Annual Report **2018**

NOW

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NOW – Annual Report **2018**

FOREWORD BY FEDERAL MINISTER ANDREAS SCHEUER MDB

Electric power is one of the most important fuels of the future, whether it is stored in batteries or generated from hydrogen in a fuel cell. There is no doubt about it. E-mobility can help us achieve three key transport objectives: we can reduce CO_2 emissions and thus meet the objectives set out in the Climate Action Plan. We can reduce emissions of nitrogen oxides (NO_x) and particulate matter and at the same time reduce traffic noise.

The question now is: how soon will e-mobility come? How soon can we switch to electric refuse trucks and battery-powered taxis? How soon will all package delivery vehicles in urban areas have an electric drivetrain? How soon can we make families bring their children to the daycare centres in an electric estate car?

The Federal Government has set itself a goal: as soon as possible! For this reason, we have been promoting electric mobility and alternative drivetrains for many years. To be more precise, we have made available 5.2 billion euros since 2009.

It is our joint responsibility: Federal Government, federal states, local authorities, businesses, associations and academia. E-mobility is team work. However, so far, it has not been tangible and visible enough. There are not enough charging stations, and there are not enough electric vehicle fleets, be it taxis, police or refuse collection vehicles. We also need vehicles that are fit for everyday use, fun to drive and, above all, inexpensive so that everybody can afford them. What we need is the same effect the original Volkswagen Beetle had on the mobility of the masses; this time, however triggered by an electric vehicle.

The Federal Government's responsibility is to create the necessary legal, financial and technical frameworks. The National Organization for Hydrogen and Fuel Cell Technology (NOW) was established by the Federal Government as a vital institution for the coordination of our technology neutral measures. You will find an overview of our joint achievements in this annual report.

The deployment of charging points is one part of it. 3,000 quick charging points and 13,000 standard charging points are currently being deployed. In addition, the government coalition has set itself the objective of deploying at least an additional 100,000 charging points for electric vehicles by 2020. A lot has happened in the past two years in the field of hydrogen, too. There are now around 60 filling stations throughout Germany.

We are providing financial assistance for the procurement of electric vehicles and the necessary charging infrastructure in the local authority context. This is what the Federal Government funding programme "electric mobility at the local level" stands for: bringing alternative drivetrains to the people in the regions. We have exempted electric vehicles from tax, compensated for disadvantages in company car taxation and allowed local authorities to provide dedicated lanes and parking spaces for electric vehicles.

The success story of the first National Hydrogen and Fuel Cell Technology Innovation Programme (NIP) goes on with the transformation of the existing National Platform for Electric Mobility into a platform for the future of mobility. Together with industry, we will develop efficient, climate-friendly and affordable mobility. Among other things, we want to support industry in setting up the whole value-added chain of electric mobility in Germany.

I am convinced that the future belongs to alternative drivetrains. Standing at the forefront, Germany has the unique opportunity to make products and strategies for clean air and low emissions a worldwide export hit.

Yours,

Andreas Scheuer, Member of the German Bundestag
Federal Minister of Transport and
Digital Infrastructure

FOREWORD BY DR. KLAUS BONHOFF

10 YEARS NOW – SPECIALISTS FOR SUSTAINABILITY IN ENERGY AND TRANSPORT

2018 was an anniversary year for NOW. It has been ten years since we commenced supporting the introduction of clean, sustainable mobility and energy supply at the interface of politics, industry and science. In the spotlight: national strategies and public-private programmes in the field of sustainable drive technologies. This especially encompasses electric mobility with fuel cells and batteries but also natural gas and electricity-based fuels as well as the introduction and market ramp-up of fuel cell technology in the stationary sector.

NOW was founded by the German government on 18 February 2008 as a Programme Management Association to coordinate funding under the National Innovation Programme Hydrogen and Fuel Cell Technology (NIP). It was established as a neutral, driving force at the interface between public and private stakeholders and was charged with the task of bundling activities and ensuring the overall implementation of the funding programme. This first phase – NIP 1 – concluded in 2016. With a total investment volume of

IT HAS BEEN TEN YEARS SINCE WE COMMENCED SUPPORTING THE INTRODUCTION OF CLEAN, SUSTAINABLE MOBILITY AND ENERGY SUPPLY AT THE INTERFACE OF POLITICS, INDUSTRY AND SCIENCE.

1.4 billion euros as well as the support of four federal ministries, NIP 1 helped create an industry comprising some 500 players, from which products from key application areas in the stationary and mobile sectors made the step into the commercial market possible. In late 2017, the federal government resolved to continue the NIP programme and thus confirmed NOW as the Programme Management Association for a further ten-year period. The portfolio of NOW GmbH has expanded considerably since its inception ten years ago. And that is no surprise given that for the energy transition to succeed, different technologies and infrastructure types must complement each other and must not – at least in the early stages – be in competition with each other.

Based on the funding programmes of the Federal Ministry of Transport and Digital Infrastructure (BMVI – Bundesministerium für Verkehr und digitale Infrastruktur), we today coordinate a diverse range of activities including:

- Procurement programmes for electric mobility with batteries and fuel cells, in particular for municipalities and commercial fleets, which then serve the purpose of opening additional doors
- The development of a customer-oriented national charging infrastructure and a demand-oriented hydrogen filling station network; both as the basis for a rapid expansion of electric mobility
- Research and development programmes in these technology areas with a focus on systemic testing and validation in a day-to-day environment

- The implementation of the mobility and fuels strategy, which among other things supports the conversion of seagoing vessels to drive systems with liquid natural gas, but also focuses on sustainable heavy commercial transport operations

- Accompanying studies to validate the findings and to develop the programmes further

- Since 2018, we have also been examining the potential of hydrogen and fuel cell technology for emerging and developing countries on behalf of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU – Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit), as well as opportunities for cooperation between Germany and Japan in the field of power-to-gas technology as part of the Environmental Technologies Export Initiative

The rise of alternative drives has commenced, not least due to the support provided in recent years by the BMVI programmes for climate protection. Mobility with alternative drives and electricity-based fuels is a reality on the roads, on rail and on the water; the corresponding refuelling and charging infrastructures are being expanded; the number of companies engaged in electric mobility is increasing.

Dr. Klaus Bonhoff, Managing Director (Chair) of NOW GmbH, and Wolfgang Axthammer, Managing Director of NOW GmbH – responsible for the commercial management of the company and Divisional Head of the Special Markets programme area

We are on the right track overall, but the real challenge still lies ahead of us. If we have the CO_2 target for 2030 in mind, the ramp-up of zero-emission vehicles must be significantly accelerated. We now have to make the necessary adjustments to the existing market structures and to the technical and regulatory framework conditions for these increasing volume levels, as quickly as possible.

HYDROGEN TECHNOLOGY PLAYS AN IMPORTANT ROLE IN THE TRANSITION TO ELECTRICITY-BASED FUELS AND THE TARGETED EXPANSION OF THE ENERGY SYSTEM ON THE BASIS OF RENEWABLE ENERGIES.

It serves as a link between the power, transport and heating sectors. Their development is systemically relevant and crucial for sector coupling. In order to raise awareness regarding these interrelationships, we will commence support for hydrogen regions in Germany in 2019. The regional funding model has already proven its value in the implementation of electric mobility. Similarly, the integration of hydrogen as a source of energy in all sectors will be demonstrated in selected regions.

The energy transition as well as the transition occuring in the area of drive technologies are complex processes. In 2008, NOW GmbH set out to coordinate the implementation of this multifaceted issue from a single source in order to avoid duplication and exploit synergies. And to this day, networking across sectors, the programmatic evaluation of project ideas as the basis for target-oriented public funding, the accompanying analysis and monitoring of developments, the further development of programme content, international cooperation as well as the coordination of the diverse range of activities remain the key factors for the successful implementation of efficient and effective programmes.

Yours sincerely,

Dr. Klaus Bonhoff
Managing Director (Chair), NOW GmbH

ABOUT NOW

SHAPING AND MODERATING AT THE INTERFACE OF POLITICS, INDUSTRY AND SCIENCE

NOW GmbH National Organisation Hydrogen and Fuel Cell Technology is responsible for the coordination and management of the federal government's National Innovation Programme Hydrogen and Fuel Cell Technology (NIP) as well as the Federal Ministry of Transport and Digital Infrastructure (BMVI – Bundesministerium für Verkehr und digitale Infrastruktur) funding guidelines for electric mobility and recharging infrastructure.

On behalf of the BMVI, NOW also supports the further development of the Mobility and Fuel Strategy (MFS, German: MKS – Mobilitäts- und Kraftstoffstrategie), as well as the implementation of EU Directive 2014/94/EU on the development of an alternative fuel infrastructure. NOW supports the continuation of MFS and the implementation of concrete support measures. This includes the technical evaluation of pilot projects, the (further) development of promotional measures, including support for the implementation of the AFID, and generally advising the BMVI on matters of content.

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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" (German: Export-initiative Umwelttechnologien) in the field of hydrogen and fuel cell technology, as well as the German-Japanese cooperation in the area of power-to-gas technology.

NOW GmbH initiates projects, evaluates proposals and bundles issues in such a way that synergy effects can be exploited. Furthermore, NOW also undertakes interdisciplinary tasks. These include topics such as the advancement of international collaborations, education and training, communication at the interface of politics, industry and science as well as public relations in order to increase overall awareness of the technologies and their perspectives.

The NOW NIP team

NATIONAL INNOVATION PROGRAMME HYDROGEN AND FUEL CELL TECHNOLOGY (NIP)

The German government has supported the market preparation of hydrogen and fuel cell technology with the NIP since 2006. With the Hydrogen and Fuel Cell Technology 2016 to 2026 government programme, the inter-ministerial NIP ensures continuity for research and development and addresses the need to support initial products in order to activate the market.

The NIP is implemented via relevant measures by the federal ministries involved. For the period 2016 – 2022, the Federal Ministry of Transport and Digital Infrastructure (BMVI – Bundesministerium für Verkehr und digitale Infrastruktur) will initially invest 480 million euros to support hydrogen and fuel cell technology. With the funding guidelines "Measures for research, development and innovation" and "Measures for market activation within the framework of the National Innovation Programme Hydrogen and Fuel Cell Technology Phase 2 (Emphasis on Sustainable Mobility)", the BMVI supports the development of products that are technically market-ready but not yet competitive in the market ramp-up phase.

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

The Federal Ministry for Economic Affairs and Energy (BMWi – Bundesministerium für Wirtschaft und Energie) is continuing its support for hydrogen and fuel cell technology in the field of applied research and development as part of the 7th Energy Research Programme with an annual budget of around 25 million euros. In 2016, the BMWi also launched a support programme for the purchase of fuel cell heating systems for private customers as part of the National Energy Efficiency Action Plan (NAPE – Nationalen Aktionsplan Energieeffizienz).

As in the first phase of the NIP, the German federal ministries for the environment as well as for education and research will continue to be actively involved in the strategic shaping of the NIP via the structures of NOW GmbH.

BMVI funding 2017 – 2018

AREA	FUNDING [€]
R&D	89,655,765
Market activation	85,419,232
Studies	2,277,069
Cluster management	345,524
Total	**177,697,590**

BMWi funding 2017 – 2018

AREA	FUNDING [€]
Transport	18,903,782
Interdisciplinary	9,123,677
Industry	7,603,264
Household energy	2,835,786
Special markets	1,537,597
Hydrogen production	1,333,231
Total	**41,337,337**

BMWi funding 2016 – 2018

AREA	FUNDING [€]
Fuel cell heating systems market ramp-up (NAPE)	approx. 87,000,000

The NOW Charging Infrastructure team

CHARGING INFRASTRUCTURE FOR ELECTRIC VEHICLES FUNDING GUIDELINE

One of the essential criteria for achieving the energy and climate protection policy goals of the German government is the switch of the energy source predominantly used in transport to that of electricity from renewable sources in conjunction with innovative drive technologies. Electric mobility is a fundamental prerequisite for accomplishing this and a decisive factor for realising the energy transition targets.

With the charging infrastructure funding guideline (Förderrichtlinie Ladeinfrastruktur), the federal government seeks to initiate the establishment of a comprehensive and user-friendly network of charging infrastructure so that electric vehicle users can recharge quickly and easily anywhere in Germany. The main purpose of the funding guideline is therefore to establish a fast charging infrastructure. In addition, the further expansion of the normal charging infrastructure is to be supported in order to meet customer needs according to driving and parking behaviour (e.g. overnight charging of e-vehicles by residents of apartment buildings without a garage in the city, car sharing, recharging during visits to department stores, restaurants, cinemas, etc.). The aim is to install at least 15,000 charging stations by 2020, for which the German government is allocating 300 million euros from 2017 to 2020. Private investors as well as cities and municipalities are supported.

Federal Ministry
of Transport and
Digital Infrastructure

The BMVI's federal charging infrastructure programme is experiencing great demand. More than 3,000 applications for funding were received in the first two funding calls. So far, applications have been approved for a total of 15,803 charging points, of which 13,473 are normal charging points and 2,330 are fast charging points. This corresponds to a funding volume of more than 76 million euros. As a result, the number of existing charging points has more than doubled. The third funding call was published on 19.11.2018. From 22.11.2018 to 21.02.2019, funding applications can again be submitted for publicly accessible charging stations.

Approved normal (NCP) and fast charging points (FCP) in the federal funding programme for charging infrastructure

	Approved		In operation	
	NCP	FCP	NCP	FCP
Baden-Wuerttemberg	2,395	459	78	33
Bavaria	1,961	452	265	15
Berlin	34	21	-	-
Brandenburg	311	44	39	2
Bremen	73	34	2	2
Hamburg	558	63	4	1
Hesse	543	142	48	7
Mecklenburg-Western Pomerania	130	29	14	-
Lower Saxony	1,430	184	112	10
North Rhine-Westphalia	3,477	349	142	17
Rhineland-Palatinate	742	200	22	3
Saarland	110	19	2	-
Saxony	510	71	27	8
Saxony-Anhalt	207	77	6	-
Schleswig-Holstein	590	50	41	7
Thuringia	255	64	83	29
Total	**13,326**	**2,258**	**885**	**134**

The NOW Electric Mobility team

LOCAL ELECTRIC MOBILITY

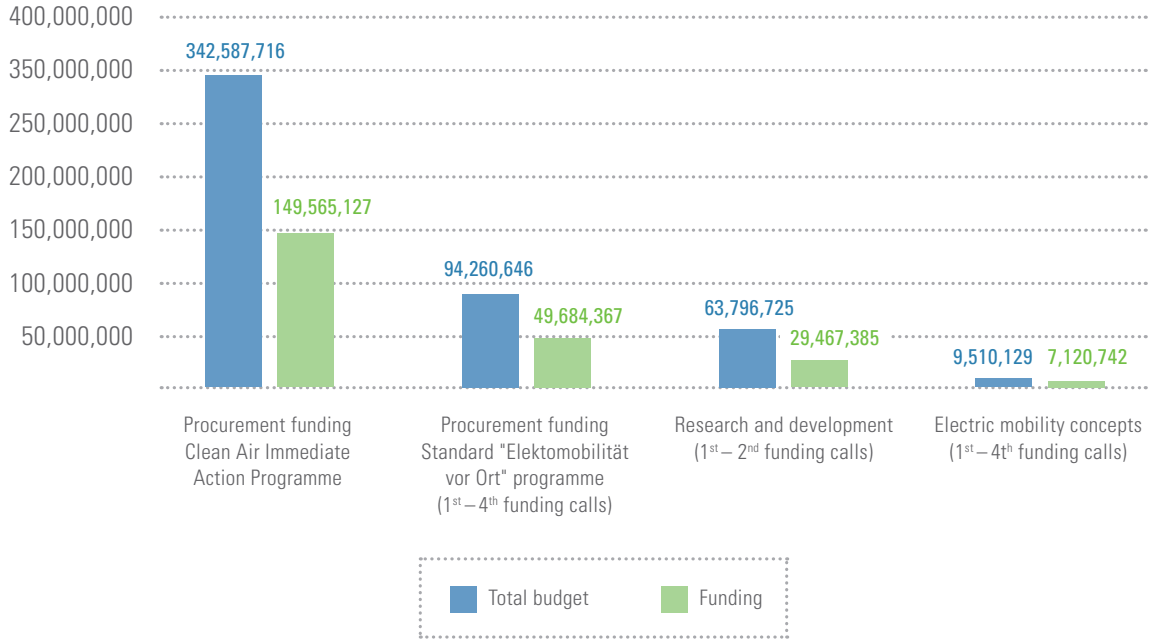
With its “Electromobility vor Ort” funding programme for local electric mobility (BMVI Funding Guideline), the German Federal Ministry of Transport and Digital Infrastructure (BMVI – Bundesministerium für Verkehr und digitale Infrastruktur) supports interdisciplinary cooperation between industry, science and the public sector, in order to promote electric mobility becoming firmly established in everyday life.

The BMVI provides funding for the procurement of electric vehicles and the associated charging infrastructure required for their operation, via the funding guideline outlined above. Funding is available for municipal fleets, vehicles and charging infrastructure used in a municipal context and for the development of application-oriented municipal electric mobility concepts. The implementation of the procurement support occurs within the "Clean Air Immediate Action Programme 2017–2020" (Sofortprogramm saubere Luft) and as part of the standard "Elektomobilität vor Ort" programme for local electric mobility. Concept funding is aimed in particular at municipalities that do not receive support for the "Clean Air Immediate Action Programme 2017–2020" master plans. In addition to this form of investment funding, the ministry also supports research and development on key issues of electric mobility that are open to technology and modes of transport. Together with the BMVI programme's overarching accompanying research (which is coordinated by NOW), findings can thereby be gained and processed at the level of the funding programme. In addition, it is possible to respond specifically to market requirements within the programme (e.g. in the form of annual funding calls).

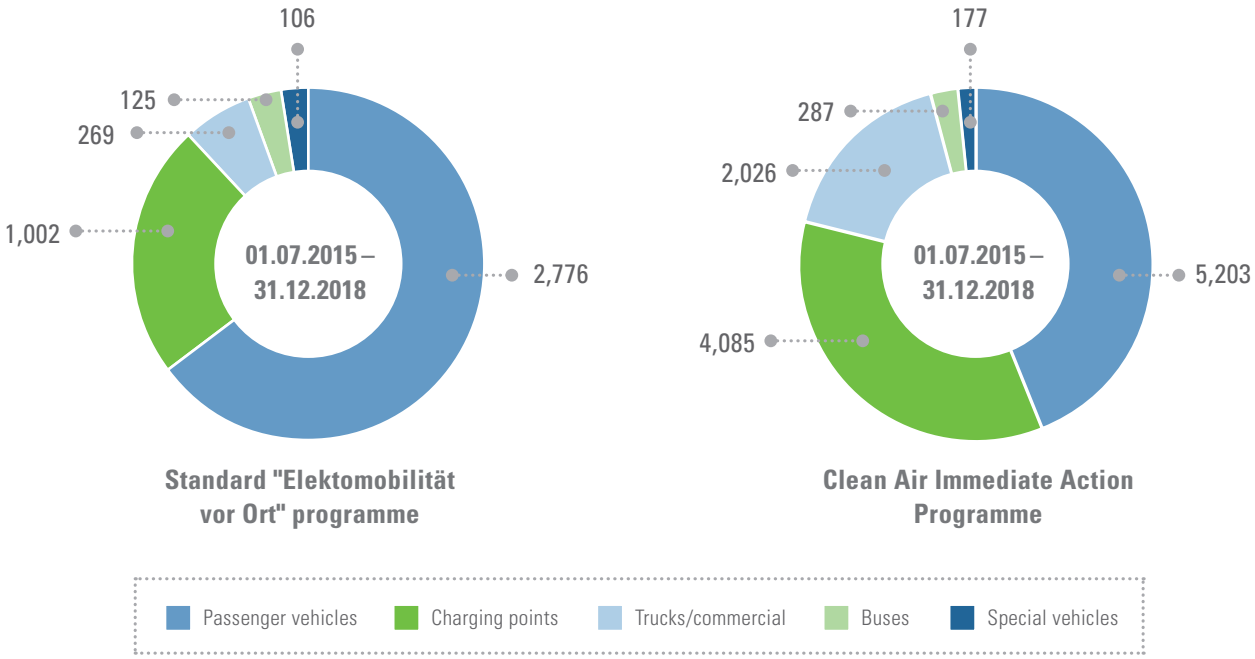
Elektromobilität vor Ort

Federal Ministry of Transport and Digital Infrastructure

Budget overview (cumulative) of. electric mobility funding guideline projects (01.07.2015 – 31.12.2018)



Procurement of vehicles and infrastructure (market activation)



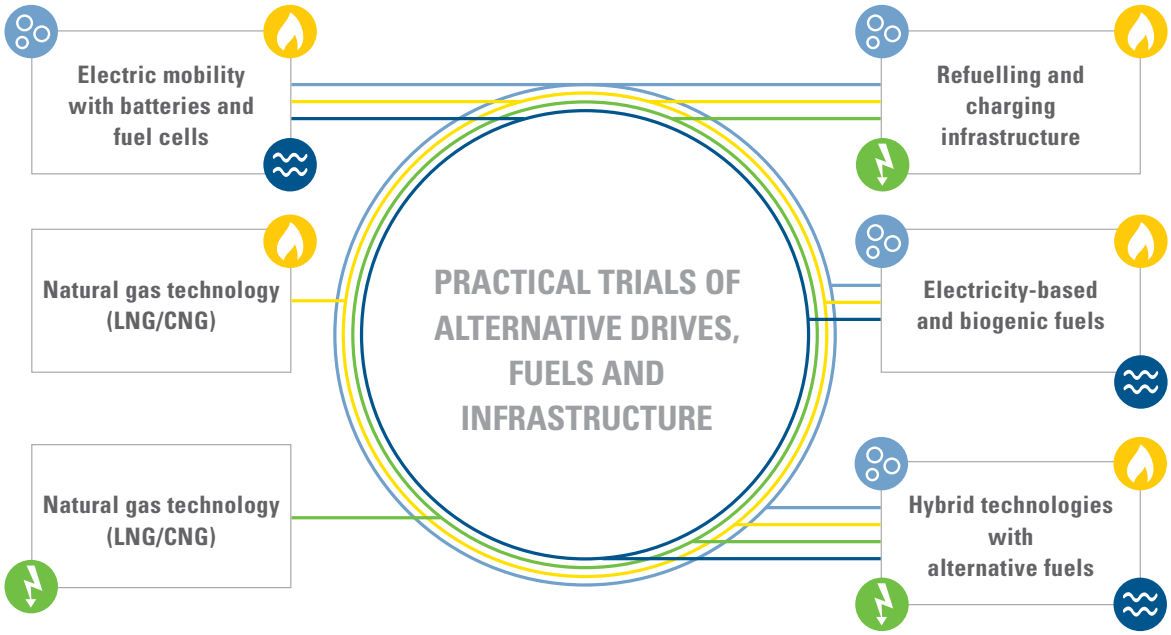
The NOW Electricity-based Fuels team

MOBILITY AND FUELS STRATEGY

The federal government's Mobility and Fuels Strategy (MFS; in German: Mobilitäts- und Kraftstoffstrategie – MKS) represents the central platform for shaping the energy transition in the area of transport and thus for achieving the energy and climate protection policy goals. The NOW has been assigned with the task of supporting the BMVI in the further development of the MFS and to accompany the implementation of specific support measures, such as the funding programme for equipping and retrofitting seagoing vessels for the use of LNG as a marine fuel and for the promotion of pilot projects.

NOW has already supported the BMVI in the past with the implementation of the 2014/94/EU Alternative Fuels Infrastructure Directive (AFID) as well as with issues of international cooperation in the field of alternative fuels and drives. In this context, the National Strategic Framework (Nationale Strategierahmen) was established as the German AFID implementation in 2016. It depicts the status, objectives and measures for the development of infrastructure for electricity, hydrogen and natural gas in the transport sector. Support from the BMVI for further AFID implementation and in the area of international cooperation will continue.

Federal Ministry
of Transport and
Digital Infrastructure



The NOW International Cooperation team

INTERNATIONAL COOPERATION 2018

The growing momentum in the field of sustainable mobility and integrated energy systems also became apparent in the international context in 2018. With market maturity having been reached in recent years, the focus has shifted to market entry and the market ramp-up of sustainable mobility and energy technologies. Particularly in the field of hydrogen and fuel cell technology, clear signals were set at the international level. With two multinational declarations, the Tokyo Statement and the Linz Hydrogen Declaration, the participating nations agreed on a common approach for establishing the technology. Hydrogen technology addresses potentials that can contribute to the decarbonisation of the global energy system beyond the transport sector. Japan and the European Union continue to play a leading role here. But China is also sending out clear signals in the direction of hydrogen technology. The task now is to bundle these activities in order to enable a targeted and efficient introduction of the technology. NOW GmbH is actively involved in this process with its International Cooperation area division, and also continues to be extensively engaged in the field of battery electric mobility on an international level..

Hydrogen technology addresses potentials that can contribute to the decarbonisation of the global energy system beyond the transport sector.

The developments in industrialised countries are necessary to enable economies of scale to be achieved and consequently enable the technology to enter the market. Nevertheless, efforts are also needed to transfer these concepts to other countries in order to enable the early integration of innovative and sustainable technology in the establishment of new infrastructure, such as in emerging and developing countries. On behalf of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU – Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit), NOW GmbH is working on and supporting this process. Here, too, it is important to support the technical implementation of hydrogen and fuel cell technology as well as the establishment of the appropriate framework conditions. This process is initiated and coordinated by international networks in political, industrial and scientific contexts. To this end, NOW GmbH has entered into a cooperation with the German Society for International Cooperation (GIZ – Deutsche Gesellschaft für Internationale Zusammenarbeit).

EUROPE

The increasing interest in hydrogen technology is reflected at the European level by the Linz Hydrogen Initiative. This was signed at an informal meeting of energy ministers in Linz in September. In the declaration, member states emphasised the need to establish hydrogen technologies in order to achieve climate targets, increase energy security and reduce their dependence on fossil energy imports. It was jointly agreed to intensify aspirations and efforts in research and development as well as for market activation in the following areas: sector coupling, short and long-term storage, industrial applications, feed-in to the gas network as well as production of renewable methane along with the development of the necessary refuelling infrastructure for higher levels of demand.

A first area of application for water electrolysis for the production of hydrogen from renewable energies on a multi-megawatt scale could arise in the refinery sector. The foundations have been laid in the revised Renewable Energy Directive (REDII) of the European Union. Under REDII, 14 % of the fuel sold should be of renewable origin by 2030. This represents an incentive to use renewable electricity and electricity-based fuels. Green hydrogen, which is used in the process of producing conventional fuels, can also be counted here. To this end, hydrogen from fossil sources is substituted in the production process of conventional fuels, resulting in a direct reduction of greenhouse gases. With REDII coming into force in 2021, water electrolysis technology is expected to ramp up in this industrial environment. NOW GmbH has actively accompanied and supported the REDII process at the European level.

The support agreement for the Programme Support Action (PSA) on data collection on alternative fuel infrastructure and the allocation of e-mobility IDs was signed in December 2018 by the Netherlands on behalf of all other 14 participating member states, allowing the project to commence in January 2019. The aim of the PSA is to strengthen consumer confidence in alternative drive systems and the corresponding fuel infrastructure and to facilitate their wider use.

Part of the National Strategy Framework evaluation was the intergovernmental cooperation of member states, which in the case of Germany takes place through the Government Support Group (GSG), whose secretariat is run by NOW in cooperation with the Dutch Rijkswaterstaat.

ASIA

Japan

With the Tokyo Statement Hydrogen, Japan was able to take an important political step towards achieving a global hydrogen economy. At a ministerial meeting in October 2018, 21 countries signed the Tokyo Statement highlighting the need for global cooperation in the field of hydrogen technology. The cooperation covers various topics such as standardisation, research and development, potential analyses and educational programmes. The role of existing global initiatives such as IPHE, IEA and Mission Innovation will also be strengthened. The successful format of the ministerial meeting is now to be repeated annually.

Japan continues to be one of Germany's most important partners in promoting hydrogen and fuel cell technology in an international context. With the update of the Memorandum of Understanding between NEDO and NOW GmbH to include the key topic of power-to-gas, the cooperation has expanded. With this expansion, the formal framework is created for the German-Japanese power-to-gas cooperation projects envisaged in the context of the export initiative. In addition to the formal requirements, the preparation of project concepts was supported through advisory talks with German industrial partners and an evaluation of Japanese interests.

China

In the wake of the impressive development in battery electric mobility, China's interest in hydrogen and fuel cell technology is also growing. Here, in addition to mobility, topics in the energy sector will also be addressed. Due to the highly dynamic nature of the Chinese market, China is becoming increasingly important as a partner in the field of hydrogen technology.

In this context, the establishment of the Sino German Electro Mobility Innovation and Support Center (SGEC) continued to be driven forward in 2018. The SGEC deals with the topics of battery electric mobility, intensifying scientific exchange and establishing a partnership in the field of hydrogen and fuel cell technology with a focus on the transport sector while also initiating German-Chinese projects. These are open to all national partners and are initially arranged according to four thematic areas: battery electric mobility, electric mobility with hydrogen fuel cells, safety (battery and hydrogen) and the integration of renewable energies. At the end of the year, the first project ideas were presented which focus on research projects with German-Chinese cooperation. The SGEC will be implemented by the China Automotive Technology & Research Center (CATARC) and NOW GmbH.

MULTILATERAL COOPERATION

IPHE

The International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE) is a consortium of 18 member states plus the European Commission with the aim of accompanying and advancing the commercialisation of hydrogen and fuel cell technologies. German representation in the IPHE is provided by the BMVI with NOW as the coordinating body. The Permanent Secretariat Office (PSO) of the IPHE, established in 2015, is now fully operational and is proving its worth.

Alongside the half-yearly Steering Committee Meetings, other formats for an active exchange with various target groups take place on a regular basis. For instance, the current political developments are discussed with business partners in industry forums.The topic of hydrogen and fuel cell technology is also discussed with students and researchers from various disciplines at regular educational events.

Further information at ↗ www.iphe.net

IEA Hydrogen Implementing Agreement

NOW supports the Executive Committee of the International Energy Agency Hydrogen Implementing Agreement (IEA HIA) and is actively involved in shaping the IEA HIA content. The IEA HIA brings together scientists and researchers from all over the world to discuss joint research projects on hydrogen and fuel cell topics. The platform provides a good basis to gain an overview of current global research activities and to establish and maintain valuable connections to the IEA and other countries.

An overview of the current task packages can be found at €
↗ http://ieahia.org

Mission Innovation – Innovation Challenge 8

The Mission Innovation initiative pursues the goal of doubling the amount of research spending by the 23 EU member states and the European Union on clean energy solutions. The topics are split into eight so-called Innovation Challenges. These include Smart Grids, Off-grid Access to Electricity, Carbon Capture, Sustainable Biofuels, Converting Sunlight, Clean Energy Materials, Affordable Heating and Cooling of Buildings, and Renewable Clean Hydrogen.

In May 2018, the Mission Innovation Ministerial Meeting launched the eighth challenge, Renewable Clean Hydrogen. The aim of the project is to accelerate the development of a global hydrogen market, and to identify and address obstacles in the production, logis-

tics, storage and use of hydrogen. In October, a workshop with more than 60 delegates from 13 nations was held at NOW GmbH in Berlin. One outcome of the workshop was to establish the necessary working structure within Innovation Challenge 8. It consists of demonstration projects, accompanying R&D projects and a platform for the exchange of information. Besides Germany, the project is coordinated jointly by Australia and the European Union.

Further information at ↗ www.mission-innovation.net

COMMISSIONING IN THE FIELD OF INTERNATIONAL COOPERATION

Environmental Technologies Export Initiative

The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU – Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit) supports innovative measures in the field of environmental and climate protection in emerging and developing countries for sustainable economic development.

The BMU's "Environmental Technologies Export Initiative" (Exportinitiative Umwelttechnologien), which was established in 2016, disseminates environmental technologies, environmental awareness and knowledge in order to make a practical contribution to the sustainable development of other countries. At the same time, new sales markets for the export of German environmental technologies are to be identified. The knowledge and technology transfer of the export initiative spans the various areas of BMU expertise. One area of focus is environmentally friendly mobility.

In cooperation with the German Society for International Cooperation (GIZ – Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH), NOW supports the BMU in establishing a network in developing and emerging countries to prepare, coordinate and implement activities for the use of climate-friendly hydrogen and fuel cell technologies. The objective is to use this network to help prepare for the use of hydrogen and fuel cell technology. Through the strategic network with local industry partners, NOW will introduce the status quo of hydrogen and fuel cell technology as well as current perspectives into the respective energy system considerations of the countries. Building upon this, the aim is to identify potential cooperation partners in emerging and developing countries for specific demonstration projects. The goal is to create the conditions for generating demand for German products in the field of environmental technologies and establishing the associated infrastructure.

The NOW Communication and Knowledge Management team

COMMUNICATION AND KNOWLEDGE MANAGEMENT

The technical and economic measures that NOW GmbH coordinates and implements in the various technology areas are supported by targeted press and public relations activities. These are designed to boost the acceptance and perception of alternative drive systems and fuels across the board and to promote the creation and expansion of network groups. In addition to establishing and expanding contacts with the media and the public, all of NOW GmbH's thematic areas are represented at trade fairs and conferences, while partner workshops, parliamentary evenings and other network events complement the activities. The NOW GmbH knowledge management consolidates the available programme, project and specialist knowledge and makes it usable for increasing acceptance and visibility, both for industry-relevant professional networks and the general public. In particular, the specialist information service pools the company's expertise, makes it accessible and thus creates the basis for the target-group-specific preparation of knowledge.


JAN
25

ELECTRIC MOBILITY FOR MUNICIPALITIES – STARTER SET PROVIDES HELP FOR ENTRY AND EXPANSION

Emission-free and modern mobility is today a matter of course for many cities and communities, because the electrification of transport with electricity or hydrogen from renewable sources makes a significant contribution to the reduction of CO_2, pollutant and noise emissions and can thus improve the quality of life of residents. Furthermore, in order to achieve the climate protection goals, greenhouse gas emissions caused by transport must be rigorously reduced over the coming years. Since 2014, NOW GmbH has provided the free, German language ↗ **www.starterset-elektromobilität.de** (electric mobility starter set) information portal, which serves to facilitate an easy introduction for municipalities to the topic that is tailored to their needs. Information from research and practice is collected and prepared here. Municipalities are also provided with a variety of impulses as to how they can embark on alternative mobility or further advance the electrification of transport.

The electric mobility starter set was updated and significantly expanded in many areas in 2018. One new feature is an overview diagram of electric mobility concepts that have already been developed. Here municipalities can gain an overview of which of their neighbours already have a comprehensive concept in place and also take a closer look at a selection of concepts. So-called practical cases also provide a detailed description of outstanding implementations of various aspects of electric mobility, e.g. the implementation of various privileges as defined by the Electric Mobility Act, in Munich or Leipzig. Planning tools, checklists, recommendations for action and concrete building blocks on topics such as the electrification of commercial transport, local public transport or refuelling and charging infrastructure help local authorities get on the right track – from the initial idea right through to the sustainable integration of emission-free mobility in cities and municipalities.

Government funding is available for the development and implementation of alternative mobility concepts in the municipal environment. The main focus is on converting municipal fleets to electric vehicles and establishing the necessary infrastructure, i.e. charging points and hydrogen filling stations. Support is provided for cars, waste disposal vehicles, special vehicles in logistics, electric vehicles in the taxi industry or at car-sharing companies, for example. The focus is also on local public transport: electric buses and hydrogen-powered trains. Besides municipalities, commercial enterprises such as delivery services, tradespeople, social healthcare and nursing services, are often also eligible to apply – provided the municipality confirms that the planned project is part of a municipal electric mobility concept. Several federal ministries are promoting the switch to sustainable electric mobility. The starter set provides an overview of relevant federal funding programmes and other financial assistance of interest to municipalities. Filtering by topic simplifies the search process.

A significant increase in the use of the electric mobility starter set could be seen in 2018. An upturn of 30 percent shows the growing interest and willingness of local authorities to explore the possibility of initiating electric mobility. NOW assists in this endeavour.

REACHES THOSE INTERESTED ALL OVER GERMANY

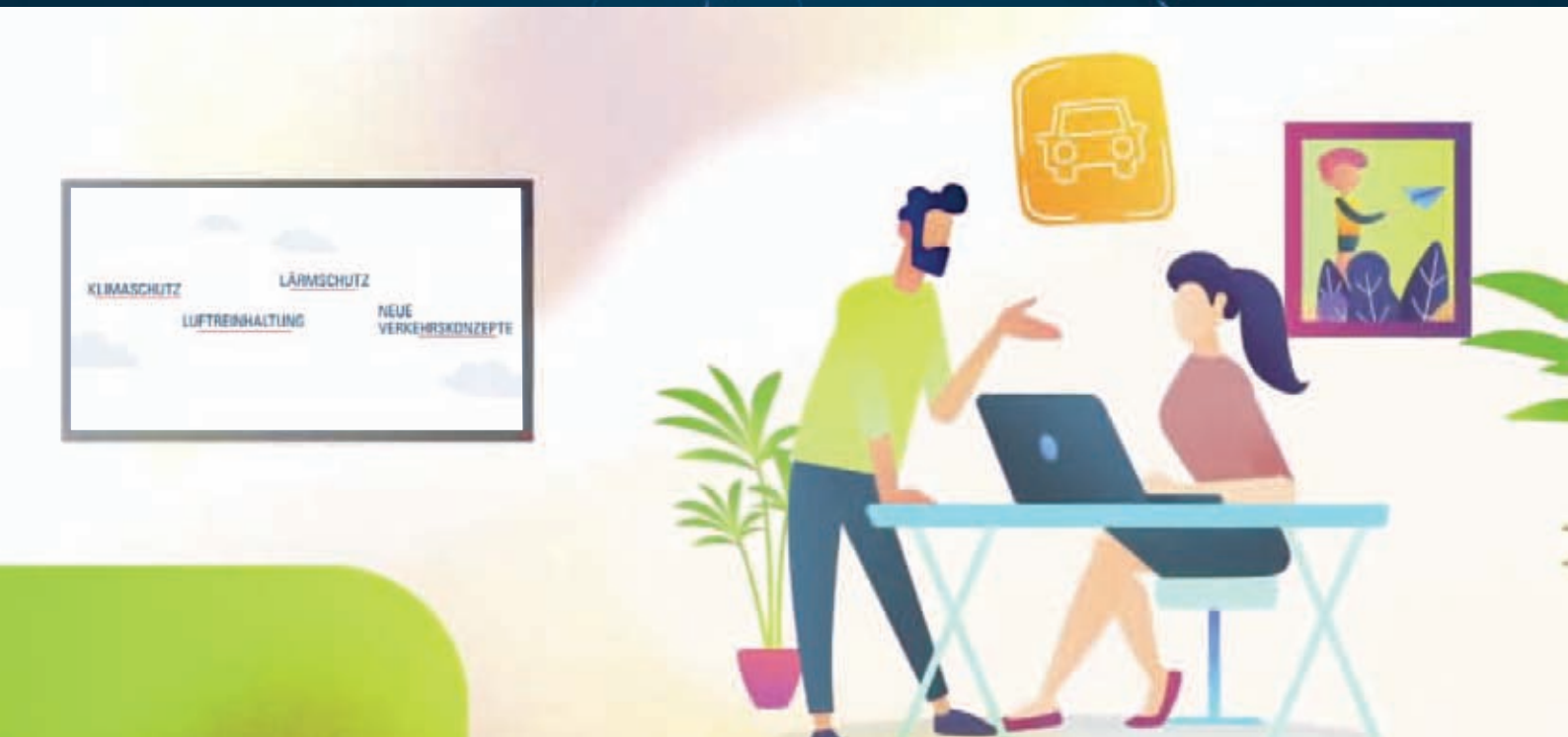
From Putbus on the island of Rügen to Lake Constance, from Oberhausen to Riesa: With an information stand for everyone interested in CO_2-free mobility, the Federal Ministry of Transport and Digital Infrastructure's (BMVI– Bundesministerium für Verkehr und digitale Infrastruktur) Electric Mobility Roadshow (Roadshow Elektromobilität) stopped off at 19 cities and municipalities in Germany in 2018. Since 2014, the Electric Mobility Roadshow has provided information across Germany on the opportunities and suitability of electric mobility for everyday use, and has since visited some 90 municipalities.

At the roadshow, citizens learn what contribution electric mobility with batteries or hydrogen and fuel cells can make to climate protection, air pollution control, noise protection and new transport concepts. For private individuals, tradespeople and municipal representatives, there is information on funding opportunities for vehicles and charging infrastructure. The dynamic, clean driving pleasure could also be experienced at numerous venues during test drives sessions offered by NOW as well as local initiatives.

The roadshow is organised by NOW. In many places, representatives of local authorities were presented with an information package containing practical recommendations for the establishment and further development of electric mobility.

↗ www.roadshow-elektromobilität.de
↗ www.starterset-elektromobilität.de


ROADSHOW ELEKTROMOBILITÄT
ROADSHOW
ELEKTROMOBILITÄT
NOW


KLIMASCHUTZ
LÄRMSCHUTZ
LUFTREINHALTUNG
NEUE
VERKEHRSKONZEPTE

OVERVIEW OF NOW EVENTS

2018

DATE	TITLE/TOPIC	PLACE
January 2018		
09 January 2018	Workshop of the Maritime LNG platform on the LNG Subsidy Directive	Hamburg
15 January 2018	Workshop "Communication Strategies for E-Mobility" of the accompanying research from the Networked Mobility area	Berlin
16 January 2018	2nd thematic meetings of the accompanying research from the Networked Mobility area	Berlin
22 – 23 January 2018	15th International Congress for Biofuels (Fuels of the Future) I Event Partnership	Berlin
30 January 2018	Handover of a funding approval for two pilot projects in Hamburg to convert public transport to electric mobility	Hamburg
February 2018		
08 – 09 February 2018	CAR Symposium & CAR connect I Event partnership	Bochum
15 February 2018	Opening of the H_2 filling station Wendlingen	Wendlingen
15 Februay 2018	Federal-State meeting on charging infrastructure	Berlin
26 – 27 February 2018	5th "Elektromobilität vor Ort" conference on local electric mobility	Leipzig
28 February – 02 March 2018	FC Expo 2018 – 14th International Hydrogen and Fuel Cell Expo	Tokyo
March 2018		
05 March 2018	Opening of the H_2 filling station Ingolstadt	Ingolstadt
08 March 2018	Workshop discussion "H_2 Mobility in Brandenburg"	Berlin
11 March 2018	Roadshow (environmental market at spring festival)	Gevelsberg
13 March 2018	Roadshow (Rhineland-Palatinate Exhibition)	Mainz
27 March 2018	Opening of the H_2 filling station Wolfsburg	Wolfsburg

Handover of funding approval by Norbert Barthle, Parliamentary State Secretary to the Federal Minister of Transport and Digital Infrastructure in Hamburg

Birgitta Worringen, Head of Sub-Division G2 Sustainable Mobility, Logistics at the BMVI, opens the 5th "Elektromobilität vor Ort Conference" on local electric mobility in Leipzig

Tilman Wilhelm and Thorsten Herbert from NOW inform Guido Beerman, State Secretary at the BMVI, about hydrogen and fuel cell technology at Hannover Messe

DATE	TITLE/TOPIC	PLACE
April 2018		
12 April 2018	Battery and fuel cell performance check, green hydrogen – state-of-the-art technology and strategic goals	Berlin
13 April 2018	Presentation and special journey of the Coradia iLint in Hesse incl. accompanying exhibition	Frankfurt
14 – 15 April 2018	Roadshow (PrimaKlima ENERGY, MOBILITY and CONSTRUCTION)	Hohen Neuendorf
17 April 2018	Meeting of working group H_2, FC and EM at airports	Frankfurt
23 – 27 April 2018	Hannover Messe 2018	Hanover
25 April 2018	German-Japanese Economic Forum at the Hannover Messe (Decarbonization of Energy Supply and Mobility – Hydrogen and Electric Transport Systems as a Solution?)	Hanover
26 April 2018	Kick-off event for the location tool for alternative fuels	Berlin
27 – 29 April 2018	Roadshow (Helle Markt I PRIMAKLIMA “Smart Mobility”)	Schlüchtern
May 2018		
03 May 2018	Clean Power Net general assembly and user workshop	Düsseldorf
04 May 2018	Pre-award ceremony of the GreenTec Award in the mobility category for the Coradia iLint	Salzgitter
05 May 2018	Roadshow (Automeile Riesa)	Riesa
07 May 2018	Ceremonial award of the project BOB Solingen by KlimaExpo.NRW	Solingen
08 May 2018	Roadshow (2nd congress “e-Mobility and Infrastructure”)	Warnemünde
09 May 2018	IPHE Workshop: Towards a clean and sustainable hydrogen supply chain	Koriyama City
13 May 2018	Presentation of the GreenTecAwards I Event partnership and jury participation	Munich
17 – 18 May 2018	11th Steering Committee Meeting Government Support Group	Prague
24 May 2018	NOW workshop “Hydrogen in Heavy Goods Transport”	Berlin
30 May 2018	2nd Clean Intralogistics Net general assembly	Berlin

2018

Panel discussion at the 8th H_2 Congress with SPD Member of Parliament Andreas Rimkus and Parliamentary State Secretary Steffen Bilger at the Federal Ministry of Transport and Digital Infrastructure

Steffen Bilger, Parliamentary State Secretary at the Federal Ministry of Transport and Digital Infrastructure congratulates on the occasion of NOW's 10th anniversary.

DATE	TITLE/TOPIC	PLACE
June 2018		
02 June 2018	Roadshow (electric mobility day of action)	Rotenburg an der Fulda
05 June 2018	Workshop of the Charging Infrastructure accompanying research – Electric Taxis	Berlin
06 – 07 June 2018	8th German Hydrogen Congress 2018	Berlin
08 June 2018	Closing event of the study "Industrialisation of Water Electrolysis in Germany"	Berlin
09 June 2018	Roadshow (city festival in Schöneiche near Berlin)	Schöneiche
11 June 2018	Mobility and Energy with Batteries and Fuel Cells – market preparation, commercialisation, future challenges (on the occasion of the 10th anniversary of NOW GmbH)	Berlin
13 June 2018	Roadshow (New Mobility 3.0 "Are we missing the boat?")	Hürth
16 – 17 June 2018	Roadshow (industrial show)	Steyerberg
17 – 22 June 2018	WHEC 2018 – 22nd World Hydrogen Energy Conference	Rio de Janeiro
20 June 2018	Meeting of the Bus working group	Berlin
21 June 2018	Workshop on charging infrastructure concepts for the accompanying research in the Networked Mobility area	Stuttgart
22 June 2018	Opening of the first Fastned charging station in Germany	Limburg an der Lahn
26 June 2018	Supplier workshop for the NIP project AutoStack Industry	Frankfurt
26 June 2018	Clean Intralogistics Net user workshop with the Baden-Württemberg Chamber of Engineers	Stuttgart
29 June 2018	Presentation of funding approvals worth around 50 million euros for municipal electric mobility projects as part of the Clean Air Immediate Action Programme 2017 – 2020	Berlin

DATE	TITLE/TOPIC	PLACE
July 2018		
04 July 2018	25th electric mobility strategy group	Berlin
05 July 2018	Workshop of the accompanying research in the Networked Mobility are with a focus on public transport	Berlin
10 July 2018	Presentation of the electric bus eCitaro by Mercedes Benz from the project SAEBEL	Mainz
August 2018		
19 August 2018	Roadshow (Day of Mobility of the Future)	Kaiseresch
24 August 2018	Kick-off event on the dialogue process leasing	Berlin
25 – 26 August 2018	Open days of the Federal Government	Exhibition at the Federal Ministry of Transport and Digital Infrastructure	Berlin
30 August 2018	Roadshow (21st Energy Day Rhineland-Palatinate)	Bingen

Andreas Scheuer MdB, Federal Minister of Transport and Digital Infrastructure, hands over the funding approvals from the Clean Air Immediate Action Programme 2017 – 2020 (Sofortprogramm Saubere Luft)

2018

DATE	TITLE/TOPIC	PLACE
September 2018		
01 – 02 September 2018	Roadshow (e-mobility weekend of action within the framework of the "pig market" (Schweinemarkt))	Steinfurt
04 September 2018	Zero Emission Shipping – Alternative energy systems for sustainable shipping	Hamburg
06 – 07 September 2018	Workshop with a focus on the densification of charging infrastructure in cities	Amsterdam
11 September 2018	8th Association Dialog	Alternative engines, fuels and infrastructures for clean mobility	Berlin
11 – 12 September 2018	International hydrogen infrastructure workshop	Boston
12 September 2018	Premiere of Bombardier's new TALENT 3 electric hybrid battery train	Hennigsdorf
13 – 15 September 2018	Roadshow (Electric Mobility Days at Berlin's Information and Competence Centre for Future-oriented Construction)	Berlin
14 – 16 September 2018	Roadshow (5th Borkum Energy Days)	Borkum
16 September 2018	Start of regular scheduled services of Coradia iLint on the route Cuxhaven-Bremervörde	Bremervörde
18 – 19 September 2018	f-cell 2018 – Trade fair and impulse meeting for hydrogen and fuel cells	Stuttgart
22 September 2018	Roadshow (1st Oberhausen Electric Mobility Day)	Oberhausen
23 September 2018	Roadshow (Mobility Day)	Zernien
26 September 2018	Mobility of the Future with Hydrogen and Fuel Cells – Congress of the Energy Agency Rhineland-Palatinate	Koblenz
27 September 2018	Climate Action in Mobility Conference of the German Society for International Cooperation (GIZ)	Berlin
30 September 2018	Roadshow (Flein municipality mobility day)	Flein

Achim Wehrmann, Head of the sub-department WS2 Shipping in the BMVI at the conference Zero Emission Shipping in Hamburg

Project start and kick-off event of the electric mobile flagship project ZUKUNFT.de with Andreas Scheuer MdB, Federal Minister of Transport and Digital Infrastructure with state representatives and project partners

DATE	TITLE/TOPIC	PLACE
October 2018		
08 October 2018	Presentation of the results of the study Integrated Energy Concept 2050 (IEK 2050)	Berlin
09 October 2018	Roadshow (2nd e-mobilty Forum Bodenseekreis)	Friedrichshafen
10 October 2018	Fuel Cell Innovation Forum 2018 of the Fuel Cell Initiative (IBZ) I Event partnership	Berlin
16 October 2018	Bund-Länder meeting on charging infrastructure	Berlin
16 – 17 October 2018	4th HYPOS FORUM - Scientific Lecture Series of the HYPOS Innovation Network I Event Partnership	Leipzig
17 – 18 October 2018	Deep-dive Workshop "Innovation Challenge 8 on Hydrogen" – Mission Innovation Renewable and Clean Hydrogen Challenge	Berlin
18 October 2018	Symposium on risk assessment, preventive fire protection and fire fighting of lithium-ion storage media of the German Association of Professional Fire Brigades (AGBF) and the German Fire Association (DFV)	Munich
19 October 2018	Project start and kick-off event of ZUKUNFT.de	Hamburg
21 October 2018	Roadshow (Future workshop e-Mobility 2018 as part of the Week of Sustainability)	Putbus/Rügen
23 October 2018	Fuel cell forum Hesse 2018 – Fuel cell vehicles for commercial and municipal fleets – the H2BZ initiative Hesse	Darmstadt
23 October 2018	Hydrogen Energy Ministerial	Tokyo
23 – 25 October 2018	International Hydrogen Fuel Cell Vehicle Congress 2018 (FCVC 2018)	Rugao
24 October 2018	Joint CEP/NOW Heavy Duty Workshop	Berlin
24 October 2018	Japanese German Energy Day 2018 - "Perspectives For Hydrogen In Germany's And Japan's Future Energy Systems"	Tokyo
25 October 2018	Annual conference of the Clean Energy Partnership	Berlin

2018

DATE	TITLE/TOPIC	PLACE
November 2018		
06 November 2018	Clean Intralogistics Symposium: Economic and Environmental Benefits with Hydrogen and Fuel Cells in Materials Handling and Intralogistics	Frankfurt
07 November 2018	Platform meeting – Zero-emission drives for trains	Berlin
08 November 2018	Parliamentary evening of the German Hydrogen and Fuel Cell Association	Berlin
12 November 2018	Conference "Bringing the energy transition to the streets"	Berlin
13 – 14 November 2018	16th UECT: Ulm ElectroChemical Talks 2018	Ulm
20 November 2018	26th Electric Mobility Strategy Group	Berlin
21 November 2018	Opening of the hydrogen filling station in Munich Verdistraße	Munich
22 November 2018	ZOOM – The expert arena Clean mobility I Infrastructure for alternative fuels–- strategy, technology, market	Berlin
23 November 2018	Handover of funding approvals to municipal electric mobility projects as part of the Clean Air Immediate Action Programme 2017 – 2020	Berlin
27 November 2018	Workshop on alternative fuels and their application in Berlin	Berlin
27 – 28 November 2018	Zero Emission Bus conference	Cologne
28 November 2018	e-Mobility Fair North & 3rd Congress e-Mobility and Infrastructure	Rostock
29 November 2018	Handing over of a funding approval for the conversion of the MV "Münsterland" to LNG drive	Berlin
29 – 30 November 2018	12th Steering Committee Meeting Government Support Group	Dublin

Further funding approvals are handed over in the presence of Andreas Scheuer MdB, Federal Minister of Transport and Digital Infrastructure

Enak Ferlemann, Parliamentary State Secretary at the Federal Ministry of Transport and Digital Infrastructure, hands over the funding approval for the conversion of MS Münsterland to LNG

Steffen Bilger, Parliamentary State Secretary at the Federal Ministry of Transport and Digital Infrastructure hands over the funding approval for the NIP project DELFIN

DATE	TITLE/TOPIC	PLACE
December 2018		
04 December 2018	Press event on the FFZ70 project –Commissioning of 70 hydrogen-powered route trains	Leipzig
05 – 06 December 2018	NIP General Assembly 2018	Berlin
10 December 2018	Opening of the hydrogen filling station Hanover Industrieweg	Hanover
12 December 2018	FastCharge – Opening and demonstration of the charging station in the Jettingen charging park	Jettingen
13 December 2018	Handover of the funding approval to the DELFIN project for the development of pressure tanks for fuel cell vehicles	Berlin

The list includes events organised and conducted by NOW GmbH as well as events in which NOW GmbH was involved in the organisation and running of.

5TH "ELEKTROMOBILITÄT VOR ORT" CONFERENCE ON LOCAL ELECTRIC MOBILITY (26–27 FEBRUARY 2018 IN LEIPZIG)

Emission-free mobility in urban and rural areas – the 5th BMVI "Elektromobilität vor Ort" conference on local electric mobility focused on the development of electric mobility in cities and municipalities. The conference has established itself nationwide as a key forum for representatives of local authorities, municipal companies and transport companies as well as fleet operators and owners. Around 500 participants gathered in Leipzig to learn about the progress being made in expanding the infrastructure for alternative fuels, about the changeover to electric mobility in local public transport and in commercial transport, and also about the latest technological developments. Practical information on the relevant funding opportunities provided by the BMVI programmes was another pivotal element on the agenda.

NOW CELEBRATES 10th BIRTHDAY (11 JUNE 2018 IN BERLIN)

In 2018 NOW GmbH celebrates its 10th anniversary. Since 2008, it has supported the introduction of clean, sustainable mobility and energy supply at the interface of politics, industry and science. On the occasion of the 10th anniversary on 11 June 2018, celebrations are held in the atrium of the Federal Ministry of Transport and Digital Infrastructure (BMVI – Bundesministerium für Verkehr und digitale Infrastruktur) under the motto "Mobility and Energy with Batteries and Fuel Cells" with a view towards the challenges that will be faced in the future.


Bundesministerium
für Verkehr und
digitale Infrastruktur
NOW
NOW-GMBH.DE
Nachhaltige Mobilität und
Energieversorgung - 10 Jahre NOW
11. Juni 2018
NOW
NOW-GMBH.DE

NIP GENERAL ASSEMBLY (5–6 DECEMBER 2018 IN BERLIN)

Some 400 participants are informed about current projects, results of completed projects and EU-funded projects in Germany at the General Assembly of the National Innovation Programme Hydrogen and Fuel Cell Technology NIP 2, on 5 and 6 December 2018 in Berlin. High-calibre keynote speeches and presentations, panel discussions and expert forums on political framework conditions and general technical developments in the hydrogen and fuel cell sector offer stakeholders from industry, research and politics a forum for networking and professional exchange.

Thorsten Herbert, NOW; Bart Biebuyck, FCHJU Brussels; Steffen Bilger, Parliamentary State Secretary Federal Minister of Transport and Digital Infrastructure; Dr. Klaus Bonhoff, NOW (from left to right)

Birgit Breitfuß-Renner, Head of Sub-Department G 2 Environment and noise protection, Federal Ministry of Transport and digital infrastructure

Dr. Lukas Voelkel, Division 723 Energy, Federal Ministry of Education and Research

Dr. Wolfgang Langen, Head of Division IIC6 Energy Research – Project Funding and International Affairs, Federal Ministry for Economic Affairs and Energy

NOW PUBLICATIONS IN 2018

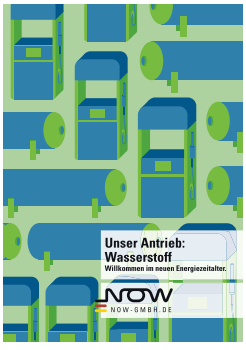
NOW issued numerous new publications in 2018, either individually or in cooperation with partners.

The publications include the annual report and reports on results, studies, funding programme-specific information brochures as well as guidelines and manuals for the four programme areas National Innovation Programme Hydrogen and Fuels Cell Technology (NIP), Charging Infrastructure (LIS – Ladeinfrastruktur), Local Electric Mobility (Elektromobilität vor Ort) and the Mobility and Fuel Strategy (MKS – Mobilitäts- und Kraftstoffstrategie).

All the publications are available in German and many in English. They can be downloaded from the website:

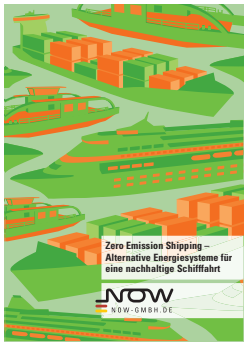
↗ **www.now-gmbh.de/en/service/publications (English)**
↗ **www.now-gmbh.de/de/service/publikationen (German)**

Alternative drives in public transport / Flyer



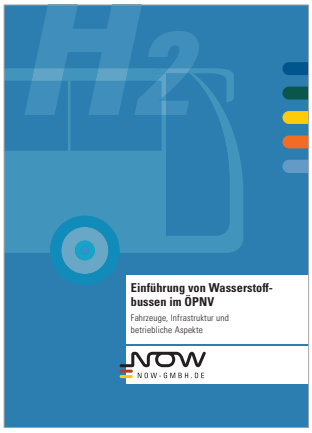
Our drive: Hydrogen. Welcome to the new energy age / Flyer

Green intralogistics: Hydrogen in the tank / Flyer



Zero emission shipping – Alternative energy systems for a sustainable shipping industry / Flyer

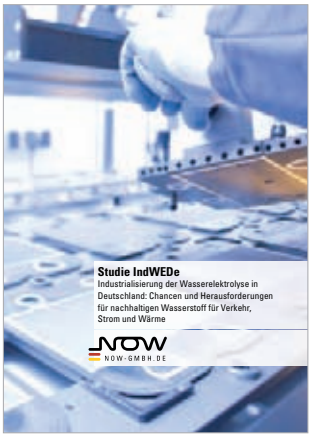
The German H_2 RCS roadmap 2025 / RCS – Regulations, Codes & Standards / Brochure



Introduction of hydrogen buses in local public transport / Vehicles, infrastructure and operational aspects / Brochure

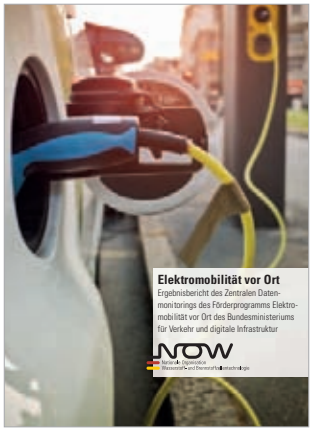
Shaper and moderator at the interface of politics, business and science for an innovative and sustainable mobility and energy system / Brochure

Planning guideline – fuel cell uninterruptible power supply and emergency power systems / Brochure

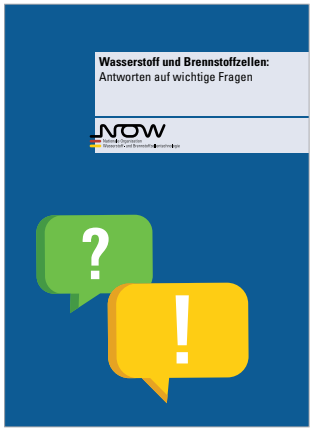


IndWEDe study / **Industrialisation of water electrolysis in Germany: Opportunities and challenges for sustainable hydrogen in transport, power and heating** / Brochure

International cooperation / Mobility, energy, environment / Brochure



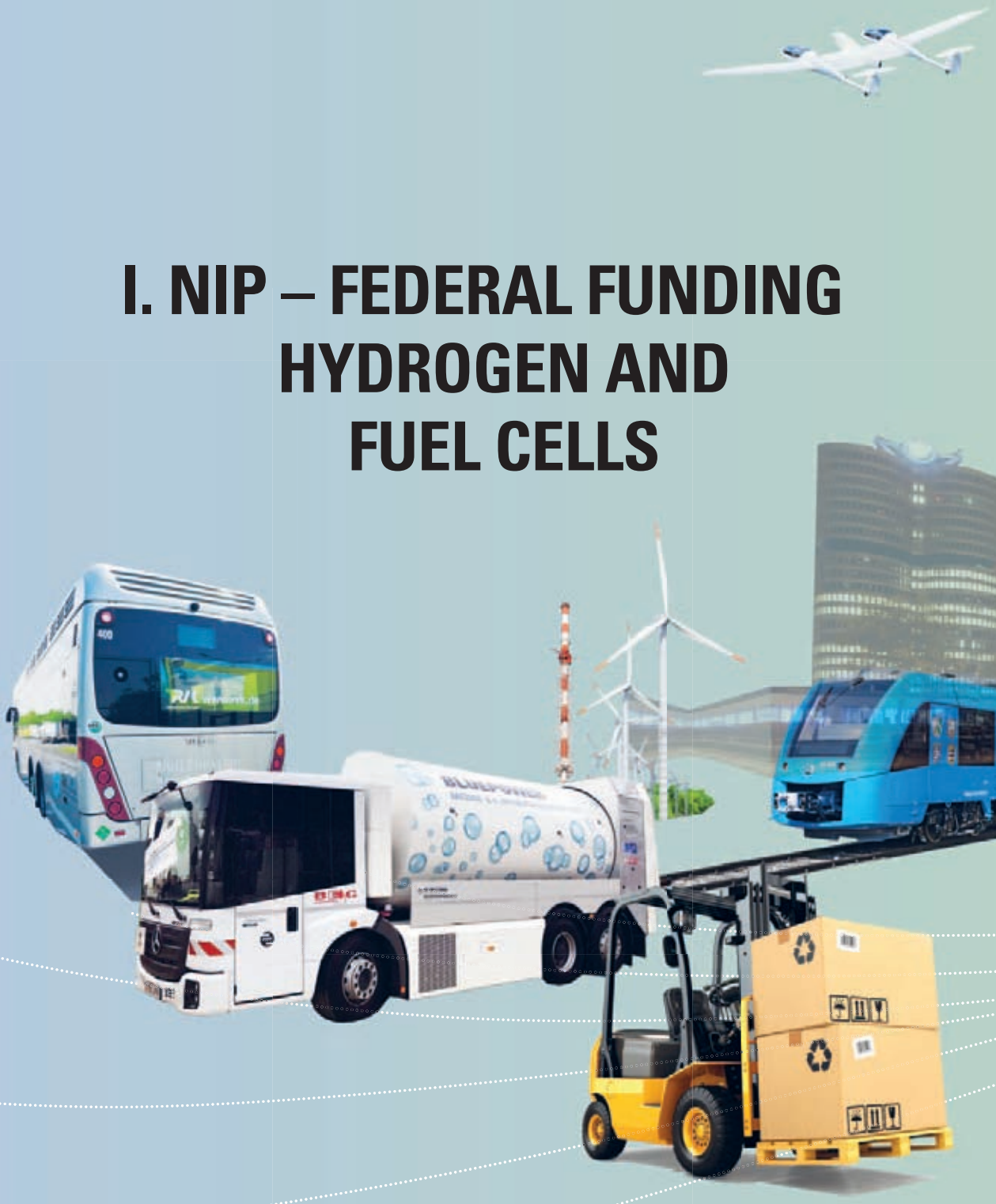
Elektromobilität vor Ort (Local electric mobility)/ Report of results of the BMVI programme / Brochure



Hydrogen and fuel cells: Answers to key questions / Brochure

Urban commercial transport / Brochure

I. NIP – FEDERAL FUNDING HYDROGEN AND FUEL CELLS



NEWLY APPROVED PROJECTS

COMPLETED PROJECTS


HYDROGEN

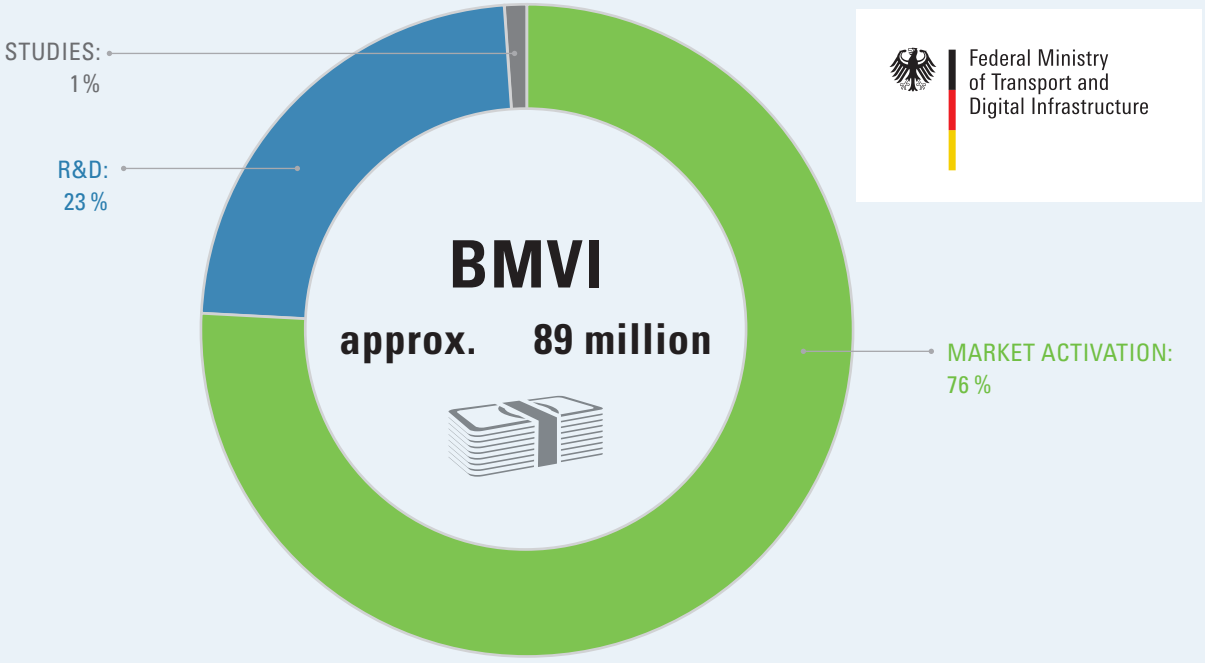
THE NIP

Implementation 2018

For the purpose of accelerating the market maturity of hydrogen and fuel cell technologies in different application areas, in 2006 the federal government, federal states, industry and science initiated the ten-year National Innovation Programme Hydrogen and Fuel Cell Technology (NIP), which comprised a funding volume of 1.4 billion euros. In September 2016 the federal cabinet adopted the government programme for hydrogen and fuel cell technology for the period of 2016 to 2026. This launched the second phase of the successful NIP (NIP 2). The continuation of the interdepartmental programme guarantees continuity for research and development and supports market activation through the relevant product developments. In the second phase, the Federal Ministry of Transport and Digital Infrastructure (BMVI) is initially investing 250 million euros until 2019 to support hydrogen and fuel cell technology for the implementation of the programme. The Federal Ministry for Economic Affairs and Energy (BMWi) is continuing its support of hydrogen and fuel cell technology in the area of applied research and development in the framework of the 6th Energy Research Programme with an annual budget of around 25 million euros. In addition, in August 2016 the BMWi drafted a funding programme in the framework of the National Action Plan for Energy Efficiency (NAPE) for the purchase of fuel cell heating systems for private customers.

As was the case during the first phase of the NIP, the Federal Ministry for the Environment, Nature Protection and Nuclear Safety (BMU) as well as the Ministry of Education and Research (BMBF) are actively involved in the strategic design of NIP through the structures of NOW.

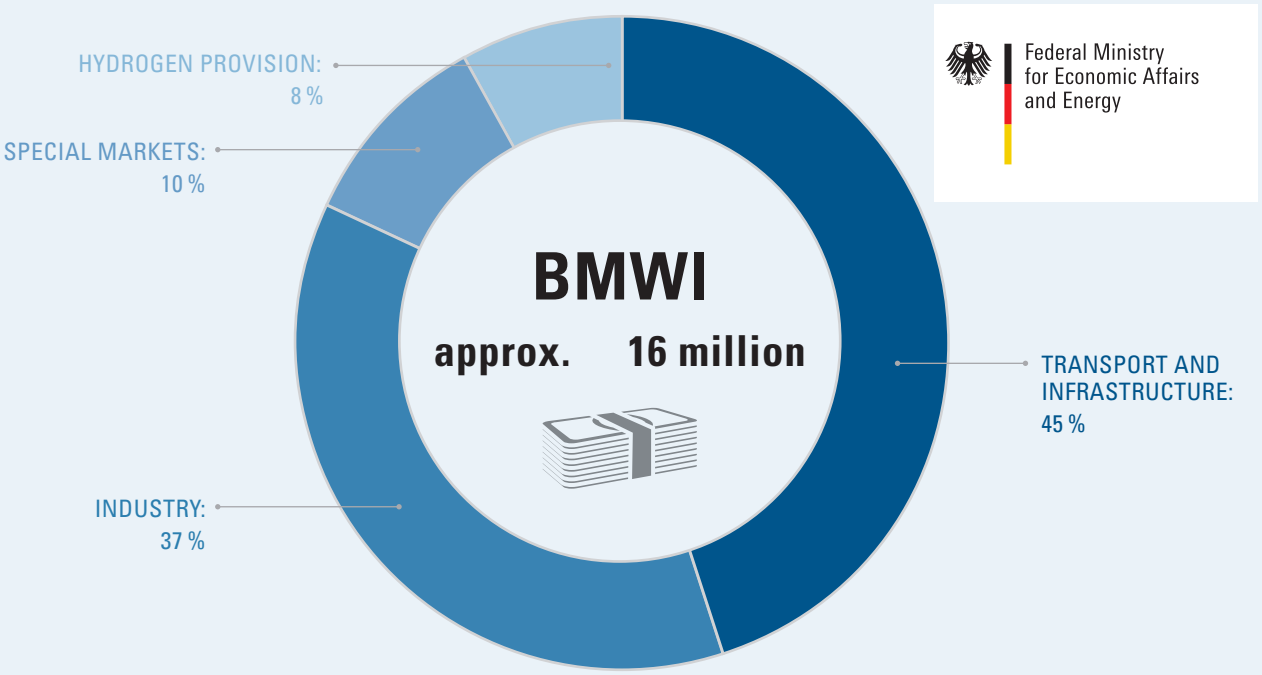
APPROVED PROJECTS 2018 (BMVI)



AREAS	FUNDING AMOUNT/€
MARKET ACTIVATION	67,909,681
R&D	19,930,090
STUDIES:	787,748
CLUSTER MANAGEMENT	227,927
TOTAL	**88,855,446**

Source: PtJ end-of-year figures 2018

APPROVED PROJECTS 2018



AREAS	FUNDING AMOUNT/€
TRANSPORT AND INFRASTRUCTURE	7,197,791
INDUSTRY	5,891,856
SPECIAL MARKETS	1,537,597
HYDROGEN PROVISION	1,333,231
TOTAL	**15,960,475**

BMWi funding 2016 – 2018
Fuel cell heating systems market

AREA	FUNDING AMOUNT/€
FUEL CELL HEATING SYSTEMS MARKET RAMP-UP (NAPE)	87,000,000

Source: PtJ end-of-year figures 2018

Federal Ministry
for Economic Affairs
and Energy

THE FOLLOWING PROJECTS WERE APPROVED IN 2018 UNDER THE BMWI FUNDING PRIORITY OF THE NIP

PROJECT	PROJECT START	PROJECT END	FUNDING AMOUNT [€]	PARTNERS
AMBITION	01.06.2018	30.11.2020	623,864	Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e. V.
AMBITION	01.06.2018	30.11.2020	517,437	NuCellSys GmbH
AMBITION	01.06.2018	30.11.2020	574,832	Zentrum für Brennstoffzellen-Technik GmbH
HCMEA	01.01.2019	31.12.2021	1,239,398	Greenerity GmbH
ISyKat	01.01.2019	31.12.2021	601,096	Technische Universität Chemnitz
ISyKat	01.01.2019	31.12.2021	911,017	Umicore AG & Co. KG
miniBIP II	01.05.2018	30.04.2021	993,146	Daimler AG
miniBIP II	01.05.2018	30.04.2021	1,070,690	Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e. V.
miniBIP II	01.05.2018	30.04.2021	514,115	NuCellSys GmbH
miniBIP II	01.05.2018	03.04.2021	152,196	Outokumpu Nirosta GmbH
Brand-schutzBz	01.01.2019	31.12.2021	251,487	Fuji N2telligence GmbH
Brand-schutzBz	01.01.2019	31.12.2021	143,546	Minimax GmbH & Co. KG
KOSOS	01.05.2018	30.04.2021	819,387	Deutsches Zentrum für Luft- und Raumfahrt e. V.
KOSOS	01.05.2018	30.04.2021	539,443	Karlsruher Institut für Technologie (KIT)
KOSOS	01.05.2018	30.04.2021	425,874	KERAFOL Keramische Folien GmbH
KOSOS	01.05.2018	30.04.2021	3,187,167	SunFire GmbH
KOSOS	01.05.2018	30.04.2021	524,952	Universität Bayreuth
eMikro	01.08.2018	31.07.2021	54,089	balticFuelCells GmbH
eMikro	01.08.2018	31.07.2021	1,161,061	Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e. V.
eMikro	01.08.2018	31.07.2021	119,758	Prignitz Mikrosystemtechnik GmbH
eMikro	01.08.2018	31.07.2021	202,689	VIA electronic GmbH
RE-FLEX	01.11.2018	31.10.2021	91,718	balticFuelCells GmbH
RE-FLEX	01.11.2018	31.10.2021	509,495	Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e. V.
RE-FLEX	01.11.2018	31.10.2021	99,277	inhouse engineering GmbH
RE-FLEX	01.11.2018	31.10.2021	632,741	Otto-von-Guericke-Universität Magdeburg

PROGRAMME AREA: TRANSPORT AND INFRASTRUCTURE INDUSTRY SPECIAL MARKETS HYDROGEN PROVISON

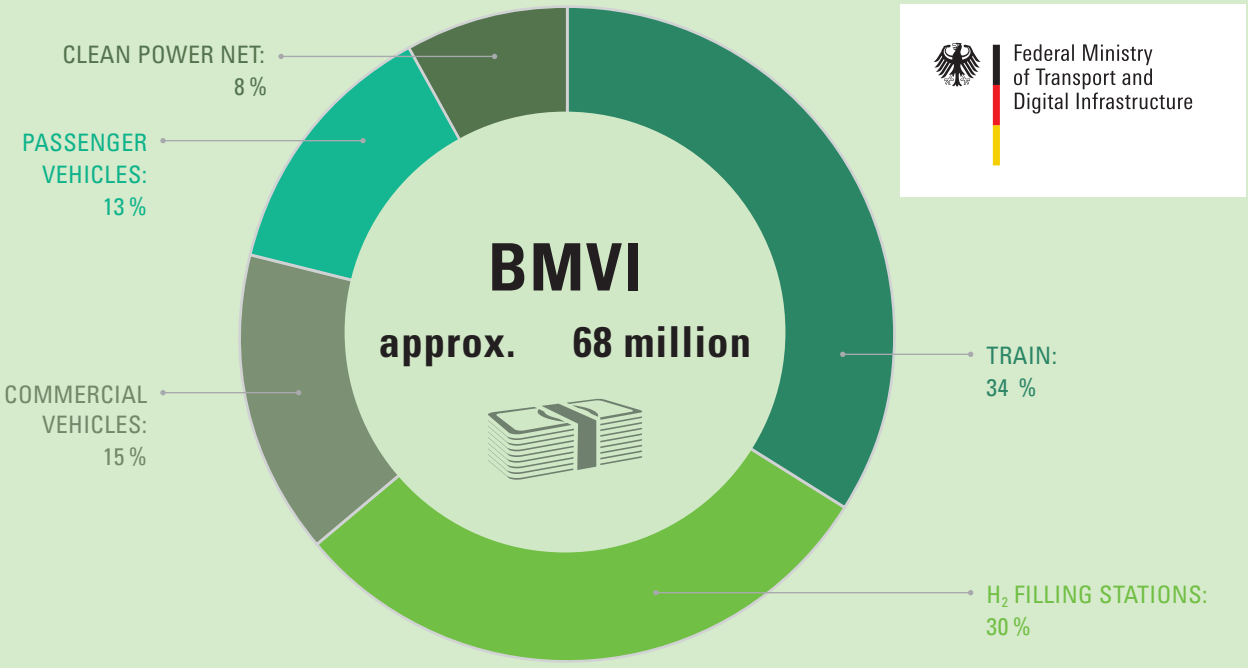

MOBILITÄT

Mobility with hydrogen

MARKET ACTIVATION

Besides research and development, NIP focuses on market activation. The promotion of market activation projects (as a preliminary stage of market ramp-up) applies to products that have reached technical market maturity but are not yet competitive on the market. The lack of competitiveness is due, on the one hand, to production costs that are still too high and, on the other hand, to the lack of infrastructure for fuel supply and maintenance for many products. The focus of the support is therefore not the individual private customer but the commercial application with corresponding quantities.

APPROVED PROJECTS 2018



Federal Ministry of Transport and Digital Infrastructure

AREAS	FUNDING AMOUNT/€
TRAIN	23,138,400
H_2 FILLING STATIONS	20,578,318
COMMERCIAL VEHICLES	9,822,330
PASSENGER VEHICLES	9,071,174
CLEAN POWER NET	5,299,459
TOTAL	**67,909,681**

Source: PtJ end-of-year figures 2018

Call for submissions for the support of fuel cell **trains and ships.**
Deadline: 31.03.2018

Trains

The electrification of railway lines is associated with substantial effort and above all large investments, so that even today, approximately 40 percent of the German railway network is still served by diesel trains. For the lines where electrification will not be economically feasible in the coming decades, hydrogen trains represent an alternative free that is free of CO_2 and particulate matter emissions and also largely free of noise emissions.

As a result, the NIP already supports two projects for the development of hydrogen trains by the manufacturers Alstom and Siemens. In order to stimulate the market entry of these trains, the first call for funding for the procurement of hydrogen trains in the NIP was launched in 2017 and attracted great interest. Applications were received for a total of 164 trains as well as for the associated hydrogen infrastructure including onsite electrolysis.

In 2018, 14 Coradia iLint trains with a total investment volume of approx. 12.3 million euros were already approved. The trains will be used by the state public transit authority of Lower Saxony (LNVG – Landesnahverkehrsgesellschaft Niedersachsen) from spring 2022 on the Cuxhaven – Bremerhaven – Bremervörde – Buxtehude route. In addition, funding of approx. 14.7 million euros was granted to the Rhine-Main public transport network (RMV – Rhein-Main-Verkehrsverbund) for the procurement of 23 hydrogen trains for use on RMV lines 11, 12, 15 and 16 in the Frankfurt region, starting at the end of 2022.

Many of the other projects for which applications have been submitted under the call for funding are projects for which cross-technology tendering procedures for the procurement of zero-emission railcars are still ongoing. In order to respond to the great interest in zero-emission trains in general, the BMVI included a new cross-technology budget category “Funding for the promotion of alternative drive systems in rail transport” (Zuschüsse zur Förderung alternativer Antriebe im Schienenverkehr) in the 2019 budget, which allocates 13.9 million euros for 2019 and 38.75 million euros for commitment appropriations for the subsequent years up to and including 2024.

PROJECT	PROJECT START	PROJECT END	FUNDING AMOUNT [€]	PARTNERS
H2BZ-Taunusnetz	01.01.2019	30.09.2022	14,738,400	
LNVGLINTX	01.01.2019	31.12.2021	8,400,000	

Ships

Besides exhaust emissions, noise-related emissions in cities, ports and coastal sea areas are also a major challenge. However, efforts to optimise today's diesel engine technology for ships with cleaner drive systems are now reaching their economic limits. A strong need therefore exists to define and implement new energy and drive concepts for inland waterway vessels in order to reduce the impact on the environment and meet future emission requirements for sulphur, NO_x and particulate matter.

NIP funding supports the market activation of products as a preliminary stage of their market ramp-up for those products that have reached technical maturity but are not yet competitive on the market. This facilitates the conversion of a passenger ship to an environmentally friendly fuel cell-based drive system.

Call for proposals for funding publicly-accessible **hydrogen refuelling stations in road transport** – deadline 31.03.2018

H_2 infrastructure in road transport

Hydrogen and fuel cells are cornerstones on the path to emission-free mobility in Germany over the medium to long-term. Expanding refuelling infrastructure for hydrogen is therefore a high priority for the federal government. As set out in the national strategic framework to implement the EU directive on the deployment of alternative fuels infrastructure (AFID), the federal government is striving to meet the goal of 100 hydrogen refuelling stations for passenger cars by 2020.

Through the funding call for public hydrogen refuelling stations, under NIP 2, funding totalling 20 million euros was approved in 2018 for a total of 20 refuelling stations and three electrolysers.The funding recipients were H2 MOBILITY (15 HRS + 1 bus extension), Roth (1 HRS + 2 electrolysers), GP Joule (2 HRS) and WP Ellhöft (1 HRS + 1 electrolyser). Under article 56 of GBER, 60 % of the investment costs to develop public H_2 refuelling stations over the lifetime of the facility are funded within the call. In addition, operational costs are eligible for funding. To generate hydrogen from renewable energies, electrolysers to supply the refuelling station are eligible (art. 36 of GBER, 40 % of the extra investment costs).

Funding a refuelling infrastructure is a priority of the National Innovation Programme Hydrogen and Fuel Cell Technology (NIP). In the first phase of NIP (2006 – 2016), 50 public hydrogen refuelling stations for cars were subsidised. Of the 55 refuelling stations currently in operation, 49 are run by the H2 Mobility industry joint venture. NOW GmbH has coordinated and managed NIP since 2008.

PROJECT	PROJECT START	PROJECT END	FUNDING AMOUNT [€]	PARTNERS
eFarm	01.08.2018	30.06.2020	2,243,648	eFarming GmbH & Co. KG
H_2-Bus-FKB	01.08.2018	30.04.2020	342,986	H2 Mobility Deutschland GmbH & Co. KG
NAH2-T1	01.08.2018	31.01.2020	3,939,590	H2 Mobility Deutschland GmbH & Co. KG
NAH2-T2	01.08.2018	31.03.2020	4,103,750	H2 Mobility Deutschland GmbH & Co. KG
NAH2-T3	01.08.2018	30.04.2020	4,028,750	H2 Mobility Deutschland GmbH & Co. KG
NAH2-T4	01.08.2018	30.06.2020	3,081,352	H2 Mobility Deutschland GmbH & Co. KG
WH2TS_ Giessen	01.08.2018	31.07.2020	2,054,150	Roth Holding GmbH & Co. KG
WPE	01.08.2018	30.04.2020	784,092	Windpark Ellhöft GmbH & Co. KG

Call for proposals on funding of fuel cell systems for autarchic **energy supply of critical or off-grid infrastructure –** deadline 30.05.2018.

Clean Power Net

If disaster strikes in Germany, a power failure often accompanies it. In a disaster situation, the role of certain critical infrastructure is particularly important. This applies for example to digital radio for emergency services (BOS), used for communication by police and fire services, among others.

For the safeguarding of BOS digital radio, innovative fuel cell technology particularly showcases its advantages as a substitite power supply, as it is extremely reliable and environmentally-friendly, can be maintained remotely, and unlike diesel generators, does not experience any fuel degradation, even over long downtimes.

Following successful R&D projects in several federal states within NIP I, now over the course of the funding call mentioned above, 505 more systems in Bavaria, Baden-Württemeberg, Brandenburg, Hesse and Saxony are being procured in six applications. Total funding of around 5.3 million euros was made available for this.

PROJECT	PROJECT START	PROJECT END	FUNDING AMOUNT [€]	PARTNERS
BY_Digitalfunk_BOS	01.01.2019	31.12.2021	1,927,800	Bayerisches Landeskriminalamt
NEA_BOS_HESSEN_2018	01.01.2019	31.12.2021	1,003,934	Präsidium für Technik, Logistik und Verwaltung Hessen
Netzhaertung	01.01.2019	30.06.2020	29,198	Landkreis Meißen
NHDBOSBW	01.01.2019	31.12.2021	1,409,280	Präsidium Technik, Logistik, Service der Polizei Baden-Württemberg
W-NEA_2	01.01.2019	31.12.2019	398,249	Zentraldienst der Polizei des Landes Brandenburg
W-NEA_3	01.01.2019	30.06.2022	530,998	Zentraldienst der Polizei des Landes Brandenburg

Call for proposals on funding fuel cell vehicles in **public transport and fleets** – deadline 30.06.2018.

Passenger cars

Introducing fuel cell drives in vehicles is a goal of the federal government in order to reach the specified CO_2 reduction targets and to increase the efficiency of the drive train in passenger cars, light commercial vehicles and other vehicle categories, particularly also in public transport.

As a prospective contribution 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 significantly reduces noise pollution and prevents local emissions. If we assume an average mileage of 12,000 km per year and a CO_2 output of 95 g/km (EU target value), using hydrogen from renewable energies produces an annual reduction in CO_2 emissions of 1.14 t per vehicle, per year.

In this context of this second call following the one in 2017, 319 vehicles were applied for, of which 225 vehicles and a funding amount of 3.35 million euros have already been

PROJECT	PROJECT START	PROJECT END	FUNDING AMOUNT [€]	PARTNERS
hyFES_FCEV	01.09.2019	30.09.2019	47,781	FES GmbH Fahrzeug-Entwicklung Sachsen
NMKFS	01.01.2019	30.06.2019	80,344	Kazenmaier Fleetservice GmbH
6NexoOlb	01.07.2018	31.12.2018	13,936	Deutsches Zentrum für Luft- und Raumfahrt e. V.
6NexoOlb	01.07.2018	31.12.2019	41,808	EWE GASSPEICHER GmbH
6NexoOlb	01.07.2018	31.12.2019	27,872	EWE Netze GmbH
ALDKoop	01.11.2018	31.06.2019	1,393,614	ALD AutoLeasing D GmbH
AlphaH_2	01.08.2018	31.12.2019	418,080	Alphabet Fuhrparkmanagement GmbH
Brunsbuettel	01.07.2018	30.06.2019	836,168	ALD AutoLeasing D GmbH
eFarm_ Fahrzeuge	01.11.2018	31.10.2020	5,736,111	eFarming GmbH & Co. KG
Ellhoeft	01.09.2018	31.12.2019	83,616	Windpark Ellhöft GmbH & Co. KG
Foerder-antrag	01.12.2018	01.10.2020	62,713	Arndt Automotive GmbH
H2D-Flott	01.09.2018	31.12.2019	13,936	Autohaus Ivancan GmbH
H2D-Flott	01.08.2018	31.12.2019	13,936	Dechent GmbH
H2D-Flott	01.09.2018	31.12.2018	25,240	Spiegelhalder & Heiler GmbH
H2D-Flott	01.08.2018	31.12.2019	66,490	Stadt Heidelberg

PROJECT	PROJECT START	PROJECT END	FUNDING AMOUNT [€]	PARTNERS
JEZ_7H2_ MOBIL	01.12.2018	31.12.2019	121,941	JEZ! mobil GmbH
PaeslerFC241	01.01.2019	30.09.2019	62,712	FairCar24 GmbH
PaeslerFC242	01.01.2019	31.12.2019	24,876	Ingenieurbüro Strehlow & Lewien GbR
HyPed	01.01.2019	30.06.2022	9,822,330	Deutsche Post AG

Buses

It is not just the cutting of greenhouse gas emissions, but also the reduction of particulate matterpollution in German cities and municipalities that is an important driver for using alternative drives in local public transport.

Fuel cell buses are enjoying increasing interest because of their higher ranges and short refuelling times, compared to battery buses.

In 2017, a first funding call was opened for the procurement of hydrogen buses as well as – for a fleet upwards of 10 vehicles – its associated infrastructure. Funding for a total of 51 fuel cell buses was guaranteed, and they are currently being procured and will soon begin operation. In order to support continuous growth in fuel cell bus fleets in Germany, in 2018 another call was published, under which applications were made for 28 buses. Of these, two buses were already approved in 2018 with the eFarm project.

Project	PROJECT START	PROJECT END	FUNDING AMOUNT [€]	PARTNER
eFarm_ Fahrzeuge (Busse und Pkw)	01.11.2018	31.10.2020	5,736,111	eFarming GmbH & Co. KG

efarm

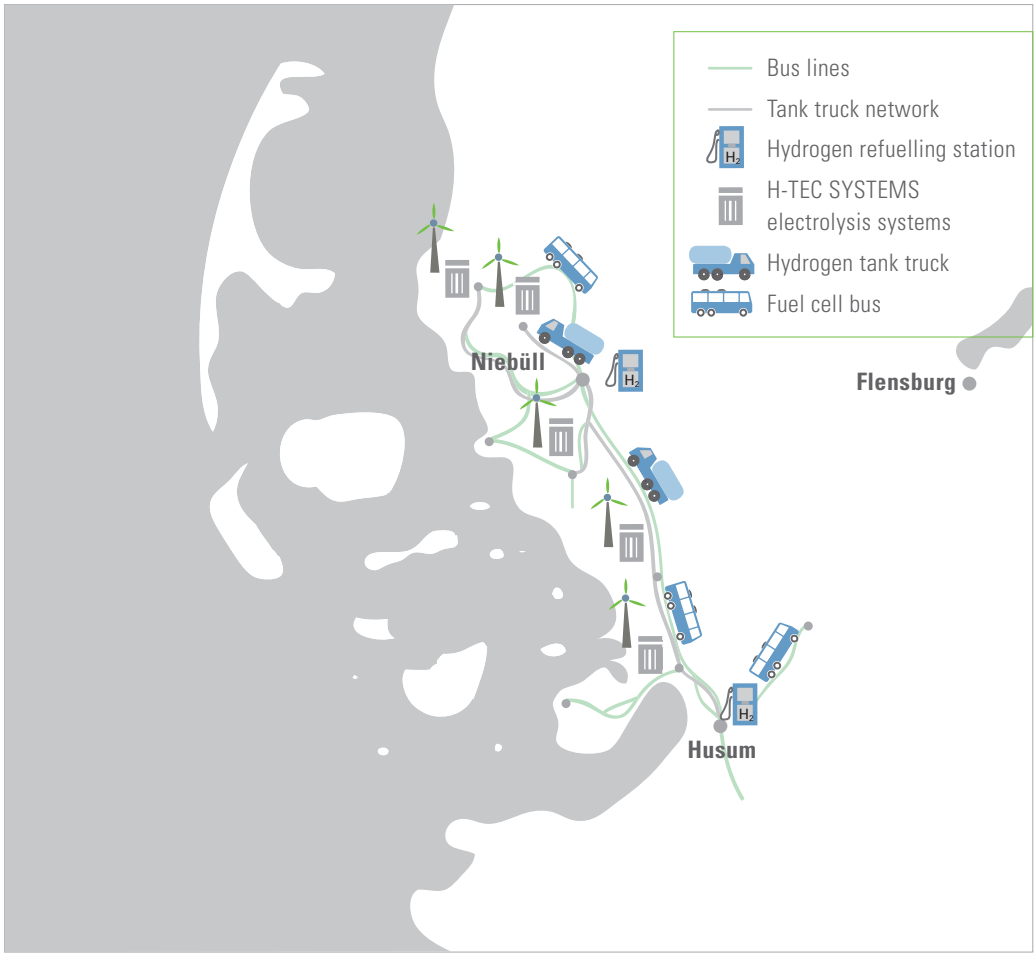
The largest ever green hydrogen mobility project called eFarm is starting in Germany. Under the market activation funding guideline of the National Innovation Programme Hydrogen and Fuel Cell Technology, eFarm will be funded with a total of eight million euros.

eFarming GmbH & Co. KG from GP Joule will build and operate the associated modular, extendable hydrogen generation and distribution grid in North Friesland. This will result in a hydrogen infrastructure from generation and treatment stage right up to fleet use in the consortium: For the production of green hydrogen from wind power that can be refuelled at the two public refuelling stations, by the end of 2019 five PEM electrolysers (each 225 kW) will be installed at suitable locations – close to wind turbines and near heating grids. The electrolysers are made by H-TEC SYSTEMS GmbH, which manufactures the systems in Schleswig-Holstein and Bavaria and is also part of GP JOULE Group. To activate demand and consumption, aside from the initial five fuel cell passenger cars in 2020, two fuel cell buses will be purchased and deployed in scheduled services in the North Friesland district. The heat yielded in hydrogen production will contribute to sustainable, local heat supply. The hydrogen will then be filled into mobile storage containers and transported by truck to both hydrogen refuelling stations. There the hydrogen will again be compressed in order to refuel the buses, but also other hydrogen trucks as required.

In North Friesland the project will establish a supply guarantee for 100 per cent green, regionally-produced hydrogen for citizens and companies wishing to procure a hydrogen vehicle. With over 60 expressions of interest, private persons and companies from the region have committed themselves to purchasing fuel cell vehicles and wish to source their hydrogen locally when the hydrogen refuelling stations are operational.

With eFarm, GP JOULE wants to make electricity processing possible in the region and open up new markets for wind energy. The project illustrates an alternative to controversial grid expansion and makes the strong wind energy in Schleswig-Holstein usable locally. The name ‘eFarm’ is purposely chosen and aims to bring a common sustainable economy with renewable energies to broader society. In this context systematic acceptance management to accompany the project is planned, which initiates a process of dialogue, captures acceptance systematically via monitoring and highlights its influencing variables.

Wind energy in Schleswig-Holstein can be used locally in North Frieland



In North Friesland, a networked hydrogen infrastructure is being created, covering production, processing and fleet use.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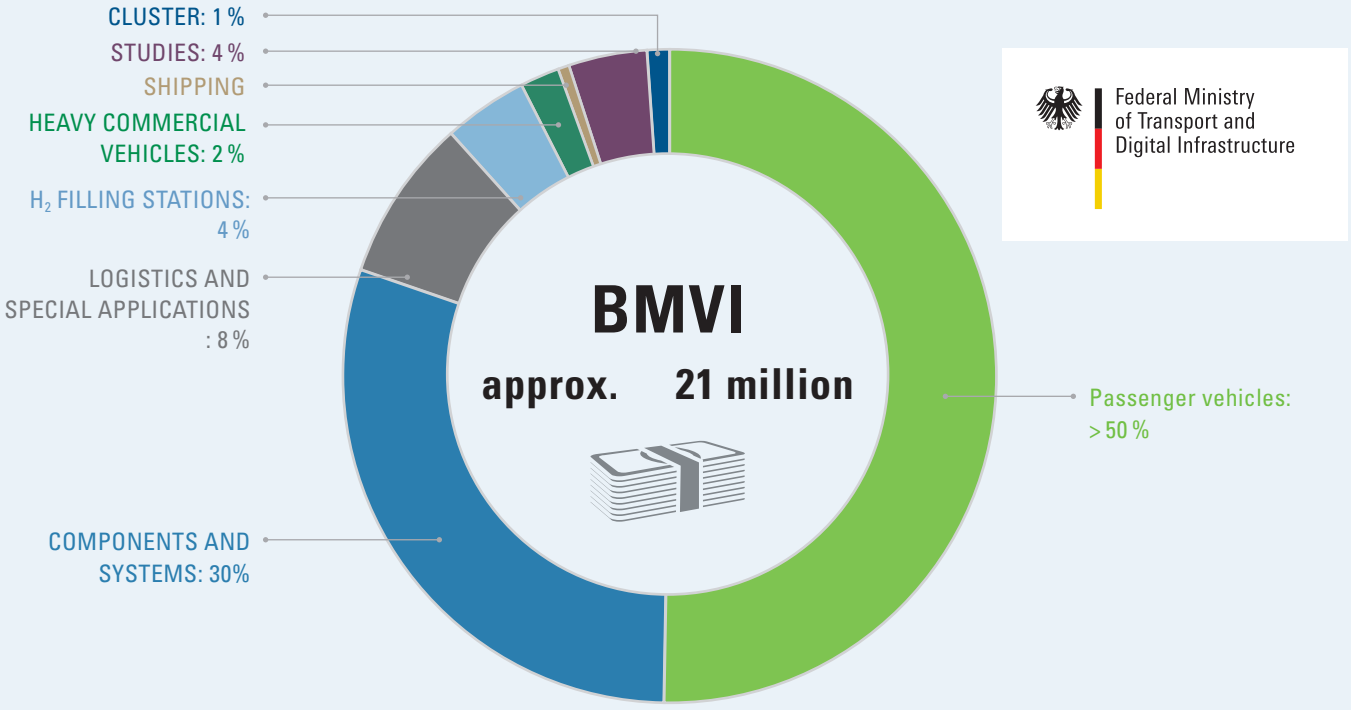
RESEARCH AND DEVELOPMENT (R&D)

An important pillar of the NIP continues to be the promotion of research, development and innovation. Many different areas of application are covered by the NIP, including vehicles and infrastructure for road transport, rail, shipping and aviation. For the implementation of the individual measures, it is important to ensure that all involved stakeholders are properly networked beyond the confines of their industry sectors, e.g. within the framework of innovation clusters, so that overarching issues can continue to be addressed jointly, accompanied by independent scientific research.

In accordance with the industry-political character of the NIP, the individual measures are designed to develop and enhance value creation in Germany and Europe in the technological field of hydrogen and fuel cells – which calls for an internationally competitive supplier industry, especially for key components such as fuel cell stacks or electrolysis.

APPROVED PROJECTS 2018



AREAS	FUNDING AMOUNT /€
PASSENGER VEHICLES	10,620,597
COMPONENTS AND SYSTEMS	6,226,890
LOGISTICS AND SPECIAL APPLICATIONS	1,746,325
H_2 FILLING STATIONS	735,554
HEAVY COMMERCIAL VEHICLES	521,241
SHIPPING	79,483
STUDIES	787,748
CLUSTER	227,927
TOTAL	**20,945,765**

Source: PtJ end-of-year figures 2018

TRANSPORT AND INFRASTRUCTURE

The measures in the NIP area of Transport and Infrastructure aim to establish mobility with hydrogen and fuel cells competitively in the market over the next few years. At the same time, this also includes the further development of vehicle technologies and systems as well as the necessary infrastructure in the market ramp-up phase.

An important pillar of the NIP therefore continues to be the promotion of research, development and innovation. Many different areas of application are covered by the NIP, including vehicles and infrastructure for road transport, rail, shipping and aviation. For the implementation of the individual measures, it is important to ensure that all involved stakeholders are properly networked beyond the confines of their industry sectors, e.g. within the framework of innovation clusters, so that overarching issues can continue to be addressed jointly, accompanied by independent scientific research.

In accordance with the industry-political character of the NIP, the individual measures are designed to develop and enhance value creation in Germany and Europe in the technological field of hydrogen and fuel cells – which calls for an internationally competitive supplier industry, especially for key components such as fuel cell stacks or electrolysis.

Find hydrogen filling stations by using the H_2 app on a smartphone

Passenger vehicles

Electric mobility with batteries and fuel cells is an integral element of sustainable mobility. The aim of the NIP is to establish fuel cell vehicles as part of the future vehicle portfolio.

Already today, fuel cell vehicles have a marketable level of both technical performance and service life. They provide customerswith the same short refuelling times and long ranges they are accustomed to with conventional vehicles. Nevertheless, further optimisation is needed, in particular to achieve competitive manufacturing costs. Economies of scale due to higher production volumes contribute to this. It is also necessary, however, to continue developing cost-effective materials for the various stack and system components as well as optimising the technical systems.

Components and Systems

Manufacturers of hydrogen and fuel cell products share the common task of making the German (supplier) industry successful in both German and international markets by continuously developing products, subsystems and components throughout the value chains. Key challenges are not only the materials to be improved, their power density and long-term stability, as well as the costs of fuel cells and complete systems, but also the preparations required for efficient and thus cost-effective series production in large quantities.

Filling up with hydrogen – just like filling up with conventional fuels

DELFIN – RESEARCH OF ALTERNATIVE MATERIALS AND PRODUCTION PROCESSES FOR THE PURPOSE OF REDUCING THE COST AND WEIGHT OF PRESSURE VESSELS MADE OF CONTINUOUS FIBRE-REINFORCED PLASTIC

The project's technical goal is to research a technology for hydrogen storage, which compared to the current state of technology or the technologies available on the market today, features lower costs as well as less weight in terms of the quantity of hydrogen stored. The project takes a holistic approach to this, covering all relevant aspects of further developing the individual components of a pressure vessel. This includes refinement of the specification, carrying out research and development activities on liners, resin-fibre composites and winding as well as conducting independent tests to demonstrate the safety of the jointly-developed vessel and its general eligibility for certification.

» The project takes a holistic approach to this, covering all relevant aspects of further developing the individual components of a pressure vessel. This includes refinement of the specification, carrying out research and development activities on liners, resin-fibre composites and winding as well as conducting independent tests to demonstrate the safety of the jointly-developed vessel and its general eligibility for certification. «

PARTNERS:
a) Mercedes-Benz Fuel Cell GmbH
b) BMW AG
c) Ford-Werke GmbH
d) NPROXX Jülich GmbH
e) Elkamet
f) ISATEC
g) KV
h) Teijin Carbon Europe GmbH
i) BAM

PROJECT BUDGET/€ / FUNDING BUDGET/€:
a) 1,131,350/656,675
b) 1,722,430/861,215 €
c) 489,640/243,270 €
d) 1,646,847/823,423
e) 614,598/307,299
f) 516,136/308,241
g) 1,293,879/1,293,879
h) 484,866/242,433
i) 1,451,312/1,451,312

COMMENCEMENT:
a) 01 August 2018
b) 01 October 2018
c) 01 August 2018
d) 01November2018
e) 01 August 2018
f) 01 August 2018
g) 01 August 2018
h) 01 August 2018
i) 01 August 2018

CONCLUSION:
a) 31 July 2021
b) 31 July 2021
c) 31 July 2021
d) 31 October 2021
e) 31 July 2021
f) 31 July 2021
g) 31 July 2021
h) 31 July 2021
i) 31 July 2021

EWAS – ANODE VALVES

Staiger and ElringKlinger have set the objective of developing a modular, scalable hydrogen supply unit including valves for PEM fuel cell modules. Staiger is developing the valves, and ElringKlinger the anode gas recirculation unit which returns hydrogen to the stack, thereby replacing a high-maintenance pump. Furthermore this substitution decreases the construction space required and increases overall system effectiveness. The radically changed framework conditions (compared to standard application with an active recirculation unit (pump)) for a hydrogen supply unit with passive recirculation require the development of new valve concepts.

The component development of a new type of pressure control valve as well as the further development of existing flush and drain valves will extend the application area of the anode subsystem with respect to performance, temperature and pressure. ElringKlinger combines the further development of the anode system using Staiger's valve components with the goal of testing them on the subsystem and the fuel cell module basis. Simulations and extensive experimental tests of the recirculation unit complete the development. The aim is to achieve stable, high stack performance across the entire operating range and to develop a modular, scalable hydrogen supply unit.

Through the EWAS project, ElringKlinger and Staiger can together prepare the technical foundation for successful and sustainable positioning in the existing market in this area. Aside from the technical advantages of such a unit, market access will be made easier by the use of cost-effective, plastic-based components. For the design and production of these components, ElringKlinger is able to tap into its existing development and production expertise.

» The aim is to achieve stable, high stack performance across the entire operating range and to develop a modular, scalable hydrogen supply unit. «

PARTNERS:
a) ElringKlinger AG
b) Staiger GmbH

PROJECT BUDGET/€:
a) 634,000
b) 444,000

FUNDING BUDGET/€:
a) 310,000
b) 248,000

COMMENCEMENT:
01 September 2019

CONCLUSION:
31 August 2020

HYPERFORMANCE – COMPONENT KITS FOR MOBILE FUEL CELL SYSTEMS 2025

The main challenges of fuel cell drives are the system costs and the hydrogen infrastructure. The system costs are a result of, among other factors, high technical requirements, which are in turn strongly dependent on the vehicle and performance class. Profound system expertise is therefore indispensable for system and component specification. The HyPerformance project has the goal of predeveloping a new system approach with reduced costs. This is accompanied by the definition of a modular system for the use of identical parts across different vehicles and performance classes. The project takes a holistic approach based on theoretical studies, detailed simulations with new modelling approaches, to experimental validation of the overall concept at the test bench.

Through the project, component and system modules of future fuel cell systems are anticipated and developed which will lead to a significant cost reduction in mass series production. This happens through standardising the requirements and identifying synergies for the reusability of already existing combustion engine components, as well as the specification of newly-developed fuel cell-specific components. The results will be passed on to series development.

» The project takes a holistic approach based on theoretical studies, detailed simulations with new modelling approaches, to experimental validation of the overall concept at the test bench. «

PARTNER:
Robert Bosch GmbH

PROJECT BUDGET/€:
10,200,000

FUNDING BUDGET/€:
4,500,000

COMMENCEMENT:
01 October 2017

CONCLUSION:
30 September 2020

» The Precors GmbH process is ecological, energy-efficient, scalable and fulfils the high demands of coating materials. «

PRECOIL – DESIGN OF LABORATORY FACILITIES FOR COATING OF COIL MATERIAL AS A SEMI-FINISHED PRODUCT FOR MANUFACTURE OF METALLIC BIPOLAR PLATES

In the PRECOIL project, a laboratory facility will be developed in order to produce coated foils as a continuous material for the manufacture of metallic bipolar plates for use in polymer electrolyte fuel cells. The carbon-based coating material developed by Precors GmbH provides effective protection against corrosion as well as a high fuel cell power density. Because a fuel cell stack (in the automotive area) contains around 350 bipolar plates, an economically feasible coating concept is of vital importance. In addition the unique coating process conceived by Precors allows a scalable coating of continuous material (metal coils), resulting in significant advantages such as cost reduction and an increase in value chain potential.

The coating process of Precors GmbH contains no vacuum-based process steps, is environmentally-friendly and based on conventional coating processes. Therefore it is designed for mass series production of metallic bipolar plates. The award-winning coating technology (including the 2016 F-Cell Award) will be developed over the course of the funded project, with a view to coating metallic continuous foils in an automatable process. At the same time scaling methods will be development and researched, which enable an upscale for the raw material needed.

The Precors GmbH process is ecological, energy-efficient, scalable and fulfils the high demands of coating materials made for precoating processes. The materials and processes developed in the PRECOIL project form the basis for a new generation of bipolar plates capable of mass production and therefore represent a great step forward towards marketability in fuel cell technology.

PARTNER:
Precors GmbH

PROJECT BUDGET/€:
672,706

FUNDING BUDGET/€:
470,894

COMMENCEMENT:
01 January 2018

CONCLUSION:
30 June 2020

HZWO: STACK – PEM FUEL CELL MODULE READY FOR MASS PRODUCTION

The HZwo: STACK project is an industrial research initiative by medium-sized companies and research institutes to develop a modular and series concept for PEM fuel cell modules suitable for mass series production. For this purpose synthesis configuration software will be specifically developed which will facilitate fast, efficient and cost-effective dimensioning of a stack module with respect to different requirement profiles. In addition new types of approaches for cost-effective and market-oriented development and mass series production of stack components such as the end plate clamping system, the housing hybrid unit and the air compressor unit will be developed. Furthermore an individual fuel cell will be designed and tested and based on the results, a stack assembly system suitable for mass series production will be designed and built. Finally the prototypical stack module will be tested.

Areas of focus:

- System modules and series development of a PEM fuel cell module with transfer into synthesis configuration software
- High-strength end plate clamping system
- Functionally-integrated housing-hybrid component
- Scalable air compressor unit for FC systems
- Single fuel cells and mass production assembly, clamping and run-in process

» For this purpose synthesis configuration software will be specifically developed which will facilitate fast, efficient and cost-effective dimensioning of a stack module with respect to different requirement profiles. «

PARTNERS:
a) Technische Universität Chemnitz, Fakultät Maschinenbau, Institut für Automobilforschung, Professur Alternative Fahrzeugantriebe
b) Fraunhofer-Institut für Werkzeugmaschinen und Umformtechnik IWU
c) WÄTAS Wärmetauscher Sachsen GmbH
d) BERND FLACH Präzisionstechnik GmbH & Co.KG
e) FES GmbH, Fahrzeug-Entwicklung Sachsen

PROJECT BUDGET/€:
a) 457,843
b) 843,646
c) 478,459
d) 839,613
e) 316,090

FUNDING BUDGET/€:
a) 457,843
b) 759,281
c) 277,506
d) 461,788
e) 173,849

COMMENCEMENT:
01 July 2018

CONCLUSION:
31 March 2021

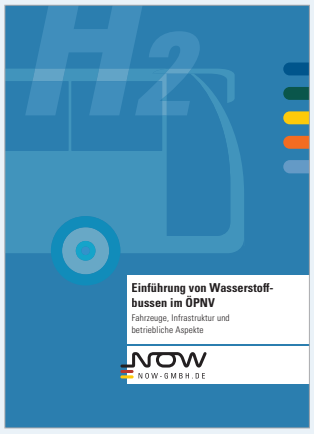
BUSES

Interest in buses with zero-emission drive systems continued to grow strongly in 2018. As an alternative to battery-powered vehicles, fuel cell buses can be used for extended distances requiring a long range as well as in topographically demanding areas. Due to the short hydrogen refuelling times, bus fleet operators will only need minor adjustments compared to conventional operation with diesel buses. This latter aspect in particular plays an important role in local public transport due to the high customer expectations regarding the reliability and punctuality of the transport service.

In order to promote the use of fuel cell buses in public transport, it is therefore necessary to test various infrastructure and operating concepts and to document the findings in order to be in a position to highlight reliable and cost-efficient applications for fuel cell buses for the bus fleet operators.

Fuel cell bus in scheduled works transport operations the Höchst industry park

INTRODUCTION OF HYDROGEN BUSES IN LOCAL PUBLIC TRANSPORT – VEHICLES, INFRASTRUCTURE AND OPERATIONAL ASPECTS



INTRODUCTION OF HYDROGEN BUSES IN LOCAL PUBLIC TRANSPORT / VEHICLES, INFRASTRUCTURE AND OPERATIONAL ASPECTS / Brochure

The handbook addresses bus fleet operators wishing to use vehicles with a hydrogen drive in their fleets. The aim is to physically give these operators a hard-copy document that features and explains the fundamental aspects of hydrogen technology in public transport, which is important for their roll-out.

As an introduction, the various bus technologies and the differences between them are described, with the focus on the necessary infrastructure in a second step, mainly the hydrogen refuelling stations. Depending on real vehicle consumption data, the technical design of the refuelling station will be discussed and aspects like space requirement and connection to the local electricity grid explained. In addition an initial classification of expected infrastructural costs will carried out.

Following an explanation of operational aspects to be considered when rolling out hydrogen refuelling buses, the contribution that can be made by hydrogen technology to climate protection and to the reduction or prevention of local harmful emissions will be highlighted. Finally an overview of current vehicle and refuelling station manufacturers will be provided and the key aspects regarding licensing of the infrastructure addressed.

RHYN-MAIN – DEVELOPMENT, TESTING AND MODELLING OF AN OPTIMAL REGIONAL CONCEPT TO USE LOCAL HYDROGEN IN PUBLIC TRANSPORT IN THE RHINE-MAIN REGION

The rHYn-main project comprises the development, testing and modelling of a regional concept to use local hydrogen in public transport in the Rhine-Main region. The objective is scientific monitoring to accompany the regional activities in the "H_2 Bus Rhein-Main" project, a subproject of the European joint initiative, JIVE. To this end the best possible H_2 logistics will be designed both operationally and in terms of refuelling fuel cell buses in the fleet parks of the associated transport companies from Mainz, Wiesbaden and Frankfurt, in order for the planned expansion of the bus fleet with alternative drives to be carried out seamlessly in future both in the Rhine-Main region and beyond.

The results obtained in the project are transferrable for other transport companies who are dealing with the introduction of alternative drives. For this purpose the important aspects of a H2FC technology ramp-up based on public transport will be summarised in a model-based hydrogen implementation plan.

The project focuses on the following goals:

- Research of all aspects of a regional H_2 value chain from the source (RE) to the wheel
- A model-based, nationwide supra-regional rollout scenario
- Integration of innovative technology in today's high-frequency operation of associated transport companies

PARTNER:
Hochschule RheinMain

PROJECT BUDGET/€:
434,461

FUNDING BUDGET/€:
434,461

COMMENCEMENT:
01 January 2018

CONCLUSION:
31 December 2020

» The objective is scientific monitoring to accompany the regional activities in the ›H_2 Bus Rhein-Main‹ project «

WABE – INNOVATIVE HYDROGEN FILLING STATION FOR THE STUTTGARTER STRASSENBAHNEN AG FOR THE RELIABLE AND COST-EFFICIENT SUPPLY OF HYDROGEN TO THE FUEL CELL BUS FLEET

As part of the WaBe project, in-house infrastructure is to be set up and tested for the reliable and cost-efficient supply of SSB AG's fuel cell (FC) bus fleet with hydrogen (H_2). To this end, SSB is establishing its own hydrogen filling station at the Gaisburg depot and using it to supply its four FC buses that are already in service. SSB is also planning a future expansion of its FC bus fleet.

Refuelling at the Gaisburg depot filling station is at a pressure of 350 bar. This allows for the use of more robust and less complex system components than is the case at 700 bar. The aim is to increase the reliability and availability of the refuelling infrastructure and reduce overall costs.

In order to assess the suitability of the H_2 filling station concept, accompanying analyses are carried out. With the help of continuous operational monitoring, it is expected that detailed findings regarding availability, suitability for everyday use, operational strategy and cost-effectiveness will be obtained.

The project documents SSB's commitment to continue using FC technology in the future. The knowledge gained is available to bus fleet operators and municipal decision-makers as well as plant manufacturers. SSB plans to use the results after the end of the project to set up H_2 infrastructure for the supply of up to 40 FC buses.

PARTNER:
Stuttgarter Straßenbahn AG

PROJECT BUDGET/€:
1,593,701

FUNDING BUDGET/€:
398,425

COMMENCEMENT:
01 January 2018

CONCLUSION:
31 December 2020

Building at an H_2 filling station with high pressure storage and compressors

Heavy commercial vehicles

Heavy goods transport involves particular challenges when it comes to switching to alternative drive systems and emission-free mobility. Characterising these types of vehicles are the strict vehicle specifications with regard to weight and dimensions as well as the closely timed use of the vehicles in both urban and extra-urban freight transport. It is here that hydrogen fuel cell systems can demonstrate their strengths: a high range and performance coupled with – when compared to battery drive systems – low vehicle weight and short refuelling times.

Besides greenhouse gas emissions, particulate matter pollution also plays a significant role in inner-city delivery transport and in waste collection and disposal services. The use of fuel cell vehicles can significantly reduce these emissions and thus make a significant contribution to better air quality in cities.

BLUEPOWER – SPECIAL VEHICLES WITH MODULAR H2FC SYSTEMS

The project will develop and manufacture a waste collection vehicle and a sweeper with a modular system of hydrogen tanks and fuel cells with the aim of increasing the range and/or improving the speed profile. The waste collection vehicles electrified at Faun can be equipped with the modular system ex works or during the vehicle's operating life.

Both prototypes are intended to examine and confirm the design and construction feasibility of the planned energy supply system and to achieve the necessary acceptance in accordance with transport regulations. After a test run, which is scheduled to begin in spring 2019, test results will be incorporated into the design of the vehicle. Subsequently, starting in late autumn 2019, a small number of field test vehicles will initially be delivered to customers. 10 waste collection vehicles and 2 sweepers are planned.

PARTNER:
Faun Umwelttechnik GmbH & Co. KG

PROJECT BUDGET/€
1,593,701

FUNDING BUDGET/€:
398,425

COMMENCEMENT:
01 January 2018

CONCLUSION:
31 December 2020

Zero emission fuel cell-based waste collection vehicle

Maritime applications

Fuel cells can not only be used in ships for the supply of on-board power, but also for propulsion in hybridised systems. In addition to high efficiency and low emissions, other important attributes of the fuel cell play an important role in shipping. The possibility of installing the system decentrally on the ship offers an significant advantage in terms of cost-effectiveness, as it optimises the utilisation of the available space. On passenger ships, the low noise and low vibration that are characteristic of the system when in operation is also a benefit for the customer. Fuels the are widely available today can be used immediately (LNG, diesel, methanol), but also electricity-based fuels (hydrogen, synthetic fuels, etc.) are also deployable. The role of fuel cells in shipping must become more prominent in the future. As part of the "e4ships" lighthouse project, the operation of fuel cells on ships was successfully demonstrated in NIP 1. In the continuation of the NIP, the demonstrator systems developed in NIP 1 are to be brought to market maturity and the development of necessary regulations at the international level is to be pursued.

E4SHIPS – CLUSTERMANAGEMENT

In the wake of further tightening of emissions regulations for ships and due to increasing environmental awareness among shipping companies and passengers, inland waterway and seagoing shipping are facing major challenges. The aim of the e4ships2 cluster management is to create the prerequisites and the corresponding regulatory framework necessary for the unrestricted use of climate-friendly fuel cell systems on board seagoing and inland waterway vessels as an environmentally friendly alternative to conventional power units.

Fuel cell systems in maritime applications can make a valuable contribution to environmental and climate protection. Besides supplying large ships with power, heat and, if necessary, cooling for hotel requirements, these systems can today also supply the complete power requirements of smaller ships. In addition, the technology contributes to the future viability of the German shipping industry. Such systems are already being intensively developed today by shipyards, shipping companies, fuel cell manufacturers, suppliers and classification bodies. The projects in the joint e4ships2 project within the National Innovation Programme Hydrogen and Fuel Cell Technology (NIP) are funded by the Federal Ministry of Transport (BMVI).

Both the International Maritime Organization (IMO) and the authorities responsible for inland navigation in Germany at the Federal Ministry of Transport and the European bodies (CCNR/CESNI) are currently shaping the conditions for the approval of fuel cells in ships, including fuels with a low flash point (IGF Code for Low Flash Point Fuels), for all European ports and waterways. Nevertheless, further framework requirements still need to be adapted to allow for the unrestricted use of fuel cells. In addition to the technological requirements for the ships and their energy supply, the issue of shore-side supply also plays an important role. This involves, for example, the technical safety as well as approvals and standardisation.

CLUSTER ADMINISTRATOR:
hySOLUTIONS GmbH

PROJECT BUDGET/€
200,930

FUNDING BUDGET/€:
100,465

COMMENCEMENT:
01 June 2018

CONCLUSION:
31 May 2019

These tasks are carried out within the framework of the e4ships2 cluster management and further concepts for the conversion of ships to climate and environmentally-friendly energy supply and drive systems using fuel cells are being developed and tested in actual operations. Work will focus on high-temperature PEM and SOFC technology for the on-board power supply of cruise ships and special ships with alternative fuels, as well as on (hybrid) drive systems for river cruise ships, ferries and other types of ships, and the use of low-temperature fuel cells (LT-PEM) on inland waterway vessels. The fuels deployed are hydrogen, low-sulphur diesel, LNG or methanol, depending on the type of fuel cell and the infrastructure available. Besides technical development work, questions relating to cost-effectiveness, safety standards, the market launch strategy and climate protection effects are also being addressed.

In addition to the activities intended to adapt the framework conditions, a platform for the professional exchange between the project partners is being established within the scope of regular project meetings. Joint communication also ensures a high level of awareness of the e4ships2 project in politics and among the general public.

A chart shown at the Zero Emission Shipping Symposium 2018

Demonstration projects:

In the **Pa-X-ell2** demonstration project, led by Meyer Werft and its project partners, a new generation of high-temperature fuel cells (HT-PEM) is being examined and developed on the basis of the results of the previous Pa-X-ell project as part of a decentralised energy network and a hybrid energy system for use on ocean-going passenger ships.

Under the leadership of thyssenkrupp Marine Systems, the **SchIBZ2** project – which is a continuation of the SchIBZ project – is testing the previously developed and constructed hybrid and diesel-powered fuel cell system on land and at sea on board the MS Forester, in order to provide comprehensive proof of the seaworthiness of the individual components and the system as a whole.

With the **MultiSchIBZ** project, thyssenkrupp Marine Systems is managing the process optimisation and further development of the fuel cell system from the SchIBZ2 project in two phases for its introduction into commercial applications.

In the **ELEKTRA** project, which is coordinated by the Technical University of Berlin, an alternative locally emission-free energy supply system for inland waterway vessels is being implemented and its economic use tested.

In the **RiverCell2** project, MEYER WERFT and its project partners are planning the modular hybridisation of the overall energy supply with fuel cells and alternative fuels for river cruise ships based on the concepts and findings developed in the predecessor RiverCell1 project.

The **Humphry Marine GmbH** project is developing a hybrid fuel cell battery drive system for recreational vessels with intelligent control.

SHIPFUEL – ELECTRICITY-BASED FUELS FOR INLAND WATERWAY USE

The study examines under which technical and economic conditions electricity-based fuels in combination with fuel cells can be sensibly utilised for inland waterway shipping. European, national and regional regulatory frameworks and operational aspects are also taken into account. The analyses also reveal specific environmental impacts and cover the entire process chain, from fuel production to transport, distribution, storage and bunkering. In addition to hydrogen (CGH_2, LH_2 and LOHC), synthetic fuels (E-LNG, E-Methanol and E-Diesel) are also investigated and evaluated within the scope of a well-to-propeller analysis for selected fuel cells (e.g. LT-PEMFC, HT-PEMFC, SOFC) and reference ships (cargo ships and passenger ships). The study also makes recommendations for possible focal points of regional application in Germany in which an early introduction of the technologies could be particularly interesting. Of pivotal importance is the dialogue held with relevant stakeholders. To this end, workshops are held in the various project phases. The most important results will be summarised in a guide for inland waterway transport operators.

» The study also makes recommendations for possible focal points of regional application in Germany in which an early introduction of the technologies could be particularly interesting.«

PARTNERS:
a) LBST
b) DNV-GL
c) IfS

PROJECT BUDGET/€:
a) 159,041.12
b) 114,906.40
c) 24,516.38

FUNDING BUDGET/€:
a) 159,041.12
b) 114,906.40
c) 24,516.38

COMMENCEMENT:
27 August 2018

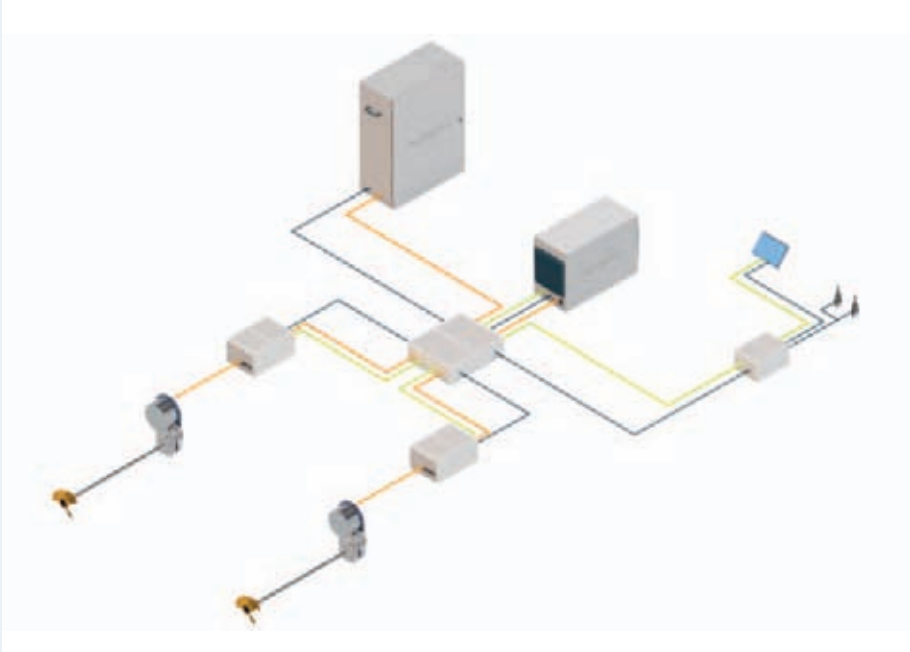
CONCLUSION:
27 May 2019

DEVELOPMENT OF A FUEL CELL BATTERY DRIVE SYSTEM FOR RECREATIONAL CRAFT

Humphry Marine GmbH is developing a fuel cell battery drive system for boats with intelligent controls. The next step in Humphry Marine's product development is the further development of the drive prototype in a model ready for series production with a full spectrum of performance. To maximise prospects for success for this advancement, the drive concept will firstly be validated and scientifically examined in the framework of this research project. This should establish the suitability of fuel cell technology and the feasibility of its integration in recreational craft in practice. The drive prototype which is developed is to be integrated in the project described here in order to test the system in a real environment.

Primarily the following tasks will be undertaken:

- Extended laboratory testing of the drive
- Integration in a recreational craft and trial on water
- Performance comparison to similar boats (battery drive and/or combustion)
- Development of a refuelling concept
- Development of transferability scenarios



Overview of drive system components in the demonstrator boat

PARTNERS:
a) Humphry Marine
b) Reiner Lemoine Institut

PROJECT BUDGET/€:
a) 72,466
b) 35,174

FUNDING BUDGET/€:
a) 47,827
b) 31,656

COMMENCEMENT:
01 October 2018

CONCLUSION:
31 June 2019

HYDROGEN PROVISION

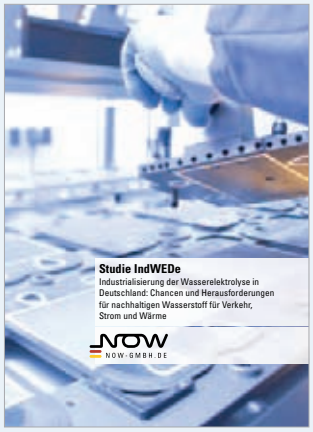
In the Hydrogen Provision programme area of NIP, demonstration projects, research and development projects as well as studies on the manufacture, storage and distribution of hydrogen are subsidised. The hydrogen will be primarily produced from renewable sources – wind and solar electricity as well as biomass – according to the targets of the energy concept. Hydrogen will be used as a fuel for fuel cell vehicles and as a storage medium for the integration of larger quantities of fluctuating renewable energies. Concrete applications also include stationary electricity reconversion, feeding-in to the natural gas network as well as its use as a climate-neutral industrial gas.

The use of regenerative hydrogen can contribute substantially to reaching the goals of the energy transition. Firstly, they enable the substitution of fossil fuels by renewable energies in the transport and energy industries to be driven forward. Secondly, the energy storage capacities are created that are urgently required for the success of the energy transition. The particular economic appeal of hydrogen as a fuel makes the creation of a lead market possible, which paves the way for energy storage and other applications. Technologically-speaking, hydrogen production by means of highly-efficient water electrolysis, mainly on the basis of surplus wind energy, forms the core of the programme area. Water electrolysis is a key technology for the integration of renewable energy in the transport and energy industries; growing and new markets for hydrogen create the precondition for tapping into considerable development potential seen in all available electrolysis technologies.

Although the tried and tested alkaline electrolysis approach is mainly used today, the technologically younger polymer electrolyte membrane (PEM) electrolysis is catching up rapidly. Demonstration projects on both technologies are being funded in the programme area. Apart from the established technologies of alkaline and PEM electrolysis, high temperature electrolysis is now also being commercially deployed. The aim of NIP activities is to achieve commercial operation of all three technologies. This ensures the possibility of efficient use of hydrogen electrolysis systems for all application scenarios.

Economic efficiency of water electrolysis systems is necessary in order to be able to exploit the advantages of hydrogen in the energy system and thus achieve decarbonisation of the sectors. For this purpose the potential of hydrogen and fuel cell technologies for the energy transition are discussed in studies and analyses. The results also help to classify the projects and other activities in the NIP and the effects which arise for the energy transition.

STUDY: INDUSTRIALISATION OF WATER ELECTROLYSIS IN GERMANY



IndWEDe STUDY/INDUSTRIALISATION OF WATER ELECTROLYSIS IN GERMANY: **Opportunities and challenges for sustainable hydrogen for transport, power and heatinge** / Brochure

The electrolysis sector must evolve into a gigawatt industry in order for the federal government's climate goals to be achieved. The technology is market-ready, therefore a further development of the sector can only be achieved with a targeted market ramp-up. For this purpose a sales market must be generated for the hydrogen produced along with an appropriate policy framework.

Those are the key findings of the study by Fraunhofer ISE, Fraunhofer IPA and E4tech: "Industrialisation of water electrolysis in Germany". The study was financed through NIP and coordinated by NOW GmbH. The results of the study were published at the beginning of June 2018 at the Federal Ministry of Transport and Digital Infrastructure.

The study shows that the electrolysis sector must prepare itself for a production capacity of up to five gigawatts per year from 2030. These capacities are necessary in order to meet the federal government's climate targets in the different sectors. There is already a market-ready technology available. The next step therefore, must be to establish and strengthen the local electrolysis sector through a stable and regular order environment.

However, today's electrolysis systems are manufactured mostly in cottage industry conditions. The study therefore addresses the question: how can the manufacture of electrolysis systems take place on an industrial scale in Germany? The derived recommendations for action for the relevant actors are summarised in a roadmap concluding the study. Apart from recommendations for the market ramp-up and on the policy framework, accompanying research and development activities to further reduce costs and to increase service life are also mentioned.

EXSAKT PROJECT

The significant reduction of climate emissions that is needed requires a massive development of regenerative electricity producers. Electricity distribution and direct use has been the focus of the energy transition so far. In the current discussion it is becoming increasingly clear that mobility also must make a far greater contribution to reducing CO_2 emissions. In this context the manufacture and use of hydrogen (H_2) by means of water electrolysis plays a central role. H_2 can be generated highly efficiently (>75 %) and used in efficient fuel cells. Furthermore H_2 can be used as a basis for numerous synthetic fuels or basic chemicals (power-to-liquid, PtL). In order to improve the overall efficiency (and costs) of H_2 production (and subsequently also of CO_2-based liquid fuels), further research work is required in order to examine and analyse the behaviour of fuel cell and electrolysis cell catalysts under different application conditions. In this regard, data obtained by X-ray photoelectron spectroscopy (XPS) is extremely important. The XPS method is particularly suited to determining mainly the chemical composition of catalysts and their surface structure. The overarching goal of the ExsAKt project is the experimental investigation of electrocatalytic materials predominantly from the use of the surface-sensitive technology, XPS. This project will support OEMs as well as electrocatalyst firms in material development and thus contribute to market activation.

PARTNER:
Fraunhofer ISE

PROJECT BUDGET/€:
2,342,652

FUNDING BUDGET/€:
2,108,387

COMMENCEMENT:
01 June 2018

CONCLUSION:
31 May 2021

» The overarching goal of the ExsAKt project is the experimental investigation of electrocatalytic materials predominantly from the use of the surface-sensitive technology, XPS. «

HYDROFLOW – DEVELOPMENT OF A CALIBRATABLE, HIGH-PRECISION CORIOLIS MASS FLOW METER FOR HYDROGEN FILLING STATIONS

Sub-project: Development of the measurement and evaluation units and structure of the overall system

The aim of the project is the development of a high-precision mass flow meter for the dispensing of hydrogen at the pump of H_2 filling stations. For the first time, a verifiable product with a calibration error limit of ±0.5% (according to the Measuring Instruments Directive MID 2014/32/EU) is aimed for. The following aspects must be taken into account:

- Robustness, tolerance and metrological stability of the sensor to the given pressure and temperature fluctuations (pressure changes from 20 bar to up to 900 bar in 3 minutes, temperature changes in the range from +50 °C to –45 °C in less than one minute)
- Fast acquisition and assessment of measured values by the evaluation electronics (measured value changes in the event of pressure surges in the millisecond range)
- High degree of functional safety (SIL 2/3) in accordance with EN IEC 61508 for the entire measurement system through appropriate design and internal monitoring and diagnostic functions
- Consideration and compensation of possible aging and drift processes of sensors and electronics on the basis of correspondingly validated algorithms and processes
- User friendliness and ease of maintenance
- Compliance with the above-mentioned properties even under extreme conditions – in order to achieve/maintain the desired calibration approval, the measuring system must demonstrate the required accuracy over a long operating period, even under extreme environmental conditions (e.g. in Siberia)

PARTNERS:
a) KEM Küppers Elektromechanik GmbH
b) KEM Küppers Elektromechanik GmbH
c) Hochschule Offenburg – Hochschule für Technik, Wirtschaft und Medien
d) Hochschule Offenburg – Hochschule für Technik, Wirtschaft und Medien

PROJECT BUDGET/€:
a)120,000
b)1,018,011
c) 64,556
d) 325,054

FUNDING BUDGET/€:
a) 60,000
b) 509,005
c) 64,556
d) 325,054

COMMENCEMENT:
01 May 2018
01 January 2019
01 May 2018
01 January 2019

CONCLUSION:
31 December 2018
31 December 2020
31 December 2018
31.December 2020

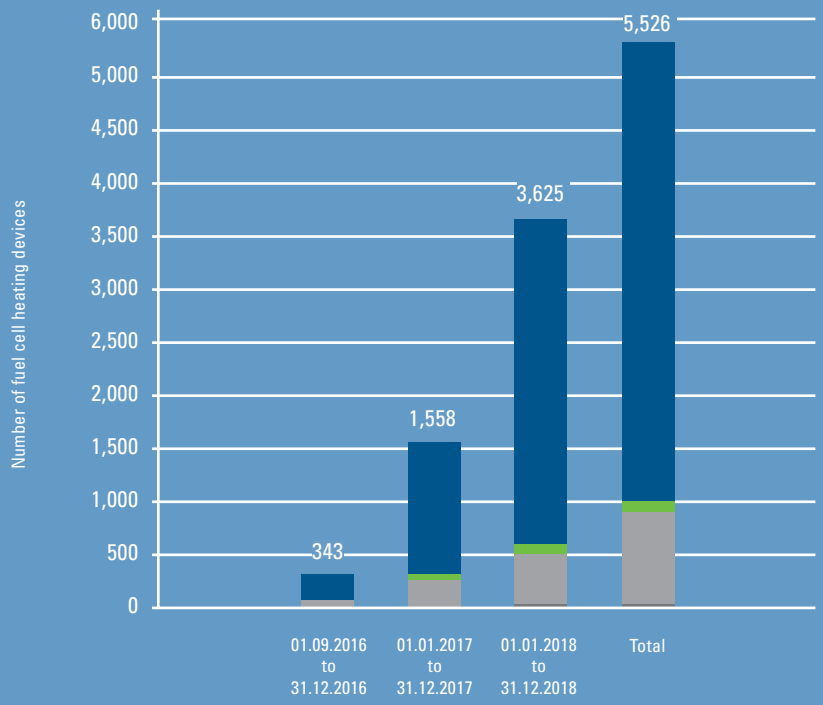
Refuelling hydrogen:
easy – fast – safe

STATIONARY ENERGY SUPPLY

Household energy

In the household energy area, fuel cells are used as micro-combined heat and power (μCHP) systems in the power range between a few 100 W and several kW. They normally supplement conventional heating devices and provide electricity as well as the required heat. Through highly efficient generation of electricity, in this way up to 40% less CO_2 can be generated compared to conventional solutions for heat generation and electricity drawn from the grid. The systems currently available can be operated with natural gas and therefore can be directly integrated into the heating market. Over the medium to long-term, operation with other fuels e.g. hydrogen) is possible as well. Together with the flexible control options, the fuel cell offers an optimal solution for energy conversion, also for the heating markets of the future. In NIP 1, fuel cell heating devices were introduced to the market through the funding of development projects and field tests such as Callux. The BMVI funding guideline "Fuel cells for highly-efficient combined heat and power systems" ensured that some commercial fuel cell heating devices could be installed. Since September 2016, the systems have been funded through the 433 KfW programme "Energy-efficient building and rehabilitation – fuel cell grant" under the NIP. According to the KfW annual report, over 5,526 funding approvals for fuel cell heating devices were issued by the end of 2018.

Status of funding approvals in the 433 KfW programme (TEP:Technologieeinführungsprogramm, Technology introduction programme)



Renovation of residential buildings	241	1,237	3,030	4,508
Renovation of non-residential buildings	0	29	88	117
New construction of residential buildings	102	287	484	873
New construction of non-residential buildings	0	5	23	28

Source: KfW funding report

Industry and trade

Fuel cell modules for industry and commercial applications can represent an electrical output of a few kW to several hundred kW. By combining modules, electrical outputs in the multi-megawatt range can be achieved. Depending on the application and technological maturity, the most diverse types of fuel cells are deployed. Fuel cells with high operating temperatures are particularly suitable for combined heat, cooling and power and thus for use in industrial processes (cold storage, breweries, laundries, etc.) or applications with high energy requirements (hospitals, office buildings, hotels, etc.). Through their high efficiency and low emissions over the entire load range, the systems are ideally suited to decentralised use in metropolitan areas. In this way large fuel cell systems can play a key role in future energy systems. In the continuation of NIP, large stationary fuel cells will be funded within the Energy Research Programme right up to demonstrator phase.

SPECIAL MARKETS

With regard to NIP 2, the term *Special markets* essentially covers the following areas of activity:

- Electricity supply business (Emergency power supply (UPS), off-grid power supply, autarchic/hybrid power supply, emergency generating units, e.g. in the areas of telecommunications, information technology, traffic guidance technology, transmission network and distribution network operation)

- Intralogistical vehicles (industrial trucks such as cargo tractors, lift trucks, conveyer belt cars, fortlift trucks, tugger trains, baggage tow tractors at airports)

Apart from activities in the areas of R&D and market activation, the breakthrough of fuel cell technology will be made through the networking of actors exchanging experiences in two innovation clusters. In Clean Logistics Net (CIN), 13 companies have joined forces for their vision of a hydrogen-operated intralogistics sector. For the 22 partners of Clean Power Net (CPN), reliable and environmentally-friendly electricity supply to industry and business is at the core of their interest.

CLEAN POWER NET (CPN) INNOVATION CLUSTER – FUEL CELL TECHNOLOGY IN INDUSTRY AND BUSINESS

Clean Power Net (CPN) is in operation since the beginning of 2018 as an open and cross-sectoral innovation cluster under the National Innovation Programme Hydrogen and Fuel Cell Technology (NIP 2). In general, CPN pursues the following objectives:

- Interdisciplinary cooperation as well as increased networking,
- Creation as well as use of synergy potential,
- Generation of scale effects in procurement as well as manufacturing processes,
- Strengthening of national and international cooperation within Europe and simplifying market activation, preparation and introduction,
- Creation and deepening of trust in innovative, future-oriented and eco-efficient fuel cell technology in expert circles of the relevant national, European and international industry sectors, such as IT, telecommunications, industrial process automation and control technology, traffic control technology as well as energy supply/ distribution grid operation, especially as the strategic goal of the export market.

Within the CPM innovation cluster project, superordinate tasks are bundled as an "umbrella" over all individual subprojects in the NIP area: "Critical infrastructure electricity supply". These superordinate tasks include for example communication (external and internal), market preparation, knowledge exchange, and the administrative tasks of the lighthouse project.

In May 2018 the user workshop "Fuel cells as reliable energy supply – a workshop for decision-makers from the energy and water industry" took place in Düsseldorf – with EnergieAgentur.NRW, BDEW NRW, Stadtwerke Düsseldorf and NOW GmbH. In June 2018 the user workshop "Planning secure energy supply solutions that are innovative, energy-efficient and CO_2-reduced with fuel cell technology" took place in Stuttgart with e-mobil BW, Baden-Württemberg Chamber of Engineers and NOW GmbH. With a total of around 100 participants the events were well attended and led to a rise in new users and further market activation.

In addition, the CPN network contributed to the enhanced visibility of the technology, whereby a CPN presentation took place in the framework of the general assembly of the VDMA AG Brennstoffzelle in Dresden (Feb 2018), the 2018 Fuel Cell Expo in Tokyo, Japan (Feb 2018) and the Hannover Messe ("Hydrogen & Fuel Cells Group Exhibit" in Hanover, April 2018). The cross-linking with other industry segments, e.g. ZVEI, VDMA, AG Flughäfen, CEP and CIN rounded off these activities.

CLUSTER ADMINISTRATOR:
EE ENERGY ENGINEERS GmbH

CPN partners
adKor GmbH
Anleg GmbH
DB Bahnbau Gruppe GmbH
Eltek Deutschland GmbH
ENERTRAG AG
fischer eco solutions GmbH
Forschungszentrum Jülich
GenCell Power Center, Europe
HOPPECKE Batterien GmbH & Co. KG
HPS Home Power Solutions GmbH
Hydrogenics GmbH
HYREF GmbH
KOSTAL Industrie Elektrik GmbH
new enerday GmbH
PASM GmbH
Proton Motor Fuel Cell GmbH
VERTIV GmbH
SFC Energy AG
Siqens GmbH
Zentrum für Brennstoffzellen Technik ZBT GmbH
Zentraldienst der Polizei Brandenburg
Zentrum für Sonnenenergie- und Wasserstoff-Forschung Baden-Württemberg (ZSW)

PROJECT BUDGET/€:
254,924

FUNDING BUDGET/€:
127,462

COMMENCEMENT:
01 January 2018

CONCLUSION:
31 December 2020

CPN partnerd at the user workshop in Düsseldorf

H2FFZ_2 – INTEGRATION OF FUEL CELL POWERED INDUSTRIAL TRUCKS OF VARIOUS PERFORMANCE CLASSES INTO THE THREE-SHIFT OPERATION OF DAIMLER AG

The project continues the activities of the evaluation of materials handling vehicles in the operational logistics of the Daimler production site Düsseldorf from Phase 1 (period 2012 – 2016).

Phase 2 will explore how hydrogen and fuel cell technology can be integrated into three-shift operations and what economic and operational benefits can be achieved compared to other drive technologies, using a diversified fleet comprising vehicles of different sizes and power classes (2 t to 5 t/24 to 80 V) and including an extension of the refuelling infrastructure. For the first time, industrial trucks of the 5t class are used and operated in the challenging three-shift operation of intralogistics. In a direct comparison with a diesel and battery-powered 5 t forklift, the technical suitability of the vehicle will be demonstrated and evaluated, showing which operational, ecological and economic advantages and disadvantages result from the operation of this vehicle class. The findings from this project can provide important impulses for the further development of the domestic market for a diversified product range for the realisation of "green logistics".

PARTNER:
Daimler AG

PROJECT BUDGET/€:
3,710,000

FUNDING BUDGET/€:
1,740,000

COMMENCEMENT:
01 June 2018

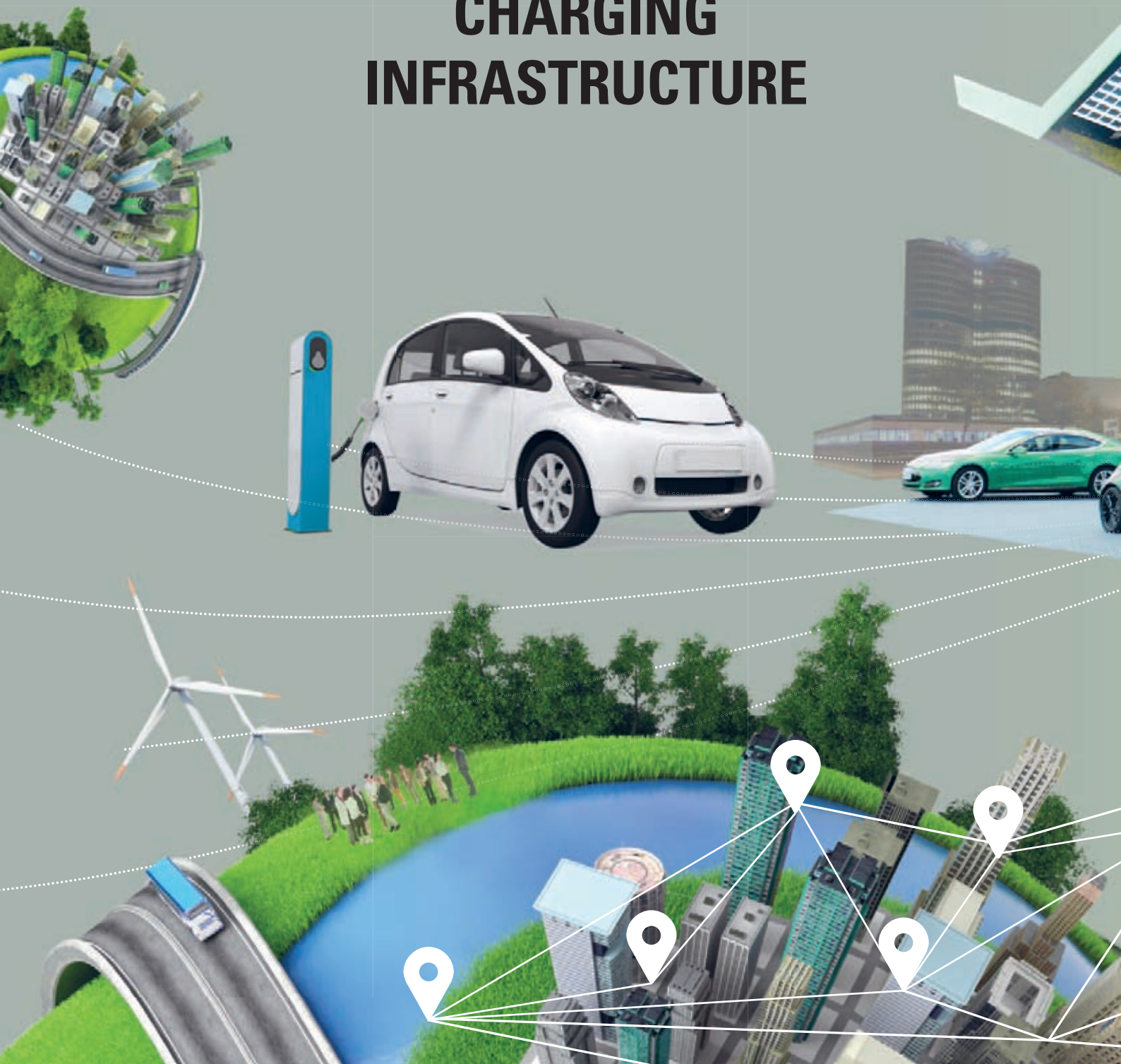
CONCLUSION:
31 January 2021

Refuelling a materials handling vehicle with hydrogen

Forklift with fuel cell drive used for on-site logistics transport

» The findings from this project can provide important impulses for the further development of the domestic market for a diversified product range for the realisation of ›green logistics‹. «

II. FEDERAL FUNDING CHARGING INFRASTRUCTURE



NEWLY APPROVED PROJECTS

COMPLETED PROJECTS

FEDERAL FUNDING PROGRAMME CHARGING INFRASTRUCTURE FOR ELECTRIC VEHICLES IN GERMANY

Implementation 2018

A key prerequisite for the further expansion of electric mobility in Germany is the presence of a nationwide charging infrastructure that is also available outside of urban areas and dimensioned with sufficient charging points at the respective locations. The customer's demand of not having to wait to access a charging point in addition the time required for the actual recharging procedure must be taken into account by making an accurate appraisal of the demand for the required charging points, especially with regard to the fast-charging infrastructure. For many people, the purchase of an electric vehicle is only an option if they can recharge it within an acceptable timeframe, in a user-friendly manner and in their immediate vicinity. The development of a nationwide, demand-oriented charging infrastructure has therefore played a pivotal role since the very beginning of the electric mobility activities of the Federal Ministry of Transport and Digital Infrastructure (BMVI – Bundesministerium für Verkehr und digitale Infrastruktur) and ultimately lead to the launch of the BMVI funding programme "Charging Infrastructure for Electric Vehicles in Germany" (Ladeinfrastruktur für Elektrofahrzeuge in Deutschland) in February 2017.

This increase in importance was recognised by NOW as early as 2016, when it founded the Charging Infrastructure Department within its Transport Division, where the number of employees was also increased in 2017 in the run-up to the launch of the new Charging Infrastructure funding guideline (Förderrichtlinie Ladeinfrastruktur – LIS). The primary tasks involve the coordination and implementation of the "Charging Infrastructure for Electric Vehicles in Germany" funding programme of the Federal Ministry of Transport, Innovation and Technology (BMVI), the methodologically-based assessment of public charging requirements using the location tool, coordination of the associated accompanying research, technical support for the "Elektromobilität vor Ort" funding programme for local electric mobility, preparation of statements and strategy papers, and intensive networking and coordination with technical bodies and other stakeholders. An additional core area of focus is the initiation, development and coordination of a new location tool for alternative fuel infrastructure, in particular for charging infrastructure. The tool should assess the need for infrastructure for alternative fuels, in particular charging infrastructure, hydrogen, LNG and CNG. In addition, it shall also be capable of depicting existing publicly accessible locations in the area of normal and fast charging as well as location data for the alternative fuels hydrogen and natural gas. External events also actively promote the BMVI's funding programmes for charging infrastructure, such as the nationwide information campaign regarding the 3rd funding call.

LIS Campaign 3rd Call

Event at the Hop Museum Wolznach

Sebastian Lahmann in the expert forum at the be-connected conference

The BMVI's funding guideline on charging infrastructure, which came into force on 15 February 2017, makes a key contribution to establishing a needs-based network of charging stations nationwide. The aim of the programme is to build at least 5,000 fast charging stations and 10,000 normal charging stations by the end of 2020. The BMVI has allocated 300 million euros in funding for this purpose.

In 2017, two funding calls were conducted. In the first call, funding was awarded on a first come, first served basis. A total of 1,316 applications for funding were received. These applications were submitted by municipalities, municipal enterprises as well as companies in the private sector and were evenly spread across the regions of Germany (see figure below):

1st funding call:
Approved normal and fast charging points by federal state (As at 1 January 2019)

NCP ≤ 22 kW FCP > 22 kW	Approved		In operation	
	NLP	SLP	NLP	SLP
Baden-Wurttemberg	841	331	76	33
Bavaria	994	333	258	15
Berlin	-	13	-	-
Brandenburg	80	42	39	2
Bremen	66	32	2	2
Hamburg	545	61	4	1
Hesse	262	75	46	7
Mecklenburg-Western Pomerania	35	13	14	-
Lower Saxony	787	113	87	10
North Rhine-Westphalia	2,665	186	134	17
Rhineland-Palatinate	419	127	22	3
Saarland	6	8	-	-
Saxony	137	47	27	8
Saxony-Anhalt	16	52	6	-
Schleswig-Holstein	254	24	35	7
Thuringia	157	44	83	29
Total	**7,264**	**1,501**	**833**	**134**

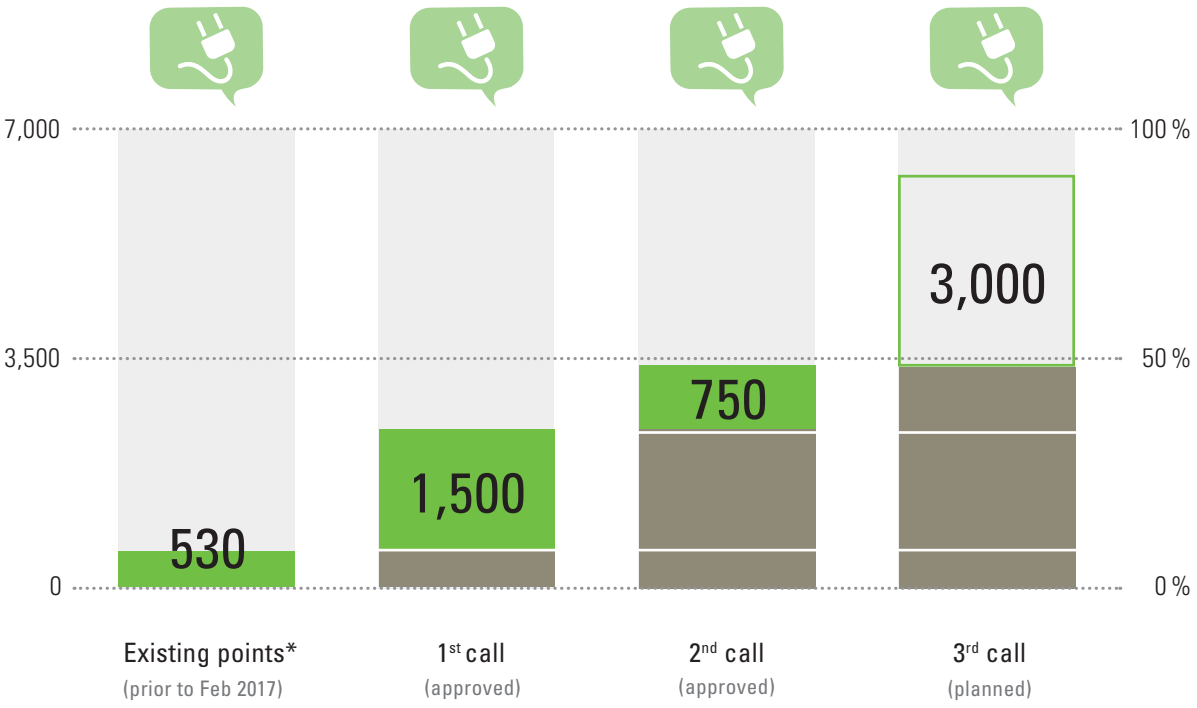
With 1,591 applications received, the second funding call was even more successful. The volume of funding applied for amounted to 135 million euros. In particular, the applications for the establishment of fast charging infrastructure with charging performance of 150 kW significantly exceeded the available budget. The Federal Institute for Administrative Services (BAV – Bundesanstalt für Verwaltungsdienstleistungen) is presently assessing applications in accordance with the principle of economic viability, i.e. applications with the lowest requested subsidy amount per kW charging capacity are approved first. These are subdivided according to federal states and between fast and normal charging infrastructure. A total of around 15,000 charging points have been approved from the two funding calls.

2nd funding call:
Approved normal and fast charging points by federal state (as at 1 January 2019)

NCP ≤ 22 kW FCP = 150 kW	Approved	
	NLP	SLP
Baden-Wurttemberg	1,554	128
Bavaria	967	119
Berlin	34	8
Brandenburg	231	2
Bremen	7	2
Hamburg	13	2
Hesse	281	67
Mecklenburg-Western Pomerania	95	16
Lower Saxony	643	71
North Rhine-Westphalia	812	163
Rhineland-Palatinate	323	73
Saarland	104	11
Saxony	373	24
Saxony-Anhalt	191	25
Schleswig-Holstein	336	26
Thuringia	98	20
Total	**6,062**	**757**

The third funding call was published on 19.11.2018, allowing applications for the funding for publicly accessible charging stations to be submitted again from 22.11.2018 to 21.02.2019. With the third call of the federal programme for charging infrastructure, the Federal Ministry of Transport and Digital Infrastructure (BMVI – Bundesministerium für Verkehr und digitale Infrastruktur) is promoting the construction of up to 10,000 normal and 3,000 fast charging points. Around 70 million euros are available for this funding call alone. In this call for proposals, the location tool was used for the first time. The regional distribution of the charging points to be supported is based on the location tool's calculation of needs. Two maps depict Germany in 283 tiles, with each tile representing an area of 40 km x 40 km, and having a maximum contingent of normal charging points (N-CP) and fast charging points (F-CP) respectively. The "F" (fast charging) map is divided into blue and yellow areas. The blue area shows an increased demand, the yellow area a lower demand. Accordingly, the areas will be assigned different funding quotas.

On the path to 7,000 fast charging points



* Source: BDEW November 2018

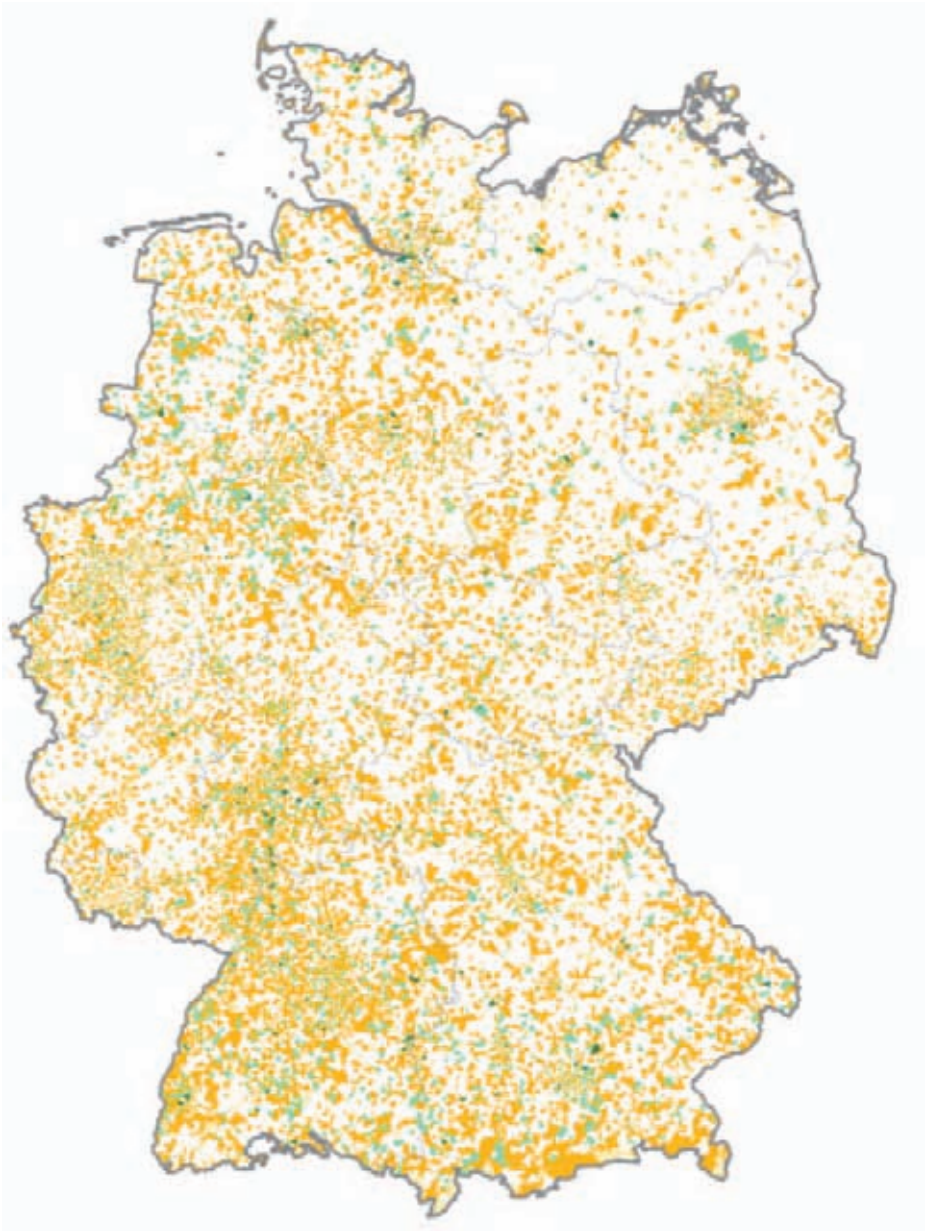
Directive 2014/94/EU on Alternative Fuels Infrastructure Directive (AFID) promotes the appropriate provision of infrastructure for the alternative fuels electricity, hydrogen and natural gas in all EU member states. In the resulting National Strategic Framework for Germany, the goal was defined to establish 7,000 fast charging points and 36,000 normal charging points. In order to achieve these goals, the BMVI initiated the Charging Infrastructure Funding Guideline for Electric Vehicles (Förderrichtlinie Ladeinfrastruktur für Elektrofahrzeuge) together with the support of NOW.

LOCATION TOOL FOR ALTERNATIVE FUEL INFRASTRUCTURE

To enable drivers to travel any route in Germany without major detours and to ensure that sufficient charging points are available and planned throughout the country, the BMVI, with the help of NOW, invited tenders for the creation of an EU-wide location tool. The contract was awarded in 2018 to the consortium Ingenieurgruppe IVV Aachen, the Institute of Urban and Transport Planning (ISB – Institut für Stadtbauwesen und Stadtverkehr) of RWTH Aachen University, the German Aerospace Center (DLR – Deutsches Institut für Luft- und Raumfahrt) and the Reiner Lemoine Institute (RLI).

The location tool is used for planning alternative fuel infrastructure networks and evaluating individual measures. The modelling methodology compiles various indicator groups to both depict and spatially locate (potential) users of electric mobility and their mobility needs in a specialised, nationwide transport model. Combined with information about spatial structures and analyses, the distribution of vehicles, the pre-existing charging infrastructure and (transport) infrastructure, a foundation is laid for further modelling steps.

Potential output on the predefined categorisation



* Source: ISB 2018

The modular structure of the model makes it possible to integrate additional framework conditions such as different forecast years and to calculate these in scenarios. The determination and calculation of future needs is based on the indicators mentioned above. From this, suitable locations are derived and shown on corresponding maps. In the future, the results will be aggregated and presented on a website.

ACCOMPANYING RESEARCH IN THE FIELD OF "CHARGING INFRASTRUCTURE"

The charging infrastructure accompanying research team started its work in spring 2018. The aim of the research is to derive from it recommendations for action for the national expansion strategy in the field of charging infrastructure in Germany.

Research topics

Among the research topics explored by the accompanying research is the impact of policy measures on the expansion of charging infrastructure both in Germany and in other pioneering countries in the field of electric mobility. The focus here is on monitoring the BMVI's federal funding programme for charging infrastructure, whereby various data on the locations, equipment, capacity utilisation and economic efficiency of supported charging stations are compiled and evaluated. Further areas of research include technical developments and challenges as well as the identification of requirements of particular user groups in the area of charging infrastructure.

Activities

In 2018, the accompanying research team organised two workshops on the topics of e-taxis as a special user group for charging infrastructure and parking space sensors as a technical solution for increasing the availability of parking spaces at charging stations. In addition, the team also conducted a fact-finding mission to the Netherlands to engage in a bilateral exchange on densification strategies and planning tools to identify suitable sites for new charging infrastructure.

Furthermore, a new online platform for reporting on the funded charging stations was designed and established within the scope of the accompanying research. Entitled OBELIS – Online-Berichte Ladeinfrastruktur (Online Reports Charging Infrastructure), it will serve to advance the accompanying research database and to provide data for the location tool from the time of its planned activation in February 2019.

Recharging made easy

FASTNED: ICONIC FAST-CHARGING STATIONS ON MOTORWAYS AND IN CITIES

Fastned is a company that is building a European network of fast-charging stations at which all electric vehicles can be recharged. The electricity used for this purpose stems 100% from renewable energy. The stations are located at busy locations along motorways and in cities, allowing electric vehicles to be recharged in just a few minutes.

The goal of Fastned is to establish a network of 1,000 fast-charging stations in Europe. This will give the drivers of electric vehicles the freedom to travel across the entire continent. Fastned currently operates over 80 charging stations in the Netherlands and Germany, and is preparing to build additional fast charging stations in these countries as well as in the UK and Belgium, too.

In September 2017, Fastned received funding of 4.12 million euros from the BMVI for establishing the German market. This support has enabled the construction of a large number of fast-charging stations incorporating the latest generation of charging equipment and has significantly accelerated market entry in Germany.

The funding enables companies such as Fastned to set up the necessary charging infrastructure at an early stage, even before the number of electric vehicles is very high. This avoids the "chicken or the egg" dilemma (i.e. drivers will not purchase electric vehicles as long as there is no appropriate charging infrastructure and investors will hesitate establishing infrastructure as long as there are only very few electric vehicles on the roads). In 2018, Fastned was able to set up 8 stations in Germany with the help of the funding, with many more under construction or planned for 2019.

PARTNER:
Fastned Deutschland GmbH & Co. KG

PROJECT BUDGET/€:
4,120,000

COMMENCEMENT:
01 September 2017

CONCLUSION:
31 December 2019

Michiel Langezaal, CEO of Fastned:

"We are very happy that the German government has initiated this programme because it brings forward the break-even point, making it more attractive for investors to invest in this green infrastructure. In the next few years, billions of euros will need to be invested in this infrastructure to provide charging capacity for the rapidly increasing numbers of EVs on European roads. Germany is central for our ambitions to create a European charging network and this subsidy really helps to accelerate the roll-out of stations in the centre of Europe."

With the development of such a network of fast-charging stations, Fastned is responding to the exponentially increasing number of electric cars in Europe. As a result of falling battery prices, a growing number of affordable electric cars with a larger battery and greater range are coming onto the market. This makes it possible to travel further distances by car, but also increases the need for fast charging infrastructure that can be used to quickly recharge these vehicles. Thanks to the stations, charging becomes more and more comparable to conventional refuelling, only that the energy for it comes from the sun and wind.

The iconic Fastned fast-charging stations feature a construction made of certified wood and a roof made of solar cells. Due to their modular design, the stations can be easily expanded. With their generous clearance height, the stations are highly visible, and are suitable for passenger cars and larger electric vehicles alike.

The charging procedure can be started by the Fastned app or with a charging card. In addition, autocharge is possible on all fast chargers (i.e. the procedure automatically commences after insertion of the plug). Billing is via a charging card, EC card or credit card.

First Fastned filling station in Limburg

PFALZWERKE DRIVES THE ON-GOING EXPANSION OF CHARGING INFRASTRUCTURE FORWARD

Over the past few years, Pfalzwerke AG has steadily invested in the infrastructure for electric mobility and expanded its network with various partners. The company currently operates the largest public fast-charging network for passenger cars in the region and is actively involved in the expansion of the charging infrastructure. A total of 350 charging points for electric vehicles are to be in operation by the year 2020. Pfalzwerke AG is allocating an investment volume of up to 5 million euros for the expansion of the charging infrastructure until 2019. To date, almost 1 million euros of support has been approved under the first and second calls for funding from the BMVI's federal charging infrastructure funding programme. Further funding applications are in preparation.

Depending on the location, either fast or normal charging columns are installed. For the fast-charging columns, Pfalzwerke currently uses 50 kW triple chargers, which are equipped with a Type 2 plug for AC charging as well as one CCS and one CHAdeMO plug each for DC charging. The standard charging points each have two Type 2 sockets as well as two SchuKo sockets. At all Pfalzwerke charging points, customers can use various options for authorisation and billing. In addition to scanning a QR code on the column, a mobile website and the Freshmile Charge App, the Pfalzwerke RFID Card can also be used. An EC-Card terminal is also installed on fast-charging columns for easy payment.

In order to be capable of promoting e-mobility as a whole, Pfalzwerke established its subsidiary Freshmile Deutschland. Besides taking care of the Pfalzwerke charging points, the company also offers operational services 24/7 along with intelligent billing services for charging point operators throughout Germany.

PARTNER:
Pfalzwerke AG

PROJECT BUDGET/€:
Up to 5,000,000

FUNDING BUDGET/€:
Close to 1,000,000 approved, further funding applications in preparation

COMMENCEMENT:
01 March 2017

CONCLUSION:
31 December 2020

To date, more than half of the sites receiving funding support have already commenced operations. A total of 110 passenger car charging points have been built so far, of which 82 are fast charging points and 26 are normal charging points. Approximately another 100 charging points will be added in 2019. Pfalzwerke also provides a free recharging network for e-bikes, with over 120 stations in the region.

Pfalzwerke cooperates with partners from the municipal and commercial sectors in the development of the locations. Through partnerships, as with the DIY chain Hornbach or retail companies such as WASGAU, the aim of densifying the electricity refuelling station network is being pursued on an ongoing basis, nationwide. The company now also offers private and business customers a comprehensive product portfolio in the field of electric mobility, extending from wallboxes including installation services and favourable electricity tariffs for e-mobility users to complete charging concepts for companies and fleets. Over and beyond electric mobility, Pfalzwerke is also exploring the mobility concepts of the future, such as currently the infrastructure for hydrogen filling stations.

Supported charging station with protective posts

SWE ENERGIE CREATES THE FOUNDATION FOR THE TRANSITION IN MOBILITY

Tomorrow's mobility will differ fundamentally from that of today, both in terms of vehicle technology and user behaviour. Electric mobility is a major element of the mobility transition. This creates new opportunities and potentials for the supply of energy, transport, urban planning and business.

The expansion of public charging infrastructure has already been underway in Erfurt for many years. Drawing on the 2016 charging infrastructure study commissioned by the Thuringia Ministry for the Environment, Energy and Nature Conservation (TMUEN – Thüringer Ministerium für Umwelt, Energie und Naturschutz), SWE Energie GmbH has developed a concept for charging infrastructure until 2020.

The concept forms the basis for planning the location of AC and DC charging stations in the state capital.

In this context, a funding application for 9 sites was submitted in the 1st call for proposals of the BMVI's Federal Charging Infrastructure (LIS) programme.

The funding enabled five charging points with two AC charging points of 22 kW each as well as four triple chargers with a DC charging point of 50 kW and an AC charging point of 22 kW, to be set up in the city area. The locations are situated both in the centre and on the outskirts of Erfurt. Cooperation partners include shopping centres and car dealerships, for example.

PARTNER:
SWE Energie GmbH

PROJECT BUDGET/€:
235,000

FUNDING BUDGET/€:
76,000

COMMENCEMENT:
05 July 2017

CONCLUSION:
05 July 2018

There are two options for authorisation at the charging stations for the customer: They can either use the SWE Energie GmbH charging card or an app. The latter enables barrier-free ad-hoc access, which is possible without any contractual obligation.

At present, in its capacity as a public charging infrastructure operator, SWE Energie GmbH operates 45 public charging points. Further charging stations are planned for 2019. The first electric filling station with two DC charging points and one AC charging point is to be built in Erfurt.

The Thüringenhalle charging station

WEMAG CONTINUES EXPANSION OF OWN CHARGING INFRA-STRUCTURE

Some five years ago, WEMAG commenced installing the nation's first recharging columns. By 2017 there were already 28 such units installed. Thanks to the funding received from the federal government last year, at least 60 additional WEMAG charging points will be able to start operating by mid-2019.

The first new charging station was put into operation by WEMAG in Neustadt-Glewe in mid-2018. It is located on the market square, right in the city centre and can be conveniently used by all electric vehicle owners. This is not least made possible through the modern payment system: "The electricity can be paid for using all common charging cards for electric vehicles, via app with the EC card or credit card, and also through SMS via the mobile phone contract or a prepaid card," explains Thomas Murche, Chief Technical Officer of WEMAG.

"Mecklenburg-Western Pomerania is the state of renewable energy. Besides incorporating an electricity transition, the energy transition must also involve a transition in the areas of heating and mobility in order to achieve the German and European climate protection targets. I am grateful for the WEMAG initiative and the expansion of charging infrastructure in the western region of our state, because a comprehensive charging infrastructure is essential in order to make electric cars suitable for everyday use."

Christian Pegel – Minister for Energy, Infrastructure and Digitalisation in Mecklenburg-Western Pomerania

Public parking spaces from which tourist attractions, restaurants, shops or the workplace are within easy walking distance, have been chosen as the locations. The most important requirement, however, is proximity to a transformer station. "With our initiative, we seek to increase the appeal of the municipalities and create the necessary infrastructure for more electric mobility," highlights Thomas Murche. A further advantage for the municipality and the region is that electric vehicles not only reduce noise emissions, but also exhaust emissions, thus making an important contribution to climate protection.

PARTNER:
WEMAG AG

PROJECT BUDGET/€:
367,577,69

FUNDING BUDGET/€:
146,125,98

COMMENCEMENT:
01 November 2017

CONCLUSION:
01 June 2019

"For some years now, we have also been developing product solutions for private and commercial customers as well as for municipalities. Our portfolio ranges from pure consulting services as well as the delivery and installation of charging technology through to technical operations management and billing."

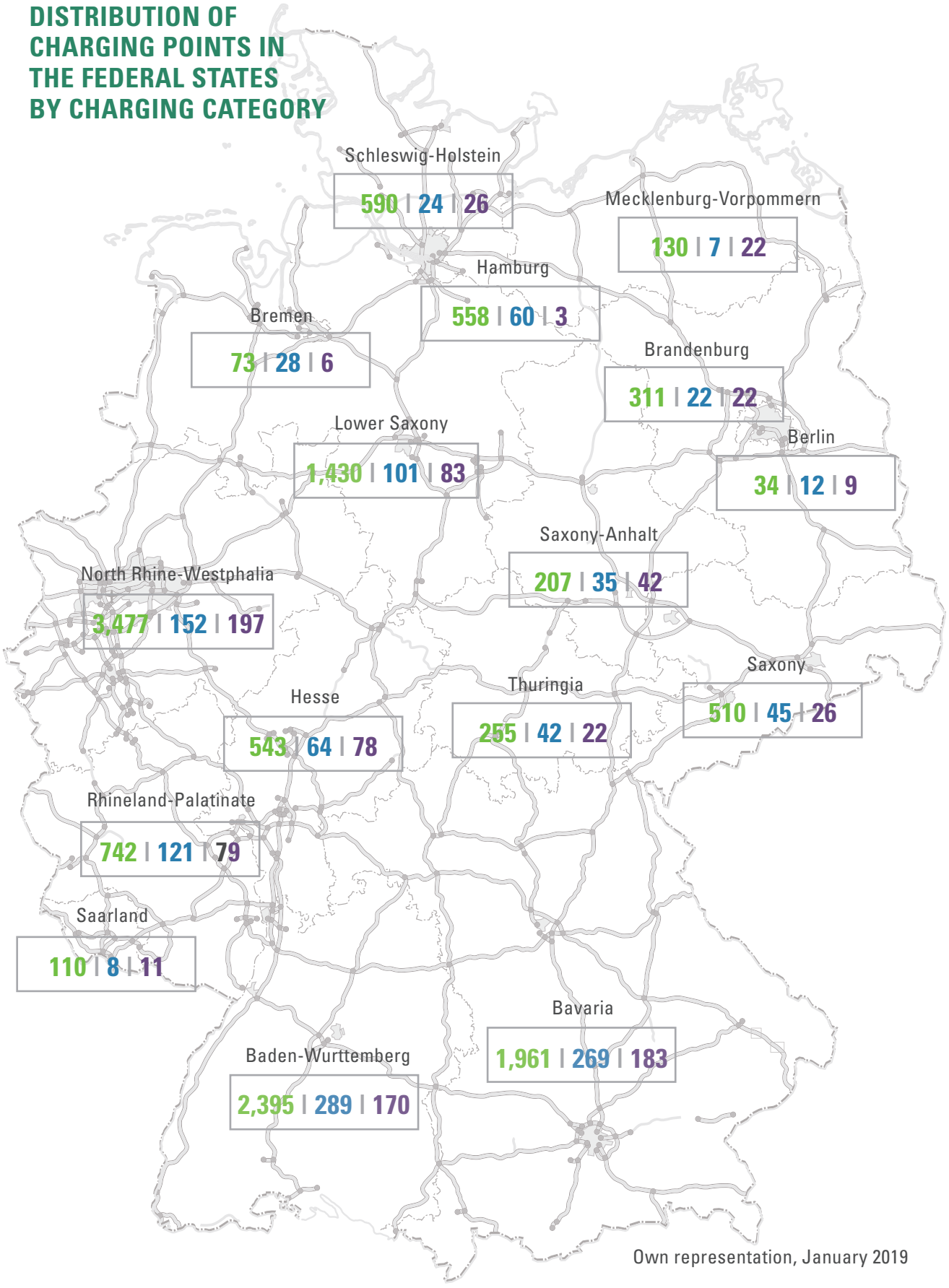
Thomas Murche – Chief Technical Officer of WEMAG AG

WEMAG is aiming to operate more than 150 charging points in Mecklenburg-Western Pomerania by mid-2019.

Inauguration of the WEMAG charging station

Simple recharging
in the inner city

DISTRIBUTION OF CHARGING POINTS IN THE FEDERAL STATES BY CHARGING CATEGORY

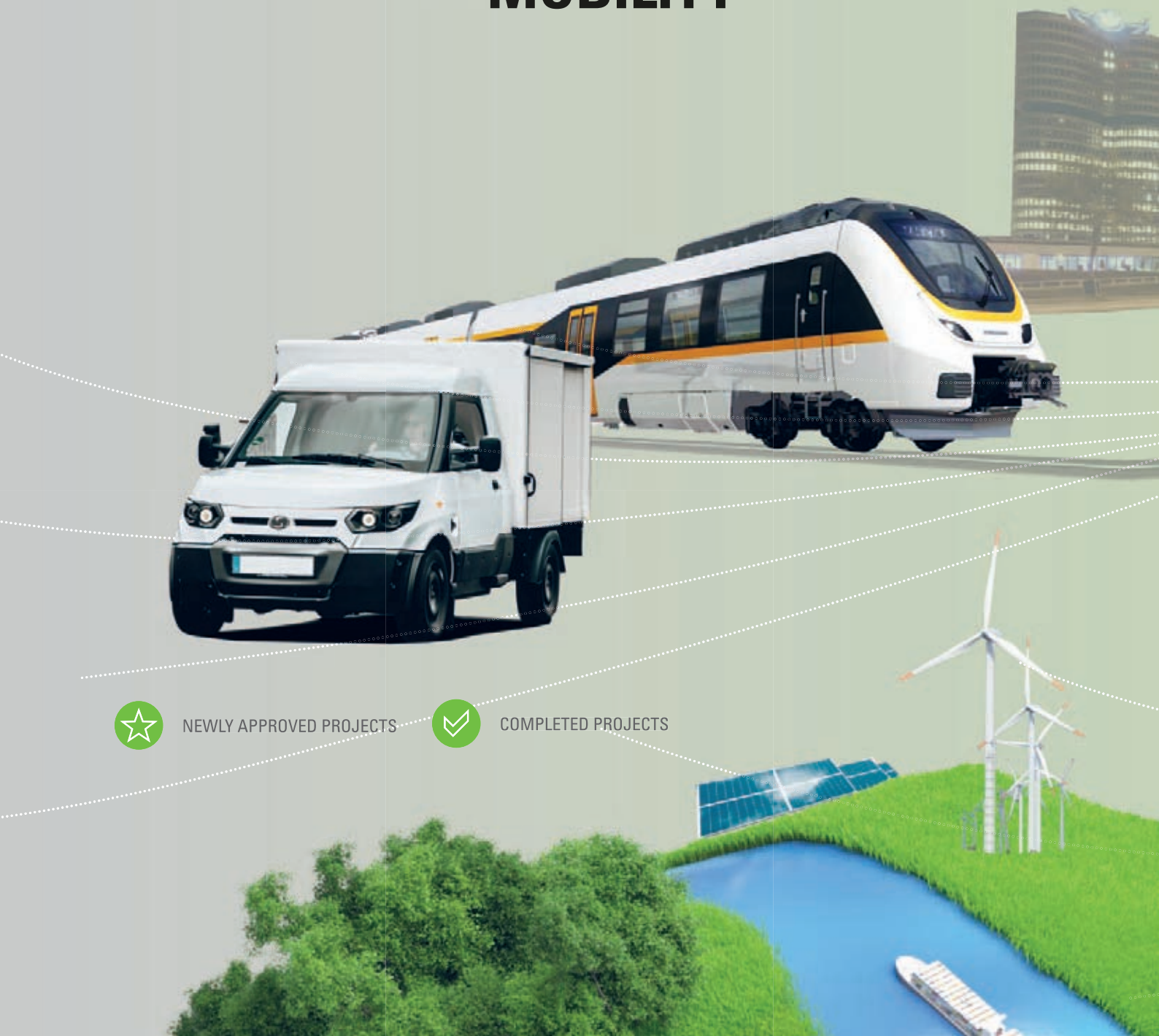


Own representation, January 2019

NORMAL CHARGING POINTS | FAST CHARGING POINTS UP TO 100 KW | FAST CHARGING POINTS OVER 100 KW

The "fuel cap" of tomorrow

III. FEDERAL FUNDING LOCAL ELECTRIC MOBILITY



NEWLY APPROVED PROJECTS

COMPLETED PROJECTS

ELECTRIC MOBILITY: A BUILDING BLOCK OF THE ENERGY TRANSITION IN TRANSPORT

Implementation 2018

In the context of existing climate policy goals, in 2009 the federal government already set concrete targets for the market development of electric mobility in Germany for the years 2020 and 2030 through the National Development Plan for Electric Mobility. Electric mobility on the basis of battery and fuel cells can contribute significantly to reaching climate goals in transport and, given increasing shares of renewable energies in the German energy mix, is an important component of the energy transition. Apart from clear vehicle targets for the abovementioned reference years, the development of Germany as an electric mobility lead market is the core focus.

As such, the federal government has been supporting market preparation and market ramp-up for almost 10 years to launch a mass market, with the aid of concrete funding programmes for electric mobility with batteries and fuel cells. This development has been spurred on further by the discussion about driving bans in German inner cities as well as particulate matter, noise and nitrogen oxides which has come more sharply into focus since 2017. A large number of cities exceed the EU limit values for nitrogen dioxide, in some cases considerably. They are confronted with lawsuits and Germany is threatened with infringement proceedings by the EU Commission. The federal government addressed this situation at the end of 2017 by initiating the "Immediate Action Programme for Clean Air 2017 – 2020" to improve air quality in German inner cities. Funding electric mobility plays a key role here. The 750 million euros in emergency aid originally announced by the German government in 2017, plus 250 million euros from the automotive industry (350 million euros of which for the electrification of transport), were increased by 500 million euros at the end of 2018 as part of a further municipal summit. Four active programmes from three federal ministries (BMVI, BMU, BMWi) address electric mobility with an additional 350m euros. In the context of this emergency programme, the existing "BMWI electric mobility funding guideline" (2017 update) is proving itself to be an effective and comprehensive instrument. The BMVI was therefore able to react quickly and begin an initial funding call for NO_x-polluted municipalities at the start of 2018, which was fully implemented over the course of 2018.

BMVI electric mobility funding priority

This electric mobility funding guideline, which has existed since 2015, forms the basis for further BMVI funding activities for electric mobility (focus on battery-electric mobility). It is the foundation for a continuation of the funding programme until the end of 2020. Through the programme, the BMVI support the procurement of electric vehicles (through so-called investment funding), in particular in municipal and municipally-integrated commercial fleets. Parallel to this, the required charging infrastructure will be funded. In addition local authorities can realise electric mobility concepts (so-called environmental studies), in order to familiarise themselves with the topic of electric mobility or to better integrate it into the municipal planning area. Aside from investment and concept funding, research and development projects will also be funded in a third instrument. While the investment projects focus on the market-ramp-up and the concepts support regional/municipal market preparation, the research and development projects, together with programme accompanying research, make an important contribution in terms of knowledge gained on the overall programme level. They inform the setting of priorities in the R&D funding itself, the detailed focus of the investment projects and the strategic further development of the funding programme. On the basis of the funding guideline, funding calls on the three funding areas are published annually. They allow for adjustments to market requirements and offer the necessary leeway to best support the market ramp-up.

In 2018 a total of 4 main funding calls were conducted:

1. Call for research and development projects to support the market ramp-up (submission period: 02/11/2017 to 31/01/2018)
2. Call for applications for electric vehicles and charging infrastructure in the context of the “Clean air immediate action programme” (submission period: 15/12/2017 to 31/01/2018, limiting measures to NOx-polluted municipalities)
3. Call for applications for electric vehicles and charging infrastructure (submission period: 29/06/2018 to 31/08/2018)
4. Call for applications for municipal electric mobility concepts (submission period: 29/06/2018 to 31/08/2018)

Across all funding priorities, approx. 580 projects were carried out. In all, this amounts to a vehicle and infrastructure potential of more than 10,000 vehicles and 5,000 infrastructural entities. These measures will be supported with approx. 234m euros from the BMVI.

Since the end of 2018, electric mobility is constituted as follows:

Funding priority	Number of projects	Number of vehicles, CI	Funding
Research and development	12 approved, 8 in the application process	Research context	29.5m euros
Electric vehicles and charging infrastructure (clean air immediate action programme)	219 applications	**Budget figures:** 7,693 vehicles 4,085 CI entities	149.6m euros
Electric vehicles and charging infrastructure	213 applications	**Budget figures:** 3,276 vehicles 1,002 CI entities	approx. 50m euros
Municipal electric mobility concepts	128 concepts	No direct implementation	7m euros

Besides the programme implementation of the funding guideline, in 2018 an evaluation was conducted of the entire programme for the 2011 to 2015 funding period on the basis of the 2011 funding guideline. The evaluators came to the conclusion that funding electric mobility through the BMVI was successful, and that it has been concluded efficiently and with the correct priorities. The current, simultaneous funding of research and development, investment as well as concepts is considered to be an optimal approach to initiate the market ramp-up, which will be able to take full effect in the future.

Organisational structure of the programme

In terms of implementing the guideline, the BMVI forms the policy framework, anchors it in the political environment and is responsible for content prioritisation in the area of electric mobility. Commissioned by the BMVI, NOW GmbH coordinates and manages the funding programme. The core tasks include the programme's implementation and strategic further development, the definition and selection of programmatic priorities as agreed with the BMVI and in coordination with the project-administrating agency, the coordination of the accompanying scientific research as well as management of the individual projects.

The project-administrating agency (Jülich (PtJ)) is responsible for the programme administration as well as the project administration and oversees the programme in terms of public funding law. As regards investment funding for vehicles and charging infrastructure, the agency has a particular role because of the size of the proposal. Coordination on regional levels happens through regional networks (project coordination centres), comprising regional actors from economic development, municipal utilities, state and energy agencies for electric mobility and other public-private partnerships. They ensure the information exchange between local project partners and ensure local and regional participation in the federal programme.

The regular supra-regional exchange takes place in the BMVI's strategy circle. It is the platform where representatives of regional networks, actors from the accompanying research as well as the BMVI, NOW and PtJ communicate with each other about the programme's activities.

Development of electric mobility in Germany in 2018

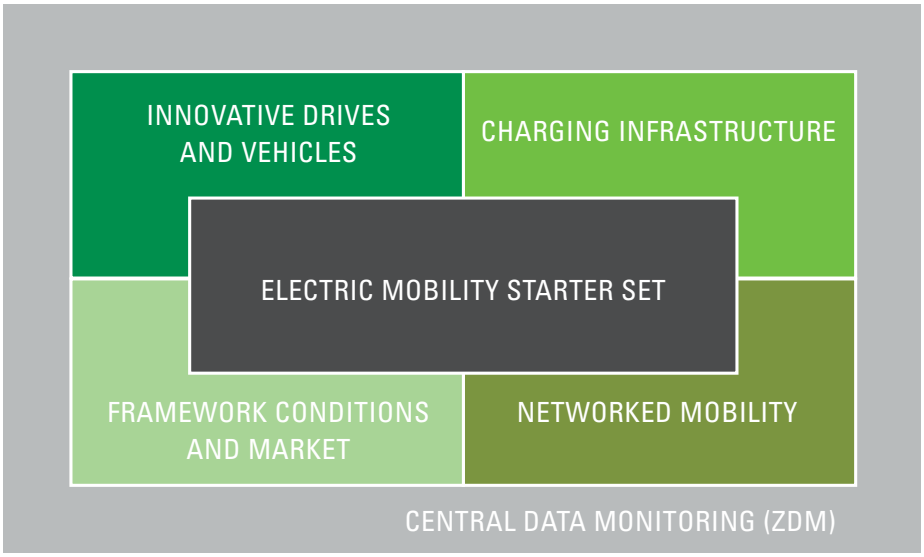
At the beginning of 2018, 120,000 electric vehicles (of all vehicle classes) were registered in Germany. Over the course of 2018, 75,000 vehicles have been added to this figure. It must be noted that this number refers to monthly information from the Federal Motor Transport Authority (Kraftfahrtbundesamt [KBA]) as well as own evaluations in the context of the central data monitoring and that de-registrations and changes in ownership are not yet taken in account. The official KBA figures are expected in April/ May 2019, although the number will not be revised significantly. At the end of 2018 the number of electric vehicles reached the threshold of approx. 200,000 vehicles for the first time.

Even though the high growth dynamic from 2017 did not continue in 2018 (due to lack of vehicle availability, among other reasons), there was considerable market growth. The market share of battery and plug-in hybrid electric vehicles in the overall vehicle market was consistently 2 % in 2018. 58 % per cent of the electric vehicles sold are pure electric vehicles, thus dominating the electric vehicle market. Commercial use also dominated with 67 %.

ACCOMPANYING RESEARCH IN THE ELECTRIC MOBILITY PROGRAMME

The BMVI programme's accompanying research is a key component of programme implementation. Its objective is to compile and evaluate project results from all three funding areas (vehicle procurement, electric mobility concepts and R&D projects). A regular exchange of information takes place between all participating companies and organisations. It therefore acts as a network for knowledge transfer on project and programme levels and thus makes an important contribution to bringing together the individual project results to the overall programmatic level.

The accompanying research was adapted to market requirements in the context of the publication of the electric mobility funding guideline in 2015. There was a refocussing with the clear objective of supporting the market ramp-up, and so four key thematic areas were established which represent the pillars of the currently ongoing accompanying research for the programme.



Accompanying research thematic areas since 2015

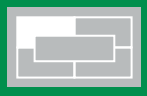
These activities were supplemented by Zentrale Datenmonitoring (ZDM – Central Data Monitoring) on electric mobility, which is now being undertaken by Ingenieurgruppe IVV Aachen in coordination with NOW.

ZDM is tasked with bundling and evaluating the project data. On the basis of minimum data sets developed together with the funding and research world, data was collected there anonymously in a structured way from the electric mobility context (including data on vehicles, charging infrastructure and users) and archived. ZDM is currently probably the most extensive data source on electric mobility in Germany. It represents the interface between thematic areas and facilitates data use across all thematic areas. At the beginning of 2018, ZDM's first results report was presented, which describes in detail developments on existing vehicles and charging infrastructure services in Germany, the market situation as well as the use of vehicles and charging infrastructure in practise. In addition it makes statements on costs and on the environmental and health effects of electric mobility. A new edition of the report is planned for 2020.

STARTERSET ELEKTROMOBILITÄT
Praktische Tipps für Kommunen

Communication of the results of the accompanying research activities will be compiled in the electric mobility starter set or presented directly to the relevant stakeholders in the thematic areas as well as to municipal actors.

There is also a multitude of publications from the respective thematic areas.



THEMATIC AREA: INNOVATIVE DRIVES AND VEHICLES

In the innovative drives and vehicles thematic area, the focus over the last few years has been concentrated on the 'bus' vehicle class. The invitation to tender and commissioning of the accompanying research: "Innovative drives in road public transport", took place in 2018. Consisting of thinkstep, Ingenieurgruppe IVV, Fraunhofer IVI, VCDB VerkehrsConsult Dresden Berlin, hySOLUTIONS and SEK Consulting, the consortium began operating in the autumn.

The focus of the content of the accompanying research is on the one hand, the monitoring and evaluation of the use of operational electric buses funded by the BMVI via comprehensive data acquisition. The specific data points to be collected were already determined in 2017 within "Minimum data sets for collecting research data in electric mobility"[1]. The focus of the accompanying research is not just on battery buses alone. Fuel cell buses are also being examined. The data collected will be extensively evaluated, and the evaluations made available to the bus operator concerned. Of particular relevance here are availability, energy consumptions and the real range of buses, among others. In addition, data from research and development projects as well as electric mobility concepts with a focus on local public transport will be taken into consideration when evaluating the data.

Building on the real gathered and evaluated data, another priority of the accompanying research is the evaluation and comparison of the different drive types and infrastructures. This entails evaluation in terms of technical, economic, ecological and operational criteria. On this basis a guideline as well as an interactive decision-making tool will be developed to support the electrification of large bus fleets.

Parallel to the accompanying research, there is 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) on the topic of innovative bus drives (or AG Bus for short). Here bus operators, manufacturers, suppliers and representatives from politics and municipalities meet each other twice a year. The accompanying research helps to shape the content of the meetings and uses this forum to present and discuss the latest results and evaluations.

[1]Minimum data sets publication: : https://www.now-gmbh.de/content/service/3-publikationen/2-modellregionen- elektromobilitaet/minimaldatensets-zu-erhebung-von-forschungsdaten-in-der-elektromobilitaet.pdf

CONTACTS:

Coordination of the accompanying research: Oliver Hoch, NOW GmbH

Scientific supervision: Michael Faltenbacher, thinkstep

CONSORTIUM:

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

THEMATIC AREA: FRAMEWORK CONDITIONS AND MARKET

Political and legal frameworks are decisive variables in the acceptance of electric mobility and the market ramp-up of electric vehicles. A mere glance at the major socio-political discussions over the past year on air quality in German cities, diesel driving bans, as well as climate protection goals in the transport sector and new EU limits in fleet consumption, underline the importance of these non-technical influencing variables.

The analysis of the interaction of market development and political and social framework conditions for electric mobility are the core focus of the accompanying research: "Framework conditions and market". How do funding programmes, market incentives, privileges, social discourses and social developments affect the spread of electric vehicles? To answer these questions the accompanying research analyses market development in Germany and in selected international markets. In addition it monitors and evaluates the implementation and effect of political funding programmes and incentives as well as legal frameworks. Furthermore the research looks at mobility behaviour and the mobility needs of potential clients from the private, public and municipal areas. Against this backdrop is the question of how electric mobility can already now meet user needs and where, from operative and financial viewpoints, it is already worth using electric vehicles.

Tasked with the accompanying research "Framework conditions and market" since 2016, the consortium consisting of TÜV Rheinland, the Institute for Innovation and Technology and KIT, brought out its final report in July 2018. The report shows that on an international level, Germany cannot yet fulfil lead market demands in terms of existing and new registration numbers of electric vehicles. The picture is different in terms of electric vehicles and charging infrastructure. Here Germany is performing well when compared internationally, with a ratio of 5.5 electric vehicles to one charging point. In relation to the market potential for current battery electric vehicles, it is shown that despite known restrictions (higher procurement costs, limited range), the latest electric vehicles can fulfil existing mobility demands and are economically viable. In the accompanying research, the implementation of the Electric Mobility Act (EmoG) in municipalities was systematically captured for the first time. Nationwide monitoring shows that by mid-2018, 110 German municipalities had implemented traffic priority measures of the EmoG. This predominantly concerns exemption from parking fees for electric vehicles. Other important results of accompanying research will be published at the beginning of spring 2019 in a final publication.

CONTACTS:

Coordination of accompanying research: Marc Weider, NOW GmbH

Scientific supervision: Dr. Sören Grawenhoff, TÜV Rheinland Consulting GmbH

CONSORTIUM:

TÜV Rheinland Consulting GmbH, Köln
Institute for Innovation and Technology, Berlin
Karlsruhe Institute of Technology, Karlsruhe

THEMATIC AREA: NETWORKED MOBILITY

Activities in the thematic area were intensified in 2018, so that the results can mostly be published in 2019. The accompanying research lasts until July 2019 and the focus will turn to processing and communication for the remaining months. 2018 was characterised by the holding of a multitude of events on the key topics of "Linking up electric mobility to the energy sector" and "Municipal mobility strategies and electric mobility concepts".

Focus 1: Linking electric mobility to the energy sector:
The aim is to demonstrate the potential of using renewable energies for the transport sector on the municipal level, to identify challenges for municipalities and (municipal) companies and to determine measures to overcome the identified challenges. The focus is on taking into account the perspectives of the different actors (municipal administration, municipal utilities, distribution network operators and transport companies) and highlight measures as well as political needs.

Over the past few months, the analysis was driven forward in two workshops and a thematic area meeting. A workshop on the role of transport companies in sector coupling and one on the future intelligent charging of electric vehicles (EVs) and the interplay between the distribution grid and EVs were held. The aim in the thematic area meeting was to launch a discussion for participants on the questions left open from previous workshops. Actors from public administration, politics, municipalities and private companies, research, multipliers, associations and automotive manufacturers were involved.

Because of BMVI internationalisation activities with China, the linking of e-mobility with the energy sector was expanded through the exchange of experience and know-how with China.

Focus 2: Municipal mobility strategies and electric mobility concepts:
The aim is the strategic incorporation of electric mobility in municipal objectives and processes. Here conceptual instruments like climate protection concepts and transport development plans were analysed and evaluated in terms of effectiveness, feasibility and stability.

There were two workshops (communication strategies for e-mobility and charging infrastructure in municipalities) and a thematic area meeting conducted which focused on approaches to communication, activation and governance. The aim is to position electric mobility independently of specific individuals as a permanent topic in administrations. There are 62 participants from public administration, politics, planning and science in the group of attendees.

City survey
In the winter of 2017/2018, Fraunhofer ISI conducted a survey of municipalities in Germany on their activities in the area of electric mobility see section: Survey of Electric Mobility in German Municipalities in the framework of the accompanying research. 540 municipalities took part and since then the results have been presented to the BMVI. The publication will be released at the 6th expert conference.

CONTACTS:

Coordination of accompanying research: Silke Wilhelm (NOW GmbH)

Scientific supervision: Dr. Elisabeth Dütschke, Fraunhofer ISI and Prof. Dr. Wolfgang Rid, ISME

CONSORTIUM:

Fraunhofer Institute for System and Innovation Research ISI, Karlsruhe
Institut Stadt | Mobilität | Energie (ISME), Stuttgart
EE energy engineers, Gelsenkirchen
Noerr LLP, Munich

THEMATIC AREA: CHARGING INFRASTRUCTURE

In 2017 NOW was commissioned with carrying out charging infrastructure accompanying research. In 2018 the accompanying research team then became operational.

Over the coming years the charging infrastructure accompanying research should generate reliable, scientific, technical as well as economic results on charging infrastructure and thus give the issue a further significant boost. This also helps to implement funding measures for charging infrastructure in a more efficient and target-oriented fashion.

The emphasis in terms of content of the charging infrastructure accompanying research is on monitoring the operating and master data from the charging infrastructure funding guideline, the technical issues, the examination of different charging scenarios as well as the formulation and evaluation of strategic approaches to the nationwide development of publicly accessible charging infrastructure. Furthermore a forecast on the demand for public charging infrastructure post-2025 is to be prepared.

Within the accompanying research, there is close consultation with the findings generated by the location tool for alternative fuel infrastructures.

CONTACTS

Coordination of the accompanying research: Dominique Sévin (NOW GmbH)

Scientific supervision: Dr. Franziska Lobas-Funck and Laura Prawatky (NOW GmbH)

SURVEY OF ELECTRIC MOBILITY IN GERMAN MUNICIPALITIES

In the winter of 2017/2018 and within the context of the programme's accompanying research, Fraunhofer ISI conducted a survey of municipalities in Germany on their activities in the area of electric mobility.

Survey of 540 German municipalities on electric mobility in the framework of accompanying research on networked mobility.

Local implementation in the everyday lives of people will play a big role in the market-ramp-up of electric mobility in the future. In this respect, how German municipalities deal with this issue is a key factor. In order to establish which topics and areas of activity are currently at the forefront in German municipalities, what the development plans are for electric mobility and what support is needed in the municipalities, the accompanying research on networked mobility conducted a survey in the winter of 2017/2018. In total, 540 German municipalities with a minimum of 5,000 inhabitants took part in the survey, including all cities with more than 500,000 inhabitants. The latest survey is a continuation of the series of earlier BMVI city surveys on electric mobility from 2011 and 2014. NOW GmbH was responsible for coordinating the survey, as leader of the accompanying research on networked mobility. Fraunhofer ISI is the supporting scientific institute.

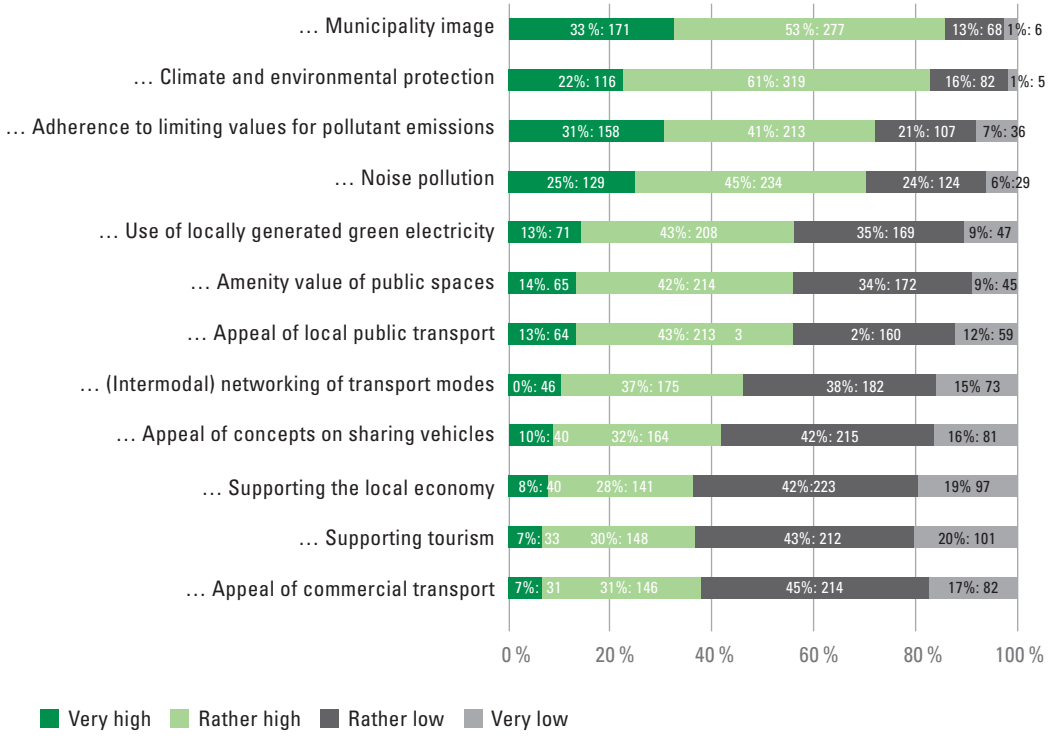
The results: How and in which areas are the municipalities active?

Electric mobility is an important topic in German municipalities: for two thirds of the municipalities surveyed, electric mobility is a high priority. Over 80 % are active on the issue, with a further 10 % planning activities. The effects of city size can be observed here: the larger the municipality, the likelier is it to be active. Electric mobility is often first and foremost an environmental and transport issue for municipalities as well as an image issue (Figure 1). The areas of activity which are the most active include the construction of charging infrastructure and the electrification of municipal fleets. At the moment only some municipalities take other approaches such as the Electric Mobility Act (Figure 2). Electric mobility as a topic has already to some extent, found its place in municipal strategic or planning papers – 53 % of municipalities surveyed confirm this, with another 27% saying this is being planned.

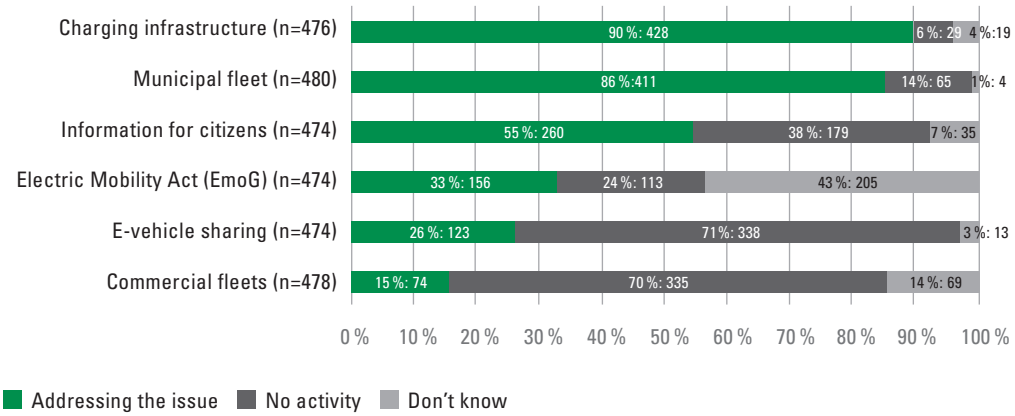
What do municipalities need?

In their responses, municipalities highlight the importance of supra-regional levels for driving electric mobility forward. For smaller municipalities this often means cooperation with the administrative district, for larger ones more often it means funding at the federal and state level. Getting involved in inter-municipal or cross-level networks could play a decisive role in making knowledge transfer easier.

Participants assess e-mobility potential with respect to …



Estimates by the municipalities on where electric mobility potential lies



Municipal activity according to areas of activity. Percentage refers to active municipalities that provided a valid answer.

PROCUREMENT FUNDING FOR ELECTRIC MOBILITY CONTRIBUTES TO IMPROVING AIR QUALITY IN GERMAN CITIES

Since 2015, the electric mobility funding guideline has been providing an important impetus for the now emerging market ramp-up of electric vehicles, with over two hundred procurement projects granted. Additionally, in the framework of the federal government's clean air immediate action programme, the funding guideline has been used as a support framework since the end of 2017. Over the course of the guideline, close to 7,700 electric vehicles from the most diverse vehicle categories were granted in 2018 in the framework of the immediate action programme. These will make an important contribution to improving air quality in the affected NO_x municipalities over the coming years. In this aspect, the funding guideline's existing focus on municipalities is exactly appropriate.

The electric mobility funding guideline focuses particularly on municipal and commercial fleets. For operators, using electric vehicles is worthwhile from many perspectives. The successive integration of electric vehicles in their own fleets allows climate and harmful emissions (CO_2, NO_x) to be sustainably reduced. Because the daily operating profile of many trips is known in advance, the electric vehicles can be scheduled in a targeted way anywhere where distances are calculable or interim recharging is possible.

Along with purchasing vehicles, leasing also plays an important role for municipal and commercial fleet operators. But direct funding for the lessee is currently not possible through the funding guideline. Lessors can however, make a funding application. This is only possible if the procurement of the vehicles is part of a municipal electric mobility concept. By the end of 2018, several leasing companies, large and small, applied for funding for a total of 4,900 electric vehicles through the funding guideline. On the basis of the impetus from the BMVI's Electric Mobility Strategy Circle to strengthen the leasing issue, NOW initiated a leasing dialogue process with the goal of optimally supporting leasing funding. The results of this process are expected in the spring of 2019.

The gradually increasing market offering in e-buses and e-commercial vehicles is also reflected in the procurement funding. Especially in the framework of the "Clean air immediate action programme", almost 40 per cent of approved e-vehicles are to be categorised in the commercial vehicle category. Predominantly it is courier, express and package services (CEP services) e-vehicles that are procured through the programme (cf. Highlight StreetScooter and R&D project: "ZUKUNFT.DE"). Furthermore applications have been made for more than 400 e-buses in the standard and immediate action programmes (cf. Highlight BVG bus procurement). Both the CEP service vehicles and the city buses have high urban mileages and are therefore especially suitable for conversion to electric operation in the context of reducing pollution.

Funding applicants can be municipalities or municipal companies. Commercial companies that are a part of an electric mobility concept will however also be funded. In terms of applications for the standard programme, municipal companies dominate as the largest group with 43 per cent. Municipalities submit 24 per cent of the applications, commercial companies 33 per cent. The picture is similar with the immediate action programme, where each group is represented almost identically.

As the 2018 application numbers for both funding calls (immediate action and standard programmes) show, demand for funding in the procurement area has risen again. In the period of July 2015 to January 2019, the BMVI invited application submissions for the procurement of electric vehicles and associated charging infrastructure in four funding calls within the standard programme. In the four calls (July/August 2015, March to May 2016, November 2016 to January 2017, June to August 2018), 213 applications were approved. This means the BMVI is facilitating the procurement of 3,276 electric vehicles and 1,002 associated charging points and is releasing total funding of over 49.7 million euros. Among the 3,276 electric vehicles approved, 269 are e-trucks, 125 are battery buses and 106 are special vehicles as well as 2,776 cars.

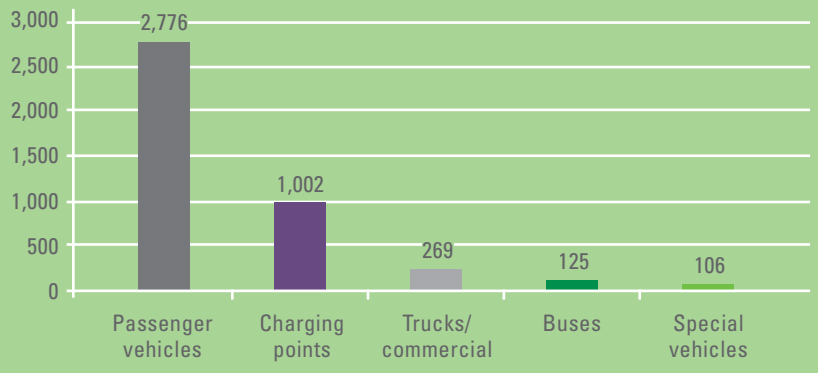
Of the approx. 1,000 approved charging points, normal charging (11/22 kW) is the most sought after charging option with 79 per cent of the acquisitions, followed by DC fast-charging columns (12 per cent) and bus/truck charging infrastructure (9 per cent).

Furthermore there was a funding call in the "Clean air immediate action programme" (December 2017 to January 2018) under which 219 projects were approved in 2018. This means that the BMVI facilitated the procurement of 7,693 electric vehicles nationwide and 4,085 associated charging points and released a good 149.6 million euros in funding. Among the 7,693 approved electric vehicles, 2,026 were e-trucks, 287 were battery buses and 177 special vehicles as well as 5,203 cars.

Of the 4,085 approved charging points in the emergency action programme, normal charging (11/22 kW) was the charging option in most demand with 87 per cent, following by DC fast-charging (11 per cent) and bus/truck charging infrastructure (2 per cent).

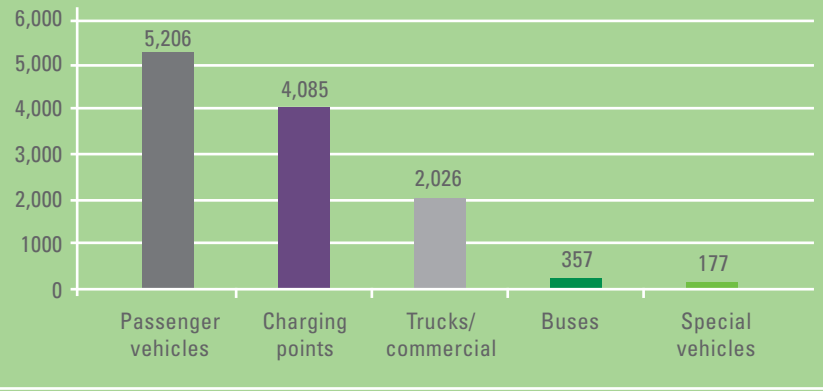
OVERVIEW OF PROCUREMENTS ELECTRIC MOBILITY FUNDING GUIDELINE

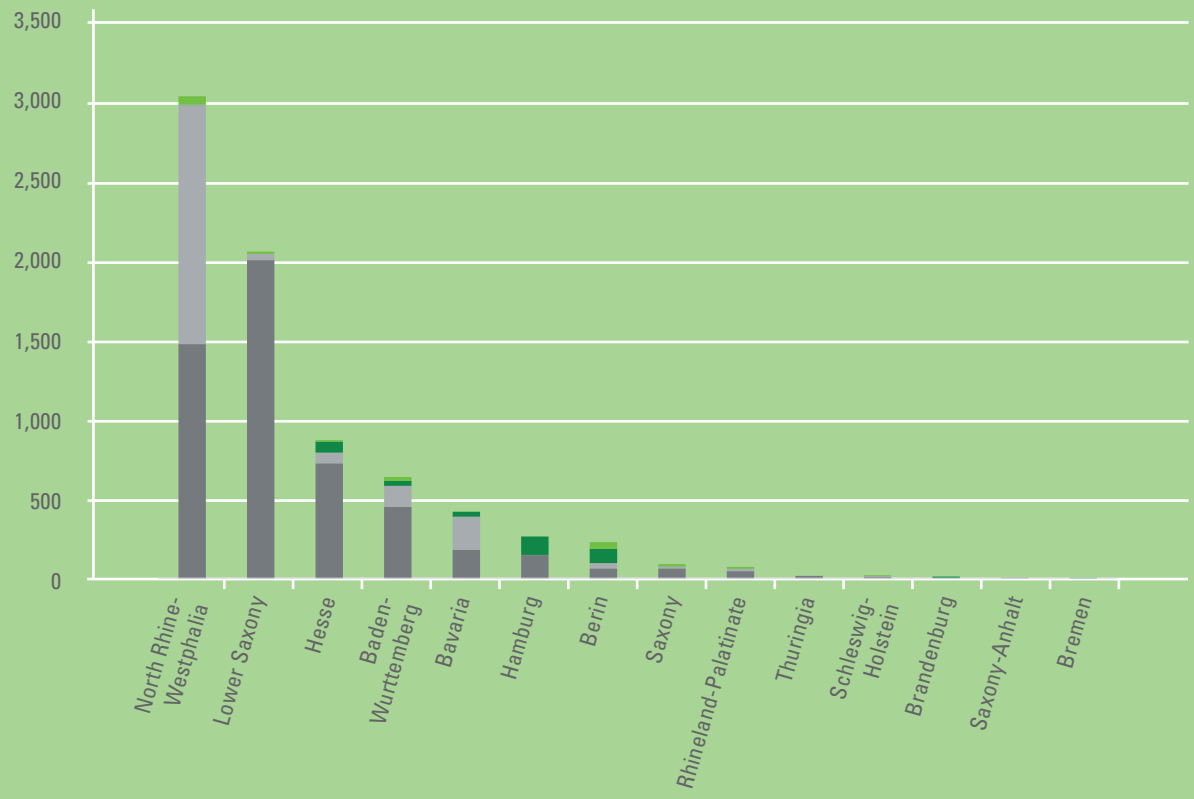
STANDARD PROGRAMME (cumulative figures since 2015)



Special vehicles	52	20	17	3	0	5	3	0	1	0	0	5	0	0	0
Buses	72	13	1	6	15	0	7	37	5	12	2	0	0	0	0
Trucks/commercial	2	0	250	4	10	0	0	2	0	0	0	0	1	0	0
Passenger vehicles	851	761	504	190	140	95	88	31	48	15	21	17	5	6	4

IMMEDIATE ACTION PROGRAMME CLEAN AIR (BMVI figures 2018)





Special vehicles	53	14	9	25	2	2	41	15	11	0	5	0	0	0
Buses	2	0	70	31	31	116	91	0	1	0	0	10	0	5
Trucks/commercial	1,510	40	68	133	208	1	33	11	15	0	4	0	3	0
Passenger vehicles	1,480	2,010	727	452	182	148	64	64	46	16	11	2	4	0

APPROVED PROCUREMENTS 2018
ELECTRIC MOBILITY FUNDING GUIDELINE
STANDARD PROGRAMME

PROJECT	COMMENCEMENT	CONCLUSION	FUNDING [€]	PARTNER
03EMI3002	01.01.2019	30.06.2020	96,123	Stadt Hauzenberg
03EMI3005	01.01.2019	30.06.2020	93,044	Stadt Bad Waldsee Dezernat II, Fachbereich Bau – Abteilung Baubetriebshof
03EMI3006	01.10.2018	30.04.2020	37,318	Stadt Erlangen – Betrieb für Stadtgrün, Abfallwirtschaft und Straßenreinigung
03EMI3013	01.01.2019	30.06.2020	113,700	Stadt Emmendingen
03EMI3015	01.10.2018	30.06.2020	90,634	Stadt Langenhagen
03EMI3017	01.01.2019	30.06.2020	143,867	Gemeinde Fischbachau
03EMI3019	01.01.2019	30.06.2020	142,943	Gemeinde Aholming
03EMI3021	01.01.2019	30.06.2020	41,433	Stadtwerke Scheinfeld
03EMI3023	01.04.2019	30.09.2020	58,825	Landkreis Schweinfurt
03EMI3026	01.01.2019	30.06.2020	51,014	Stadt Vilsbiburg
03EMI3029	01.01.2019	30.06.2020	120,166	Zweckverband Kommunale Wasserver-/Abwasserentsorgung Mittleres Erzgebirgsvorland Eigenbetrieb Hainichen/Sachsen
03EMI3032	01.01.2019	30.06.2020	99,315	Gemeinde Linkenheim-Hochstetten
03EMI3037	01.01.2019	30.06.2020	328,770	Stadt Gersthofen
03EMI3039	01.01.2019	31.12.2021	872,400	Stadtwerke Weilheim i.OB., Anstalt des öffentlichen Rechts
03EMI3042	01.01.2019	30.06.2020	44,169	Stadt Coburg
03EMI3043	01.01.2019	30.06.2020	33,270	Stadt Holzminden
03EMI3046	01.01.2019	30.06.2020	65,778	Gemeinde Mulfingen
03EMI3048	01.01.2019	30.06.2020	50,256	Gemeinde Gröbenzell
03EMI3049	01.01.2019	30.06.2020	65,778	Gemeinde Büchen
03EMI3050	01.01.2019	30.06.2020	33,766	Verbandsgemeindeverwaltung Monsheim
03EMI3056	01.01.2019	30.06.2020	65,670	Landratsamt Erzgebirgskreis
03EMI3057	01.01.2019	30.06.2020	137,343	Landkreis Biberach
03EMI3065	01.10.2018	31.12.2020	562,217	Abwasser, Grün & Lüneburger Service GmbH
03EMI3068	01.01.2019	30.06.2020	48,775	Gemeinde Bischofsheim - Bauhof
03EMI3069	01.01.2019	30.06.2020	16,332	Stadt Freiberg am Neckar
03EMI3070	01.01.2019	31.12.2021	347,210	Rhein-Hunsrück Entsorgung
03EMI3073	01.01.2019	30.06.2020	45,984	Gemeinde Wettenberg
03EMI3079	01.01.2019	30.06.2020	411,300	Alba Städte- und Industriereinigung Baving GmbH
03EMI3080	01.01.2019	30.06.2020	123,127	Verwaltungsgemeinschaft Großaitingen

PROJECT	COMMENCEMENT	CONCLUSION	FUNDING [€]	PARTNER
03EMI3082	01.01.2019	30.06.2020	127,341	Stadtbetriebe Schwäbisch Hall
03EMI3086	01.04.2019	31.03.2020	141,672	Stadtwerke Ettlingen GmbH
03EMI3090	01.01.2019	30.06.2020	39,805	Zweckverband Kommunalwirtschaft Mittlere Bergstraße (KMB)
03EMI3094	01.01.2019	30.06.2020	158,146	Gemeinde Auenwald
03EMI3095	01.01.2019	31.12.2021	296,728	Entsorgungs- und Baubetrieb der Stadt Bamberg
03EMI3096	01.01.2019	30.06.2020	49,524	Gemeinde Biebesheim am Rhein
03EMI3097	01.01.2019	30.06.2020	57,691	Stadt Passau - Hauptamt
03EMI3098	01.01.2019	30.06.2020	40,197	Gemeinde Flein
03EMI3099	01.01.2019	30.06.2020	87,802	Stadt Weilheim an der Teck
03EMI3101	01.01.2019	30.06.2020	63,100	Gemeinde Grasbrunn
03EMI3104	01.05.2019	31.10.2020	113,886	Landkreis Vorpommern-Rügen
03EMI3105	01.01.2019	30.06.2020	60,423	Samtgemeinde Hesel
03EMI3110	01.01.2019	31.03.2020	192,688	Stadtwerke Eckernförde GmbH
03EMI3112	01.01.2019	30.06.2020	129,987	Stadt Fürstenwalde/Spree
03EMI3121	01.01.2019	31.12.2019	142,000	Stadtwerke Baden-Baden
03EMI3129	01.01.2019	30.06.2020	58,782	Amt Zarrentin
03EMI3131	01.01.2019	30.06.2020	2,000,000	Berliner Wasserbetriebe Technischer Service I Fuhrparkmanagement
03EMI3132	01.01.2019	30.06.2020	763,334	Stadtverwaltung Koblenz Umweltamt
03EMI3134	01.01.2019	30.06.2020	105,613	Lahn-Dill-Kreis - Abfallwirtschaft Lahn-Dill
03EMI3139	01.01.2019	30.06.2020	1,575,308	Stadt Solingen - Technische Betriebe Solingen
03EMI3150	01.01.2019	31.12.2019	115,591	Barnimer Energiebeteiligungsgesellschaft mbH (BEBG)
03EMI3152	01.01.2019	30.06.2020	591,165	Paritätischer Verein Heidekreis e.V.
03EMI3156	01.01.2019	30.06.2020	67,664	Stadtwerke Neuwied GmbH
03EMI3157	01.10.2018	30.10.2019	56,363	Die Bremer Stadtreinigung Anstalt öffentlichen Rechts
03EMI3158	01.01.2019	30.06.2020	141,730	Stadt Meersburg
03EMI3166	01.01.2019	30.06.2020	118,400	Gemeinde Weissach im Tal
03EMI3169	01.01.2019	31.12.2021	225,851	aha Zweckverband Abfallwirtschaft Region Hannover
03EMI3177	01.10.2018	31.12.2020	1,079,578	Stadt Rheinberg - DiensLleistungsBetrieb
03EMIF0101	01.07.2018	31.12.2020	2,023,765	Volkswagen Leasing Gesellschaft mit beschränkter Haftung
03EMIF0104	01.05.2018	31.12.2020	552,516	Kölner Verkehrs-Betriebe Aktiengesellschaft
03EMIF0105	25.01.2018	31.12.2020	4,185,884	Berliner Verkehrsbetriebe (BVG)

APPROVED PROCUREMENTS 2018
ELECTRIC MOBILITY FUNDING GUIDELINE
IMMEDIATE ACTION PROGRAMME CLEAN AIR

PROJECT	COMMENCEMENT	CONCLUSION	FUNDING [€]	PARTNER
03EMIS0001	21.12.2017	31.12.2019	13,324	Stadtwerke Augsburg Holding GmbH
03EMIS0003	18.01.2018	30.09.2019	18,060	GCA Projektmanagement + Consulting GmbH
03EMIS0004	01.07.2018	31.12.2019	52,729	Gemeinde Hatten – Wirtschaftsförderung und Tourismus
03EMIS0005	29.11.2017	31.12.2019	339,038	Stadt Bielefeld – Umweltbetrieb
03EMIS0007	15.01.2018	30.09.2019	18,452	Taxi Blitz GmbH & Co. KG
03EMIS0009	29.11.2017	31.03.2020	25,065	Land Berlin, vertreten durch Senatsverwaltung für Umwelt, Verkehr und Klimaschutz Berlin – Abt. V Tiefbau
03EMIS0012	01.05.2018	31.12.2019	60,336	Dresdner Verkehrsbetriebe Aktiengesellschaft – Center Kraftfahrzeuge
03EMIS0013	29.11.2017	31.12.2019	274,600	Wirtschaftsbetrieb Hagen AÖR
03EMIS0014	29.11.2017	31.12.2019	36,396	Stadt Heidenheim
03EMIS0015	23.01.2018	30.06.2019	16,207	Metallbau Andreas Wiesinger
03EMIS0016	29.11.2017	31.12.2019	240,949	Stadt Langenfeld – Ref 530, Klimaschutz
03EMIS0017	29.11.2017	31.12.2020	1,072,955	Landeshauptstadt Stuttgart – Eigenbetrieb Abfallwirtschaft Stuttgart
03EMIS0018	29.11.2017	31.12.2019	137,570	Landeshauptstadt Stuttgart – Referat Strategische Planung und nachhaltige Mobilität, Abt. Mobilität
03EMIS0019	25.01.2018	30.09.2019	231,824	Flughafen Düsseldorf Ground Handling GmbH
03EMIS0020	29.11.2017	31.03.2020	848,240	Wissenschaftsstadt Darmstadt Eigenbetrieb für kommunale Aufgaben und Dienstleistungen
03EMIS0021	01.05.2018	31.12.2019	31,261	SWK Mobil GmbH
03EMIS0022	01.05.2018	31.12.2019	401,800	Landeshauptstadt Kiel
03EMIS0023	01.07.2018	31.12.2019	1,396,683	Freie und Hansestadt Hamburg, vertreten durch die Finanzbehörde
03EMIS0024	29.11.2017	31.12.2020	503,370	Stadtreinigung Hamburg AöR
03EMIS0025	29.11.2017	31.03.2020	368,380	Stadtreinigung Hamburg AöR
03EMIS0026	29.11.2017	31.12.2019	226,168	Stadt Paderborn – Dezernat II – Abfallentsorgungs- und Stadtreinigungsbetrieb Paderborn – ASP (Eigenbetrieb)
03EMIS0027	29.11.2017	31.12.2019	283,820	Stadt Münster
03EMIS0028	29.01.2018	31.12.2019	390,480	NVG Omnibus-Betriebsgesellschaft mbH
03EMIS0029	29.11.2017	31.12.2019	185,969	Stadt Witten – Bauordnungsamt – Dezernat 1
03EMIS0030	01.08.2018	31.12.2019	312,883	Stadtverwaltung Mühlacker
03EMIS0031	29.01.2018	30.09.2019	18,604	BES Berlin Energie Service GmbH
03EMIS0032	29.11.2017	30.11.2019	27,855	Stadt Halle (Westf.)
03EMIS0033	29.11.2017	30.09.2020	2,334,780	Stadt Ludwigsburg – Referat Nachhaltige Stadtentwicklung
03EMIS0034	29.11.2017	31.12.2019	2,166,400	Stadt Ludwigsburg – Referat Nachhaltige Stadtentwicklung
03EMIS0035	29.01.2018	31.03.2019	4,984	Stadtwerke Herne Aktiengesellschaft

PROJECT	COMMENCEMENT	CONCLUSION	FUNDING [€]	PARTNER
03EMIS0036	29.11.2017	31.12.2019	92,378	Landeshauptstadt Dresden – Geschäftsbereich Umwelt und Kommunalwirtschaft, Klimaschutzstab
03EMIS0037	29.11.2017	31.12.2019	639,018	Abfallwirtschaft und Stadtreinigung Freiburg GmbH
03EMIS0038	29.11.2017	31.12.2020	317,407	Stadt Regensburg – Direktorium 3 - Umweltamt
03EMIS0040	01.07.2018	31.12.2020	1,008,300	Bremer Straßenbahn Aktiengesellschaft
03EMIS0041	30.01.2018	31.12.2020	1,870,294	RSV Reutlinger Stadtverkehrsgesellschaft mbH Hogenmüller und Kull Co. KG
03EMIS0042	29.11.2017	31.12.2019	103,669	Große Kreisstadt Leinfelden-Echterdingen – Haupt- und Personalamt Zentrale Dienste
03EMIS0043	31.01.2018	30.09.2019	779,295	AWG Abfallwirtschaftsgesellschaft mbH Wuppertal
03EMIS0044	01.04.2018	31.12.2019	645,615	Stadt Wuppertal – Eigenbetrieb Straßenreinigung Wuppertal (ESW)
03EMIS0045	01.02.2018	30.09.2019	52,299	WSW Wuppertaler Stadtwerke GmbH
03EMIS0046	31.01.2018	30.09.2019	145,312	EWE NETZ GmbH
03EMIS0048	29.11.2017	30.06.2020	460,505	Stadt Offenbach – Eigenbetrieb Kommunale Dienstleistungen (ESO)
03EMIS0049	01.05.2018	30.04.2019	210,193	Freiburger Verkehrs Aktiengesellschaft
03EMIS0050	30.01.2018	31.12.2019	32,402	Hagener Straßenbahn Aktiengesellschaft
03EMIS0051	29.11.2017	31.12.2019	281,550	Stadt Leonberg – Dezernat C – C61 Planungsamt
03EMIS0052	29.11.2017	30.06.2020	74,531	Landkreis Fulda
03EMIS0053	29.11.2017	30.06.2020	145,420	Kreisausschuss des Landkreises Limburg-Weilburg
03EMIS0054	31.01.2018	31.12.2019	109,277	Breitsamer Entsorgung – Recycling GmbH
03EMIS0057	29.11.2017	30.06.2020	1,723,442	Landeshauptstadt München – Direktorium
03EMIS0058	01.05.2018	31.12.2020	2,369,677	Zentrale Polizeidirektion Niedersachsen – Abteilung 3 – Dezernat 31 (Fuhrparkmanagement)
03EMIS0059	30.01.2018	31.03.2020	305,960	Kölner Verkehrs-Betriebe Aktiengesellschaft
03EMIS0060	29.11.2017	31.12.2019	843,776	Landeshauptstadt Düsseldorf – Stadtbetrieb Zentrale Dienste
03EMIS0061	29.11.2017	31.12.2020	489,384	Stadt Mannheim Dezernat 1
03EMIS0062	31.01.2018	31.12.2020	1,351,520	Stadtwerke München GmbH
03EMIS0063	30.01.2018	31.12.2020	12,749,400	Berliner Verkehrsbetriebe (BVG) – Bereich Rechnungswesen/Finanzen – Alternative Finanzierungen (FRF-AF) – Drittmittelfinanzierung
03EMIS0064	26.01.2018	31.12.2020	1,828,065	AWB Abfallwirtschaftsbetriebe Köln GmbH
03EMIS0065	01.06.2018	30.06.2020	1,996,435	Alphabet Fuhrparkmanagement GmbH
03EMIS0066	31.01.2018	31.12.2020	681,022	Rhein-Neckar-Verkehr GmbH
03EMIS0067	29.11.2017	31.03.2020	1,371,182	Gelsendienste
03EMIS0068	29.11.2017	31.03.2020	920,780	Landeshauptstadt Hannover – Fachbereich Umwelt und Stadtgrün – Bereich Umweltschutz – Klimaschutzleitstelle

PROJECT	COMMENCEMENT	CONCLUSION	FUNDING [€]	PARTNER
03EMIS0069	29.11.2017	31.12.2019	792,095	Landeshauptstadt Mainz – Dezernat V – Umwelt, Grün, Energie und Verkehr – Stadtplanungsamt Abt. VerkehrswesenGCA Projektmanagement + Consulting GmbH
03EMIS0070	30.01.2018	31.12.2019	14,999,700	Deutsche Post AG
03EMIS0071	29.11.2017	31.12.2019	697,245	Stadt Reutlingen
03EMIS0072	29.11.2017	31.10.2020	673,993	Stadt Leipzig
03EMIS0073	29.11.2017	31.12.2020	810,093	Stadt Bochum – Baudezernat – Zentrale Dienste
03EMIS0074	29.11.2017	31.12.2019	728,999	Stadt Osnabrück – Fachbereich 68 Umwelt und Klimaschutz
03EMIS0075	29.11.2017	30.06.2020	574,269	Stadt Heidelberg – Dezernat IV – Amt für Umweltschutz, Gewerbeaufsicht und Energie
03EMIS0076	30.01.2018	31.12.2019	153,929	bnNETZE GmbH
03EMIS0077	29.11.2017	31.12.2019	285,786	Universitätsstadt Gießen
03EMIS0078	31.01.2018	30.09.2019	153,605	Stadtwerke Düsseldorf AG
03EMIS0079	29.11.2017	31.12.2019	513,931	Stadt Ludwigshafen am Rhein
03EMIS0080	29.11.2017	31.03.2020	498,684	Landkreis Ludwigsburg – Landratsamt – Dezernat I – Fachbereich 10 Zentrale Steuerung und Verwaltung – Geschäftsteil 101 – Geschäftsstelle Kreistag und zentrale Verwaltungsaufgaben
03EMIS0081	30.01.2018	31.12.2020	174,912	Bus-Verkehr Berlin KG Omnibus-Betriebs- und Verwaltungsgesellschaft mit beschränkter Haftung & Co
03EMIS0082	31.01.2018	30.06.2019	31,873	Jan Obernauer Elektrohandel + -installation Elektro Obernauer
03EMIS0083	29.11.2017	31.12.2019	512,425	Kreisstadt Limburg a. d. Lahn – Magistrat der Kreisstadt Limburg a. d. Lahn
03EMIS0084	30.01.2018	30.06.2019	15,410	B&M Maschinenbau GmbH
03EMIS0085	26.01.2018	30.09.2019	95,299	Urban Cargo FMRP Unternehmergesellschaft (haftungsbeschränkt)
03EMIS0086	30.01.2018	30.09.2019	205,059	EVI Energieversorgung Hildesheim GmbH & Co. KG
03EMIS0087	29.11.2017	31.03.2020	362,161	OGM Oberhausener Gebäudemanagement GmbH
03EMIS0088	26.01.2018	30.09.2019	13,483	Stumbaum GmbH
03EMIS0089	29.01.2018	30.04.2019	87,113	Barbara Kotowski-Klima Vermietung und Verpachtung von Fahrzeugen
03EMIS0090	29.11.2017	31.12.2019	203,122	Stadt Siegen – Arbeitsgruppe 1/2 – 1 – Wirtschaftsförderung
03EMIS0091	29.11.2017	31.12.2019	31,357	Stadt Esslingen am Neckar
03EMIS0092	26.01.2018	31.12.2019	25,178	Stadt Regensburg – Amt für Abfallentsorgung, Straßenreinigung und Fuhrpark
03EMIS0093	29.11.2017	31.12.2019	1,334,466	Landeshauptstadt Wiesbaden – Dezernat V – Dezernat für Umwelt, Grünflächen und Verkehr – Umweltamt
03EMIS0095	29.11.2017	31.12.2018	27,974	Freie und Hansestadt Hamburg – vertreten durch die Behörde für Wirtschaft, Verkehr und Innovation – Abteilung Bundesfernstraßen

PROJECT	COMMENCEMENT	CONCLUSION	FUNDING [€]	PARTNER
03EMIS0096	29.11.2017	31.03.2020	251.700	Citipost Nordwest GmbH & Co. KG
03EMIS0097	30.01.2018	31.12.2019	63.802	Stadtwerke Aachen Aktiengesellschaft
03EMIS0098	29.11.2017	31.03.2020	77.614	Universitätsklinikum Bonn – Geschäftsbereich 6 – Facility Management
03EMIS0099	29.11.2017	31.12.2019	248.200	Stadt Willich – Geschäftsbereich Stadtplanung
03EMIS0102	31.01.2018	30.09.2019	33.328	Ewald Consulting GmbH & Co. KG
03EMIS0103	29.11.2017	30.09.2019	19.771	wewole WERKEN gGmbH
03EMIS0105	31.01.2018	31.12.2019	546.700	Autokraft GmbH
03EMIS0106	31.01.2018	30.09.2019	387.267	USB Bochum GmbH
03EMIS0109	30.01.2018	30.09.2019	109.968	STATTAUTO Köln Gesellschaft für Car Sharing mbH
03EMIS0110	31.01.2018	30.09.2019	70.660	Wellenwerk Berlin GmbH
03EMIS0111	29.01.2018	31.12.2019	56.492	WBO Wirtschaftsbetriebe Oberhausen GmbH
03EMIS0112	25.01.2018	31.12.2018	39.434	GWW Wiesbadener Wohnbaugesellschaft mbH
03EMIS0113	30.01.2018	30.09.2019	18.556	Citipost Nordwest GmbH & Co. KG
03EMIS0114	30.01.2018	31.12.2019	19.812	SUG Transport & Dienstleistung GmbH
03EMIS0116	19.01.2018	31.12.2019	29.978	Comnovis IT GmbH
03EMIS0117	28.01.2018	31.12.2019	7.877	Jürgen Jeske Elektromaschinenbau
03EMIS0118	29.01.2018	31.12.2019	11.946	Auto Zentrum Dresden GmbH & Co. KG
03EMIS0121	29.01.2018	31.12.2019	15.496	Medienvertrieb Horst Börstler GmbH
03EMIS0123	23.01.2018	30.06.2019	142.970	ENSO NETZ GmbH
03EMIS0124	29.11.2017	31.12.2020	12.678.403	Berliner Stadtreinigungsbetriebe (BSR)
03EMIS0125	29.01.2018	30.09.2019	11.696	ebm elektro-bau-montage GmbH & Co. KG
03EMIS0127	29.11.2017	30.06.2020	185.222	Sportwelt Dortmund gGmbH
03EMIS0128	23.01.2018	30.09.2019	7.748	Gießener Anzeiger Vertriebs-GmbH
03EMIS0129	23.01.2018	31.12.2019	10.713	GGEW, Gruppen-Gas- und Elektrizitätswerk Bergstraße Aktiengesellschaft
03EMIS0130	24.01.2018	31.12.2019	7.748	NWZ-Zustellgesellschaft mbH & Co. Kommanditgesellschaft
03EMIS0131	25.01.2018	30.09.2019	25.616	ENERVIE Vernetzt GmbH
03EMIS0132	25.01.2018	30.06.2019	79.200	Fako-M Getränke GmbH & Co. KG
03EMIS0133	26.01.2018	30.09.2019	7.748	Pep-Logistik GmbH
03EMIS0134	29.01.2018	31.12.2019	15.134	Heizungsbau Nürnberg GmbH
03EMIS0135	30.01.2018	30.09.2019	39.403	Schwäbischer Verlag GmbH und Co.KG Drexler, Gessler
03EMIS0136	29.01.2018	30.09.2019	32.915	Borowski GmbH & Co. KG
03EMIS0137	31.01.2018	30.09.2019	1.625.93	Kazenmaier Fleetservice GmbH

PROJECT	COMMENCEMENT	CONCLUSION	FUNDING [€]	PARTNER
03EMIS0138	29.01.2018	30.09.2019	49,993	Sozial-Pädagogisches Zentrum
03EMIS0139	24.01.2018	31.12.2019	94,387	Merkuria Zustelldienst Verwaltungsgesellschaft mbH
03EMIS0140	25.01.2018	30.06.2019	10,825	GOLDMANN CONSULTING e.K. Silke Beate Patricia Goldmann
03EMIS0143	29.11.2017	31.03.2020	184,476	Landkreis Reutlingen – Kreis-Straßenbauamt
03EMIS0144	25.01.2018	30.09.2019	51,121	Jens Wiese
03EMIS0145	31.01.2018	31.12.2019	41,118	Sharegroup GmbH
03EMIS0147	31.01.2018	31.12.2019	36,120	einfach mobil Carsharing GmbH
03EMIS0149	31.01.2018	30.09.2019	20,477	Elektro-Koppen Gesellschaft mit beschränkter Haftung
03EMIS0150	30.01.2018	30.09.2019	77,162	FairNetz GmbH
03EMIS0151	30.01.2018	30.09.2019	31,180	Stadtteilauto OS GmbH
03EMIS0152	31.01.2018	31.12.2020	1,661,000	Agentur für Stadttourismus Potsdam GmbH & Co. KG
03EMIS0153	29.01.2018	31.12.2019	3,691,125	RCI Banque S.A. Niederlassung Deutschland
03EMIS0154	31.01.2018	30.09.2019	12,640	Jugendberufshilfe Düsseldorf gemeinnützige Gesellschaft mit beschränkter Haftung
03EMIS0155	31.01.2018	31.12.2019	63,692	MVD Medien Vertrieb Dresden GmbH
03EMIS0156	29.01.2018	31.12.2020	250,190	Orten Betriebs GmbH & Co. KG
03EMIS0157	26.01.2018	30.09.2019	34,960	PS Union GmbH
03EMIS0159	31.01.2018	31.12.2019	50,360	Schenker Deutschland AG – Geschäftsstelle Nürnberg
03EMIS0160	31.01.2018	31.12.2019	33,404	Staedtler Mars GmbH & Co. KG
03EMIS0162	31.01.2018	31.12.2020	174,456	Global Lifestyle Logistics Inh. Lars Woytschekowski-Altrath
03EMIS0164	31.01.2018	30.09.2019	255,080	Maske Fleet GmbH – Geschäftsstelle Hamburg
03EMIS0165	01.07.2018	30.06.2019	25,032	Fritz Mühlenbäckerei GmbH
03EMIS0167	31.01.2018	31.12.2020	12,213,092	hySOLUTIONS GmbH
03EMIS0168	31.01.2018	31.12.2020	13,364,968	Verkehrsbetriebe Hamburg-Holstein GmbH
03EMIS0169	31.01.2018	30.06.2020	189,329	evm Verkehrs GmbH
03EMIS0170	29.11.2017	31.12.2019	43,216	Große Kreisstadt Backnang
03EMIS0171	30.01.2018	30.09.2019	162,678	EVV Verwertungs- und Betriebs GmbH
03EMIS0172	29.11.2017	31.12.2019	505,796	Landratsamt Rems-Murr-Kreis
03EMIS0173	29.11.2017	31.12.2019	56,335	Land Berlin, vertreten durch Bezirksamt Mitte von Berlin – Abteilung Straßen- und Grünflächenamt
03EMIS0174	29.11.2017	30.09.2019	25,096	Taxi Olaf Steingen
03EMIS0176	29.11.2017	31.03.2020	40,554	Land Berlin vertreten durch Bezirksamt Mitte von Berlin – Abteilung Ordnung, Personal und Finanzen – Ordnungsamt
03EMIS0178	30.01.2018	31.12.2020	175,782	Landratsamt Böblingen Amt für Finanzen, Service und Zentraler Einkauf

PROJECT	COMMENCEMENT	CONCLUSION	FUNDING [€]	PARTNER
03EMIS0181	30.01.2018	31.12.2020	2,098,130	Schlepp- und Fährgesellschaft Kiel mbH-SFK
03EMIS0182	29.11.2017	31.03.2020	33,795	Landratsamt Heilbronn-Energie&Klima
03EMIS0183	29.11.2017	31.12.2019	27,015	Landkreis Heidenheim
03EMIS0184	29.11.2017	31.12.2019	51,732	Stadtentwässerungsbetriebe Köln, AöR - TB-03 Fahrzeugmanagement
03EMIS0185	29.11.2017	31.12.2020	129,427	Stadt Köln – Sportamt
03EMIS0186	29.11.2017	31.12.2020	926,795	Stadt Köln – Dezernat VI Stadtentwicklung, Planen und Bauen – Amt für Landschaftspflege und Grünflächen
03EMIS0187	15.01.2018	31.12.2019	26,352	Global Flash Service GmbH & Co. KG
03EMIS0188	29.11.2017	31.03.2020	73,910	Land Berlin, vertreten durch das Bezirksamt Spandau von Berlin Abteilung Planen Gesundheit, Strae und Grünflächenamt
03EMIS0189	29.11.2017	31.12.2019	67,328	Land Berlin vertreten durch Bezirksamt Friedrichshain-Kreuzberg von Berlin
03EMIS0190	29.11.2017	31.03.2020	42,370	Stadt Köln – Amt für öffentliche Ordnung
03EMIS0191	29.11.2017	31.12.2019	63,798	Stadt Köln – Dezernat VIII Mobilität und Verkehrsinfrastruktur – Amt für Brücken, Tunnel und Stadtbahnbau
03EMIS0192	29.11.2017	31.12.2019	103,974	Stadt Köln – Amt für Straßen und Verkehrstechnik – Verkehr-Verkehrmanagement
03EMIS0193	30.01.2018	30.06.2019	21,026	Gemeindewerke Budenheim
03EMIS0195	30.01.2018	30.06.2019	25,116	Gemeinnütziger Verein für Behindertenhilfe Wiesbaden und Rheingau-Taunus-Kreis e. V.
03EMIS0197	31.01.2018	31.12.2020	778,332	Paul Becker GmbH
03EMIS0198	30.01.2018	31.12.2019	4,742,630	mobileeee Betriebsgesellschaft mbH & Co KG
03EMIS0199	30.01.2018	31.12.2020	539,640	Heidenheimer Verkehrsgesellschaft mbH
03EMIS0201	31.01.2018	30.09.2019	16,397	Alfred Schwarz GmbH Elektroinstallation
03EMIS0203	31.01.2018	31.12.2019	692,132	Deutsche Leasing Fleet GmbH
03EMIS0206	31.01.2018	31.12.2019	375,080	PIN Mail AG
03EMIS0207	29.11.2017	30.09.2019	157,476	Arbeiterwohlfahrt Bezirk Westliches Westfalen e. V.
03EMIS0208	31.01.2018	31.07.2019	32,352	Bäckerei Naber-Schüren
03EMIS0209	29.11.2017	31.03.2020	393,864	Land Berlin, vertreten durch Bezirksamt Treptow-Köpenick von Berlin– Abteilung Bürgerdienste, Personal, Finanzen, Immobilien und Wirtschaft – Serviceeinheit Facility Management
03EMIS0212	29.11.2017	31.12.2019	33,795	Landkreis Teltow-Fläming
03EMIS0214	29.11.2017	31.12.2019	203,415	Kreis Groß-Gerau
03EMIS0215	29.11.2017	31.03.2020	285,698	Stadt Ravensburg – Technisches Rathaus Dezernat 3: Bau- und Umweltverwaltung
03EMIS0216	29.01.2018	31.05.2019	30,471	Stadtwerke Dinslaken GmbH
03EMIS0217	29.11.2017	31.12.2019	75,087	Stadt Schwäbisch Gmünd – Dezernat 2 – Baubetriebsamt

PROJECT	COMMENCEMENT	CONCLUSION	FUNDING [€]	PARTNER
03EMIS0219	29.11.2017	31.03.2020	61,668	Kreis Düren
03EMIS0220	29.11.2017	31.03.2020	96,221	Stadt Köln – Berufsfeuerwehr – Amt für Feuerschutz, Rettungsdienst und Bevölkerungsschutz
03EMIS0221	29.11.2017	31.07.2019	83,324	Stadt Würzburg – Referat II Umwelt- und Kommunalreferat – Fachbereich Umwelt- und Klimaschutz
03EMIS0222	29.01.2018	30.06.2019	14,865	NIKOLAUS-CUSANUS-HAUS e. V.
03EMIS0223	31.01.2018	30.09.2019	13,244	Freiburger Stadtbau Gesellschaft mit beschränkter Haftung (FSB)
03EMIS0224	26.01.2018	30.09.2019	9,560	Kfz-Ingenieur-Büro Tarrach
03EMIS0225	29.11.2017	31.12.2019	36,450	Stadt Freiburg im Breisgau – Garten- und Tiefbauamt
03EMIS0226	26.01.2018	30.09.2019	73,684	Rheinbahn AG
03EMIS0229	30.01.2018	31.12.2019	12,008	Paul Jacobs GmbH
03EMIS0230	30.01.2018	30.09.2019	12,014	Knieps und Komm GmbH
03EMIS0232	30.01.2018	31.03.2020	1,910,640	Flughafen Hamburg Gesellschaft mit beschränkter Haftung – FA-FL Geschäftsbereich Aviation
03EMIS0233	31.01.2018	31.12.2020	2,640,000	AeroGround Flughafen München GmbH
03EMIS0234	31.01.2018	31.12.2019	71,368	Mainzer Stadtwerke AG
03EMIS0235	30.01.2018	31.12.2020	84,341	Schwarz Logistik GmbH
03EMIS0236	30.01.2018	30.09.2019	5,440	STOAG Stadtwerke Oberhausen GmbH
03EMIS0237	31.01.2018	31.12.2019	37,740	Eugen Hackenschuh e. K.
03EMIS0238	29.11.2017	31.12.2019	65,235	Stadt Augsburg – Amt für Grünordnung, Naturschutz und Friedhofswesen mit Unterer Naturschutzbehörde
03EMIS0239	29.11.2017	30.06.2020	25,875	Stadt Neuss – Personal- und Verwaltungsmanagement
03EMIS0240	31.01.2018	31.12.2020	175,277	Weber GmbH
03EMIS0241	31.01.2018	31.12.2019	192,067	Autohaus Knoblauch e.K.
03EMIS0242	31.01.2018	30.09.2019	51,630	Sunline Solartechnik GmbH
03EMIS0243	26.01.2018	30.09.2019	30,992	Mittelweser Vertriebs GmbH
03EMIS0244	16.01.2018	31.12.2019	27,018	Grimmer Klimatechnik GbR
03EMIS0245	31.01.2018	31.12.2019	17,662	Kai Rüsberg
03EMIS0246	29.11.2017	31.03.2020	93,686	Evangelische Jugend Nürnberg
03EMIS0247	29.11.2017	31.03.2020	203,224	Stadt Rüsselsheim
03EMIS0248	29.11.2017	31.03.2020	21,004	HEB GmbH Hagener Entsorgungsbetrieb
03EMIS0251	25.01.2018	31.12.2019	152,116	CYX mobile KG
03EMIS0253	29.01.2018	31.12.2019	11,418	Stadtwerke Würzburg Aktiengesellschaft – Bereich Immobilien/Häfen
03EMIS0254	31.01.2018	31.12.2019	18,320	NW Post- und Presselogistik GmbH & Co. KG
03EMIS0255	31.01.2018	31.12.2019	2,355,052	RCI Banque S.A. Niederlassung Deutschland

PROJECT	COMMENCEMENT	CONCLUSION	FUNDING [€]	PARTNER
03EMIS0257	29.01.2018	30.09.2019	17,812	Stadtwerke Bochum Netz GmbH
03EMIS0260	29.11.2017	31.03.2020	51,424	Stadt Heilbronn
03EMIS0261	30.01.2018	31.12.2020	179,929	Kloiber GmbH
03EMIS0262	26.01.2018	30.09.2019	50,042	Rechtsanwaltskanzlei Ludolph GbR
03EMIS0263	31.01.2018	31.12.2019	157,152	Rinklin Naturkost GmbH
03EMIS0264	31.01.2018	31.12.2019	17,554	MigraTEC Netzwerktechnik GmbH
03EMIS0266	29.01.2018	31.12.2020	74,884	RÖMER-EXPRESS GmbH
03EMIS0267	31.01.2018	30.09.2019	5,235,877	Volkswagen Leasing Gesellschaft mit beschränkter Haftung
03EMIS0268	31.01.2018	30.09.2019	1,494,496	Volkswagen Leasing Gesellschaft mit beschränkter Haftung
03EMIS0269	31.01.2018	30.09.2019	1,385,647	Volkswagen Leasing Gesellschaft mit beschränkter Haftung
03EMIS0275	29.11.2017	31.03.2020	54,517	Landratsamt Emmendingen – Dezernat I – Finanzen, Bildung, Straßen & Hochbau
03EMIS0276	31.01.2018	31.12.2020	51,366	Nutzfahrzeugcenter Backnang GmbH


EM-PACK
BEHALA

Electric vehicles can be integrated well in diverse company fleets

The procurement projects presented on the following pages are examples of how cities and municipalities implement the topic of electric mobility in actual practice.

CLIMATE-FRIENDLY LOCAL TRANSPORT IN SYLT

The Sylt transport authority SVG (Sylter Verkehrsgesellschaft), together with the Flensburg University of Applied Sciences and the Moteg company, conducted a route analysis of the bus line network on the island of Sylt, in order to advance ecologically sustainable local public transport. For this the deployment of electric buses was examined with regard to routes, frequency, charging times, charging stations, and economic efficiency among other aspects. The result showed that on some circuits, electric buses can replace the diesel buses that have been running on them up to now.

The SVG decided to commission an e-bus by Sileo GmbH from Salzgitter for the middle of 2016 – one of the first local public transport providers in Schleswig-Holstein. In the medium term the SVG is striving for conversion of the entire fleet to e-drives. The faster the experiences can be gathered in every operation, the faster this adjustment can take place. The e-bus will be deployed on all routes on the island and topped-up during the day using the charging device. The SVG is in talks with the island's energy provider for the provision of the necessary infrastructure on the island. The island of Sylt in the Wadden Sea World Heritage Site is protected to a large extent. The SVG is going a step further for the island with climate-friendly local transport.

In the framework of the project, we were able to collect on the one hand, experience in handling the technology as well as daily use, and on the other, to test reliability. The bus is used daily and has now driven around 62,000 km. The electricity from our energy suppliers consists of 100 % hydro power plants (no pumped storage plants) that are produced in Norway. The plants are owned by non-nuclear plant operators. And so around 76 t CO_2 and 100 per cent diesel have been saved over the past two years. In addition considerable savings in maintenance, lubricants and brakes are expected.

The vehicle sets itself apart from the rest of the SVG fleet through a prominent sticker and is easily recognised as an electric bus.

The analysis of the grid capacity by the energy supplier at the train station, the testing of an intelligent charging infrastructure and scheduling are the next steps towards expanding electric mobility on the island of Sylt.

PARTNER:
Sylter Verkehrsgesellschaft (SVG)

PROJECT BUDGET/€:
271,000

FUNDING BUDGET/€:
135,500

COMMENCEMENT:
01 January 2016

CONCLUSION:
31 August 2018

PROCUREMENT:
1 Sileo electric bus S12 including fast-charging column

E-bus in line service in Sylt

» In this project we were able to obtain experience handling the technology on a daily basis, as well as test reliability. «

90 ELECTRIC BUSES AND CHARGING INFRASTRUCTURE FOR BERLINER VERKEHRSBETRIEBE

The Berlin transport authority BVG (Berliner Verkehrsbetriebe) is creating an incentive for manufacturers to develop their capacities with the tendering of 30 electric buses in 2018. Because several tendering procedures for bus procurement will go through during the ramp-up phase, there are incentives for bus manufacturers to improve vehicle quality through innovations and reduce costs in the short term. The contribution to the visibility of electric mobility locally begins with vehicles in regular service. Good visibility and driving routes with higher NOx levels are the criteria for route selection.

In the BVG's ramp-up phase of electric mobility, electrically-operated bus transport in Berlin will gradually be expanded from one route to entire neighbourhoods. As the capital city, Berlin has special significance. Electric buses can be experienced by the wider community as well as by tourists and will be a frequent feature of the cityscape to achieve a broad impact. The characteristics of electric vehicles such as low noise emissions or reliability can then be observed by everybody.

Objectives

- The goal of the state of Berlin is to become climate-neutral by 2050. The BVG is committed to this goal and will contribute substantially to it by procuring electric buses
- Gradual conversion from diesel to electric buses
- Compliance with the Berlin Mobility Act: bus transport using entirely alternative drives by 2030
- Testing and optimising the charging infrastructure
- Development and validation of an operational concept and disruption management for electric bus routes
- Extending competences in the planning and operational area of electric bus routes
- Reduction of both procurement costs for electric buses and the necessary infrastructure costs through the purchase of greater quantities
- Utilisation of results
- Findings obtained from operation contribute to optimising vehicles, charging infrastructure as well as the operating procedure
- Further development of procedures and standards in terms of repair shop operations
- Experiences form the basis for decisions on other technological courses (e.g. depot chargers, opportunity chargers, etc.)

PARTNER:
Berliner Verkehrsbetriebe (BVG)

PROJECT BUDGET/€:
10,464,711

FUNDING BUDGET/€:
4,185,884

COMMENCEMENT:
25 January 2018

CONCLUSION:
31 December 2020

DEPLOYMENT OF ELECTRIC VEHICLES IN COMMERCIAL FLEETS IN THE FREE AND HANSEATIC CITY OF HAMBURG

The aim of the project was to reduce harmful emissions caused by commercial transport road users in urban road transport. This was a practical measure in the context of the overall concept initiated by the Senate of the Free and Hanseatic City of Hamburg to decrease the environmental impact from local air pollutants, particularly in relation to reducing NO_x. For this purpose 148 battery-electric vehicles (BEVs) and plug-in hybrid vehicles (PHEVs) were deployed in local businesses in Hamburg. These vehicles were purchased by applicants and then made available to users in the framework of a 24-month leasing arrangement. The funds used were passed on to the lessee in the form of a correspondingly reduced leasing rate.

Local business in Hamburg makes an important contribution to the market ramp-up of electric mobility and at the same time, to the improvement of air quality locally. Companies (and fleets) of different sizes and structures were involved in the project. The development so far and direct exchange with regional businesses has shown that in Hamburg there is increased demand for the procurement of electric vehicles, in particular with company partners in the area of small and medium-sized businesses (SMEs).

The project was supported by FHH (at the state ministerial level through the authorities for economic affairs, transport and innovation) as well as by the Hamburg Metropolitan Region.

» The aim of the project was to reduce exhaust emissions in urban road traffic as a practical measure. «

PARTNER:
Volkswagen Leasing GmbH

PROJECT BUDGET/€:
1,954,110

FUNDING BUDGET/€:
781,644

COMMENCEMENT:
01 January 2017

CONCLUSION:
31 December 2018

PROCUREMENT:
Nissan e-NV200: 11 vehicles
Passat GTE: 6 vehicles
Peugeot iOn: 1 vehicle
Smart: 10 vehicles
e-Golf: 86 vehicles
e-up!: 20 vehicles
Golf GTE: 14 vehicles

StreetScooter:
a pioneer in electric
commercial vehicles

DEUTSCHE POST ELECTRIFIES DELIVERY VEHICLES IN NO_x CITIES

The aim of the project is to further advance the substitution of conventional delivery vehicles fitted with combustion engines with battery-electric operated vehicles. This should be done on the appropriate scale to test the capacity of electric mobility for use in commercial fleet operation for society as a whole.

Deutsche Post DHL Group is the largest fleet operator nationally and is already now using electric vehicles predominantly in city suburbs and outskirts. To expand use to particularly NO_x-polluted cities, a much greater number of vehicles and a simple, scalable charging technology are required. The goal of the project is to take on at least 1,460 electric vehicles by the end of 2019 for the fleet and deploy them in eligible cities and regions nationwide. The vehicles will mainly be deployed for inner city delivery transport. They handle up to 300 stops and starts per day, up to 300 days per year. The average route length amounts to approx. 50 km per day and per vehicle.

The project notably supports the funding policy objectives of the clean air immediate action programme 2017 – 2020, as diesel vehicles in the emission class EURO 4 or worse will be replaced.

In a full operating year for all 1,460 vehicles applied for, approx. 2,100,000 litres of dieselfuel will be saved. To be able to ensure daily deployment, at least 945 1-phase (3.7 kW charging capacity) and 562 3-phase (11 kW charging capacity) charging points will be constructed and put into operation at the locations. Where StreetScooters are used, certified green electricity is implemented. This guarantees sustainable and environmentally-friendly vehicle operation.

PARTNER:
Deutsche Post AG

PROJECT BUDGET/€:
37,499,250

FUNDING BUDGET/€:
14,999,700

COMMENCEMENT:
31 January 2018

CONCLUSION:
31 December 2019

PROCURED VEHICLES IN 2018:
Streetscooter Work: 16
Streetscooter Work L: 298
Streetscooter Work XL: 340

PROCURED CHARGING INFRASTRUCTURE IN 2018:
1-phase (3.7 kW): 216 charging points
3-phase (11 kW): 254 charging points (127 double charging columns)

MUNICH SENDS OUT A CLEAR MESSAGE WITH THE ELECTRIFICATION OF THE MUNICIPAL FLEET

The state capital Munich has committed itself to ambitious environmental and climate protection goals. An important component is the funding of electric mobility. The city wants to send a signal and advance electrification in its own municipal fleet. The aim of the project is to contribute to environmental and climate protection targets and at the same time act as a municipal role model and pioneer by purchasing electric vehicles instead of fuel-operated vehicles. In terms of upcoming replacement procurements, conventional cars and light commercial vehicles will be substituted for purely battery-operated electric vehicles where possible.

The vehicles will be used for passenger transport, transport of equipment, tools and hardware, as well as test and data collection drives. Furthermore vehicles will be replaced at the fire department. These vehicles are primarily foreseen for use as utility vehicles for rear-of-vehicle tasks. These include for example transport trips between individual fire stations within the urban area or use for inspections of objects of planned deployment scenarios as part of fire inspections. The majority of vehicles will travel at peak times almost daily. All vehicles are predominantly in service in the inner city of Munich and thus have high visibility.

In the framework of this project 44 electric vehicles were purchased, including 14 VW e-Golfs for the fire service. The other vehicles were small vans, cars and two utility vehicles for street cleaning.

PARTNER:
Landeshauptstadt München

PROJECT BUDGET/€:
657,148

FUNDING BUDGET/€:
328,574

COMMENCEMENT:
01 July 2016

CONCLUSION:
31 December 2018

14 electric vehicles in service for the Munich professional fire brigade

Streetscooter is a pioneer
for electric commercial vehicles

AACHEN COMBINES CONCEPT AND PROCUREMENT FUNDING IN ESTABLISHMENT OF E-VEHICLE POOL

The city of Aachen planned and then achieved the establishment of a municipal e-vehicle pool in the Neo-E-CarCharge project. The implementation took place in two work packages. Through the project the city of Aachen is trying to raise the share of electric vehicles from the approx. 4.6 per cent of the entire city's vehicle inventory at the beginning of the application to 10 per cent and thereby make a contribution to improving air quality in the city, as well as serving as a role model.

This involved setting up a municipal e-vehicle pool. This was against the backdrop of the needs assessment carried out in the emove project for selected locations of Aachen's city administration. The analysis proved that e-vehicles could be stationed at different administrative locations and could be put to effective use. Through the now compulsory use of this e-vehicle pool, the situation can be avoided whereby staff continue to use their private cars for professional errands, which have mostly combustion engines. 15 vehicles and the associated charging infrastructure will be procured and funded as part of this element of Neo-E-Charge.

In the second work package, vehicles were acquired for Aachener Stadtbetrieb (own municipal services of the city of Aachen). The intended uses of the vehicles orient themselves towards the assignment profile of the city's services (i.e. city driving for street cleaning and maintenance of green areas, repair and maintenance of buildings as well as courier service trips).

The visibility of electric mobility in Aachen has been greatly increased through the project. Furthermore the use of the vehicles confirms the "usability", suitability for everyday use as well as the reliability of electric mobility in a fleet context.

Electric vehicle for city cleaning and garden maintenance in Aachen

PARTNER:
Stadt Aachen

PROJECT BUDGET/€:
633,701

FUNDING BUDGET/€:
316,850

COMMENCEMENT:
01 January 2016

CONCLUSION:
31 July 2018

VEHICLES AND INFRASTRUCTURE
16 Smart electric drives
6 Nissan eNV200
6 wall boxes with two charging points each

DEPLOYMENT OF A FULLY ELECTRIC 2M³-CLASS STREET SWEEPER

Street sweeper vehicles clean all public roads, paths and squares on a daily basis across the entire area of the city of Freiburg. Because of different topography and building development, the most diverse requirements have to be fulfilled depending on the district. The street sweeper vehicles are equipped with a drive for the vehicle's mobility, a vacuum fan to suck up the swept material and brushes to clean the ground. Until now a diesel engine has provided the energy for the operation of all the units, with a hydraulic distribution system passing on energy to the different units. In order to provide them all with sufficient energy for sweeping operation, the engine speed will be ratcheted up to a sweeping speed of 7 – 10 km/h. The resulting emissions (particularly CO_2 and noise) are to be reduced.

Street sweeping machines have long operating times of up to six to eight hours daily in particularly high-density populated spaces and residential areas. With an average consumption of at least 7 – 8 litres of diesel per hour, there is an annual requirement of around 8,400 litres diesel per vehicle with an annual output of approx. 1,100 hours. In addition to high diesel consumption and the associated CO_2 and particle emissions, noise emissions from the diesel engine constitute significant pollution.

» Until now a diesel engine has provided the energy for the operation of all the units, with a hydraulic distribution system passing on energy to the different units. «

PARTNER:
Badenova AG & Co. KG

PROJECT BUDGET/€:
108,203,32

FUNDING BUDGET/€:
83,162

COMMENCEMENT:
01 January 2017

CONCLUSION:
31 December 2018

Project aim and categories

The aim is to prove that an e-street sweeper is suitable for everyday use and then gradually convert the fleet appropriately, taking economic efficiency into account.
A fully-electric street sweeper exhibits the following ecological and economic improvements compared to a conventionally-driven sweeper:

- Reduction of CO_2 emissions by approx. 27 tonnes per year (within the aforementioned deployment scope)
- Energy consumption reduced by 85 % (tank to wheel)
- Noise emissions reduced by 75 % in sweeping and driving operation
- 70 % reduction in operational costs

Market ramp-up

The vehicle has fulfilled all expectations in terms of noise and harmful emissions during active deployment periods, with driving handling performance regarded as successful. If the still very high procurement costs come close to the market price of diesel sweeping machines, then the e-street sweeper is a tenable technological as well as ecological alternative. The results of the long-term study are still awaited (target service life of 8 years).

Electric street sweepers are quiet, environmentally friendly and economical in terms of operating costs

BERLIN CITY SANITATION TESTS ELECTRIC SPECIAL VEHICLES

Depending on the results of pilot testing, of the 1,700 BSR (Berliner Stadtreinigung, Berlin City Sanitation) vehicles, up to 10 % will be converted to electric mobility in future with the aid of the funding programme.

At present there are already approx. 80 e-cars deployed and 64 charging points have been put into operation. Theoretically up to 116 different kinds of e-commercial vehicles can go into operation through the clean air programme by the end of 2020.

The aim is to supply these vehicles with an intelligent, AC and DC charging infrastructure connectable to the grid that is supplied with 100 per cent renewable energy electricity at the relevant properties. Thus the BSR is taking a tangible step towards a modern commercial vehicle fleet. The requirements of the BSR vehicles in operative use are high (load capacity, winter service). That is why the BSR is first testing new technologies for their basic suitability before they are deployed in larger numbers. Depending on the vehicle type, a test phase with 1 – 2 prototypes will be carried out. If the suitability test results are successful, more e-vehicles will be procured.

The following effects arise from the acquisition of e-commercial vehicles:

- Reduction of greenhouse, pollutant and noise emissions in the urban area
- Experiences for the further development of e-vehicle fleets and charging infrastructure
- Survey of test results for deployment in Berlin
- Expansion of fields of application for more user groups
- Addressing requirements early for the development of vehicles on the market

PARTNER:
Berliner Stadtreinigung (BSR)

PROJECT BUDGET/€:
16,904,537

FUNDING BUDGET/€:
12,678,403

COMMENCEMENT:
29 November 2017

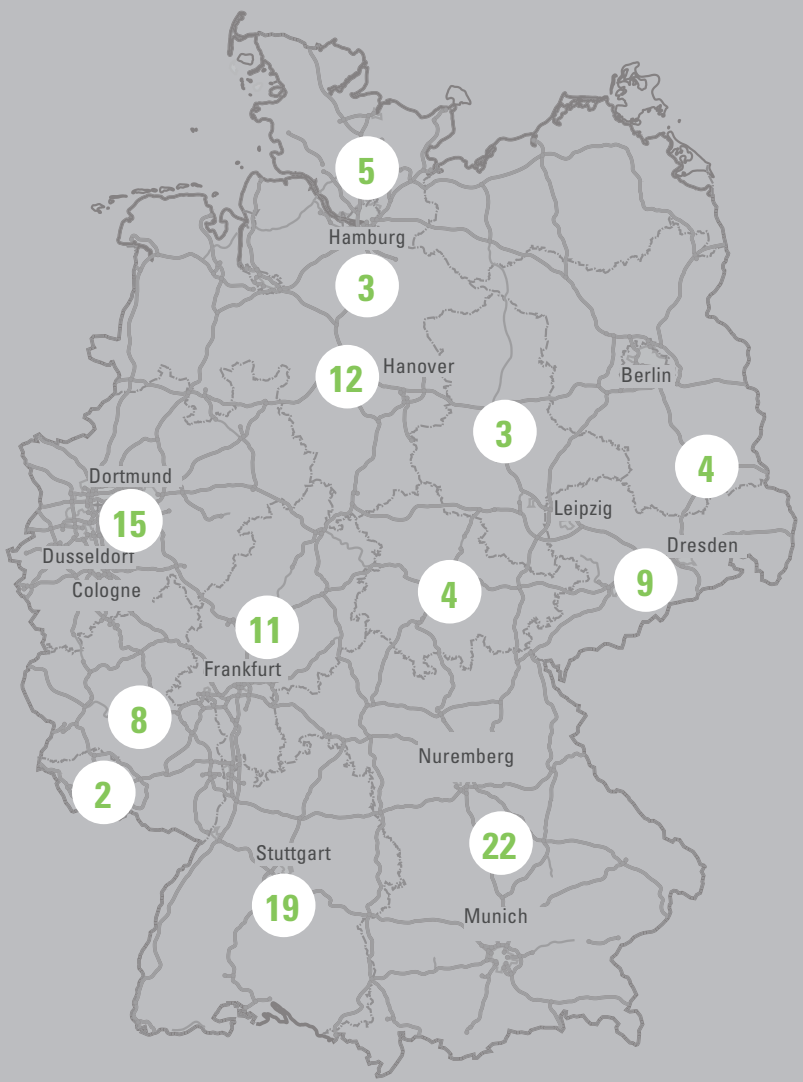
CONCLUSION:
31 December 2020

VEHICLES AND INFRASTRUCTURE:
Through the e-mobility funding guideline in the clean air immediate action programme, test vehicles were ordered: 1 small street sweeper, 1 compact sweeper, 1 street refuse collection vehicle as well as 1 waste collection vehicle and 1 paper recycling vehicle, the latter two through the Berlin Programme for Sustainable Development (BENE).

In total there were 64 AC charging stations built. By the middle of 2019, another 20 AC charging stations will be added. A DC charging station is planned for the charging of refuse collection vehicles at MHKW Ruhleben.

CONCEPT FUNDING STRENGTHENS LOCAL AUTHORITIES IN ELECTRIC MOBILITY IMPLEMENTATION

Within the electric mobility funding guideline from 9 July 2015, 128 municipal electric mobility concepts are currently being funded by the BMVI following three funding calls. The regional authorities, companies and associations are located by a large majority in urban regions (73 %), in regions with population concentrations (15 %), with only approx. an eighth (12 %) of all funded electric mobility concepts found in rural regions (see figure below).

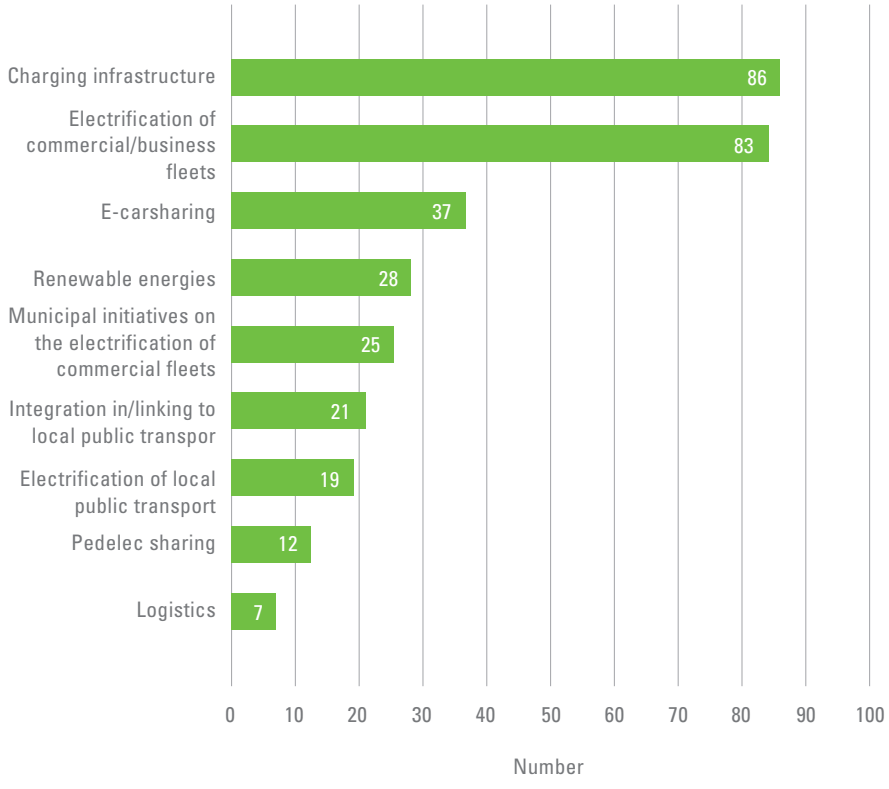


Regional distribution of BMVI municipal electric mobility concepts

An overview of all electric mobility concepts can be found on the electric mobility starterset website via the infocentre (https://www.starterset-elektromobilität.de/Infothek/elektromobilitaetskonzepte). When the concept is successfully concluded, the final reports are to be made available to download on an ongoing basis. They can be filtered according to topic and completed concept.

The funding options provided by the programme are diverse. They range from general concepts analysing the potential of electric mobility in the municipality to highly specialised topics like for example, the development of exclusive e-taxi fast-charging infrastructure. Concepts on spheres of activity like electrification of municipal or commercial fleets as well as charging infrastructure themes were submitted most frequently (see figure below). Along with the electrification of fleets, the establishment of e-carsharing was also a goal, and to some extent in combination with pedelec sharing. Concepts increasingly in focus are the electrification of local public transport as well as its integration and connection to newly created services (intermodal multi-leg journeys).

Areas of action for the funded electric mobility concepts



Overview of priority areas of action of concept funding

With the fourth funding call on electric mobility concepts in 2018, important topics were highlighted. Aside from fleet themes and charging infrastructure, the linking up to self-generated renewable energies is to receive bolstered support. This applies to the electrification of local public transport and logistics/commercial transport fleets and/or the assessment of potential in electrifying local public transport fleets and fleets in the area of logistics/commercial transport.

The areas of activity already established will continue to be examined in the accompanying research: "Networked mobility". In 2018 the series of workshops introduced in 2017 were continued. There were three workshops held on the themes of electrification of fleets, communication strategies for e-mobility and charging infrastructure development in municipalities.

The workshop on the electrification of fleets yielded a multitude of results. As the experiences of workshop participants show, the electrification of fleets cannot take place on an ad hoc basis. The changeover from combustion to electric vehicles should be implemented gradually but with a time limit objective. This requires staff capacities and clearly defined responsibilities ("carers"). From an economic and ecological point of view, the multiplication of uses for e-vehicles is sensible. In practise this happens by opening up the fleet to private use by staff or to the public after office hours (connection to e-carsharing). All these new options need the relevant communication and activation measures for them to become accepted.

At the workshop for charging infrastructure development, participants found that charging infrastructure is increasingly becoming a topic for urban planning. Charging infrastructure is the interface between mobility and the urban space. Municipal instruments such as parking space regulations, urban development contracts and development plans can be used to determine projects on charging infrastructure. Also in private residential and commercial construction, charging infrastructure must be considered more carefully in the future – ducts will be laid or charging infrastructure constructed from the start.

In addition, several activation strategies for the public and semi-public space presented themselves. Aside from cooperation with municipal utilities and building networks, inventory and demand analyses are particularly important in terms of a foundation for systematic charging infrastructure.

Highly relevant to implementing electric mobility concepts is their strategic integration. By interlinking already existing concepts in the areas of climate protection, transport and urban development, chances of implementation and success can be greatly increased.

Market ramp-up of electric vehicles must go hand in hand with the development of charging infrastructure

APPROVED CONCEPTS IN THE BMVI ELECTRIC MOBILITY FUNDING PROGRAMME 2017

PROJECT	COMMENCEMENT	CONCLUSION	FUNDING [€]	PARTNER
Commencement 2018				
03EMK232	01.01.2018	30.06.2019	39,731	Burgenlandkreis
03EMK273	01.01.2018	30.06.2019	56,800	Stadt Wertingen
03EMK278	01.01.2018	30.06.2019	43,849	Gemeinde Tutzing
Conclusion 2018				
03EMK003	01.03.2016	31.03.2018	64,672	Landeshauptstadt Stuttgart – Ref. für Koordination und Planung des Oberbürgermeisters – Abt. Mobilität
03EMK011	01.06.2016	30.06.2018	79,200	Große Kreisstadt Fürstenfeldbruck – Amt 4 Bauamt – SG41 Stadtplanung, Landschafts- und Verkehrsplanung und Klimaschutz
03EMK017	01.04.2016	31.01.2018	80,000	Landkreis Leipzig – Dezernat 2 – Amt für Kreisentwicklung
03EMK031	01.05.2016	30.06.2018	75,535	Landkreis Alzey-Worms – Abt. 6 Bauen und Umwelt
03EMK033	01.03.2017	30.06.2018	50,000	Wirtschaftsförderungsgesellschaft Hamm mbH
03EMK049	01.09.2016	31.07.2018	78,800	Freie und Hansestadt Hamburg – Behörde für Wirtschaft, Verkehr und Innovation – Amt für Innovations- und Strukturpolitik, Mittelstand, Hafen
03EMK102	01.04.2017	31.12.2018	59,440	Kreis Soest – Koordinierungsstelle Regionalentwicklung
03EMK103	01.01.2017	31.12.2018	32,725	Caritasverband für die Diözese Osnabrück
03EMK104	01.10.2016	31.12.2018	59,976	Landkreis Hof
03EMK105	01.01.2017	30.06.2018	60,632	Stadt Dortmund – Wirtschaftsförderung Dortmund
03EMK106	01.10.2016	30.04.2018	79,676	Stadt Bad Säckingen
03EMK107	01.02.2017	31.12.2018	30,300	EUV Stadtbetrieb Castrop-Rauxel
03EMK109	01.10.2016	28.02.2018	80,000	Stadt Aachen – Dezernat III Planung und Umwelt – Bauverwaltung (B03/20)
03EMK110	01.11.2016	28.02.2018	76,434	Landkreis Traunstein
03EMK113	01.02.2017	31.01.2018	20,800	Altmühl-Jura GmbH
03EMK120	01.10.2016	31.12.2018	46,110	Landkreis Gießen
03EMK121	01.10.2016	31.01.2018	80,000	Landeshauptstadt Hannover – Fachbereich Umwelt und Stadtgrün – Bereich Umweltschutz – Klimaschutzleitstelle
03EMK122	01.09.2016	30.11.2018	73,600	Stadt Bielefeld – Dezernat 4 Planen/Bauen – 660 Amt für Verkehr
03EMK123	01.10.2016	31.03.2018	76,640	Stadt Chemnitz – Umweltamt

PROJECT	COMMENCEMENT	CONCLUSION	FUNDING [€]	PARTNER
03EMK125	01.01.2017	30.06.2018	74,912	Gemeinde Gärtringen – Ordnungsamt
03EMK127	01.04.2017	30.09.2018	39,381	Stadt Flensburg -– Fachbereich Entwicklung und Innovation – Abt. Strategische Projekte, Verkehr und Umwelt
03EMK130	01.01.2017	31.05.2018	34,813	Leipziger Verkehrsbetriebe (LVB) Gesellschaft mit beschränkter Haftung
03EMK133	01.01.2017	30.04.2018	76,000	Stadt Baunatal – Stadtwerke Baunatal
03EMK208	01.08.2017	31.12.2018	70,202	Landratsamt Ebersberg – Sachgebiet Wirtschaftsförderung, Regionalmanagement
03EMK211	01.07.2017	31.12.2018	41,200	Gemeinde Weissach im Tal
03EMK213	01.07.2017	31.12.2018	23,112	Gemeinde Büchen
03EMK215	01.06.2017	31.12.2018	42,840	Stadtverwaltung Stollberg
03EMK216	01.07.2017	31.12.2018	19,112	Amt Büchen
03EMK218	01.07.2017	31.12.2018	80,000	Gemeinde Lossatal
03EMK219	01.07.2017	31.12.2018	72,160	Gemeinde Großbeeren
03EMK220	01.05.2017	30.10.2018	58,241	Stadt Radolfzell
03EMK222	01.07.2017	31.12.2018	80,000	Ev.-Luth. Kirchenkreis Hamburg-West/Südholstein
03EMK223	01.06.2017	30.11.2018	47,940	Energieversorgung Mittelrhein AG
03EMK224	01.06.2017	31.12.2018	48,480	Marktgemeinde Ottobeuren
03EMK226	01.06.2017	30.11.2018	80,000	Stadt Ettenheim
03EMK227	01.09.2017	31.12.2018	56,016	Stadt Koblenz – Dezernat II – Kommunaler Servicebetrieb Koblenz (EB 70)
03EMK234	01.07.2017	31.12.2018	48,320	Landratsamt Bautzen- Geschäftsbereich 2
03EMK235	01.07.2017	31.12.2018	36,200	Stadt Jena – Dezernat Stadtentwicklung – Fachbereich Bauen und Umwelt – Fachdienst Umweltschutz
03EMK237	01.07.2017	31.12.2018	14,765	Stadt Schwabach – Referat 4 – Stadtplanung und Bauwesen – Amt für Stadtplanung und Bauordnung
03EMK239	01.07.2017	31.12.2018	71,089	Gemeinde Flein
03EMK240	01.07.2017	31.12.2018	80,000	Landkreis Waldeck-Frankenberg
03EMK246	01.07.2017	31.12.2018	41,555	Stadtwerke Neuwied GmbH
03EMK247	01.06.2017	30.11.2018	44,650	Duisburger Verkehrsgesellschaft Aktiengesellschaft
03EMK248	01.07.2017	30.12.2018	61,200	LEADER Region Rhein-Haardt
03EMK250	01.06.2017	30.11.2018	22,982	Stadt Lützen

PROJECT	COMMENCEMENT	CONCLUSION	FUNDING [€]	PARTNER
03EMK252	01.06.2017	31.05.2018	40,910	Offenbacher Verkehrs-Betriebe GmbH
03EMK255	01.06.2017	30.11.2018	80,000	Landkreis München – Geschäftsbereich 3 Infrastruktur und Gesundheit – Sachgebiet 3.3.1.1 Mobilitätsplanung
03EMK262	01.08.2017	30.09.2018	31,626	Stadt Vogtsburg im Kaiserstuhl
03EMK264	01.07.2017	31.12.2018	76,032	Stadt Kölleda
03EMK266	01.05.2017	31.08.2018	24,800	Gemeinde Bergkirchen
03EMK270	01.07.2017	31.12.2018	23,995	Landkreis Nordsachsen
03EMK271	01.06.2017	31.12.2018	79,840	Stadt Vilsbiburg
03EMK274	01.07.2017	30.09.2018	56,000	Landratsamt Kyffhäuserkreis
03EMK279	01.09.2017	31.08.2018	48,480	Kommunen in der Metropolregion Hannover Braunschweig Göttingen Wolfsburg e. V.
03EMK280	01.07.2017	31.12.2018	20,850	Stadt Homberg (Efze)

The concepts described on the following pages are examples of how cities and municipalities are exploring the topic of electric mobility for themselves.

STUTTGART ELECTRIC TAXI ACTION PLAN

In the region of the state capital of Stuttgart, more than 700 taxis cover around 50 million kilometres per year. In addition there are about 80 taxis that begin their journeys from Stuttgart airport (in the Esslingen district region.) Most of these airport journeys also travel to the Stuttgart urban area. Thus taxis account for a not inconsiderable share of daily automotive transport in the urban area.

It is the city administration's stated goal to convert the entire taxi fleet to electrically-operated vehicles over the longer term. In this way a contribution can be made to support electric mobility, to exemplify the changeover in a highly visible area and to reduce noise, particulate matter and pollution. In order to successfully realise this ambitious project, a study was to be conducted to obtain concrete answers to questions and address problem areas associated with implementation. A pilot project with electric taxis has shown that primarily vehicle selection and procurement, customer management and acquisition raise issues. Other open questions arose concerning charging times, charging stations and charging techniques. The implementation study delivered concrete answers to this and will facilitate a rapid implementation of the changeover to e-taxis. The city is fundamentally prepared to fund the electrification of the taxi fleet with its own finances. With regard to efficiency and effectiveness of such funding, it is necessary to conduct a thorough prior analysis of alternative courses of action.

» It is the city administration's stated goal to convert the entire taxi fleet to electrically-operated vehicles over the longer term. «

PARTNER:
Landeshauptstadt Stuttgart

PROJECT BUDGET/€:
80,840

FUNDING BUDGET/€:
64,672

COMMENCEMENT:
01 March 2016

CONCLUSION:
31 March 2018

Project goal:

- Generation of a funding concept through which incentives for private taxi operators will be created to switch to electrically powered vehicles
- Concretisation and implementation of the funding concept
- In the long term, conversion of the entire taxi fleet (around 700 vehicles) is the aim
- The implementation study is to tie in with the GuEST project (joint project examination of utilisation of electric taxis in Stuttgart) from the "Electric mobility showcase" funding programme.

Methods and instruments:

The contractor is to work out concrete alternative courses for action:

- Proposals for a funding model for vehicle procurement (purchase as well as leasing are to be considered)
- Proposals for a concept that allows simultaneous charging and customer operations (regular and fast-charging, as well as the construction of publicly accessible infrastructure and infrastructure exclusive to taxis)
- Concrete demand and investment planning for the charging infrastructure to be built (type, number, locations), tailored to the existing taxi ranks.

In the course of implementing the measures, 3 triple-charges with a 61 kW connected load will be constructed by May 2019 and numerous vehicles funded through the state capital of Stuttgart.

CREATION OF A MUNICIPAL ELECTRIC MOBILITY CONCEPT FOR THE DISTRICT OF SOEST

The electric mobility concept for the Soest district is to produce the following results:

- Specification and categorisation of potential locations for public charging points taking into account existing infrastructure (existing grid connection, existing regenerative energy producers feeding into the grid, or feeders, integration of existing transport infrastructure)
- Assessment of the degree of utilisation of charging stations based on criteria yet to be defined which characterise the position of the charging station (categorisation of the location, local population density, cultural institutions, commercial/ trade/ residential areas, etc.); characterisation of charging stations according to the number of charging points and charging capacity
- Connection concepts for the charging stations to the electrical supply based on the categorised locations
- List of requirements for mobility concepts (incl. local public transport, carsharing for private users and businesses for whom a fleet of electric vehicles offers potential economic advantages)
- Evaluation of existing or yet to be defined approaches to solutions for customer-oriented access to public charging points
- List of requirements to integrate electric vehicles' charging processes in an optimised load management in order to balance generated and consumed electric energy in terms of the various regions

The study thus comprises the entire value chains right from the generation and provision of electrical energy for electric mobility, to the users and billing.

It provides approaches to solutions and suggestions for action to implement a sustainable charging infrastructure based on the medium to long-term forecast demographic and economic development of the region in question. The results of the study make an important and sustainable contribution to the climate and environmental protection goals of the district of Soest.

PARTNER:
Kreis Soest

PROJECT BUDGET/€:
59,440.00

FUNDING BUDGET/€:
74,643.50

COMMENCEMENT:
01 April 2017

CONCLUSION:
31 December 2018

BUILDING SUSTAINABLE MOBILITY CHAINS BASED ON ELECTRIC VEHICLES IN CHEMNITZ

The aim of the government-funded study was to create a concept on the topic: "Setting up sustainable mobility chains based on electric vehicles, taking into account the differentiated settlement structure, linking to public transport at suitable hubs as well as supply with renewable electric energy."

The project's goal is to analyse the development of mobility behaviour in the city of Chemnitz and the bordering district of Erzgebirgskreis, examine existing infrastructure, discover what the obstacles are to the acquisition and the use of electric vehicles and develop concrete recommendations for action to support electric mobility. Aside from cars, bike transport as well as commercial transport are also viewed as important target groups. Especially because of the topography and the age structure in the study area, starting points for supporting bike traffic will be seen here, which can lead to positively influencing the modal split towards an environmental alliance. Another priority is the linking of public transport with the city and regional railway "Chemnitz model" with individual electric vehicles at suitable hubs.

In the context of incentives now in force, the study highlights options to establish electric mobility according to regional circumstances. The study did not only aim to boost the market ramp-up, but also generally examined mobility activities with the goal of traffic reduction. Apart from contributing to the market ramp-up, the city's interest lies in reducing traffic and the use of existing infrastructure. This view is not just necessary because of the nitrogen oxide problem or noise pollution, but also essential in relation to the need for space and quality of life in the inner city.

The contribution of the study is therefore rather more geared towards the creation of a concept to set up sustainable mobility chains, which take the differentiated settlement structure into account in the study area, guarantee extensive development and thereby sustainably link together places where there is human activity.

PARTNERS:
a) Stadt Chemnitz
b) Included Erzgebiergskreis

PROJECT BUDGET/€:
a) 70,036.72
b) 5,000

FUNDING BUDGET/€:
a) 52,029.38
b) 4,000

COMMENCEMENT:
01 October 2016

CONCLUSION:
31 March 2018

Electric mobility goes hand in hand with renewable energy

» In the framework of currently valid incentives, the study demonstrates opportunities for the establishment of electric mobility, depending on regional circumstances. «

CONCEPT FOR THE ELECTRIFICATION OF THE OFFENBACH CITY BUS FLEET

This study examines the technical and operational feasibility of electric bus systems currently on the market along with their capability of being integrated into the bus network of Offenbacher Verkehrs-Betriebe GmbH (Offenbach public transport company). Furthermore the anticipated costs and positive environmental effects of using electric buses will be determined including identifying specific locations and determining the dimension of the necessary charging infrastructure, vehicle requirements and the technical specifications of the vehicles. In line with the objectives of the project therefore, the feasibility analysis included the operational, technical and economic evaluation of an electrification of the bus lines in accordance with the new Offenbach local public transport plan for the period 2018 to 2022. Based on the results of the feasibility study, a conversion concept was subsequently formulated which recommended the gradual introduction of 27 electric buses by the year 2023. Thanks to operational expansions, the target has increased in the meantime to 36 vehicles.

Results of the study at a glance:

- By 2023, 35 % of Offenbach's city bus fleet can become electrified this has now been increased to 45 % in the interim
- Thus 2,300 t CO_2, 1,000 kg nitrogen oxide and 8kg particulate matter can be saved per year.
- No additional vehicles (compared to diesel bus operation) and no additional driving personnel are required to achieve this goal and guarantee smooth operation.
- The electric buses will be recharged at night at the depot and at two terminals during the day in the Offenbach urban area with the aid of a so-called pantograph.
- Appropriate charging infrastructure and suitable power supply must be established at the three locations.
- A hybrid heating system will be used to ensure optimal operation and adequate air conditioning (heating/cooling) for the interior at all times of the year.

PARTNER:
Offenbacher Verkehrs-Betriebe GmbH

PROJECT BUDGET/€:
78,880

FUNDING BUDGET/€:
39,440

COMMENCEMENT:
01 June 2017

CONCLUSION:
31 May 2018

- The repair garage equipment of Offenbacher Verkehrs-Betriebe must be expanded to include special tools. Garage and driving staff also need further training on the new technology and the new vehicles.
- Through the high visibility of the electric buses on public streets, road users are made aware of electric mobility. Operators of other municipal fleets (for example supply and waste disposal) as well as other transport providers can also profit from the experiences gained on a regional and supra-regional level. The electrification of urban bus fleets is a component of the Offenbach electric mobility strategy and is incorporated in all publicity campaigns on the subject (see www.e-wie-offenbach.de).

Visualisation of an electric bus with a pantograph

RESEARCH AND DEVELOPMENT (R&D) FUNDING PRIORITY

Aside from funding procurement of electric vehicles and operationally-necessary charging infrastructure as well as electric mobility concepts, the electric mobility funding guideline contains strategically important, research and development (R&D) funding instruments. Besides making a key contribution to the market ramp-up of electric mobility, the R&D projects which are funded also contribute important findings for the thematic areas of the accompanying research to the programme.

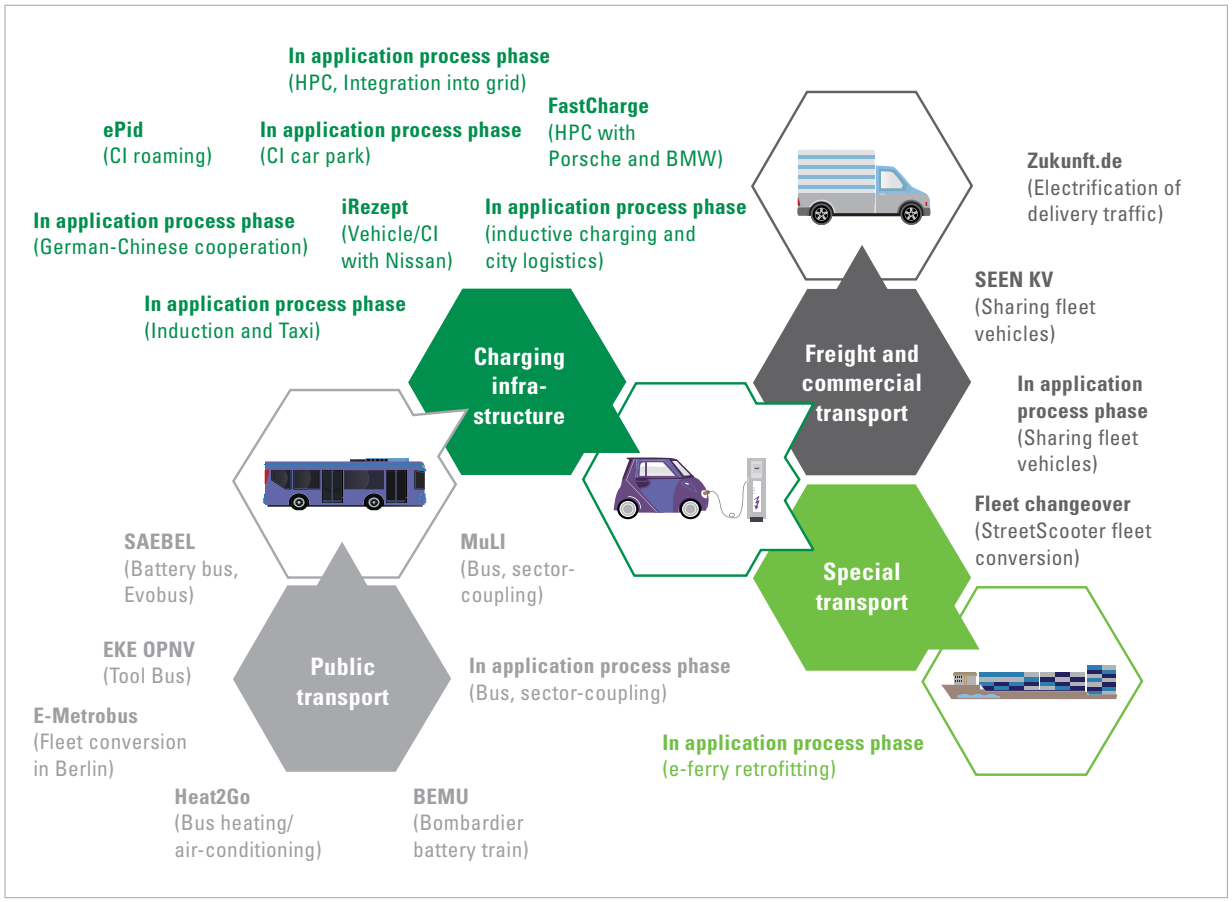
Since the funding guideline's went into force in 2015, three funding calls were conducted in the R&D area. The focus of the research is practical technology testing and further development in the following areas:

- Testing utilisation or operational concepts for electric mobility in the relevant vehicle segments
- Battery and battery components with a focus on vehicle integration
- Developing and testing innovative charging technologies
- Developing integrated approaches on linking infrastructure and vehicles
- Technical implementation of system solutions and services in the broader context of electric mobility
- Strengthening electrification in the areas of public transport, goods and special transport, maritime and other transport policy relevant applications

Within each of the funding calls, there was a focus on key technologies and applications. The fundamental thematic priorities have remained the same. In the third call, projects to support the current BMWI German-Chinese cooperation were submitted for the first time.

1st Call (07/2015)	2nd Call (09/2016)	3rd Call (11/2017)
• Innovative charging technologies • Electrification of local public transport, rail, goods and special transport as well as maritime applications • Linking vehicles and infrastructure • Utilisation and operational concepts • System solutions and service solutions • Battery and battery components with a focus on vehicle integration	• Boosting electrification in local public transport, goods and commercial transport as well as special transport and maritime applications • Linking vehicles and infrastructure • Integration of renewable energies in the transport sector	• Innovative charging technologies • Boosting electrification in local public transport (road and rail), goods and commercial transport (road and rail) as well as special transport and maritime applications • Integration of renewable energies in the transport sector • Project support for BMVI German-Chinese cooperation

Priorities of the R&D calls



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

At the moment there are 12 ongoing R&D projects from the 1st and 2nd call. A further 8 are still in the applications phase, with their approval expected in 2019. The main thematic priorities are: local public transport, charging infrastructure, goods and commercial transport, as well as special transport and shipping.

This landscape will be supplemented by ERA-NET Plus projects, which serve the collaboration between national or regional research funding institutions. There are currently 10 projects in progress which bundle scientific competence in Europe.

SAEBEL –APPLICATION-ORIENTED DEVELOPMENT OF BATTERY-ELECTRIC CITY BUS SYSTEM CAPABLE OF SERIES PRODUCTION

Electric drives will prove their worth in city buses and gradually replace today's diesel drive. This vision, which is being pursued for the sake of climate policy as well as for society, can work when the necessary technological prerequisites and framework conditions for economic operation are already established. Without setting this course, the market ramp-up cannot be successfully implemented. Other than the fuel cell drive, whose high range and centralised energy supply at the depot reproduces the operating profile of a diesel bus, the pure battery drive, which has depot and top-up charging options while in service, represents a cost-effective alternative that can find a wide field of application in Europe.

The aim of this project was to develop a marketable city bus transport system with a pure battery drive. In order to take the next step towards market maturity and market ramp-up, a two-part integrated approach will be taken in SAEBEL:

- Development of technical maturity on the vehicle and system side
- Feasibility studies in selected cities to develop sustainable e-mobility concepts for city bus deployments in partial or entire networks

SAEBEL has made an essential contribution to developing the technical maturity of pure battery-electric city buses right up to marketability. Parallel to vehicle development, the preconditions for the successful deployment of battery buses in partial or entire networks were examined together with transport companies in feasibility studies. The knowledge gained here, for example on the operational and charging concept, is fed directly into the development of the Mercedes-Benz eCitaro. Thus the preconditions for the market ramp-up in this vehicle segment were created, which in turn boosts the visibility of electric mobility in Germany.

» The aim of this project was to develop a market-ready city bus transport system with pure battery drive. «

PARTNER:
EvoBus GmbH

PROJECT BUDGET/€:
6,084,995

FUNDING BUDGET/€:
1,849,838

COMMENCEMENT:
01 May 2016

CONCLUSION:
31 December 2018

Fully electric-drive
Mercedes-Benz
eCitaro city bus

SEEN-KV

The objectives of the joint project were the research and development as well as the practical application of a support tool for the deployment of electric heavy commercial vehicles in the first and last legs ("last miles") of combined transport. This was to primarily examine and facilitate the hitherto problematic use of purely electric commercial vehicle fleets in the dynamic environment of combined transport freight terminals.

Combined transport is the transport of standard load units (containers, swap-bodies, semi-trailers) using several modes of transport. The switch between transport modes takes place in combined transport terminals, e.g. in inland ports and freight centres. The operating conditions of electric vehicles in combined transport terminals in Saxony were analysed in the project. The industry partners were Sächsischen Binnenhäfen Oberelbe GmbH and Emons-Rail-Cargo GmbH, the project coordinator was LUB Consulting GmbH. The simulation was conducted by the Technical University of Applied Sciences Wildau. GVZ-Entwicklungsgesellschaft Dresden mbH and Deutsche GVZ-Gesellschaft mbH were associated partners.

With SEEN-KV, users can simulate using electric trucks for their field of application and make an informed decision about procuring suitable vehicles. Another goal was the research of charging infrastructure requirements in freight transport bundling points. With GVZ Dresden, the three inland harbours Dresden, Riesa and Torgau, and the combined transport terminal Schkeuditz, five test sites were available.

» The aim of the project was the research and development as well as practical application of a decision-making support tool for the deployment of electric heavy commercial vehicles. «

PARTNERS:
a) LUB Consulting GmbH
b) Technische Hochschule Wildau (FH)
c) Emons-Rail-Cargo GmbH
d) Sächsische Binnenhäfen Oberelbe GmbH

PROJECT BUDGET/€:
453,287

FUNDING BUDGET/€:
293,828

COMMENCEMENT:
01 October 2016

CONCLUSION:
31 December 2018

» An important project priority for reaching the aforementioned goals is the integration of e-vehicles in the operational practice of participating CEP companies under everyday conditions. «

ZUKUNFT.DE: CUSTOMER-ORIENTED, SUSTAINABLE, FLEXIBLE AND TRANSPARENT DELIVERY TRAFFIC WITH ZERO EMISSIONS

ZUKUNFT.DE is a multicentre model project focused in Baden-Württemberg, Hamburg and Hesse. In the project, more than 500 fully and partially electric vans will be deployed for the first time for 'last-mile' parcel delivery. This includes mostly vehicles from the 2.8 and 3.5t classes, but also larger vehicle concepts. The objectives of the project are to avoid local emissions for the last leg of the journey, guarantee operational efficiency and scale the operational use of e-drives in the courier, express and parcel (CEP) services industry.

An important project priority for reaching the aforementioned goals is the integration of e-vehicles in the operational practice of participating CEP companies under everyday conditions. This includes in particular, the determination of criteria for site selection and identification of suitable locations, the technical upgrading of depots as well as integrating e-vehicles into operational processes.

The technical focus is the concept development for charging and load management at the CEP locations. Exact system configurations will be developed, taking into account circumstances specific to locations and companies concerned.

The focus of the research is on the development of a suitable process for data collection and evaluation and the development of a data protection concept, the optimisation of existing route planning having regard to the power capacities of the e-vehicles as well as the evaluation of the processes changed by the electrification of the fleet at the CEP companies.

PARTNERS:
a) hySOLUTIONS GmbH
b) Daimler AG
c) DPD Deutschland GmbH
d) Frankfurt University of Applied Sciences
e) Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e. V.
f) General Logistics Systems Germany GmbH & Co. OHG
g) Hermes Germany GmbH
h) Kühne Logistics University GmbH
i) Stromnetz Hamburg GmbH
j) United Parcel Service Deutschland S.à.r.l. & Co. OHG
k) Volkswagen AG

PROJECT BUDGET/ FUNDING BUDGET/€:
a) 246,834/123,417
b) 3,745,661/1,274,784
c) 100,225/40,090
d) 277,977/277,977
e) 392,486/392,48
f) 539,310/215,724
g) 524,387/209,755
h) 329,739/329,739
i) 446,553/223,276
j) 4,516,177/1,806,471
k) 769,425/307,770

COMMENCEMENT:
01 January 2018

CONCLUSION:
31 December 2020

» Through the development and deployment of an innovative vehicle concept including a demand-oriented charging infrastructure, a significant contribution will be made towards cost reduction and thus a wider distribution of electric vehicles in an important submarket with a key exemplary role. «

FLEET TRANSITION: E-VEHICLE AND CHARGING INFRASTRUCTURE DEVELOPMENT FOR MUNICIPAL USE

The aim of the project is to develop electrically-operated complete mobility systems for municipal fleets. These consist on the one hand of electric light commercial vehicles weighing up to 4.25 t in total, which in terms of purpose design, will be specifically tailored to the requirements of municipal fleets. On the other hand, suitable charging infrastructure is being developed which should meet municipal requirements. Smart vehicles and smart charging infrastructure will ensure that the mobility solutions will present no disadvantages compared to conventional fleets. The specific design represents an improvement in the eco-balance compared to what previous solutions have achieved thus far. If the desired paradigm shift in the municipalities' procurement philosophy takes place in the light commercial vehicles segment, this may have an impact on procurement as a whole for municipal and commercial fleets in the sense that it results in systematic downsizing. The project will therefore strengthen the electrification of commercial transport. Through the development and deployment of an innovative vehicle concept including a demand-driven charging infrastructure, a significant contribution will be made to cutting costs and consequently to spreading the use of electric vehicles in a key submarket, serving as an important example.

PARTNERS:
a) StreetScooter GmbH
b) aixACCT mechatronics GmbH
c) Wuppertal Institut für Klima, Umwelt, Energie GmbH

PROJECT BUDGET/€:
a) 1,165,149
b) 564,856
c) 108,210

FUNDING BUDGET/€:
a) 466,059
b) 282,428
c) 97,389

COMMENCEMENT:
01 March 2018

CONCLUSION:
28 February 2021

I-REZEPT: INTELLIGENT BACKFEEDING ELECTRIC VEHICLES FOR MAXIMISING OWN ELECTRICITY CONSUMPTION AND PARTICIPATION IN PRIMARY OPERATING RESERVE MARKET

The i-rEzEPT project will help to reduce the investment and operating costs of electric vehicles and charging infrastructure through the testing of new business models. For this e-vehicles and charging stations capable of energy recovery will be operating in the field in order to:

- Be able to participate in the primary operating reserve market
- Maximise the degree of self-sufficiency of districts as well as energy-efficient single properties
- Implement sector coupling between mobility, electricity and heating in an innovative and particularly far-reaching model

The goal of the project is to clearly demonstrate the uses of e-vehicles for society as a whole with respect to renewable energies.

The project's results should prove the feasibility and thus contribute to the acceleration of the market ramp-up of e-vehicles. It is emphasised that the project results are considered independent of charging protocol and are applicable to all e-vehicles capable of energy recovery. The research on the use of the concept will cover existing properties. The potential to be able to equip a very high number of single residence houses and comparable properties is especially high. That is why this part of the project will be the focus of research and testing. In the framework of field tests the project will demonstrate that electric mobility can be coupled with electric grids and properties of all types (single-, multi-residence and commercial buildings, both existing and new build) independently from one another. And so the traction batteries of series production-ready electric vehicles capable of backfeeding should act on the one hand as buffer storage for the building in question (maximising consumption of own power and minimising feeding in renewable energy into the grid) also using series production-ready charging infrastructure capable of backfeeding. On the other hand they should be made available for the electricity balancing market – in this case the provision of the particularly ambitious and lucrative primary balancing power.

In the project 20 e-vehicles capable of energy recovery will be tested. These will be vehicles from the automobile manufacturer NISSAN: 20 NISSAN LEAF ZE1 (2nd generation).

PARTNERS:
a) NISSAN Center Europe
b) Bosch Software Innovations
c) Fraunhofer Institut IFAM
d) Fraunhofer Institut IAO

PROJECT BUDGET/€:
a) 1,422,104
b) 704,518
c) 890,595
d) 821,842

FUNDING BUDGET/€:
a) 568,841
b) 281,807
c) 801,535,50
d) 739,333,80

COMMENCEMENT:
01 March 2018

CONCLUSION:
31 October 2020

» This allows the costs for both mobile applications (e.g. e-cars) as well as stationary storage systems to be reduced. «

INNOVATIONS FOR SUSTAINABLE MOBILITY: MULTIMODAL LOAD MODULE INTEGRATION (MULI)

The aim of the MuLi project is the demonstration of a charging system with integrated load modules for different vehicle classes, whose core system architecture is designed for recharging battery buses. At the same time the multimodal-designed charging system will be connected to different voltage levels (10 kV AC, rail DC), with a scalable storage solution also planned.

Vehicle high-voltage batteries or cells constitute the foundation for the scalable energy storage system, whose storage capacity is insufficient for mobile applications, but which can be used in stationary applications. They can be used for grid stabilisation, minimisation of power withdrawal from the grid and optionally as an operating reserve (source and sink) for local electricity networks. This allows the costs for both mobile applications (e.g. e-cars) as well as stationary storage systems to be reduced.

The core application of the MuLi charging system is the provision of higher load capacities for fast-charging battery buses which will become an integral part of electric local public transport in future. Particularly on very busy articulated bus routes, two or more such charging systems are necessary and are to be placed at the terminals, which are often the intersection point between motorised personal transport and local public transport. These points of intersection could be ideal locations for the construction of multimodal mobility hubs if different charging technologies for all types of recharging electric vehicles (AC & DC) and any performance class could be successfully concentrated. Apart from battery buses and e-cars, other vehicles classes (for example refuse collection vehicles, courier, express and package service vehicles, delivery trucks) could use the charging modules.

Three battery-electric articulated buses were procured in the project. In total two MuLi stations were built. The charging technology for fast-charging e-buses and other vehicle classes is integrated into these stations. Each station is to be equipped with a charging point for e-buses and with four charging points for the charging of other vehicle classes.

PARTNERS:
a) Kölner Verkehrs-Betriebe AG
b) RheinEnergie AG
c) Ford-Werke GmbH

PROJECT BUDGET/€:
a) 470,200
b) 2,744,170
c) 528,967

FUNDING BUDGET/€:
a) 144,821
b) 982,412
c) 194,659

COMMENCEMENT:
01 May 2018

CONCLUSION:
30 April 2021

E-METROBUS: DEVELOPMENT OF AN OPERATION, INCIDENT AND ENERGY CONCEPT FOR HIGH-FREQUENCY URBAN BUS TRANSPORT

With the "E-MetroBus" project, partners Berliner Verkehrsbetriebe (Berlin transport services (BVG)), the Technische Universität Berlin and the Reiner Lemoine Institute wish to reach another expansion stage in the electrification of bus transport in Berlin. This project should highlight under which framework conditions e-buses in high-frequency city bus transport can be deployed in the following configuration: opportunity charger combined with the appropriate fast-charging infrastructure.

Among the factors to consider in the electrification of urban bus transport, particularly in dense intervals and high passenger volumes in metropolitan regions such as Berlin, is that short disruptions in the charging infrastructure or impairments in terms of access have massive effects on operational stability. Therefore one of the project's priorities is to develop an operational and disruption concept to minimise such influences on operation. In this context, the theoretical foundations will be developed for a so-called e-bus control system in the project that is focused on early recognition of possible range problems in traffic jams, diversions etc., as well as initiation of countermeasures and optimised dispatching of reserve vehicles.

In one study an energy provision concept is being prepared which allows local integration of renewable energy generation and energy storage in a network of electric bus charging stations and in an e-bus depot. Because the reduction in energy demand of the heating and air-conditioning system in the electric buses currently represents the most important lever in terms of increasing range, an empirical investigation of the guests' sense of comfort will be carried out in order to provide valuable information on the optimal energy design of the air-conditioning system. Finally the economic and ecological implications of electrification, gathered by means of operational data obtained during passenger operation, should be validated. The TCO and life cycle analysis models developed in the E-Bus project should be adapted accordingly. Furthermore, in a web application specially developed for the project, passengers are to be made more aware of the project and the electrification of city bus transport in general.

» This project should highlight under which framework conditions e-buses in high-frequency city bus transport can be deployed. «

PARTNERS:
a) Berliner Verkehrsbetriebe (BVG)
b) Technische Universität Berlin
c) Reiner Lemoine Institut

PROJECT BUDGET/€:
a) 311,499
b) 623,489
c) 720,782

FUNDING BUDGET/€:
a) 124,599
b) 623,489
c) 684,704

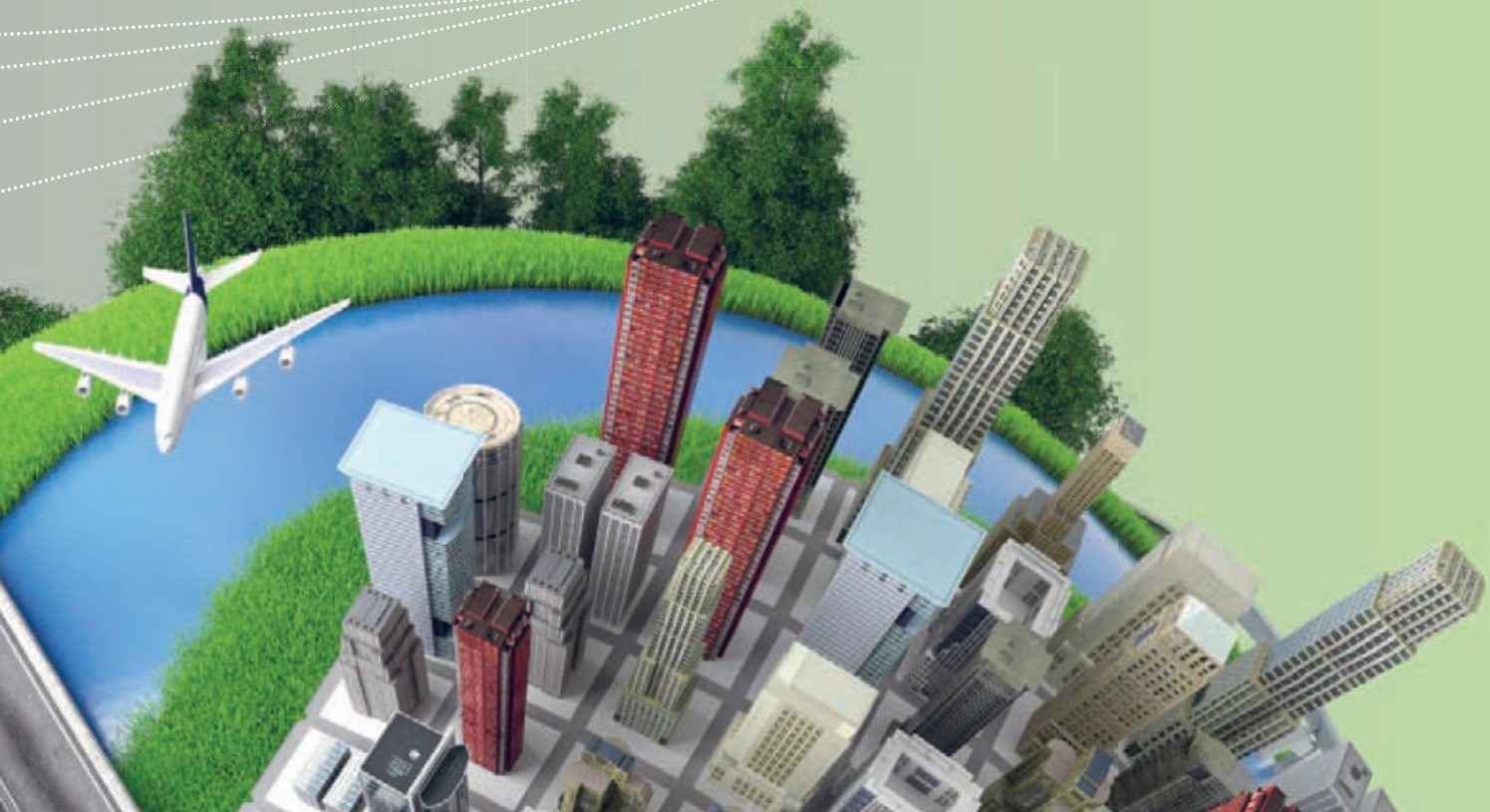
COMMENCEMENT:
a) 01 September 2018
b), c) 01 January 2019

CONCLUSION:
31 December 2022

IV. MOBILITY AND FUELS STRATEGY

NEWLY APPROVED PROJECTS

COMPLETED PROJECTS



MOBILITY AND FUELS STRATEGY

Implementation 2018

Mobility and fuel strategy

The German federal government's Mobility and Fuels Strategy (MFS, in German: Mobiltäts- und Kraftstoffstrategie – MKS) is the central platform for shaping the energy transition in the transport sector and thus for achieving the federal government's energy and climate protection policy goals. The MFS was developed in 2013 on the basis of extensive expert consultation and adopted by the federal cabinet. In doing so, the Federal Ministry of Transport and Digital Infrastructure (BMVI – Bundesministerium für Verkehr und digitale Infrastruktur) has created the platform for a cross-modal basis for information and orientation on technologies, energy and fuel options as well as innovative and contemporary mobility and modal shift concepts. It pools existing knowledge and actively promotes the generation of new knowledge.

The 2050 Climate Protection Plan (Klimaschutzplan 2050) envisages a reduction in carbon emissions of 40 to 42 percent for the transport sector as an interim target by 2030. This requires ambitious measures, especially as transport volume continues to grow, particularly in freight transport.

The MFS identifies suitable technology-neutral and cross-modal measures for achieving the energy and climate policy goals in transport. The transport modes are considered from the perspective of which technical developments and innovations can lead to more efficient drive systems and alternative energy sources (fuels) being used and their necessary infrastructure being established. In doing so, not only will the options that can make a decisive contribution in the short, medium and long term be examined for each mode of transport, but also for the individual use cases. Based on the aggregate results of the analyses, conclusions are drawn for an overall optimisation of the transport system.

One current area of focus of the MFS is the shaping of climate-friendly freight transport. This is attributable to the strong growth anticipated in this area. Until now, a considerable proportion of goods have been transported by road using diesel trucks. Yet in this area, the development of alternative drive and fuel options is even more so in its infancy than for passenger cars. Accordingly, both the optimisation and modification of drives and the energy base as well as the modal shift to other modes of transport, e.g. to electrified railways and inland waterways, are urgently needed.

The BMVI supports particularly promising approaches within the framework of the MFS pilot projects and thus enables the application and examination of new technological solutions and concepts under real conditions. In order to support technologies that have already reached technical market maturity but are not yet competitive, an initial market ramp-up phase can be supported by funding programmes.

Besides concrete projects on specific technologies, the MFS is also investigating how individual measures and developments can interact at the strategic level in order to achieve the climate protection targets defined by the federal government. In particular, the integrated view of the electricity and transport sectors (under the umbrella term "sector coupling") will be pursued, which may lead to important synergies for both sectors. In this context, on behalf of the BMVI, NOW coordinated the study entitled "Regulatory Framework for an Integrated Energy Concept 2050 and the Integration of Renewable Fuels" ("Regulatorischer Rahmen für ein integriertes Energiekonzept 2050 und die Einbindung von EE-Kraftstoffen"), which was completed at the end of 2018.

This project examined which measures could be taken to strengthen the link between the transport sector and the power, heat and industrial sectors. To this end, a number of different energy scenarios for Germany up to 2050 were calculated and examined in terms of their robust developments. The focus was on converting the car and truck fleets to low-emission drive systems and on the potential of synthetic energy sources for sector coupling. Among other findings, the study shows that renewable hydrogen constitutes an efficient option for a high level of renewable energy production, as its use also permits a storage capability for flexible power generation and emission-free energy supply in all sectors.

Finally, in combination with a comprehensive analysis of current regulations relevant to sector coupling, recommendations for action to support sector coupling were developed.

Complementing the national developments, NOW GmbH also takes European and international developments into account when developing strategies within the framework of the MFS. Given that air and sea transport, in particular, often involves the crossing of borders, international developments are crucial in this regard. Moreover, measures for sustainable transport are also essentially determined by implementation requirements at a European level, which is precisely why these are also closely monitored and accompanied. Relevant here are, for example, the implementation of Directive 2014/94/EU concerning the Alternative Fuels Infrastructure Directive (AFID) and the revision of the Renewable Energies Directive (RED II) within the framework of the MFS.

Organisational structure

NOW is commissioned to accompany the BMVI in the further development of the Mobility and Fuels Strategy and for the implementation of specific supporting measures. This includes the technical evaluation of pilot projects, the (further) development of support measures to promote AFID implementation and the provision of general content-related advice to the BMVI.

Other areas of work include the market ramp-up of vehicles with alternative drive systems, analyses of sustainable mobility solutions, energy system analyses and technical approaches to the production of electricity-based and biogenic fuels. NOW's main task in this context is to evaluate technology approaches and their relevance for achieving the climate protection goals in the transport sector.

Furthermore, within the scope of an expert's dialogue, the MFS project office, supported by IFOK GmbH, coordinates the integration of key specialist stakeholders into the MFS. In addition to the expert's dialogue, the project office also coordinates communication and public relations activities relating to the MFS. The BMVI is supported through accompanying scientific research in the further development of the MFS. For the analysis of individual subject areas, the accompanying scientific research consortium of the MFS conducts studies on measures and technologies that can contribute to the reduction of overall energy consumption and greenhouse gas emissions.

Network

Urban Commercial Transport/
Brochure

Due to the wide range of topics covered by the MFS, a large number of different parties are involved. Specific topics are discussed with industry and science, usually in the context of ongoing study projects of the scientific consortium. Interviews and targeted specialist workshops include practical perspectives for answering the research issues. In this way, relevant developments can be taken into account and the results seamlessly transferred to an implementation phase. This enables a targeted exchange with all relevant parties.

NOW GmbH tackles specific topics with its own workshops and deepens the dialogue with relevant market players. A recent focus here was on urban but also long-distance freight transportation. In the field of alternative drive systems for road freight transport, the brochure "Urbaner Wirtschaftsverkehr" (Urban Commercial Transport) was published to summarise the results of a previous workshop. On the basis of a study commissioned in 2018 on the market potential of urban commercial transport, the dialogue will be continued in 2019.

Pilot projects

Support for pilot projects will make it possible to test and demonstrate new technologies in a real-life context. In principle, the MFS aims to establish application-specific technological solutions with a technology-open approach. In the pilot projects, technology approaches are to be tested in actual use that have not yet been able to compete with conventional solutions due to their technical maturity and the resulting higher costs. Decisive is the benefit that the chosen solution will bring to reducing greenhouse gas emissions and also its contribution to the development of alternative fuel infrastructure.

Consequently, the range of topics covered by the current pilot projects and the project ideas under discussion is correspondingly broad.

The focus for the implementation of the MFS is presently on areas in which progress towards the establishment of alternative drive systems has so far been less pronounced. These are, in particular, heavy road freight transportation, air traffic and maritime applications. But the area of public transport also faces special challenges when it comes to introducing alternative drive technologies.

Pilot projects in the aforementioned priority areas will therefore be implemented as part of the implementation of the MFS. In most cases, the implementation of concrete pilot projects is preceded by an assessment and scientific consideration of possible technologies in the target markets. Here, the scientific consortium supporting the implementation of the MFS provides the basis for decisions on promising pilot projects.

Refuelling of an LNG truck at Ludwig Meyer freight forwarders

Road freight transportation

Road freight transportation accounts for a significant share of GHG (greenhouse gas) emissions from transport and is expected to increase further in the coming years. The traffic forecast for 2030 assumes a growth rate of 38 percent in freight transportation. At the same time, the number of vehicles responsible for emissions is relatively small compared to the number of registered cars. This shows that the conversion of road freight transportation to low-emission drives with relatively low vehicle numbers can lead to considerable GHG reductions.

Until now, however, very few vehicles with alternative drive systems have been available, especially for long-distance journeys. In particular, semi-trailer units with liquefied natural gas (LNG) drives are available on the market and are increasing their market share due to the existing production possibilities. The BMVI supported the pilot project for the procurement and testing of 20 LNG trucks at Meyer Logistik in the Berlin region at an early stage as part of the MFS in order to gain insights for the initial market entry. The results of the project, which was successfully implemented in 2017, show that, depending on load, distance and area of application, the emission reduction values mentioned in the relevant literature can indeed be achieved.

In order to gain further insights into vehicles with compressed methane (CNG), a pilot project for the procurement of four CNG trucks by freight forwarding company Spedition Zippel was also funded. Through the balanced use of 100 percent biomethane from residual and waste materials, the possibility of achieving CO_2-neutral delivery transport was also able to be demonstrated.

CNG truck from Spedition Konrad Zippel, with biomethane as a fuel

In the medium term, hydrogen and catenary trucks are also seen as an option for heavy road haulage. In order to verify existing findings from investigations within the framework of the MFS, the implementation of support measures in other NOW-coordinated programmes and the climate-friendly road freight transport initiative, it is important to initiate pilot projects for emission-free long-distance heavy goods transport. A clear focus should be placed on future measures for these technologies and the infrastructure required for them.

The potential of fermentable biomass in Germany is in the region of 50 to 60 million tonnes and is still largely untapped. In view of the technical usability of these resource potentials, the production of biogas and its subsequent processing into bio-CNG and, if required, liquefaction into bio-LNG for use in shipping and heavy goods vehicles is a relevant option. In order to better assess this potential, the BMVI commissioned a pilot project at the German Biomass Research Centre (DBFZ – Deutsches Biomasse Forschungszentrum). The aim is to conduct a comprehensive potential analysis of suitable waste and residual materials on the basis of an example region and the joint fermentation of partly non-critical waste and residual material fractions. The results should be transferable to other regions and existing biogas plants. With the results of this 5-year project, the subsequent installation of a demonstration plant will be prepared, which could be erected at a suitable location on an economically relevant scale.

Loading containers from rail to truck at KTSK Kombi Terminal Schkopau

LNG PowerPacs

Maritime applications

The use of LNG is also currently the focus of measures that can be implemented in the short term for maritime applications. The container ship MS "Wes Amelie", which was already converted in 2017, demonstrated the possibility of using LNG engines in seagoing vessels.

Since then, the technical maturity of the alternative drive system has been impressively demonstrated in day-to-day operation.

Based on the experience gained from the pilot project, the equipping or conversion of further seagoing vessels with LNG propulsion was able to start in 2018 thanks to the associated funding guidelines (see next chapter).

But LNG is also currently a marketable alternative for other ship applications. As part of the MKS implementation, the new construction of the research vessel Atair with LNG propulsion will also be implemented, as will the new Lake Constance ferry of Stadtwerke Konstanz. In 2019, this will be the first LNG-powered passenger ship to set sail on an inland waterway.

Besides the low-emission propulsion of maritime vessels, the environmentally friendly supply of electricity during port lay times is also a relevant option for reducing greenhouse gases in the maritime sector.

It was here that Becker Marine Systems' pilot project LNG PowerPacs presented the first prototype of an environmentally friendly mobile power supply for container ships in 2018. A total of four PowerPacs will be provided for the environmentally friendly energy supply of container ships in the Port of Hamburg through the BMVI's pilot project funding. The PowerPac is a compact unit the size of two 40-foot containers that combines a gas-powered generator and an LNG tank. Each PowerPac is brought aboard a container ship from the terminal and supplies it with electricity during its time in port. This significantly reduces pollutant emissions, which otherwise occur during operation of the auxiliary diesel engines of the respective ship.

Further projects and measures to provide environmentally friendly energy for ships in port are in the pipeline.

In the federal budget, a new budget item "Subsidies for investments to promote environmentally friendly on-board and mobile shore-side electricity supply for seagoing and inland waterway vessels" ("Zuschüsse für Investitionen zur Förderung von umweltfreundlicher Bordstrom- und mobiler Landstromversorgung für See- und Binnenschiffe") was created for this purpose.

Aviation

Air traffic is also expected to increase significantly in the medium to long term. On top of this is the long-term demand for liquid fuels in aviation. There is a fundamental consensus here that kerosene will be the fuel of choice for air traffic in the foreseeable future. In order to reduce emissions, it is necessary to integrate increasing proportions of renewable kerosene into airport logistics.

Within the framework of MFS implementation, this approach was recognised at an early stage and has since been pursued in a targeted manner. The current DEMO-SPK pilot project validates the technological basis for the use of renewable kerosene in existing airport logistics and fuel distribution. In particular, the mixing behaviour of bio kerosene from different manufacturing processes and its use in different mixing ratios with fossil kerosene in real use are the subjects of the project. Results of the project are anticipated in 2019. These can serve as a basis for further pilot projects for the production of renewable kerosene.

In view of the limited quantities of sustainably produced biomass that are available and the permanent high demand for kerosene for international aviation, the timely establishment of electricity-based aviation fuel (power-to-liquid (PtL) kerosene) is a next logical step.

The production processes required for this are already at a technological level that is close to market. Challenges can still be seen in the scaling of technologies to industrial standards. Other aspects that stand in the way of an early market ramp-up are the availability of renewable electricity, the supply of CO_2 for the synthesis process and, above all, the resulting production costs. It is therefore important to demonstrate the production of PtL kerosene on a (small) industrial scale in order to prepare for the market ramp-up on a larger scale.

Upgrading of the Alsterdorf bus depot

Public transport

Public transport also offers promising points of departure for the establishment of alternative drive systems and fuels. Especially against the backdrop of increasingly stringent requirements for the procurement of buses by municipalities and municipal companies, emission-free buses, mostly battery buses, are increasingly being procured. These already enable local zero-emission public transport on many routes, especially in inner-city areas. But hybrid trolleybuses (HT buses) are also increasingly attracting the interest of transport companies. The combination of batteries and overhead power lines enables purely electric operation and increases the range and flexibility compared to the individual technologies.

The suitability of the dual technology approaches will be demonstrated in pilot projects within the framework of the MFS. Large battery bus fleets pose new challenges for depots, especially with regard to the charging infrastructure and the energy supply required for it. A pilot project is currently underway in Hamburg to upgrade an existing bus depot and equip a new one for operating purely electric bus fleets. The installation is to be completed in 2019 and the project is expected to provide findings that can be transferred to other depots in Germany.

In addition, the HT bus is being tested as part of a comprehensive pilot project in Solingen. Since mid-2018, four prototype vehicles have already been in active use, especially in daily school bus services. It is expected that the vehicles will then be used in normal line operations from spring 2019. Further pilot projects for the use of HT buses are being planned.

FUNDING PROGRAMME ON USE OF LNG AS A MARINE FUEL

The BMVI is supporting the equipping and retrofitting of seagoing vessels for the use of liquefied natural gas (LNG) as a marine fuel. The funding programme will advance the use of LNG in German shipping. The required funds will be made available from the federal government's Mobility and Fuels Strategy (MFS).

LNG dual fuel conversion of the MS "Wes-Amelie" at German Dry Docks in Bremerhaven

The purpose of the funding guideline for the equipping and retrofitting of seagoing vessels for the use of LNG as a fuel (from 17 August 2017) is to increase demand for LNG as a marine fuel in Germany and Europe, thus creating incentives for the development of an LNG supply infrastructure in ports.

Both environmental and health protection are also reasons for using LNG in shipping. As a marine fuel, LNG contributes to reducing greenhouse and air pollutant emissions. In contrast to conventional, oil-based marine fuels, LNG does not produce any sulphur oxide emissions (SO_x). Nitrogen oxide emissions (NO_x) are reduced by up to 90 per cent compared to conventional fuels, and particle emissions by approx. 98 per cent.

Following the resolution of the International Maritime Organisation (IMO), from 2020 onwards only fuel that has a maximum sulphur content of 0.5 per cent will be admissible on a global basis, instead of the 3.5 per cent up until now. Ships that continue to sail with heavy fuel oil must clean away the sulphur from the exhaust gases with the aid of SO_x exhaust after-treatment systems – so-called scrubbers. In the Emission Control Areas in the North and Baltic seas as well as in all EU ports, the maximum sulphur content is currently already at 0.1 per cent. Sulphur-reduced diesel oil has become the standard up to now. However, the North and Baltic seas will also become Emission Control Areas for NO_x from 2021, making the IMO Tier III standard applicable to businesses operating in the North and Baltic seas. This can only be complied with if costlier NO_x exhaust after-treatment systems are deployed for diesel oil use or more environmentally-friendly alternative fuels and drives are used. Using LNG as a marine fuel means that both SO_x as well as NO_x limit values can be respected.

The roughly 150m-long MS "Wes Amelie" from the Wessels shipping company was the first container ship worldwide to be converted to LNG dual fuel propulsion in the summer of 2017. The around ten million euro investment was 60 per cent financed by the BMVI from MFS funds. Shipments using LNG-operated container ships such as the "Wes Amelie" are increasingly in demand. Compared to sulphur-reduced diesel oil, aside from the environmental benefits, bunker costs in particular are proving to be cheaper. With the aid of this funding, the commercial use of LNG as a marine fuel is assured.

Engine room view of the converted 9MW main engine MAN 51/60DF

Project applications can be made on the respective current funding calls within the LNG funding programme for seagoing vessels. The funding will be granted in the form of non-repayable subsidies for the partial financing of extra investment costs for equipping or retrofitting seagoing vessels for LNG propulsion. The focus of the funding is either the equipping of new builds or the retrofitting of existing seagoing vessels to use LNG as a marine fuel in pure gas or in so-called dual fuel operation. Companies owning a ship or a planning to build a new ship, as well as bodies and institutions incorporated under public law are eligible to apply.

An initial funding call was published on 13.12.2017. Up to the end of February 2018, funding applications were submitted electronically and by post up to the end of March 2018. In total, applications were submitted by 17 applicants for one or more ships for the first call. Both new builds and conversions were proposed for ferries, container ships and tankers. The implementation of retrofitting and new build projects from the first funding call already got the go-ahead in 2018.

Further grants will be decided upon and calls for proposals issued on equipping and retrofitting projects

More LNG ship projects will be funded in 2019 too. The funding programme for the use of LNG as a marine fuel will enter the next stage, with a second call for proposals being planned. Interested ship-owners are again invited to apply when the second funding call is published. A broad implementation of equipping and retrofitting projects for the use of LNG as a marine fuel will be facilitated. NOW GmbH will advance the programmatic further development in the second round as well and remains available as a contact partner for applicants in terms of content.

TT-LINE: LNG NEW BUILD OF TWO ROPAX FERRIES

PARTNER:
Green RoPax GmbH & Co. KG

COMMENCEMENT:
01 October 2018

CONCLUSION:
End 2021

TT-Line is the market leader in the direct ferry service between Germany and Sweden. The connection between both countries exists since 1962. TT-Line offers the most extensive route network in direct service to southern Sweden. With six ships and up to 17 daily departures, TT-Line links the German Baltic sea ports of Trävemunde and Rostock, the Polish port of Świnoujście as well as the Lithuanian port Klaipėda with Trelleborg in southern Sweden.

The latest generation of TT-Line green ships is characterised by its LNG drive and high level of efficiency and flexibility. Both ferry boats are designed for long-term deployment in TT-Line's Baltic sea route network. They are the world's largest LNG new-build ferries and will introduce a new generation of ships which will set new standards in terms of size, fuel efficiency, environmental friendliness and handling equipment.

The two new-build projects are the world's largest LNG new-build ferries. The ships will be deployed in TT-Line's Baltic sea route network. They are to call at Trelleborg in southern Sweden (the largest RoRo port in the Baltic sea) and the two leading German RoRo ports: Lübeck-Travemünde and Rostock.

By using LNG as a fuel instead of the alternative of marine diesel, around 22 % CO_2 (carbon dioxide), 98 % SO_x (sulphur oxide), 82 % NO_x (nitrogen oxide) and 93 % of particle emissions (particulates) are prevented for each ship. The LNG technology cuts as many greenhouse gases per vessel as around 2,000 diesel cars emit per year. In terms of nitrogen oxides, there is an emission saving which corresponds to approx. 900,000 diesel cars.

» The latest generation of TT-Line green ships is characterised by its LNG drive and high level of efficiency and flexibility. «

With six ships and up to 17 departures a day, TT-Line connects the German Baltic Sea ports of Travemünde and Rostock, the Polish port of Świnoujście and the Lithuanian port of Klaipėda with Trelleborg in southern Sweden.


TT-Line
TT-Line

Despite comparatively reduced overall loading capacity and larger investment, the shipping company is prepared to invest in environmental protection by using LNG as a shipping fuel. Both ships are launching a new generation of RoPax ferries, with which TT-Line is sending a clear message to the shipping industry to drive forward sustainable investment in environmental protection.

Both green RoPax ferries will each be equipped with four LNG dual fuel main engines which power propulsion. For this task two engines on each vessel are coupled via a common reduction gear with a drive shaft and a propeller. These ships each have two drive shafts and propellers. The LNG dual fuel auxiliary engines have no link to the propellers, but are connected to electricity generators and provide the on-board electricity supply of the ship. In addition, shaft generators are used for on-board energy supply. Auxiliary boilers provide hot water on board. These will also be designed for LNG operation on both ferries.

To avoid vaporisation of the LNG in storage, it must be stored in specially insulated tanks. For this purpose two cylindrical double-walled vacuum-insulated LNG tanks, each with a 500m³ storage capacity are planned (1,000m³ gross tank volume in total) on the ferries. The shipbuilding structure of the vessels must be locally strengthened for the intake of the LNG tanks. In addition the use of low-temperature steel is required in these areas for safety reasons. A bunker station is planned on both ship sides for the receipt of LNG at port.

For the preparation of the combustion of LNG in the engines, an evaporator unit for the vaporisation of liquid LNG to gaseous natural gas ("gas handling unit") and a pressure regulator are required. Special, double-walled, vacuum-insulated piping is necessary to transport the gas from the evaporator unit to the consumers (machines, boiler burners). For the extraction of LNG from the tanks, either cryogenic, external pumps or internal tank pumps are required.

Additional systems include a cold recovery system, a safety area adjacent to the LNG tank, a nitrogen system, an LNG ventilation duct as well as specific equipment in the engine control room and in the safety systems (as stipulated in the IGF Code for explosion protection from machines, safety equipment and fire prevention).

AG EMS: LNG RETROFITTING OF THE MS "MÜNSTERLAND" RORO FERRY

PARTNER:
AG "EMS"

COMMENCEMENT:
27 November 2018

CONCLUSION:
21 July 2020

AG EMS is the first German shipping company to use LNG technology for the ferry service in the Wadden Sea world heritage site. In June 2015 the maiden voyage of the MS "Ostfriesland", which had already been converted to an LNG drive, took place on the Emden to Borkum route. The experience gained from the LNG retrofitting of the MS "Ostfriesland" will now benefit the LNG conversion of the MS "Münsterland".
The MS "Münsterland" travels between Emden, Eemshaven and Borkum. In doing so it ensures passenger and goods transport from the mainland to the island of Borkum. The conversion will extend the service life of the ship by another 25 years.

A gas-electric drive is the drive concept used on MS "Münsterland". The ferry is fitted with two LNG dual fuel engines and two LNG gas engines as gas gensets. The electricity produced from the generators is essentially used to power the propellers and bow thrusters through e-engines as well as on-board services. The LNG fuel is pumped via the bunker station at a temperature of around –160 °C and a bunker pressure of around 6 – 8 bars into the double-walled vacuum-insulated LNG tank. The pressure in the tank is automatically kept at the set operating pressure (4.5 bars). The stored LNG is heated with glycol and converted into its gaseous state, so that it flows to the engines at a temperature of 30°C and at the required injection pressure. The tank system operates without mechanical pumps. In the event of a loss of pressure in the tank (gas withdrawal by consumers), some of the LNG is gasified with the aid of glycol and fed back into the tank. Heat recovery is provided for in order increase energy efficiency in the process.

» AG EMS is the first German shipping company to use LNG technology for the ferry service in the Wadden Sea world heritage site. «

The MS Münsterland provides passenger and goods transport from the mainland to the island of Borkum.


Borkum Eemshaven
AG EMS
MÜNSTERLAND

Funding by:

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of Transport and
Digital Infrastructure

following a resolution by
the German Bundestag

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