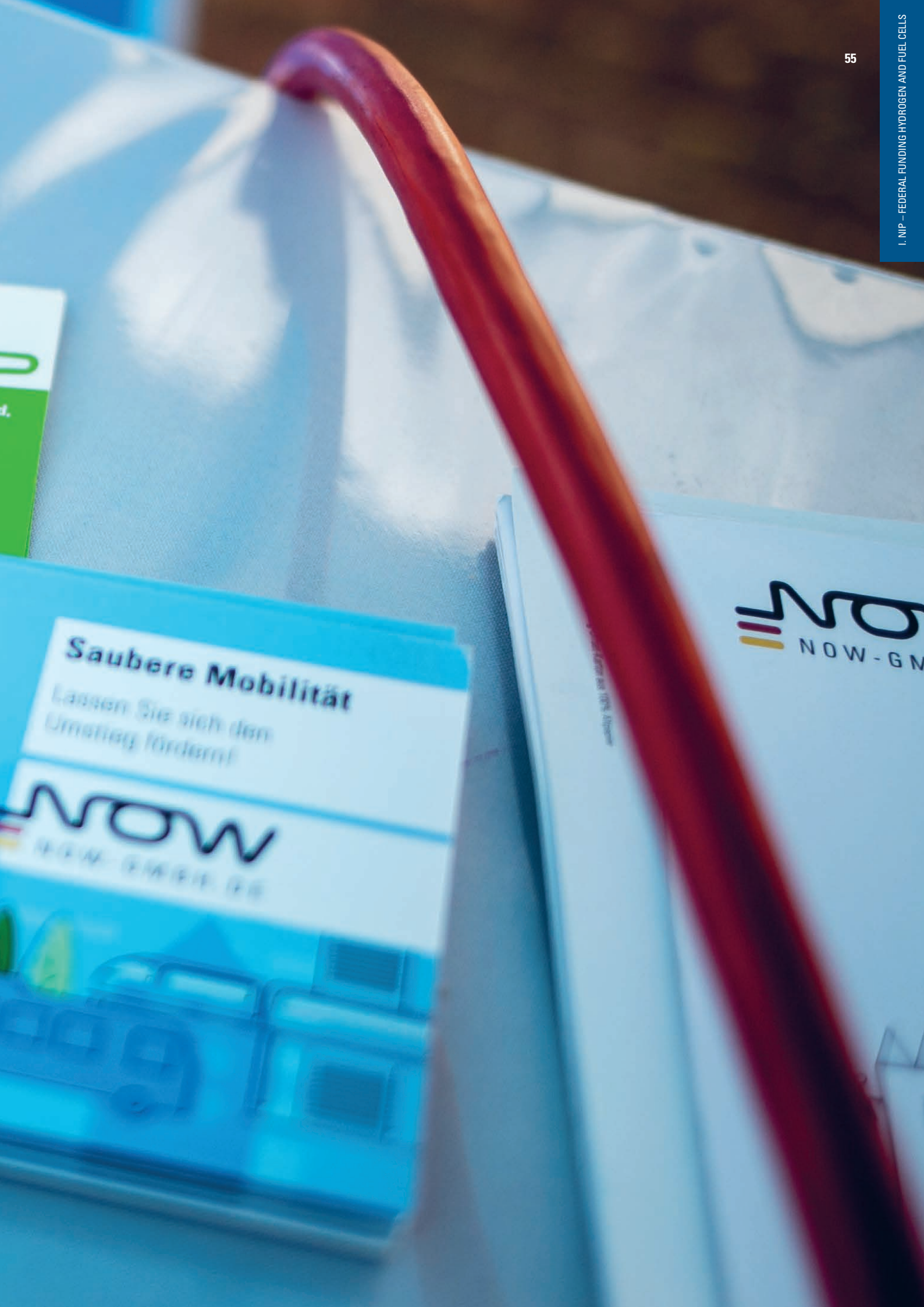
PROGRAMME AREA: ■ TRANSPORT ■ INTERDISCIPLINARY ■ HOUSEHOLD ENERGY

**ICH GEB MIT
WASSER STOFF.**

NOW
NOW-GMBH.DE

**Klimaschonener
dynamisch -
und jetzt
günstiger**





MARKET ACTIVATION

Apart from research and development, market activation is paramount in NIP. Funding market activation projects (as a precursor to market ramp-up) applies to products that have achieved technological market maturity, but are not yet competitive on the market. The lack of competitiveness is on the one hand, due to still too high production costs and on the other, a lack of infrastructure in terms of fuel supply and maintenance for many products. The focus of the funding is therefore not on individual private customers but rather on commercial application with its associated quantities.

Approved BMVI projects 2020

AREA	FUNDING AMOUNT/€
WASTE COLLECTION AND SWEEPER VEHICLES	29,025,228
ELECTROLYSIS	13,410,680
RAIL	11,870,404
H ₂ INFRASTRUCTURE	7,460,034
PASSENGER VEHICLES	6,220,235
CRITICAL INFRASTRUCTURE (CI)	4,991,448
INTRALOGISTICS	1,094,309
TOTAL	74,072,338

Source: PtJ year-end lists 2020



Trains

In order to drive forward the market entry of hydrogen trains, in 2017 the first funding call for the procurement of hydrogen trains was launched in NIP and garnered great interest. The investment funding of 14 Coradia iLint trains, amounting to approx. 8.4 million euros, was already approved in 2018. The trains will be deployed from the spring of 2022 on the Cuxhaven-Bremerhaven–Bremervörde–Buxtehude route by LNVG (Landesnahverkehrsgesellschaft Niedersachsen – Lower Saxony’s state transport company). Furthermore, funding of approx. 14.7 million euros has been allocated to the RMV (Rhein-Main-Verkehrsverbund – public transport network of the Frankfurt Rhine-Main area) for the procurement of 23 hydrogen trains for the 11, 12, 15 and 16 RMV lines in the Frankfurt region from the end of 2022. Finally in 2019, funding applications by Infraser GmbH und Co. Höchst KG (Hesse) as well as Linde Gas Produktionsgesellschaft mbH & Co. KG (Lower Saxony) were finally approved for the necessary hydrogen infrastructure.

In order to be able to respond to the great interest in emission-free trains in general, the BMVI anchored a new, multi-technology budget title: “Subsidies to support alternative drive systems in rail transport” in the 2019 budget. In the course of this, a third project, deploying six hydrogen trains on the route between Basdorf and Wilhelmsruh (Heidekrautbahn) in Brandenburg, was launched in 2020. A special unique selling point is the generation and use of 100 % green hydrogen.

The preparation of a market analysis of alternative drives in rail transport commissioned by NOW GmbH in 2019 led to the forecast that with a persistent conversion from diesel to hybrid drives, a national new vehicle potential of approx. 1,700 to 2,500 vehicles can be expected by 2038.



DB expects to start trial operations with the Mireo Plus H between Tübingen, Horb and Pforzheim in 2024



Hydrogen infrastructure for road transport

Hydrogen and fuel cells are cornerstones on the path to medium to long-term emission-free mobility in Germany. Expansion of the hydrogen refuelling infrastructure is therefore a high priority for the federal government. As laid out in the National Strategic Framework on the implementation of the EU directive on the deployment of alternative fuels infrastructure (AFID), the federal government is aiming for 100 hydrogen refuelling stations for the passenger car sector nationwide by the end of 2020, a goal which has been largely achieved: On 1 February 2021, the 90th hydrogen refuelling station in Germany began operation. Commercial vehicles can already now refuel at six of the hydrogen stations at 350 bar. 16 others are in the different phases of commissioning.

The funding of filling station infrastructure is a priority of the National Innovation Programme Hydrogen and Fuel Cell Technology (NIP). In the first phase of NIP (2006–2016) there were already 50 public hydrogen refuelling stations funded for passenger vehicles. In 2019, a total of 23 refuelling stations and two electrolyzers were approved for over 29 million euros through the second funding call for public hydrogen refuelling stations in NIP II. Through Art. 56 AGVO under the call, investments for the construction of public hydrogen refuelling stations are funded with 50 % of costs over the life cycle of the facility. Operational costs are also eligible for funding. Electrolysers for the generation of hydrogen from renewable energies to supply the refuelling stations are eligible for funding (Art. 36 AGVO, 40 % of the added investment costs).

Further expansion of the H₂ refuelling station network will take place depending on the vehicle ramp-up or the existing demand for hydrogen in the region through the relevant mobile applications with fuel cells. In future there could potentially be hydrogen refuelling stations with a higher refuelling capacity, filling up to 150 cars per day and at specific locations, also for refuelling light and heavy-duty commercial vehicles.

➤ <https://h2.live/>



Call for applications for the funding of electrolysis plants for hydrogen production (09/2020)



Hydrogen production for use in transport

Using renewable hydrogen can contribute significantly to achieving the goals of the energy transition. Firstly, this will drive the replacement of fossil fuels with renewable energies in the transport and the energy sectors. Secondly, energy storage capacities will be created that are urgently needed for the success of the energy transition. The particular economic appeal of hydrogen as a fuel facilitates the establishment of a leading market, which paves the way for energy storage and other applications. Technologically speaking, hydrogen production by means of highly efficient water electrolysis, mainly based on surplus renewable power, forms the core of the programme area. Water electrolysis is a key technology for integrating renewable energies in the transport and energy industries. Growing and emerging markets for hydrogen create the prerequisite for exploiting the substantial development potential in all electrolysis technologies.

For transport applications with fuel cell vehicles in particular, the question arises of a sustainable supply of renewably produced hydrogen in order to achieve a greenhouse gas reduction. But because of the new type of technology and lack of infrastructure, hydrogen systems today cannot yet be operated economically. In addition to the modification of the regulatory frameworks therefore, further substantial funding measures are necessary over the coming years.

A call for applications for funding electrolysis plants for hydrogen production from September 2020 supports the market activation of electrolyzers. A funding volume of 50 million euros is planned for the call addressed to projects providing hydrogen for the transport area. Criteria for approval include electrolysis operation with renewable power, guaranteed hydrogen consumption by specific transport applications (e.g. fuel cell vehicles), low hydrogen production costs, grid efficiency of the plants as well as certification of the hydrogen produced. If the project is approved, the total investment costs for constructing the facility will be funded. A subsidy rate of 45 % is allowed, for SMEs this can be increased to 65 %.

Due to the oversubscription to the funding call, the project applications submitted were prioritised by Project Management Jülich (Projektträger Jülich (PtJ)) in coordination with the BMVI and NOW GmbH. The funding notices will be presented to the applicants at the beginning of 2021. There will be funding opportunities for electrolysis plants for the provision of hydrogen for the transport sector in future also, to ensure that hydrogen electrolysis becomes a competitive market element.

Call for applications for funding fuel cell systems for autarchic energy supply of digital or critical infrastructure (09/2020)



Uninterruptible power supply

In the event of a catastrophe in Germany, power failure can also be an issue. But it is precisely during a catastrophic situation that the functioning of certain critical infrastructure is especially important. This applies to, for example, the digital radio for public safety authorities and organisations (BOS), used for communication by the police and fire services, among others. Fuel cell technology can fully utilise its advantages as a substitute power supply to secure radio sites for BOS digital radio, as it is highly reliable and environmentally-friendly, can be maintained remotely and, in contrast to diesel generators, does not undergo fuel degradation, even with long downtimes. Following successful R&D projects in several federal states under NIP I, around 1,000 additional systems in Bavaria, Baden-Württemberg, Brandenburg, Hesse and Saxony were approved over the course of two funding calls under the market activation guideline (2018, 2020) with a funding amount of around 11.3 million euros. For the systems that were approved in 2020, local implementation begins in 2021. In addition to BOS digital radio, in future an increasing number of fuel cells are to be installed as off-grid or uninterruptible power supply also in other application areas such as distribution networks, data centres or industrial plants.

Call for applications for funding of fuel cell passenger cars in fleets (08/2019) – deadline 31/01/2020



Passenger vehicles

The introduction of fuel cell drives in cars is one of the aims of the federal government in order to achieve the agreed-upon CO₂ reduction goals and to increase the efficiency of the drivetrain in cars, light commercial vehicles and other vehicle categories, particularly in local public transport. As a future contributor to environmentally-friendly and sustainable energy supply, fuel cell vehicles are an integral part of the energy concept of the federal government. This type of drive substantially reduces noise emissions and eliminates local emissions. Assuming an average driven distance of 12,000 kilometres per year and a CO₂ output of 95 g/km (EU target value), using renewable energy hydrogen equates to an annual CO₂ reduction of 1.14 t per vehicle.

551 vehicles have been approved so far in the first two calls. In the call that ended on 31 January 2020, another, 325 fuel cell vehicles were able to be approved by the end of 2020. More projects will receive their funding commitments in 2021.



Emission-free mobility in daily life:
One of the 90 hydrogen stations operated
by H2 MOBILITY (as of February 2021)





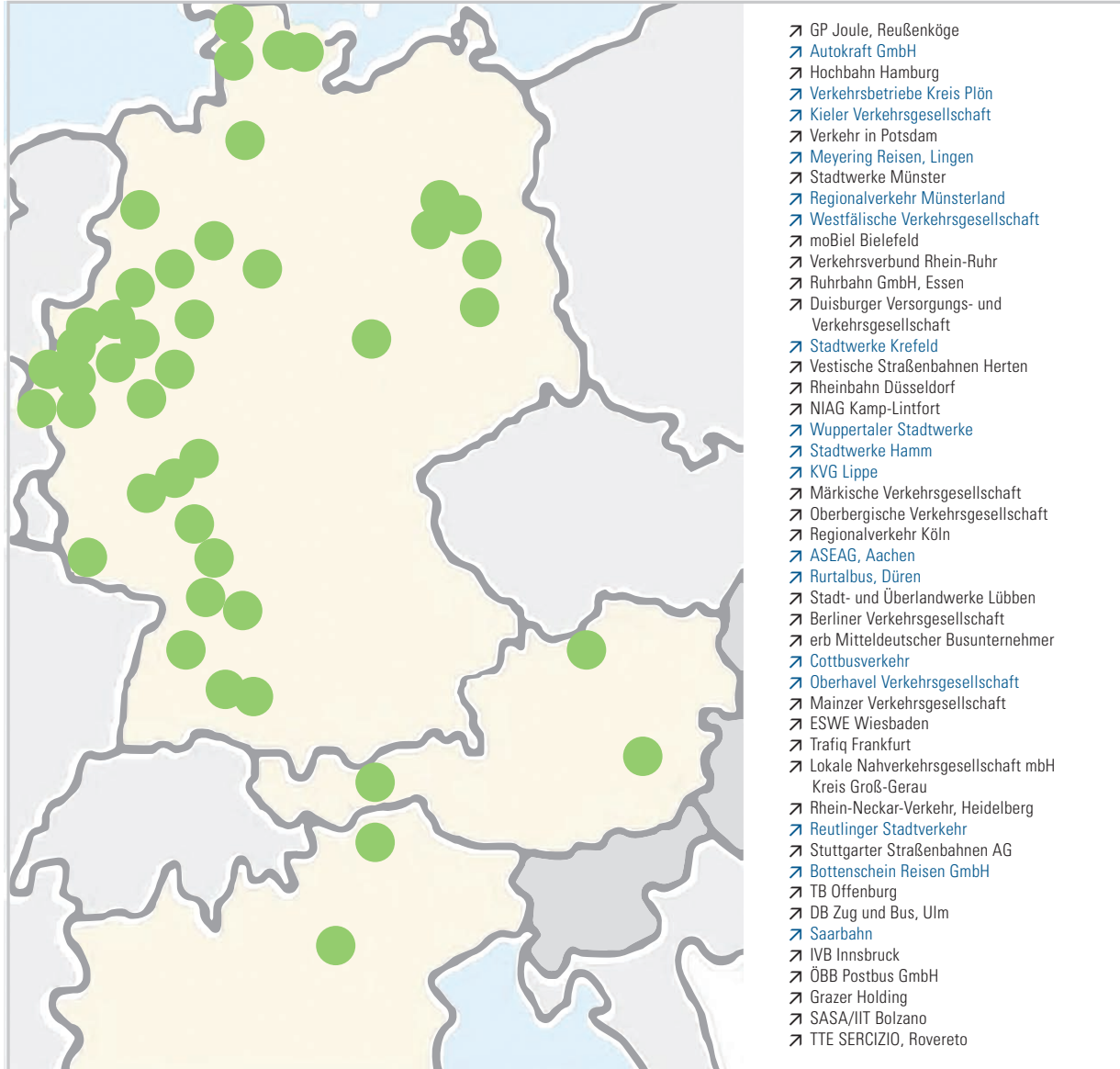
Buses

It is not just the cut in greenhouse gas emissions, but also the reduction of particulate matter pollution in German cities and municipalities that is one of the key drivers for implementing alternative drives in local public transport. Fuel cell buses are enjoying increasing interest because of their higher ranges and shorter refuelling times compared to battery buses.

In both the 2017 and 2018 funding calls, a total of 79 fuel cell buses and four operational refuelling stations were approved.

In an effort to further drive forward the use of fuel cell buses in local public transport, since the spring of 2019 NOW GmbH has been funding the German fuel cell bus cluster. Originally established in 2015 as part of the EU initiative: Fuel Cell and Hydrogen Joint Undertaking (FCH JU), it was tasked with coordinating the procurement projects of German, Swiss, Austrian and South Tyrolean bus fleet operators which are funded under EU funding programme JIVE. However, the second phase of the JIVE II programme heralded the expiration of the cluster's remit at the end of 2017. The new German fuel cell bus cluster, which connects bus fleet operators, advises them on the procurement of fuel cell buses and the necessary hydrogen infrastructure as well as initiates exchange between operators and vehicle manufacturers, is seen as a valuable platform for establishing fuel cell buses in Germany both by NOW GmbH as well as by the stakeholders involved, and will therefore continue to serve as an important access point for interested parties.

At the beginning of 2020, the German fuel cell bus cluster had 30 members. As a result of numerous talks with local transport companies, who became aware of the cluster either from existing members through NOW, but also to a large extent through the advisory activities within the HyStarter programme, membership has now grown to 47 companies (See p. 65).



The German fuel cell bus cluster (blue: new members in 2020)

Fuel cell bus at the eFarm in
Northern Germany





Call for applications for funding waste disposal and sweeper vehicles with fuel cell drives (09/2020)



Municipal vehicles

The call for funding waste disposal and sweeper vehicles with fuel cell drives ended on 15 October 2020. Eligible for funding in this call were fuel cell vehicles used for waste disposal and road sweeping in the inner city area. Furthermore, investments in maintenance infrastructure of the vehicle depot were funded on the condition of using hydrogen. The funding quotas range between 40–60% of the added investment costs. Municipal operators operating in a sovereign capacity can apply for up to 90 % of investment costs.

In 2020, three projects with a total of 43 vehicles and a funding volume of 29 million euros were approved. 70 more applications are being processed at the moment.

Call for applications on funding industrial truck fleets with fuel cell drives (09/2020)



Intralogistics

There is hardly an economic sector that has shown as much growth over recent years as intralogistics, which is not least attributable to the online boom and an increase in the global flow of goods. Aside from performance challenges, this growth brings with it a great responsibility to adopt a climate-friendly approach for the sector. Industrial trucks with fuel cell drives can represent a suitable alternative to conventional drives in this regard. The market introduction and penetration of fuel cell industrial trucks and vehicles for the airport apron as well as the associated hydrogen infrastructure is supported in the framework of market activation under NIP II. The technology has many benefits: industrial trucks with fuel cell drives can achieve significant CO₂ savings, short refuelling times ensure a considerable increase in productivity. There is also no need to save valuable logistics space for battery replacement. This underscores the strengths of fuel cell technology, particularly for heavy loads in intralogistics or freight transport. Following on from the successful R&D and demonstration activities at the BMW Leipzig plant and at the Düsseldorf Mercedes Benz plant, in 2020 seven more projects received a positive funding decision in the framework of market activation. Including the development of refuelling infrastructure and an electrolysis plant for on-site generation of green hydrogen, BMVI funding in the amount of 6.1 million euros was provided for this in 2020.



Fuel cells in use: At the BMW plant in Leipzig, 70 hydrogen-powered tugger trains (indoor tugs) from Linde Material Handling are responsible for intralogistics.

RESEARCH AND DEVELOPMENT (R&D)

An important pillar in NIP is the funding of research, development and innovation. In general, the application areas of NIP are broad and include vehicles and infrastructure for road and rail transport, shipping, aviation and intralogistics. In implementing individual measures, it is important to ensure the interlinking of players across industry sectors, e.g. in the context of innovation clusters, so that overarching issues can be worked on together. Reflecting the industrial-political nature of NIP, within the individual measures, the added value in Germany and in Europe in the technological field of hydrogen and fuel cells must be developed and reinforced. This requires an internationally competitive supplier industry, particularly for key components like fuel cell stacks or tank systems.

In addition to funding research and development projects, since July 2020 another focus of the programme implementation has been the support of feasibility studies.



Preparations for series production of fuel cells at Daimler Truck AG

TRANSPORT AND INFRASTRUCTURE

The aim of the transport and infrastructure measures within NIP is to establish hydrogen and fuel cells competitively on the market over the coming years. This includes the further development of onboard technologies and systems as well as the necessary infrastructure, also in the market ramp-up phase.

An important pillar in NIP therefore continues to be the promotion of research, development and innovation. In principle, the areas of application of NIP are broad and include vehicles and infrastructure for road transport, rail, shipping and aviation. In implementing the individual measures, it is important to ensure the networking of stakeholders across industrial sectors, e.g. within the framework of innovation clusters, so that overarching issues continue to be addressed jointly, flanked by independent accompanying scientific research.



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Passenger vehicles

Electric mobility with batteries and fuel cells is a fundamental component of sustainable mobility. NIP pursues the goal of establishing fuel cell passenger vehicles as part of the future vehicle portfolio. Fuel cell vehicles already exhibit a marketable technical performance capability and service life. They offer customers the usual short refuelling times and long ranges of conventional cars. However, further optimisation is still needed, particularly in order to achieve competitive manufacturing costs. Economies of scale contribute to this through greater unit numbers. In addition, the further development of cost-effective materials for the different stack and system components, as well as optimised system technology, is necessary.



Components and systems

The manufacturers of hydrogen and fuel cell products now have the joint task of successfully positioning the German (supply) industry through a continuous further development of products, subsystems and components along the value-added chains on the German and international markets. In addition to the need to improve materials, power density and long-term stability, major hurdles include the costs of fuel cells and overall systems, in particular with regard to the preparation of an efficient, and thus cost-efficient, series production in high unit numbers. The following are examples of newly-approved projects in this area:

The joint project cleanEngine with partners ABT e-Line GmbH and the Kempten and Rhine-Main universities involves the method development and the establishment of a development platform for the energetic optimization of fuel cell drives for light commercial vehicles. Robert Bosch GmbH and Salzgitter Mannesmann Forschung GmbH are working on HySteelStore, a metallic, hydrogen high-pressure storage system for mobile fuel cell systems that could be launched after 2025. In the joint project MaTalnH2, MAHLE Filtersystem GmbH, the University of Munich and the Institute for Composite Materials in Kaiserslautern are advancing the material-efficient and cycle-time-optimised industrialisation of 700 bar hydrogen pressure tanks.

The descriptions of these and all other R&D projects can be found in the

➤ www.now-gmbh.de/en/projectfinder/



Buses

The interest in buses with emission-free drives is continuing to grow sharply. An alternative to battery vehicles, fuel cell buses can be sensibly used primarily for long journeys requiring a long range capability as well as in topographically challenging areas, such as medium mountainous regions. Furthermore, short hydrogen refuelling times mean that only minor modifications are necessary for bus fleet operators compared to normal operation with diesel buses. It is precisely the latter point that plays a major role in local public transport because of high customer demand in terms of reliability and punctuality of the transport service.

The Go4City joint project of partners ELOMobility GmbH and the Fraunhofer Institute for Transport and Infrastructure Systems is developing a hydrogen fuel cell drive for city buses with a modular approach to vehicle architecture from software and hardware components. The project is being funded in the amount of 5.3 million euros and is scheduled for completion by the end of 2022.



Commercial vehicles

Converting to alternative drives and emission-free logistics chain brings its own special set of challenges to heavy goods vehicle traffic in particular. They are mainly characterised by the strict vehicle specifications in terms of weight and dimensions as well as the high frequency use of the vehicles in extra-urban and urban freight transport. Hydrogen fuel cell systems can let their strengths come to the fore here: a long range and high performance at a low (empty) vehicle weight and short refuelling times compared to battery drives.

Aside from the reduction of greenhouse gas emissions, particulate matter pollution plays an especially significant role in urban delivery traffic as well as in waste and disposal management. Using fuel cell vehicles can substantially reduce it, thus making a substantial contribution towards better air quality in cities. The range of trucks with this type of drive is still limited, despite high demand. This makes the launch of the FC-Truck project for the development of a tractor unit with a fuel cell drive and an appropriate infrastructure solution all the more welcome. The project partners began work in 2019 on the basis of a non-binding prospective subsidy. In 2020 all funding applications were finally approved. The first project in the light commercial vehicle area was also approved. Opel Automobile GmbH is receiving 5.7 million euros in funding for the development of a light commercial vehicle with an electrically hybridised fuel cell drive in the HyLightCOM project.



Waste and disposal management, energy supply and public transport are often the responsibility of municipal utilities – an ideal constellation for advancing sector coupling and, for example, decarbonising waste collection transport with hydrogen vehicles.

The development of suitable hydrogen infrastructure for long-haul road freight transport represents a special challenge which was discussed in 2020 in the framework of diverse initiatives on both national – in particular in the context of a cooperation with the Clean Energy Partnership (CEP) – and international levels (FCH JU, Hydrogen Europe, etc.). The evaluation of different refuelling pressure levels, the necessity of suitable components (on the vehicle as well as on the infrastructure side) and the provision of the required hydrogen quantities still provide ample scope for development and action for the coming decade.



Shipping applications

Alternatives in shipping will also become more important in the future. In ships, fuel cells can be used for onboard power supply, but also for propulsion in hybridised systems. Aside from high efficiency and low emissions, other features of fuel cells play an important role in shipping. The decentralised design option on the vessel provides a major efficiency advantage, as the use of space can be optimised. On passenger ships, low noise and low vibration operation is a benefit for customers. As a combustion fuel, fuels that are available now can quickly be reverted to (LNG, diesel, methanol), but also electricity-based fuels (hydrogen, synthetic fuels, etc.) can be used. In the e4ships lighthouse project, the readiness for use of fuel cells on ships was successfully demonstrated in NIP I. In the continuation of NIP, the demonstrators developed there will be brought to market readiness and the development of necessary rules will be advanced on international levels.



Rail transport

Electrifying rail routes requires considerable effort and more importantly, major investment, which is why today approx. 40 % of the German rail network is operated with diesel trains. For the routes where electrification is not economically justifiable, even over the next few decades, hydrogen trains represent a zero CO₂ and zero particulate emission alternative which is virtually noiseless. That is why two projects by rail manufacturers Alstom and Siemens to develop hydrogen trains were already subsidised under NIP II.

As well as using hydrogen trains in local rail passenger transport, in 2020 the use of hydrogen trains in urban areas came back into focus. Because of often long approval periods for the construction of overhead lines for trams, as well as the in part, lesser level of acceptance among the population, hydrogen as a type of propulsion can represent a sensible alternative in revitalising local public transport in many places.



Aviation

The decarbonisation of air travel is a global task requiring the effort of the whole of society. The BMVI has been funding aviation research in NIP II since 2008, particularly for small and medium-sized airplanes to pursue the goal of emission-free passenger air travel based on hydrogen and fuel cells.

Among other priorities, the focus is on the further development of the drivetrain and hydrogen storage. While pressurised hydrogen is used in current research planes like the HY4, for larger airplanes in future, liquid hydrogen is envisaged. In liquid form, hydrogen is around 2.8 times lighter per unit of energy than conventional fuels, which offers great potential for its use in aviation. However due to significantly higher volumes, new solutions for storage in the plane are required.

Due to extreme environmental conditions, there are particularly high demands on the powertrain in aviation. That is why aviation research has a pioneering role to play within the entire hydrogen industry. Other segments can synergistically participate in its successes, for example in the area of storage of liquid hydrogen or in performance, weight and scaling of fuel cells. The direct use of hydrogen as a fuel for aviation is considered a realistic decarbonisation scenario primarily for short and medium-range flights that can be supplemented through the use of regenerative fuels on long journeys.



After successful test flights, the first four-seater passenger aircraft powered solely by a hydrogen fuel cell battery system was presented at its home airport of Stuttgart on 11 December 2020. It deploys the latest generation of emission-free propulsion technology.



Hydrogen fuel cell powertrain

Digitalisation is based on functioning telecommunications infrastructures. A reliable emergency power supply through fuel cells and hydrogen ensures operational reliability.



SPECIAL MARKETS

In the context of NIP II, the term “Special Markets” largely comprises both the following areas of activity:

- Business power supply (emergency power supply, UPS, off-grid power supply, autarchic/hybrid power supply, emergency power systems, e.g. in the areas of telecommunications, information technology, traffic management systems, transmission and distribution network operation)
- Intralogistics vehicles (industrial trucks such as cargo tow tractors, lift trucks, conveyor belts, forklifts, logistics train tows, luggage tow tractors at the airport)

Aside from activities in the area of R&D and market activation, the breakthrough of fuel cell technology through the interlinking of stakeholders to exchange experiences will be focused on two innovation clusters. In Clean Intralogistics Net (CIN), 13 companies have joined together in order to advance fuel cell technology, particularly in the intralogistics area. Apart from targeted communication measures (internal and external), aims also include, for example, the dismantling of market barriers as well as national and international cooperation between players. For 18 partners in Clean Power Net (CPN), the secure and environmentally-friendly power supply for industry and business using fuel cells is the centre of interest. Increasingly the solutions are being used for off-grid or uninterruptible power supply, especially in the areas of digital radio for public safety authorities and organisations, telecommunications, traffic management systems, data centres and industrial facilities. Both networks were initiated and since coordinated by NOW GmbH.

For further information, go to ➤ www.cleanintralogistics.net and ➤ www.cleanpowernet.de

GERMANY IS HYLAND: REGIONS COMPETE WITH EACH OTHER

The German government aims to cut carbon emissions by up to 95% by 2050 compared to 1990. In the context of the National Innovation Programme for Hydrogen and Fuel Cell Technology (NIP), green, climate-neutral hydrogen is of particular importance. Through a competition initiated by the federal government – and coordinated by NOW GmbH – German regions were invited to play an active role. The funding is specifically intended to motivate municipalities and regions to develop, expand on and implement ideas for integrated hydrogen concepts in three phases. The funding takes into account the different levels of knowledge and experience in the regions. Ultimately, all should have the chance to become a hydrogen region in the short to long term.

The multi-stage funding support ranges from helping raise awareness of the subject or general organisation of the players' landscape (HyStarter), development of integrated concepts and in-depth analyses (HyExperts), to the third phase of implementation of the concepts (HyPerformer).

Due to great interest, a second Hyland competition round is taking place in the spring of 2021. In addition to selecting more municipalities and regions as HyStarters or HyExperts, network activities and support for the regions by a consortium of companies will continue, expand and intensify, along with conceptual and content support from NOW GmbH. The objective will also be to intensify exchange with hydrogen regions in European neighbouring countries, e.g. the so-called hydrogen valleys.



HyStarter

From a total of 138 applications, nine regions were selected in 2019 as so-called HyStarters. These are scattered throughout the entire country: the Kiel region, Rügen-Stralsund, the Schaumburg district, the Lausitz region, Weimar, the Marburg district, Neustadt an der Waldnaab, Reutlingen and the Ostallgäu region. For one year, the regions or municipalities were provided with expert advice. They formed a landscape of local players involving politicians, municipal companies, industry, business and members of civil society. Together they developed initial concepts for hydrogen and fuel cells based on renewable energies in the transport sector. However, since the integration of the sectors is also becoming increasingly important in view of the climate protection

BMVI “HyLand – Hydrogen Regions in Germany” Initiative



Mobility and logistics with hydrogen from renewable energies – within the framework of the National Innovation Programme Hydrogen and Fuel Cell Technology (NIP II), HyLand supports the transition in transport in 25 municipalities and regions. Coordination with other German and European H₂ regions is intended to establish a valuable network of activities.

HyPerformer

- Three regions with existing hydrogen projects
- Selected through a nationwide competition in 2019
- From 2020 onwards, implementation of the competition concepts to expand hydrogen activities
- Funding support of 20 million euros each
- Total project volume 195 million euros

HyExperts

- 13 regions with initial project experience and knowledge
- Selected through a nationwide competition in 2019
- From 2020 onwards, refinement of competition concepts
- Funding support of 20 million euros each

HyStarter

- Nine regions
- Chosen in 2019 through a nationwide selection process
- Will receive 12 months of organisational and content-related support in the development of concept ideas for green hydrogen

goals, the areas of heating, electricity and storage technologies were also considered. A consortium consisting of the companies Spilett, Choice, Becker-Büttner-Held Consulting and EE ENERGY ENGINEERS as well as the non-profit Reiner Lemoine Institute was commissioned to implement the HyStarter project. The kick-off of the project was in September 2019. The results of the regions and municipalities will be published in the form of detailed concepts in April 2021.

➤ Reutlingen example: The HyStarter in the South-West

In the course of the HyStarter funding, the district of Reutlingen began the establishment of a hydrogen network for sustainable regional development as defined by the energy transition. With the goal of strengthening future technologies and consistently advancing the climate protection process, the external support and competence as well as the networking of players to develop a common concept was seen as a great opportunity to establish hydrogen as a key technology of a cross-sectoral, renewable energy industry in the Reutlingen district. The topic of hydrogen has emerged as an interesting option for countless biogas plants in the district following the expiration of EEG subsidies. By participating in the HyStarter project, an implementable concept is developed, which gives impetus to sustainable development in the region and contributes to climate goals.

As a next step, the district of Reutlingen will apply for funding as a HyExpert. Through a detailed concept, production and demand volumes as well as the necessary investment will be worked out in detail in order to facilitate implementation and procurement of hydrogen technologies.

HyExperts

HyExperts funding focuses on regions that already possess initial project experience and knowledge. A total of 13 HyExperts were selected from 28 applications: the town of Brake, the Emsland district, the cities of Essen, Frankfurt am Main, Fulda, Ulm and Ingolstadt, the districts of Lippe, Oberallgäu, Osterholz, Wunsiedel in Fichtelgebirge and Recklinghausen, as well as Saarland. They each receive 300,000 euros in order to create and calculate project ideas for hydrogen concepts. Qualified service providers are engaged from the region who can contribute their technical, legal and business expertise for this purpose. The regions' detailed concepts will be publicly accessible and thus will serve as a blueprint for interested regions in Germany to approach the topic.

➤ Example: HyAllgäu – Oberallgäu district and the town of Kempten

The district of Oberallgäu is the southernmost district in Germany and contains the independent town of Kempten. The area consists of alpine and pre-alpine terrain and is of particular interest to tourists. The economic structure is nevertheless heterogeneous and characterised by largely medium-sized businesses. The goal of the region is the creation of a detailed concept with a general overview ("source/sink land register") of generation plants and consumers. The comparison enables a decision on the decentralised or centralised generation of hydrogen and therefore ensures the demand-oriented production and economic utilisation of future investments.

With the "HyAllgäu – Economic and regional production of renewable hydrogen" project, the project team plans entry into hydrogen technology. The surplus power of a wastewater treatment plant will produce 30 t of hydrogen per year. This counters the economic disadvantages of volatile power generators and avoids grid charges. HyAllgäu can be considered a preliminary phase of a large hydrogen generation project in order to be able to supply energy and transport applications with regional renewable hydrogen resources.

➤ Example: HyWheels – city of Fulda

The focus of the detailed concept "HyWheels – hydrogen-based commercial transport in East Hesse to cut emissions in logistics and road transport" is on the decarbonisation of the transport sector through the use of fuel cell vehicles as well as the establishment of a sustainable, green hydrogen economy in East Hesse. The aim of the detailed concept is to determine the framework conditions and potentials as well as utilisation and demand forecasts to build up a hydrogen-based infrastructure spanning hydrogen production from green energy to refuelling infrastructure. Taking into account the economic aspects as well as the requirements in terms of maintenance, personnel and service, a feasible concept for commercial vehicles of all sizes and purposes will be developed.

On the one hand, the region is a particularly important logistics location nationally. In the Fulda district alone there are 174 companies in freight transport as well as 26 companies in the courier and the express sector. Fulda and Bad Hersfeld, together with Kassel (North Hesse) form the largest distribution hubs in the region. On the other hand, the central location of Hesse makes particular sense for the introduction of fuel cell trucks in Germany, as the current range of 400 km allows all metropolitan regions of Germany to be reached.

➤ Example: HyLandEL – Emscher Lippe region

The Emscher-Lippe region is a pioneer in hydrogen production and processing, which is illustrated by a specialised technology centre (h2herten) as well as other lighthouses along the entire value chain – from generation and storage to transport and utilisation, to demonstrators. The competencies and the resulting unique landscape of actors are now to be pooled in order to create an overall concept from various lighthouses. Under the leadership of the district of Recklinghausen, the consortium aims for a timely, comprehensive and broad-based use of hydrogen mobility.

In this way, the region can solve its own environmental problems caused by transport in the metropolitan area and contribute to climate protection. The HyExpert funding results in an integrated concept for using hydrogen in mobility and logistics in the form of an implementation study. It thus simultaneously develops the blueprint for the transition from grey to green hydrogen and from diesel to fuel cell in the various areas of application in mobility and logistics.

HyPerformer

HyPerformer funding is aimed at regions or regional project consortia that are already in a position to implement their concepts. In this category, the three winning regions each have 20 million euros at their disposal in the form of investment grants for the implementation of pre-existing regional concepts. The three project consortia funded are found in the North West metropolitan region (Hyways for Future) with the towns of Oldenburg, Bremen, Bremerhaven and Cuxhaven, in the Rhine-Neckar metropolitan region (H2Rivers) and in the South East of Bavaria (HyBayern), with the districts of Landshut, Munich and Ebersberg. The planned project volume of the three HyPerformers amounts to a total of 163 million euros.

Hyways for Future – North West metropolitan region

The main objective of the Hyways for Future project is to bring together the main players in the region to establish a green hydrogen infrastructure along the entire value chain – from production and transport to applications from all transport areas (road, rail, ship, aviation) and sectors. In this way, the cities of Bremen, Oldenburg, Wilhelmshaven, Cuxhaven and Bremerhaven as well as the entire region will be positioned as a hydrogen model region. This will pave the way for a market ramp-up of hydrogen technologies and thus CO₂ emissions in the region and Germany will be considerably reduced.

As a first step, the foundation for the establishment of a sustainable hydrogen infrastructure will be laid. The focus here is on (heavy) mobility including refuelling station infrastructure and the acquisition of fuel cell vehicles for local public transport, waste disposal, logistics and fleet vehicles. This in turn serves as the initial spark for the expansion of renewable hydrogen as a fuel for the entire transport sector in the Ems-Weser-Elbe area. The long-term goal is to expand supply of and demand for green hydrogen across all sectors up to the two-digit terawatt hour range and thus achieve a CO₂ reduction of 2 % of Germany's total emissions.



H2Rivers – Rhine-Neckar metropolitan region

The project takes a prototypical approach on how the market entry of hydrogen and fuel cell technology in the transport sector can succeed. Aspects such as sustainability, local and integrated generated concepts with simultaneous economic feasibility and diversity of mobile fuel cell applications are at the forefront here.

The goal is to establish a regional hydrogen economy incorporating major players from industry and the public sector. Along the entire value chain – from regenerative production to short-distance distribution to use in mobility, economic synergetic effects are leveraged and many regional partners are involved who can scale up this concept in the future and bring fuel cell technology to market maturity. In addition, the whole project serves as a blueprint and a beacon for other regions, who are also striving to decarbonise the transport sector.



HyBayern – The districts of Ebersberg, Landshut, Munich as well as the city of Landshut

Together with transport companies, energy providers, industry and business/trade, the districts of Ebersberg, Landshut and Munich are planning a closed loop of green hydrogen production, distribution and use in emission-free hydrogen vehicle fleets. For this purpose 430 tonnes of green hydrogen will be generated regionally on an annual basis by means of a large electrolyser connected to an H₂ distribution centre in the immediate vicinity of a hydroelectric power plant.

The green hydrogen will supply up to three car-bus refuelling stations, potentially an in-facility refuelling station for industrial trucks and the planned hydrogen technology user centre. In addition, two innovative subprojects will be conducted with decentralised hydrogen generation and on-site refuelling from surplus photovoltaic power. Through the use of green hydrogen, up to 4,500 tons of CO₂ will be saved annually.



Regulations, codes and standards

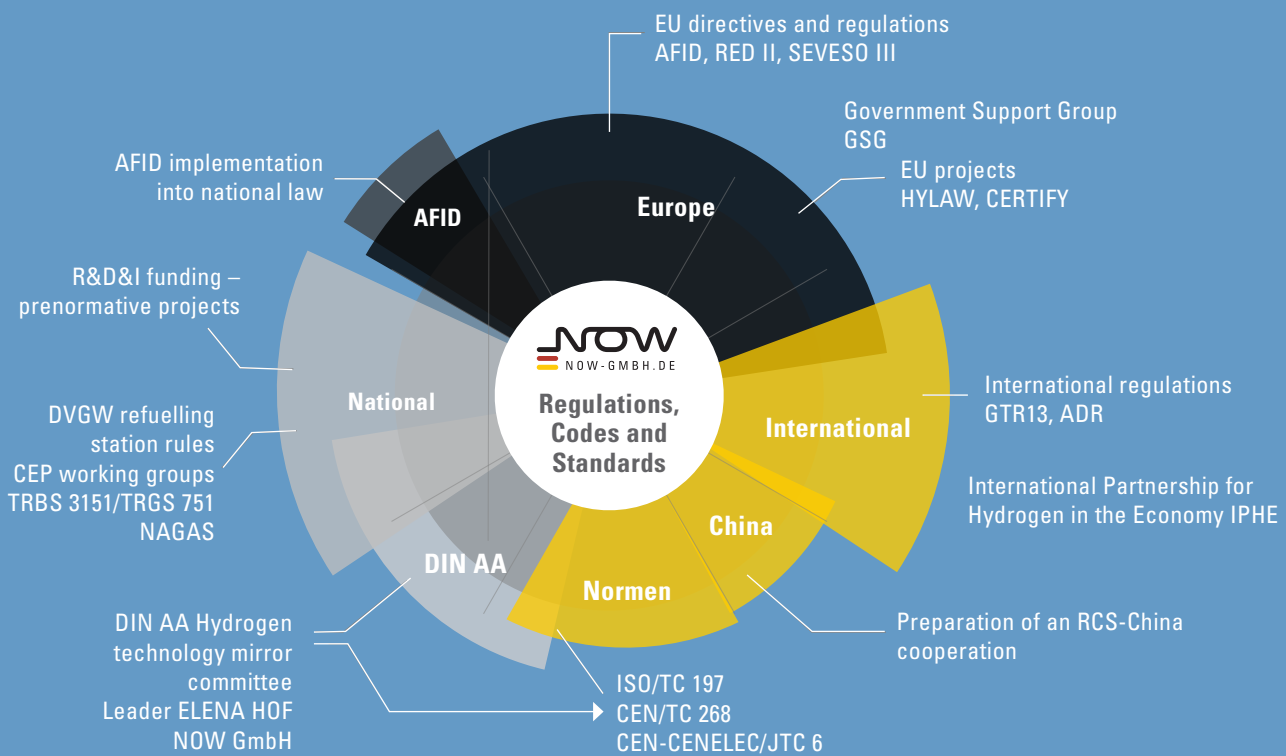
The harmonisation of regulations, codes and standards (RCS) on the national and international levels represents one of the major challenges for the market introduction of hydrogen and fuel cell technologies. In addition to determining hydrogen safety standards, the primary focus is on the standardisation of product requirements in the context of cost and resource efficiency. The key premise here is to ensure that the use of hydrogen and fuel cell technology is simple, efficient and safe for end users. Establishing standardised and practically applicable norms and standards thus simplifies on the one hand, the market entry of new technologies and on the other, enables international trade. Through proactive research work, project consortia make an important contribution to shaping the content of international standards and strengthen Germany's position in the relevant standardisation committees.

It should be emphasised that regulations, codes and standards relating to hydrogen technologies have a fundamental influence on the innovative and economic power of an industrial nation. In order to understand the complicated context of direct and indirect – and moreover not always obvious – relationships between different RCS, an intensive networking of experts as well as cross-sectoral cooperation is required.

The most important areas requiring action identified here include the revision and further development of the Alternative Fuels Infrastructure Directive (AFID) and the development of refuelling protocols for heavy trucks as well as applications from the maritime and aviation sectors. In terms of the development of hydrogen and fuel cell norms for example, the international bodies Hydrogen Technologies (ISO/TC 197), Hydrogen in Energy Systems (CEN-CENELEC/JTC 6) and Specific Hydrogen Technologies Applications (CEN/TC 268 WG 5) are especially important. The coordination of German experts in these committees happens through the DIN Working Committee on Hydrogen Technologies (NA 032-03-06 AA), which has been headed by NOW GmbH since October 2019.

In this working committee composed of representatives from research and development, science and industry, norms and standards related to hydrogen technology are developed and/or adopted.

The activities of NOW in terms of hydrogen RCS are represented in the following figure:







II. FEDERAL FUNDING CHARGING INFRASTRUCTURE

NATIONAL CENTRE FOR CHARGING INFRASTRUCTURE

A key requirement for the further proliferation of electric mobility in Germany is a nationwide charging infrastructure that provides sufficient charging points at the respective locations. The desire of customers of not wanting to wait extended periods for an available charging point must also be taken into account. This is especially important in the case of the fast-charging infrastructure, where an appropriate assessment of the number of charging points is needed. For many people, the purchase of an electric vehicle is only an option if it is possible to charge in an acceptable length of time, in a user-friendly manner and in close proximity. The establishment of a nationwide, demand-oriented charging infrastructure has therefore played a central role since the Federal Ministry of Transport and Digital Infrastructure (BMVI – Bundesministerium für Verkehr und digitale Infrastruktur) first initiated its electric vehicle activities, culminating in the launch of the BMVI funding programme Charging Infrastructure for Electric Vehicles in Germany (Ladeinfrastruktur für Elektrofahrzeuge in Deutschland) in February 2017.

NOW GmbH has already been addressing this increase in importance since 2016 with the establishment of the Charging Infrastructure division within the Transport area, which received additional staff in 2017 in the run-up to the commencement of the new charging infrastructure funding guideline, and in January 2020 was finally commissioned by the BMVI in accordance with the “Charging Infrastructure Masterplan of the Federal Government” to establish and operate the National Centre for Charging Infrastructure. An official visit by Federal Transport Minister Andreas Scheuer on 6 October 2020 marked the opening of the National Centre for Charging Infrastructure and the transition of the centre from the developmental to the operational phase.

Among the centre’s main tasks is the efficient and rapid development of a viable charging infrastructure that is appealing to all user contexts throughout Germany. Consequently, staff members are active in many areas, including: Coordinating and implementing the “Charging Infrastructure for Electric Vehicles in Germany” and “Charging Infrastructure on Residential Buildings” federal funding programmes; developing and implementing other federal funding and financing programmes; methodically supporting the estimation of public charging needs via the StandortTOOL location tool; coordinating the associated accompanying research (monitoring & analysis); the development of new digital tools such as the FlächenTOOL (plot tool) for bringing together sites for the installation of charging infrastructure with investors; the technical support of the “Elektromobilität vor Ort” funding programme for local electric mobility; the preparation of statements, strategy papers and studies; and close networking and coordination with technical committees and other stakeholders, such as federal states and municipalities.

During online events in 2020, the centre was actively promoted along with its activities involving planning, promotion, implementation, understanding and networking, such as during an online seminar week running 9–13 November 2020, with a total of six live broadcasts and several hundred participants.



Digital tools for the development of charging infrastructure

The centre is accelerating the development of charging infrastructure in Germany with new digital tools. With the StandortTOOL, it is determining the future local demand for charging points in Germany on the basis of traffic flows, socio-economic data as well as user and spatial structures. This decisively facilitates the demand-oriented expansion of the charging infrastructure, as it creates a basis for investors as well as municipalities when deciding on suitable locations. It also analyses the status quo, the likely developments over the next few years and the objectives of the German government.

On the StandortTOOL website, it is possible to obtain an overview of the current status of the charging points registered with the Bundesnetzagentur (Federal Network Agency). Likewise, forecast scenarios for the necessary expansion of the charging infrastructure to meet the anticipated market ramp-up of electric mobility can be accessed for 2022 and 2030. The StandortTOOL offers the federal states their own point of access to integrate their activities in the field of charging infrastructure into the federal strategy. In addition to planning the charging infrastructure for battery vehicles, it has also been possible to plan the demand-oriented expansion of the filling station network for hydrogen vehicles since June 2020.

On 18 November 2020, Federal Transport Minister Andreas Scheuer presented the new FlächenTOOL of the National Centre for Charging Infrastructure at the top-level meeting of the “Alliance for Modern Mobility” (“Bündnis für moderne Mobilität”) as part of the annual conference of the Network for Sustainable Mobility (NaKoMo – Netzwerk für nachhaltige Mobilität).

With FlächenTOOL, the centre has created a digital platform that provides information about sites in Germany that are potentially available for the installation of charging infrastructure. Federal states, municipalities, municipal companies, businesses and private individuals have the opportunity to offer their properties via FlächenTOOL. The web application is designed in such a way that no special prior knowledge is required for this purpose.

FlächenTOOL can be used to find suitable sites in the upcoming funding calls as well as in the development of the planned fast charging network across Germany with 1,000 locations. Since December 2020, it has been possible for investors to contact the providers of available sites directly via FlächenTOOL.

- www.standortTOOL.de
- www.flaechenTOOL.de
- www.nationale-leitstelle.de/en

**With FlächenT00L, we are jointly
accelerating the development of
charging infrastructure in Germany**



FEDERAL FUNDING SUPPORT PROGRAMME DOR CHARGING INFRASTRUCTURE FOR ELECTRIC VEHICLES IN GERMANY

With the federal funding support programme for Charging Infrastructure, the federal government has initiated the development of a nationwide and demand-oriented network of fast and normal charging stations. The federal government's goal is to convert the energy basis of transport to electricity from renewable energy sources in combination with innovative drive technologies. Electric mobility is a cornerstone for achieving this goal and a key factor in the energy transition. The government aims to support the development of a nationwide and user-friendly network of charging infrastructure through the federal funding programme, so that electric vehicle users can charge their vehicles quickly and easily anywhere in Germany. With this aim in mind, the federal government allocated 300 million euros in funding from 2017 to 2020. Both private investors as well as cities and municipalities are supported. And demand is high for the programme. In six funding calls (2017 to 2020), more than 7,000 applications for funding were received. To date, applications for more than 30,000 charging points, including 21,000 standard charging points and 9,800 fast charging points, have been approved. As of January 2021, 11,500 of the charging points are already in operation, and the 20,000 additional approved charging points will progressively become connected to the grid.

Two funding calls took place in 2020. The 5th funding call ran from 29 April 2020 to 17 June 2020. A total of 1,094 applications were received. 3,484 normal and 2,037 fast charging points were approved. This funding call also seeks to support charging points in customer car parks that are publicly accessible for at least 12 hours on weekdays (Monday-Saturday).

The 6th funding call commenced on 22 June 2020, and funding applications for publicly accessible charging stations could be submitted until 22 July 2020. A total of 832 applications were received. 1,157 normal and 1,082 fast charging points were approved. As in the 5th funding call, funding is also provided for charging infrastructure that is not accessible around the clock. This means that parking spaces at kindergartens, hospitals, sports facilities and district centres are particularly targeted.

4th funding call:

NCP ≤ 22 kW

FCP > 22 kW

	Approved		In operation
	NCP	FCP	NCP and FCP total
Baden-Württemberg	420	354	33
Bavaria	238	454	22
Berlin	12	77	2
Brandenburg	37	137	7
Bremen	6	24	2
Hamburg	0	78	0
Hesse	254	337	23
Lower Saxony	350	346	58
Mecklenburg-Western Pomerania	37	68	0
North Rhine-Westphalia	268	659	12
Rhineland-Palatinate	166	189	47
Saarland	19	16	0
Saxony	106	118	15
Saxony-Anhalt	26	93	4
Schleswig-Holstein	150	119	22
Thuringia	14	95	8
Total	2,103	3,164	255

NCP = Normal Charging Point, FCP = Fast Charging Point


Charging points are inspected
on a regular basis






Charging infrastructure on a national motorway

5th funding call (published mid-2020, commissioning of the charging infrastructure therefore from 2021 onwards)

 NCP ≤ 22 kW FCP > 22 kW	Approved		In operation
	NCP	FCP	NCP and FCP total
Baden-Württemberg	388	215	3
Bavaria	629	266	0
Berlin	80	82	0
Brandenburg	170	87	0
Bremen	27	12	0
Hamburg	73	24	0
Hesse	379	202	2
Lower Saxony	508	259	6
Mecklenburg-Western Pomerania	119	49	0
North Rhine-Westphalia	257	481	0
Rhineland-Palatinate	204	86	0
Saarland	97	22	0
Saxony	206	125	0
Saxony-Anhalt	107	49	0
Schleswig-Holstein	131	73	0
Thuringia	105	35	0
Total	3,480	2,067	11

NCP = Normal Charging Point, **FCP** = Fast Charging Point

6th funding call (published mid-2020, commissioning of the charging infrastructure therefore from 2021 onwards)

 NCP ≤ 22 kW FCP = 150 kW	Approved		In operation
	NCP	FCP	NCP and FCP total
Baden-Württemberg	114	151	0
Bavaria	150	149	0
Berlin	0	24	0
Brandenburg	16	44	0
Bremen	10	11	0
Hamburg	27	9	0
Hesse	199	88	0
Lower Saxony	279	160	0
Mecklenburg-Western Pomerania	16	24	0
North Rhine-Westphalia	155	216	0
Rhineland-Palatinate	61	45	0
Saarland	9	10	0
Saxony	53	41	0
Saxony-Anhalt	4	34	0
Schleswig-Holstein	50	52	0
Thuringia	10	24	0
Total	1,153	1,082	0

NCP = Normal Charging Point, **FCP** = Fast Charging Point

Bochum municipal utilities
charging station



Share of charging points supported by the federal funding programme in the existing stock of public charging points (as of February 2021).

Year	Stock of public charging infrastructure	Of which supported by federal funding programme	Share federal funding programme
2008	2	0	0 %
2009	147	0	0 %
2010	334	42	13 %
2011	882	80	9 %
2012	1,210	94	8 %
2013	1,566	118	8 %
2014	2,367	146	6 %
2015	3,632	172	5 %
2016	5,986	276	5 %
2017	9,937	1,039	10 %
2018	17,868	4,617	26 %
2019	27,222	8,230	30 %
2020	35,655	10,028	28 %

Charging points listed as "supported" that went into service before the launch of the 2017 support programme are supported modernisations of existing charging infrastructure after 2017.

FEDERAL FUNDING SUPPORT PROGRAMME CHARGING INFRASTRUCTURE FOR ELECTRIC CARS – RESIDENTIAL BUILDINGS

The new federal funding programme “Charging Infrastructure for Electric Cars – Residential Buildings” (“Ladeinfrastruktur für Elektroautos – Wohngebäude”) was launched on 6 October 2020. In the course of spring and summer 2020, the National Centre for Charging Infrastructure played a key role in developing the content of this programme on behalf of the BMVI and coordinated this with relevant stakeholders.


Homeowners, tenants and landlords have had the opportunity to submit applications since 24 November 2020. Eligible for funding is the procurement of charging stations with a charging capacity of 11 kW for an owner-occupied or rented parking space, as well as the associated installation and grid connection measures, with a flat-rate funding amount of 900 euros per charging point. The BMVI is providing a total funding volume of 200 million euros for this purpose until the end of 2023. The funding programme is coordinated by the National Centre for Charging Infrastructure, the project administrator is KfW.

Since the start of the application process, the new funding programme has enjoyed high demand. As of 31 December 2020, 136,575 applications had been submitted to KfW for the procurement of 165,590 charging stations. For this reason, the BMVI increased the funding to 250 million euros at the end of 2020, and a further increase to 400 million euros was made at the end of February 2021. As the funding programme sets a deadline of nine months to set up the funded charging stations, a strong increase in existing private charging points can be expected in 2021.

Applications can still be submitted at: ➔ www.kfw.de/440



Approved applications by federal state

	No. of applications	No. of charging stations applied for
Baden-Württemberg	25,084	30,659
Bavaria	28,649	35,666
Berlin	1,886	2,234
Brandenburg	3,414	4,156
Bremen	449	510
Hamburg	1,429	1,658
Hesse	12,212	14,843
Lower Saxony	23,465	27,750
Mecklenburg-Western Pomerania	1,355	1,653
North Rhine-Westphalia	15,547	18,470
Rhineland-Palatinate	9,161	10,988
Saarland	1,699	2,042
Saxony	3,316	4,233
Saxony-Anhalt	1,820	2,231
Schleswig-Holstein	5,347	6,356
Thuringia	1,742	2,141
Total	136,575	165,590

Source: KfW

STANDORTTOOL



Aim

The StandortTOOL is used to plan and calculate the expansion of the charging infrastructure throughout Germany by 2030. These calculations serve as the basis for the measures to expand the charging infrastructure. In addition, StandortTOOL offers the possibility to plan the expansion requirements of the hydrogen filling station infrastructure. It focuses on passenger car transport, but can also cover the commercial vehicle sector and identify synergies between the various applications.



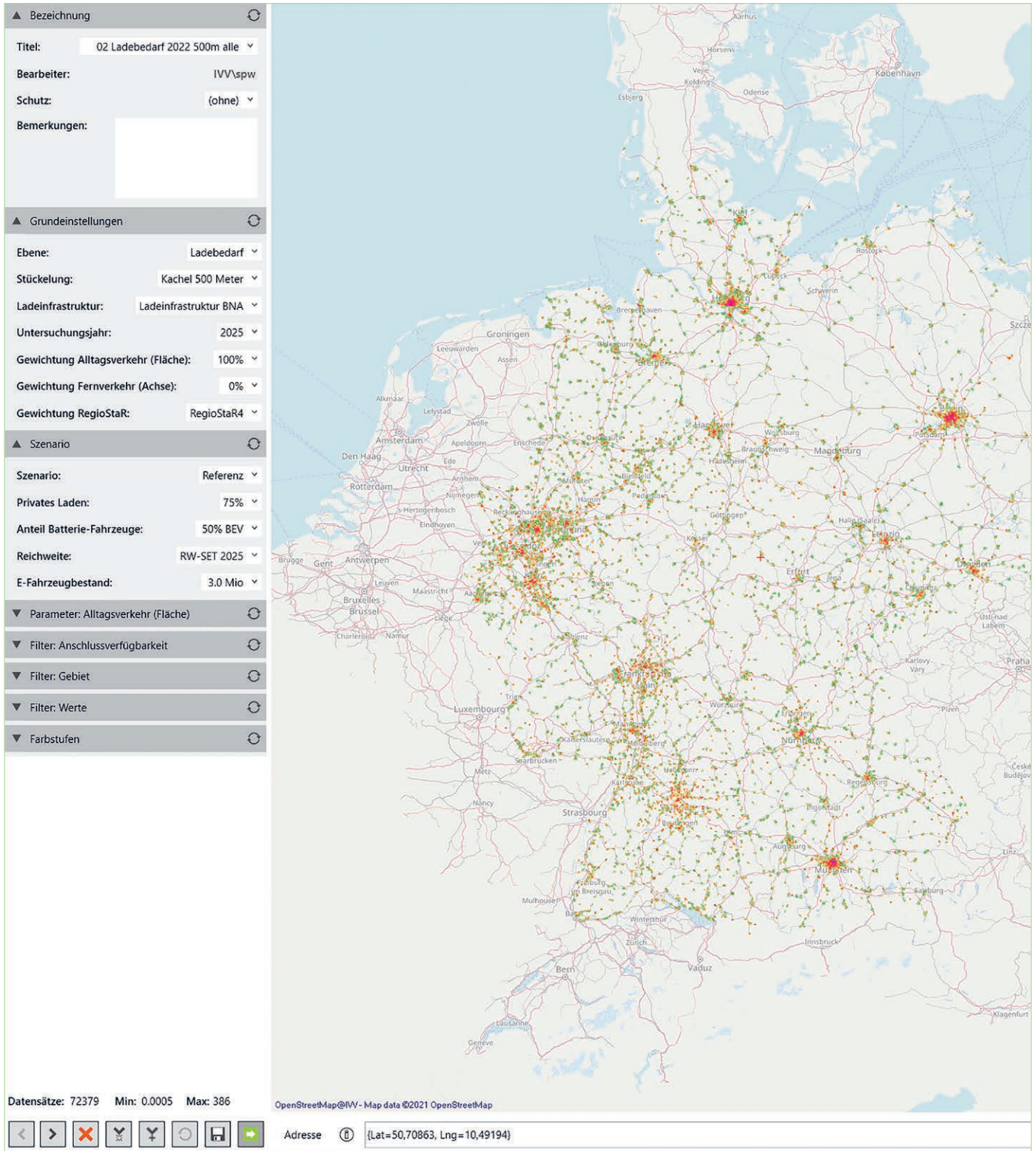
Necessity

Developing charging infrastructure is not economically viable at many locations. As a result, locations that would be necessary for the mobility needs of users are in many cases not built or not equipped with sufficient charging points. The StandortTOOL calculates the charging infrastructure needs from the user's perspective and takes the further expansion needs until 2030 into account. Only if sufficient charging infrastructure is available at the right locations from a user's perspective will electric mobility prevail.



Methodology

The modelling methodology compiles various indicators such as traffic flows, vehicle distribution, the existing charging infrastructure and regional structures (urban or rural areas) and calculates the charging sessions that are anticipated per spatial unit (e.g. tile). The special feature is that all charging processes of supported charging stations are integrated into subsequent expansion planning. The development is conducted by the IVV Aachen engineering group, the ISB (Institut für Stadtbauwesen und Stadtverkehr) chair of RWTH Aachen University, the German Aerospace Center DLR and the Reiner Lemoine Institute.



FLÄCHENTOOL



Aim

With FlächenTOOL, the National Centre for Charging Infrastructure has established a central digital platform that provides information about properties in Germany that are potentially available for the development of charging infrastructure. As a modern one-stop shop, FlächenTOOL brings together those looking for space and those offering it, including the possibility of direct contact, and thus accelerates the development of charging infrastructure in Germany.



Necessity

Anyone wanting to invest in charging infrastructure will find suitable sites here. Anyone looking for locations to set up charging infrastructure can obtain an overview of potentially suitable sites and their characteristics. In the upcoming funding calls, the FlächenTOOL can be used to find suitable individual sites as well as for the development of the planned fast charging network across Germany with 1,000 sites. Municipalities in particular can benefit from FlächenTOOL and help their residents to access a well-developed charging infrastructure without being required to finance it themselves.



Methodology

Federal states, municipalities, municipal companies, businesses and private individuals have the opportunity to list their properties via FlächenTOOL. The web application is designed in such a way that no special prior knowledge is required. It takes less than five minutes to enter the necessary basic data, which includes the location, size of the space, number of parking spaces and public accessibility. Optionally, further details such as connection to the electricity grid, availability of toilets and proximity to restaurants, shopping facilities, sights or entertainment options can also be entered. In order to promote the registered areas, it is also possible to add an individual description and pictures of the area and its surroundings. When searching, the results can be filtered according to various attributes, such as the postal code. It is also possible to establish contact directly via FlächenTOOL.

FlächenTOOL

Südharz

Kommune 1 2 3

PLZ 06536 **ART** Parkplatz

FLÄCHE 1000 m² **OFF ZUGÄNGLICH** Ja

STELLPLATZE 2 **STRASSENZUGANG** Ja

KONTAKT **DETAILS**

Südharz

Kommune 1 2 3

PLZ 06536 **ART** Parkplatz

FLÄCHE 200 m² **OFF ZUGÄNGLICH** Ja

STELLPLATZE 2 **STRASSENZUGANG** Ja

KONTAKT **DETAILS**

Südharz

Kommune 1 2 3

PLZ 06536 **ART** Parkplatz

FLÄCHE 1000 m² **OFF ZUGÄNGLICH** Ja

STELLPLATZE 2 **STRASSENZUGANG** Ja

KONTAKT **DETAILS**

Südharz

Kommune 1 2 3

PLZ 06536 **ART** Parkplatz

FLÄCHE 200 m² **OFF ZUGÄNGLICH** Ja

STELLPLATZE 2 **STRASSENZUGANG** Ja

KONTAKT **DETAILS**

Südharz

Kommune 1 2 3

PLZ 06536 **ART** Freifläche

FLÄCHE 300 m² **OFF ZUGÄNGLICH** Ja

STELLPLATZE 2 **STRASSENZUGANG** Ja

KONTAKT **DETAILS**

Südharz

Kommune 1 2 3

PLZ 06536 **ART** Parkplatz

FLÄCHE 1100 m² **OFF ZUGÄNGLICH** Ja

STELLPLATZE 2 **STRASSENZUGANG** Ja

KONTAKT **DETAILS**

Kommune **Südharz** 1 2 3

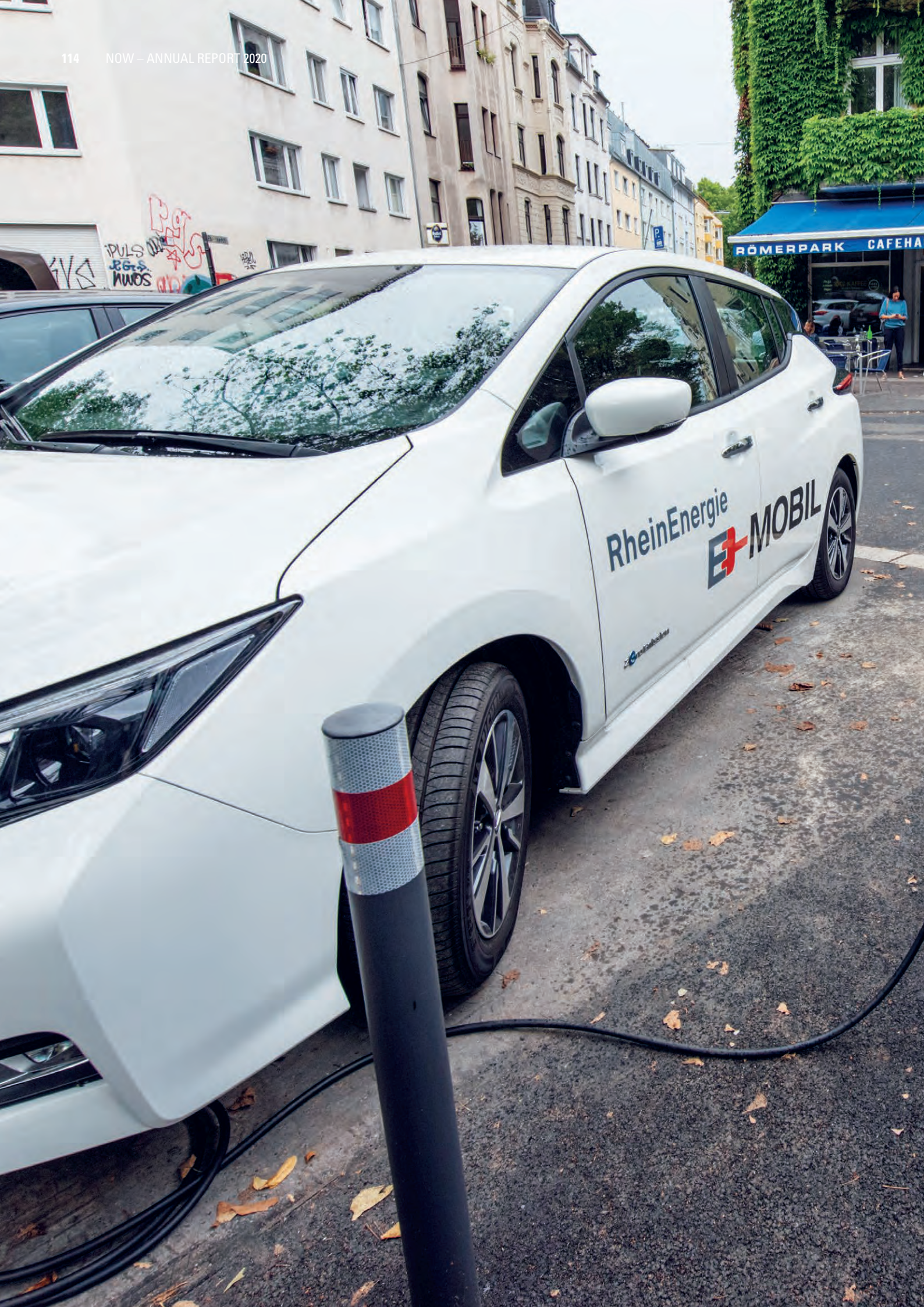
PLZ 06536 **ART** Parkplatz **STRASSENZUGANG** NEIN

FLÄCHE 1800 m² **OFF ZUGÄNGLICH** Ja **STROMNETZ** +

STELLPLATZE 3 **STRASSENZUGANG** Ja **BÜHLAND** +

KONTAKT **DETAILS**

The FlächenTOOL shows sites that are potentially available for new charging infrastructure. ➔ www.flaechenTOOL.de





TANKE

Getördert durch:
Bundesministerium
für Verkehr und
digitale Infrastruktur
aufgrund eines Beschlusses
des Deutschen Bundestages

RheinEnergie

Rheinenergie charging station
in Cologne's Südstadt district



III. FEDERAL FUNDING LOCAL ELECTRIC MOBILITY



FEDERAL FUNDING LOCAL ELECTRIC MOBILITY



Climate policy background and structure of the programme

Under the terms of the Paris Agreement of 2015, the Federal Republic of Germany has committed itself to limiting global warming to a maximum of 2 degrees Celsius compared to the pre-industrial era. To achieve this objective, the federal government has set out a long-term climate protection strategy with its Climate Protection Programme 2030 and Climate Protection Plan 2050. In the transport sector, a 40 % to 42 % reduction in greenhouse gases by 2030 compared to 1990 is envisaged. In order to accomplish this goal, it is necessary to promote electric mobility, strengthen the rail sector and introduce carbon pricing. As early as 2011, the federal government set targets to develop the electric mobility market in Germany by means of the government's electric mobility programme. By 2022, a total of 1 million electric vehicles are to be registered in Germany. With a current stock of 633,424 electric passenger cars (December 2020) and the current development, the achievement of this (revised) target is within sight. To achieve the climate protection goals in 2030, a total of between 7 and 10 million electric vehicles must be registered in Germany. The development of a "lead market for electric mobility in Germany" is also an area of focus of the government's electric mobility programme.

It is against this background that individual measures are being successively underpinned by legislation and implemented through funding programmes. Over the past ten years or so, the German government has been supporting the market preparation and market ramp-up to initiate a mass market through specific funding programmes for electric mobility with batteries and fuel cells. Most recently, this was accomplished through funding under the third phase (2015–2020) of the Electric Mobility Funding Guideline of the Federal Ministry of Transport and Digital Infrastructure (BMVI – Bundesministerium für Verkehr und digitale Infrastruktur). A detailed description of this and its extension can be found in Part I, Local Electric Mobility.

The BMVI sets the political framework for the funding guideline and is responsible for the content priorities. On behalf of the BMVI, NOW GmbH coordinates and manages the funding as the programme management association. The central tasks of NOW GmbH are the implementation and further strategic development of the funding activities, the definition and selection of the programme priorities in consultation with the client (BMVI) and in cooperation with Project Management Jülich (Projektträger Jülich (PtJ)), the coordination of the content-related programme support (including scientific accompanying research, data monitoring, analysis) as well as the steering of the content of the individual funding projects. The project administrator accompanies the programme and the projects in terms of funding law and also from a technical perspective with regard to the utilisation of the individual projects. In the context of procurement funding for vehicles and charging infrastructure, the latter plays a special role due to the large volume of applications.



Federal Ministry
of Transport and
Digital Infrastructure

As part of the programme support, coordination also takes place at regional and municipal levels via the existing networks. These networks include regional project management offices, stakeholders from the field of economic development, state agencies for electric mobility, energy agencies, state ministries, municipal associations, municipal utilities organisations and other public-private partnerships. These networks ensure the exchange between the local project partners and thus guarantee local and regional participation in the federal programme. Representatives of the regional networks, accompanying research as well as the BMVI, NOW GmbH and Project Management Jülich (Projektträger Jülich (PtJ)) regularly exchange information about the programme activities. The BMVI's strategy circle serves as a platform for this purpose.



Special programme: “Clean Air Immediate Action Programme” (2017 to 2020)

As a result of the intensified public debate on driving bans in German inner cities and the pollution caused by nitrogen oxides, noise and particulate matter since 2017, the promotion of electric mobility has assumed even greater importance. In a large number of cities, the EU limit values for nitrogen dioxide are exceeded, in some cases significantly. For this reason, the Clean Air Immediate Action Programme (running 2017 to 2020) was initiated at the end of 2017. The advancement of electric mobility plays a pivotal role in this programme. Of the total funding of approx. 1.5 billion euros, 750 million euros alone are earmarked for the electrification of transport, of which approx. 50 % is the responsibility of the BMVI. Other ministries with an eye on battery-electric subjects are the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU – Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit) and the Federal Ministry for Economic Affairs and Energy (BMWi – Bundesministerium für Wirtschaft und Energie). The BMVI's Electric Mobility Funding Guideline, published in 2015, was adapted to the requirements of the immediate action programme in 2017 and also proved to be an adequate, comprehensive set of instruments in this context. This enabled the BMVI to react swiftly and fully implement a funding call for NO_x-affected municipalities in both 2018 and 2019. With a view to this special programme, the following years, including 2020, serve purely for programme implementation and monitoring of the projects. A large part of the electric vehicles and necessary infrastructures went or will go into operation in 2020 and 2021, and are part of the dynamic market development of electric mobility in 2020. The immediate action programme is designed as a special programme; a continuation is therefore not envisaged.



Mercedes-Benz eSprinter production in Düsseldorf

Production of the ID.3
at the Volkswagen
plant in Zwickau





Special programme: “Economic Stimulus and Future Package” (2020 to 2021)

To deal with the consequences of the COVID-19 pandemic, the federal government launched a special stimulus programme on 3 June 2020 comprising a total volume of 130 billion euros, of which 120 billion euros are federal funds. The programme encompasses a package to stimulate the economy and overcome the crisis amounting to approximately 80 billion euros (Part A) and a future package to increase innovation for climate protection and digitalisation amounting to 50 billion euros (Part B). While the measures in Part A are aimed at stimulating the economy and consumption, with special offers for SMEs, public transport services and municipalities, a significant part of Part B is dedicated to climate protection in the transport sector. 24 to 25 billion euros are allocated to alternative drive systems (especially those based on batteries and fuel cells). 7 to 8 billion euros each will flow into the areas of electric mobility and hydrogen strategy. Concrete electric mobility measures include the continuation and increase of the environmental bonus (innovation premium) for electric vehicles, bonus programmes for industry, targeted fleet replacement programmes for user groups, as well as procurement and research funding for the expansion of the charging infrastructure and for electric mobility (including for the battery as a key component). Based on this special programme, the procurement funding call for crafts enterprises and SMEs was implemented within the Electric Mobility Funding Guideline (for detailed information, refer to the section on procurement funding).



Standard BMVI funding programme with the funding priorities: Procurement, concepts, research and development (2015 to 2020)

Established in 2015, the Electric Mobility Funding Guideline is the basis for the BMVI's battery-electric funding activities and the foundation for the ongoing continuation of the funding programme until the end of 2020. A key component of the guideline is the targeted support of fleet electrification in Germany, including the focus on the procurement of electric vehicles and charging infrastructure required for operation (procurement funding), especially in municipal and municipally integrated commercial fleets. Furthermore, municipalities can apply for electric mobility concepts (or environmental studies) in order to approach the topic of electric mobility on a conceptual level and to integrate it directly into the scope of municipal planning and decision-making. In addition to procurement and concept funding, R&D funding is also being implemented.

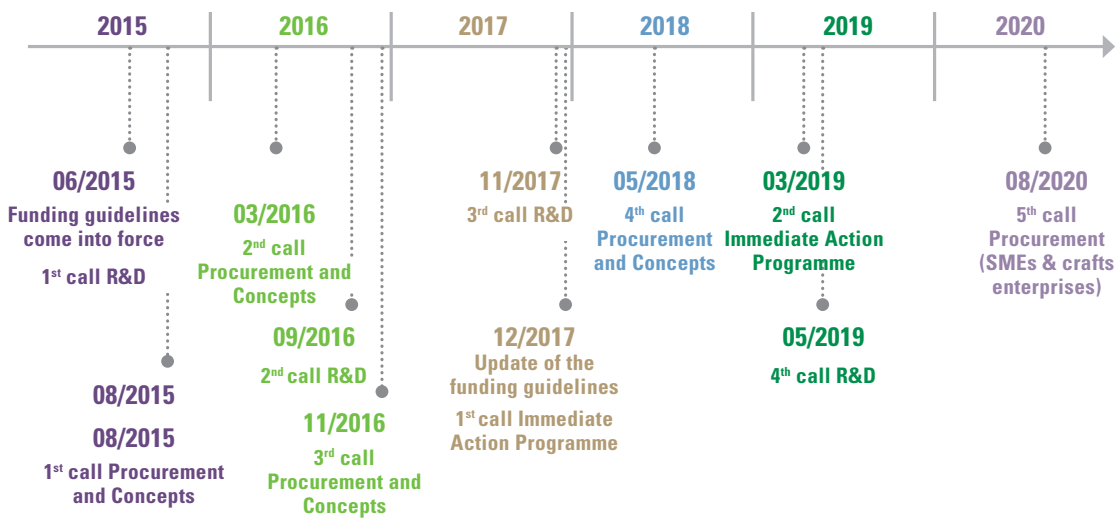
While the procurement projects focus on market ramp-up and the concepts support regional or municipal market preparation, the R&D projects, together with the programme support by NOW GmbH, make a significant contribution to gaining knowledge at the level of the overall programme. They serve to set priorities in the R&D funding itself, the precise orientation of the procurement projects and the strategic further development of the funding programme. Based on the funding guidelines, annual calls for submissions are published for the three funding areas (procurement, concept and R&D funding). They allow for adjustments to market requirements and offer the necessary leeway to support the market ramp-up in the most effective manner possible.



Programme status

Throughout the entire term of the funding guideline from June 2015 to December 2020, a total of 15 calls were made in the three funding pillars (seven procurement calls, four concept calls and four R&D calls). For the funding of procurement projects, three special calls were published in addition to four standard calls. In 2017 and 2018, for example, two separate calls were made as part of the Clean Air Immediate Action Programme. In 2020, another special call followed on the basis of the federal government's economic stimulus and future package to deal with the effects of the COVID-19 pandemic.

Timeline



To date, more than 1,000 projects have been approved across all funding priorities. The total vehicle and infrastructure potential is approximately 18,400 vehicles and 8,500 infrastructure units. These measures are supported by the BMVI with approximately 379 million euros in funding.

The overall picture of electric mobility funding at the end of 2020 is as follows:

Funding priority	Number of projects	Number of vehicles, Charging infrastructure	Funding
Research and development	33 plus 9 associated procurement projects	Planned figures: 1,173 vehicles 631 charging units	€ 49.5 million € 20 million
Electric vehicles and charging infrastructure (procurement/investment)	369	Target figures: 5,733 vehicles 2,543 charging units	€ 59.7 million
Electric vehicles and charging infrastructure (procurement/investment) in the Clean Air Immediate Action Programme)	291	Target figures: 9,045 vehicles 4,879 charging units	€ 210 million
Electric vehicles and charging infrastructure (procurement/investment) in the Economic Stimulus and Future Package	112	Target figures: 2,447 vehicles 503 charging units	€ 29.5 million
Municipal electric mobility concepts	200	No direct implementation	€ 10.7 million

The reduction in the number of approved projects compared to the previous year is due to projects that were subsequently withdrawn or rejected due to the lapse of the deadline.

PROCUREMENT FUNDING SUPPORT



Procurement Funding Support in the “Local Electric Mobility” funding guideline

In its current form, the Electric Mobility Funding Guideline places particular emphasis on municipal and commercial vehicle fleets. For operators, the use of electric vehicles is advantageous from several angles. By successively integrating electric vehicles into their fleets, it is possible to sustainably reduce greenhouse gas and pollutant emissions (CO₂, NO_x). Since the daily operational profile of many journeys is predefined, electric vehicles can also be specifically scheduled wherever distances can be calculated or intermediate charging is possible. In addition, municipal vehicle fleets in particular are generally very well suited for conversion to electric vehicles due to the short distances generally involved.

Municipalities and municipal companies are eligible to apply for funding. Commercial companies that are part of a municipal electric mobility concept can also apply. Leasing companies are also of particular significance for the procurement of new vehicles, as almost half of all newly registered passenger cars in Germany are financed through leasing. Within the framework of the procurement funding of the funding guideline, an average of 50 % of the approved electric vehicles are attributable to leasing and rental companies.

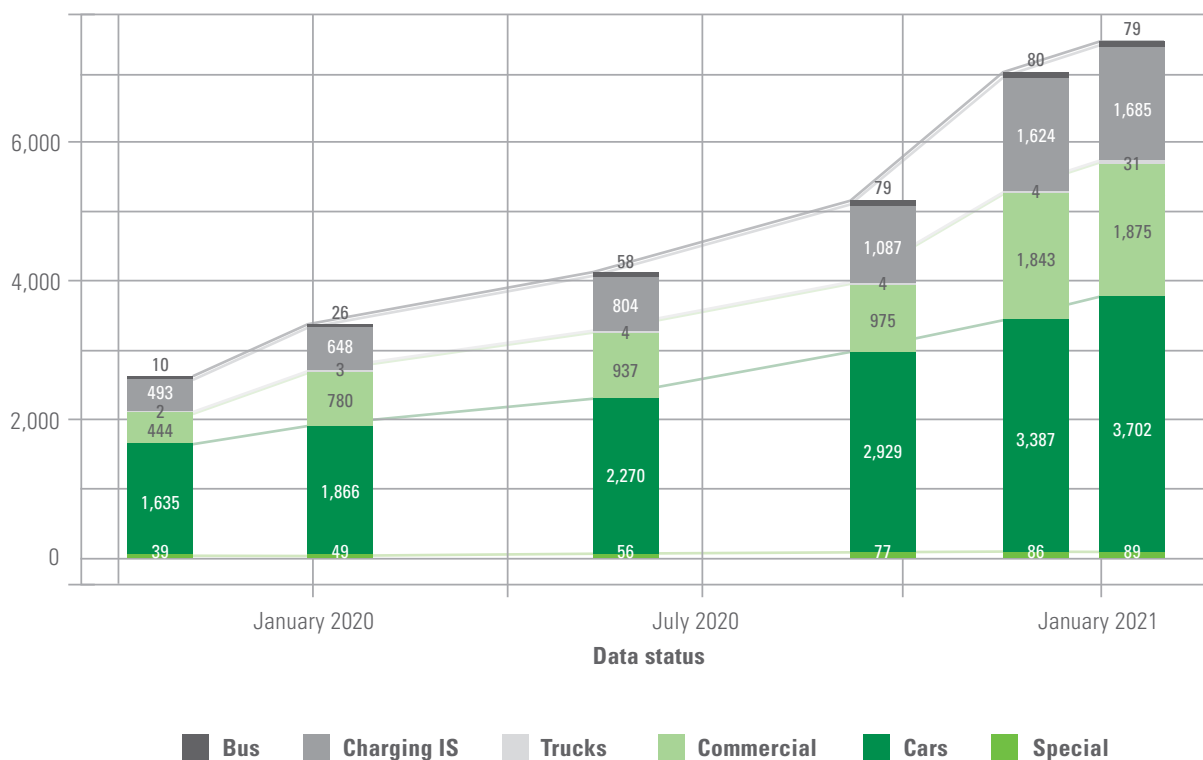
Both the electric vehicles themselves and the charging infrastructure necessary for their operation are eligible for funding support. In the case of vehicles, the additional costs compared to conventionally operated vehicles and, in the case of the charging infrastructure, the total costs can be subsidised proportionately. The subsidy rates are between 40 to 60 % for companies and up to 90 % for municipalities.

Within the procurement funding programmes, strong growth in the numbers of procured charging infrastructure and vehicles could be documented (See Fig. Procurement ramp-up, p. 126 – 127). In 2020 alone, the number of electric passenger cars procured jumped by 98 %, special vehicles by 82 %, light commercial vehicles (<3.5 t) by 140 %, buses by 204 %, charging infrastructure by 160 % and trucks (>3.5 t) by as much as 933 %.

Electric Mobility Funding Guideline 2015 – 2019	Approved					
	Passenger vehicles	Commercial vehicles (< 3,5 t)	Trucks (> 3,5 t)	Buses	Special vehicles	Charging infrastructure
Baden-Württemberg	1,007	1,582	57	22	44	1,175
Bavaria	980	632	5	58	6	782
Berlin	347	149	21	106	86	501
Brandenburg	70	22		2		65
Bremen	2	4	1	5		9
Hamburg	500	1,693	8	126	12	721
Hesse	790	642	6	2	8	697
Lower Saxony	2,358	652	3	1	26	954
Mecklenburg-Western Pomerania	13	12	2		1	19
North Rhine-Westphalia	3,169	2,356	3	7	95	3,097
Rhineland-Palatinate	157	98	1	8	11	232
Saarland	4					10
Saxony	153	54			1	131
Saxony-Anhalt	26	27				29
Schleswig-Holstein	61	39		34	6	122
Thuringia	4	21				12
Total	9,641	7,983	107	371	296	8,556

Despite the positive procurement dynamics, the procurement rates (ratio of procurement and approval) are still below 40% at the end of 2020 (Fig. Procurement rates). On this basis, it can be assumed for the future that procurement will continue to increase in the coming years and that, in addition to new projects, previously approved vehicle funding

Procurement ramp-up



Procured							Funding [€]
Passenger vehicles	Commercial vehicles (<3,5 t)	Trucks (>3,5 t)	Buses	Special vehicles	Charging infrastructure		
565	190	29	15	22	232		45,389,768
567	125		6	2	96		26,688,025
36	17	1	15	12	77		46,883,705
52	7				40		2,842,780
2	1	1					1,173,576
194	65		40	1	16		50,618,014
130	57			6	128		26,499,723
737	103		1	13	140		23,129,211
3	3			1	4		553,521
1,139	1,245		2	25	831		65,804,129
59	26			4	70		9,907,163
2					2		44,606
181	17				26		3,308,350
15	1				7		438,093
16	6			3	16		15,576,499
4	12						312,058
*	3,702	1,875	31	79	89	1,685	319,169,222
**	1,931	780	3	26	57	648	
***	92 %	140 %	933 %	204 %	56 %	160 %	

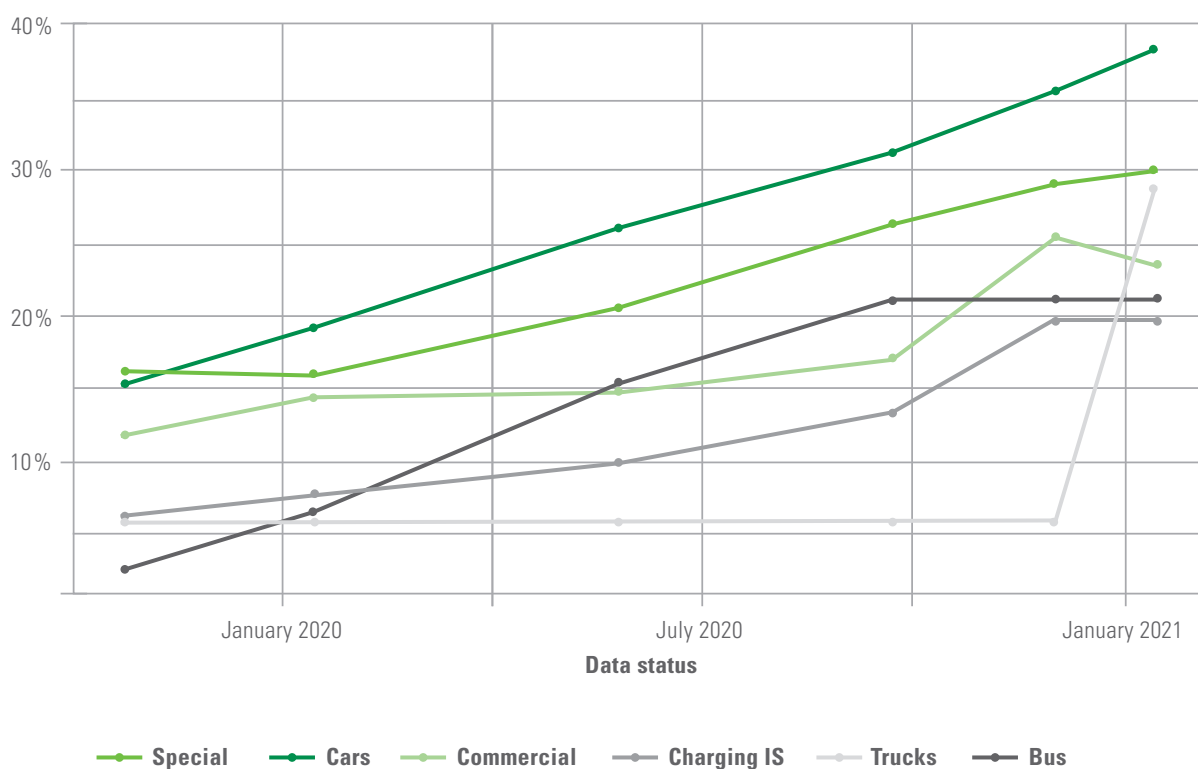
* Total procured (2020)

** Comparison previous year (2019)

*** Year-on-year growth (2020 over 2019)

support will also translate into real vehicles on German roads. If this procurement trend continues, it can be expected that several thousand additional electric passenger cars, commercial vehicles and charging infrastructure units will be procured in 2021.

Procurement rates





Funding support 2020

As part of the federal government's economic stimulus and crisis management programme, a limited fleet replacement programme for craft enterprises and SMEs was initiated on the basis of the electric mobility funding guideline. This special call specifically addressed those users wishing to convert their conventional vehicle fleet to electrically powered commercial vehicles in a timely manner and also to make investments in the charging infrastructure necessary for operation. An evaluation of this call is presented in the subchapter "Electric mobility in practice". Particularly for the more cost-intensive commercial vehicles, support through the BMVI's Electric Mobility Funding Guideline (with funds from the Economic Stimulus and Future Package) was an attractive alternative to the environmental bonus from the Federal Office of Economic Affairs and Export Control (BAFA – Bundesamt für Wirtschaft und Ausfuhrkontrolle), as this also makes the charging infrastructure eligible for support.

Within a short timeframe, 127 funding applications with an application volume of approx. 32 million euros were submitted. Of these, a total of 112 applicants received a funding approval with a total volume of 29.5 million euros. This corresponds to an approval rate of approx. 90 %. In this way, 2,465 electric commercial vehicles and 503 charging infrastructure units will be procured.

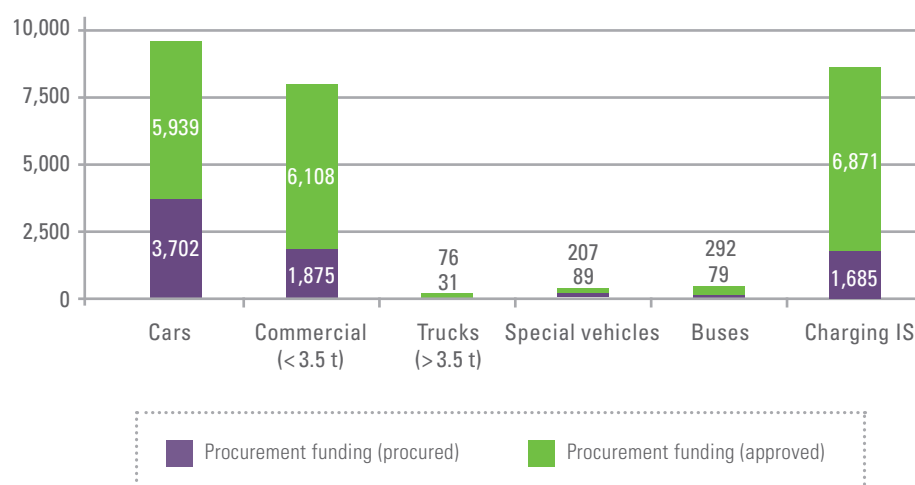


Procurement funding support – Overview of all procurement projects under the guideline

In the seven funding calls conducted in the standard and special programmes from 2015 to 2020, a total of 781 procurement projects with a funding volume of 319 million euros were approved. These include a total of more than 9,600 passenger cars, almost 8,000 commercial vehicles, around 400 buses and more than 9,500 charging stations. The fleet size within the funding applications ranges from approximately 1,500 commercial vehicles at Deutsche Post to a single vehicle in a municipality.

The table "Federal states approved and procured" with procurement projects shows all funded vehicles listed by federal state. Particularly active in the implementation of vehicle procurement are North Rhine-Westphalia, Lower Saxony, Baden-Württemberg and Bavaria. And for the procurement of charging infrastructure, North Rhine-Westphalia is exceptionally dynamic. The difference between the approved vehicles and charging infrastructure units (left) and those already procured (right) decreases significantly compared to the previous year. Accordingly, a growing number of vehicles and associated charging infrastructure units are in operation and are therefore contributing to climate protection. Particularly large increases in implementation can be seen in commercial vehicles and charging infrastructure (Fig. Procurement funding). However, tender processes at municipalities and municipal companies as well as the lengthy delivery times for vehicles in some cases are still reflected in the high number of vehicles and charging infrastructure units that have been approved but not yet procured. The dynamic market development of the last few months – and the associated increase in vehicle choice – is likely to accelerate procurement significantly again in the short to medium term.

Procurement funding
(cumulative forecast figures until 31.12.2020)



1st–4th Call
Standard Programme
(01.07.2015–31.12.2019)

	Approved		Completed	
	Funding amount (€)	Number of projects	Funding amount (€)	Number of projects
Baden-Württemberg	2,493,069	42	1,287,575	23
Bavaria	1,800,293	34	1,544,123	30
Berlin	48,600	1	—	—
Brandenburg	293,921	6	278,904	5
Bremen	—	—	—	—
Hamburg	223,526	3	223,526	3
Hesse	745,821	14	689,578	13
Lower Saxony	1,081,827	19	752,430	15
Mecklenburg-Western Pomerania	111,492	2	32,000	1
North Rhine-Westphalia	1,511,757	25	887,977	17
Rhineland-Palatinate	722,577	14	413,947	9
Saarland	300,818	5	141,473	3
Saxony	639,477	14	560,469	13
Saxony-Anhalt	286,954	6	75,844	3
Schleswig-Holstein	222,214	8	169,254	7
Thuringia	259,487	7	161,995	5
Total	10,741,833	200	7,219,095	147



Concept funding support

In the wake of four funding calls, 200 municipal electric mobility concepts are currently being funded by the BMVI. More than half of these have already been completed. The applicants consist of 64 % cities and municipalities, 19 % districts, 7 % municipal companies in the energy sector, 5 % municipal transport companies and 5 % others such as non-profit associations and special-purpose associations.

An overview of all electric mobility concepts can be found at

➤ www.starterset-elektromobilitaet.de/praxis/elektromobilitaets-konzepte



Final reports on completed electric mobility concepts can also be downloaded from the website.



CO₂-free through Berlin

The electric mobility concepts cover a wide spectrum of topics. They range from general concepts for analysing the potential of electric mobility in the municipality, to very specific topics such as the development of an exclusive e-taxi fast-charging infrastructure. The largest share is attributable to concepts for the fields of action involving the electrification of municipal vehicle fleets and charging infrastructure. In combination with the electrification of vehicle fleets, the establishment of e-car sharing at the municipal level is often targeted, sometimes in combination with other sharing offers such as pedelec sharing. Increasingly, concepts also focus on the electrification of public transport and, in order to electrify intermodal travel, their integration and connection to newly created services.

In 2020, more than 30 concepts were completed. Again, the electrification of municipal vehicle fleets and charging infrastructure were the most prominent topics in these concepts. In addition, topics such as network management in the sense of bringing together stakeholders, public transport conversion and the integration of renewable energies were also increasingly addressed. In the currently completed concepts, districts and small towns with up to 50,000 inhabitants are more strongly represented. Current issues are also addressed in the electric mobility concepts, such as how mobility behaviour has changed as a result of the COVID-19 pandemic in the Hannover-Braunschweig-Göttingen-Wolfsburg metropolitan region. The municipalities also make great use of concept development to involve their citizens in the change processes at an early stage. As such, the topic of citizen participation is reflected as an important component in many of the concepts.

The main target groups for the concepts are city administrations, public transport providers, businesses, commuters and tourism. In addition, car park operators, schools and nursing care services are increasingly being addressed. The opening of the electric mobility funding guideline to commercial applicants in the concepts funding pillar from 2021 will lead to a further expansion of the thematic spectrum and the target groups.



R&D funding support

The Electric Mobility Funding Guideline also includes the strategically important funding instrument of classical research and development (R&D) to further support market ramp-up. In addition to making a pivotal contribution to the market ramp-up of electric mobility, the supported R&D projects also provide important new insights for the thematic fields of the programme's accompanying research.

Since the funding guideline came into force in 2015, four calls for funding have been conducted in the R&D area. These calls focus on practical technology testing and further development. The 4th and last call for research projects took place between May and August 2019. With the aim of providing targeted market support, it was possible to further focus the research topics and adjust the priorities within this call. Focusing on the aim of providing targeted support for the market, it was possible to further focus the research topics and adjust the priorities within the four calls. This focus applies in

particular to the area of technology research and further development. Within this, there is a concentration on those areas of application in which there is still insufficient market penetration and in which vehicle availability is reduced (e.g. in local public transport and in freight and commercial transport). With the goal of linking existing or soon-to-be-introduced vehicle fleets and infrastructure units, the new focus of the large-scale demonstration projects was established. In the future, the relevant stakeholders will be brought together and research questions will be answered from within the overall system. This systemic approach follows the recommendations of the National Platform Electric Mobility (NPE) and National Platform Mobility (NPM).

15 R&D projects from the four calls are currently in progress. Another project is still in the application process, here approval is expected in 2021. Another seven projects have already been completed. The main topics are public transport, charging infrastructure and freight and commercial transport.

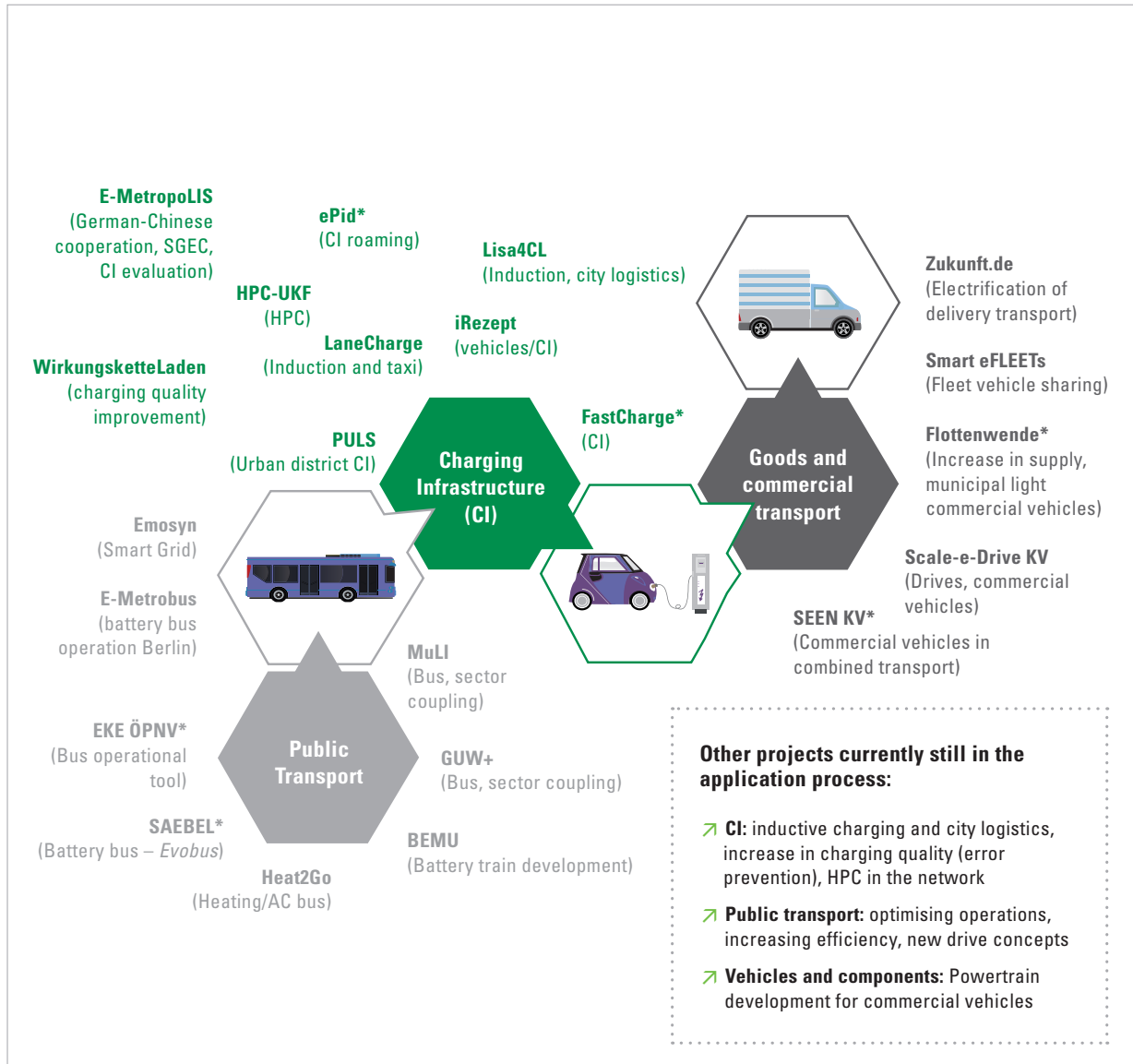
This picture is supplemented by projects of cooperation between national or regional research funding institutions within the framework of the ERA-NET Plus European funding, which aims to bundle Europe's scientific competencies. In 2020, eight projects were completed as planned and, in addition to two ongoing projects, six more were launched. The new projects address the focal fields of public transport, charging infrastructure and the development of components in the area of freight transport.

Completed projects 2020

- Eke-ÖPNV
- Zukunft.de

Commenced projects 2020

- LISA4CL
- HPC-UKF
- Scale-e-Drive
- EUniS
- Emosyn
- Wirkkette Laden



* Projects already completed

Thematic distribution of ongoing R&D projects and those in the application stage



Wuppertal municipal utilities already have 10 hydrogen buses "on the road" in 2020 (top); Berlin's BVG operates the largest e-bus fleet in Germany (below)



ELECTRIC MOBILITY IN PRACTICE



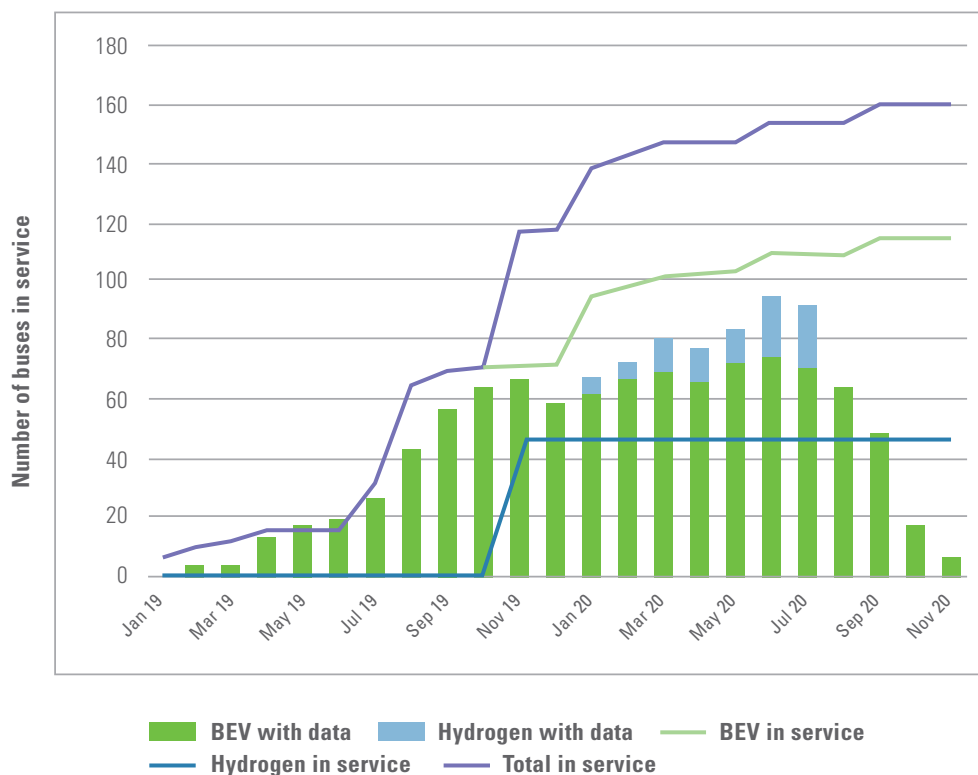
Using the electrification of bus fleets as an example

The market entry of e-buses has been sluggish over the past years. On the one hand, the range of battery-electric and fuel cell buses available is still quite limited. On the other hand, the integration of the new drive technologies presents transport companies with financial and technical challenges. Additionally, climate policy requirements will be transposed into national law with the Clean Vehicles Directive (CVD) on 2 August 2021.

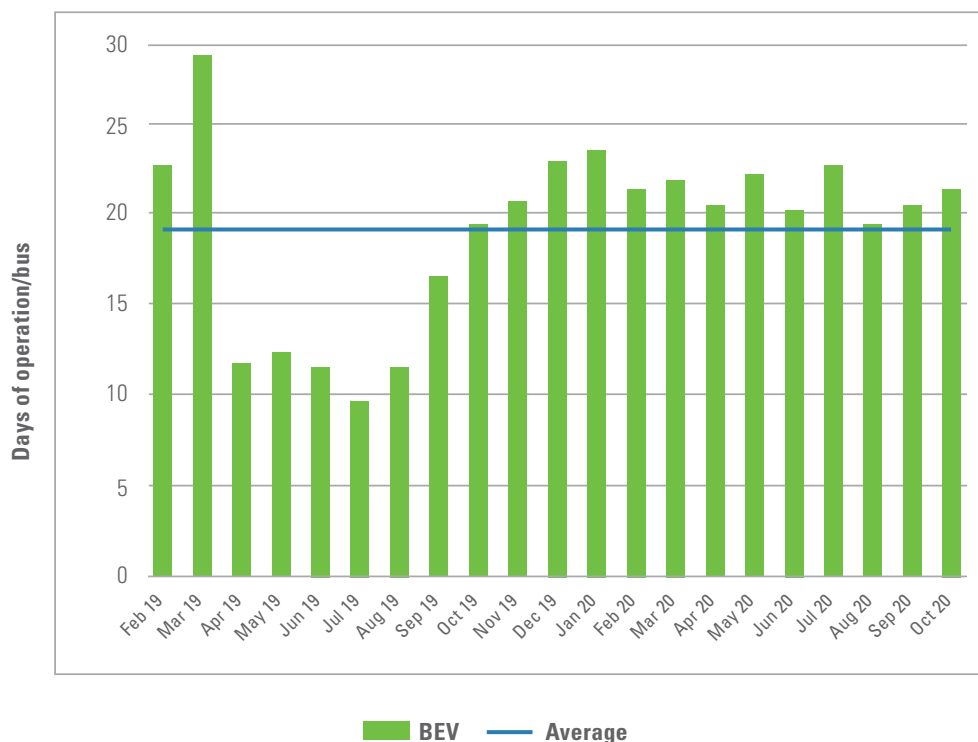
For the transport companies themselves, the availability, energy consumption and actual range of the e-buses represent a key challenge for fleet integration. To address this, the consortium of the accompanying research on innovative drives and vehicles (see Part V Accompanying research and monitoring) evaluated and analysed the data collected during real operation of the funded buses, on the occasion of the last status meeting in 2020. Currently, 160 subsidised battery and fuel cell buses are in service; operating data is available for 105 of these buses (Fig. Number of buses in service, p. 136). The average monthly mileage is 2,250 km on more than 13 operating days (Fig. Monthly mileage, p. 136). The daily mileage per bus is 130km (Fig. Daily mileage, p. 137). The utilisation of the battery capacity by the battery-electric buses is currently between 20% and 75 %, which indicates varying operating strategies on the part of the transport companies. Furthermore, the evaluations show that the availability of the fuel cell and battery buses is now high at approx. 90%. A diesel bus, by comparison, has an availability of approx. 95 %. In addition to the electric buses, the corresponding charging and refuelling infrastructure is also considered. Here, 24 % of the energy delivered by the charging infrastructure is accounted for by additional consumption such as charging losses, battery balancing and vehicle conditioning. In addition to the well-known challenges in practice – availability, increased energy consumption due to air conditioning and the associated loss of range – charging management is also an issue. Furthermore, the data evaluation also takes data from research and development projects as well as electric mobility concepts with a focus on public transport into account.

The evaluations reveal both known and new challenges. However, they also show that alongside the increase in the number of e-buses integrated by transport companies in their fleets, these challenges are being addressed in practice in a targeted and comprehensive manner. In order to support the further ramp-up, a new bus funding guideline from the BMVI is planned for 2021.

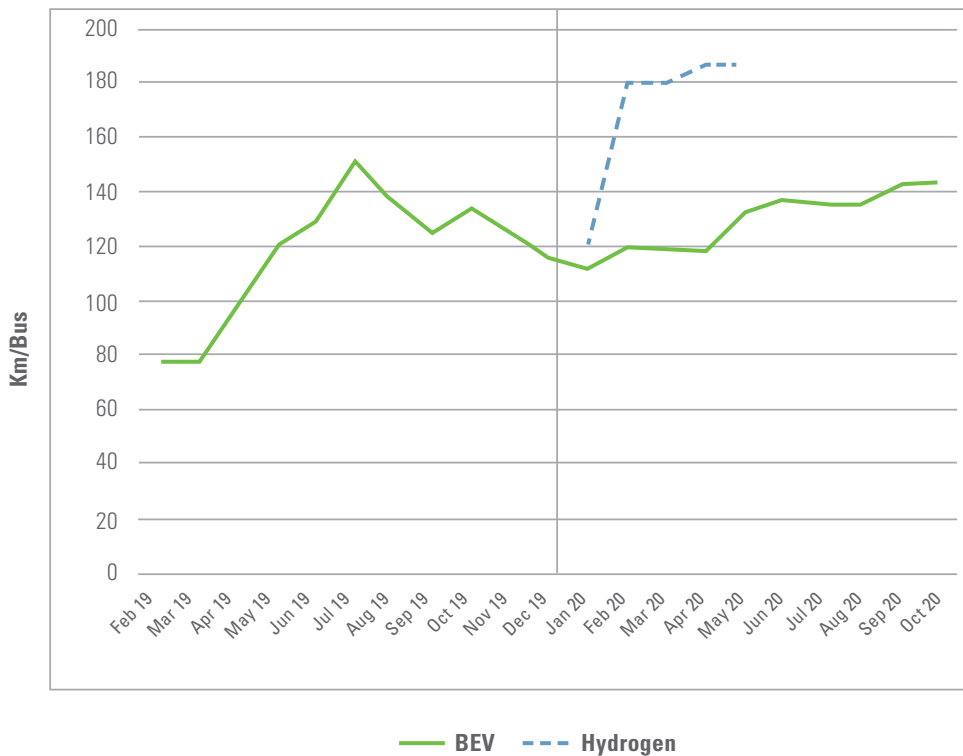
Evaluation of operating modes I Number of buses in service and with data collection (Status 03.12.2020)



Evaluation of operating modes I Monthly operating days BEV buses (Status 03.12.2020)



Evaluation of operating modes I Daily bus mileage (Status 03.12.2020)



Using the example of application requirements of electric commercial vehicles for crafts enterprises and SMEs

The aim of the fleet replacement programme was to replace road-based vehicles of the EC vehicle classes N1, N2 and N3 (motor vehicles for the transport of goods up to 3.5 t; 3.5 to 12 t; over 12 t) with purely electric vehicles of the same vehicle class.

The focus of applicant companies was chiefly on N1 vehicles (1,896 vehicles). In addition, 566 vehicles of the N2 vehicle class and seven N3 vehicles were also procured. The N1, N2 and N3 vehicles procured are distributed among approx. 40 vehicle models and approx. 20 vehicle manufacturers. With 503 approved charging infrastructure units, including both standard and fast charging points, the fleet exchange programme for craft enterprises and SMEs also contributes to the expansion of the commercial charging infrastructure in Germany.

Based on the detailed analyses of the application figures, the following picture can be drawn of the requirements of crafts enterprises and SMEs for electric commercial vehicles: On average, 20 N1 class electric commercial vehicles are procured per application, mostly from the manufacturers Renault, Mercedes-Benz, Fiat or Opel. The AC charging infrastructure is mostly geared to a charging capacity of 11kW and is installed and operated on the company's own premises without public access. In many cases, plans are also in place to expand the company's own non-public charging infrastructure by 2025 in order to further electrify the fleet. The high level of planned use is significant: the vehicles are intended for year-round use (220 working days) in all utilisation contexts in both urban and rural areas.



Carbon footprint of light electric commercial vehicles

As part of a master's thesis supervised by NOW GmbH, the carbon footprint of commercial vehicles in the N1 vehicle class was analysed using real driving data. The results show a significant reduction in the carbon footprint of the vehicles between 2012 and 2018. Contributing factors include more sustainable production (e.g. by switching to climate-neutral production), the increasing share of renewable energies in the German electricity mix, more efficient vehicle models and improvements in recycling. The emission reduction potential also increases significantly if both the operating electricity comes exclusively from renewable energies and the annual mileage of the electric vehicles increases. Consequently, the emissions of battery electric vehicles can still be reduced, particularly when in use.

Carbon footprint results for light commercial vehicles

	Greenhouse gas emissions [in kg CO ₂ -eq.] Electric (electricity mix 2012) — 1 st funding phase	Greenhouse gas emissions [in kg CO ₂ -eq.] Electric (electricity mix 2018) — 2 nd funding phase	Reduced greenhouse gas emissions 2018 vs. 2012
Manufacture of vehicle chassis & drivetrain	5,894	4,785	approx. 19 %
Battery production	4,935	4,113	approx. 17 %
Use	11,365	8,653	approx. 24 %
Recycling	973	847	approx. 13 %

Source: Carbon footprint of light commercial vehicles. Evaluation of real driving data from the funding programme "Elektromobilität vor Ort", Mildenerberger, L. T. (2020)



In 2020, a tour of Germany takes an ID.3 over 28,000 km across the entire country



APPRAISAL OF THE ELECTRIC MOBILITY FUNDING PROGRAMME

2015 – 2020

The overall appraisal of the Electric Mobility Funding Guideline for the years 2015 to 2020 is positive. In 2015, it was able to seamlessly continue the previous funding phase and create a broad funding offer by expanding the funding priorities in the direction of procurement and concept funding. This formed the basis for various funding calls for battery-electric applications by the BMVI, with the defined goal of electrifying vehicle fleets in the municipal and integrated municipal sector. The range of applications of the vehicles extends from classic fleet applications as company cars, municipal fleets, applications in commercial transport and logistics to public transport as well as others. These activities are complemented by collaborative projects with research objectives. They form the bridge between market requirements and open research questions, e.g. in vehicles, components and system solutions.

Over five years, a total of 15 calls for funding with more than 1,000 individual projects were implemented. A steady increase in demand can be observed over the years of implementation and calls, especially in the area of procurement funding support. Standard and special programmes complement each other in a notable manner and live up to their claim of contributing to a further market ramp-up in the short term by stimulating demand. In the meantime, manufacturers are responding to the increasing demand with a broader range of products in the necessary scope (see Market Development in 2020 (see Market Development in 2020, p. 172).

The early implementation years of the funding programme (2015 to mid-2017) primarily served to adapt and align the programme contents to the limited market situation. In many cases, corrections were necessary in the approval periods because the supply in the market was insufficient or vehicles could not be delivered. This was exacerbated by procedural requirements for project approval and procurement processes for the users. Through networking activities of the programme support organisation (by NOW GmbH), supply and demand sides were brought together, e.g. in the leasing dialogue process and the Bus Working Group, in order to better coordinate the divergent developments. From mid-2017 to the end of 2018, increased demand was evident, particularly due to the "Clean Air Immediate Action Programme". With the exception of a special call in the economic stimulus and future package, the subsequent and final years (2019 and 2020) focused primarily on the appropriate management of the projects and programmes and the consolidation of results through programme monitoring. The high levels of demand in the last implementation phase are reflected by the dynamic development in 2020.

The total vehicle portfolio of the funding programme amounts to 18,400 vehicles and approx. 8,500 infrastructure units. The focus is on passenger cars and light commercial vehicles and – in the area of non-public and essential charging infrastructures – on AC charging capacities of 11 to 22 kW. Also noticeable in the programme implementation is the increase in vehicle supply beginning only in 2019 and 2020. Of these vehicles, around 31 % are in operation at the end of 2020. Here, too, it is clear that a strong correlation exists between the development of the funding programme and the market, and that the momentum of 2020 will be noticeable at the end of the funding programme. The vehicles that have been approved but have yet to be procured, especially in the areas where the supply of vehicles is still limited (battery buses, electric commercial vehicles), are therefore likely to contribute to a continued ramp-up of vehicles in 2021 and 2022.

The funding guideline was revised at the end of 2020 and published in an updated, even more market-oriented form. The new funding guideline continues the successful model of the past five years with the combination of funding for preliminary conceptual considerations and actual procurement funding for market activation and continued market ramp-up. The unique selling point of the Electric Mobility Funding Guideline – the funding of research and development – has also been adopted. In addition, further technology-neutral funding guidelines, which are geared to specific modes of transport, such as alternative drives in public transport or commercial vehicles, are currently being developed and coordinated.



The market ramp-up of electric mobility picked up speed in 2020. Battery production at the Mercedes-Benz subsidiary Accumotive in Kamenz





IV. MOBILITY AND FUELS STRATEGY

MOBILITY AND FUELS STRATEGY (MFS)

In 2020, public discourse on alternative drives and fuels was dominated by the National Hydrogen Strategy, the European Green Deal and preparations for the national implementation of the Renewable Energy Directive (RED II). A variety of measures to support the market ramp-up of alternative fuels – as well as electric mobility using batteries and fuel cells – were discussed and adopted. Building on the regulatory framework conditions and funding support already in place, political decisions substantially raised ambition levels in all sectors once again. The discussion about the most useful, convenient and/or most efficient solutions for climate protection in the transport sector continues to play a special role in this. NOW GmbH has provided expert support in terms of this discussion and advised the BMVI on content, drawing on the findings gained from ongoing funding programmes and continuously monitoring political developments in Germany, Europe and globally, as well as activities in both research and industry.

NOW GmbH is tasked with supporting the BMVI in implementing the Mobility and Fuels Strategy (MFS), an overarching framework adopted in 2013. In implementing the MFS as well as the measures from the Climate Action Programme 2030, the focus is on a broad market ramp-up of alternative drives and fuels in all application areas. The tasks of NOW GmbH in this regard are providing expert advice on alternative drives and fuels as well as supporting specific funding measures. The scientific and technical evaluation of pilot projects, the (further) development of funding measures and monitoring implementation in terms of content are at the forefront here.

The following will highlight that various investment and model projects across all markets and technologies are being implemented and coordinated by NOW GmbH for the transport sector in updating the MFS. NOW GmbH developed a funding concept for environmentally-friendly onboard and mobile shoreside power supply for seagoing and inland waterway vessels. The funding guideline based on this was published in 2020. The second funding call in the area of LNG equipping and retrofitting of maritime vessels heralded the continuation of the corresponding funding programme: The original funding programme which actually expired at the end of 2020 was extended for another year, so that a market-oriented range of funding support for LNG propulsion systems in maritime shipping can continue to be provided.

Focus areas – in addition to the measures already underway – was on the topics of “Climate-friendly commercial vehicles” and “Renewable fuels”. NOW GmbH supports the BMVI in creating and designing new funding measures for a rapid market ramp-up.

Market observation and technology monitoring are key tasks of NOW GmbH, especially for the market ramp-up of vehicles with alternative drives, analyses of sustainable mobility solutions, energy system analyses as well as technical ways to manufacture electricity-based and biogenic fuels. It is the job of NOW GmbH here in particular to evaluate technological approaches and their relevance for achieving climate protection goals in the transport sector. Aside from assessments about technology development, market ramp-up and cost outlooks for the transport sector, looking beyond application areas and across sectors has always played an important role.

It is a part of NOW GmbH’s remit to take European and international developments into account in formulating strategy. Because the aviation and maritime sectors in particular involve cross-border transport, it is precisely in these areas that international developments are so significant. Furthermore, the regulatory framework for alternative fuels and drives is largely determined by implementation requirements at European level. These include for example, the implementation of Directive 2014/94/EU on the Alternative Fuels Infrastructure (AFID) or the revised Renewable Energy Directive (RED II) as well as the respective national implementations.

Network

Because of the comprehensive range of topics found within the MFS remit, a large number of stakeholders are relevant. Specific themes are discussed with industry and science in various formats.

In addition to NOW GmbH expertise, the MFS project office, overseen by IFOK GmbH, also assists the BMVI in involving key MFS specialist stakeholders in the framework of an expert dialogue. The project office also coordinates communication and public relations on the MFS, as well as the expert dialogue. The BMVI is also supported by scientific monitoring. The scientific consortium conducts evaluations on measures and technologies for the analysis of individual thematic areas which could contribute to the reduction of end energy consumption and greenhouse gas emissions.

Practical insights which address research questions are also incorporated through targeted expert workshops. This allows relevant developments to be taken into account and the results to be seamlessly transposed to an implementation phase. A target-oriented exchange is thus facilitated between the relevant stakeholders.

The overall concept of climate-friendly commercial vehicles also includes fuel cell trucks. These will play an important role in achieving the climate goals in transport





Additionally, the National Platform Future of Mobility (NPM) was established at the end of 2018 as an advisory board to the federal government. In a broad dialogue with stakeholders from science and industry, its purpose is to discuss the entire spectrum of developments in the transport area as well as help shape recommended courses of action for climate protection policy decisions in transport. NOW GmbH supports this work on behalf of the BMVI in the appropriate working groups for alternative drives and fuels and brings its expertise to the table in this process.



Commercial vehicles with alternative drives

Road freight transport currently causes around one third of all CO₂-emissions in the transport sector. The total mileage in this area is almost exclusively covered by commercial vehicles with a conventional, diesel-based drive. The market supply of commercial vehicles with alternative drives (battery-electric drives, hydrogen fuel cell drives and hybrid overhead line drives) is still very small and largely limited to light commercial vehicles. Heavy commercial vehicles with alternative drives on the other hand, are still overwhelmingly in the development or pre-series phase. Furthermore, the necessary re-fuelling/recharging/ overhead line infrastructure for commercial vehicles with alternative drives either does not exist, or is inadequate.

Unlike the passenger car segment, few vehicles have a high transport performance in heavy road haulage, comparatively speaking. The operating cycles of these vehicles are also comparatively short. The fleet is replaced much more frequently and after a shorter period of use. These special features make heavy freight transport particularly suitable for an effective fleet replacement in favour of alternative drives. Because of high traffic volume, there is a huge CO₂-savings potential to be achieved by using low or zero-emission vehicles.



Commercial vehicle summit: On the path to zero-emission road logistics with alternative drives

At the commercial vehicle summit in November 2020, the BMVI came to an agreement with companies and associations on joint implementation for climate-friendly commercial vehicles. To achieve the climate objectives, the BMVI's overall concept of climate-friendly commercial vehicles was presented at the commercial vehicle summit.



Overall concept for climate-friendly commercial vehicles

In the overall concept for climate-friendly commercial vehicles, the central requirements of users and suppliers of commercial vehicles with alternative drives and the associated infrastructure are represented in ten core messages. In addition, the further elaboration of the three core measures from the Climate Action Programme 2030 is outlined and the path to a goal-oriented implementation of the measures is illustrated..

The requirements of the Climate Action Programme are to be implemented with three key measures:

- Purchase premiums for the procurement of climate-friendly commercial vehicles.
Added costs incurred compared to diesel trucks are to be subsidised by up to 80 %.
- Managing the development of the necessary refuelling and charging infrastructure for alternatively-operated commercial vehicles.
- Creating suitable regulatory conditions, in particular for differentiating the HGV toll according to CO₂ output of the vehicles.

These measures will make climate-protecting commercial vehicles competitive and increase planning and investment security. Only through joint and targeted action can decarbonisation of road freight transport progress. All relevant actors will be included in the successful implementation of the overall concept. In an initial phase, specific technology projects (like ultrafast charging or hydrogen storage technologies) will be jointly carried out. Larger-scale infrastructure will be developed and used by vehicles with alternative drives. On this basis, successive political decisions on the type and scope of the design of the nationwide development of the appropriate infrastructure of the various technologies could be made together with all stakeholders from 2023 onward.



Funding guideline for the procurement of commercial vehicles with alternative drives

To implement the measures of the Climate Action Programme 2030, the BMVI intends to provide cross-technology funding for the procurement of commercial vehicles with alternative drives (EC vehicle classes N1, N2, N3 as well as special vehicles). A draft guideline agreed in this regard by the ministries requires notification by the EU Commission, which will take place in the first quarter of 2021. Specifically, the funding is intended for battery-electric, fuel cell-based and externally chargeable (hybrid) commercial vehicles. According to the draft of the directive, the technology-related additional investment costs in vehicle and infrastructure procurement and feasibility studies are eligible for funding on a pro rata basis. The guideline was drafted in 2020 and agreed by the federal government. Publication is scheduled for the 2nd quarter of 2021.

FUNDING OF A PILOT PROJECT IN ROAD FREIGHT TRANSPORT



PEM at RWTH Aachen University: “SeLv” project:

In the SeLv project, an electrification kit with an economically efficient production system is being developed for emission-free heavy freight vehicles. The core research objective of the SeLv project is to develop a modular powertrain kit which enables application-specific configurations. The basis for this is the integration of both a fuel cell system and a traction battery in the electric powertrain. The combination of battery and fuel cell should enable heavy trucks to cover long distances for long-haul transport as well as distribution to city limits or linking to rural regions, all with zero emissions. The development focuses on industrialisation of the powertrain production processes, in order to achieve unit-based cost advantages in manufacturing. Business cases for different application areas are to be developed for the overall system, which will serve as germs for growth for a possible widespread use of the electrification kit that is developed.

In order to validate the electrification kit, a total of three heavy trucks are to be built and tested with different power and storage characteristics as primotypes (precursors to an actual prototype stage).

The project was successfully launched in 2020. The notice of funding will be presented at the beginning of 2021. The requirements analysis began successfully for both the overall integration as well as the components of the powertrain. An exchange with potential application partners about use cases was begun in parallel in order to complete the market analysis, on the basis of which the requirements analysis will be completed for the powertrain kits so that the selected use cases can be depicted.

RENEWABLE FUELS

The use of renewable fuels is an important driver of sustainable and climate-friendly transport. They can be manufactured in principle on the basis of biogenic raw materials (biofuels) or renewable electricity (electricity-based fuels).

At present biofuels are largely produced from conventional biomass (e.g. rapeseed) and used in road transport. They are combined with fossil fuels (Diesel B7) and are compatible with the current infrastructure as well as with use in combustion engines. In 2019, the use of biofuels led to a reduction of greenhouse gas emissions of 9.7 million t CO₂-eq. Due to possible competing uses and limited volume potential, a further expansion of the use of conventional biofuels in Germany is not planned. The current debate focuses therefore on the increased use of advanced biofuels. They can be made from agricultural residues (e.g. straw or slurry) or from waste wood and used in the transport sector.

In addition to biofuels, electricity-based fuels can make an important contribution to climate protection in the transport sector. Renewable electrical energy can be used in a water electrolysis facility in order to provide renewable or green hydrogen. Synergies with the electricity sector are exploited so that hydrogen serves as an energy storage system. Using hydrogen in the transport sector lends itself to applications where the battery-electric mobility reaches its limits. Because hydrogen has a very high mass-specific energy density, this relates above all to mobility with heavy loads and high mileages. Conceivable fields of application for rural transport are for example: commercial vehicles, heavy load vehicles, trains and buses that use fuel cell systems or hydrogen combustion engines as their drive technology.

Furthermore, the hydrogen provided can be further processed with carbon dioxide from non-fossil sources to gaseous or liquid fuels. Power-to-X fuels are particularly suitable for aviation and maritime transport, but also for long-distance road freight transport, as using batteries and fuel cells reaches technical limits because of heavy weights and long haul requirements. These modes of transport will therefore still continue to rely on gas or liquid fuels in the long term, meaning that from today's standpoint, power-to-gas and power-to-liquid fuels represent the most important climate protection option in these areas.



The power-to-gas pilot plant
in Falkenhagen produces
green hydrogen

REGULATORY FRAMEWORK CONDITIONS



Monitoring the implementation of the RED II directive into national law

In order to ensure a renewable fuels contribution to climate protection, in 2020 the Renewable Energies Directive (RED II) began implementation into national law. Transport sector implementation is carried out by revising the Federal Immission Control Act (Bundesimmissionsschutzgesetz BImSchG)) and the Federal Immission Control Ordinance (BImSchV)). The core instrument for the transport sector here is the greenhouse gas reduction quota. Companies distributing fuels, such as the mineral oil industry, must adhere to a specified quota, or risk financial penalties. The current draft law provides for a GHG quota of 22 % until 2030. Alongside the direct use of renewable electricity through for example, battery-electric mobility or overhead line applications, the reduction of greenhouse gas emissions in the transport sector can be achieved with renewable fuels. Furthermore, other quotas are being introduced for different fuels. For example, a sub-quota for advanced biofuels from waste and residues for road transport and a sub-quota for blending climate-neutral, synthetic kerosene for aviation are to be introduced.



Monitoring the EEG (Renewable Energy Sources Act) amendment

In December 2020, the amendment to the Renewable Energy Sources Act (Erneuerbare-Energien-Gesetz EEG 2021) was adopted by the federal government. As the key instrument for the construction of more renewable energy plants, the legal amendment is especially important for cutting carbon dioxide emissions, and not only in the electricity sector. Electricity-based fuels can only sustainably contribute to climate protection if the electricity used is produced renewably. Furthermore, the exemption from the EEG levy was adopted for the purchase of electricity for the generation of green hydrogen by means of electrolysis. This is a National Hydrogen Strategy measure and is particularly important for enabling economic business models of green hydrogen provision. This facilitates the market ramp-up of a hydrogen economy.





Wind to hydrogen: The “eFarm” is one of the largest green hydrogen mobility projects in Germany

FUNDING CONCEPT FOR ALTERNATIVE FUELS

The production processes of advanced biofuels and electricity-based fuels are in principle, already at a near-to-market stage, technologically-speaking. There is however, still a need for research and development, particularly in terms of integrating the various manufacturing processes (renewable electricity production, electrolysis, fuel synthesis) and the scaling of the technologies up to industrial levels. Other challenges are the availability of renewable electricity, the provision of CO₂ for the synthesis process as well as the resulting manufacturing costs.

An important next step is therefore to demonstrate the manufacture of electricity-based fuels in (small to) industrial scale in order to prepare the market ramp-up on a larger scale. High levels of initial investment in manufacturing plants are required. The Climate Action Programme 2030 calls the closing of research and development gaps as well as the funding of generating plants for renewable fuels an important measure of the energy transition in transport. By implementing the Climate Action Programme and the National Hydrogen Strategy, experience gathered so far with renewable fuels will grow and funding will increase over the coming years. The planned funding guidelines are in development and comprise funding in the amount of 1.54 billion euros until 2024. Of this 640 million euros will go to the development of alternative fuels for research and development purposes and 900 million euros will go into the generation of alternative fuels.



POWER-TO-LIQUID ROADMAP

Air transport is currently responsible for around 2.8 % of global CO₂ emissions and no other transport mode is growing faster globally. Taking Germany alone, it is calculated that the volume of air passenger transport will grow by 65 % from 2010 to 2030, and for freight by 94 %. Even when air traffic plummeted due to the COVID-19 pandemic, it is expected to increase rapidly after the crisis. Air traffic is currently based almost entirely on fossil kerosene. Through more efficient airplanes and the optimisation of flight paths and operations, fuel consumption can be reduced and the CO₂ footprint of air transport improved. But these measures alone are not sufficient to compensate for the rate of growth and to achieve climate policy goals. The rapid market introduction or market penetration of renewably-produced kerosene therefore lays an important foundation for climate-friendly air transport. In addition to the federal government's planned funding measures, in 2020 a joint roadmap for the market ramp-up of the use of sustainable fuels based on renewable energy sources was drawn up by the federal government, the German states, the aviation industry, the mineral oil industry as well as plant manufacturers and operators. Publication is due at the beginning of 2021.



Power-to-gas-facility in Dresden

SHIPPING



Extension of the LNG funding guideline

The BMVI's funding guideline is being continued with the one year extension of the guideline on grants for the equipping and retrofitting of seagoing vessels to use LNG as a marine fuel. A third funding call is planned for 2021.

LNG burns more cleanly than conventional shipping fuel. In addition to fewer greenhouse gas emissions in LNG-operated ships, which can be reduced still further by using renewably-produced synthetic methane, substantially fewer harmful emissions are caused.

Projects that are funded through the guideline for the equipping and retrofitting of sea vessels for the use of LNG as a marine fuel thus contribute to environmental, climate and health protection.

In addition to funding from the private sector for equipping and retrofitting seagoing vessels, there are diverse new-build projects for LNG-operated, federally-owned vessels being implemented or planned in parallel. The financing of the LNG-related added investment costs from MFS funds for the new build, Atair, as a research ship of the German Federal Maritime and Hydrographic Agency (BSH) was already reported in the 2019 NOW Annual Report.



LNG equipping and retrofitting projects are to be implemented for all ship types

As a result of the first funding call, the new LNG construction of two RoPax ferries from TT-Line and two container feeder ships from Nordic Hamburg as well as the LNG retrofitting of a car and passenger ferry from AG Ems got underway. The new LNG construction of the first of the two "Green RoPax" ferries of the TT Line is already well advanced. Delivery of the first RoPax ferry is due in 2022. The LNG retrofitting of the AG Ems car and passenger ferry "Münsterland" is also very far advanced – the "Münsterland" is expected to already begin operation for the 2021 summer season with the more environmentally-friendly LNG drive.

As a result of the second funding call, further multifaceted projects were approved. The LNG shipping drive of four identical chemical tanker new builds from the John T. Essberger shipyard were funded – the "John T. Essberger", "Liselotte Essberger", "Eberhart Essberger" and "Heinrich Essberger". Furthermore the LNG retrofitting of both cement freighters MS "CemCoaster" and MS "CemClipper" from the shipping company cooperation Brise/Baltrade was approved. Another project supports the LNG new build from the Nordic Hamburg shipyard: the container feeder ship "Nordic Emden". Including the two sister ships, which were already approved in the first funding call, a total of three



Three new special ships with LNG propulsion will be built for the Federal Waterways and Shipping Administration in the coming years

identical LNG-operated container feeder ships were newly built with the assistance of grants from the funding programme.



“BordstromTech” funding programme on environmentally-friendly onboard and mobile shoreside power supply

A new BMVI funding programme was introduced with the guideline on grants for market activation of alternative technologies for the environmentally-friendly onboard power supply and mobile shoreside power supply of seagoing and inland waterway vessels (BordstromTech guideline) of 26 March 2020. The funding is to contribute to reducing pollution caused by shipping emissions, particularly in German seaports and inland ports.

The BordstromTech funding programme provides investment subsidies for the upgrading of seagoing and inland waterway vessels for the use of shoreside power, for generating onboard power from alternative energy sources or for the procurement of mobile (containerised, rolling or swimming) shoreside power systems in sea and inland waterway ports. Eligible recipients of the grants come from both the public and private sector in the shipping and port industry sectors. With the aid of this BMVI funding programme, more environmentally-friendly onboard power is offered competitively and the path to market can be paved for alternative technologies to supply ships with onboard power. The budgetary funds for technology funding also come from the title group for the continuation of the Mobility and Fuels Strategy of the federal government.





The AG Ems ferry "Münsterland" is being converted to environmentally friendly LNG propulsion and will receive a completely new stern in the course of the conversion in the Netherlands



An isometric illustration on a light brown background with a white grid pattern. The illustration depicts a research and monitoring workflow. At the center is a laptop with a document icon on its screen. To its left is a smartphone and a small notepad. To its right is another notepad and a blue car icon on a green base, connected to a charging station. Above the laptop is a tablet displaying three donut charts. Further up and to the right is a 3D bar chart with a green upward-trending arrow. A dotted line connects the tablet to the bar chart. A blue location pin icon is positioned to the right of the laptop. Various geometric shapes, including green and grey squares and rectangles, are scattered around the central elements. White lines with dots at the end connect different parts of the scene, suggesting a network or data flow.

V. ACCOMPANYING RESEARCH AND MONITORING



ACCOMPANYING RESEARCH AND MONITORING

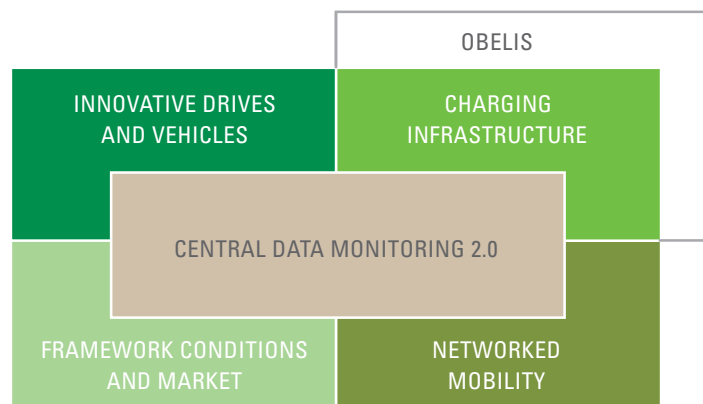
The intensive programme monitoring of the funding measures of the Federal Ministry of Transport and Digital Infrastructure (BMVI) is a key component of successful implementation. Its overarching goal is to provide focused, content-related support to federal programmes and consolidate the results of individual projects. For example, it evaluates the results of the three funding pillars (procurement, concepts and R&D) of the electric mobility funding guideline in order to generate relevant practical results for participating actors and publish for example, guidelines or decision-making aids. Furthermore, regular exchange takes place with participating companies and organisations. Programme support serves therefore as a network for optimising knowledge transfer on the project and programme level. In doing so it builds on four important thematic fields: innovative drives and vehicles, charging infrastructure, framework conditions and market as well as networked mobility.

Part of the programme accompanying research is data collection, processing and analysis in the Central Data Monitoring (ZDM – Zentrales Datenmonitoring). In the charging infrastructure thematic area, this is also supported by data collection in the online reporting platform on charging infrastructure (OBELIS) of the National Centre for Charging Infrastructure (Nationale Leitstelle Ladeinfrastruktur (NLL)). Communication of the results of the accompanying research activities will be consolidated in the electric mobility starter set or presented directly to the relevant players in the thematic area and the municipalities.

In the context of the new electric mobility funding guideline, the issues of programme accompanying research have been adapted to the latest market requirements and from 2021, the four thematic areas will be reorganised for the coming years.



Charging station at the BMVI headquarters, Berlin





“INNOVATIVE DRIVES & VEHICLES” THEMATIC AREA

In recent years the thematic area of innovative drives and vehicles has positioned itself strongly in the local public transport sector, with the programme accompanying research focusing on city buses. The main priorities are data monitoring and evaluating the use of operational electric buses (battery and fuel cell) funded by the BMVI as well as supporting transport companies, including in the Bus and Decision-making working groups. The data capture follows the minimal data set for the collection of research data in electric mobility.

Link to the detailed execution of the minimal data set:

➔ www.now-gmbh.de/en/knowledgefinder/

Based on the real collected and evaluated data, another focus of the accompanying research is the assessment and comparison of different types of drives and infrastructures. The assessment is based on technical, economic, ecological and operational criteria.



NETWORKING IN THE THEMATIC AREA

The Innovative Bus Drive working group – a joint working group of the Federal Ministry of Transport and Digital Infrastructure (BMVI) and the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) – works in parallel to the accompanying research on the topic of climate-friendly bus drives. Bus operators, manufacturers, suppliers and political and municipal representatives usually meet twice a year in the Bus working group. The meetings should take place as far as possible on site at the transport companies in order to integrate specific practical orientation, e.g. visits. Accompanying research supports shaping the content of the meeting and uses it for the presentation and discussion of the latest results and evaluations. In March of 2020, a meeting took place at the Cologne Public Transport Authority (Kölner Verkehrsbetriebe (KVB)) and the Regional Transport Company of Cologne (Regionalverkehr Köln (RVK)) on fuel cells and hydrogen infrastructure. A second meeting was held in December as a web event focussing on battery-electric drives.



PUBLICATIONS

A new edition of the project overview of subsidised electric bus projects was already produced in 2019. In addition to the BMVI-funded projects (from the Electric Mobility programmes, the National Innovation Programme Hydrogen and Fuel Cell Technology (NIP) and the Mobility and Fuels Strategy (MFS)), the brochure contains the BMU projects as well. The print version was published on the occasion of the 11th VDV electric bus conference. The overview is available for download online in the Starter set as a map and as a pdf.

The funding and market overview, also published in 2019, was updated in 2020. Both documents are still available for download in the Starter set.

➤ www.starterset-elektromobilitaet.de/Bausteine/OEPNV/

The planned guide for the electrification of bus fleets was created as a print version in 2020. Publication is planned for early 2021. The web-based version of the guide will have an expanded scope and an interactive decision-making tool for transport companies will be launched in parallel. Publication is also scheduled for the first half of 2021.

Contact partners

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- Scientific management: Dr Michael Faltenbacher, sphaera (formerly thinkstep)

Consortium

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- Ingenieurgruppe IVV, Aachen
- Fraunhofer Institute for Transportation and Infrastructure Systems IVI, Dresden
- hySOLUTIONS GmbH, Hamburg
- VerkehrsConsult Dresden-Berlin GmbH, Dresden
- SEK Consulting, Berlin

guideline, as well as state funding programmes from Brandenburg, Baden-Württemberg and Saxony-Anhalt are also collected. As of 2 February 2021, 1,360 users were registered with OBELIS and 6,000 charging stations with a total of 12,291 charging points were recorded. For these charging points, a total of 2,707,617 charging processes were reported.

The data recorded is used to analyse the development and use of the funded charging infrastructure and flow into the model calculation of the StandortTOOL location tool. Initial analyses of economic efficiency, pricing models and defining capacity utilisation have already been presented at international conferences and specialist trade fairs.

Overview of the subsidised charging infrastructure

State	No. charging stations	No. charging points	Charging processes recorded
Baden-Württemberg	1,239	2,554	648,245
Bavaria	801	1,675	412,866
Berlin	28	38	38,414
Brandenburg	170	335	41,121
Bremen	50	100	57,248
Hamburg	251	503	215,242
Hesse	257	527	142,324
Lower Saxony	773	1,535	223,960
Mecklenburg-Western Pomerania	7	14	4,486
North Rhine-Westphalia	1,009	2,050	464,747
Rhineland-Palatinate	467	959	171,318
Saarland	80	171	22,161
Saxony	270	618	92,044
Saxony-Anhalt	146	288	13,315
Schleswig-Holstein	295	596	104,581
Thuringia	157	328	55,545
Total	6,000	12,291	2,707,617

Data collection via OBELIS, broken down by federal state, as of 02.02.2021

Contact

➤ Coordination of the accompanying research: Stefan Sonntag (NOW GmbH)



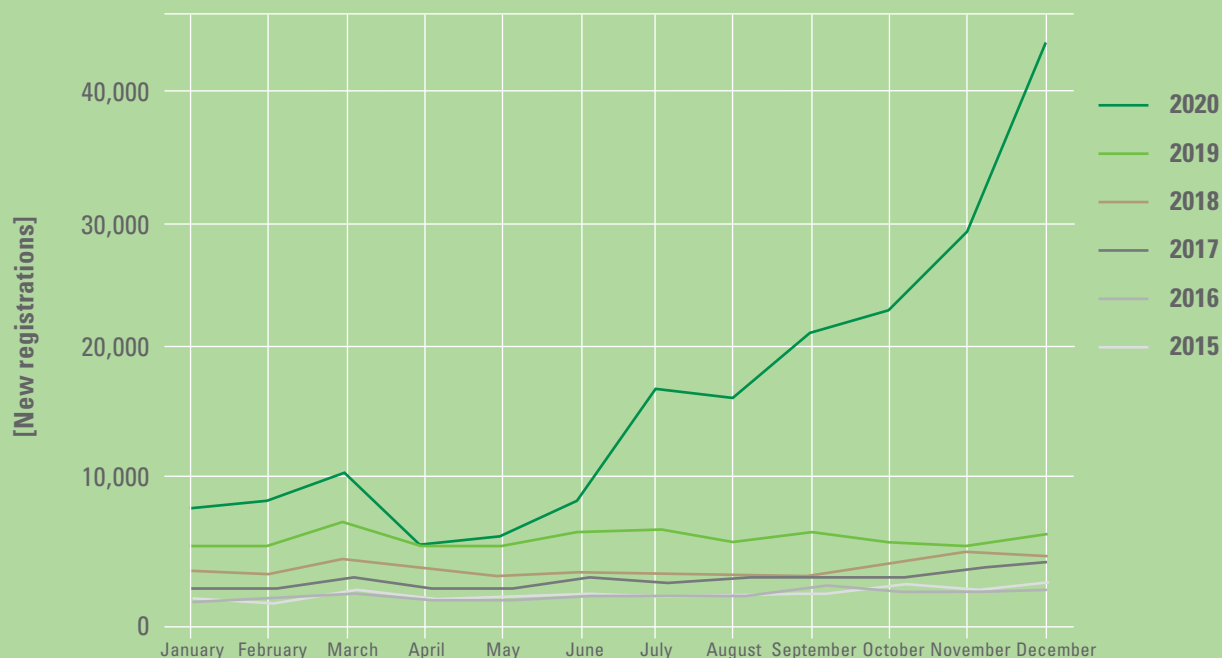
“FRAMEWORK CONDITIONS & MARKET” THEMATIC AREA



DEVELOPMENT OF ELECTRIC MOBILITY IN GERMANY 2020

Although in 2020 new car registrations EU-wide contracted by almost a fifth (–19.1%) and reached a historical low point, in 2020 new registrations for electric vehicles rose to a record high in Germany. While battery-electric new car registrations from 2018 and 2019 contrast slightly positively compared to previous years, with no actual momentum in annual trends, in 2020 there is a considerable increase in newly registered battery-electric cars. Despite the registration low point in April 2020 as a result of the COVID-19 pandemic, BEV registration figures rose sharply over the remainder of the year. This trend continued unabated until the end of the year and reached a record high in December 2020, with 43,671 new car registrations of purely electric vehicles.

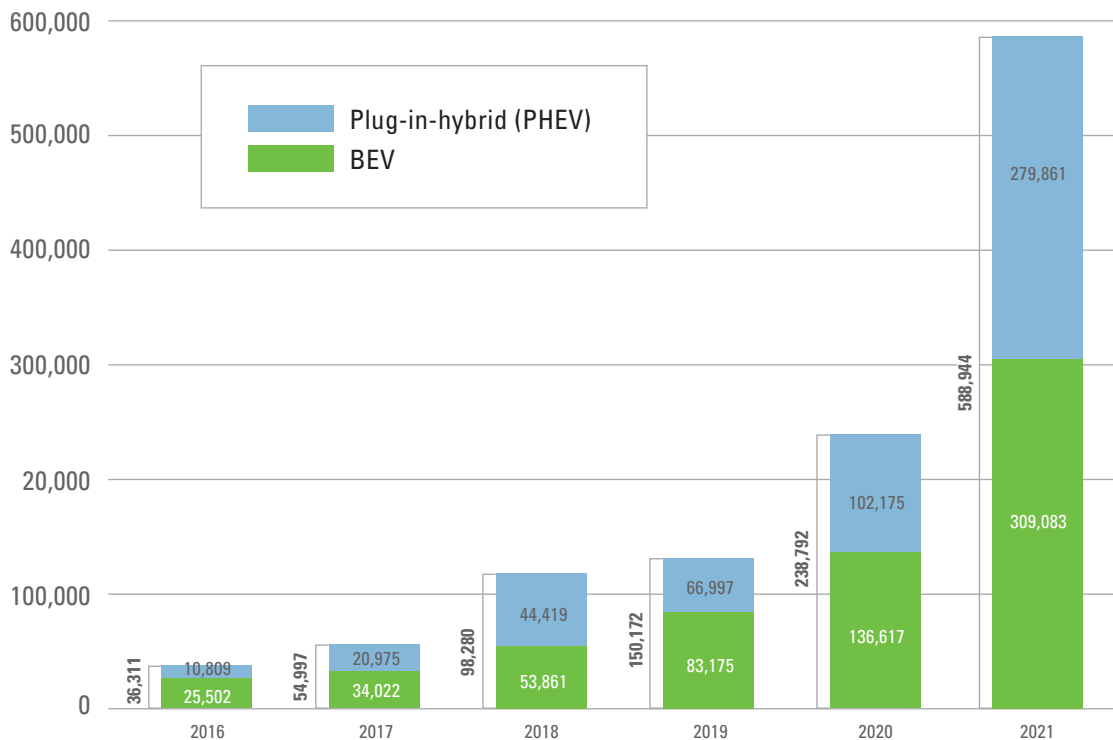
BEV new registrations on an annual basis



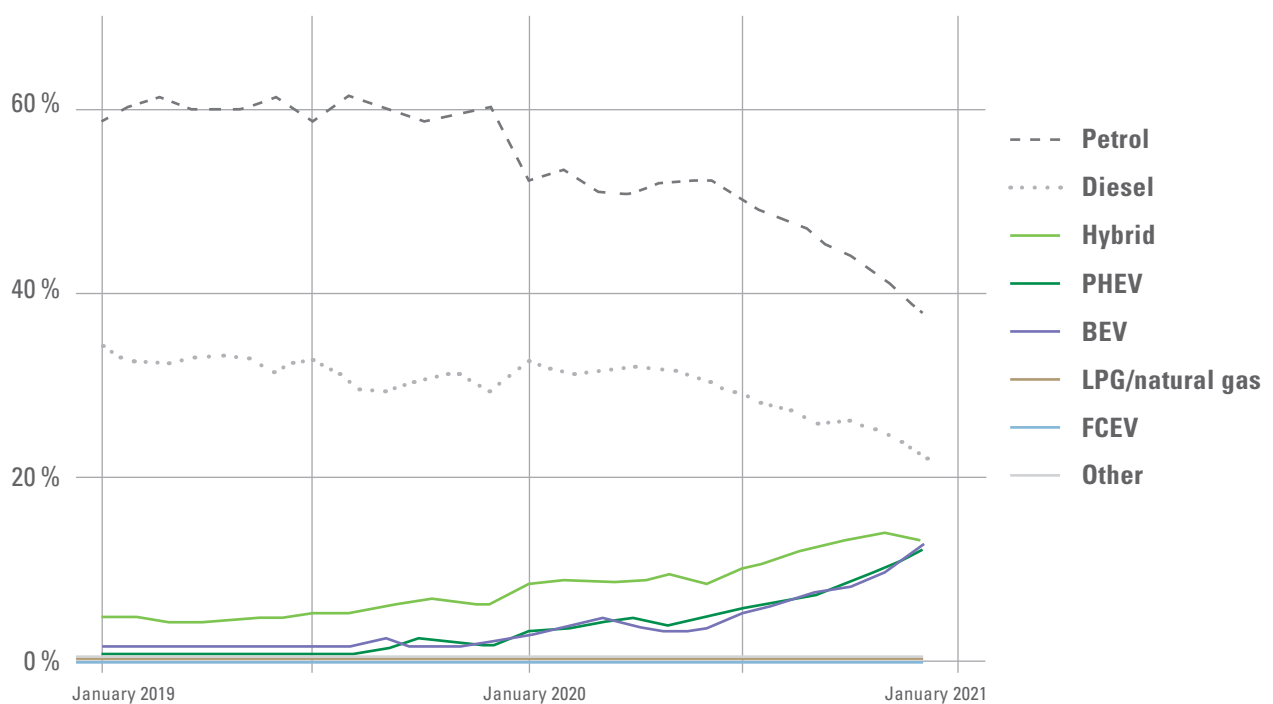
The development of electric, hybrid and plug-in hybrid vehicles can be explained through regulatory, financial, and technological factors such as decreasing investment costs, increased range, the introduction of a CO₂ tax on 1 January 2021, and an expanded range of models. Electric vehicles also benefit from the increase in public charging columns, which can now be charged at approximately 34,000 charging points. Developments between 2019 and 2020 were to the advantage of PHEVs so that the BEV surplus of previous years could be gradually reduced. Nevertheless, the higher BEV market share in December 2020 could be an indication of developments to come.

At the end of 2020, the total stock of electric vehicles was 633,424 (330,780 of which are BEVs and 302,644 PHEVs, excluding FCEVs). Compared to the previous year, this constitutes an increase of 206.8 % in new purely battery-electric vehicles. In terms of PHEVs, there was a rise of 342.1 %.

Annual stock of electric passenger cars (differentiation by type of drive)



The ramp-up of electric mobility in Germany in 2020 is accompanied by a decline in new registrations of conventionally powered passenger cars: the registration numbers decreased by around –28.9 % for diesel passenger cars and even by around –36.3 % for petrol cars. However, this stark decline in the year of the COVID-19 pandemic cannot be explained exclusively by substitution with electric cars. However, the development of market shares provides a very good indication of the extent to which the new registrations of diesel and petrol influence each other. From January 2019 to March 2020, both types of drive lost market share, but partly compensated for this by the decline of market share of the other type of drive. From July 2020 however, conventional types of drive lose significant market share to the benefit of electric, hybrid and plug-in hybrid vehicles.



In total, around 40 new electric vehicle models came onto the market in 2020, almost doubling the model portfolio within a year. The electric car market was primarily dominated by Volkswagen and Renault in 2020, together selling 40% of all new battery-electric cars in Germany. Tesla, Smart and Hyundai together total 25 %. The remaining third of the market was divided between Audi, BMW, Kia, Mercedes, Opel, Peugeot, Nissan, Skoda and others with each a share under 5 %.

After Renault led the field in cumulative new BEV registrations since May 2016 (with Kia leading briefly beforehand), the brand has now been overtaken by VW in May 2020. As of the end of 2020, both brands are clearly dominating the field with approx. 70,000 units (VW) and approx. 60,000 units (Renault). Tesla and Smart and other manufacturers not further defined by the Federal Motor Transport Authority (Kraftfahrt-Bundesamt (KBA) follow with combined approx. 40,000 units.

BEV new registrations by manufacturer

Brand	Registrations	Market share in %
AUDI	8,356	4.3
BMW	8,700	4.5
HYUNDAI	15,941	8.2
KIA	5,909	3.0
MAZDA	3,782	1.9
MERCEDES	4,494	2.3
MINI	4,365	2.2
NISSAN	4,050	2.1
OPEL	6,963	3.6
PEUGEOT	4,008	2.1
PORSCHE	3,203	1.6
RENAULT	31,477	16.2
SEAT	2,149	1.1
SKODA	4,751	2.4
SMART	16,035	8.3
TESLA	16,694	8.6
VW	46,193	23.8
Other	7,093	3.6



TASKS IN THE THEMATIC AREA

The function of this thematic area is explaining and forecasting the above-mentioned dynamics. Therefore the study of the interaction between market development and political and societal framework conditions in terms of electric mobility is the focus of the accompanying research. It analyses and assesses political and regulatory framework conditions in Germany, evaluates specific policy incentive instruments and compares German conditions with those in other countries. It observes and analyses the market development in Germany and selected international markets and highlights the processes and dynamics of market emergence as well as the spread of electric mobility. The accompanying research also pays particular attention to examining procurement processes and the integration of electric vehicles in municipal and commercial fleets. This is because for the foreseeable future, the market ramp-up of electric mobility and the transformation process towards sustainable mobility will continue to depend very significantly on political and regulatory framework conditions.

The results of the accompanying research: "Framework conditions and market" 2016-2019 can be downloaded from the website of NOW GmbH. The new tendering of the accompanying research will be issued at the beginning of 2021 with three priorities:

- 1. Forecast of market development until 2030 and necessary funding requirements**
- 2. Analysis of market development in the area of electric mobility in seven international markets and "lessons learned" for German development**
- 3. Creation of an application and implementation-oriented handbook and establishment of the working group: "Procurement and integration of e-vehicles in fleets" (WG Fleets & electric mobility)**

In this context, the leasing dialogue process initiated by NOW GmbH in the autumn of 2018 was taken into a second phase by policymakers, administrators and the leasing sector in 2020. Leasing is particularly important for the procurement of new vehicles – in 2019 approx. 42 % of newly registered vehicles in Germany were financed through leasing. This is also reflected in the funding programme. On average 50 % of the vehicles approved in procurement funding are applied for by leasing and rental companies. In a special call in 2020 for the procurement of commercial vehicles for tradespeople, as many as 85 % of vehicles were applied for by leasing companies.

As part of the leasing dialogue process coordinated by NOW GmbH with the aid of hySOLUTIONS GmbH, an online event took place in 2020 with representatives of the leasing sector as the kick-off to the continuation of the process.

The aim of the dialogue process was and is to better align funding and leasing practice and thus increase the effectiveness of using state funding. Leasing can, in this way, act as an important driver of the market ramp-up of electric mobility. The primary outcome of the second phase of the leasing dialogue process is the establishment of a leasing roadmap together with the leasing companies. Based on the goals of the federal government, this highlights the politically targeted ramp-up of leased e-vehicles until the year 2030, compares it with product development on the manufacturer's side, identifies the contribution of the sector in relation to market ramp-up and reveals the need for action and control. The measures derived from this will be worked on in detail in two working groups in order to advance a holistic integration of e-vehicles in company fleets. Numerous bilateral discussions and surveys of leasing companies will be conducted for this purpose.

Contact partners

- Coordination of accompanying research:
 - Framework conditions and market: Stefanie Wolff (NOW GmbH)
 - Dialogue process leasing: Juliane Reimer (NOW GmbH).





“NETWORKED MOBILITY” THEMATIC AREA

The focus of the accompanying research: “Networked mobility” (implementation period: 2016 – 2019) lay in the development and expansion of competencies on the municipal level with regard to holistic mobility strategies and relevant measures for implementation. Two intersections were considered key on the subject: on the one hand the inter-linking between different electric mobility applications and their users, and on the other, the interfaces between electric mobility and the energy industry.

As a conclusion to this topic area, in 2020 a brochure on the funding priority of the electric mobility concepts from the first two funding calls was published (Title: “Electric mobility concepts – an instrument for consolidating electric mobility in municipal administrations and companies”). It presents the findings of a survey of 44 funding recipients. The key results of the brochure are published in a data sheet:

➤ www.now-gmbh.de/en/knowledgefinder/

The survey was conducted by ISME GmbH – from the consortium of Fraunhofer Institute for Systems and Innovation Research ISI, EE ENERGY ENGINEERS, and Noerr LLP – and coordinated by NOW GmbH as part of the accompanying research. It contains three key areas of action to determine how electric mobility on the municipal level can be consolidated through the funded concepts and which stabilising influencing factors can be identified.

The areas of action are:

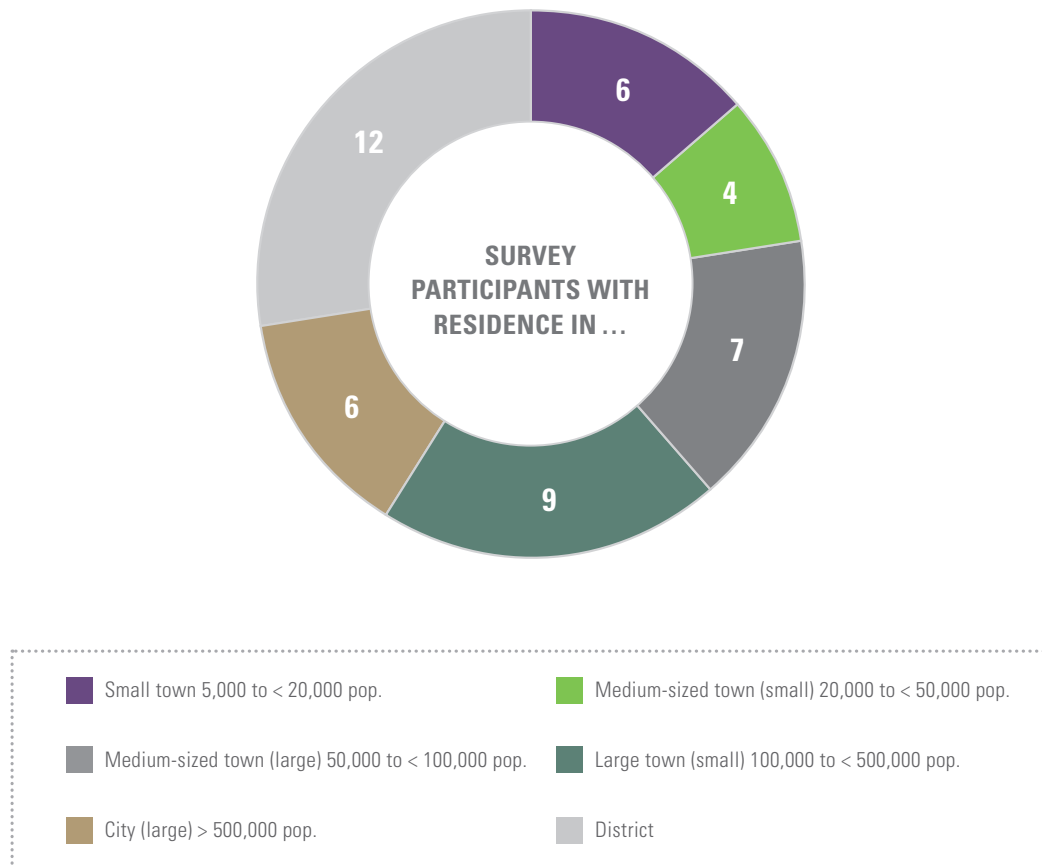
➤ **The electrification of the fleet of municipal administrations and municipal companies**

➤ **Municipal support for electrification of commercial vehicle fleets**

➤ **The development of charging infrastructure**

The participants in the survey are comprised of municipal, district, municipal company and association representatives. The overwhelming majority of participants live in cities, predominantly in small cities with between 100,000 to 500,000 residents (9) and larger cities of over 500,000 residents (6). Those surveyed are second most likely to be located in districts (12). Following closely after are towns – mostly large towns of between 50,000 and 100,000 residents (7) and somewhat fewer in small towns with between 20,000 to under 50,000 residents (4). The least amount of participants came from small towns with between 5,000 to 20,000 residents (6).

Survey participants – city size (n = 24)



The results of the survey will provide an initial, neutral overview of already processed or completed concepts in the funding programme. Overall they demonstrate that the concept funding instrument is in high demand and is ideal for and successful in rolling out electric mobility in municipalities.

The electric mobility concepts are an important instrument for starting with the technology and for thematic consolidation on the municipal level. They cover a wide spectrum of relevant issues. Nevertheless there are gaps in terms of content and the concept creators would like further support on (legal) regulations and framework conditions, concrete practical examples, charging infrastructure issues as well as vehicles. Almost two thirds of those surveyed (64 %) would like specific funding for implementing electric mobility concepts in terms of consolidating measures locally, particularly in the areas of (special) vehicles as well as charging infrastructure.

Stabilisation in the sense of implementing the electric mobility concept is positively influenced overall by permanent contacts or partners, detailed planning and analysis and specific implementation plans. In detail these are:

- Existence of a technical and regional contact
- Conducting a needs assessment for electrification of the fleets as well as for the development of charging infrastructure
- For fleet electrification:
 - Existence of a vehicle fleet manager
 - Conducting a cost analysis
 - Conducting a fleet analysis
 - Creating a procurement plan
 - Staff training
- For the development of charging infrastructure
 - Planning charging infrastructure development in scenarios
 - Involving other municipalities or relevant districts
 - Supporting public charging infrastructure through parking spaces

At 77 %, the majority of those surveyed integrated the electric mobility concept into other municipal concepts and strategies. This clearly demonstrates that electric mobility is justifiably considered a interdisciplinary issue. This is also evident from the anchoring of the contact partner in different departments, like for example, vehicle fleet management.

By integrating the concept into overarching strategies, synergies can be generated and the integration of electric mobility measures can be consolidated. In addition, the electric mobility concept facilitates a greater level of detail and density of implementation.

In summary, the results of the accompanying research in this field so far indicate that the municipal development status of electric mobility can be described as follows:

- Electric mobility has arrived as a topic ready for roll-out on the municipal level in Germany nationwide
- The added value of electric mobility is primarily seen in the area of municipal visibility (also as a locational advantage) and the environmental benefits of its use
- The implementation of the energy transition in transport is still just beginning
- The opportunities of the Electric Mobility Act are still underused
- The legal framework sets the conditions

Priority electric mobility implementation goals that quickly create added value and should be adopted on the municipal level as quickly as possible are:

- Activation of the housing industry in new and existing buildings
- Integration into city logistics
- Sector coupling and the electrification of local public transport in this regard
- Challenges through an insufficient supply in the commercial vehicle sector
- The anchoring of specific measures in municipal strategy papers

The creation of electric mobility concepts will continue to be financially supported in the “Local electric mobility” (Elektromobilität vor Ort) programme and is also anchored in the electric mobility funding guideline newly published at the end of 2020 as a funding instrument. This is linked to the objective of increasing electrification in municipal and commercial fleets as well as designing the charging infrastructure required in a targeted manner. There is also the need to link up with other funding guidelines, especially in the area of commercial vehicles, buses and charging infrastructure, which also include concept funding.

In 2021 there will be a restructuring of accompanying research. The goal is to continue to create an attractive custom-made service that supports the work of municipal actors in a way that is practically relevant.

Contact

- Coordination for Accompanying Research: Silke Wilhelm, Juliane Reimer (NOW GmbH)





ZDM 2.0 – ELECTRIC MOBILITY DATA SERVICE (MONITORING AND ANALYSIS)

The BMVI commissioned the NOW GmbH in 2020 with taking over the Central Data Monitoring (ZDM) in the electric mobility funding programme. The objectives were on the one hand, to take over the existing data stock and its periphery from the previous service provider (Ingenieurgesellschaft IVV) and transpose it into an own (internal NOW GmbH) data architecture, and on the other, to considerably expand the usability and scope of ZDM. Along with collecting programme data, real driving and charging data from funded e-vehicles (e.g. via data loggers), the collection and evaluation of master and operational data from the funding projects as well as the evaluation of the nationwide registration numbers, ZDM 2.0 will also tap into and analyse other data sources. The goal of ZDM 2.0 is to be able to support and evaluate the programme implementation and market ramp-up of electric mobility in a broader and more well-founded way. This should strengthen the key functions of NOW GmbH – advising the BMVI and optimising the implementation and further development of funding programmes. Furthermore, the ZDM 2.0 offers the possibility of making a broader range of information available to the interested public on the topic of electric mobility.

In 2020, different options for the technical implementation of ZDM 2.0 were prepared in consultation with all participating partners and staff, and requirements for cybersecurity, data protection and compliance, access and authorisation management, cost-effectiveness and connectivity and scalability were evaluated. Finally a proof-of-concept established in a pilot phase showed that the necessary infrastructure can be mapped with a serverless architecture using several public cloud services. ZDM thus offers not only optimal connectivity and scalability, but also achieves a very high quality of data work with quality features such as data location in Germany, compliance with GDPR, C5 criteria catalogue and cybersecurity standards such as high economic efficiency and environmental compatibility.

At the beginning of 2021, all data including peripherals were fully migrated to the new infrastructure of NOW GmbH. The ZDM 2.0 also continuously and automatically imports the latest data from public third sources. As the central data service for questions about electric mobility, the ZDM 2.0 provides high-level analyses, insights, data and data tools for internal and external bodies.

Contact

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