

ENVIRONMENT

Around the world, a considerable amount of the greenhouse gas emissions that contribute to climate change are caused by the construction and operation of buildings. The condition of the buildings and how they are managed also have a significant impact on the extent of the emissions released. With the treaty signed at the United Nations Climate Change Conference in Paris in 2015, the global community committed to restrict global warming to a maximum of two degrees by taking appropriate action. As a signatory to the Paris Agreement, the Federal Republic of Germany derived a target for itself to achieve a virtually climate-neutral building stock in Germany by the middle of the century. For a residential real estate company of our size, this gives rise to a special ecological responsibility. Vonovia aims to make a contribution to achieving this ambitious target through a number of measures in the area of climate and environmental protection.

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Our Approach Regarding Environment

☒ 103-1, 103-2, 103-3

Management Approach 103-1

Vonovia is the largest real estate owner in Germany. The responsibility that we have toward the environment is therefore considerable.

Even if the consequences of climate change and environmental damage are not obvious from our buildings and open spaces, the signs of changes to come are mounting – for example, longer warm periods, heavier rainfalls and increasing air pollution in cities.

We want to provide our customers with comfortable, up-to-date and environmentally friendly homes – while also guaranteeing affordable rents. It is therefore very important to us to combine climate protection with fair rents, because climate protection must not become a question of social status.

Vonovia has aligned with the government's aim of making buildings climate-neutral in the long term and reducing greenhouse gas emissions. We are aware, of course, that the landlord can only influence energy and resource consumption in the operation of residential buildings to a limited extent – unlike in other property management building types, such as commercial properties and offices. It is ultimately the tenants' decision to decide how they consume electricity, water and heat. Nevertheless, we have a number of measures that we can implement to improve buildings from an energy perspective. Currently, the main approaches include energy-efficient building refurbishment, fitting modern boilers, and using and generating renewable energy, for instance, through decentralized energy provision offers and through our own energy sales. The size of our portfolio shows that this is the biggest lever we have for making an active contribution to climate protection (see chapter Energy Efficiency and Reducing Greenhouse Gas Emissions → p. 58 et seq.).

And we also look at other aspects of building operation. We address other possible negative effects on the environment through measures in areas such as waste

management and prevention, recycling waste, green waste and recyclable materials, or by paying attention to environmental criteria in purchasing materials and the use of regional products – for example wood from local stock (see chapter Environmental Protection in the Portfolio → p. 63 et seq.). The purchasing strength of our Group structure helps us to take ecological measures in an economical way.

Operating buildings is not the only material factor in the emission of greenhouse gases and impacts on the environment – new construction and dismantling, too, have an effect on the climate and environment through the materials that are used and the construction and recycling process. We therefore consistently adhere to the requirements of the 2016 German Energy Saving Ordinance (Energieeinsparverordnung EnEV) for new constructions. We minimize detrimental environmental impacts on our construction sites by dealing with hazardous waste correctly and specifically using environmentally friendly materials (see chapter Environmental Protection in Connection with Conversions and New Construction → p. 65 et seq.).

Our normal operations, too, require us to consume resources and energy, and release emissions. We therefore focus on keeping the negative environmental impacts of our internal processes as low as possible (see chapter Company Environmental Protection → S. 68 et seq.). The main factors in ensuring we keep these impacts low are general improvements in resource efficiency and targeted reductions, for instance, in energy and water consumption. The area where we can have the greatest influence is our fleet, which we manage through continual process optimization and by considering how we can reduce damaging environmental effects (see chapter Impact of Transport and Logistics → S. 70 et seq.).

We have identified five material environmental topics and have integrated these into our materiality matrix:

- > Energy Efficiency and Reducing Greenhouse Gas Emissions
- > Environmental Protection in the Portfolio
- > Environmental Protection in Connection with Conversions and New Construction
- > Company Environmental Protection
- > Impact of Transport and Logistics

In the following chapter, we will cover these topics in detail and explain their relevance for Vonovia. The relevant challenges, opportunities and risks, and the objectives, measures and indicators are outlined for each topic.

Challenges, Opportunities and Risks 103-1

The implementation of climate and environmental remediation in residential properties is closely interlinked with analyses of potential and economic feasibility studies. We not only take the interests of our company into consideration, but, first and foremost, those of our customers. We are currently seeing that social acceptance for modernization work that drives up costs is noticeably declining. This means that the greatest challenge we currently face is performing ecologically important measures while also keeping any resulting financial burden for our tenants as low as possible.

A number of statutory requirements and regulations, that partially even contradict one another, also restrict our plans. The form the Landlord-to-Tenant Electricity Act has taken, for example, in connection with the reduction in the feed-in tariffs for photovoltaic plants (PV) has hindered the economic operation of our planned PV program. In addition, the number of regulations and directives is mounting constantly, while developments in the political frameworks – for example, with relation to the Building Energy Act, the Climate Protection Act and the rejection of the Federal Government's Building Commission – are stalling and leading to uncertainty and an inability to plan in this area. Higher CO₂ costs – as sensible as they may be for achieving the government's climate protection targets – could, depending on the form this takes, result in considerable burdens on both landlords and tenants. Depending on the distribution of the social burdens, however, this could also create opportunities for considerably boosting climate protection in the building sector. The building sector is fundamentally characterized by high initial investments and long useful lives. Changes in the legal framework conditions therefore have the potential to have long-term effects on the economic operation of the buildings.

Volatile energy prices also hinder planning processes and financial feasibility calculations for our energy sales.

The constant increase in the costs for construction services and materials in the past few years has also increased the pressure on the company to pay attention to value for money when making purchases in order to be able to continue to provide affordable homes. This increases the risk that more expensive – but ecologically more beneficial – construction materials are used less due to economic concerns. With our high purchasing volumes of construction materials, we can at least partly compensate for this effect.

In the field of building insurance, contributions may be increased or certain insurance services may be excluded, such as flood insurance. Due to Vonovia's size, however, even if this risk materializes, we may assume it would have a low impact on results.

In addition, the ongoing discussion surrounding diesel vehicles also poses a potential risk for Vonovia due to the fact that the majority of our fleet consists of (modern) diesel vehicles. Court judgments and possible driving bans in cities may mean that we have to acquire new vehicles. This would result in considerable costs.

The expansion of our own services in trade professions presents us with opportunities. By employing more tradesmen, we can expand and keep knowledge in the company, including for environmental measures such as the correct separation and disposal of the materials that we use.

Objectives, Measures and Indicators

103-2, 103-3

The federal government's environmental protection plan aims to make building stock in Germany virtually climate neutral by 2050. In this context, "climate neutral" means that the buildings have very low energy requirements and that the energy requirements that do exist are primarily met with renewable energy. The material strategies involved in achieving this target are the reduction of resource consumption, increasing energy efficiency and substituting fossil fuels with renewable energy sources.

Energy-efficient building renovation continues to play an important part here, as refurbished buildings need less energy. The current refurbishment rate in Germany of approximately one percent is far from enough to achieve the savings effects required by the middle of the century. Several players in the world of politics, such as the Federal Environment Agency and the German Energy Agency (Deutsche Energie-Agentur [dena]) are therefore pushing to have this rate doubled.

In 2017, Vonovia initially set an annual refurbishment rate of 3%. We will continue to pursue this target, even in light of the fact that we are currently restricting energy-efficiency refurbishments due to economic considerations in order to avoid extra burdens for our tenants. The energy-efficient modernization measures focus on heat insulation for facades, basement and attic ceilings, the replacement of windows and the installation of new heating boilers. The aim is to constantly reduce energy consumption and greenhouse gas emissions in our portfolio (see chapter Our Service Promise [AR 2018, p. 91 et seq.](#)).

With new constructions, we can influence the low-emission realization of construction projects and later energy-efficient operation right from the planning stage. Considerably higher benchmarks and requirements apply in this area compared with refurbishing existing stock. We are therefore placing increasing value on optimized energy-efficient building designs and aiming for construction methods that conserve resources. We aim to meet the high requirements of individual KfW standards in both our energy-efficiency modernizations and new constructions.

Another major lever that can be used to reduce greenhouse gas emissions is the expansion of renewable sources of energy. Vonovia is also taking active steps in this area and is continually expanding the generation and sale of renewable energy through its own energy sales company.

We are aware, however, that these measures – even considered altogether – will not be sufficient to achieve the target of a climate-neutral building stock by the year 2050. The limits of energy-efficiency refurbishments are already visible – both in terms of tenants' acceptance and the efficiency gains. Vonovia is therefore actively initiating and participating in numerous research and development projects, providing momentum and driving innovation. The goal is to develop cost-effective measures to improve the energy balance and to reduce greenhouse gas emissions in the building stock.

Climate and environmental protection is also a factor in our operating processes, albeit a lesser one. We continuously seek out opportunities to increase our level of resource efficiency and reduce our negative impact on the climate and the environment in our internal processes. An important starting point here is our fleet of vehicles, for which we intend to reduce the fuel consumption/consumption intensity.

We are also engaged in dialogue with stakeholders from the world of politics, academia, business and civil society, and we include their ideas in our decisions. We are a member of the associations KlimaDiskurs.NRW e.V. and Deutsche Unternehmensinitiative Energieeffizienz e.V. (DENEFF) and are involved in the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety's dialogue forum "Wirtschaft macht Klimaschutz" (Business Mitigates Climate Protection). The dialogue forum is a two-year project (2017–2019) designed to connect businesses from all industries and to establish specific climate protection measures in companies. [102-13](#)

Outlook for 2019

In 2019, we intend to become more involved in the discussions surrounding climate change, primarily through networks, research projects and partnerships. Developing ideas and concepts regarding the implementation of measures and political demands that enable climate protection while also protecting our tenants are the main focal points. In addition, we intend to launch our own specialist conference in fall 2019, where we can exchange ideas with our stakeholders about the challenges we face and discuss specific possible solutions.

In the future, we also intend to raise awareness of circular economies at Vonovia. Recycling garden waste for energy generation or topsoil production could be an initial step in this area.

We intend to continue pursuing our ecological targets in the procurement department as far as possible, using our economic position in our procurement processes in order to purchase ecological construction materials and products at competitive prices.

We have gained some experience in the field of e-mobility in the past few years – for instance, by testing electric vans. We will continue to observe developments in this area and investigate deployment possibilities for our company. In 2019, we will test some vehicles with natural gas, hybrid and electric drives in everyday use and launch a pilot project on the use of vans with hydrogen drive.

Energy Efficiency and Reducing Greenhouse Gas Emissions

☒ 102-13, 103-1, 103-2, 103-3, 302-1, 302-3, 302-4, 302-5, 303-5, 305-5, CRE1

Management Approach 103-1

Modernization

Every day, energy is consumed and emissions are released as a result of the operation of our buildings. On the one hand, volumes are dependent on the behavior of customers, on the other, however, they also depend on the age and condition of the building and on weather conditions. We only have a limited influence on individual use and we cannot control the weather, but we can improve the condition of our portfolio with suitable measures – thereby reducing the energy consumption and emissions from the apartments. Due to the size of our portfolio, this is Vonovia's primary lever for significantly reducing greenhouse gas emissions.

We will achieve this mainly through comprehensive energy-efficient modernizations in the portfolio and modern, energy-efficient new constructions. These measures will allow us to offer attractive and comfortable homes throughout Germany.

Energy Supply

Lower resource consumption and higher energy efficiency are two important strategies in reducing harmful greenhouse gas emissions. Another lever we have is the expansion of renewable energy as part of the energy revolution, which is chiefly characterized by the decentralized generation and storage of electricity. Changes in legislation and various funding programs support projects are driving forward the decentralization of energy supply. Our connected neighborhoods – particularly in urban conurbations – and the expanse of roof surface provides us with interesting opportunities for using and expanding renewable energies in our real estate portfolio. They represent an effective lever that we and our customers could use to contribute to climate protection and the energy revolution in Germany. For Vonovia this also opens up new business areas in which climate protection could be advanced both economically and in a customer-friendly manner.

Establishment in the Organization 103-2

The portfolio and tenant management department is responsible for planning and managing planned modernization measures in the portfolio. Planned new constructions are partly organized by our new constructions department and partly through the regions, and the portfolio and tenant management department provides support functions.

The business development department is responsible for energy supply issues. Energy sales, through which our customers can sign green electricity contracts directly with Vonovia, take place via the company's own Vonovia Energie Service GmbH.

Challenges, Opportunities and Risks 103-1

Modernization

Energy-efficient modernizations are currently considered to be the cause of rising rents, which are driving the cost of living considerably. The acceptance of large-scale modernization measures is therefore sinking in sociopolitical and media political opinion. The federal government has stipulated the reduction of modernization allocations from 11% to 8% and restricted allocation capacity of measures to a maximum of €3 per m² (or €2 for rents under €7 per m²) in its coalition agreement, and has now also enacted this into national law.

Nevertheless, energy-efficient modernization of the portfolio remains a necessary and effective measure in improving building performance and living comfort, and in reducing consumption. In order to keep the burden on our tenants as low as possible, we restrict the allocation to a maximum of €2 per m² and plan modernizations individually for each building. We achieve cost savings by combining measures – so that we can, for example, allocate costs for scaffolding to different measures.

Declining acceptance also means that the search for alternative approaches to improve building performance is becoming more important. However, as the legal framework conditions and requirements are becoming stricter and the cost of materials and purchased construction services are rising, the challenge is to test the shrinking elbowroom for forward-looking measures.

The further expansion of our technical service, which allows us to perform several key trade tasks ourselves, provides us with the opportunity to stretch out the elbowroom available to us a little in terms of costs and efficiency advantages.

Energy Supply

We intend to keep driving forward energy generation from photovoltaic plants (PV). This in turn creates another opportunity for us to use our buildings to generate sustainable energy. We want to technically implement all new PV plants in a way that they can be integrated into a landlord-to-tenant electricity model and the electricity generated is available to our customers in their home or at charging stations.

The particular challenges we face in implementing the landlord-to-tenant electricity model include the expensive meter reading technology and the complicated invoicing processes and processes associated with the turnover of tenants for so-called customer plants. These lower the viability of the projects considerably and increase the economic risk associated with implementing the landlord-to-tenant electricity model. At the same time, however, they also offer the opportunity of deploying digital meter reading systems, also known as smart meters, which provide our customers with a visual presentation of the electricity being consumed and generated.

From a legal point of view, legislation relating to landlord-to-tenant electricity models remains incomplete and is not precise in its terminology. In addition, further statutory regulations hinder the implementation of sustainable energy projects, e.g., the energy pooling law, which will result in a drastic decline in feed-in tariffs and cause a considerable reduction in the associated tenant electricity subsidy from the beginning of 2019. Continual changes to funding principles is causing trust in the planning security of the projects to erode, but this trust is indispensable for making long-term investment decisions. Vonovia therefore follows legal developments very closely and is committed to promoting future regulations that are shaped in a sustainable and positive manner through its membership in associations such as the Association of German Housing and Real Estate Companies (Bundesverband deutscher Wohnungs- und Immobilienunternehmen GDW) and

German Association for Housing, Urban and Spatial Development (Deutscher Verband für Wohnungswesen, Städtebau und Raumordnung DV).

With Vonovia Energie Service GmbH, a licensed energy provider in Germany, we have created a good and important foundation to fully tap into numerous new business areas and add our own value. Decentralized energy supply, charging infrastructure for e-mobility and energy storage are just a few examples.

Objectives, Measures and Indicators

103-2, 103-3

Modernization

Energy-efficient Modernizations

Vonovia makes a considerable contribution to protecting the climate through energy-efficient modernizations and new constructions. We want to make a decisive contribution to realizing the Federal Government's target of a virtually climate-neutral building stock by 2050.

To this end, we will continue to conduct energy-efficient refurbishments on at least 3% of the building stock per year and have updated our modernization program for the reporting period to reflect this. In 2018, we again achieved a refurbishment rate of 5%, considerably exceeding the annual target of 3%.

Our modernization program in 2018 included:

> Measures on the building shell: facade insulation, window replacements, attic and basement ceiling insulation. In total, approximately 18,000 apartments (2017: 18,000) with a living area of more than 1.1 million m² (2017: 1.1 million) were fully or partly modernized in 2018.



~ 5%

Modernization rate 2018
(refurbishment rate)

> Heating system measures: exchanging old heating systems like individual coal or oil furnaces and gradual replacement with new gas condensing boilers. In 2018, we exchanged heating units in approximately 13,000 homes (2017: approximately 15,000). 303-5

To finance energy-efficiency refurbishments, we generally use funds provided by the German government-owned development bank Kreditanstalt für Wiederaufbau (KfW). The amount of funds available depends on the level of energy efficiency attained. Our measures particularly focus on the two funding programs KfW 151 and KfW 152. KfW 151 covers the refurbishment of a building, and the implementation of individual measures lead in total to achieving a KfW efficient house standard 100, while KfW 152 promotes the implementation of individual energy-efficiency measures such as window replacements and facade insulation. 302-4, 305-5

In the 2018 reporting year, we were able to cut a total of around 27,300 tons of CO₂ emissions (2017: 29,800 tons) by evaluating energy performance certificates. Based on their results, we carried out energy-efficient refurbishments on building shells and renewed heating systems. The energy intensity in 2018 amounted to an average of approximately 166 kWh/m² (2017: 172 kWh/m²). 302-3, CRE1, 302-4, 302-5, 305-5

TOP 10 Modernization Locations by Investment Amount

City	Number of apartments	Area (in m ²)	Investment volume (in € million)
Dortmund	2,340	138,507	53.2
Berlin	918	60,236	26.2
Bremen	752	48,132	24.9
Hanover	569	35,245	21.8
Essen	698	39,470	21.5
Dresden	1,472	79,402	20.5
Osnabrück	543	34,843	20.3
Bielefeld	581	38,323	16.6
Bochum	587	31,598	14.4
Cologne	1,235	86,784	14.0
Total	9,695	592,541	233.3

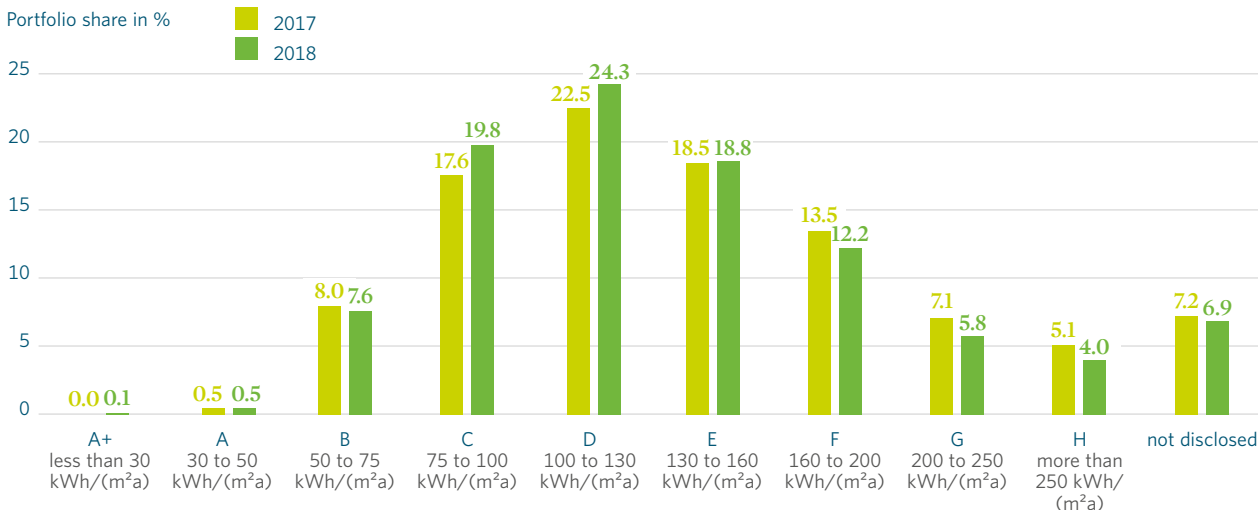
Average energy intensity in the portfolio

(KWh/m²)



Energy-efficiency in the portfolio

Portfolio share in %



Energy-efficiency classes

In addition to the existing energy-efficient refurbishment measures, Vonovia initiates and participates in select research projects to test alternative and cost-efficient refurbishment options and tries them for economies of scale:

- > The Alliance for Climate-neutral Building Stock is a joint project between the housing industry, research institutes and associations which aims to research technical measures to improve boiler efficiency, heat distribution and user behavior and to feed this research into political discourse. Vonovia plays an important part in this project by providing the buildings.

🔗 www.energieeffizient-wohnen.de

- > Energiesprong is a new refurbishment standard that represents a high level of living comfort, minimal refurbishment times and an innovative financing model. The aim is to conduct refurbishments to bring buildings to net zero, meaning that they generate as much energy in a year as they consume. Energiesprong was developed in the Netherlands and has already been implemented in more than 4,500 buildings. Vonovia is supporting Deutsche Energie-Agentur (dena) in its endeavors to introduce the Energiesprong principle to the German market. 🔗 www.energiesprong.de

Energy Supply

We review the technical and economic feasibility of deploying PV plants, cogeneration units (CHP units), heat recovery, solarthermal energy and charging infrastructure for electric vehicles in a standardized manner and across the board. We implement these systems directly wherever possible.

Photovoltaics and Cogeneration Units

We thoroughly investigated the potential of photovoltaics in our portfolio in the reporting period. Using data-led preselection criteria, we conducted a detailed solar cadastre analysis on approximately 18,000 properties. We identified more than 5,000 properties that receive a high level of sunlight intensity on the roofs and therefore present considerable photovoltaic potential.

We are currently working on equipping these buildings with PV plants. A team consisting of project managers, back office staff and local construction managers are coordinating the projects. In addition, a large portfolio of approximately 800 individual properties in Dresden and Munich were tendered for PV plant fitting, planned in 2019.

8,525

customers

purchase green electricity
from Vonovia.

5,944

MWh

green electricity sold

Our plant portfolio consisted of 208 PV plants as of the reporting date December 31, 2018, with total capacity of 5.7 MWp and annual electricity generation of around 5,350 MWh (2017: 3,700 MWh). 302-1, 302-4, 305-5

We use numerous cogeneration units (CHP units) for efficient, decentralized heat and electricity produced directly in the neighborhoods. 302-1

Energy Sales

In 2018, we rolled out energy sales nationwide through our subsidiary Vonovia Energie Service GmbH, enabling us to provide our customers with gas and electricity directly. 100% of the electricity is from renewable sources. The primary source is Norwegian hydropower plants, and we provide proof of this in the form of certificates. In the fiscal year 2018, more than 8,500 customers used green electricity from Vonovia.

Mobility

We aim to make an active contribution to the transport revolution and support alternative modes of mobility. We also want to get our customers interested in this and are investing in measures such as charging stations for electric cars and e-bikes, and car sharing parking spaces, while reducing the number of traditional car parking spaces. In Pasing, Munich, we are working on a mobility concept, as part of a new construction and vertical expansion project that will allow our customers to rely less on private vehicles in future. In addition to car sharing parking spaces, the concept includes offers for bicycle-based goods transport and a number of roofed bicycle parking

spaces. We are planning to include the development of mobility concepts in our neighborhood development projects in the medium term. Overall, Vonovia customers currently have access to 47 car sharing vehicles at 18 locations. Vonovia is also continuing its work on e-mobility concepts. For instance, we are currently planning to erect 34 public charging stations throughout Germany. We are also planning new constructions that enable charging stations and wall sockets to be rapidly retrofitted.

Sector Coupling & Neighborhood Approaches

In addition to the expansion of renewable energies, there is an increased focus on more solid networks between local producers and users of electricity, heat and mobility. It seems probable that considerable savings potential can be realized here with smart management systems. The numerous connected buildings in our neighborhoods offer an interesting starting point in this regard.

- > Vonovia therefore decided to become a founding member of Open District Hub e.V., an initiative organized by Fraunhofer Gesellschaft aimed at enabling intelligent sector coupling in neighborhoods. By establishing open and scalable system solutions based on renewable energy, we aim to find new energy-efficiency property management modes at neighborhood levels. Vonovia is testing and implementing this approach in a pilot neighborhood in Bochum. www.opendistricthub.de
- > As part of the "MAchUP" program funded by the European Commission, Vonovia is involved with the development of the Johannstadt district of Dresden. A combination of city development measures will be carried out to make this district an intelligent and energy-efficient neighborhood. The city, businesses and citizens are working together to discover solutions and new business models aimed at achieving measurable success in terms of energy and resource efficiency. We are modernizing a building complex of 560 apartments. In addition, the city of Dresden will be constructing and operating a PV plant on another Vonovia building. Electric vehicles will also be leased for our employees as part of this project and we will jointly construct charging stations for car sharing. www.matchup-project.eu 102-13

Environmental Protection in the Portfolio

☒ 103-1, 103-2, 103-3, 203-2

Management Approach 103-1

Climate change is already affecting environmental conditions in many parts of the world. Such changes are also increasingly becoming visible in Germany with ever longer periods of warm weather, a rise in average temperatures, and a higher incidence of downpours and storms. The decline in biodiversity and the general decrease in natural areas add to this.

This is why protecting the climate and environment does not stop at the doorstep for Vonovia. Our company not only invests in energy-efficient building refurbishments but also takes responsibility for the areas surrounding its apartments. Vonovia's portfolio does not simply consist of individual apartment and buildings. We take care of more than 217,000 trees, around 40 million m² of open space, 14 million m² of lawns and around 310 kilometers of hedges. This greenery allows us to improve the residential atmosphere and air quality in our neighborhoods, provide habitats for animals and combat increasing soil sealing.

We want to motivate our tenants to protect the environment, too, and are supporting them in their endeavors. Our support primarily takes the form of helping them to reduce the resources they consume, such as water and energy, and reduce and recycle their waste.

Our security obligations mean we are responsible for ensuring that equipment, such as oil boilers and sewer canals, is used and maintained correctly and does not damage the environment.

Establishment in the Organization 103-2

Our residential environment organization is responsible for taking care of our green spaces. The organization plans and carries out gardening and landscaping work. Currently, around 650 employees in the residential environment – around 400 of whom are gardeners – cultivate and landscape the open spaces. As far as maintenance is concerned, Vonovia implemented its first gardening and landscaping projects with its own employees in 2018. This move also allows the company to expand its training opportunities in the gardening and landscaping segment. The offices in Dresden, Berlin and Hanover are currently training employees in gardening and landscaping. Future growth and expertise will increasingly be generated within the company itself in the field of gardening and landscaping as well.

Traffic security obligations are recorded and managed by our central technology department.

Communication with tenants is supported through our centralized corporate communications.

Challenges, Opportunities and Risks 103-1

Vonovia has thus far not dealt with the challenges, opportunities and risks of environmental protection in the portfolio in a systematic manner. This requires more comprehensive evaluations in order to derive more concise conclusions for the portfolio.

The development of standardized residential environment modules (such as playgrounds and refuse collection points), however, serves to boost efficiency and generate additional cost advantages. In addition to the higher quality of the services provided, cost savings can also be achieved in this area by bundling and standardizing procurement processes (consumer materials, playgrounds, etc.). Residential environment measures contribute to positive neighborhood development. Increased

visual appeal and moves to rid neighborhoods of areas that feel unsafe help to boost customer satisfaction.

Objectives, Measures and Indicators

103-2, 103-3

Green Spaces/Biodiversity

The natural areas in our portfolio contribute to the wellbeing of both residents and the environment in a number of ways. We therefore want to maintain and care for existing spaces so that they can fully develop their social and ecological potential.

We aim directly for an ecological balance when planning new constructions, for example, through compensation planting, greenery on roofs and vertical surfaces, and by planting trees, bushes and wildflower meadows. The measures are included in the development plans and reviewed against the approval requirements from local authorities. Our residential environment organization assists with this planning and reviews target attainment.

We always include soil sealing and flood protection in our new construction planning. It is our aim to keep unavoidable soil sealing from car and bicycle parking spaces to a minimum when carrying out vertical expansions and densification construction measures. One form this takes is through mobility concepts, where the parking area can be reduced through car sharing or charging stations, for example. We are developing new construction planning measures that use backwater installations and roof greenery to absorb sudden water surges from heavy rainfall. We collect flooding information for our drainage plans and include potential rain management measures such as reservoirs, trenches and run-off troughs. Retention area planning, which serves to provide flooding areas for running water, is included in the approval phase.

We also aim to protect insects and other animals by treating our natural spaces with care. We review the site for existing populations during planning for construction and modernization measures, install beehives on building roofs – as we have at our office in Berlin, for instance.

Waste Management

Our customers can protect the environment by creating less waste and increasing the amounts they recycle. We actively support this, and have, for example, commissioned a service provider to sort through domestic waste and separate the recyclable waste. This allows us to reduce residual waste by approx. 50% and recycle a greater amount of waste. In turn, our customers benefit from lower waste surcharges and ancillary costs. 203-2

With our new construction projects, the design of the outdoor garbage collection points is an opportunity to exert a little influence on the behavior of our tenants. We are currently developing standardized, modular concepts for outdoor garbage collection points that provide customers with easier handling and thus can help boost the willingness to separate garbage. We are also looking into the installation of barrier-free garbage collection points that are set into the ground and are more easily accessible.

Tenant Information

Our customers' energy and water consumption make up a considerable part of the resources consumed in the portfolio – and this is something we can only influence to a limited extent. We therefore regularly provide our customers with information about how they can save energy in their normal daily routines – for example, with the Caritas electricity check. We bring information to our customers with our customer magazine “zuhaus” and various flyers – explaining, for instance, how modern heating units work and how to heat your home efficiently. The aim is to animate our customers to conserve resources.

Safety Obligations

Our tree stock is listed in a cadastre and cataloged. This gives each tree an identification number. We meet our traffic safety obligations by conducting regular review and inspection rounds and survey the condition of our portfolio. The processes we have in place to meet our operator obligations are laid out in our Group guidelines and detailed in an obligation document. This is updated every two years. The maintenance procedure for oil heating units is also laid out here, amongst other procedures, to prevent ground contamination from leakage of hazardous substances.

Environmental Protection in Connection with Conversions and New Construction

☒ 102-9, 103-1, 103-2, 103-3, 203-2, 204-1, 306-2, 308-1, 308-2

Management Approach 103-1

We impact the environment not only through the operation of our buildings, but also through our construction activities, which consume resources and release emissions. On our construction sites, we ensure that our employees and service providers adhere to all applicable laws and regulations in order to protect people and the environment to the fullest extent possible.

In addition, constructing new buildings gives us the opportunity to establish a sustainability-conscious focus directly in the planning processes. This is achieved through the use of sustainable materials, the addition of greenery or through efficient and – wherever possible – renewable energy supply. The recyclability of construction materials and the reduction of construction waste are also becoming more important. BUWOG's development projects specifically develop and pilot innovative processes (see chapter BUWOG → p. 8 et seq.).

Vonovia believes that sustainability and cost-efficiency can go together. We intend to seize the opportunities of sustainable procurement available to us through efficient and centrally organized procurement processes and cooperative supplier relationships.

Establishment in the Organization 103-2

New constructions are organized and managed by our new construction department in cooperation with the regions. The portfolio and rent management department provides support functions. The central procurement department at Vonovia is responsible for procuring construction materials and services, and thus also supply chain management.

With the acquisition of BUWOG and its development division, Vonovia has gained significant potential in the new construction field. Further comprehensive development projects will continue to be conducted under the brand name and responsibility of BUWOG – partly for sale

and partly for the portfolio. More information is available in the section BUWOG → p. 8 et seq.

Challenges, Opportunities and Risks 103-1

A key opportunity afforded by new construction and development projects is that climate and environmental aspects can be planned in right from the beginning of the life cycle. However, this also brings with it a considerable challenge – we must ensure that the buildings we construct now will meet the 2050 sustainability requirements.

The rising prices for materials and construction services could lead to the risk that the procurement department chooses cheaper – and thus possibly less environmentally friendly – construction materials in order not to encumber the later rental price.

Objectives, Measures and Indicators

103-2, 103-3

Environmentally Friendly Construction

In addition to BUWOG's development projects, densification and vertical expansions are the two most significant measures employed by Vonovia in new construction. We deploy prefabricated modules in wood hybrid, steel skeleton and precast concrete construction. We plan to construct more than 1,000 new apartments throughout Germany in 2019. One of the projects will be our first wood hybrid building in the district of Knorr in Frankfurt. We are also planning to build two carbon dioxide-free and glue-free solid wood houses with inner cores for stairs, lifts and utilities supply (point houses) in Kornwestheim near Stuttgart. An ecological balance sheet on the construction will be created by an external service provider that serves as proof that the building is carbon neutral. A new green building will be constructed in Bochum that will generate all of its energy from a PV plant.

As far as energy efficiency is concerned, the Energy Saving Ordinance (Energieeinsparverordnung [EnEV 2016]) is the decisive factor for our new construction projects. With intelligent construction methods we can come in under the base standards stipulated by EnEV by up to 10% in some cases – for example, through timber panel construction, core insulation or the use of solar thermal and PV plants. We generally use modular and prefabricated construction methods which allow us to place high-volume factory preproduction orders. This means we are saving resources and energy right from the production stage.

We apply for funding from the KfW 153 subsidy program for new constructions that fulfil the energy requirements of the KfW efficient house standards. The KfW 153 new construction project in Münster was recently completed. The new KfW “Katzenbruchstraße” construction project in Essen is currently in the preparation stage. Further new constructions are planned in Dortmund, Cologne, Berlin and Oberursel.

Waste Management and Recycling

One of the most important environmental issues on our construction sites is waste management. This is due to the fact that substances hazardous to people and the environment may be released and influence resource consumption. Our internal environmental health and safety provisions (EHS) already deal with a number of issues related to environmental protection.

Our construction work – both new construction and modernizations – entail working with polluting materials, such as asbestos, which we must ensure are disposed of correctly. This task is entrusted to subcontractors that we commission, from whom we require full documentation regarding the amounts disposed of and the waste fractions, along with proof of disposal and landfill measures taken, amongst other things.

Our service technicians learn how to correctly dispose of the materials they use at the start of their training. Following initial training, they attend regular training sessions with experts and managers on the proper separation and correct disposal of various materials and construction materials.

A certified laboratory analyzes all construction components and materials for potential pollutants before they are used. We coordinate waste disposal schemes with the responsible firms and the authorities as necessary. Qualified staff from the companies commissioned and health and safety officers monitor the work performed on the construction sites.

In 2018, the technical service carried out energy-efficiency modernizations on 250 apartments in the Bremen district of Wohlers Eichen. In cooperation with plastic recycling companies, Vonovia collected and recycled the waste material from 800 windows that were replaced as part of the modernization work. This was later reused to make window profiles. Across the country, we have recycled more than 32,000 tons of PVC granulate from old windows in this way. We will continue the collaboration in 2019 to support this development process. [306-2](#)

Procuring Environmentally Friendly Materials

Our business activities require us to use a wide range of materials – from plumbing, painting and electrical consumer equipment to flooring, tiles and thermal insulation systems to tools, work clothing, cars and office equipment. Our technical operation managers and procurement department ensure that we adhere to common German and European standards and regulations. We purchase our materials almost exclusively from production plants within the European Union. We source trees and plants for our green spaces from regional suppliers. We also intend to integrate compliance with European biodiversity legislation into our processes and guidelines. [102-9, 204-1](#)

We use sustainability criteria, for example the environmental friendliness of raw materials and production processes and their energy footprint, as a foundation when assembling and standardizing our range. We actively communicate this information to our suppliers and expect them to comply with the same criteria. [308-2](#)

In 2018, we successfully tested a chlorine-free substance for eliminating mold, for example. This substance is safer for our employees and customers than the substances traditionally used and we will introduce it throughout the Group in 2019. We also plan to roll out the share of mineral fiber in 2019 to replace polystyrene for building insulation, due to be phased out in 2020. We monitor our insulation suppliers to ensure that insulation waste is optimally disposed of – there have been no negative incidents so far.

We reviewed our Business Partner Code in 2018 and made it mandatory for all suppliers. The Code also stipulates adherence to environmental protection criteria and traceability in relation to material origin for our suppliers. We are thus able to verify that:

- > Our suppliers operate a secure business that minimizes environmental damage and adheres to applicable environmental protection laws.
- > Materials and goods supplied to Vonovia come from traceable sources, and are not procured or manufactured through illegal or unethical means. [308-2](#)

These obligations are not (yet) audited, but the creation of a concept for systemic monitoring is planned for the year 2019. [308-1](#)

We also work closely with our suppliers on a number of projects. We exchange information directly, for example, regarding product characteristics and sometimes even develop complete products together. This not only enables us to improve quality, but also increases transparency in our supply chain.

We expect the companies that we commission to work with materials that do not harm the environment (mineral plaster, etc.). We specifically use mineral insulation materials with our steel module buildings, for instance. We only use FSC-certified timber for sandboxes and benches.

Company Environmental Protection

☒ 103-1, 103-2, 103-3, 301-1, 302-3, 302-4, CRE1

Company Environmental Protection 103-1

Renting out homes cannot be compared with industrial manufacturing in terms of resource consumption and emissions from our own business processes as they only relate to offices and Vonovia's vehicle fleet. And in comparison to our portfolio, too, the impact that our daily work has on the environment is minimal. Nevertheless, we endeavor to minimize negative impacts on the environment in this area also by optimizing our processes.

A large part of our in-house work takes place in our own or rented office spaces that are spread throughout Germany as well as in our new headquarters in Bochum. Around ten percent of our employees are based here. The other largest individual locations are used by our customer service department and are based in Duisburg and Dresden. A total of roughly 1,000 employees work there and take care of the needs of our customers.

We are also available on site for our customers – at construction sites, in the residential environment and in taking care of buildings. The mobility that this requires is provided by our large fleet of vehicles, which is responsible for a considerable part of our in-house resource consumption. Due to the significance of this, it is covered in more detail in the chapter Impact of Transport and Logistics (→ p. 70 et seq.).

Establishment in the Organization 103-2

The facility management department is responsible for building management. This primarily concerns the headquarters in Bochum where around 1,000 people are based, but also includes activities across the Group, such as the energy audit. In addition, the managers of individual Vonovia companies are responsible for the decentralized locations.

Challenges, Opportunities and Risks 103-1

According to the Energy Services Act (EDL-G), which implements EU energy-efficiency guidelines, Vonovia is obligated to conduct an energy audit every four years. The next audit cycle is due in 2019. Our greatest challenge in this regard is creating an overview of all of the independent work locations and their actual use, along with preparing basic data on consumption as a foundation. The integration of other companies, such as BUWOG, Victoria Park and conwert, and organizational changes, such as the establishment of the residential environment organization and expansion of the technical service, mean that the data needs to be collected and evaluated anew.

The new construction of our headquarters in Bochum provides us with an opportunity to improve our resource consumption and emissions. As the owner of the new property we are in a much better position to manage resource efficiency in and around the building.

Objectives, Measures and Indicators

103-2, 103-3

In our operating business we have different levers to reduce our impact on the environment, e.g., using environmentally friendly office materials and equipment, and digitalizing processes. In this regard, we work with AfB gemeinnützige GmbH to consciously dispose of our end-of-life IT hardware. AfB takes our IT hardware and, if possible, refurbishes it for resale in compliance with data protection regulations. Any devices that cannot be refurbished are recycled in the correct manner. Reusing devices cuts emissions and the consumption of metals and energy, because new IT devices do not have to be made. In 2018, we were able to provide 141 devices for reuse, and regain valuable raw materials by recycling 394 devices. This saved a total of 4,822 kg of CO₂e. 301-1, 301-2

With the introduction of digital tenant files and the overall reduction in paper printouts, we have been able to reduce

our paper consumption considerably. We are also increasingly handling jobs with our subcontractors through our digital service portal. 302-4

The respective organizational units are responsible for saving energy and conserving resources at all sites; there are currently no mandatory Group rules in place that cover this. The company's intranet is used to communicate general measures, such as turning off lights and monitors, along with departmental training.

Sustainably Built Corporate Headquarters 302-4

We moved into our new corporate headquarters in Bochum in the summer of 2018. The building has been awarded gold standard status by the German Sustainable Building Council (DGNB). It fulfils the requirements of the following five main criteria:

- > Ecological quality
- > Economical quality
- > Sociocultural and functional quality
- > Technical quality
- > Process quality

Examples include:

- > The selection of a site with links to public transport
- > The availability of bicycle stands and electric charging stations
- > Barrier-free approach
- > Upholding sustainable building criteria (incl. insulation, use of natural daylight)
- > Erection of a photovoltaic plant on the roof
- > Use of low-emission construction materials
- > Construction of a building that is repurposable and has a long useful life
- > Measures to reduce ancillary expenses, such as the use of low-maintenance constructions and equipment

The building's electricity requirements were completely met using certified renewable energy sources (hydro-power plant) in 2018.

We also stopped the use of disposable coffee-making equipment for employees and introduced centralized printer systems. Another important step was the introduction of water filter systems in all office kitchens. The systems, which are built directly into the faucets, cool and carbonate tap water so that it is not necessary to buy bottled water. This has considerably reduced the number of plastic and glass bottles that we use.

We are also looking into changing our printing paper to recycled paper in order to optimize our resource consumption in this area, too.

Energy Audit

We will conduct a Group-wide energy audit in 2019. This will require reliable data concerning all work locations and how these locations are used as well as all associated consumption. The centralization of payment management for rental and ancillary expenses for rented work locations that we use (currently around 120) has already had a positive impact on the data. In the second half of 2019, we intend to use a location database for all of our work locations, improving the quality of the data available for the upcoming energy audit. Preparation talks are already underway with an external service provider in order to coordinate the necessary processes as early as possible and secure the processing capacities.

Impact of Transport and Logistics

☒ 103-1, 103-2, 103-3, 305-5

Management Approach 103-1

A number of our employees, particularly our technicians, gardeners and caretakers, often work directly on site at our buildings renovating apartments, caring for green spaces and providing customer service. This requires a good deal of mobility and availability. This applies particularly to our technical service, because their availability and response times have a direct impact on customer satisfaction. Our logistics system focuses on avoiding downtimes in the maintenance of apartments. The technical service therefore provides a vehicle for virtually each technician.

Vonovia's fleet consists of a total of around 4,800 vehicles. Due to the high level of fuel consumption, the fleet is responsible for the majority of CO₂ emissions caused by our internal business processes. By modernizing the fleet of vehicles and attempting to reduce the number of kilometers driven, we aim to ensure that the increase in fuel consumption and CO₂ emissions is proportionately lower to the growth in the technical service. The average fuel consumption per vehicle was reduced from 132 litres per month in 2017 to 120 litres in 2018.

The decentralized organizational structure and the internationalization of the business areas – due to the acquisition of BUWOG in Austria and Victoria Park in Sweden in 2018 – is causing an increase in the number of business trips. However, we are committed to employees using modes of mobility that conserve resources and are environmentally friendly. We are thus constantly optimizing our processes in the field of transport and logistics and looking for alternative solutions.

Establishment in the Organization 103-2

Vonovia's central procurement department is responsible for fleet management throughout the company. As the vehicles in the fleet are primarily minivans used by our technicians and gardeners, the technical service and residential environment companies are included in the management of the fleet – particularly when it comes to user behavior.

The central procurement department also records business trips – in partnership with HR management.

Challenges, Opportunities and Risks 103-1

We believe the modernizations of our fleet and the use of modern, low-consumption vehicles presents us with an opportunity to make mobility more efficient both ecologically and economically in the long term. In 2018, we continued testing electric minivans, focusing on their practicality for our everyday work. We faced particular challenges with their reliability and reach. We have thus started new pilot projects with other electric minivans and will continue these in 2019.

Objectives, Measures and Indicators

103-2, 103-3

Vehicle Fleet

We primarily optimize the efficiency of our fleet of vehicles through the use of modern, low-consumption vehicles and regular maintenance. GPS systems and journey optimization are included as standard, which has led to a reduction in the distances covered and better capacity utilization of the vehicles. Empty journeys are avoided wherever possible.

We make sure that our vehicles are up-to-date in terms of technology. We have completely stopped adding diesel

vehicles to our compact car segment and swapped to low-consumption ecoFlex gas vehicles. We have also replaced a wide range of old diesel vehicles with new Euro 6d-TEMP standard vehicles, and we have expanded our network of service and workshop partners to avoid unnecessary journeys.

We will integrate a number of natural gas, hybrid and electric drive vehicles into the fleet in 2019 and test them in our everyday work. We are also planning a pilot project for the use of hydrogen drive vans.

The use of e-bikes has also become more commonplace at Vonovia now. 21 employees travel through our neighborhoods on e-bikes. This makes it even easier for our customers to approach our employees directly and connect with Vonovia – while our employees protect the environment. 174 traditional bicycles are also currently a regular part of our vehicle fleet. 305-5

Fleet Software

We systematically collect and analyze the fuel consumed by our fleet using our fleet software. We inform employees who cover a lot of miles of the costs and CO₂ emissions associated with their driving and provide advice on fuel-saving driving. 305-5

Reducing the Number of Kilometers Driven

Centralized Processes

Through the centralization of processes in transport and logistics and the use of our journey planning tool we can drastically reduce the miles our employees have to drive. Our repair center, for instance, is responsible for centrally handling repair queries and coordinating service appointments. Our employees estimate demand and the amount of time needed based on the number of queries they receive and plan appointments for the service technicians in a way that optimally conserves resources and ensures cost efficiency. Our service technicians are also responsible for dealing with smaller jobs from other trades so that no other Vonovia employees have to attend. Our technicians receive training for this where necessary.

In order to avoid long journeys at the beginning of the working day, we try to make appointments for our technicians close to their homes. We use local subcontractors to complete trade work at buildings that are far from our technical service locations.

Innovative Logistics Concepts

We have been making use of an overnight delivery system for a number of years now. The service delivers replacement parts and materials directly to our vehicles overnight so that our employees do not have to pick them up. We were able to increase the volume of direct deliveries again in 2018. Our close branch network of trade partners enables us to procure materials and replacement parts at short notice that could not be delivered.

The “empty apartment deliveries” system is another successful logistics concept that we use across the Group, and is a well-established process. This system entails bundling materials for several trades into one delivery.

Both concepts save us time and reduce kilometers driven – and therefore also reduce the consumption of valuable fuel and CO₂e emissions. 305-5

Deploying New Technology

In our modernization work we fit our apartments with smart meters that enable the digital recording and billing of heating consumption. This means heating meters no longer have to be read by Vonovia employees in person, which in turn allows us to reduce the energy consumption of our fleet further. We now use smart meters to bill customers in around 130,000 residential units (2017: 80,000 residential units) via a wholly-owned subsidiary of Vonovia.

Reducing Business Trips

We try to avoid business trips as much as possible and instead use digital communication channels whenever employees from different locations need to exchange information with one another or with stakeholders.

Whenever a business trip can't be avoided, we try not to fly but prefer to travel by rail and car. Car pools are formed if several employees are going on the same business trip.