



Bundesrepublik Deutschland  
Finanzagentur GmbH

# Federal Republic of Germany Green Bond Investor Presentation

April 2022

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# Executive Summary

## Climate Policy

- Environmental and climate protection are a top priority in Germany. This has been clearly emphasized once again in the **Climate Change Act 2021**. The federal government is now pursuing the goal of being climate neutral already by 2045 and is setting ambitious climate targets across a wide range of sectors, nationally and internationally.
- Since 1990, greenhouse gas (GHG) emissions have been reduced by 39% (2021). The 2030 objective is to reduce GHG emissions by at least 65%, the 2045 objective is a **neutral GHG emission balance**.

## Green Budget Expenditure

- Green Federal securities are part of Germany's sustainability strategy. They strengthen green financial markets and increase the **transparency for selected green budget items**.
- Indicative amount of eligible green expenditures for 2021 budget: **€ 16.9 bn**, selected from five sectors: (1) transport; (2) international cooperation; (3) research, innovation and awareness raising; (4) energy and industry; (5) agriculture, forestry, natural landscapes and biodiversity.

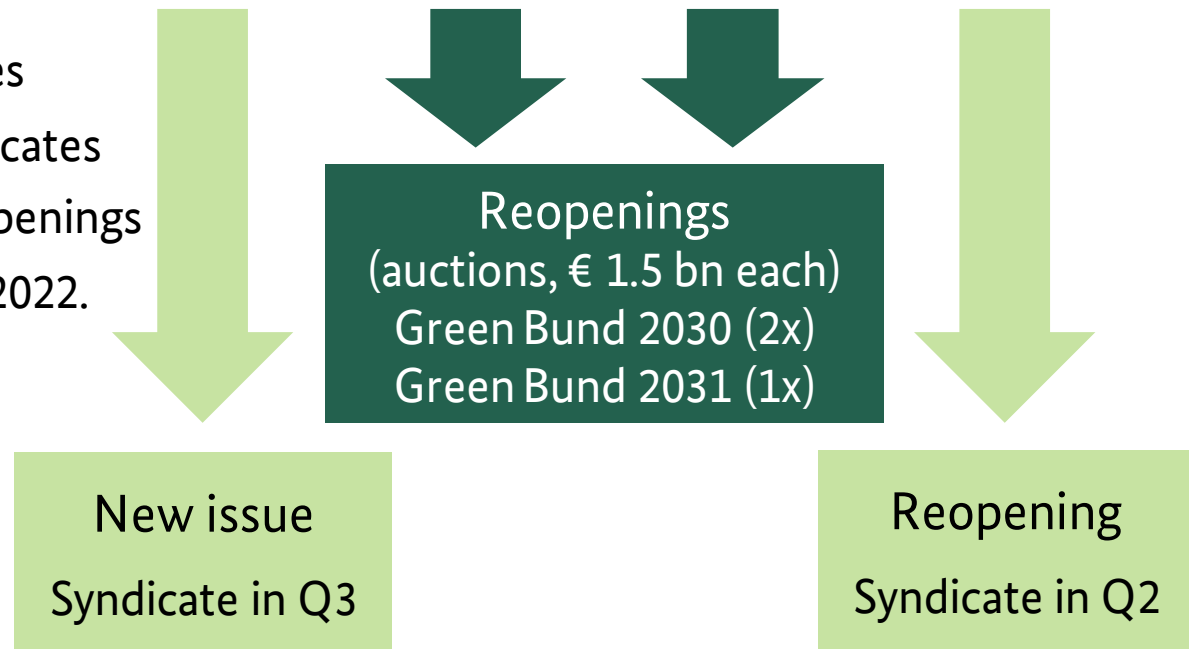
## Green Federal Securities

- Germany will continue to establish a **green yield curve** with its 5<sup>th</sup> green bond, a **new 5-year Green Bobl** to be issued in Q3 2022. The aggregate annual issuance volume **is to be further expanded in 2022** (after € 12.5 bn in 2021 and € 11.5 bn in 2020).
- The innovative **twin bond concept** makes the 'greenium' transparent and has created a new benchmark in the green bond market.

# Green Bonds Issuance Plans in 2022

	0% Bobl/g	Bobl/g	0% Bund/g	0% Bund/g	0% Bund/g
<b>Issuance</b>	04.11.2020	Q3 2022	02.09.2020	08.09.2021	11.05.2021
<b>Maturity</b>	10.10.2025	15.10.2027	15.08.2030	15.08.2031	15.08.2050
<b>Outstanding*</b>	€ 5 bn		€ 6.5 bn	€ 6.5 bn	€ 6 bn

- 5 green issuance dates
  - 3 auctions, 2 syndicates
  - 1 new issue, 4 reopenings
- Starting on 2 March 2022.



\* at year-end 2021

# 1 Germany's Green Footprint

# Following a Stringent Green Path – Germany's Contribution to the 1.5 Degree Celsius Target

With the United Nations' 2030 Agenda for Sustainable Development and the **Paris Climate Agreement**, the German Government is pursuing the clear goal of setting the course for a sustainable social and economic system. Climate protection is a core priority, thus, Germany was one of the first countries to submit the long-term low GHG emission development strategy to the UNFCCC as required under the Paris Agreement. Germany contributes to reaching the goals set out in the Paris Agreement through the EU Nationally Determined Contributions (NDCs).

In its **Climate Action Plan 2050**, Germany confirms its ambitious climate targets and also lays down concrete 2030 mid-term targets for the individual sectors

With the **Climate Action Programme 2030**, a new level of commitment is set in German climate policy, even regulated by law: For the first time, national climate targets are given legal status with the **Climate Protection Act** which – and the climate targets anchored therein – was significantly tightened in 2021 as a result of a judgement by the highest German court. Sector targets are checked upon in an annual monitoring procedure.

Furthermore, the Climate Action Programme paved the way for the **Inaugural Green Federal securities**. With the innovative twin bond approach, Germany makes a substantial contribution to the growth of the sustainable bond market.



# Intergenerational Contract for the Climate

With the amendment to the Climate Change Act **in June 2021**, the German Government has defined a more ambitious GHG mitigation pathway and has enshrined in law the goal of achieving GHG neutrality by 2045.

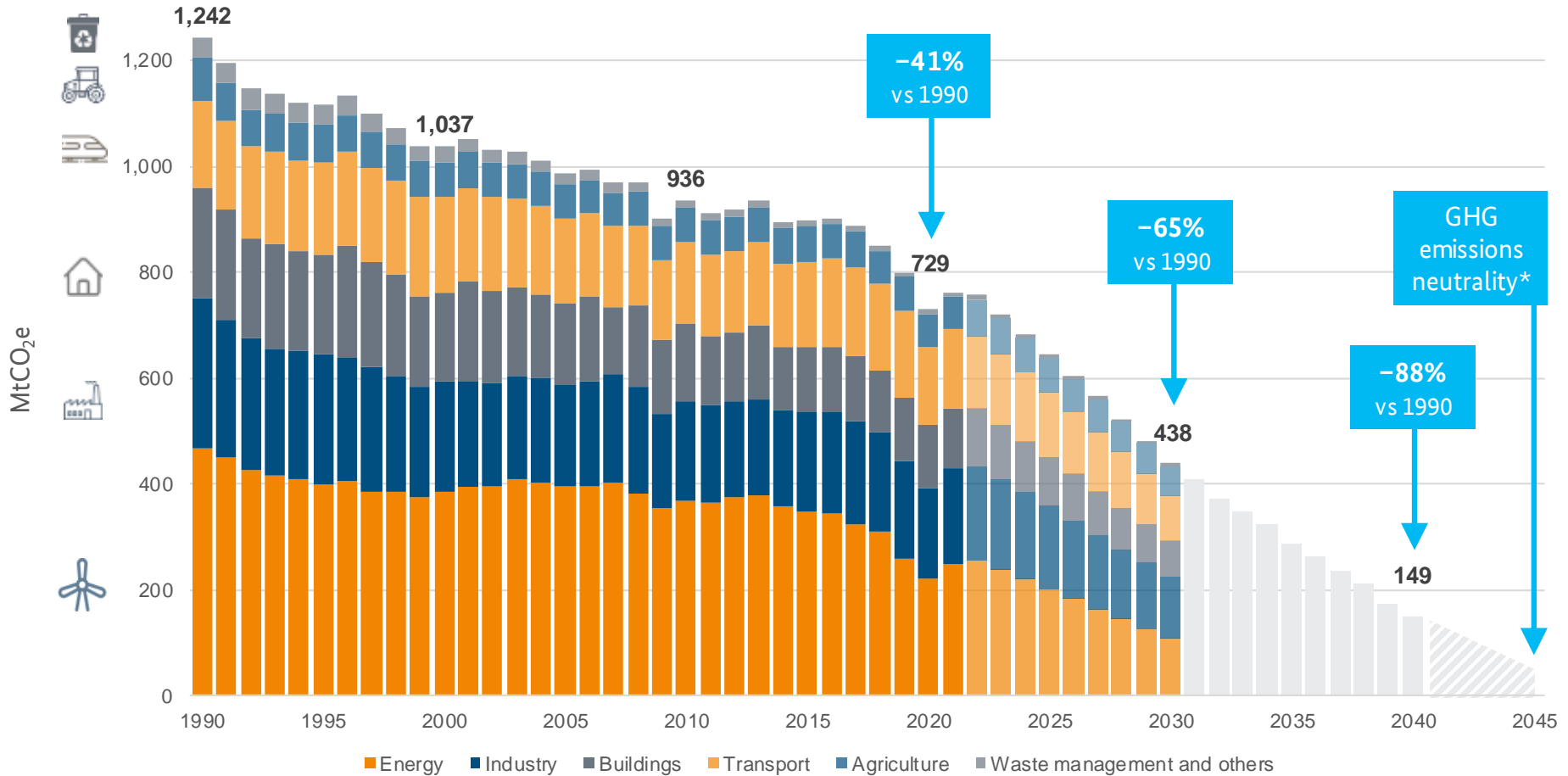
- Greenhouse gas emissions
  - By 2030: 65% less CO<sub>2</sub>
  - By 2040: 88% less CO<sub>2</sub>
  - 2045: Climate neutrality
- Permissible annual CO<sub>2</sub> emissions for individual sectors such as energy, industry, transport and buildings to be reduced.



Source: Federal Government (<https://www.bundesregierung.de/breg-de/themen/klimaschutz/climate-change-act-2021-1936846>)

# Germany's Path to Decarbonisation

GHG Emissions Development in Germany per Sector (in MtCO<sub>2</sub>e)



Sources: Federal Climate Change Act; Umweltbundesamt (15.03.2022); \*net zero anthropogenic GHG emissions from all sectors covering all GHG emissions, which means emissions from carbon dioxide as well as other GHG like methane





Share of GHG emissions	32% of all GHG emissions in Germany
2021 achievement	247 MtCO <sub>2</sub> e (–47% vs 1990 level)
2030 target	108 MtCO <sub>2</sub> e (–77% vs 1990 level)

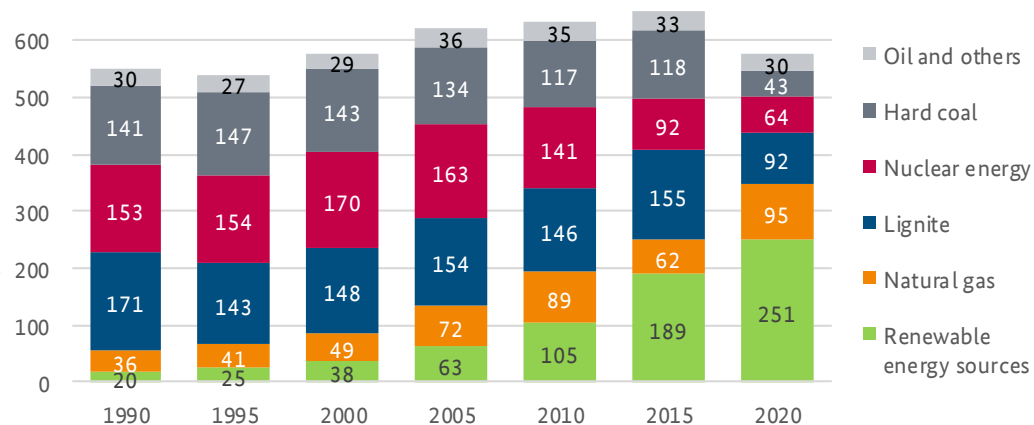
## Overview

- Through ambitious targets and regulatory measures, such as the Renewable Energy Sources Act (EEG), GHG emissions in the energy sector have been halved since 1990.
- Full decarbonisation by 2045 through the gradual transformation of the energy supply towards more renewable energies and energy efficiency.

## Germany's path to the energy system of the future

- No more power from coal at the latest by 2038 (ideally by 2030)
- No more nuclear power by the end of 2022
- Renewables to generate 80% of Germany's power by 2030

Gross Electricity Production in Germany (in bn kWh)



Source: *Arbeitsgemeinschaft Energiebilanzen (March 2022)*;  
kWh: kilowatt hour



Share of GHG emissions	24% of all GHG emissions in Germany
2021 achievement	181 MtCO <sub>2</sub> e (–36% vs 1990 level)
2030 target	118 MtCO <sub>2</sub> e (–58% vs 1990 level)

### Overview

- The decarbonisation of the industrial sector is to be achieved through a comprehensive modernization strategy.
- Industry will become more climate-friendly with increased efficiency, more renewable energies and new production processes (e.g. “green” hydrogen).

### Transforming the industry sector

- National decarbonisation programme, i.a. introducing Carbon Contracts for Difference
- Establishing lead markets for green products
- Incentivising energy and resource efficiency

### Final energy consumption by energy source in industry (2020)

- 37.0% Gas
- 31.1% Electricity
- 9.9% Hard coal
- 6.8% District heating
- 5.4% Others
- 4.7% Renewables
- 3.3% Lignite
- 1.8% Heating oil



Source: *Arbeitsgemeinschaft Energiebilanzen (March 2022)*



Share of GHG emissions	15% of all GHG emissions in Germany
2021 achievement	115 MtCO <sub>2</sub> e (-45% vs 1990 level)
2030 target	67 MtCO <sub>2</sub> e (-68% vs 1990 level)

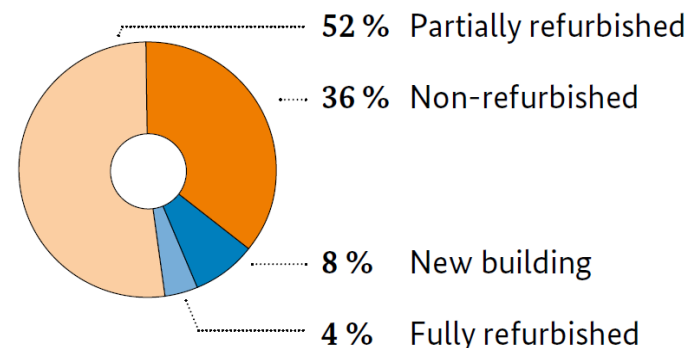
### Overview

- The basis for making building and living more climate-friendly is a mix of increased funding, information and advice, CO<sub>2</sub> pricing and regulatory law, e.g.:
  - Home owners receive a payment for replacing old oil central heating.
  - KfW is extending higher loans for the purchase, restoration or construction of energy-efficient buildings.

### Sustainable green housing

- Upgrading heating systems
- Tax incentives for energy upgrades
- Developing energy standards
- Supporting modular upgrades

### Share of residential buildings by refurbishment status (2020)



Source: BMU, Climate Action in Figures 2021



Share of GHG emissions	19% of all GHG emissions in Germany
2021 achievement	148 MtCO <sub>2</sub> e (–9% vs 1990 level)
2030 target	85 MtCO <sub>2</sub> e (–48% vs 1990 level)

### Overview

- With record-high investments into clean and sustainable transportation such as rail, public and non-motorised transport, as well as electro-mobility and alternative fuels (especially hydrogen), transport-related emissions should be cut significantly by 2030.
- Investments in the railway system are both a key area of action in the Climate Action Programme 2030 and a key part of Green Bunds.

### New pathways for transportation

- Fundamental and massive overhaul of transport sector
- Increasing the share of passenger and freight rail transport in the modal split
- Increasing the share of the mileage in heavy road haulage of vehicles powered by electricity or electricity-based fuels.
- Expanding the charging infrastructure for electric mobility
- Expanding cycle routes
- Digitalisation of mobility

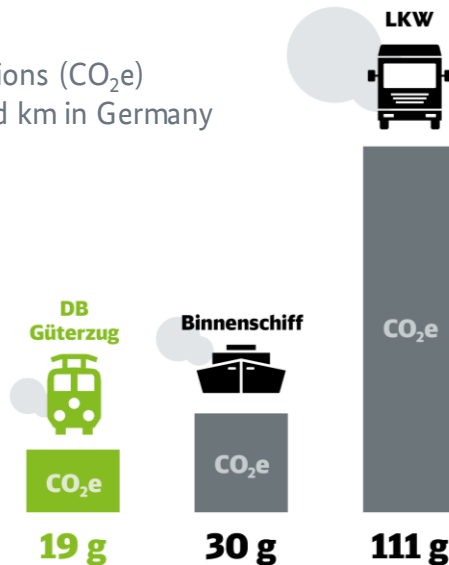


## Investment in the railways

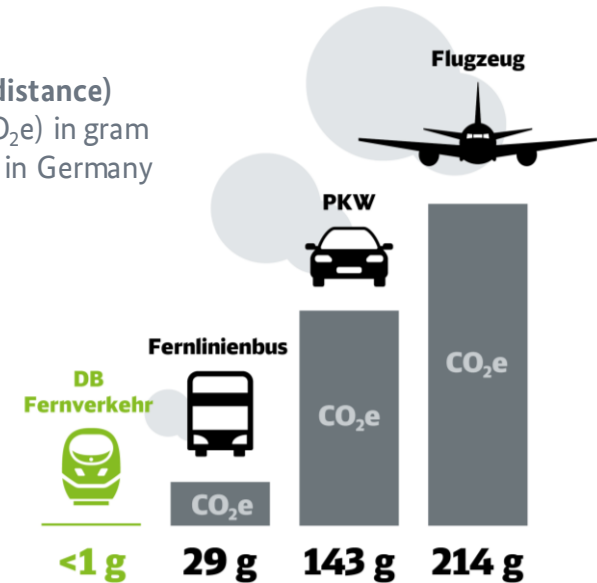
*Strengthening rail freight transport*

*Making rail travel more attractive by modernising the rail network*

Freight GHG emissions (CO<sub>2</sub>e) in gram per ton and km in Germany



Passengers (long-distance) GHG emissions (CO<sub>2</sub>e) in gram per person and km in Germany



Source: Deutsche Bahn AG, January 2021

# Focus on Agriculture



Agriculture

Share of GHG emissions	8% of all GHG emissions in Germany
2021 achievement	61 MtCO <sub>2</sub> e (-25% vs 1990 level)
2030 target	57 MtCO <sub>2</sub> e (-30% vs 1990 level)

## Sustainable agriculture - a mix of measures to make the sector more climate-friendly

- Sustainable farming
- Conservation and sustainable management of forests and timber use
- Avoiding food waste

# Focus on Waste Management and others



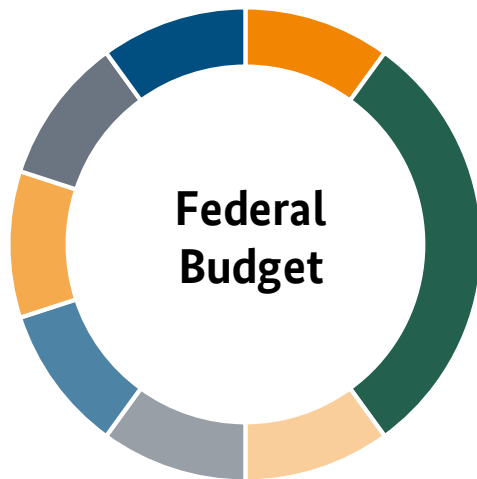
Waste management and others

Share of GHG emissions	1% of all GHG emissions in Germany
2021 achievement	8 MtCO <sub>2</sub> e (-78% vs 1990 level)
2030 target	4 MtCO <sub>2</sub> e (-89% vs 1990 level)

Waste management is at a very high level in Germany already. Waste is collected, separated, reused, recycled or used for energy.

# Environmental and Climate Policy within the German Federal Budget

- German climate and environment policies are extensive.
- The federal budget contains a significant amount of green expenditures.
- The reporting for Green German Federal securities provides high transparency regarding the allocated green expenditures.



## The federal budget contains many more green items than those selected for Green German Federal securities:

- Eligible green expenditures earmarked for the NGEU funding program
- Green expenditures associated with funds raised by the Carbon Pricing Scheme, channeled through the Energy and Climate Fund (EKF)
- Grants to increase energy efficiency in buildings associated with KfW Green Bonds
- Further green expenditures, which are neither earmarked for a green bond program nor part of the EKF

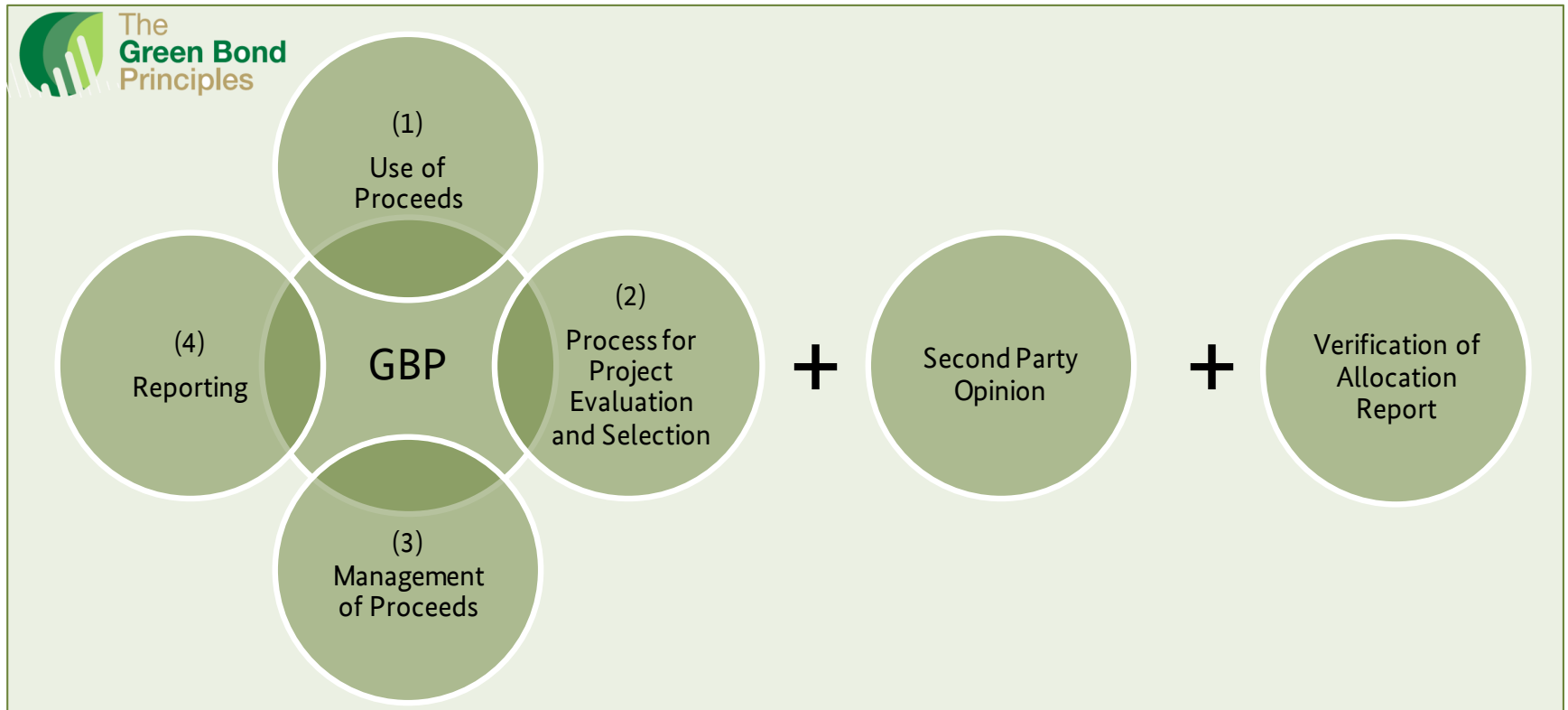
# 2 Green Bond Framework Overview

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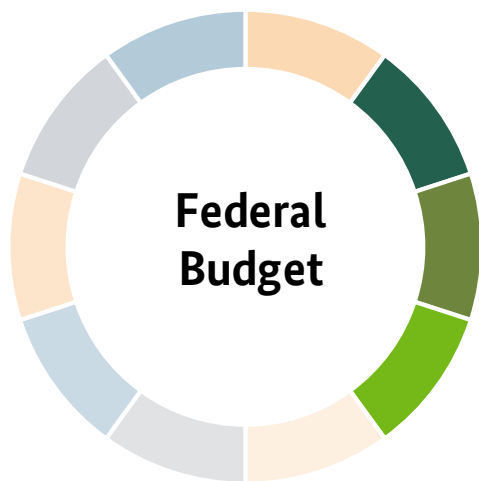
# Overview of the Green Bond Framework

- Germany's Green Bond Framework follows the ICMA's Green Bond Principles ("GBP")
- A Second Party Opinion as well as a Third Party Verification of the Allocation Report are provided



# Use of Proceeds

- **Germany's Green Bond Framework provides for five Green Sectors for the use of proceeds:** (1) transport; (2) international cooperation; (3) research, innovation and awareness raising; (4) energy and industry; (5) agriculture, forestry, natural landscapes and biodiversity.
- Eligible Green Expenditures contribute to the six environmental objectives of the EU Taxonomy Regulation and at least 12 out of the 17 UN Sustainable Development Goals



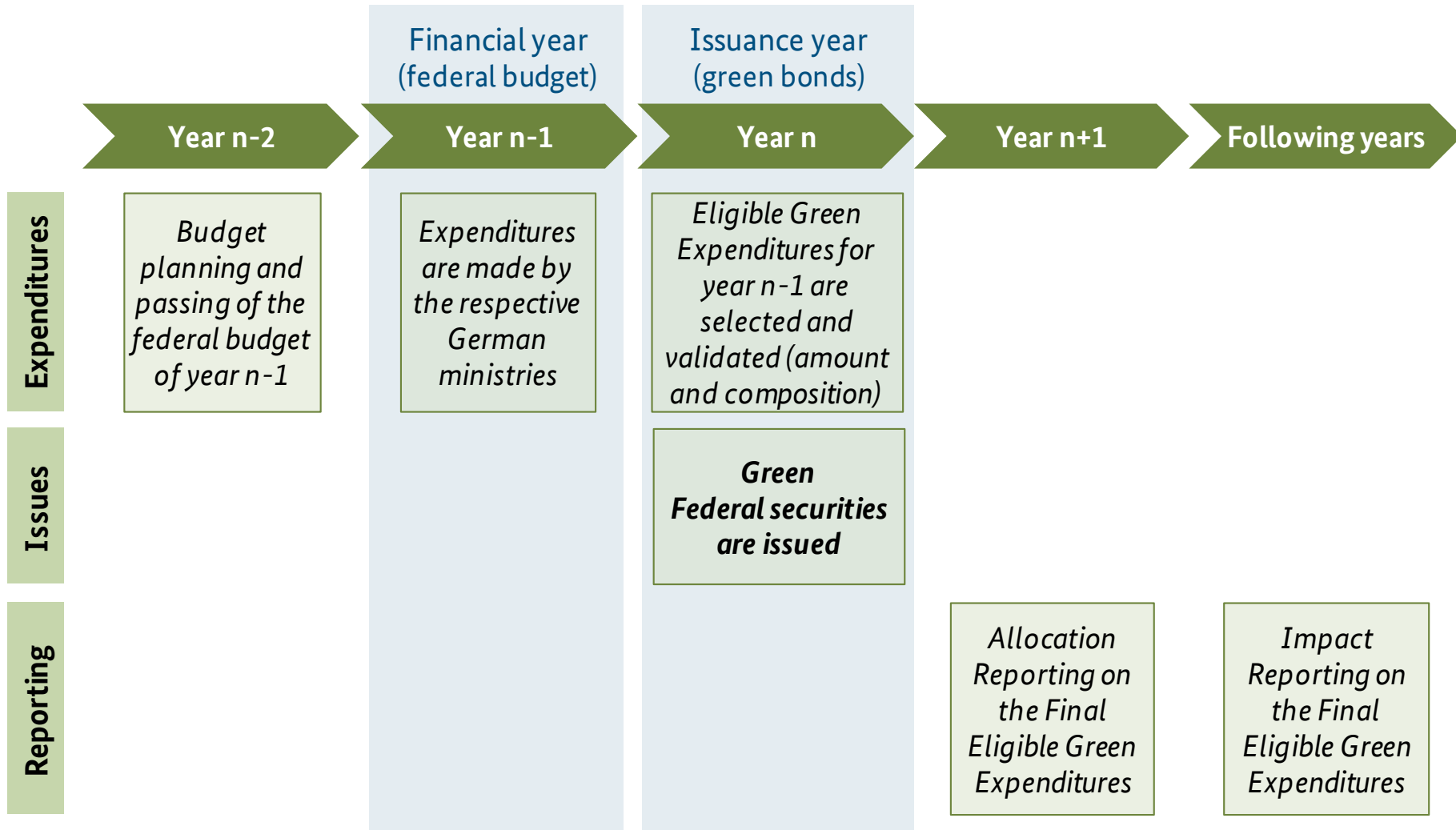
## Eligible green expenditures:

- Green Eligible Expenditures can include any type of Federal expenditure contributing to a transition towards a low-carbon, resource efficient and sustainable economy

## Excluded expenditures:

- State expenditures which are already earmarked by other public Green Bond issuers (such as KfW or NGEU)
- Armaments, defence, tobacco, alcohol, gambling, fossil fuels and nuclear power

# Project Evaluation, Selection and Reporting



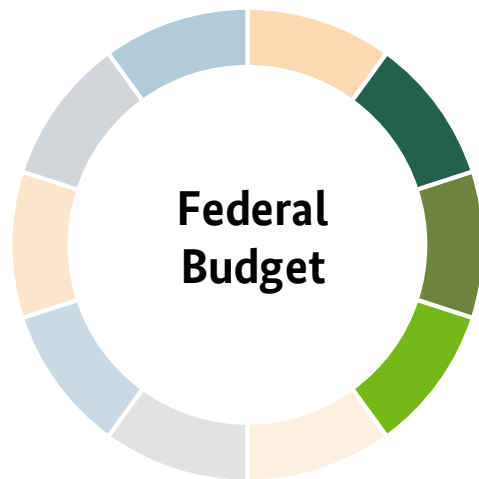
# 3 Green Federal Securities in Practice - Eligible Green Expenditures

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# High Level of Transparency and Strict Standards

## ➤ **Exclusion of double counting:**

Expenditures allocated to Green German Federal securities are earmarked for this purpose only, and will not overlap with the use of any other green funding source.



## **Clear differentiation of green expenditures:**

- Expenditures proposed by the federal government in the German Recovery and Resilience Plan (DARP) for the NGEU program are excluded from the allocation to Green Bunds.
- Only EKF expenditures in the amount financed by the federal budget (including reserves) are taken into account for Green Bunds.
- Federal budget expenditures associated with KfW Green Bonds are excluded from the allocation to Green Bunds.

# Overview Use of Proceeds: Eligible Green Expenditures (€ mn)

Green Sectors	2021 Indicative	2020 Preliminary	2019 Final	Sector Details
Transport	8,400.0	7,387.3	7,125.3	e.g. rail transport, alternative drive systems and fuels, waterways, cycling infrastructure
International cooperation	3,700.0	3,278.3	2,981.7	Assist EM and developing economies in their transition towards greater environmental sustainability; governance: page 23
Research, innovation and awareness raising	1,400.0	1,085.0	625.1	Support and facilitate knowledge and innovation about climate and environmental matters; eligible items: page 24
Energy and industry	2,600.0	1,093.2	1,198.5	e.g. energy research, renewable energy, energy efficiency
Agriculture, forestry, natural landscapes and biodiversity	800.0	564.0	381.5	e.g. sustainable agriculture and forestry, coastal defences and food protection, protection of ecosystems
<b>Total</b>	<b>16,900.0</b>	<b>13,407.8</b>	<b>12,312.1</b>	

# Key Sector “International Cooperation”



International  
cooperation

## Expenditure

Eligible programs and projects are targeted at mitigating and adapting to climate change, transitioning towards sustainable energy systems based primarily on renewable energy sources, improving energy efficiency, protecting habitats and biodiversity sustainable use of natural resources and energy, including developing renewable energy generation facilities and sustainable agriculture.

## Governance

The selection and approval of specific projects is subject to **compliance with German law**, the Guidelines for bilateral Financial and Technical Cooperation **and all relevant international agreements and treaties signed by Germany**.

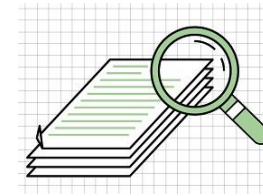
**Governance safeguards** and processes are in place for every type of expenditure to prevent corruption and money laundering in line with European and national legislation and standards.

**Social safeguards** and processes are in place for every type of expenditure to reduce the risk of forced labor and child labor and to promote and strengthen human rights in developing countries in accordance with European and national legislation and standards.

International support is reported in accordance **with internationally agreed guidelines**, criteria and reporting cycles, either as official development assistance (ODA) to the OECD Development Assistance Committee (DAC) and/or as climate finance to the EU and United Nations Framework Convention on Climate Change (UNFCCC).



# Key Sector “Research, Innovation and Awareness Raising”



Research,  
innovation and  
awareness raising

## Expenditure

Eligible budget items primarily include :

- Expenditure enabling the development of solutions for combating climate change, for the preservation of ecosystems and biodiversity and for compensating for fluctuations in power grids due to the increasing use of renewable energy sources to generate electricity
- Expenditure enabling research for all renewable energies and energy storage, energy efficiency, power grid and renewable energy integration, energy transition
- Expenditures enabling research related to climate change, biodiversity, nature protection and the environment
- Expenditures enabling research on coasts, oceans and polar areas

## Cross-Section

In a society making a transition towards a sustainable economy, strong government commitment is essential. Thus, the federal budget contains considerable green expenditures on research, innovation and awareness raising. Including green expenditure on research and innovation in the other four Green Sectors, overall spending in this area is much larger than € 0.6 bn in 2019 and € 1.1 bn in 2020.





# Contributions of Eligible Green Expenditures: Breakdown by Green Sector

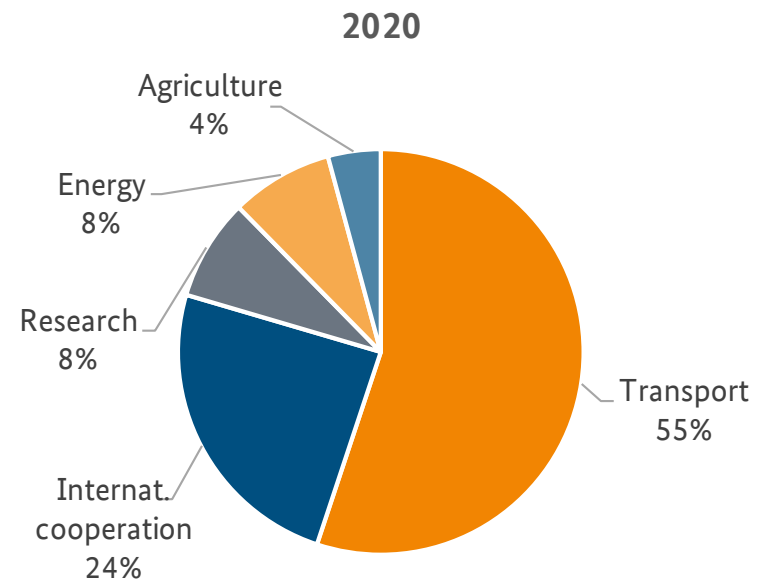
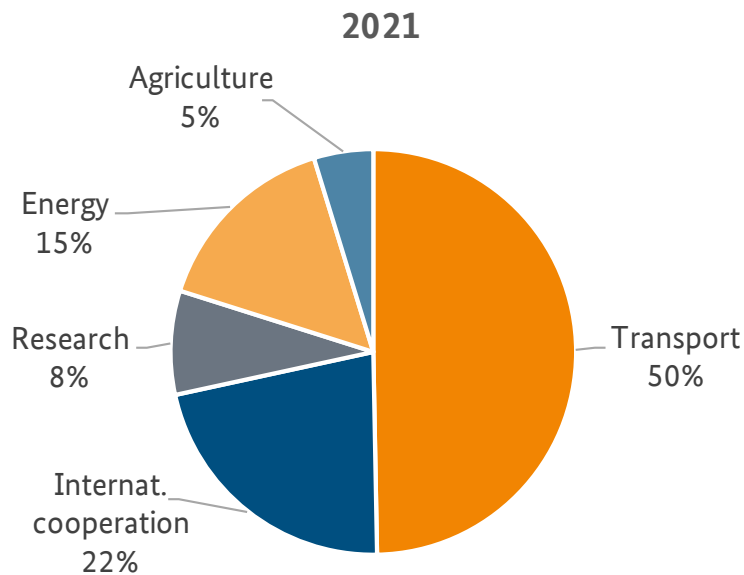
(1) Transport

(2) International  
cooperation

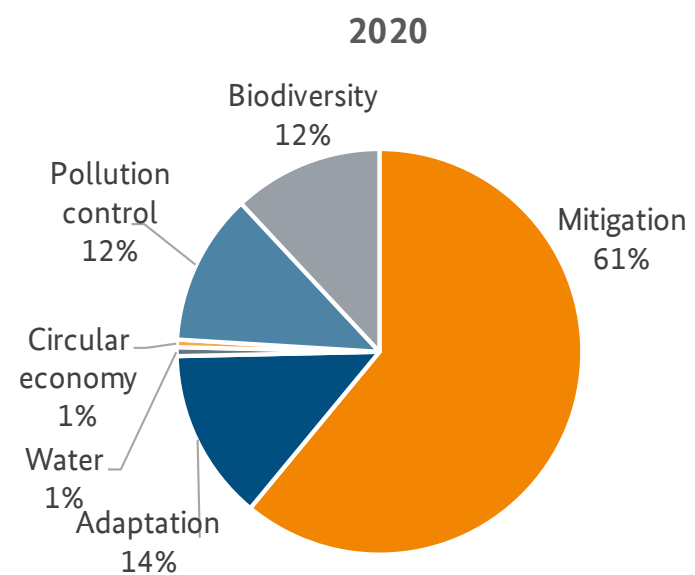
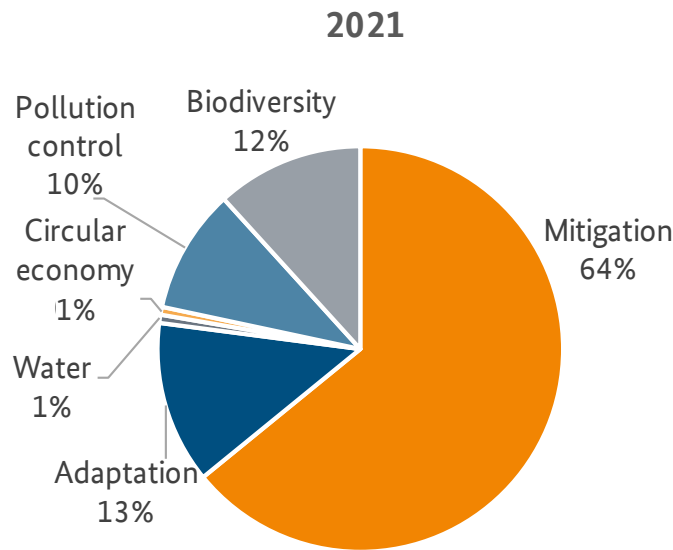
(3) Research,  
innovation and  
awareness raising

(4) Energy and  
industry

(5) Agriculture,  
forestry, natural  
landscapes and  
biodiversity



# Contributions of Eligible Green Expenditures: Breakdown by EU Environmental Objective



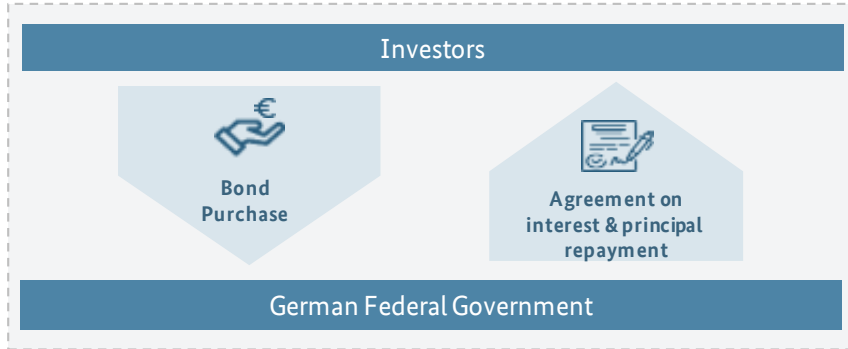
Symbols are taken from „Financing Sustainable Growth“, European Union, 2019.

# 4 Green Federal Securities Execution - Strategy and the Twin Bond Concept

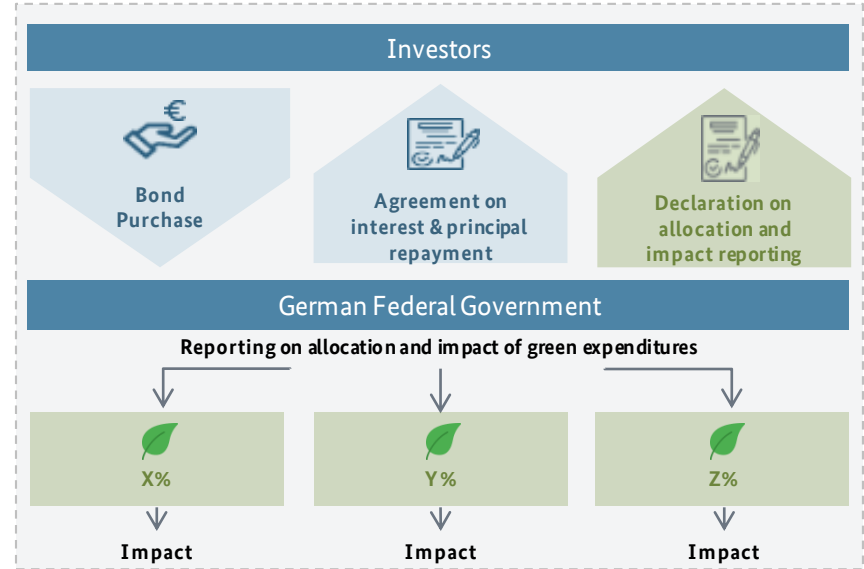
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# Twin Bond Concept

## Conventional German Federal security “Conventional twin”



## Green German Federal security “Green twin”

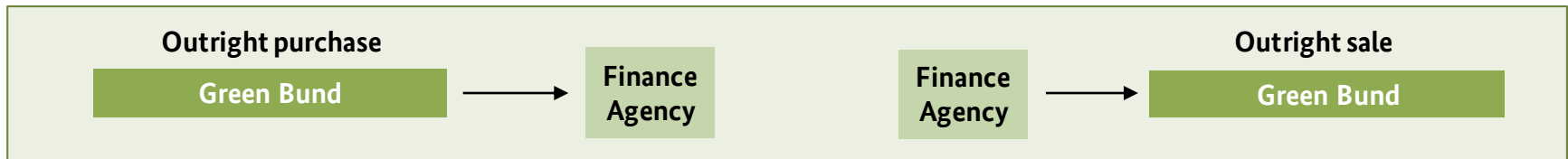


## Main terms (10y twins Aug 2031)

	Conventional twin	Green twin
Identical to both twins	Maturity segment	10y
	Coupon	0.00%
	Interest dates	Annually
	Maturity	15 August 2031
	Future-Contracts	Deliverable
Different for each twin	Outstanding size	EUR 31.0 bn (after tap in May)
	Issuance date	8 September 2021
	ISIN	DE0001030732

# Secondary Market Activity by Finanzagentur Ensures Liquidity

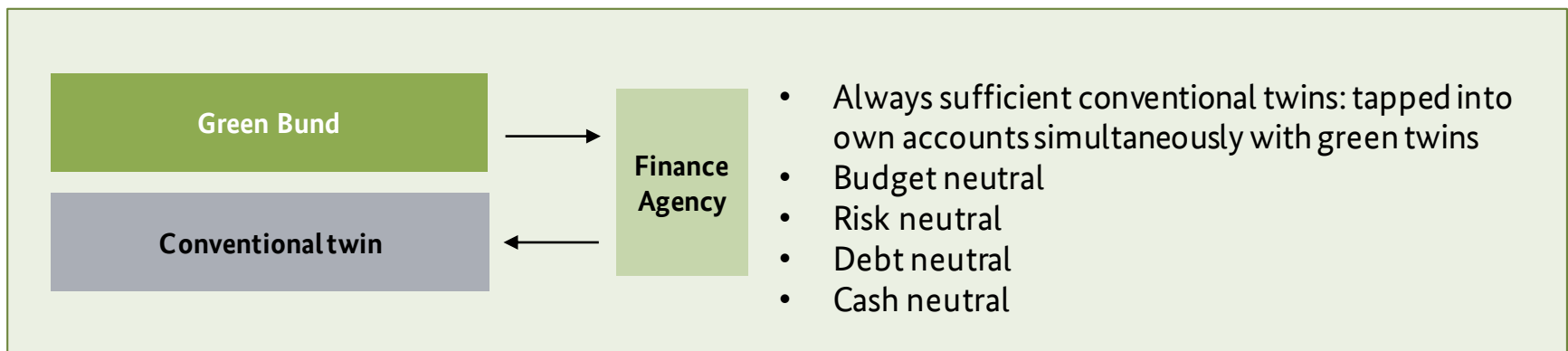
## 1. Outright (“one-way”) sales and purchases



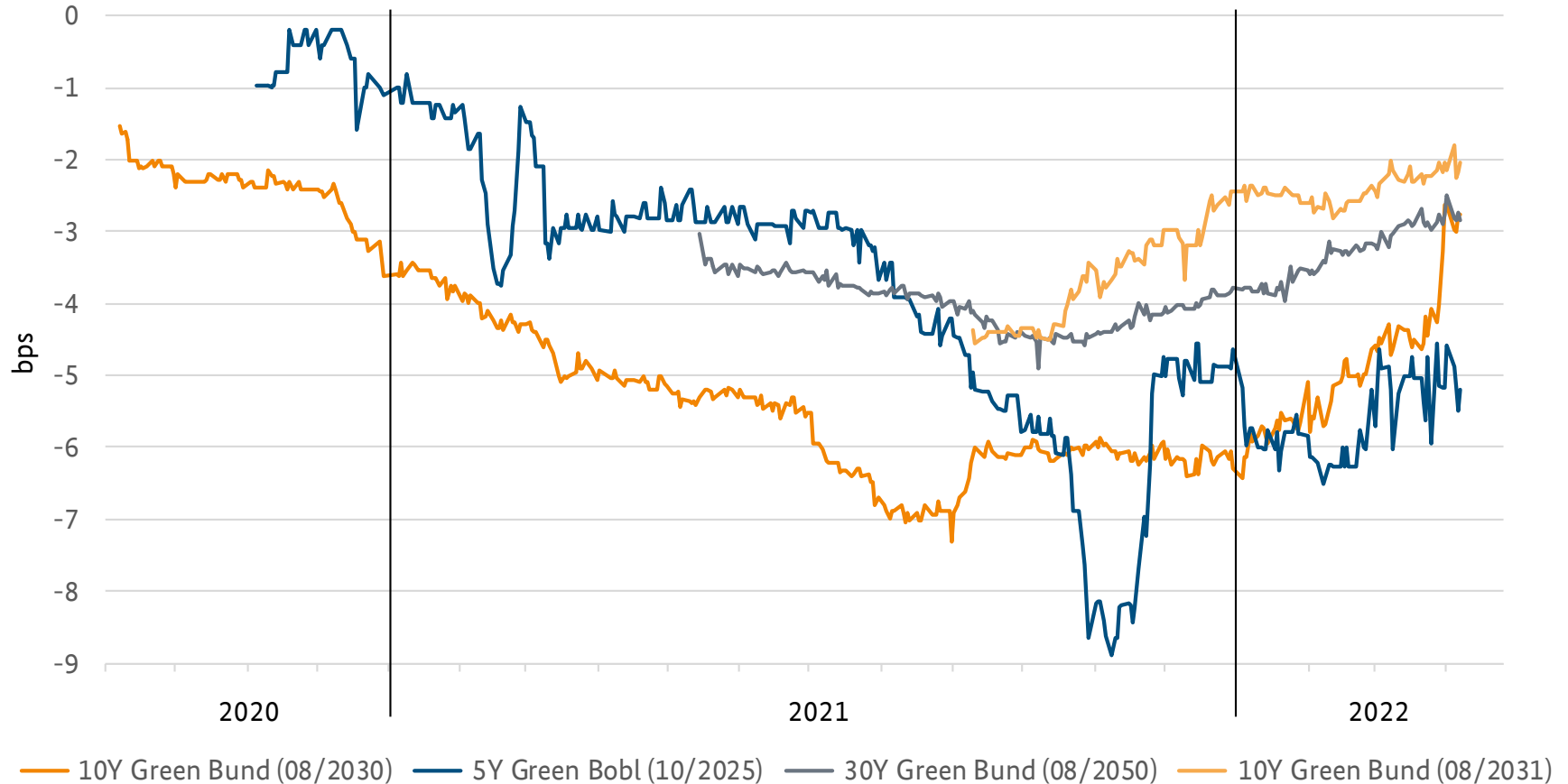
## 2. Repurchase agreements and securities lending, using the Federal Government’s own stock of Green Bunds



## 3. Combined and debt-neutral sale-and-purchase (switch) transactions: Most powerful tool



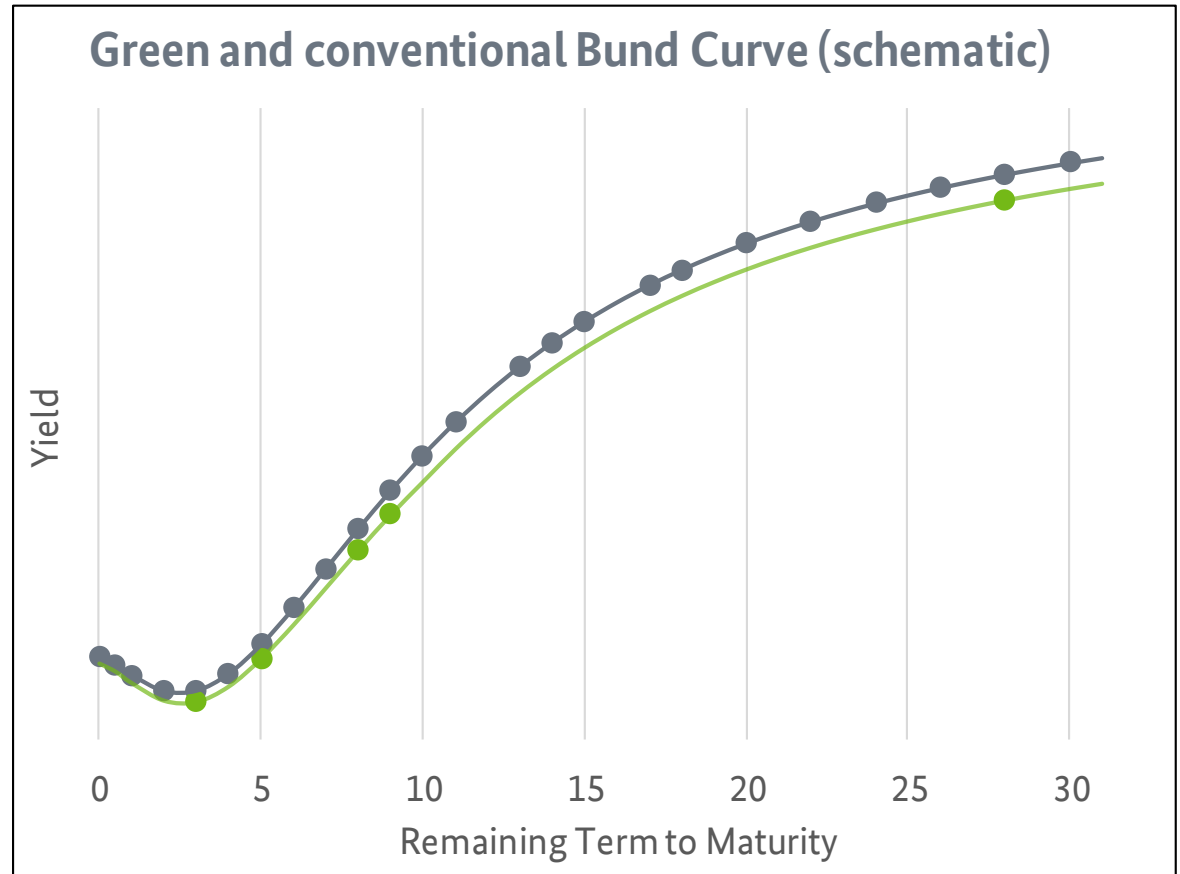
# The Twins` Performance: Making the ‚Greenium‘ Transparent



*Greenium = yield spread between green and conventional bond, calculated from Bundesbank reference yields*

# The Twin Bond Concept Creates a Liquid Curve and Offers a Diversified Maturity Spectrum for Different Investor Types

- Germany will be a permanent issuer of green bonds.
- Liquid green yield curve acts as a reference for the euro area.
- This curve serves different investor type needs, e.g.:
  - Duration considerations
  - Liquidity considerations



# Developing Sustainable Finance Markets by Applying the Twin Bond Concept

The twin bond concept ...

- 1 ... transfers the Bund's established market approach to the green segment
- 2 ... creates a liquid curve and offers a diversified maturity spectrum for different investor types
- 3 ... provides full price transparency and allows for outperformance of the green twins

- will therefore accelerate the development of sustainable finance markets
- will serve as a catalyst to channel more investments towards a more environmentally friendly economy
- will attract new investors to the Green Bond market



# 5 Selected Case Studies of Eligible Green Expenditures

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# Case Study 1: Upgraded Line Ulm –Lindau

## Objective

- Increasing rail track speed and capacity for passenger transport

## Output and measures

- Ulm–Friedrichshafen railway, also known as Südbahn used to be a non-electrified main line in the state of Baden-Württemberg (built from 1846).
- The route will be upgraded and electrified.
- Additionally, there is an extension to Lindau as part of the "Bodenseegürtelbahn".
- The total length of the route is 127 km.
- The total costs amount to approx. EUR 370 mn.

## Achievements

- Extension to Lindau as part of the "Bodenseegürtelbahn"
- The rail tracks are prepared for train speeds up to 160 km / h
- The project is being carried out since 2015 (preparation), construction has started in March 2018 and was commissioned on 06.12.2021



Source: Deutsche Bahn AG, 2020, Neubaustrecke Ulm-Lindau



# Case Study 2: Model Cities for Sustainable Mobility

(1) Transport

## Objective

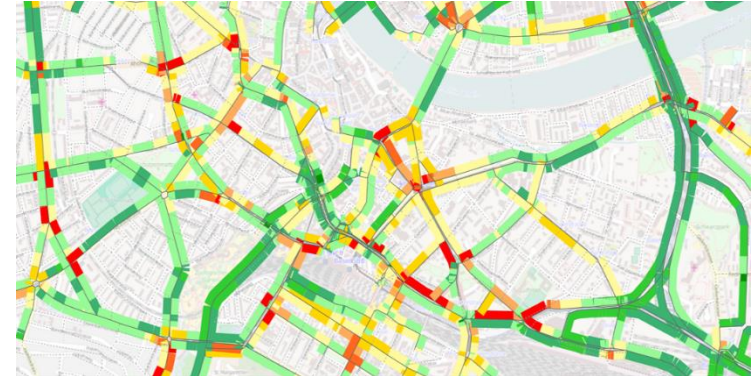
- Improve air quality and prevent exceedance of NO<sub>2</sub> limits in five model cities (2018-2021)

## Output and measures

- Funding of around 120 million euros
- Measures to improve local public transport and cycling in the areas of service improvement, tariff and pricing adjustments, traffic control and digital services
- Examples for specific measures are the creation of new bus routes, dynamic traffic guidance, new cycle lanes, tariff reductions and mobility apps

## Achievements

- All of the cities' bundles of measures had a positive effect on local air quality
- In all model cities, the results of the traffic simulation show that the measures could potentially save a combined average of 82,000 of 1,364,000 car trips per day, resulting in a daily reduction of 264,000 car kilometers and 165 kg NO<sub>x</sub>



*Illustration on top: exemplary traffic simulation  
Illustration below: visualization of NO<sub>x</sub>-emissions*





# Case Study 3: Bicycle Lanes (National Cycling Plan)

(1) Transport

## Objective

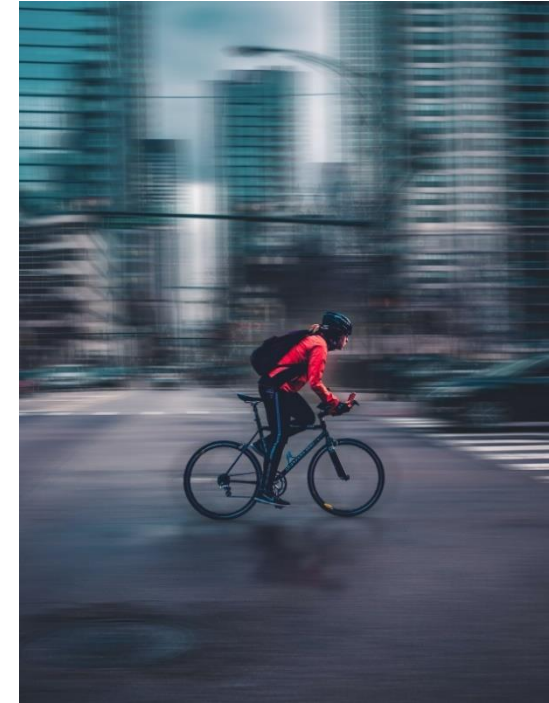
- The NCP 3.0 launched in April 2021 by the Federal Government: Ensuring more, better and safer bicycle traffic by 2030

## Output and measures

- Both the number and the length of the routes covered by bicycles should grow by 50% to 180 routes per person and year by 2030 with an average distance of 6 km per route
- In order to achieve this goal, the Federal government is funding non-capital and capital measures, for example creation of a seamless cycling network in Germany: cycle highways, with a total of around 390 mn Euro over the entire funding period, cycle paths along federal highways and cycling infrastructure in municipalities.

## Achievements

- In 2021, 158 km of cycle paths were completed, resulting in cycle paths on approx. 14,600 km of federal highways in the federal government's construction load
- Cycle highways are already built for instance between Frankfurt and Darmstadt or along the Ruhr in Gelsenkirchen
- Around 500 mn Euro are approved in approx. 1.000 capital measures (Programme "Stadt&Land")



Source: Radschnellwege bringen Fahrradfahrer zügig & sicher ans Ziel! (BMVI, 2020); photo: Max Bender



# Case Study 4: Power Plant Albania

(2) International cooperation

## Objective

- Development loan to KESH (Albanian Power Corporation) for the electro-mechanical rehabilitation of the Hydropower Plant (HPP) in Fierza
- Expected extension of the HPP's lifetime by at least 30 years.

## Output and measures

- Rehabilitation of turbines and generators
- Total investment: EUR 48.35 million
- Development loan: EUR 40 million
- Accompanying measure: EUR 2 million
- Project will be implemented until Dec 2027

## Achievements

- Increase in the HPP's reliability, efficiency and capacity of HPP Fierza (500 MW), which covers around a quarter of the Albanian power generation
- The project will reduce energy losses and ensure a clean energy supply, reducing the demand for energy imports from neighboring countries with carbon intensive power production (expected greenhouse gas savings of 137,000 t CO<sub>2</sub>e/year)

## Project partner

- The project is implemented by **KFW**





# Case Study 5: Implementation of Climate Strategy in the Mexican Transport Sector

(2) International cooperation

## Objective

- Development loan to the Mexican Development Bank NAFIN, aiming at financing the acquisition of low emission (electric) vehicles by MSMEs and bonuses for scrapping old vehicles for financed MSMEs

## Output and measures

- Total investment: EUR 100 million (incl. loan subsidy of EUR 4.7 million)
- Investment grant from German Federal Funds: EUR 10 million
- Accompanying measure: EUR 2 million
- Implementation of Phase I in 3 Mexican Federal States until 2025

## Achievements

- Contribution to the achievement of National Determined Contributions in Mexico (reduction of greenhouse gas emissions in the transport sector)
- More than 2,600 companies shall be supported in replacing old vehicles
- Expected GHG mitigation of around 75,000 t CO<sub>2</sub>e/year

## Project partner

- The project is implemented by **KFW**







# Case Study 6: Construction of a Bicycle Trail Network in Lima, Peru

(2) International cooperation

## Objective

- Grant to the Municipality of Lima for the further development of the metropolitan bicycle vial infrastructure

## Output and measures

- Construction of more than 100 km of bicycles lanes and related infrastructure (parking slots)
- Expected investment: EUR 22 million:
- Investment grant from German Federal Funds: EUR 20 million
- Project will be implemented until 2024

## Achievements

- Development of alternatives for passenger transportation
- Integration of bicycle vial infrastructure into the public transport system
- Around 500,000 people (5% of total population) will directly benefit by using the newly created infrastructure (time reduction)
- Expected GHG mitigation of around 2,000 t CO2e/year (switch from car to bicycles)

## Project partner

- The project is implemented by **KFW**





# Case Study 7: SAGEN

South African - German Energy Programme  
Promotion of a Diverse and Inclusive Energy Transition

(2) International cooperation

## Objective

- The project advises the national electricity utility and municipal distribution companies on the grid integration of renewable energies (RE) and supports selected municipalities regarding energy efficiency (EE) measures

## Achievements

- In total, the project contributed to emission reductions of 353,221 tones of CO2 equivalents in 2021.
- Since 2012, more than 5.7 GW of utility-scale renewable energy has been integrated into the grid (0.7 GW in 2021).
- In 2021, 19.4 MW of newly installed capacity of wind and solar PV plants can be attributed to SAGEN.
- The project also helped reduce electricity consumption in municipalities by a total of 20 GWh per year through EE measures such as municipal EE management systems, EE measures in the water sector, LED street lighting, etc.
- 71 municipalities have been enabled to introduce processes and structures to allow for the connection of “Small-Scale Embedded Generation” producing approx. 1,656 GWh in 2021.
- In 2021, funds of EUR 2.8 million were implemented.
- The support will be expanded under the 4th phase (2022-2024).

## Project partner

- Implemented by



Source: [www.sagen.org.za](http://www.sagen.org.za); CSIR Energy Centre; photos: GIZ, Glenn McCreath





# Case Study 8: Energy Systems of the Future in Brazil

(2) International cooperation

## Objective

- Energy Planning Authority: Development of strategies for integrating renewable energy into long-term energy planning.
- Regulatory Agency: Development of regulatory solutions to make the Brazilian energy system more flexible
- National Electrical System Operator (ONS): Support to ONS in modernization of management and operations.
- Ministry of Energy: Development of financing approaches and business models



## Output and measures

- Support for the establishment of 19 local energy cooperatives with an installed capacity of 26 MWp, serving more than 1,700 consumer units.
- Education and training of more than 750 teachers and 7800 specialists in demand-oriented courses for the RE market

## Achievements

- The number of PV systems in net metering increased from 30 (2012) to more than 859,000 PV systems (Feb 2022) with 9.3 GW of installed capacity.
- The installed capacity of wind power increased from 2.5 GW (2012) to 21.8 GW in the end of 2021. The installed capacity of large-scale solar power plants increased from 7 MW (2012) to 4.6 GW in 2021. Together, wind and solar PV now represent 14% of Brazil's electricity matrix.

## Project Partner

- Implemented by





# Case Study 9: ProAmbiente

## Implementation-oriented forest and environmental management

(2) International cooperation

### Objective

- The objective is to improve the conservation and the sustainable and legal usage of biodiversity and tropical forests in Peru
- Support to the protection and sustainable usage of biodiversity
- Strengthened legality / sustainability in the Peruvian forestry sector
- Integration of biodiversity and forestry criteria in environmental impact assessments



### Output and measures

- Creation of biodiversity labels to promote sustainably produced products in conservation areas and increasing the value of new products
- Participatory development of digital tools to ensure legality in the wood supply chain
- Strengthening the Peruvian forest supervision agency in preventing deforestation and controlling areas under legal management and minimize impacts of large investment projects on biodiversity and forest

### Achievements

- Since 2017, 160 businesses contributed directly towards financing the conservation of biodiversity.
- The legal Peruvian forestry industry expanded its area from 1 751 823 ha of tropical rainforest in 2017 to 4 925 995 ha in 2021. This includes 1 093 009 ha managed by indigenous people (up from 297 890 ha in 2017)
- Regulated forest use prevents deforestation and prevents emissions: In areas reported above, no deforestation was reported. Compared to country-wide figures, this translates to 7 950.98 ha of prevented deforestation and avoided emissions of more than 4 142 408 tCO<sub>2</sub>EQ in 2021 alone.

### Project Partner

- Implemented by





# Case Study 10: Kopernikus Project SynErgie

(3) Research,  
innovation and  
awareness raising

## Objective

- With an increasing share of renewable energies, fluctuations in the power grid increase considerably. This project investigates how industry may help to compensate for these fluctuations by flexibly adapting its demand to the electricity supply.
- Industry has the potential to significantly offset fluctuations in the power grid. If renewables like wind and sun do not provide enough energy, industry can adjust its electricity demand and reduce electricity consumption until more electricity is available again (demand side management).

## Output and measures

- SynErgie determined how much energy the German industry could either use more/ less in the event of grid fluctuations.
- In Vejle, Denmark, the gas company Linde has commissioned the world's first commercial air separation plant. Air separation involves separating air into its individual components in order to obtain rare gases. Previously this was only possible with constantly high electricity consumption. SynErgie developed simulations and facilities that show that the process of air separation can also be conducted with fluctuating levels of electricity.
- Federal subsidy 2020: EUR 10.4 mn; 2021: EUR 14.1 mn



## Selected project partners

- University of Stuttgart, Fraunhofer Gesellschaft, Linde GmbH, UPM GmbH, TRIMET Aluminium SE, Siemens AG, Software AG, Covestro AG, Naturschutzbund Deutschland

Source: Kopernikus; photo: TRIMET's flexible aluminium furnaces (SynErgie/TRIMET)



# Case Study 11: Solar Energy Use for Storage, Fuels and Industry (Projects PEGASUS, BaSiS)

(3) Research, innovation and awareness raising

## Objective

- Processing sulphur as one of the most important raw materials for chemical industry by means of solar energy (PEGASUS)
- On-demand solar power generation using sulphur storage technologie (BaSiS)
- Long-term storage solutions to replace fossil power plants 24/7

## Output and measures

- Novel power cycle combining a CSP plant with a sulphur storage system for 24 hours baseload operation
- Demonstrate a thermo-chemical sulphur storage cycle to permanently and efficiently store solar energy in chemical form as elemental sulphur at a 30 times higher energy density than today's molten salt systems
- Direct combustion of sulphur in gas turbines for highly efficient renewable energy recovery
- Product SO<sub>2</sub> can be used for sulphuric acid production and for hydrogen production

## Project partners

- DLR, in cooperation with KIT, BrightSource (and others)



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für Luft- und Raumfahrt**  
German Aerospace Center



Source: DLR Solar Towers in Jülich © DLR





# Case Study 12: CoBra

High Temperature Heat Pumps based on the Brayton Process located in Cottbus

(3) Research, innovation and awareness raising

## Objective

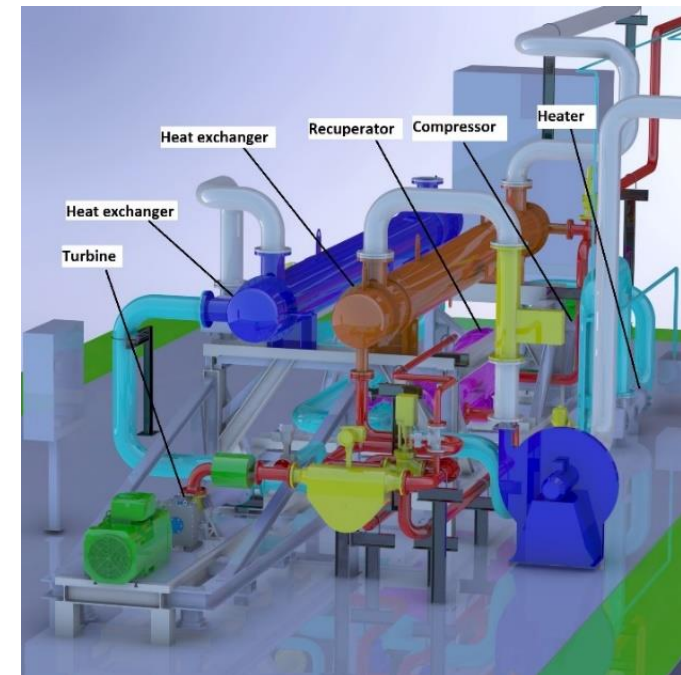
- Roughly 60% of the industrial energy demand in Germany is used for process heat
- There is significant need in CO<sub>2</sub>-neutral process heat in the range of 150-500°C. Market cannot provide heat pumps with adequate performance.
- Objective is the development, upscaling and integration of CO<sub>2</sub>-neutral high temperature heat pumps in energy intensive processes of several industries (chemistry, petrochemistry, iron, steel, paper, food, cement, aluminium)

## Output and measures

- Demonstrator high temperature heat pump (HTHP) operational at DLR Cottbus by the end of 2022
- Development of necessary turbo components
- Accompanying research will identify options for operating scenarios
- Virtual model of the HTHP and its embedding in the industrial processes
- Electrification of the industrial process heat demand up to 500 °C could result in CO<sub>2</sub> savings equal to the current Switzerland's CO<sub>2</sub> emissions



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German Aerospace Center



Source: DLR, CAD scheme of the first test facility for a HTHP



# Case Study 13: Institute of Maritime Energy Systems

(3) Research, innovation and awareness raising

## Objective

- Development & Demonstration of sustainable CO2 neutral maritime energy systems



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German Aerospace Center

## Output and measures

- Sustainable maritime energy systems for ships of various sizes
- Prevention of air pollution by pollutants from the use of fossil fuels, especially CO2.
- Introduction of CO2-neutral fuels like H2, NH3, and LOHC
- Optimization of energy demand and supply on-board for power, heat and cooling
- Conception of needed infrastructure in ports
- Offering test facilities on shore and research vessel for tests and qualifications of components



## Project partners



Fuel Cells



Fuel Tanks



Batteries



Bridge



Leisure



Accommodation  
Air Conditioning

Source: DLR

Source: [www.dlr.de/ms](http://www.dlr.de/ms)



# Case Study 14: TTP Leichtbau – Verbundvorhaben CC-Mesh

(3) Research, innovation and awareness raising

## Objective

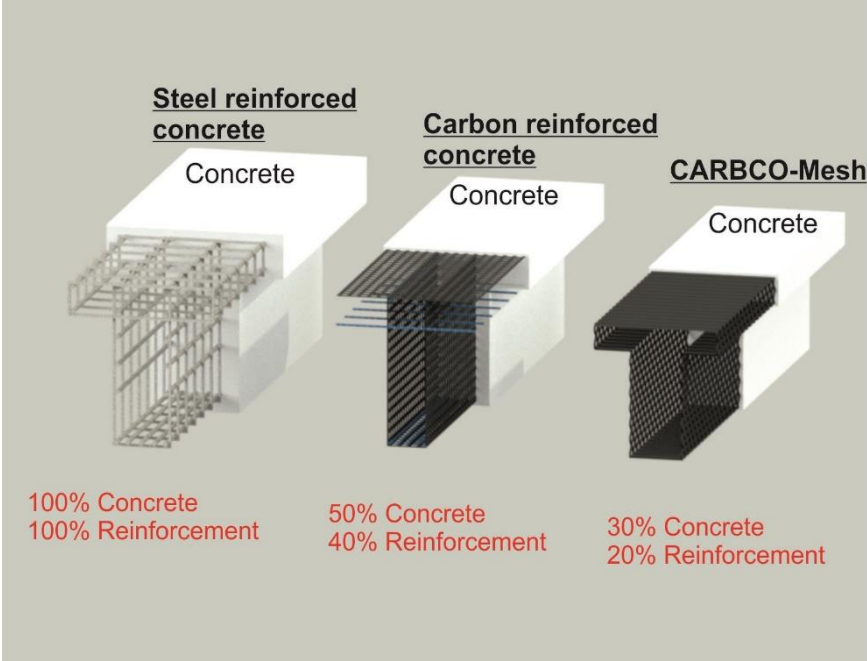
- Joint project for lightweight construction
- Transfer of design and reinforcement concepts from lightweight construction to concrete construction.

## Output and measures

- Funding amount: € 1.8 million, project term: 01.11.2020 - 31.10.2023
- Development and optimisation of innovative, large-format and durable carbon reinforcements for concrete construction.
- The three-dimensional reinforcement structures adapt optimally to the force flow, GHG savings potential of up to 86% compared to reinforced concrete

## Project partners

CarboCon GmbH, HA-CO Carbon GmbH, Technische Universität Dresden - Institut für Massivbau, Hochschule für Technik, Wirtschaft und Kultur Leipzig



Source: CARBOCON GMBH



# Case Study 15: Norddeutsches Reallabor

## Energy transition alliance for innovations and effective climate protection

(4) Energy and industry

### Objective

- The project partners are working on new ways to achieve climate neutrality.
- The large-scale approach gives the project a supraregional model character for hydrogen-based sector coupling in Germany and Europe.



### Output and measures

- The aim of the joint project is to test how CO2 emissions in the region can be reduced by 75 percent by 2035.
- The work planned for the project period could save an estimated amount of up to 500,000 tonnes of CO2 per year for project partners and associated partners.
- To achieve this, production and living areas with high energy consumption will be decarbonised - especially in industry, but also in the heat supply and mobility sectors.
- Eight electrolysers with a hydrogen production capacity of 42 megawatts will contribute to this. They will be used to replace fossil fuels in industrial processes with hydrogen and its derivatives.
- In addition, three projects are to be implemented that will enable waste heat utilisation to the tune of 700 gigawatt hours per year.
- In the mobility sector, several hydrogen filling stations and more than 200 vehicles are planned to be tested in different usage scenarios.

Image source: [Nicholas Doherty/unsplash.com](https://unsplash.com/photos/Nicholas-Doherty)





# Case Study 16: Federal Funding for Efficient Buildings (BEG)

(4) Energy and industry

## Objective

- The Building sector is responsible for about 35% of Germany's total final energy consumption
- The BEG funding scheme aims at incentivizing homeowners, businesses, municipal entities, and charitable organisations to invest in the energetic refurbishment of existing buildings or to construct highly energy efficient new buildings that distinctly exceed the general level of energetic requirements as outlined in the Building Energy Act (GEG)



## Output and measures

- By updating the exterior front of buildings, installing new windows and switching from fossil to renewable energy sources for heating, substantial energy savings can be achieved and green house gas emissions can be reduced correspondingly

## Achievements

- In 2021, BEG funding was granted for more than 14,000 residential and non-residential buildings that were entirely energetically refurbished. In addition, BEG funding was granted for more than 260,000 individual renovation measures such as the insulation of walls, the installation of new windows or the commissioning of new heating sources using renewable energy sources such as heat pumps or solarthermal installations

Source: © Adobe Stock/Gerhard Seybert



# Case Study 17: Project PROMAR (Prevention of Marine Litter in the Caribbean Sea)

(5) Agriculture, forestry, natural landscapes and biodiversity

## Objective

- Promoting Circular Economy Solutions in the Dominican Republic, Costa Rica and Colombia to reduce marine litter

## Output and measures

- Implementation of monitoring systems at a local level for monitoring the input of litter into the sea;
- Design and implementation of circular economy solutions to reduce marine litter;
- Capacity building with political partners for implementing extended producer responsibility and the circular economy solutions developed in the project;
- Raising awareness about ways to avoid marine litter;
- Sharing of project results with other Latin American and Caribbean countries.

## Project partners

- Project lead: adelphi research gmbH
- Project partners: Parley República Dominicana SRL, CEGESTI, Centro de Producción Más Limpia y Tecnologías Ambientales (CNPML) Colombia, Associação Brasileira de Empresas de Limpeza Pública e Resíduos Especiais (ABRELPE).



Source: Grant Programme against Marine Litter, Project Overview, PROMAR; photo: Bo Eide



# Case Study 18: Project MooReSax – Applying Knowledge of Peatland Protection

(5) Agriculture, forestry, natural landscapes and biodiversity

## Objective

- Development of optimal variants of forest peatland revitalisation for different categories of overlapping protective functions in peatlands
- Assessment of ecosystem benefits that can be achieved through forest peatland revitalisation (incl. greenhouse gas emissions effects)

## Output and measures

- State of the art engineering will be applied to the revitalisation of 10 forest peatlands in the Westerzgebirge (Saxony) model region
- Findings of the project studies will be shared with stakeholders at a nationwide conference and in other formats
- Transparent evaluation of ecosystem benefits through peatland restoration

## Achievements

- The revitalisation activities at the first forest peatland site (Heuschuppenmoor) were completed in September 2021



Source: Forest and Climate Fund Project MooReSax (FKZ: 2218WK49A1-B1); photo: Isabelle Fanghänel





# Case Study 19: Project InsHabNet – Insects, Habitat, Network

(5) Agriculture, forestry, natural landscapes and biodiversity

## Objective

- Development of protection strategies for endangered insect populations of habitats in a fragmented landscape

## Output and measures

- For this project, forests of different sizes, hedges, avenues and individual trees have been selected in a central study area (mainly Rostock district, Güstrow forest offices) in Mecklenburg-Western Pomerania
- In 2019 and 2020, the occurrence of beetles and moths in the various structural elements has been analysed
- Linear structures such as pipeline routes and their potential for biotope-connecting and insect support will be examined
- Well-known scientists and experienced specialists support the project team
- The project is being carried out between January 2019 and December 2021



Source: Source: BMEL Förderprojekt InsHabNet (Landesforst Mecklenburg-Vorpommern, 2019); <https://www.wald-mv.de/Forstbehoerde/Forstliches-Versuchswesen/Forschungskooperation-und-Projekte/>; photos: I. Brunk; U. Gehlhar; S. Poeppel

# 6 Appendix: Contact Persons and Further Information

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# Examples of Impact Reporting Approaches

Sector	Indicative impact report indicators
<b>Transport</b>	<ul style="list-style-type: none"> <li>• Greenhouse gas emissions avoided (when possible)</li> <li>• Length of electrified railway-km</li> <li>• Length of newly built railway-km</li> <li>• Length of newly built bicycle lanes</li> <li>• Final reports about and descriptions of projects</li> </ul>
<b>International cooperation</b>	<ul style="list-style-type: none"> <li>• Greenhouse gas emissions avoided (when possible)</li> <li>• Specific reports about the environmental efficiency of the German international cooperation and the mobilisation of private capital</li> <li>• Listing of main initiatives and projects and presentation of key examples, and / or a description of mandates of financed multilateral institutions as well as international organisations and funds</li> </ul>
<b>Research, innovation and awareness raising</b>	<ul style="list-style-type: none"> <li>• Standard research indicators</li> <li>• Total funding or number of funded projects</li> <li>• Lists of main initiatives or presentation of key examples</li> </ul>
<b>Energy and industry</b>	<ul style="list-style-type: none"> <li>• Greenhouse gas emissions avoided (when possible)</li> <li>• Reduction of energy consumption, share of renewable energies</li> <li>• Specific reports about the climate and environmental efficiency of the subsidies</li> </ul>
<b>Agriculture, forestry, natural landscapes and biodiversity</b>	<ul style="list-style-type: none"> <li>• Specific reports about the climate and environmental efficiency of the GAK-policy (Gemeinschaftsaufgabe Agrarstruktur &amp; Küstenschutz: joint task of agricultural structure and coastal protection)</li> </ul>

# Issuance Calendar 2022 (as of 23 March 2022)

Issuance Outlook of the Federal Government 2022 (€ bn)														
Security	Share	Volume € bn	Q1 2022			Q2 2022			Q3 2022			Q4 2022		
			Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Schatz	16.4%	67	5	6	5.5	5.5	6	5.5	5.5	6	5.5	5.5	6	5
Bobl	10.5%	43	4	4	4	4	3	3	4	4	4	3	3	3
Bobl/g									S					
Bund 10Y	13.7%	56	4	4	4	4	4	4	5	4	4	4	4	4
Bund/g 10Y	1.1%	4.5			1.5		1.5		1.5					
Bund 15Y	3.4%	14	1.5	1.5		2	2	1.5		1.5	1.5	1.5	1	
Bund 30Y	3.5%	14.5	1.5	1.5	4	1	1.5		1.5	1	1.5	S		1
Bund/g 30Y								S						
ILBs	0.5%	2.2	0.75	0.7	0.75	A	A	A	A		A	A	A	
Capital market	49.2%	201.2	58.2			52.5			53.5			37		
Bubills	50.8%	208	18	18	18	18	24	12	18	18	17	23	17	7
Money market	50.8%	208	54			54			53			47		
Year total € bn:		409.2	38.75	35.7	37.75	34.5	45	27	39.5	34.5	32.5	37	35	12
			112.2			106.5			106.5			84		

Share and Volume without  
 - upcoming syndicates  
 - upcoming ILB auctions  
 - one-off-taps  
 - taps of conventional twins

A / S = Auction / Syndicate (size not fixed)  
 New issues orange shaded, else reopenings.



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