# ENVIRONMENT REPORT 2023

BANCA D'ITALIA
EUROSISTEMA

*For this edition of the Environment Report, we have chosen images of wetlands as a reminder of their contribution to ecosystems: they are vital habitats for a multitude of rare species that favour damp areas, they clean watercourses, they can reduce flood peaks as a result of their huge water retention capacity, and they play a key role for the climate by storing organic carbon.*

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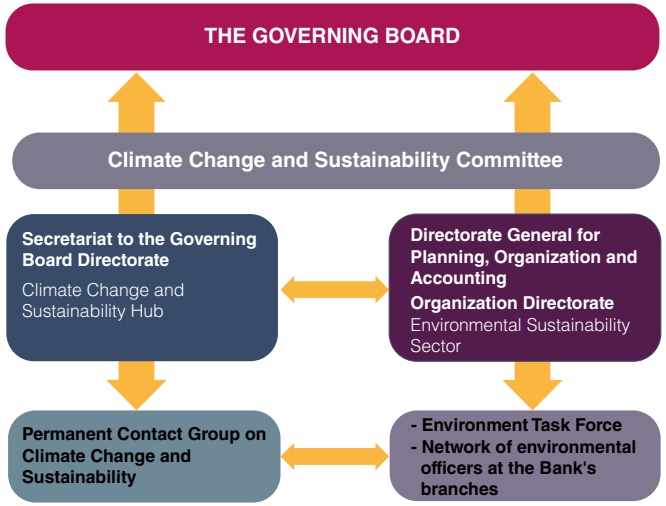
# introduction

The environmental goals of the UN 2030 Agenda, the Paris Climate Agreement, and European and national strategies for the environment call for the firm commitment of all parts of society, with institutions at the forefront.

In line with its Environmental Policy, the Bank of Italy is committed to making a contribution through its institutional functions (financial investments, banking and financial supervision, economic analysis and research and the production and issuance of banknotes) and by steadily reducing its ecological and carbon footprint as it moves towards its long-term goal of net zero emissions.

The Bank of Italy's environmental and sustainability strategy is designed by its Governing Board, consisting of the Governor, the Senior Deputy Governor and three Deputy Governors. The Climate Change and Sustainability Committee, set up in 2022 and chaired by a member of the Governing Board, steers the Bank's strategy in this area and coordinates actions on various fronts. The Climate Change and Sustainability Hub ensures the coordination of operational efforts on the institutional side, including through a permanent team of experts from the economic research, financial stability, markets, supervision and financial education functions. The Environmental Sustainability Sector, which is part of the Organization Directorate, coordinates the projects aimed at reducing the carbon footprint of the Bank's internal operations. This sector draws on the input of an Environmental Task Force of staff members involved in the management of the Bank's property, logistics, IT, banknote production, tenders, human resources and communications, and of the Network of environmental officers at the Bank's branches in Italy.




The Environment Report, published by the Bank of Italy for the first time in 2010, illustrates the impact of the Bank's operations on the environment and the measures taken to reduce it. It also provides general information on the greenhouse gas emissions of its financial investments – which are outside the scope of the calculation of the Bank's carbon footprint – and an overview of institutional research and supervision efforts. In addition, the report contains statistical tables with quantitative indicators and methodological notes explaining how environmental indicators are calculated. Methodological choices are based on current best practices and available databases; they are therefore subject to ongoing scrutiny and may evolve in line with any new developments.

# *at a glance*

Since 1 April 2022, the Bank has been operating with a new hybrid work model, which combines on-site and remote working arrangements. Last year saw an increase in both on-site working (58 per cent of total work, versus 41 per cent over the 2020-21 pandemic years) and the number of Bank employees (6,840 at end-2022, roughly 200 more than in 2021; Table a1). Despite these increases the Bank's overall environmental footprint improved compared with 2021.

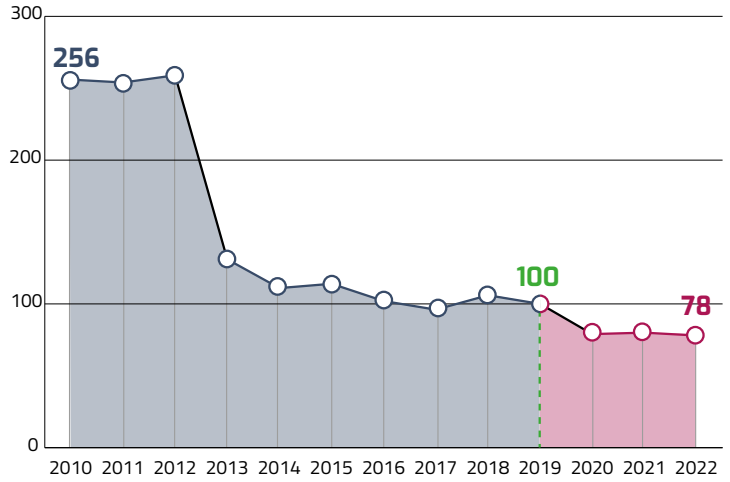
### The Bank's carbon footprint

Starting from last year's Environment Report, the boundaries for calculating the Bank's carbon footprint have been significantly extended, mostly to take account of indirect emissions along the entire value chain (see the box 'Extension of the boundaries for measuring greenhouse gas emissions' in the 2022 Environment Report). We have therefore recalculated our greenhouse gas emissions using the new approach as of 2019, which was set as the base year. With reference to the more restricted basis used in the past, there was a 61 per cent reduction in emissions between 2010 and 2019, mainly because all electricity has come from renewable sources since 2013 (Figure 1).

In 2022, total GHG emissions were down by 2 per cent on the previous year, still around 22 per cent lower than in 2019, the last pre-pandemic

**CARBON FOOTPRINT - BANK OF ITALY** FIGURE 1

$CO_2$ equivalent emissions 2010-22 (1)
(index numbers, 2019=100)




(1) The Bank's carbon dioxide ($CO_2$) equivalent emissions series is interrupted in the year 2019; the figure shows two series of values for the years 2010-19 and 2019-22, expressed in index numbers, with 2019=100 for each series. The data from 2010 to 2019 refer to direct emissions from the use of fossil fuels (Scope 1) and indirect ones resulting from the use of electricity and from district heating networks (Scope 2) and purchase of paper and business travel (Scope 3). The data from 2019 onwards also include emissions from fluorinated gas leakages (Scope 1), centralized heating (Scope 2), purchase of products, goods and services, commuting by employees and external staff, and the life cycle of banknotes (Scope 3). For further details, see 'Greenhouse gas emissions' in the Methodological Notes.

year (Figure 2; Table a2). Compared with 2021, there was a decline in heating fuel consumption and in the corresponding emissions, partly as a result of the energy saving measures introduced by Italian legislation (see the section 'Energy').

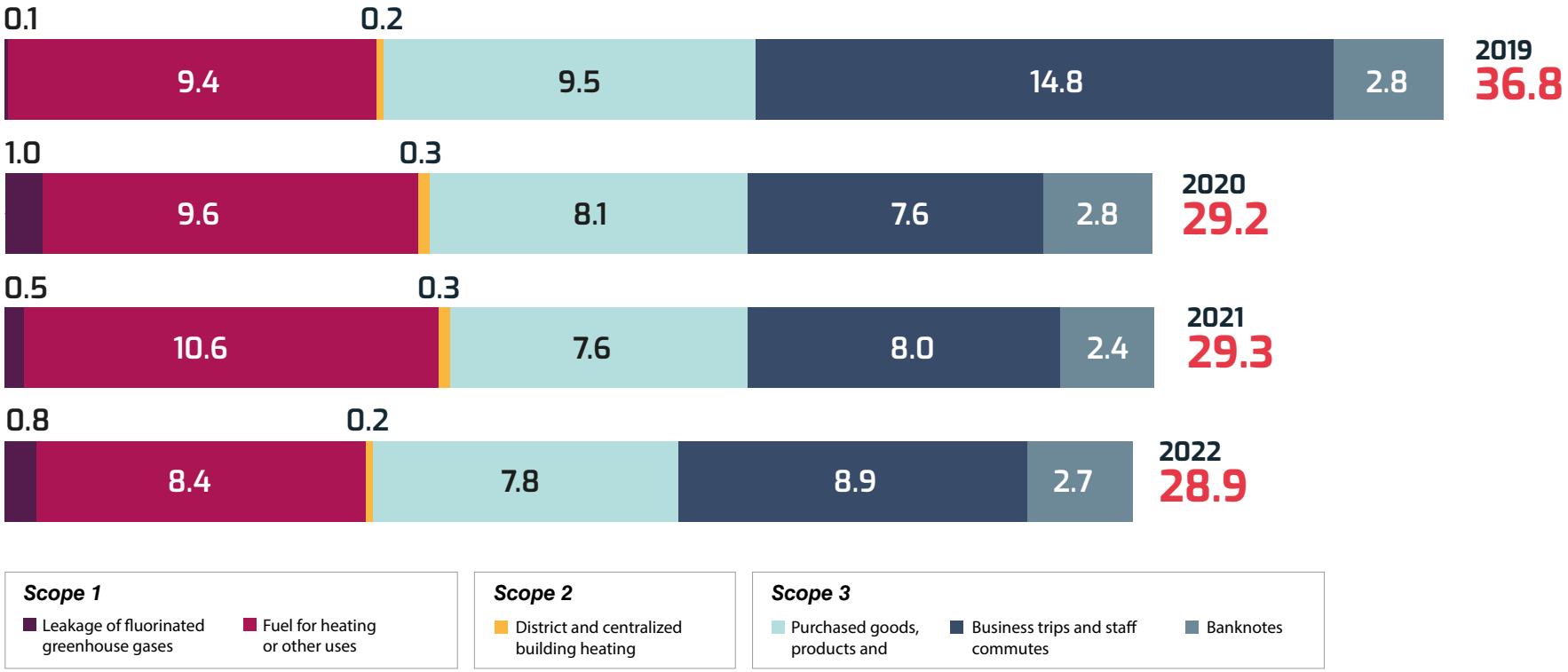
Although the cooling systems are regularly inspected and maintained, unexpected fluorinated gas leakages (485.9 kg) occurred in 2022 as well (see Table a3). These leakages add to the Bank's carbon footprint due to the high climate-altering power of fluorinated gases.

Emissions from purchased products, goods and services rose slightly on account of the higher number of meals provided in the staff canteens and

**CARBON FOOTPRINT - BANK OF ITALY**

FIGURE 2

$CO_2$ equivalent emissions 2019-21 (1) (2) (3)
(thousands of tonnes of CO2 equivalent)




(1) Due to methodological updates, the data for 2019, 2020 and 2021 have been partially recalculated in order to make them comparable with those for 2022; For the definitions of Scope 1, Scope 2 and Scope 3, see 'Greenhouse gas emissions' in the Methodological Notes. – (2) Emissions from electricity consumption were considered to be zero as the electricity purchased only comes from renewable sources (market-based approach; see the subsection on 'Indirect greenhouse gas emissions from imported energy' in the section 'Greenhouse gas emissions' in the Methodological Notes). – (3) Any mismatches are due to the rounding of decimals.

of the furniture bought for the new building at via Quattro Fontane in Rome (Table a2). Emissions from business travel doubled compared with the previous year, albeit remaining at much lower levels than in the pre-pandemic period (-63 per cent on 2019). There was a 10 per cent increase in the emissions associated with commuting, as staff gradually returned to on-site working after the pandemic (see the section 'Sustainable Mobility').

**-22%**
Reduction in the Bank's GHG emissions compared with the pre-pandemic period (2019)

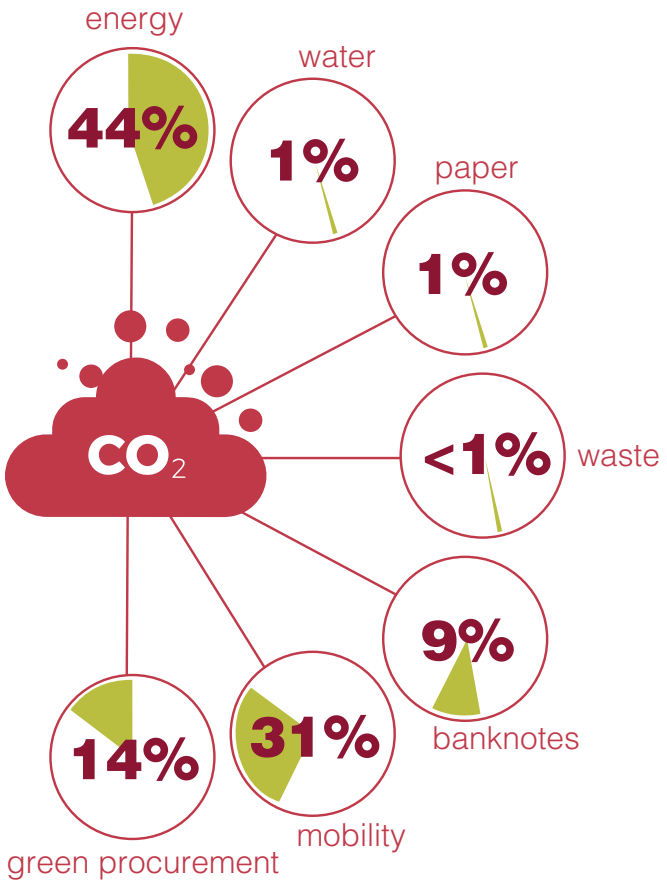
Likewise, emissions from the life cycle of banknotes rose, as more raw materials were required to produce a larger number of banknotes (807 million banknotes compared with 663 million in 2021). Since 2023, all waste consisting of shredded worn banknotes has been sent to waste-to-energy plants, in line with the decisions taken by the Eurosystem (see the section 'Banknotes').

**-24%**
Reduction in GHG emissions per employee compared with the pre-pandemic period (2019)

Figure 3 shows 2022 GHG emissions broken down by theme section, as covered by the Environment Report.

FIGURE 3

**CARBON FOOTPRINT - BANK OF ITALY**
GHG emissions in 2022 aggregated by section of the Environment Report (percentage)



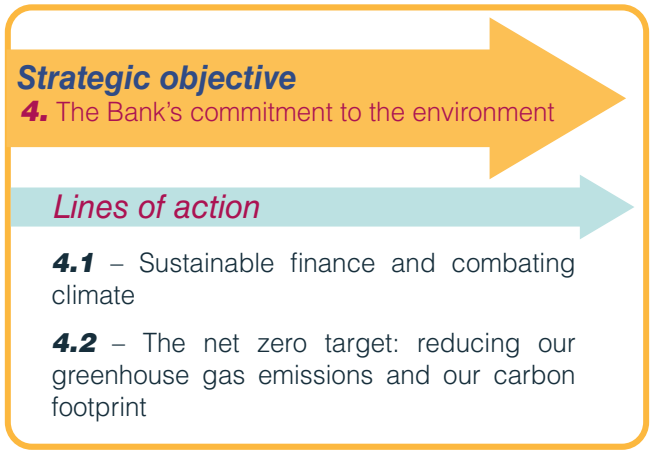
## Other achievements

Over the past year, the Bank has made further progress in the area of sustainable investment – especially in terms of its portfolios' carbon intensity (see the section 'Sustainable Investment') – and stepped up its participation in sustainable finance working groups (see the section 'Eco-friendly Culture').

An independent international study ranked the Bank of Italy as the second greenest central bank in the G20 countries.

## Strategic Plan for 2023-25

In 2023, the Bank published its Strategic Plan for 2023-25, which sets out an innovation-oriented work programme comprising a large number of projects. One of the five objectives of the Plan is to increase environmental stewardship through two action plans.




The first one is intended to strengthen initiatives for sustainable finance and combating climate change by: a) boosting research on the ecological transition; b) improving investment sustainability; c) encouraging banks to incorporate climate and environmental risk assessments into their risk management processes; d) offering financial education training initiatives on climate transition; and e) taking on a leading role in relations with external stakeholders.

With its second action plan, 'The net zero target', the Bank will further step up its efforts to progressively reduce its environmental and carbon footprint by: (a) cutting fossil fuel consumption; (b) promoting the self-generation of electricity from renewable sources; (c) improving the energy performance of Bank buildings and installations; (d) encouraging e-mobility; (e) reducing the environmental impact of business travel; (f) offsetting greenhouse gas emissions; (g) launching staff training and awareness initiatives; and (h) extending partnerships with other public institutions to address environmental issues.

At the same time, the Bank is going to draw up a longer-term transition plan detailing the goals, actions, viable GHG reduction targets and any offsetting initiatives to achieve net zero emissions for internal operations.

# *energy*

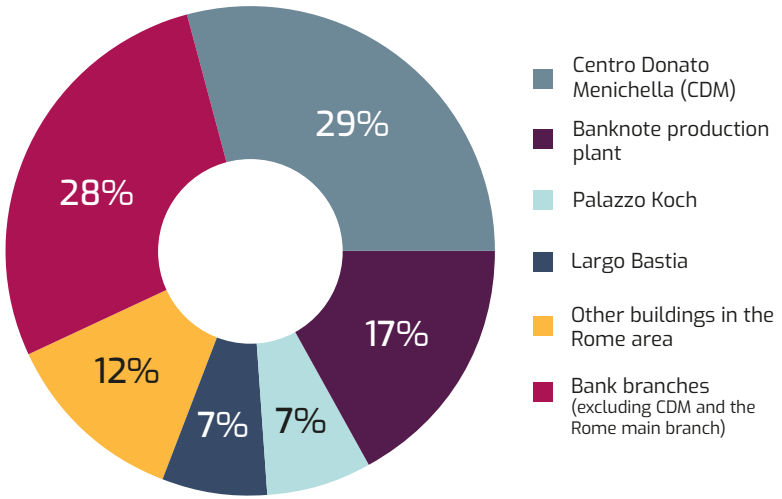
*Energy consumption accounts for 44 per cent of the Bank's greenhouse gas emissions.*

*The Bank is committed to: steadily reducing its energy consumption and use of fossil fuels, achieving greater energy efficiency by improving its buildings and technological installations and adopting better management measures, and steadily increasing the share of energy produced by its own photovoltaic systems. The electricity that is purchased comes exclusively from renewable sources.*

The Bank's operations are carried out across more than 60 buildings nationwide. The four main operational sites (Centro Donato Menichella (CDM) in Frascati, Palazzo Koch, the banknote production plant, and the building in Largo Bastia in Rome) account for 60 per cent of the Bank's electricity and heating requirements (Figure 4; Table a7).

**ENERGY - BANK OF ITALY** FIGURE 4

Energy consumption (per cent)




## Use of renewable resources

Since 2013, the Bank has purchased electricity exclusively from certified renewable sources. Around 47 per cent of the renewable energy purchased in 2022 came from wind farms, 31 per cent from solar power systems and the rest from hydroelectric plants (Table a5).

The Bank's own photovoltaic plants at the banknote production plant and at the Catania and Catanzaro branches produced more than 65,400 kWh of electricity, i.e. 0.1 per cent of total annual consumption, marking a 6 per cent increase in production compared with 2021, with the same number of photovoltaic panels (Table a4).

Photovoltaic panels are being installed on the canopy roofs of the parking areas at the Centro Donato Menichella: the installation will be completed by 2023 and the system will generate around 380,000 kWh per year when fully operational.

In 2023, a small photovoltaic system will be activated at the Genoa branch and the one in Catanzaro will be expanded, adding 9 kWp (kilowatts peak[1]) to its current capacity of 11 kWp; the installation of photovoltaic panels on the roofs of the Sassari (153 kWp), Livorno (34 kWp) and Arezzo (23 kWp) branches will also begin. Starting in 2024, photovoltaic panels are going to be installed on the roofs of the Ancona, Bari, Bergamo, Campobasso and L'Aquila branches as well.

1 The kilowatt-hour (kWh) measures the amount of energy that a plant actually generates, whereas the kilowatt peak (kWp) describes the maximum output that a photovoltaic system can produce at standard conditions of temperature and incident irradiance.

## Energy efficiency upgrades

The Bank is gradually replacing traditional light bulbs with LED light fittings, which consume less energy and last longer.

The Centro Donato Menichella is certified under the international standard ISO 50001. It is the site that consumes the most energy, also because it houses one of the Bank's data processing centres (see Table a7). The installation of an integrated system of meters to monitor electricity and heating energy consumption continued in 2022. In one of the CDM buildings, a system is being tested with sensors that automatically switch off the lights when the work space is empty and adjust artificial lighting according to the amount of natural light detected. These sensors will gradually be installed in all the CDM buildings, and will also be used to turn off heating and cooling when the workspace is unoccupied. The four new cooling towers (which disperse the heat produced by the air-conditioning systems) will become operational by the end of 2023 and will reduce annual electricity consumption by 400,000 kWh (equivalent to 0.5 per cent of the total) and non drinking water consumption by about 15,000 cubic metres (9.2 per cent of the total).

**-10%**

Reduction in energy consumption compared with the previous year

At Palazzo Koch, the management and optimization system of the new central heating system and the implementation of the energy saving government measures made it possible to cut methane gas consumption by more than 30 per cent compared with the previous year. Upon completion of the cooling plant's energy optimization system, new high efficiency cooling towers will be installed by the end of 2023. The cooling towers will be coupled with a heat pump system that is able to produce hot water using the condensation heat, which would otherwise be lost as waste heat. Moreover, the installation of a switchboard monitoring system is under way, to see how to further reduce energy consumption.

In the other buildings in Rome and at the branches, a number of energy efficiency upgrades are under way, including the renewal of heating and cooling systems; the replacement of windows and building insulation; the installation of smart temperature regulation systems with occupancy sensors; and the installation of switchboard monitoring systems for targeted energy-saving interventions.

## Electrification of the heating systems

Replacing traditional methane or oil-fired heating systems with electric heat pumps will reduce direct $CO_2$ emissions.

The heating systems at the Palermo and Cagliari branches were electrified before winter 2022-23.

In 2023, heat pumps will be installed to replace the oil-fired systems at the Rome training centre and at the Catania, Foggia and Sassari branches (for the branches, this will prevent around 160 tonnes of $CO_2$ equivalent emissions per year).

### The CONSIP Convention

The Bank signed the 'Integrated Energy Services Framework Agreement, Edition 4' for seven of its branches (Bologna, Forlì, Genoa, Lecce, Milan, Padua and Piacenza). This is the fourth edition of an integrated energy services framework agreement which covers the management and maintenance of electric and air-conditioning systems and the supply of heating fuels and of electricity from renewable sources. The agreement involves a commitment to achieving specific energy-saving targets and, where possible, to installing photovoltaic systems, and will be extended to a further six Bank branches by the end of 2023.

### Workplace management solutions

Hybrid work allowed the Bank to try out a number of energy-saving workplace solutions. At the Florence branch, for instance, all of the work stations on the mezzanine floor (which is the only floor served by a completely independent air-conditioning system) were moved to other parts of the building, making it possible to shut down all of the heating and cooling systems on the mezzanine floor and save an estimated 25,000 kWh of electricity and 6,000 cubic metres of methane per year, cutting down greenhouse gas emissions by around 12 tonnes per year. Looking ahead, the new systems will be designed so that the heating and cooling are automatically turned off when the spaces they serve are not occupied by staff.

## Maintenance work and new projects

After the renovation of the façades, the building at Via Milano 60 in Rome is undergoing works on its interior and technical installations which will reduce the energy requirements of the premises by approximately two-thirds (the building's energy performance rating will go from its current E rating to A2). The building at Via Mazzarino in Rome will undergo a complete retrofitting of the building envelope and installations will be renewed in accordance with the most advanced energy efficiency standards (the building's energy performance rating will go from E to A2).

The feasibility study for the construction of the Bank's new data processing centre in Castel Romano (Rome) is currently under review. The centre will be designed in accordance with the most advanced criteria for environmental sustainability and green building, including: a) voluntary adherence to specific protocols for new constructions (e.g. LEED or BREAAM); b) the use of environmentally sustainable materials; c) the adoption of advanced technology for thermal insulation and energy efficiency (e.g. free cooling, high-efficiency refrigeration units, LED lighting); d) the installation of consumption management and monitoring systems; e) the production of energy from renewable sources; and f) the adoption of strategies to limit land and water consumption to the greatest possible extent.

## Green IT

A project is under way to phase out the use of personal printers almost entirely by 2024, replacing them with centralized multi-purpose equipment for shared use. This will avoid the production of around 210 tonnes of $CO_2$ equivalent emissions per year, which is 50 per cent of the emissions produced under the current printing arrangements.

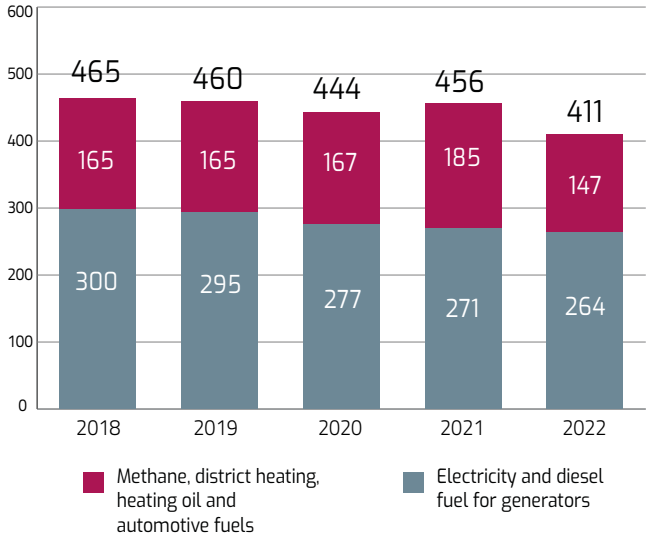
## Energy consumption

Overall energy consumption for heating (methane gas, district heating and heating oil) decreased by 20 per cent compared with the previous year (with a saving of around 1 million cubic metres), mostly due to the extraordinary measures to cut energy consumption introduced by Italian legislation (Law 34/22 and Ministerial Decree 383/22 for issuing the national plan to limit natural gas consumption) and by a number of municipal regulations (Figure 5; Table a4).

FIGURE 5

**ENERGY - BANK OF ITALY**

Energy consumption (terajoules)



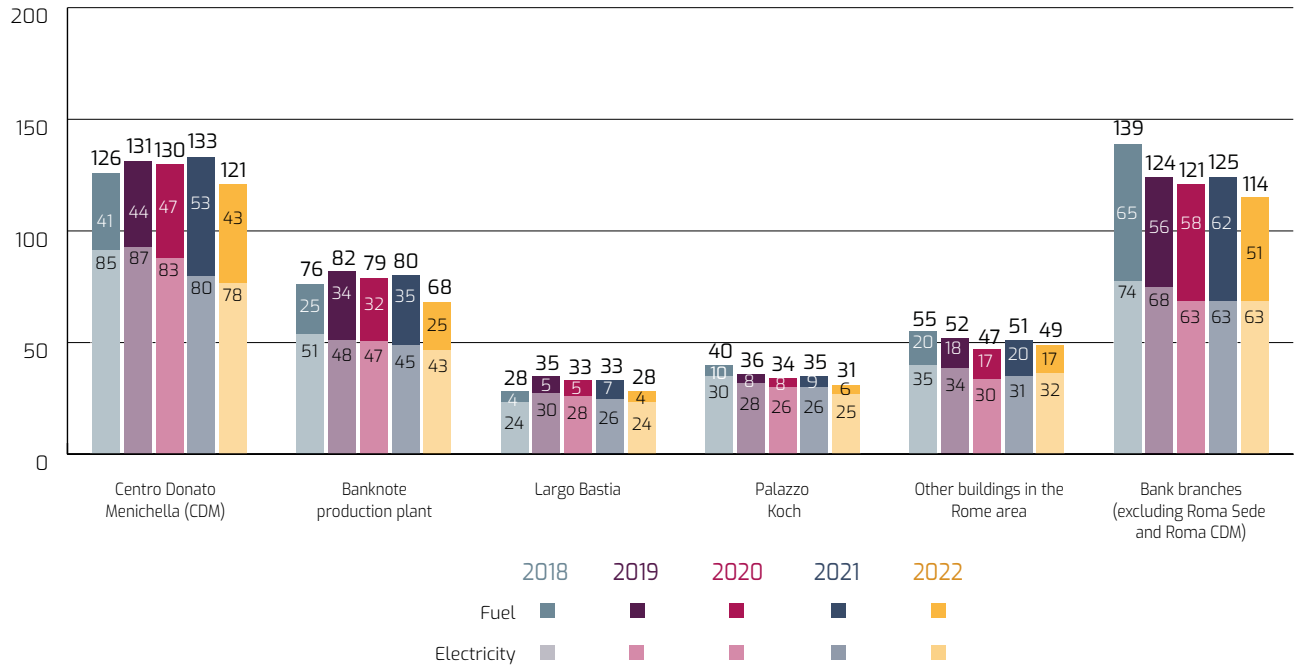

Total electricity consumption fell by 2 per cent compared with 2021 (Figure 5; Table a4). The reduction in consumption achieved through the energy efficiency measures has been partly offset by higher consumption linked to the electrification of some central heating systems and the use of

new buildings in Rome, i.e. two rented properties (since mid-2021); the Salone Margherita (once again available for use by the Bank) and the building at Via delle Quattro Fontane, fully occupied since October 2022 after undergoing complete renovation (Figure 6; Table a7). To reduce electricity consumption further, the Bank has decided to set temperatures to 1 °C higher than the norm for public buildings over the summer of 2023.

**ENERGY - BANK OF ITALY**

Energy consumption (terajoules)

FIGURE 6



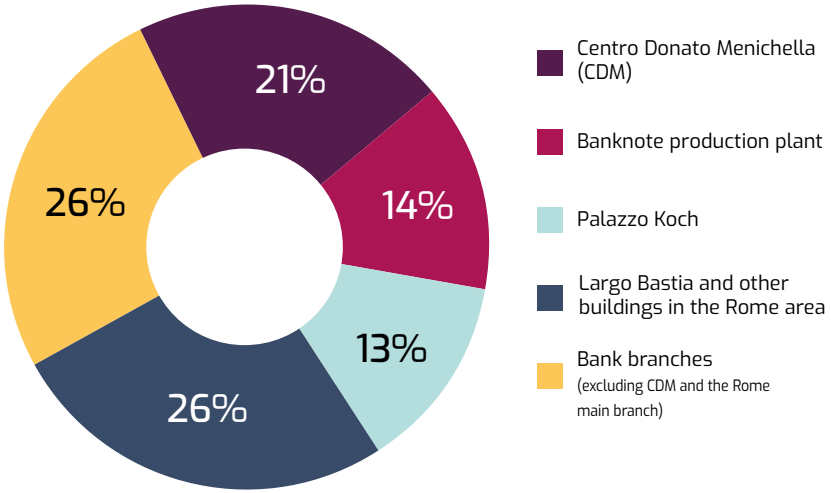

# water

*Water consumption accounts for 1 per cent of the Bank's greenhouse gas emissions.*
*We are trying to gradually reduce the consumption of drinking water. Where possible, non-drinking water is used for irrigating the green areas or for industrial purposes (for banknote production and in the evaporative cooling towers for producing chilled water).*

The Centro Donato Menichella, Palazzo Koch and the banknote production plant are the sites with the highest number of people and they use up about half of the Bank's total drinking water requirement (Figure 7; Table a9).

**WATER - BANK OF ITALY**
Drinking water consumption (per cent)

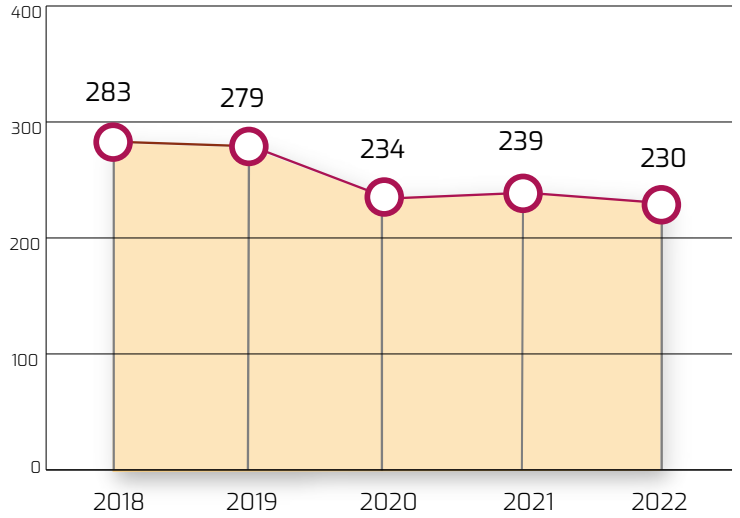
FIGURE 7




In 2022, total drinking water consumption was 230,000 cubic metres, slightly down from the previous year (Figure 8; Table a8), despite the increase in the number of people working on site compared with 2021 (-18 per cent compared with 2019, the last year before the pandemic).

FIGURE 8

**WATER - BANK OF ITALY**
Drinking water consumption (thousands of cubic metres)




Total non-drinking water consumption was 163,000 cubic metres, 9 per cent less than a year earlier.
A number of water efficiency interventions were adopted at the Catania, Naples and Sassari branches, which include the installation of meters to monitor drinking water consumption.

# *paper*

*Paper consumption accounts for 1 per cent of the Bank's greenhouse gas emissions.*
*We are committed to reducing paper consumption by streamlining and digitalizing processes and by dematerializing documents and publications.*

## Office paper

The general public has been making increasing use of the 'Online Services for the Public' platform available since 2019, to send reports and access the Bank's information services. In 2022, more than 83 per cent of the Bank's external communications were digital (96 per cent in terms of pages sent).

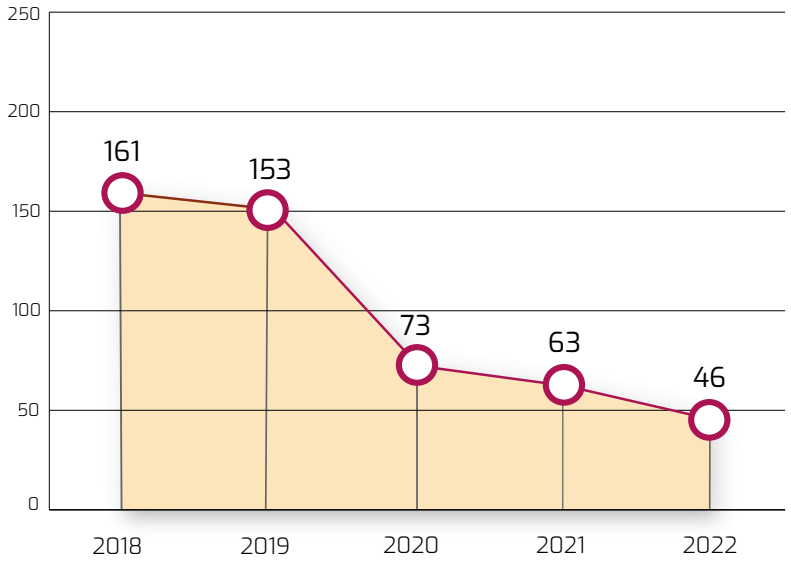
**-70%**
Reduction in the supply of paper for office use compared with the pre-pandemic period (2019)

Almost all internal work processes are paperless, with the exception of some processes relating to state treasury services – which will be completely digitalized by 2024 – and of branch operations and accounts. With regard to the latter, an IT application is being phased in that will almost completely eliminate the use of paper forms by 2023.

The digitization of the archives continued throughout 2022, with a substantial portion of the Bank's historical documents made available to scholars and researchers in digital format through 'l'Aura', the virtual study room created in 2020. The Bank was also authorized by the General Archives Directorate of the Ministry of Culture to destroy all the more recent original paper documents for which certified digital copies are available. In 2022, 57 tonnes of paper were recycled (around 6,000 linear metres of shelf space), thanks to the digitization and disposal of 80 per cent of the documents from the Bank's storage facilities on the basement floors of Palazzo Koch and to the disposal of the documents stored at the two Rome branches for which the retention period had expired.

**PAPER - BANK OF ITALY** FIGURE 9

Purchase of packs of A3 and A4 office use paper (thousands of kilograms)



The Bank uses virgin and recycled EU Ecolabel certified paper, which guarantees compliance with the highest environmental standards at all stages of the manufacturing process.

**6.6**

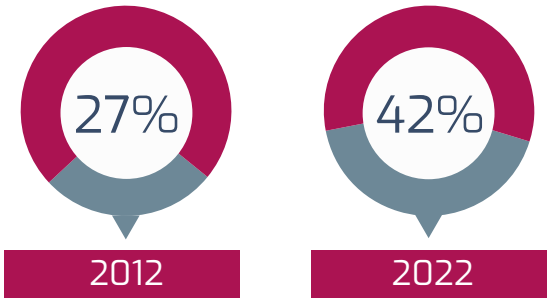
Sheets of A4 equivalent paper used on average in one day by each member of staff

In 2022, total purchases of office paper decreased further from the previous year, coming down to around one third of pre-pandemic levels (Figure 9; Table a10). Recycled paper purchases fell from 63 per cent to 42 per cent, due to difficulties in sourcing the product on the market last year (Figure 10; Table a10).

**PAPER - BANK OF ITALY**

FIGURE 10

Recycled office paper (per cent)




## Publications

The Bank of Italy's publications are all available in digital format on its website. Some are digital only, and these include the Environment Report, the thematic publications in the Statistics Series and, as of 2022, the 'Questioni di Economia e Finanza (Occasional Papers)' and the 'Temi di Discussione (Working Papers)' series.

Hard copies of other publications are only printed on demand or for specific needs, such as those distributed on the occasion of the Governor's 'Concluding Remarks' at the end of May. Print runs of these publications have been steadily reduced over the years: for example, the number of printed copies of the Annual Report has gone down from 2,700 in 2019 to 1,895 in 2023.

**-21%**

Reduction in paper consumption for publications compared with 2019

The Bank also prints financial education publications, which are mainly distributed in schools.

In order to reduce the environmental impact of the Bank's printing activity, the greatest share of the paper used in 2022 was FSC-certified, whereas for the copies distributed on the occasion of the Governor's 'Concluding Remarks' and other publications, EU Ecolabel paper was used (15 per cent of paper weight). Recycled paper accounted for 8 per cent of the total.

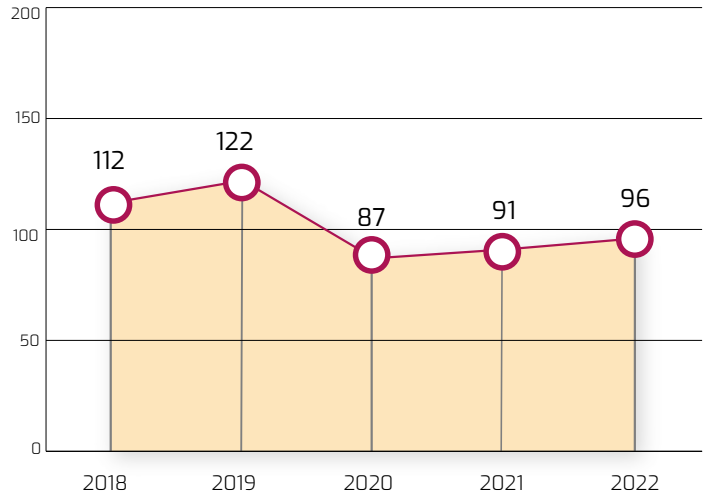
Paperless formats, such as the HTML markup language used for the 2021 and 2022 editions of the Environment Report, are being tested as an alternative to printing in order to improve information accessibility and usability, as well as for sustainability.

Last year, the overall consumption of paper used for publications and other published material (e.g. conference handouts) rose by nearly 5 per cent compared with the previous year, mainly owing to an increase in face-to-face events. However, this was still 21 per cent lower than in 2019 (Figure 11; Table a11).

**PAPER - BANK OF ITALY**

FIGURE 11

Use of paper for publications
(thousands of kilograms)




# *waste and charitable donations*

*Less than 1 per cent of the Bank's greenhouse gas emissions are due to waste production.*
*The priorities for waste management are to reduce the production of waste at source and to promote reuse and recycling over disposal in landfills, in line with the principles of a circular economy.*

All office and staff canteen waste, as well as obsolete archival documents and waste from printing the Bank's publications, is collected separately and sent for recycling (Table a13). Waste from the banknote production process is recycled or sent to energy recovery facilities (see the section 'Banknotes'). Plastic is used sparingly in the Bank. At its 17 staff canteens and, on a trial basis, at the Florence and Perugia branches, the water dispensers are connected to the local water network, drastically reducing the use of bottled water; Bank staff have been issued with steel thermos bottles, and single-use cups and tableware (made of recyclable paper or compostable material) are only used when strictly necessary. For the occasions when the use of bottled water cannot be avoided, returnable glass water bottles are gradually being introduced.

**Charitable donations**

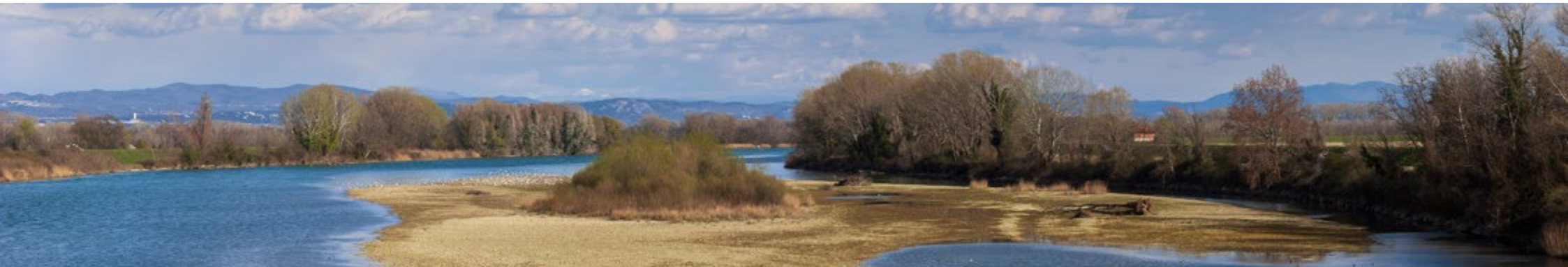
Charitable donations of food and other goods, such as furniture and computers, are primarily intended for the promotion of social well-being and also contribute to cutting down waste, in line with the principles of a circular economy.

The Bank's staff canteens have minimized the number of meals that are prepared and then not consumed. In 2022, the Rome and Frascati canteens had to discontinue the donation of unconsumed meals because of difficulties in finding charities that were equipped to transport food in accordance with health regulations.

In the Rome and Frascati offices, employees contributed to the collection of more than 60 old pairs of glasses and 70 second-hand mobile phones, which were then donated to charities.

Furthermore, 400 items of furniture which were no longer fit for purpose in the Bank were donated to parish churches, schools and non-profit associations upon request.

Between July 2022 and June 2023, the branches of L'Aquila, Campobasso and Perugia donated a total of 85 used personal computers to local schools and non-profit organizations.



# banknotes

*The production, distribution, recirculation and disposal of euro banknotes account for 10 per cent of the Bank's greenhouse gas emissions.*
*Together with the ECB and the other central banks of the Eurosystem, the Bank of Italy contributes to reducing the environmental impact of cash.*

## Eurosystem initiatives

Since 2020, the Bank has been part of a working group on the product environment footprint (PEF) of banknotes set up by the ECB to assess the ecological impact of cash (using the Life-Cycle Assessment (LCA) international standard methodology) and to reduce its footprint on the environment. All the stages in the life cycle of banknotes were analysed so as to identify the most impactful ones and how they may be optimized. The project also involves the suppliers of raw materials, as well as cash handlers on account of their active role in banknote circulation. The analysis of the information and data that were gathered was completed last year and the outcomes of this study are expected to be published by the end of 2023 and will be used to draw up a longer-term plan.

## Banknote production

The Bank of Italy prints banknotes at a production plant that obtained ISO 14001 environmental standard certification in 2004.

There are numerous initiatives under way to reduce the environmental impact of the banknote production process.

Industrial partners have been found to carry out production tests for small intaglio printing metal plates that can be laser-engraved directly, as an alternative to the traditional galvanic process. This system would reduce both hazardous waste and occupational health and safety risks.

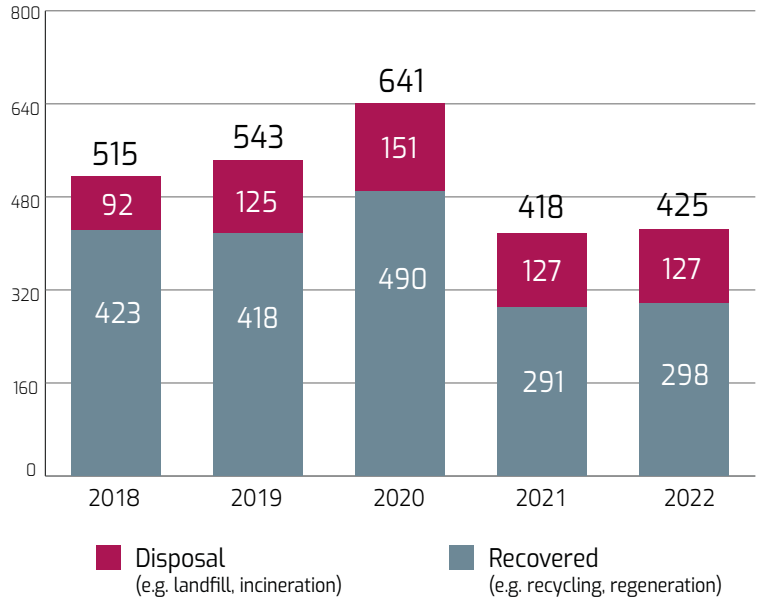
In 2022, further improvements were made to the plant's industrial wastewater treatment system.

There are plans to test environmentally friendly protective safety footwear which is made out of recycled materials or is fully carbon neutral.

Over the past five years, the trend has been to send most of the special

**WASTE - BANKNOTE PRODUCTION PLANT** FIGURE 12

Special waste from the banknote printing process (thousands of kilograms)



waste from the banknote production process to recovery facilities (for recycling, regeneration, waste-to-energy incineration, waste storage before recovery and so on) instead of mere disposal (e.g incineration or preliminary storage before disposal; see Figure 12 and Table a14).

### Banknote transportation

In order to reduce the environmental impact of the distribution of cash from the production site to the Bank's branches, its fleet of armoured vehicles is being gradually renewed with models in line with the latest EU directives on emissions.

### Management of worn banknote waste

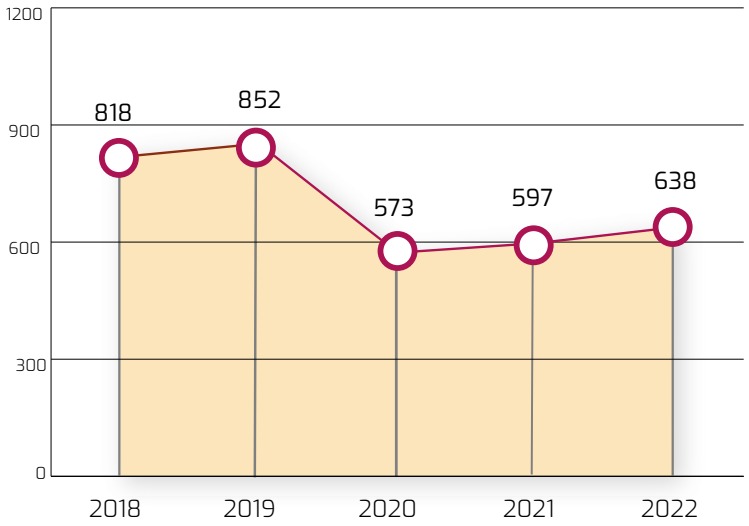
At the Currency Circulation Management Directorate in Rome and at 34 branches, the banknotes in circulation are periodically sorted to ensure that cash quality standards are maintained. All banknotes deemed unfit for circulation because they are worn or damaged are then shredded.

In 2022, the production of waste from shredded banknotes increased by 7 per cent from the previous year (Figure 13; Table a14). The ECB has recently revised the criteria for managing shredded banknote waste, asking central banks to stop using landfill disposal by 2022. In line with these indications, as of 2023, all of the waste generated by the Bank of Italy when shredding

banknotes is being sent to facilities for the production of secondary solid fuel (SSF) or to waste-to-energy incineration plants, which is the most environmentally effective way of dealing with it. In this way, the production of $CO_2$ equivalent emissions was down by 37 tonnes (Table a2).

**WASTE - BANK OF ITALY** FIGURE 13

Worn banknotes withdrawn from circulation and shredded (thousands of kilograms)




As part of a research project carried out by the Faculty of Engineering at the 'Federico II' University of Naples on the reuse of end-of-life products in construction, a sample of shredded banknotes was tested in the laboratory production of bricks and lime-based plaster.

The preliminary findings are encouraging: adding worn banknote fragments to the lime enhances its flexural strength as compared with the samples made without additives and with the samples made by adding other types of waste products, such as plastic and hemp. In light of these initial findings, the Bank is assessing how to proceed to the stage of industrial feasibility.

# *sustainable mobility*

*Home-office commuting and business trips account for 31 per cent of the Bank's greenhouse gas emissions.*
*We are committed to reducing work-related travel and encouraging the use of environmentally sustainable means of transport and electric mobility.*

**Remote working, commuting and travel between Bank premises**

Remote working does have a positive environmental impact and reduces overall greenhouse gas emissions (see the box 'The environmental impact of remote working and the joint research project with ENEA').

Since 1 April 2022, the Bank has been operating a hybrid work model whereby staff are able to combine office and remote working arrangements on a stable basis. On average, 42 per cent of work was performed remotely over the year, which is a lower figure than in 2020-21, when it was 59 per cent, but conspicuously higher than in 2019, the year before the pandemic, when it was 4 per cent.

Our estimates of the emissions produced by employees travelling to and from work are based on the assumption that their mobility habits in 2022 were comparable to those in 2019 (whereas per capita daily emissions

**THE ENVIRONMENTAL IMPACT OF REMOTE WORKING AND THE JOINT RESEARCH PROJECT WITH ENEA**

From an environmental perspective, remote working implies: (a) lower energy and water consumption in the workplace owing to a smaller number of people on site; (b) a reduction in commuting and the associated atmospheric emissions; and (c) an increase in household consumption.

In partnership with the Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA), the Bank is conducting research into the environmental impact of remote working and developing an overall framework that will assist the public and private sectors in better assessing the environmental impact of changes to their work models.

In June 2023, a questionnaire was circulated to all employees to: update the data first gathered in 2020 about their travel to and from work and to estimate the emissions so produced; map out Commuting Plan for staff working in Rome and Frascati and at 6 branches; and estimate the quota of additional household energy consumption when working from home.

The results of the survey will be published as part of the next 'Environment Report'.

increased by 27 per cent during the pandemic due to the lower use of public transport). The figure for 2022 (around 3,700 tonnes of $CO_2$ equivalent emissions) was 11 per cent higher than the previous year (39 per cent lower than in 2019; see Table a2).

To reduce the amount of fossil fuels consumed for commuting to and from work, charging stations for electric cars, motor bikes, and bicycles have been installed at the Bank's main offices in Rome and Frascati. Over the course of 2023, fast-charging stations will be installed in the Bank's parking areas for employees to recharge their private electric vehicles at subsidized rates. In addition, two new bicycle stands were installed at the Centro Donato Menichella.

In accordance with regulatory provisions, the Bank will update its Commuting Plan ('Piano degli spostamenti casa-lavoro' - PSCL) for staff working in Rome and Frascati and will lay out similar plans for the Bari, Bologna, Milan, Palermo, Turin and Naples branches. PSCLs aim to identify and implement targeted sustainable mobility measures that reduce the use of private means of transport for commuting.

The fleet of corporate shuttle buses, which runs 68 trips daily along seven routes in Rome and Frascati, has been designed to cater to staff travelling to work and back as well as between the Bank's premises.

**15**

Electric cars for transfers to and from the Rome and Frascati offices

Further addressing environmental sustainability concerns, the latest procurement contract involves the incorporation of 12 methane-powered buses into the fleet by the end of 2023, as they are less polluting than diesel buses.

To help reduce the environmental impact of travel between premises within the Rome area, the Bank has signed long-term rental contracts for 15 electric cars and extended its bike-sharing service (with 10 electric pedal assist bikes parked at 4 buildings in Rome).

**10**

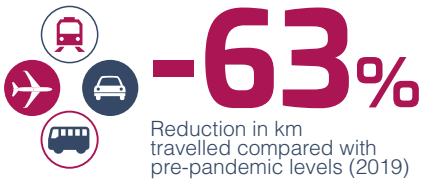
Electric bicycles for transfers to and from the Rome and Frascati offices

## Business travel

For 2023, the Bank has set a quantitative target of a 25 per cent reduction in business travel emissions compared with 2019. In order to meet the target, this year has seen the introduction, on a trial basis, of a greenhouse gas emissions budget alongside the customary financial budget that is allocated to each Bank unit. Over the course of the year, shares of the budget are then deducted in proportion to the estimated emissions for each business trip made. Through this tool, which is currently non-binding, it will also be possible to heighten the awareness of managers and staff regarding the environmental impact of business travel.

Compared with 2022, the total number of kilometres travelled more than

doubled (but was 63 per cent lower than in 2019), whereas the number of kilometres travelled by rail almost matched those covered by air (Figure 14).

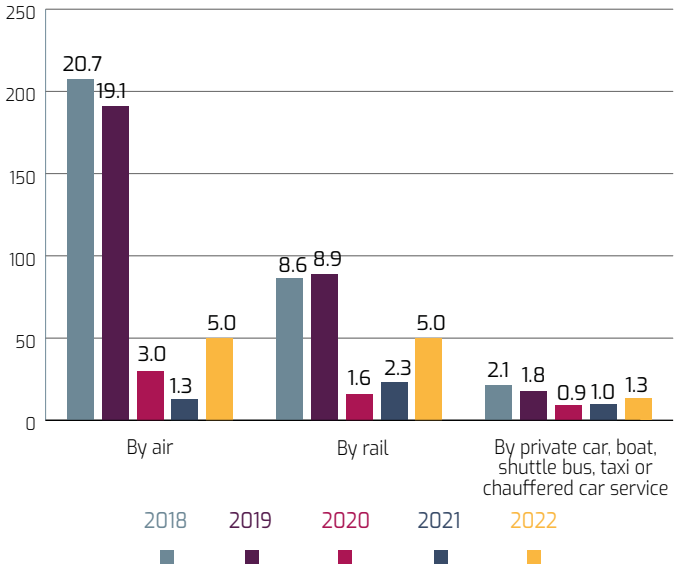



Overnight stays on business trips nearly doubled from 2021 (down by 40 per cent compared with 2019), and 92 per cent of them were at hotels located in Italy. The total number of kilometres travelled in private or rented cars increased from the previous year, but was 41 per cent lower than in 2019 (see Table a15).

The remote communications infrastructure was strengthened by installing a further 4 multi-purpose monitors and 10 sets of videoconferencing equipment, in addition to the 136 already in place. In 2022, over 3 million phone calls were made and 430,000 online meetings were held, down slightly from the previous year's figures.

**BUSINESS TRAVEL - BANK OF ITALY** FIGURE 14

Distances travelled by means of transport (millions of kilometres)



# *green procurement*

*Some 14 per cent of the Bank's greenhouse gas emissions are due to purchases of computer equipment and furniture, as well as to canteen services.*

*Our green procurement policy is intended to help guide the market towards developing more environmentally eco-friendly jobs, goods and services.*

Tender processes comply with the minimum environmental standards set by the Italian Ministry of Environment and Energy Security. Moreover, where applicable, the Bank of Italy: (a) requires environmental certification (ISO 14001 or EMAS); (b) requires green clauses for the provision of services; (c) requires eco-labels for the goods and services covered by procurement contracts; and (d) awards points to companies using products, tools and procedures with the lowest environmental impact (in the tenders in which the award criterion is 'best value for money').

Suppliers are also encouraged to adopt best practices for workplace health and safety (ISO 45001 standard) and social responsibility (SA 8000 social accountability standard and UNI/PdR 125 gender equality standard).

Internal procedures require contracting units to include environmental and social criteria as early as the procurement planning stage, or to explain why these criteria are not included.

In 2022, a total of 46 high-value procurement procedures were started (excluding contracts negotiated with a single provider, direct awards and Eurosystem-wide contracts). Environmental or social responsibility clauses were included in 22 of them. The remaining procedures involved services for which it is not possible to set green criteria, given their nature (e.g. the purchase of intangibles such as software and databases).

In addition to requiring the contractor to hold ISO 14001 or EMAS certification, procurement procedures for office cleaning services included contractual clauses on the use of cleaning products bearing the EU Ecolabel environmental quality logo. Additional points were awarded to companies providing EU Ecolabel-certified cleaning services, as well as those using products that meet the ISO 14067 carbon footprint requirements and are packaged in recycled plastic, or microfibre materials and staff uniforms with the EU Ecolabel.

The Bank rewarded bidders holding ISO 14001 or EMAS environmental certification in tenders for the following services: exam proctoring in the context of selective entrance exams; execution of transfers to non-euro area countries; operation of the centralized oversight security system; and surveillance of closed branch buildings. In the latter type of tender, the use of vehicles with a low environmental impact was also rewarded.

In the tender for the installation and operation of 17 electric car charging stations in a number of Bank buildings in Rome and Frascati, bidders were required to be ISO 14001 or EMAS certified and to use only electricity from certified renewable sources.

The framework agreements for the award of professional engineering and architectural services included the following requirements: limited land use; energy saving and recycling both in the construction and throughout the life cycle of any works or buildings; a focus on forest management and

hydrogeological criteria; and the use of environmental sustainability best practices. Moreover, a certified energy management expert was required to be on the construction site.

The tenders for the operation and maintenance of Centro Donato Menichella buildings and facilities, Largo Bastia buildings and Bank branches required ISO 14001 or EMAS certification. Moreover, organizations complying with the ISO 50001 (energy management systems) or the UNI 11352 (energy services companies, ESCOs) standard were awarded additional points, as were contract managers certified as a certified energy management experts or auditors for ISO 50001-compliant energy management systems. Likewise, tenderers were rewarded for carrying out energy efficiency and energy saving measures, as well as for using vehicles with a low environmental impact (Euro 6-compliant hybrid or electric vehicles). A number of social accountability criteria were also included in these tenders, with a view to: promoting staff retention; ensuring the application of appropriate contractual conditions; and re-employing staff who used to work for former contractors and were not covered by a re-hire clause.

Environmental sustainability requirements were significantly improved in tenders for the supply of watermark paper for the production of banknotes: the cotton fibres used to make the paper are now 100 per cent sourced from organic or fair trade farming, or from integrated farming (the minimum requirement was 20 and 30 per cent respectively in the past). EMAS together with ISO 14001 certification was required in the tender for special waste management at the banknote production plant; compliance with the ISO 14001 standard was required of tenderers bidding to burn shredded worn banknotes in waste-to-energy plants or secondary solid fuel production plants (see the section 'Banknotes').

In order to further foster green procurement, in 2022, the Bank's directorates and branches were encouraged to focus their efforts on identifying any requirements or reward criteria that could improve the environmental performance of the goods, services or works under tender.

# sustainable investment

*We contribute to environmental protection and to economic and social growth, including through sustainable investment.*

Since 2019, the Bank of Italy has integrated environmental, social and governance (ESG) criteria into its portfolio management outside the scope of monetary policy. Its guiding principles are set out in the Responsible Investment Charter, published in 2021. The integration of sustainability criteria into investment strategies serves two purposes: improving the risk-return profile of investments and contributing to environmental stewardship and sustainability.

In the area of fighting climate change, the Bank intends to manage its investment operations in line with the goals of the Paris Agreement and the European Union's 2050 climate neutrality target.

In practice, equity and corporate bond investments aim to improve our portfolios' ESG scores and climate metrics against benchmark indices.

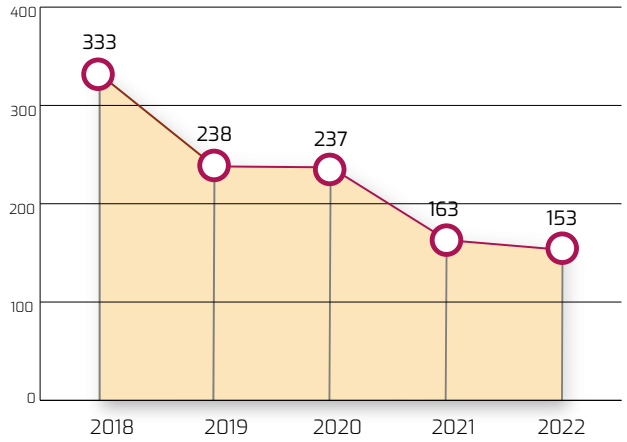
The climate metrics used by the Bank include information on corporate carbon emissions and, as of 2022, on net-zero commitments.

A sustainable investment performance review is available in the Bank's annual Report on sustainable investments and climate-related risks, which also explains how sustainability profiles are integrated into investment decisions, strategies and risk management, as well as illustrating the methods for measuring these profiles.

For our internally managed equity portfolio in euros (worth €14.2 billion and accounting for 80 per cent of our private-sector investments), carbon intensity has been reduced by 36 per cent since 2019, to 153 tonnes of $CO_2$ equivalent emissions per million euros of sales (Figure 15; Table a17): this is 32 per cent lower than for the benchmark index. The portfolio has also outperformed the benchmark in terms of use of electricity (-26 per cent), water consumption (-56 per cent) and waste production (-29 per cent).

**SUSTAINABLE INVESTMENT - BANK OF ITALY** FIGURE 15

Weighted average carbon intensity of the equity portfolio in euros, 2018-22 (1)
(tonnes of $CO_2$e per million euros of sales)




(1) The weighted average carbon intensity values reported are not directly comparable with those indicated in the 2022 Environment Report, as it was agreed in the Eurosystem to use a different data source and calculation methodology.

For the corporate bond portfolio in euros (around 5 per cent of our private-sector investments), carbon intensity has dropped by 26 per cent since 2019, to 109 tonnes of $CO_2$ equivalent emissions per million euros of sales (Table a16), i.e. 18 per cent lower than for the benchmark.

Our sustainable investment also includes foreign-currency equities and corporate bonds (13 and 2 per cent, respectively, of our private-sector investments), as well as sovereign, supranational and agency debt.

In terms of public-sector securities, we believe the optimal sustainability strategy is thematic investing in green bonds, which currently amount to a total of €4.5 billion.

# *biodiversity*

*Protecting biodiversity is a challenging aim and one to which we are committed in the coming years.*

The Bank pays particular attention to its highly biodiverse green heritage, which is predominantly located in the areas surrounding the banknote production plant in Rome ('Polo Tuscolano'), the Centro Donato Menichella in Frascati and the Bank's 'Sadiba' training centre in Perugia.

The Polo Tuscolano covers approximately 25 hectares and hosts over 500 trees, while the 37 hectares of the Centro Donato Menichella are home to around 1,000 olive trees, among other plants. In Sadiba's 7-hectare park in Perugia, there are more than 2,660 trees, numerous shrubs and aromatic plants. All these areas are also home to a variety of animals, such as squirrels and various bird species.

Our management and maintenance activities aim to protect the trees and to constantly improve our heritage. We regularly update our monitoring plans and introduce new plant species that do not upset the balance of the surrounding environment and ecosystems, including in urban areas.

When carrying out maintenance and launching new initiatives, we pay special attention to the protection of wildlife that, over time, has found shelter in the areas owned by the Bank of Italy, including urban ones, as is the case for the many parakeets that have been nesting for years in the palm trees in front of Palazzo Koch. Agronomists and ornithologists are involved in the maintenance of our plants, in order to ensure the protection of the existing balance.

Furthermore, to help raise awareness of environmental and biodiversity issues, we organize courses, seminars and guided tours on our premises in Rome and Frascati, also with a view to showcasing the specific and unique value of these places.

In March 2023, we opened a bee sanctuary in the garden of the Agrigento branch, i.e. an area with nectar-producing plants blooming throughout the year, where we created friendly environments for bees and other pollinators. The inauguration ceremony was attended by a leading expert who explained the complex activity and social behaviour of these precious insects. This project, carried out together with the local Rotary Club, is part of a Rotary International project to protect bees and biodiversity.

In autumn 2023, the Bank of Italy will carry out a reforestation project in Italy to offset part of its greenhouse gas emissions, in partnership with the Comando Unità forestali, ambientali e agroalimentari (CUFAA), a special unit of the Carabinieri police force tasked with forest, environmental and agri-food protection. We are going to plant native or compatible species and we will do our utmost to protect biodiversity.

# *eco-friendly culture*

*The Bank works with other institutions on sustainable finance and contributes to national and international efforts in this area. In its role as supervisory authority, it helps to ensure that financial intermediaries perform sound and prudent ESG risk management. It shares the findings of its research and analysis on the links between the economy, finance, energy and the environment, and participates in educational initiatives to raise awareness of environmental issues among banks, firms and the general public.*

**International and EU projects**

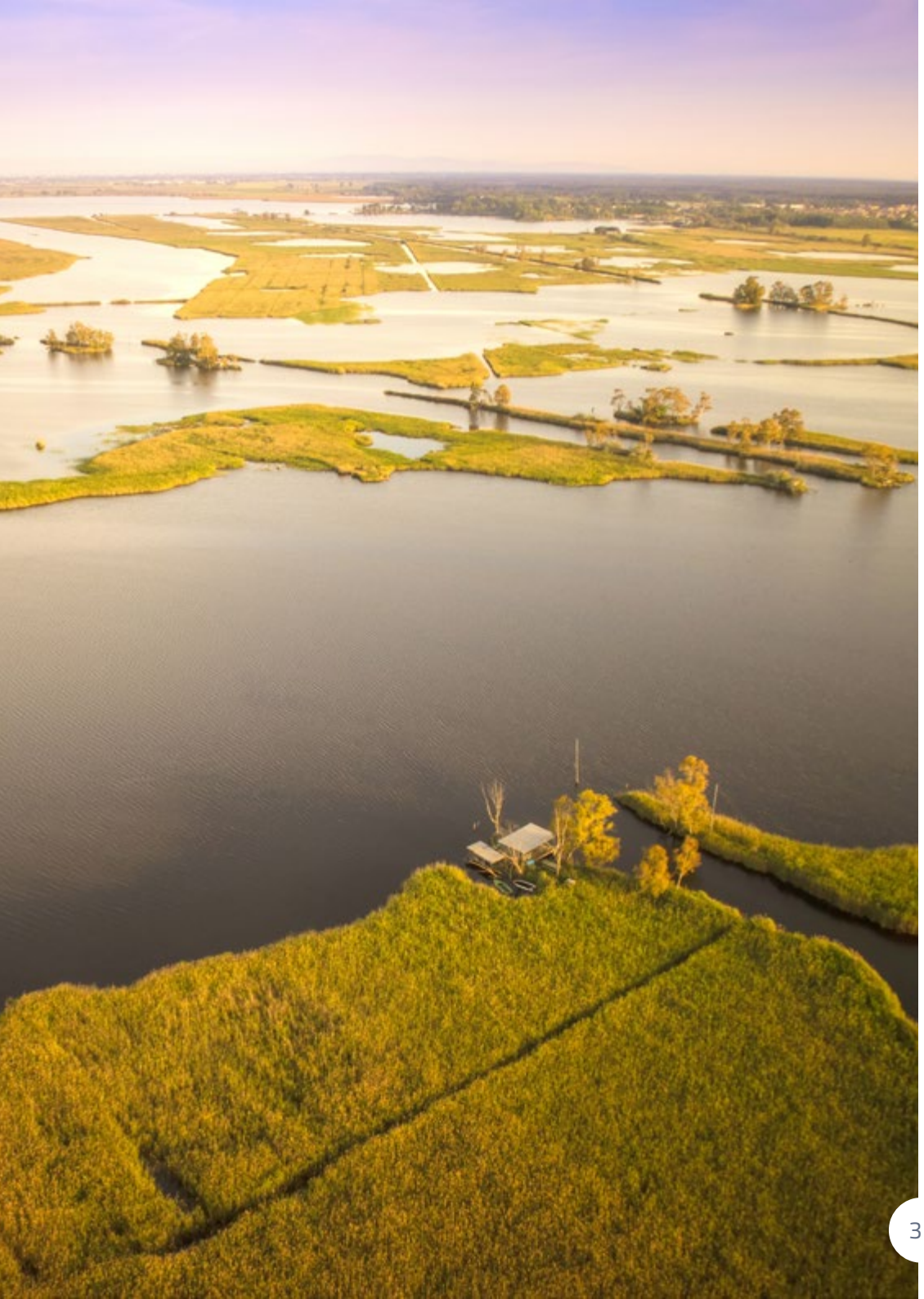
Since 2022, the Bank has been on the Steering Committee of the Network for Greening the Financial System (NGFS), the global network of central banks and supervisory authorities, comprising 125 organizations and 19 observatories, that coordinates research and exchanges of experiences on environmental and climate risk management in the financial sector. In June 2022, the Bank of Italy and the Central Bank of New Zealand took over as coordinators of the Net Zero for Central Banks working group, which aims to step up central banks' efforts to reduce emissions and tackle climate change. Specifically, the group is focusing on sustainable investment, best practices to reduce the environmental footprint of internal operations, and climate disclosures for central banks.

Within the G20, the Bank of Italy is a member of the permanent Sustainable Finance Working Group (SFWG), which laid out a multi-year G20 Sustainable Finance Roadmap to identify the obstacles to and solutions for the development of a sustainable financial system.

The Bank also contributes to the work of the Financial Stability Board (FSB), whose programme for 2023, published in March, has as one of its priorities the assessment of the impact of climate change on financial risks and thus on the stability of the financial system as a whole. Furthermore, the Bank is part of the joint working group of the European Central Bank and the European Systemic Risk Board (ESRB), which has promoted a shared methodological approach for analysing climate-related risks to financial stability.

On the banking and financial supervision front, the Bank is involved in the work of several international bodies, including the Basel Committee on Banking Supervision (BCBS), which is conducting analyses and assessments for the inclusion of climate risks in the current prudential framework: in June 2022, the BCBS published the principles for effective management and oversight of climate-related risks. The Bank participates in the activities of the European Banking Authority (EBA), which published a multi-year roadmap in December 2022 outlining its sustainable finance targets and milestones, including: (a) integrating ESG factors and risks into the risk management frameworks of banks and into the supervisory activities of the competent authorities; (b) assessing a possible dedicated prudential treatment of exposures associated with environmental factors; and (c) developing standards, green labels and measures for banking and financial products to limit the risk of funding activities that are not linked to sustainability factors (greenwashing).

In April 2022, the Bank of Italy published its supervisory expectations for all financial intermediaries under its direct supervision, illustrating how climate and environmental risks should be integrated into corporate strategies, business models, governance, risk management and public disclosures.



Over the course of the year, the document was used as a base for starting discussions with individual intermediaries on their level of compliance with supervisory expectations and on their adjustment plans. The Bank also contributed to a thematic study, initiated under the coordination of the ECB, on a representative sample of less significant banks and a sizeable group of non-bank intermediaries. The findings fed into two communications to supervised banks, urging them to adopt action plans to improve the integration of climate-related and environmental risks into their corporate strategies and practices, governance and control systems.

Lastly, the Bank is part of the Environmental Network of Central Banks (ENCB), a working group made up of 15 central bank representatives, which promotes the exchange of best practices in the management of internal environmental aspects.

### Participation in national working groups

The Bank's experts help to draft the report on the national energy situation (La situazione energetica nazionale), prepared by the Ministry of Environment and Energy Security (MASE), and participate in the work of the Committee for Natural Capital, coordinated by the Ministry.

With MASE, IVASS, COVIP and CONSOB, the Bank is involved in the Sustainable Finance Coordination Table, promoted by the MEF with the aim of fostering the mobilization of private resources through the capital market, to support the green transition in Italy as part of its international commitments. Furthermore, it contributes to the work of the Italian Observatory on Energy Poverty (Osservatorio Italiano sulla Povertà Energetica, OIPE) and is part of two ABI Lab observatories: the Electricity and

Gas Market Monitoring Centre, which studies changes in energy prices and regulations, and the Green Banking Monitoring Centre, which investigates how environmental impacts are managed in internal operations and issues guidelines on environmental reporting.

### Analysis and research, conferences and publications

Over the last two years, the Bank has given a major boost to research on sustainable finance, the impact of climate change on the stability of Italy's economic and financial system and manufacturing sector, and possible changes to the prudential framework to increase safeguards for financial stability. The numerous studies published by the Bank of Italy on these subjects are available on a dedicated page on our website.

Between July 2022 and July 2023, the Governor and other members of the Governing Board gave speeches at events on sustainable finance. The main ones are listed in Figure 15, and 17 publications were issued on the same topic.

The Bank also organized several events throughout the year, including: a workshop to present the findings of a research project on the effects of climate change on the Italian economy; a joint conference with the Florence School of Banking and Finance (FBF) of the European University Institute on the challenges posed by climate change to banking regulation and supervision; a workshop in partnership with the Italian Association of Energy Economists on sustainable finance and the green transition; and a conference in partnership with the University of Catania and Confindustria Catania on the green economy.

As part of its cooperation with international experts and the central banks of the countries included in the European Neighbourhood Policy, as well as other emerging economies, the Bank held a webinar on 'Sustainable finance/ESG and supervision of banks and other financial intermediaries' in April 2023 and a webinar on 'Audit activities in a central bank: new challenges and perspectives' in May 2023.

### Other educational initiatives

The Bank renewed its partnership with the Scuola nazionale dell'Amministrazione (SNA) to design and conduct two training courses for public-sector employees: one for the most senior executives ('General government sustainability: strategies, management and reporting'), and one for middle management ('Measuring, reducing and offsetting the carbon footprint').

On 30 September 2022, on the occasion of the European Researchers' Night – promoted by the European Commission to create opportunities for researchers to meet the general public and spread scientific culture – the Bank took part in a number of initiatives agreed with the Frascati Scienza association. The Centro Donato Menichella in Frascati was open to the public for the event and offered thematic guided tours, many of which focusing on environmental sustainability issues.

In the school year 2022-23, the Bank offered 237 'Work Experience Projects' (Percorsi per le Competenze Trasversali e l'Orientamento, PCTO) for high school students: 12 of these (held in Rome and in the Ancona, Brescia, Campobasso, Catania, Catanzaro, Lecce, Livorno, Naples, Pescara and Verona branches) covered environmental issues and involved 134 students.

Every year, the Bank awards the school prize 'Let's design a new banknote'

Main speeches on environmental sustainability given by Governing Board members in external conferences between July 2022 and July 2023

FIGURE 16

| | | | |
|---|---|---|---|
| Governor | september 2022 | Conference on 'The multiple role of central banks: the new frontiers of monetary policy' | Closing speech |
| | october 2022 | Development Committee in Washington, D.C. | Opening speech |
| | march 2023 | 14th edition of the MAECI-Banca d'Italia annual conference | Opening speech |
| Senior Deputy Governor | march 2023 | 14th edition of the MAECI-Banca d'Italia annual conference | Closing speech |
| | april 2023 | Inauguration of ABI's advanced training course | The challenge of sustainability: ecological transition and public finance |
| Deputy Governor Alessandra Perrazzelli | december 2022 | Executive Committee of the Italian Banking Association | Opening speech |
| | february 2023 | Conference on 'Firms and the green transition. Trends in and strategies for Lombardy's production system' | The Bank of Italy's contribution to sustainability talks and strategies (only in Italian) |
| Deputy Governor Piero Cipollone | june 2022 | Conference on 'Environment, market, community: ideas for teaching critical thinking' organized by the Ministry of Education | Energy transition, finance and climate: challenges and opportunities (only in Italian) |
| Deputy Governor Paolo Angelini | october 2022 | Conference on 'The effects of climate change in Italy: adaptation strategies and the role of insurance companies' | Closing speech |
| | november 2022 | Event organized by the National Association for the Study of Credit-related Issues | The financial risks posed by climate change: information gaps and transition plans |
| | december 2022 | Round table on 'New Frontiers in Banking and Capital Markets', organized by the University La Sapienza | Net zero pledges of financial firms: trade-offs and problems |

and the theme for the 2022-23 edition was 'The great heat, the great freeze: the earth's resources are not infinite'. The awarding ceremony for this year's edition was held at the Centro Donato Menichella on 19 May and 1,143 schools took part in the competition, including 7 Italian schools located abroad.

**134**

High school students involved in work experience projects (PCTO) on environmental issues i n the school year 2022-23

A mural will be painted on the external walls of the Catania branch in July using a mineral paint that can reduce smog and pathogens in the air through photocatalysis, which will help to improve environmental conditions in the surrounding urban area.

### In-house training and awareness raising

As part of the onboarding process, as of 2022, new recruits are offered specific training on environmental sustainability and provided with a welcome kit, including eco-friendly stationery and a thermal steel water? bottle.

In 2023, in-house staff have been offered seven courses on sustainability. A self-study training module for all employees on the 2030 Agenda and the Sustainable Development Goals will be launched by the end of 2023.

This year, we have joined several awareness raising initiatives. On 16 February 2023, the Bank celebrated the annual Italian Energy Saving and Sustainable Lifestyles Day 'M'illumino di meno' when the external lighting of buildings is switched off. In addition, on 25 March, together with the ECB and other European central banks, the Bank took part in the global Earth hour promoted by the World Wildlife Fund (WWF) and launched an awareness raising campaign with a quiz on environmental issues.

In June, we circulated information to our staff on World Environment Day, organized by the United Nations General Assembly.

# statistical tables

This section comprises 17 statistical tables containing quantitative detailed indicators on the Bank of Italy's environmental impacts:

Table a1 Staff
" a2 Greenhouse gas emissions
" a3 Leakages of fluorinated greenhouse gases
" a4 Energy consumption
" a5 Renewable electricity purchased
" a6 Emissions of nitrogen oxides ($NO_X$) and sulphur dioxide ($SO_2$) from fossil fuels
" a7 Energy consumption by facility
" a8 Water consumption
" a9 Water consumption by facility
" a10 Office paper purchases
" a11 Use of paper for publications
" a12 Toner cartridges
" a13 Waste generation
" a14 Banknotes
" a15 Business travel
" a16 Sustainable investments
" a17 Assessment of uncertainty in the calculation of GHG emissions.

The percentages given in the statistical tables have been calculated using non-rounded data. In addition, the following symbols and conventions were used:

– the phenomenon does not exist;
.... the phenomenon exists, but the data are not known;
.. the value is nil or less than half of the final digit shown.

**Table a1**

**Staff** (1)
*(units)*

| | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| Employees | 6,424 | 6,337 | 6,416 | 6,330 | 6,522 |
| Staff seconded to other organizations (2) | 265 | 256 | 255 | 299 | 318 |
| **Total employees** | **6,689** | **6,593** | **6,671** | **6,629** | **6,840** |

(1) Data as at 31 December of each year. – (2) Representative offices and financial attachés abroad, staff on leave or seconded to the European Central Bank and other national and international institutions.

Table a2

**GHG emissions**
*(tonnes of $CO_2$ equivalent)*

| | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|
| **Direct emissions: Scope 1** | | | | |
| From stationary combustion | | | | |
| Heating fuels | 9,359 | 9,484 | 10,499 | 8,350 |
| Fuels for generators | 44 | 88 | 64 | 53 |
| From mobile combustion (car fleet) | 22 | 16 | 18 | 17 |
| From leakages of fluorinated greenhouse gases | 70 | 950 | 483 | 823 |
| **Total** (A) | **9,495** | **10,538** | **11,064** | **9,244** |
| **Indirect emissions: Scope 2 (market-based)** | | | | |
| From imported energy | | | | |
| Electricity (1) | 0 | 0 | 0 | 0 |
| District heating | 168 | 208 | 220 | 178 |
| Centralized heating | 43 | 44 | 60 | 57 |
| **Total** (B1) | **211** | **252** | **280** | **235** |
| **Indirect emissions: Scope 2 (location-based)** | | | | |
| From imported energy | | | | |
| Electricity (2) | 25,998 | 22,762 | 20,955 | 19,146 |
| District heating | 168 | 208 | 220 | 178 |
| Centralized heating | 43 | 44 | 60 | 57 |
| **Total** (B2) | **26,209** | **23,014** | **21,235** | **19,381** |
| **Indirect emissions: Scope 3** | | | | |
| From transportation | | | | |
| Business travel | 4,259 | 851 | 608 | 1,545 |
| Nights spent in hotels for business trips | 1,121 | 196 | 383 | 432 |
| Bank staff commuting | 6,030 | 3,054 | 3,342 | 3,698 |
| Remote working of Bank staff | 6 | 76 | 70 | 45 |
| External staff commuting | 3,363 | 3,391 | 3,597 | 3,145 |
| **Total** (C1) | **14,779** | **7,568** | **8,000** | **8,865** |

*continues*

*continues:* Table a2

**GHG emissions**
*(tonnes of $CO_2$ equivalent)*

| | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|
| From products used by the Bank | | | | |
| Energy-related activities (3) | 3,624 | 2,905 | 3,134 | 3,296 |
| Water (4) | 187 | 177 | 176 | 165 |
| Paper for publications | 115 | 82 | 85 | 89 |
| Office paper | 129 | 61 | 52 | 42 |
| Toner cartridges | 112 | 67 | 71 | 68 |
| Furniture | 546 | 552 | 560 | 1,269 |
| IT equipment | 1,544 | 2,545 | 1,770 | 434 |
| Canteen services | 3,217 | 1,725 | 1,737 | 2,410 |
| **Total** (C2) | **9,474** | **8,114** | **7,585** | **7,773** |
| From banknotes | | | | |
| Transportation of paper and ink for the production of banknotes | 542 | 107 | 379 | 514 |
| Paper and ink for the production of banknotes | 807 | 870 | 748 | 1,258 |
| Waste from the banknote production process | 66 | 80 | 64 | 66 |
| Transportation of banknotes | 1,286 | 1,626 | 1,171 | 891 |
| Waste consisting of shredded banknotes | 120 | 68 | 56 | 19 |
| **Total** (C3) | **2,821** | **2,751** | **2,418** | **2,748** |
| **Total (C)**=(C1)+(C2)+(C3) | **27,074** | **18,433** | **18,003** | **19,386** |
| **Total emissions (market-based)** (A)+(B1)+(C) | **36,780** | **29,223** | **29,347** | **28,865** |
| **Total emissions (location-based)** (A)+(B2)+(C) | **62,778** | **51,985** | **50,302** | **48,011** |
| GHG emissions per employee (market-based) ($tCO_2e$/employee) | 5.8 | 4.6 | 4.6 | 4.4 |
| GHG emissions per employee (location-based) ($tCO_2e$/employee) | 9.9 | 8.1 | 7.9 | 7.4 |

See the section 'Greenhouse gas emissions' and its subsections in the Methodological Notes.
(1) The market-based methodology requires emissions to be calculated using factors relating to where the energy purchased was sourced, in line with the provisions of the supply contract. Since 2013, the Bank has purchased electricity exclusively from renewable sources; as a result, the emissions for the electricity purchased are zero. – (2) The location-based methodology requires greenhouse gas emissions to be calculated by applying the average emission factor of the country where the energy is purchased. – (3) Activities connected to the consumption of energy outside the Bank that are relevant to its operations: methane gas, diesel gas, petrol, purchased and self-produced electricity, district heating energy. – (4) The data have been recalculated for the entire time series due to a significant change in the relevant emission factor (see 'Update of emission factors' in the Methodological Notes).

Table a3

**Leakages of fluorinated greenhouse gases**
*(kilogrammes)*

| FLUORINATED GAS | 2019 (1) | 2020 | 2021 | 2022 |
|---|---|---|---|---|
| R32 | – | 1.0 | 1.0 | 1.5 |
| R134A | – | 307.0 | 57.0 | 344.5 |
| R407C | 36.0 | 135.0 | 38.8 | 60.0 |
| R410A | 0.4 | 98.5 | 142.4 | 79.9 |

(1) The data for 2019 may be underestimated due to the time lag with which they were collected.

Table a4

**Energy consumption**
*(gigajoules)*

| | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| Electricity | 298,964 | 294,792 | 275,026 | 270,097 | 263,821 |
| *of which:* self-produced (1) | 145 | 141 | 242 | 222 | 236 |
| Diesel oil for generators | 772 | 584 | 1,187 | 854 | 714 |
| District heating | 2,914 | 2,802 | 3,564 | 3,727 | 3,026 |
| Methane gas for heating | 158,256 | 158,265 | 159,995 | 177,784 | 141,238 |
| Heating oil | 4,115 | 3,482 | 3,654 | 3,384 | 2,392 |
| Fuels for car fleet | 221 | 234 | 151 | 181 | 235 |
| **Total** | **465,242** | **460,159** | **443,577** | **456,027** | **411,426** |
| Energy consumption per square metre (GJ/m2) | 0.58 | 0.57 | 0.56 | 0.58 | 0.51 |
| Energy consumption per employee (GJ/ employee) | 72.4 | 72.6 | 69.1 | 72.0 | 63.1 |

See the section 'Consumption of fuel, electricity, water, paper and toner' in the Methodological Notes.
(1) Using photovoltaic plants.

Table a5

**Renewable electricity purchased (1)**
*(per cent)*

| SOURCE | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|
| Wind | 28.7 | – | 60.7 | 46.6 |
| Hydroelectric | 24.4 | 73.5 | 14.4 | 22.2 |
| Solar | 46.9 | – | 24.9 | 31.2 |
| Thermal - solid biomass | – | 26.5 | – | – |

Source: Based on data from Gestore dei Servizi Energetici – GSE SpA.
(1) The percentages are calculated based on the 'Guarantee of Origin' certificates.

Table a6

**Emissions of nitrogen oxides ($NO_x$) and sulphur dioxide ($SO_2$) from fossil fuels**
*(kilogrammes)*

| | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| Nitrogen oxides ($NO_x$) | 4,826 | 4,794 | 4,868 | 5,326 | 4,293 |
| Sulphur dioxide ($SO_2$) | 267 | 237 | 274 | 250 | 211 |

See the section 'Emissions of other pollutants' in the Methodological Notes.

Table a7

**Energy consumption by facility**
*(gigajoules)*

| | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| | | | **Electricity** (1) | | |
| Palazzo Koch | 29,701 | 28,330 | 26,024 | 26,371 | 25,107 |
| Centro Donato Menichella (CDM) | 85,412 | 87,254 | 83,020 | 79,681 | 77,817 |
| Banknote production plant | 51,466 | 48,018 | 46,674 | 45,088 | 43,372 |
| Largo Bastia | 24,455 | 29,600 | 27,828 | 25,712 | 23,513 |
| Other buildings in Rome | 34,777 | 34,026 | 29,571 | 31,415 | 32,048 |
| Branches (2) | 73,925 | 68,148 | 63,096 | 62,684 | 62,679 |
| **Total electricity** | **299,736** | **295,376** | **276,213** | **270,951** | **264,536** |
| | | | **Energy for heating and transport** (3) | | |
| Palazzo Koch | 10,181 | 8,266 | 8,303 | 9,249 | 6,468 |
| Centro Donato Menichella (CDM) | 40,580 | 44,080 | 47,383 | 52,513 | 43,424 |
| Banknote production plant | 25,394 | 33,782 | 31,684 | 34,511 | 24,988 |
| Largo Bastia | 3,913 | 4,627 | 4,836 | 6,874 | 4,157 |
| Other buildings in Rome | 19,966 | 18,388 | 16,695 | 19,560 | 16,985 |
| Branches (2) | 65,472 | 55,639 | 58,464 | 62,369 | 50,869 |
| **Total energy for heating and transport** (3) | **165,506** | **164,782** | **167,365** | **185,076** | **146,891** |
| | | | **Total energy** | | |
| Palazzo Koch | 39,882 | 36,596 | 34,327 | 35,620 | 31,575 |
| Centro Donato Menichella (CDM) | 125,992 | 131,334 | 130,403 | 132,194 | 121,241 |
| Banknote production plant | 76,860 | 81,800 | 78,358 | 79,599 | 68,360 |
| Largo Bastia | 28,368 | 34,227 | 32,664 | 32,586 | 27,670 |
| Other buildings in Rome | 54,743 | 52,414 | 46,266 | 50,975 | 49,033 |
| Branches (2) | 139,397 | 123,787 | 121,560 | 125,053 | 113,548 |
| **Total energy** | **465,242** | **460,158** | **443,578** | **456,027** | **411,427** |

See the section 'Consumption of fuel, electricity, water, paper and toner' in the Methodological Notes.
(1) Includes energy produced by generators. – (2) Excludes the Roma Sede and Rome CDM branches; includes consumption of the three representative offices abroad. – (3) Includes methane gas, district heating, heating oil and fuels for the car fleet.

Table a8

**Water consumption**
*(cubic metres)*

| | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| Drinking water | 282,942 | 278,523 | 234,010 | 239,143 | 229,679 |
| Non-drinking water | 219,665 | 166,028 | 186,365 | 178,697 | 162,814 |
| **Total** | **502,607** | **444,551** | **420,375** | **417,840** | **392,493** |
| Drinking water consumption per employee ($m^3$/employee) | 78.2 | 70.2 | 65.5 | 66.0 | 60.2 |

See the section 'Consumption of fuel, electricity, water, paper and toner' in the Methodological Notes.

Table a9

**Water consumption by facility**
*(cubic metres)*

| | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| | | | **Drinking water** | | |
| Palazzo Koch | 38,651 | 37,857 | 33,744 | 34,001 | 29,099 |
| Centro Donato Menichella (CDM) | 49,522 | 59,767 | 55,206 | 53,057 | 49,704 |
| Banknote production plant | 23,389 | 23,463 | 24,363 | 33,277 | 31,619 |
| Largo Bastia | 3,564 | 6,041 | 3,529 | 2,651 | 2,147 |
| Other buildings in Rome | 69,716 | 63,781 | 48,114 | 57,239 | 56,960 |
| Branches (1) | 98,100 | 87,614 | 69,054 | 58,918 | 60,150 |
| **Total drinking water** | **282,942** | **278,523** | **234,010** | **239,143** | **229,679** |
| | | | **Non-drinking water** (2) | | |
| Palazzo Koch | 2 | 2 | .. | 1 | 19 |
| Centro Donato Menichella (CDM) | 125,501 | 98,638 | 114,028 | 109,300 | 118,188 |
| Banknote production plant | 77,950 | 45,324 | 59,392 | 56,493 | 27,593 |
| Largo Bastia | 11,177 | 10,789 | 6,530 | 9,163 | 7,086 |
| Other buildings in Rome | 2,056 | 8,572 | 4,073 | 2,540 | 7,482 |
| Branches (1) | 2,979 | 2,703 | 2,342 | 1,200 | 2,446 |
| **Total non-drinking water** | **219,665** | **166,028** | **186,365** | **178,697** | **162,814** |
| | | | **Total water** | | |
| Palazzo Koch | 38,653 | 37,859 | 33,744 | 34,002 | 29,118 |
| Centro Donato Menichella (CDM) | 175,023 | 158,405 | 169,234 | 162,357 | 167,892 |
| Banknote production plant | 101,339 | 68,787 | 83,755 | 89,770 | 59,212 |
| Largo Bastia | 14,741 | 16,830 | 10,059 | 11,814 | 9,233 |
| Other buildings in Rome | 71,772 | 72,353 | 52,187 | 59,779 | 64,442 |
| Branches (1) | 101,079 | 90,317 | 71,396 | 60,118 | 62,596 |
| **Total water** | **502,607** | **444,551** | **420,375** | **417,840** | **392,493** |

See the section 'Consumption of fuel, electricity, water, paper and toner' in the Methodological Notes.
(1) Excludes the Roma Sede and Rome CDM branches; includes consumption of the 3 representative offices abroad. – (2) Includes the consumption of cooling water for installations and of water for irrigating green areas.

Table a10

**Office paper purchases**
*(tonnes)*

| | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| White paper with EU Ecolabel certification | 86.6 | 69.2 | 29.1 | 23.1 | 26.4 |
| Recycled paper with EU Ecolabel certification | 74.2 | 83.4 | 44.0 | 39.5 | 19.3 |
| **Total** | **160.8** | **152.6** | **73.1** | **62.6** | **45.7** |
| Share of recycled paper to the total | 46 | 55 | 60 | 63 | 42 |

See the section 'Consumption of fuel, electricity, water, paper and toner' in the Methodological Notes.

Table a11

**Use of paper for publications**
*(tonnes)*

| | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| White paper | 99.3 | 121.3 | 27.5 | 22.9 | 34.3 |
| White paper with EU Ecolabel, FSC, PEFC certifications | 12.9 | 0.8 | 59.3 | 67.9 | 61.6 |
| **Total** | **112.2** | **122.1** | **86.8** | **90.8** | **95.9** |

See the section 'Consumption of fuel, electricity, water, paper and toner' in the Methodological Notes.

Table a12

**Toner cartridges**
*(units and kilogrammes)*

| | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| Total toner cartridges per office (units) | …. | 5,387 | 3,278 | 1,103 | 869 |
| Total toner cartridges used to print publications (kg) | 4,446 | 4,389 | 2,982 | 3,568 | 3,578 |

See the section 'Consumption of fuel, electricity, water, paper and toner' in the Methodological Notes.

Table a13

**Waste generation** (1)
*(kilogrammes)*

| | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|
| Archival document waste | 32,410 | 8,350 | 14,200 | 93,000 |
| Decommissioned furniture (2) | 36,540 | 23,550 | 36,240 | 32,250 |
| Paper and cardboard packaging (2) | 49,990 | 49,490 | 15,110 | 20,870 |
| Waste from publication printing processes | 3,770 | 5,080 | 2,970 | 3,277 |

See the section 'Waste generation' in the Methodological Notes.
(1) Excludes waste from the life cycle of banknotes. – (2) Only includes waste generated in the Rome and Frascati buildings.

Table a14

**Banknotes**
*(units)*

| | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|
| Euro banknotes produced (million notes) | 791 | 692 | 663 | 807 |
| Paper and ink purchased for the production of banknotes (kg) | 813,524 | 894,370 | 763,888 | 1,292,427 |
| Transportation of paper and ink for the production of banknotes (km travelled) | 131,417 | 67,666 | 108,224 | 57,643 |
| Waste from the banknote production process (kg) | 542,763 | 641,174 | 418,200 | 424,945 |
| Transportation of banknotes to and between the branches of the Bank of Italy (litres of diesel oil) | 133,904 | 151,162 | 147,485 | 132,793 |
| Transportation of banknotes to and from other central banks (No. of flights) | 24 | 32 | 21 | 14 |
| Waste consisting of shredded worn banknotes (kg) | 851,596 | 572,745 | 597,382 | 637,930 |

See the sub-section 'Indirect greenhouse gas emissions relating to the life cycle of banknotes' in the section 'Greenhouse gas emissions' in the Methodological Notes.

Table a15

**Business travel**
*(thousands of kilometres and units)*

| | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| By air | 20,652 | 19,111 | 3,019 | 1,287 | 5,013 |
| By train | 8,571 | 8,900 | 1,565 | 2,254 | 4,995 |
| By ship | .... | .... | .... | .... | 5 |
| By corporate shuttle bus | 247 | 284 | 214 | 294 | 386 |
| By chauffered car | 230 | 254 | 35 | 10 | 46 |
| By taxi | .... | .... | .... | .... | 58 |
| By private car | 1,585 | 1,225 | 659 | 694 | 825 |
| **Total business travel** | **31,285** | **29,774** | **5,492** | **4,539** | **11,328** |
| Overnight stays | .... | 50,118 | 8,663 | 16,741 | 30,096 |
| *of which:* in Italy | .... | 41,783 | 7,532 | 16,464 | 27,813 |

Table a16

**Sustainable investment** (1)
*(environmental footprint indicators)*

| | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|
| **Euro-area equity portfolio** | | | | |
| Weighted average carbon intensity (2) | 237.6 | 237.0 | 162.6 | 152.8 |
| Weighted average energy intensity (3) | 2.0 | 1.6 | 1.4 | 1.3 |
| **Euro-denominated corporate bond portfolio** | | | | |
| Weighted average carbon intensity (2) | 148.8 | 131.0 | 114.4 | 109.4 |
| Weighted average energy intensity (3) | 1.4 | 1.7 | 1.4 | 1.1 |
| **Euro-denominated government bond portfolio** | | | | |
| Weighted average carbon intensity (4) | 176.0 | 172.9 | 165.2 | 165.1 |
| Weighted average energy intensity (5) | 2.6 | 2.6 | 2.6 | 2.6 |

Sources: Based on ISS data for weighted average carbon intensity and on Refinitiv data for weighted average energy intensity. See 'Environmental indicators for investment' in the Methodological Notes.
(1) The reported weighted average carbon intensity values are not directly comparable with those indicated in the 2022 Environment Report because of the different data source and calculation methodology agreed at Eurosystem level. – (2) Tons of $CO_2$ equivalent per million euros of sales. – (3) Gigajoules of energy per million euros of sales. – (4) Tons of $CO_2$ equivalent per million euros of gross domestic product at purchasing power parity (GDP PPP). – (5) Megajoules of energy per euro of GDP PPP.

Table a17

## Assessment of uncertainty in the calculation of GHG emissions

| | Uncertainty in activity data | Uncertainty in emission factors | Compound uncertainty |
|---|---|---|---|
| **Scope 1** | | | |
| Petrol for transport (car fleet) | low | very low | low |
| Diesel fuel for transport (car fleet) | low | very low | low |
| Gas oil for generators | low | very low | low |
| Heating oil | low | very low | low |
| Methane gas for heating | very low | very low | very low |
| Leakages of fluorinated greenhouse gases | low | very low | low |
| **Scope 2** | | | |
| Electricity (location-based) | very low | very low | very low |
| District heating | very low | very low | very low |
| Centralized heating | high | very low | high |
| **Scope 3** | | | |
| Business travel | | | |
| By air (with RFI) | very low | medium | medium |
| By train | very low | medium | medium |
| By ship | very low | very low | very low |
| By private car | very low | very low | very low |
| By taxi | very low | very low | very low |
| By chauffered car | medium | very low | medium |
| By corporate shuttle bus | very low | very low | very low |
| Overnight stays | very low | very low | very low |
| Bank staff commuting | very low | medium | medium |
| Remote working of Bank staff | high | very low | high |
| External staff commuting | medium | high | high |
| Energy-related activities | | | |
| Petrol for transport | low | very low | low |
| Diesel fuel for transport | low | very low | low |

*continues*

*continues:* Table a17

## Assessment of uncertainty in the calculation of GHG emissions

| | Uncertainty in activity data | Uncertainty in emission factors | Compound uncertainty |
|---|---|---|---|
| Gas oil for generators | low | very low | low |
| Heating oil | low | very low | low |
| Methane gas for heating | very low | very low | very low |
| Electricity (purchased) | very low | very low | very low |
| Electricity (self-produced) | low | very low | low |
| Water | low | very low | low |
| Paper for publications | low | very low | low |
| Office paper | | | |
| Purchases | low | very low | low |
| Other paper waste | low | fair | fair |
| Toner cartridges | | | |
| Consumption | low | fair | fair |
| Waste | fair | very low | fair |
| Furniture | | | |
| Consumption | low | fair | fair |
| Waste | fair | very low | fair |
| IT equipment | low | very low | low |
| Canteen services | very low | fair | fair |
| Transportation of paper and ink for the production of banknotes | low | fair | fair |
| Paper and ink for the production of banknotes | low | low | low |
| Waste from the banknote production process | low | very low | low |
| Transportation of banknotes | | | |
| By air (with RFI) | low | low | low |
| Landborne | low | very low | low |
| Waste consisting of shredded banknotes | low | very low | low |

See 'Assessment of uncertainty in the calculation of GHG emissions' in the Methodological Notes.

# *methodological notes*

This section contains methodological information such as: details of the extent of the buildings and activities to which the indicators and information contained in the Environment Report refer (organizational boundaries); the standards and guidelines used; and the information sources from which the factors used for the calculation of environmental indicators are taken.

Details are also given on how these indicators are calculated, divided into headings and sub-items:

– fuel consumption, electricity, water, paper and toners;

– greenhouse gas emissions;

– emissions of other pollutants;

– environmental indicators for investments;

– waste generation.

The section concludes with: the percentage change in the emission factors; the methodology for assessing the uncertainty of greenhouse gas emission data; and a matching table between the information required by the Global Reporting Initiative (GRI) reporting standard and the sections of the Environment Report in which this information is reported.

**Aggregated statistics and reference publications**

The data in this edition of the Environment Report refer to organizational boundaries consisting of:

– Bank staff, with the exception of staff seconded to external institutions;

– the buildings in Rome and Frascati (including the Carlo Azeglio Ciampi Centre for Monetary and Financial Education, the Salone Margherita theatre, archives and warehouses not staffed by Bank employees and authorized garages), the building that houses the Milano Hub innovation centre, branches operating in Italy, including the Sadiba Training Centre in Perugia, closed branches, and the London, New York and Tokyo Delegations.

The figures showing the words 'Bank of Italy' in the title illustrate the data relating to the boundaries thus outlined; in the others, the reference building or activity is specified.

As regards the calculation of environmental indicators per employee (e.g. water consumption per employee), the presence of staff belonging to external firms and of Carabinieri police officers was not taken into account, even if their respective activities were carried out continuously within the buildings.

The data in this edition of the Environment Report were updated up to 31 December 2022. The baseline year chosen for calculating changes in key environmental indicators is 2019, the last year before the pandemic.

The percentages reported in the text and infographics have been calculated from unrounded data.

**Reference standards and guidelines**

The contents and quantitative indicators of the Report were prepared using the following methodologies:

– Global Reporting Initiative (GRI) Standards, 2016;

– Linee guida sull'applicazione in banca degli standard GRI in materia ambientale, ABI Lab, 2022 (ABI Lab guidelines).

With specific regard to the calculation of greenhouse gas emissions,

reference was also made to the following methodologies:

- A Corporate Accounting and Reporting standard, Greenhouse Gas (GHG) Protocol, 2015;
- UNI EN ISO 14064-1:2019 Gas ad effetto serra – Part 1, 2019 (ISO 14064) and UNI ISO/TR 14069:2017 Greenhouse gases – Quantification and reporting of greenhouse gas emissions for organizations – Guidance for the application of ISO 14064-1, 2017.

**Information sources**

Information sources available up to 31 December 2022 have been used for the calculation of environmental indicators and greenhouse gas emissions unless otherwise specified.

For the calculation of greenhouse gas emissions, the publications and databases of the Institute for Environmental Protection and Research (Ispra) have been used, including:

- the Italian Greenhouse Gas Inventory report 1990-2020. National Inventory Report 2022 (NIR 2022) and in particular Annex 6 National Emission Factors;
- the Common Reporting Format 2022 (CRF 2022), published together with the NIR 2022, and in particular Table1.A(a)s4;
- the emission factors database.

In the absence of nationally determined emission factors, the following international databases were used for the calculation of greenhouse gas emissions:

- the Climate change 2021 report: the physical science basis, Working Group I contribution to the Sixth Assessment Report (AR6) of the Intergovernmental Panel on Climate Change (IPCC);
- the emission factors database of the Department for Environment, Food and Rural Affairs (Defra) of the British Government;
- the emission factors database of the French Government's Environmental Transition Agency (Agence de l'environnement et de la maîtrise de l'énergie, Ademe). For the calculation of greenhouse gas emissions for business travel, the following were used:

For the calculation of greenhouse gas emissions of business travel, the following were used:

- the International Civil Aviation Organization (ICAO) calculator for emission factors, the length of the routes flown and the weight of fuel used for each flight;
- the Ecopassenger calculator developed by the International Railways Union (UIC) in agreement with the Sustainable Development Foundation, the Institut für Energie und Umweltforschung Heidelberg (IFEU) and Hacon Ingenieurgesellschaft mbH and the Ecotransit World calculator developed by the Smart Freight Centre in agreement with the Global Logistics Emissions Council, for the emission factors and the length of train routes respectively.

For the calculation of the emissions relating to the provision of canteen services, the emission factors database of the French Agribalyse programme on ready-to-eat food products was used.

## Consumption of fuel, electricity, water, paper and toner

*Fuel consumption.* – The consumption of fuels (methane gas, diesel and petrol) for heating purposes and other uses (e.g. transport, generators) was obtained from the direct reading of meters or from the corresponding bills. In the case of methane gas, the metered consumption values have been multiplied by the respective conversion factors in order to determine the consumption expressed in standard cubic metres (Smc).

Estimates have been used for the three representative offices in London, New York and Tokyo and for rented buildings, for which no methane gas consumption data are available. The consumption at the three representative offices was obtained by multiplying the average methane gas consumption of the branches opened in the reference year (expressed in Smc/m³ of heated volume) by the volume (in m3) of each office (this volume was estimated by multiplying the net surface area of each office by an average height of 3 metres). The consumption for rented buildings was obtained by multiplying the consumption in the reference year (expressed in Smc/m³ heated volume) of the most similar building - in terms of installation characteristics and building envelope - by the volume of the rented building.

For 2022, the energy (expressed in gigajoules, GJ) associated with the consumption of gas oil, natural gas and petrol has been calculated using the conversion factors shown in Table A.

**Table A**

**Conversion factors by fuel type**
*(GJ per litre of fuel and GJ per Smc of methane gas)*

| FUEL | GJ produced per unit of fuel |
|---|---|
| Gas oil for generators | 0.0360108 GJ/l |
| Natural gas for heating | 0.0342900 GJ/Smc |
| Heating oil | 0.0360108 GJ/l |
| Diesel fuel for transport | 0.0359940 GJ/l |
| Petrol for transport | 0.0319162 GJ/l |

Source: calculations based on 2022 NIR and 2022 CRF data. Conversion factors based on those reported in the respective updates of NIR and CRF were used for the calculation of the emissions for the years prior to 2022. For further details, see ABI Lab, 'Linee guida sull'applicazione in banca degli Standard GRI in materia ambientale' (only in Italian).

*Electricity consumption.* – Electricity consumption was obtained directly from the distributor and was checked using meter readings located in the various buildings. Data are available for all buildings within the organizational boundaries except for the three representative offices abroad: for the latter, the electricity consumption was estimated by multiplying the average figure for the branches opened in the year in question (expressed in kWh/m³) by the volume of each office.

For the breakdown between renewable and non-renewable energy, the representative offices' consumption was assumed to come from renewable sources.

*Water consumption.* – Water consumption was obtained by direct readings from the meters and checked using the bills. In order to estimate the water consumption of the three representative offices abroad and the rented buildings, the average value for all the Bank's buildings in the year in question (expressed in m3/employee) was multiplied by the number of staff employed by each office or working in the rented building.

*Paper consumption and toner.* – Figures for the actual consumption of office paper and toner are not available, therefore, data on purchases were used. In the case of the printing activities for institutional publications, the actual consumption of paper and toner was reported.

## Greenhouse gas emissions

International standards ISO 14064 and the GHG Protocol classify greenhouse gas emissions into the following categories:

a) direct emissions (Scope 1);
b) indirect emissions from imported energy (Scope 2);
c) other indirect emissions (Scope 3), which are in turn subdivided into:
– from transportation;
– from products used by the organization;
– associated with the use of products from the organization;
– from other sources.

The following are the methodologies for calculating direct greenhouse gas emissions, indirect greenhouse gas emissions from imported energy, transportation and products used, as well as indirect emissions relating to the life cycle of banknotes.

***Direct emissions (fixed and mobile combustion and leakage of fluorinated greenhouse gases)***

*Fossil fuels.* – The consumption of gas oil, natural gas and petrol results in emissions of carbon dioxide ($CO_2$), methane ($CH_4$) and dinitrogen monoxide ($N_2O$): the 2022 greenhouse gas emissions have been calculated using the factors shown in Table B.

**Table B**

**Emission factors by fuel type**
*(grammes of greenhouse gases emitted per litre of fuel and per Smc of methane gas)*

| FUEL | Emissions of carbon dioxide | Emissions of methane | Emissions of dinitrogen monoxide |
|---|---|---|---|
| Gas oil for generators | 2,661.96 $gCO_2/l$ | 0.252084 $gCH_4/l$ | 0.072013 $gN_2O/l$ |
| Natural gas for heating | 1,986.0 $gCO_2/Smc$ | 0.08572 $gCH_4/Smc$ | 0.03429 $gN_2O/Smc$ |
| Heating oil | 2,661.96 $gCO_2/l$ | 0.252084 $gCH_4/l$ | 0.072013 $gN_2O/l$ |
| Diesel fuel for transport | 2,646.0 $gCO_2/l$ | 0.003704 $gCH_4/l$ | 0.0987 $gN_2O/l$ |
| Petrol for transport | 2,332.48 $gCO_2/l$ | 0.315388 $gCH_4/l$ | 0.02894 $gN_2O/l$ |

Source: calculations based on 2022 NIR and 2022 CRF data. Conversion factors based on those reported in the respective updates of NIR and CRF were used for the calculation of the emissions for the years prior to 2021. For further details, see ABI Lab, 'Linee guida sull'applicazione in banca degli Standard GRI in materia ambientale' (only in Italian).

The greenhouse gas emissions associated with the use of each fossil fuel, expressed in tonnes of carbon dioxide equivalent ($tCO_2e$), were derived from the sum of the emissions of carbon dioxide, methane and dinitrogen monoxide, expressed in tonnes, multiplied by their respective global warming potential (GWP)[1], using the formula: $tCO_2e = tCO_2 + 27{,}9\ tCH_4 + 273\ tN_2O$.

*Fluorinated greenhouse gases.* – Direct emissions relating to fluorinated greenhouse gas leakages from air conditioning and heat pumps have been calculated using the GWPs published in the 'Climate change 2021: the physical science basis' report. The calculation of emissions in terms of $tCO_2e$ is performed by multiplying the mass in tonnes of each refrigerant gas by its GWP (Table C).

**Table C**

**GWP of fluorinated greenhouse gases for which leakages occurred**

| FLUORINATED GAS | GWP at 100 years |
|---|---|
| R32 | 771.0 |
| R134A | 1,530.0 |
| R407C | 1,907.9 |
| R410A | 2,255.5 |

Source: 'Climate change 2021: the physical science basis', IPCC Sixth Assessment Report.

### *Indirect greenhouse gas emissions from imported energy*

*Electricity.* – Two different values are provided for the calculation of indirect emissions relating to electricity consumption, calculated according to the market-based and location-based methodologies respectively.

1 For more details, see 'Climate change 2021: the physical science basis'.

The market-based methodology requires emissions to be calculated using factors relating to the sources from which the energy purchased comes, in line with the conditions of the supply contract. The Bank of Italy has been purchasing electricity exclusively from renewable sources since 2013 and consequently, according to the criteria of this methodology, the emissions relating to the electricity purchased are zero.

According to the location-based methodology, greenhouse gas emissions are calculated by applying the national grid-average emission factors, based on the average consumption mix of the Italian grid, from which electricity is consumed (the fuel mix or energy mix). Table D shows the factors used to calculate the emissions of carbon dioxide, methane and dinitrogen monoxide for the purchase of electricity for 2022[2].

**Table D**

**Emission factors for electricity**
*(grammes of greenhouse gases emitted per kWh of electricity purchased)*

| | Emissions of carbon dioxide | Emissions of methane | Emissions of dinitrogen monoxide |
|---|---|---|---|
| Electricity | 260 $gCO_2$/kWh | 0.0176 $gCH_4$/kWh | 0.0028 $gN_2O$/kWh |

Source: calculations based on 2022 NIR and 2022 CRF data. Conversion factors based on those reported in the respective updates of NIR and CRF were used for calculating the emissions for the years prior to 2022. For further details, see ABI Lab, 'Linee guida sull'applicazione in banca degli Standard GRI in materia ambientale' (only in Italian).

The greenhouse gas emissions associated with the use of electricity, expressed in $tCO_2e$, were obtained from the sum of the emissions of carbon dioxide, methane and dinitrogen monoxide, expressed in tonnes, multiplied by the respective GWP, using the formula: $tCO_2e = tCO_2 + 27{,}9\ tCH_4 + 273\ tN_2O$.

2 These factors were calculated on the basis of those reported in the NIR 2022 and the 2022 CRF (see ABI Lab Guidelines for further details). Conversion factors based on those reported in the respective updates of NIR and CRF were used for calculating the emissions for the years prior to 2022.

*District heating.* – District heating uses heat (transported from a fluid such as water) from a production plant (e.g. cogeneration or waste-to-energy plants). In accordance with the ABI Lab Guidelines, indirect greenhouse gas emissions from heat purchased through district heating were calculated using the coefficient provided by Ispra,[3] which was 210.96 $gCO_2$/kWh.

***Indirect transport-related greenhouse gas emissions***

*Business travel by air.* – Indirect greenhouse gas emissions from air travel have been estimated using the ICAO, an online calculator that provides the kilometres and emissions for each air journey, calculated on the basis of:
(a) the aircraft used to travel on individual routes; (b) the routes followed; and (c) passenger load factors.
In line with the information provided by Ademe, for each route, the carbon dioxide equivalent value obtained by the calculator was then multiplied by a radiative forcing index (RFI)[4] of 2.

*Business travel by train.* – Indirect greenhouse gas emissions from train journeys are estimated using the Ecopassenger online calculator. The mileages relating to the journeys were taken from the Ecotransit World online calculator.

*Business travel by ship.* – Indirect greenhouse gas emissions from ship travel have been included in the calculation of the Bank's carbon footprint as of 2022. These emissions were calculated by multiplying the kilometres travelled by employees by the factor provided by Defra of 112,86 $gCO_2$/km.

*Business travel by car.* – Indirect greenhouse gas emissions from the use of private cars for business trips have been calculated by multiplying the kilometres travelled by employees by the average factor provided by Ispra[5] of 166.96 $gCO_2$/km.

*Business travel by taxi.* – Indirect greenhouse gas emissions from the use of taxis have been included in the calculation of the Bank's carbon footprint as of 2022. These emissions were calculated by multiplying the actual kilometres by the average factor used for car business travel provided by Ispra.

*Business travel by chauffeured car service.* – The emissions from the use of chauffeured car services were calculated by multiplying the number of routes by the length of a hypothetical average route (assumed to be 30 km) and by the abovementioned Ispra factor.

*Corporate shuttle buses.* – The company's collective transport system links the various buildings of the Bank located in Rome and Frascati with the main public transport hubs during the working day. The number of trips made and

3 See the Ispra Emission factors database, 'Serie storiche emissioni, Fattori di emissione per la produzione ed il consumo di energia elettrica in Italia'.
4 Radiative forcing is the metric used by the IPCC to assess the human-induced imbalance in the Earth's climate system. In the case of airplanes, the emissions they generate may change the composition of the atmosphere – both in terms of gas input and aerosol formation – and, consequently, the climate.
Aircraft impacts also occur in the upper layer of the troposphere and can lead to climate changes of a different nature than those created by carbon dioxide. Given the difficulty of accurately assessing the overall climate impact of aviation, Ademe proposes the use of an RFI, i.e. a multiplication factor of emissions. In line with these indications, an RFI of 2 was chosen: for each kilogramme of carbon dioxide equivalent emitted for the combustion of the fuel, one additional kilogramme is then taken into account for other aviation-related effects.
5 See the Ispra Emission factors database, 'Serie storiche emissioni, Banca dati dei fattori di emissione medi del trasporto stradale in Italia, auto private' (Passenger cars).

the kilometres for each run are multiplied by the average factor supplied by Ispra[6] of 632,99 $gCO_2$/km. Emissions from corporate shuttle buses are then included in the indirect emissions relating to business trips.

*Nights spent in hotels for business trips.* – Indirect greenhouse gas emissions from overnight stays are calculated by multiplying the number of nights by the emission factor provided by Defra for the city or country in which the hotel facility is located. For countries for which Defra does not provide any emission factor, average emission factors for the geographical reference area have been used.

*Commuting to work by employees and external collaborators.* – A questionnaire was circulated to all employees in December 2020 to estimate the environmental impact of commuting to work before and during the pandemic. The finalization of the section of the questionnaire on environmental impacts and the estimation of carbon dioxide emissions was carried out with the collaboration of the Studies, Analysis and Evaluation Unit of the Italian National Agency for New Technologies, Energy and Sustainable Economic Development (Enea). The analysis of the responses made it possible to calculate the daily carbon dioxide equivalent emissions per employee of 4.837 $kgCO_2e$ before the pandemic (up to and including February 2020) and 6.103 $kgCO_2e$ during the pandemic (the rise is caused by the increased use of private transport during the health emergency). Emissions from staff commuting to work were calculated by multiplying these factors by the number of days worked on-site.

An estimate of the emissions from commuting to work by external staff who regularly access company facilities (employees of external firms, guests, Carabinieri police officers and security staff) was obtained by multiplying the access data of these workers by the same emission factors used for internal staff commuting: external employees were therefore assumed to make the same home-work journey and to use the same means of transportation or combination thereof as internal staff do.

For the calculation of the 2022 emissions, it was assumed that the commuting habits of employees and external collaborators had returned to those of the pre-pandemic period: the factor 4.837 $kgCO_2e$ was therefore used.

*Remote working.* – The emissions associated with the remote working by staff have been estimated, as a first approximation, only taking account of the electricity consumption of a laptop and for lighting the workplace (no account has been taken of the energy needed for cooling and heating remote workplaces). The electricity consumption of a remote working day was calculated as the sum of:

(a) the consumption of a Lenovo ThinkPad T490 PC[7] calculated by multiplying its energy absorption of 24.1 W by 8 hours of operation;

(b) the consumption of one or more compact fluorescent lamps, with a total absorption of 30 W, for 4 hours per day of operation.

The energy consumption thus determined, at 0.3128 kWh per day, was

6 See the Ispra Emission factors database, 'Serie storiche emissioni, Banca dati dei fattori di emissione medi del trasporto stradale in Italia, autobus a diesel' (Buses diesel coaches standard <=18 t Euro VI).

7 These consumptions are described in the manufacturer's technical sheets as Category 1: functional adder allowances (kWh) Field details, according to the Energy Star specification

multiplied by the total number of days worked remotely in one year. The resulting value was then multiplied by the emission factors of the national energy mix (for 2022, see Table D) in order to achieve the corresponding greenhouse gas emissions.

***Indirect greenhouse gas emissions from products used by the organization***

*Emissions from energy-related activities.* – This category includes emissions during all the phases that take place before fuel combustion or energy consumption, such as extraction, transport, construction of production and distribution infrastructure.

In the case of fuels, indirect emissions were estimated using the factors in Table E, provided by Defra.

**Table E**

**Indirect emission factors relating to fuel consumption**
*(grammes of carbon dioxide equivalent per litre and Smc of methane gas)*

| ORIGIN | Emissions |
|---|---|
| Petrol | 602.83 $gCO_2e/l$ |
| Gas oil | 628.74 $gCO_2e/l$ |
| Methane gas | 343.40 $gCO_2e/Smc$ |

Source: Defra.

As regards electricity, the Bank of Italy has purchased energy exclusively from certified renewable sources since 2013.

The Guarantee of Origin (GO) certificates make it possible to derive for each year the composition of the sources of the renewable energy purchased. Indirect emissions relating to the purchase of renewable electricity were then calculated using the factors in Table F, provided by Ademe.[8]

8 Ademe, Consulter les données, 2. Emissions indirectes associées à l'énergie, Energie, Electricité, Moyen de production, Renouvelables.

**Table F**

**Indirect emission factors relating to the renewable energy purchased by the Bank in 2022**
*(grammes of carbon dioxide equivalent per kWh of electricity)*

| ORIGIN | Emissions |
|---|---|
| Hydropower | 16.3 |
| Wind | 15.6 |
| Solar | 43.9 |

Source: Ademe.

For district heating energy, indirect emissions have been estimated using the factor provided by Defra of 27.0 $gCO_2e/kWh$.

*Indirect emissions from water consumption.* – The estimate of indirect emissions from water consumption was made, for both drinking and non-drinking water, by using the factor provided by Defra of 421 $gCO_2e/m^3$, which also takes into account the final treatment and purification phase.

*Indirect emissions relating to purchases of office paper and paper for publications.* – The data on kilogrammes of paper purchased have been multiplied by the factors provided by Defra, i.e. 919 $gCO_2e/kg$ for white paper and 739 $gCO_2e/kg$ for recycled paper; an additive factor of 21.3 $gCO_2e/kg$ has been added to these factors, to take emissions at the final recycling stage into account. These emissions also include those relating to the recycling of archival paper waste (the figure was obtained by multiplying the kilogrammes of archive waste by the Defra factor of 21.3 $gCO_2e/kg$).

*Indirect emissions relating to toner consumption* – Emissions relating to toner consumption have been estimated using a factor of 3.003 $gCO_2e$ per page

in A4 equivalent format: the highest factor included in Ademe's Guide Sectoriel 2012[9] was chosen conservatively, and increased by 30 per cent, in line with the same study, to take into account the fact that the toners consumed by the Bank are new and not reprocessed. The emissions are therefore calculated by estimating the amount of A4 equivalent sheets of paper that can be printed based on the number of toners purchased (see the item 'Fuel consumption, electricity, water, paper and toner'). These emissions also include those relating to waste generated in the printing process for the Bank's publications, mostly consisting of exhausted toner cartridges containing no hazardous substances (the figure was obtained by multiplying the kilogrammes of exhausted toner cartridges by the Defra factor for the recovery of mixed waste, i.e. 21.3 $gCO_2e/kg$).

*Indirect emissions relating to the use of furniture.* – These emissions have been estimated using a monetary factor provided by Ademe,[10] which estimates the emissions relating to the purchase of office furniture at 600 $gCO_2e$ per euro spent, excluding VAT. In line with the GHG protocol, the emissions are fully counted against the year of purchase of the assets and no amortization is made. These emissions also include those relating to the disposal of furniture from the premises in Rome and Frascati (the figure was obtained by multiplying the number of discarded pieces of furniture by an average weight of 30 kg and then by the Defra factor, which was 467 $gCO_2e$ per kg of waste).

*Indirect emissions relating to the purchase of IT equipment.* – Indirect emissions associated with the purchase of laptops, monitors and printers have been calculated using the data, expressed in terms of $kgCO_2e$ relating to the entire life cycle, as shown on the manufacturer's technical sheets, reducing the emissions from the use phase as they have already been included in the Bank's energy consumption. Emissions relating to the purchase of videoconferencing equipment, for which life cycle emission information is not available, were estimated using the factor provided by Ademe[11] for televisions larger than 49 inches. For emissions relating to the purchase of servers, network equipment, data storage equipment and other network hardware, the data shown on the manufacturer's technical sheets were used where possible; if not available, a factor provided by another producer has been used for a similar generic apparatus, not considering the greenhouse gas emissions from the use phase. In line with the GHG protocol, the emissions calculated were fully counted against the year in which the assets were purchased.

*Indirect emissions relating to the provision of canteen services.* – In order to calculate the indirect emissions associated with the provision of canteen services, a survey of the food consumed in six canteens in the Rome area in 2019 was carried out in collaboration with the current service provider. Using the emission factors provided by the Agribalyse programme[12] for agricultural and food products, covering the whole life cycle, total emissions in carbon dioxide equivalent were calculated and then divided by the number

9 Ademe, Guide Sectoriel 2012, Tableau 28: Facteurs d'émissions cartouches et toners d'impression.
10 Ademe, Consulter les données, 4. Emissions indirectes associées aux produits achetés, Achats de services, Ratios monétaires, Service/Meubles et autres biens manufacturés.

11 Ademe, Consulter les données, 4. Emissions indirectes associées aux produits achetés, Achats de matière et de biens, Machines et équipements, Autres, Télévision/49 pouces, Informations additionnelles, Ordinateurs et équipements périphériques, Télévision >49 pouces.
12 Agribalyse, tableur pour les produits alimentaires, prêts à être consommés.

of meals provided by those canteens in 2019 (excluding coffee bars): the calculation made it possible to obtain a value of the emissions per meal delivered of 5.227 $kgCO_2e$.[13] This factor was then multiplied by the number of meals provided in 2019, 2020, 2021 and 2022 in all seventeen internal canteens of the Bank, six of which are in Rome, one in Frascati and ten at some of its branches.

***Indirect greenhouse gas emissions relating to the life cycle of banknotes***

*Raw materials for banknote production.* – Indirect greenhouse gas emissions for the raw materials purchased in the base year for banknote production have been estimated, as a first approximation, using: (a) for paper, the Defra factor for non-recycled paper (919 $gCO_2e/kg$); and (b) for inks, the factor provided by Ademe[14] for offset printing inks (1,870 $gCO_2e/kg$).

*Transportation of raw materials for banknote production.* – For air transport, the ICAO calculator has been used to determine the weight (in kilogrammes) of the fuel consumed to travel between the departure and arrival airports (assuming, as a precautionary measure, that these raw materials are the only item being transported); greenhouse gas emissions were then obtained by multiplying this weight by the aviation spirit factor, provided by Defra, of 3,192.76 $gCO_2e$ per kg of fuel and by a radiative force index of 2. For land-based transport, greenhouse gas emissions have been obtained by multiplying the total kilometres travelled by the average emission factor supplied by Ispra,[15] i.e. 453.1 $gCO_2e/km$.

*Transportation of banknotes.* – For air transport, the ICAO calculator has been used to determine the weight (in kilogrammes) of the fuel used to travel between the airport of departure and the airport of arrival (the transport of the banknotes is always carried out on flights dedicated exclusively to that purpose); greenhouse gas emissions were then obtained by multiplying this weight by the aviation spirit factor, provided by Defra of 3,192.76 $gCO_2e$ per kg of fuel and by a radiative force index of 2 (see: Greenhouse gas emissions, sub-item: Indirect transport-related greenhouse gas emissions). For land transportation, greenhouse gas emissions were obtained by multiplying the total litres of diesel consumed by the average emission factor of 0.35994 GJ/l, provided by Ispra in the NIR 2022.

*Waste relating to the banknote production process.* – The different types of waste associated with the production process were considered to belong to the categories 'paper' or 'mixed'; data on kilogrammes of waste have been multiplied by the Defra emission factors for each type of waste and the final treatment (disposal or recovery (see Table G).

*Waste consisting of shredded worn banknotes.* – Emissions have been calculated by multiplying the total weight of waste consisting of shredded worn banknotes (see item: Generation of waste) sent for recovery and disposal by the respective Defra factors relating to the recovery and disposal of paper waste (Table G).

13 This factor includes a 30 per cent increase to account for uncertainty in the estimation.
14 Cfr. Ademe, Consulter les données, 4. Emissions indirectes associées aux produits achetés, Achats de matière et de biens, Autres produits manufacturés, Consommables de bureau, Encre couleur impression offset.
15 See the Ispra Emission factors database, 'Report e serie storiche emissioni Banca dati dei fattori di emissione medi del trasporto stradale in Italia', Heavy Duty Trucks, Diesel, Rigid 7.5 - 12 t, Euro V, $CO_2$ 2019 g/km totale.

Table G

**Indirect emission factors relating to waste disposal and recovery**
*(grammes of carbon dioxide equivalent per kilogramme of treated waste)*

| TYPE OF WASTE | Final treatment | Emissions |
|---|---|---|
| Paper | recovery | 21.3 |
| Paper | disposal | 1,041.8 |
| Iron | recovery | 21.3 |
| Mixed | recovery | 21.3 |
| Mixed | disposal | 467.0 |

Fonte: Defra.

## Emissions of other pollutants

Consumption of gas oil, natural gas and petrol also results in emissions of nitrogen oxides ($NO_X$) and sulphur dioxide ($SO_2$). The emissions of these pollutants have been calculated using the factors shown in Table H.[16]

Table H

**Emission factors by fuel type**
*(grammes of $NO_X$ and $SO_2$ per litre, per Smc or per GJ fuel)*

| FUEL | Emissions of nitrogen oxides | Emissions of sulphur dioxide |
|---|---|---|
| Gas oil for generators | 1.80012 $gNO_X$/l | 1.68756 $gSO_2$/l |
| Natural gas for heating | 0.973 $gNO_X$/Smc | 0.01 $gSO_2$/Smc |
| Heating oil | 1.80012 $gNO_X$/l | 1.68756 $gSO_2$/l |
| Diesel fuel for transport | 214.244 $gNO_X$/GJ | 0.335 $gSO_2$/GJ |
| Petrol for transport | 57.677 $gNO_X$/GJ | 0.230 $gSO_2$/GJ |

Source: calculations based on ISPRA data.

16 These factors were calculated on the basis of those reported in the Ispra database, Report e serie storiche, Fattori di emissione dalla combustione in Italia anno 2020, table Non industrial, and Banca dati dei fattori di emissione medi del trasporto stradale in Italia, Passenger Cars, Petrol e Diesel, $NO_x$ e $SO_2$, 2020 t/TJ totale.

## Environmental indicators for investments

The indicators used in the Environment Report to assess the environmental profiles of investments are Weighted Average Carbon Intensity (WACI) and Weighted Average Electricity Intensity.[17]

The WACI of each portfolio measures the exposure of issuers with high levels of greenhouse gas emissions. The indicator is calculated by weighting the carbon intensity of each issuer by its weight in the portfolio. For individual equity and bond issuers, the figure is calculated as the ratio of the sum of direct emissions (Scope 1) and indirect emissions from purchased energy (Scope 2) – expressed in $tCO_2e$ – to the respective turnover in millions of euros. For government bonds, carbon intensity is the ratio of the country's greenhouse gas emissions – expressed in $tCO_2e$ – to GDP at purchasing power parity (PPP) in millions of euros.

Like the WACI, the weighted average energy intensity of each portfolio is calculated by weighting the energy intensity of each issuer by its weight in the portfolio. For equity and bond issuers, the energy intensity is the ratio of electricity consumption – expressed in GJ – to the respective turnover in millions of euros. For government bonds, the energy intensity is defined as the ratio of the country's primary energy demand, expressed in MJ, to GDP at PPP in euros.

## Waste generation

This item only reports the data available for: (a) archive waste; (b) furniture, paper and cardboard packaging, and waste produced in the printing of the

17 For more details, see the Bank of Italy's 2022 Report on Sustainable Investment and Climate Risks.

Bank's publications, for the buildings in Rome and Frascati only; and (c) waste relating to the banknote production process and waste consisting of shredded worn banknotes. The weight of the latter has been estimated by multiplying the number of shredded worn banknotes by the average weight of a euro banknote (i.e. 0.88 g/banknote). For other types of waste, no detailed data have been provided as they are not available.

## Update of emission factors

The factors for calculating greenhouse gas emissions are continuously updated. Table I shows the emission factors that have changed by more than 5 per cent since 2021.

If this change exceeds 50 per cent, the time series of greenhouse gas emissions is reconstructed.

**Table I**

**Percentage change in emission factors**

| EMISSION FACTOR | Scope | Source | Percentage change 2021-22 |
|---|---|---|---|
| Electricity | Scope 2 (Table D) | Ispra / NIR | -6.5% |
| Gas oil | Scope 3 (Table E) | Defra | +30% |
| Hydropower | Scope 3 (Table F) | Ademe | +25% |
| Water | Scope 3 | Defra | -60% |

## Assessment of uncertainty in the calculation of GHG emissions

In line with the requirements of international methodologies, an assessment of the uncertainty in the calculation of greenhouse gas emissions was carried out: specifically, a semi-quantitative criterion was used to determine the uncertainty associated with the source of the activity data and with the emission factor (Table J). Based on this information, the compound uncertainty for each direct and indirect emission source is estimated.

**Table J**

**Assessment of uncertainty in the calculation of GHG emissions**

| UNCERTAINTY | Uncertainty in activity data | Uncertainty in emission factors |
|---|---|---|
| High | The data are estimated (e.g. based on studies or comparable situations). | The emission factors are estimated as a first approximation but are still very general. |
| Medium | Data are available but incomplete (e.g. not available for the entire assessment period) or only data on costs are available. | The emission factors are available but are either not very specific and robust or they are monetary factors, which estimate the carbon footprint based on the cost incurred. |
| Low | The data are complete and reliable, but may have some inaccuracies/ omissions which, however, do not have a significant impact on the results. Assumptions and estimates are kept to a minimum. | The emission factors are specific and robust, but may still have a degree of uncertainty. Some average factors from sources such as Ademe or Defra fall into this group. |
| Very low | The data are complete and reliable, and are obtained from measurements and meter readings. No assumptions or estimates are made. | All emission factors are specific and reliable and are taken from widely used databases such as Ademe or Defra. |

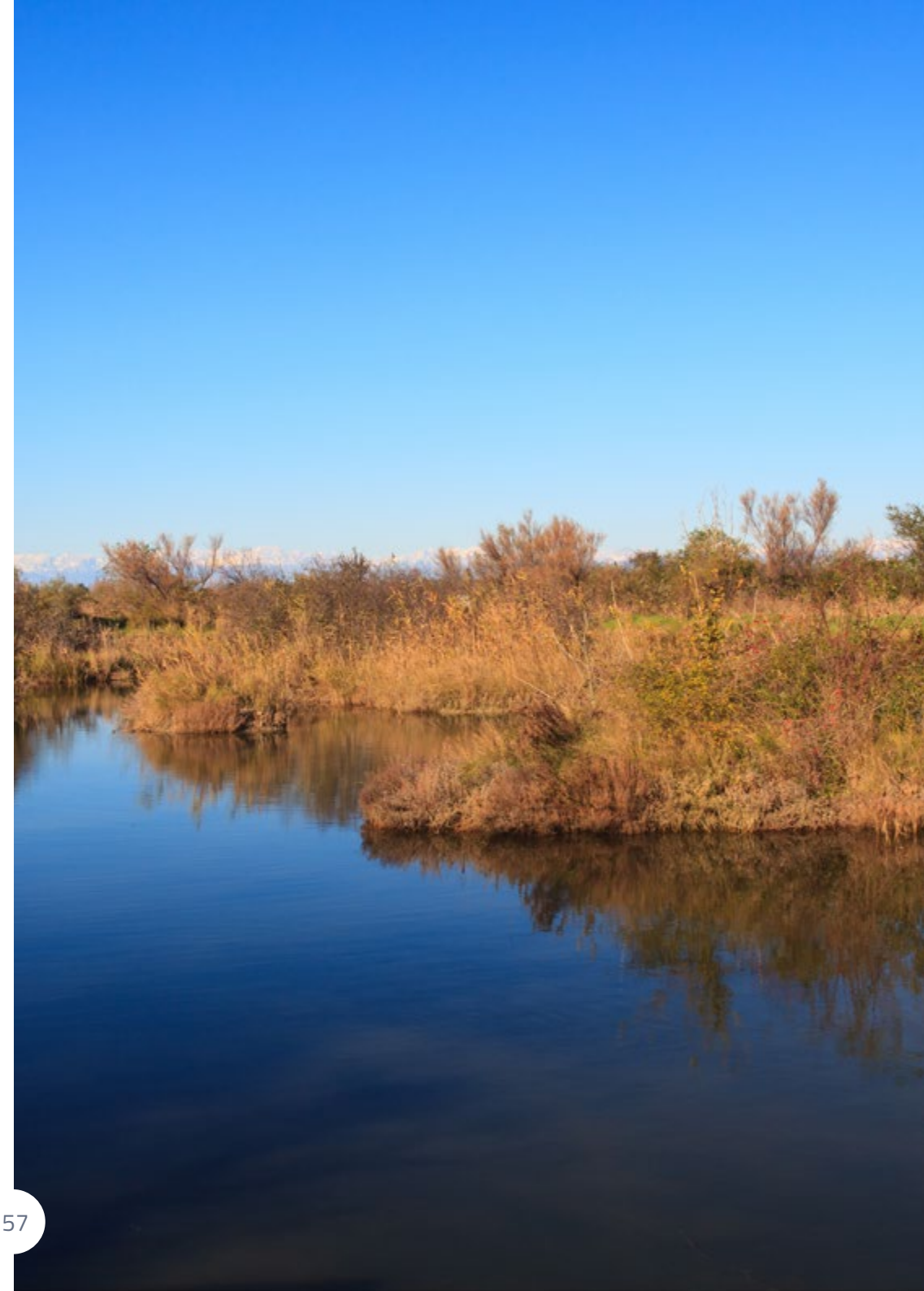
## Feedback table for information required by the GRI standards

Table K shows the correspondence between the indicators required by the GRI reporting standards, the pages of the 2023 Environment Report and the statistical tables where the indicators are contained.

**Table K**

**IIndicators required by the Global Reporting Initiative (GRI) reporting standard**

| GRI STANDARD | Definition of the standard | Page reference | Statistical tables |
|---|---|---|---|
| 103-2 | The management approach and its components | 4-8 | a1; a2 |
| 301-1 | Materials used by weight or volume | 4-21 | a10-a12; a14 |
| 301-2 | Recycled input materials used | 15-17 | a10 |
| 302-1 | Energy consumption within the organization | 9-13 | a4-a5; a7 |
| 302-3 | Energy intensity | – | a4 |
| 302-4 | Reduction of energy consumption | 9-13 | a4; a7 |
| 303-1 | Interaction with water as a shared resource | 14 | a8-a9 |
| 305-1 | Direct GHG emissions (Scope 1) | 6-8 | a2-a3; a6 |
| 305-2 | Indirect GHG emissions from energy consumption (Scope 2) | 6-8 | a2 |
| 305-3 | Other indirect GHG emissions (Scope 3) | 6-8 | a2 |
| 305-4 | GHG emissions intensity | – | a2 |
| 305-5 | Reduction of GHG emissions | 6-8 | a2 |
| 305-7 | Nitrogen oxides ($NO_x$), sulphur oxides ($SO_x$), and other significant emissions | – | a6 |
| 306-3 | Waste generated | 18-21 | a13-a14 |
| 308-1 | New suppliers assessed using environmental criteria | 25-26 | – |




*Printing of documents results in electricity, paper and toner consumption, resulting in carbon dioxide emissions and environmental impacts.*

*This document has been optimised for reading on screen.*
*Don't print it.*