

# ENVIRONMENT REPORT 2022



BANCA D'ITALIA  
EUROSISTEMA



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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, beginning with the institutions.

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. Last year, on the occasion of the United Nations Conference on Climate Change COP26, the Bank reiterated its [commitment](#) to countering climate change and in favour of measuring and managing the connected risks.

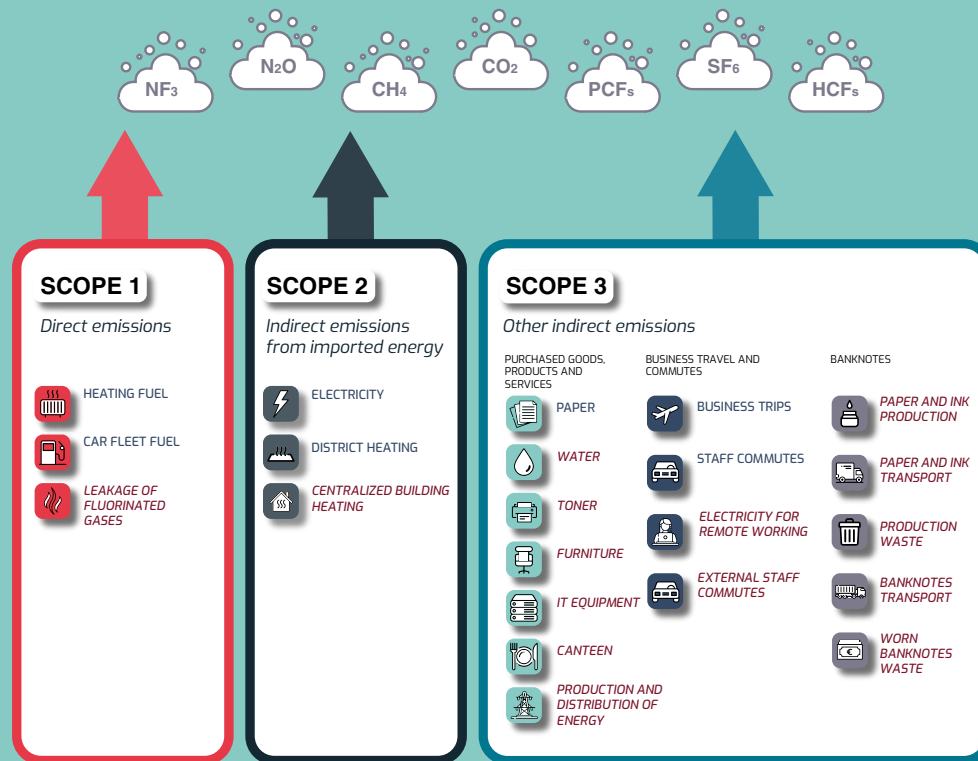
## at a glance

The *Environment Report*, published by the Bank of Italy for the first time in 2010, reports on the impact of its own activities on the environment and the measures taken to reduce it. This year's edition contains two new sections – one with statistical tables giving detailed quantitative indicators, and the other with some methodological notes on how these environmental indicators are calculated. This methodology has been revised and updated since the last edition of the report, especially as regards greenhouse gas (GHG) emissions (see '*Greenhouse gas emissions*' in the Methodological Notes). Specifically, starting from the three-year period 2019-21, the boundaries have been extended for calculating the Bank's carbon footprint, mainly to take account of indirect emissions along the entire value chain (*Scope 3*; see the box '*Extended boundaries for measuring greenhouse gas emissions*'). In addition, starting this year, some other buildings were added to the energy-use calculations, including the Bank's '*Sadiba*' training centre in Perugia (see '*Organizational boundaries*' in the Methodological Notes). These changes mean that it is not possible to make a direct comparison between the data given in the 2022 edition of the Report with those of previous years. The methodological choices made are based on best practices and the emission factors databases currently available. They are therefore subject to continuous scrutiny and may evolve in line with new developments.

## EXTENSION OF THE BOUNDARIES FOR MEASURING GREENHOUSE GAS EMISSIONS

In the previous edition of the *Environment Report*, besides direct emissions from the use of fossil fuels (*Scope 1*) and indirect ones resulting from the use of electricity and district heating networks (*Scope 2*), the only other indirect emissions counted were those associated with the purchase of paper, business travel and staff commuting (*Scope 3*).

Starting with this year's report and with reference to 2019 data, emissions from fluorinated gas leakages (*Scope 1*) and centralized heating (*Scope 2*) were also included. Furthermore, there was a significant extension of the boundary for calculating the *Scope 3* category, which also includes: (a) purchased products, goods and services (such as furniture, IT equipment, water, toner, canteen services and those connected with energy production and distribution);



*The emissions included in the calculation of the Bank's carbon footprint, starting with this edition of the Environment Report, are given in italics.*

(b) transport (electricity consumption of staff working remotely and commutes of external staff; (c) banknotes (the entire life cycle: production and transportation of paper and inks, production waste, transportation of the banknotes to and from other central banks and between branches, and waste from the shredding of worn banknotes). As a result of these changes, *Scope 3* emissions, which accounted for less than one third of total emissions before the boundaries were extended, now make up more than 60 per cent of the Bank's carbon footprint. Overall, the emissions calculated according to the new boundaries are almost double those recorded previously.

The Methodological Notes describe these changes in detail, highlighting the difficulties encountered when calculating the *Scope 3* emissions. As regards these emissions in particular, the methodologies have not yet been standardized and so they are discordant, are constantly evolving and require many approximations and estimates.

### The Bank's carbon footprint

Considered on this broader basis, total GHG emissions in 2021 remained broadly stable compared with the previous year, at levels around 20 per cent lower than in 2019, the last pre-pandemic year (Figure 1; Table a2). On the more restricted basis used in the past, there was a 61 per

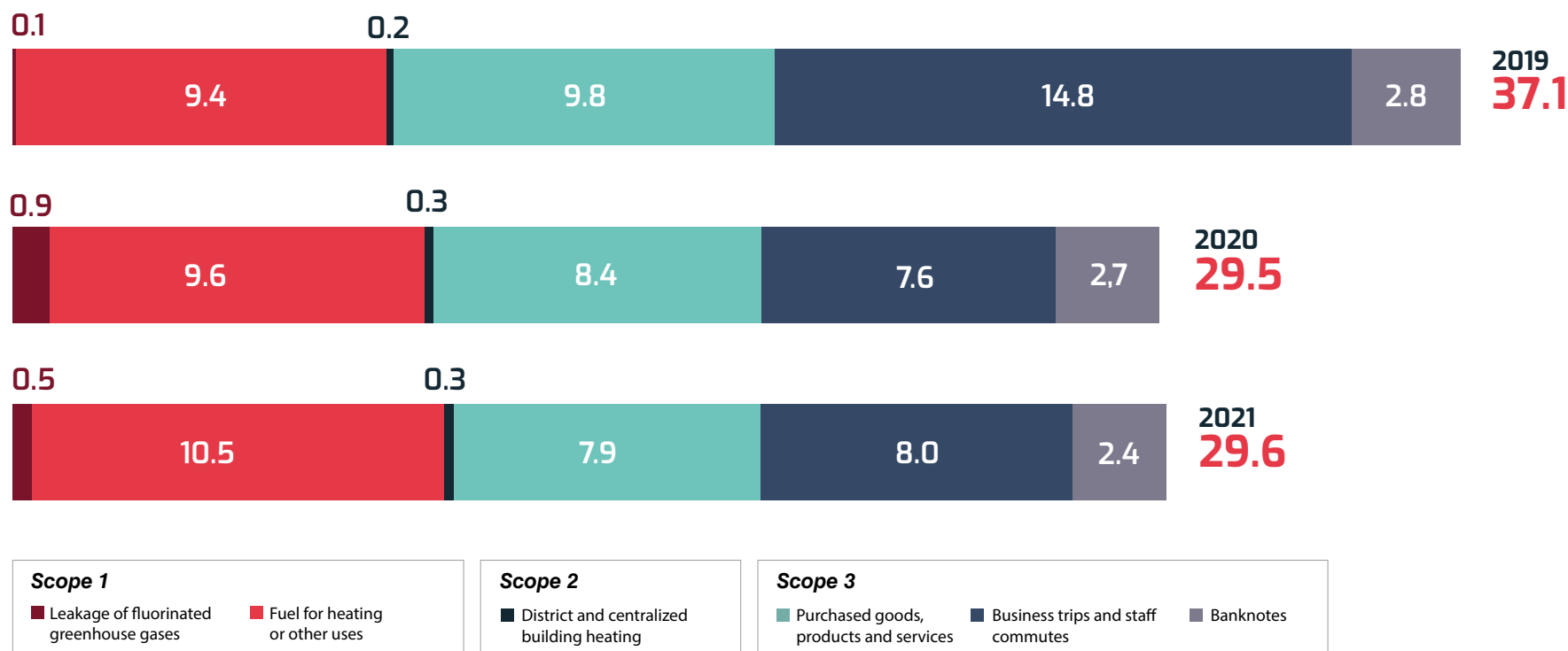
cent decline in emissions between 2010 and 2019, mainly thanks to the purchase of electricity exclusively from renewable sources since 2013.

As in 2020, the Bank of Italy's activities and their impact on the environment were affected in 2021 by the COVID-19 pandemic. Remote working accounted on average for around 59 per cent of the total (no

FIGURE 1

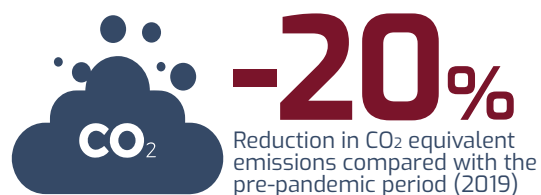
### CARBON FOOTPRINT - BANK OF ITALY

CO<sub>2</sub> equivalent emissions 2019-2021 <sup>(1)</sup> <sup>(2)</sup> <sup>(3)</sup>  
(thousands of tonnes of CO<sub>2</sub> equivalent)



(1) For the purpose of comparison with the 2021 figures, data for 2019 and 2020 were recalculated according to the new methodology and the new reporting boundaries. Using the previous methodology, total GHG emissions in 2019 and 2020 were, respectively, 20.1 and 14.5 thousands of tonnes. – (2) The emissions from electricity consumption were put at zero, according to the market-based approach, since it came exclusively from renewable sources (see 'Greenhouse gas emissions', a sub-item of 'Indirect greenhouse gas emissions from imported energy' in the Methodological Notes). – (3) Possible discrepancies in totals are due to rounding.

change compared with 2020, against 4 per cent in 2019). There was an increase in heating fuel consumption between 2019 and 2021, primarily due to the need to ensure clean air circulation to reduce the risk of infection (see the section: 'Energy').



Moreover, there has been a steady reduction in emissions for the purchase of products, goods and services and for those relating to the life cycle of banknotes (see the section 'Banknotes').

The emissions relating to business travel were still in line with the previous year, while there was an increase in emissions from commutes by in-house

and external staff working in the Bank, as a result of the greater use of private vehicles rather than public transport (see the section 'Sustainable mobility').

In the last year, the Bank has made great progress in the area of sustainable investments (see the section 'Sustainable investment').

In addition, since January 2022, the Bank has become a member of the Steering Committee of the Network for Greening the Financial System (NGFS), which is composed of more than 116 central banks and supervisory authorities. It coordinates research and the sharing of experiences on sustainable finance and on the strategies to reach the goal of net zero emissions (see the section 'Eco-friendly culture').

In order to give further impetus to environmental action, internal organizational arrangements were revised and strengthened in early 2022 (see the box. 'Organizational changes in relation to the environment and sustainability').



## ORGANIZATIONAL CHANGES IN RELATION TO THE ENVIRONMENT AND SUSTAINABILITY

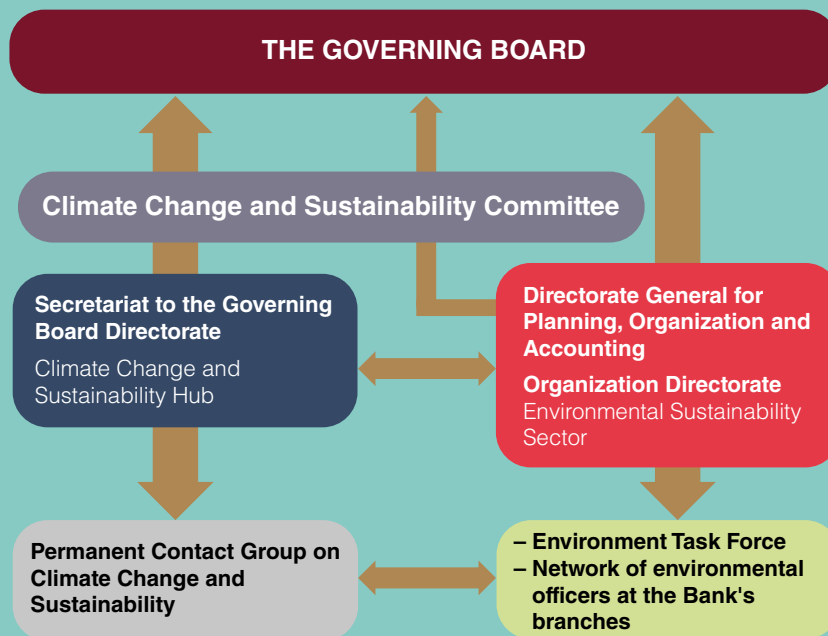
In 2022, the [Climate Change and Sustainability Committee](#) was set up, presided over by a member of the Governing Board. It will contribute to defining the Bank's strategy in this area and will coordinate actions on various fronts.

The Bank has also set up a Climate Change and Sustainability Hub, which will coordinate institutional activities in relation to the environment and interact with similar units created by other central banks and national and international institutions. The Hub, which is part of the Secretariat to the Governing Board, collaborates with experts in the field, who work in the areas of economic research,

financial stability, markets and supervision, and are part of a permanent contact group on climate change and sustainability.

In 2021, project coordination was strengthened to reduce the carbon footprint of the Bank's internal operations through the creation of the Environmental Sustainability Sector within the Organization Directorate.

This sector leverages on the collaboration of an Environmental Task Force, composed 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.





# energy

The Bank is committed to progressively reducing energy consumption and the 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 panels. Electricity is purchased exclusively from renewable sources.

The Bank carries out its work in more than 60 buildings across the country. The four main sites in Rome (Centro Donato Menichella (CDM) in Frascati, Palazzo Koch, the banknote production plant, and the building in Largo Bastia) account for more than 60 per cent of the Bank's electricity and heating requirements (Figure 2; Table a7).

## ENERGY - BANK OF ITALY

Energy consumption (per cent)

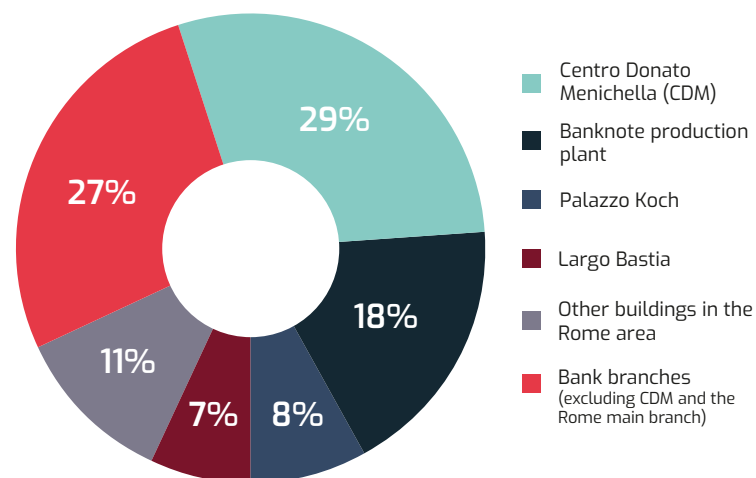


FIGURE 2

## Use of renewable resources

Since 2013, the Bank has purchased electricity exclusively from certified renewable sources. Around 60 per cent of the renewable energy purchased in 2021 came from wind farms, 25 per cent from solar panels and the rest from hydroelectric plants (Table a5).

The Bank's own photovoltaic panels at the banknote production plant and at the buildings housing the Catania and the Catanzaro branches, produced more than 61,000 kWh of electricity, i.e. 0.1 per cent of total annual electricity consumption, recording an 8.3 per cent fall in production compared with 2020 (Table a4).

In 2021, following some updates to the regulations, it was necessary to re-apply for authorization to install photovoltaic panels on the roof of the parking areas at the Centro Donato Menichella. Once they have been installed, they will produce around 380,000 kWh per year.

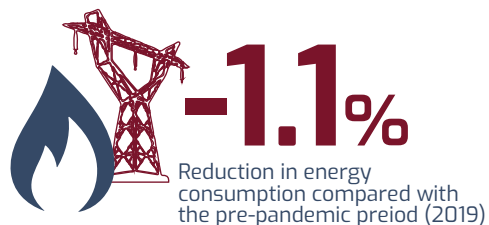
In 2022, a small photovoltaic installation at the Genoa branch will be activated. Another such plant is going to be installed on the roof of the Sassari branch and the one at the Catanzaro branch is going to be extended. Once the preparatory activities have been completed and the necessary authorizations obtained, starting in 2023 photovoltaic panels will be installed on the roofs of the branches of Arezzo, Livorno, Florence, Ancona and L'Aquila.

## Maintenance work

The electricity and heating energy consumption of the Bank's buildings depends on several variables, including the type of technological systems,

the characteristics of the building envelope, the volume of the rooms to be cooled and heated, the climate zone, the type of activity carried out, the presence of IT equipment and machinery (e.g. for the production or sorting of banknotes, and the printing of publications).

The Centro Donato Menichella is certified under the international standard ISO 50001. It is the site that consumes the most energy (mainly because it houses one of the Bank's data processing centres; see Table a7). The implementation of an integrated system of meters to monitor electricity and heating energy consumption continued in 2021. Work has also started on replacing the cooling towers (these disperse the heat produced by the air-conditioning systems): the new equipment will reduce annual electricity consumption by 400,000 kWh (equivalent to 1.8 per cent of the total) and non-drinking water by about 15,000 cubic metres (13 per cent of the total). Furthermore, the programme to replace old light fittings with LED lighting continued in another part of the building: once completed, this will reduce electricity consumption by approximately 67,000 kWh a year.



In the banknote production plant, which is the building with the second highest energy use, a multi-annual project was launched to build a new low-voltage electricity plant, including the installation of meters to record the electricity consumption.

At Palazzo Koch, the renovation of the thermal power plant was completed with the installation of high-efficiency condensing boilers and a weather-predictive management system. This reduced the building's methane gas consumption in the first few months of 2022 by 18 per cent compared with the same period in 2021. A number of measures have also been taken to reduce energy consumption further, including the use of free cooling (i.e. outdoor air to cool the new processing centre) during the winter season and at night.

In the other buildings in Rome and at the branches, a number of energy efficiency improvements are under way, including: the renovation of the air-conditioning systems; the installation of smart systems with human presence sensors to regulate the temperature in the workplace; the replacement of windows; and the installation of high-efficiency LED lighting. The refurbishment of the façades at the building in Via Milano 60 in Rome is almost complete. There is also a tender procedure under way for more building work and the reorganization of the installations inside the premises (see the box 'Major works at Via Milano 60 in Rome'), which will reduce energy requirements per square metre by approximately two-thirds (the building's energy class will go from its current Class E to A2).

At the Cagliari branch, the heat pump system used for cooling the building was also used for heating during the winter season 2021-22, saving approximately 30,000 litres of diesel oil and reducing the associated GHG emissions by about 80 tonnes of carbon dioxide equivalent.

Last year, for some of its branches, the Bank signed the 'Consip SIE4' (the fourth edition of an integrated energy and connected services convention) rather than going ahead with specific expenditure measures. The SIE4

## MAJOR WORKS AT VIA MILANO 60 IN ROME

The building at Via Milano 60, which was built between 1958 and 1961, once housed the Bank of Italy's Rome main branch office.

The new systems were designed using the most advanced energy-saving standards that are compatible with the site.

The main technological solutions that will be adopted are as follows:

- the use of electric heat pump systems for winter and summer air-conditioning and for the production of domestic hot water;
- an installation management system that regulates the microclimate and lighting in function of the presence of people and of the external lighting and heat inputs;
- high-efficiency LED lighting;
- a rainwater recovery system that can be reused for irrigation and non-drinking water uses.

The planned measures will make it possible to avoid the everyday use of fossil fuels (methane gas and diesel oil), with benefits in terms of lower direct GHG emissions.

covers the management, running and maintenance of air-conditioning, water supply and electric systems and the supply of electricity and heating fuels. It provides for the achievement of specific energy-saving

targets through a series of energy upgrade measures, including: the implementation of a power monitoring system; the renewal of technological and lighting systems; the improvement of automatic adjustment systems; the construction of shading systems and the installation of photovoltaic systems. To date, this convention is in use at the Bank's branches in Genoa, Piacenza and Bologna, while the branches in Milan, Forlì, Padua, Lecce and some others will sign up later.

### Green IT

The lighting in the rooms housing the data processing centres was optimized in 2021 with both the installation of automatically activated LED lighting inside the cabinets that contain the servers and a reduction in centralized lighting. In addition, a project is under way to phase out the use of personal printers by 2024. They will be replaced by centralized multi-purpose equipment for shared use, with benefits in terms of lower energy consumption and GHG emissions.

### Awareness-raising

On 11 March 2022, the Bank took part in the Italian Energy Saving Day *M'illumino di meno* celebrated annually, as usual, by turning off the external lighting of its buildings. In addition, on 26 March, together with the [European Central Bank](#) (ECB) and other European central banks, the Bank of Italy joined in the global *Earth Hour* promoted by the World Wildlife Fund (WWF). In June 2022, staff were informed about the [UN World Environment Day](#) and received guidance on changes in office behaviour to help reduce energy consumption and GHG emissions.



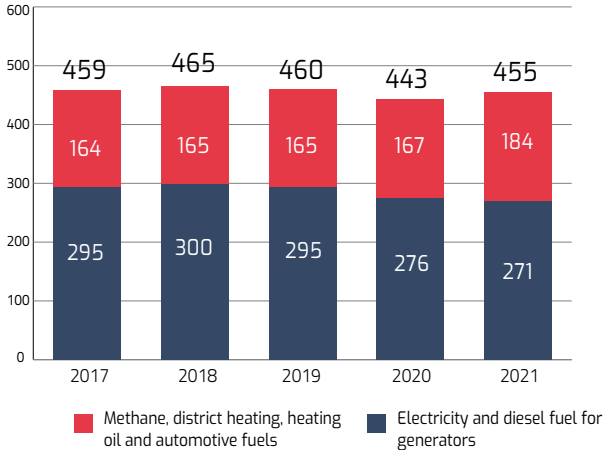
### Energy consumption

In 2021, energy consumption for heating and for running vehicles increased while electricity consumption fell (Figure 3 and Table a4). It fell in almost all the Bank's buildings (Figures 4 and 5; Table a7) but there was a slight increase at Palazzo Koch, following the installation of a new 90 kW data processing hub, and at the other buildings in the Rome area which, since

### ENERGY - BANK OF ITALY

FIGURE 3

Energy consumption (terajoules)



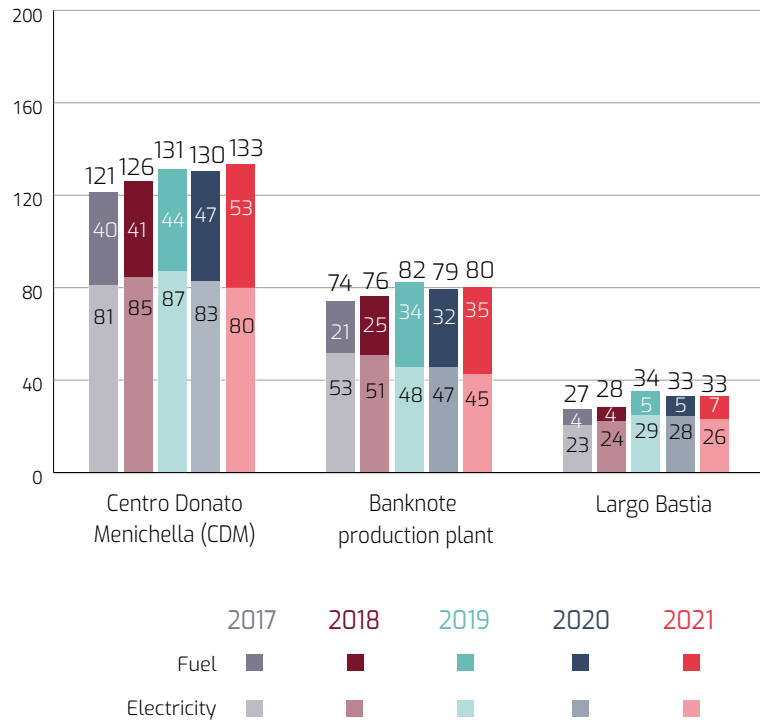
2021, include the two new rented buildings in Via del Traforo and Via di San Vitale.

There was an increase in the consumption of methane gas for heating at all the buildings (Figures 4 and 5; Table a7), largely due to the temporary decommissioning of the air recirculation systems in line with the national protocols to combat the spread of the coronavirus: according to these protocols, outdoor air had to be used to change the air inside the buildings and be adequately heated and treated before passing into the work environment.

## ENERGY - BANK OF ITALY

Energy consumption (terajoules)

FIGURE 4



In order to resolve this problem, high-efficiency filters were installed at the Centro Donato Menichella and in other buildings, making it possible to use recirculated air without compromising workers' health.

Changes in outdoor temperatures also contributed to the increase in demand for energy for cooling in the summer months and heating in the colder ones<sup>1</sup>.

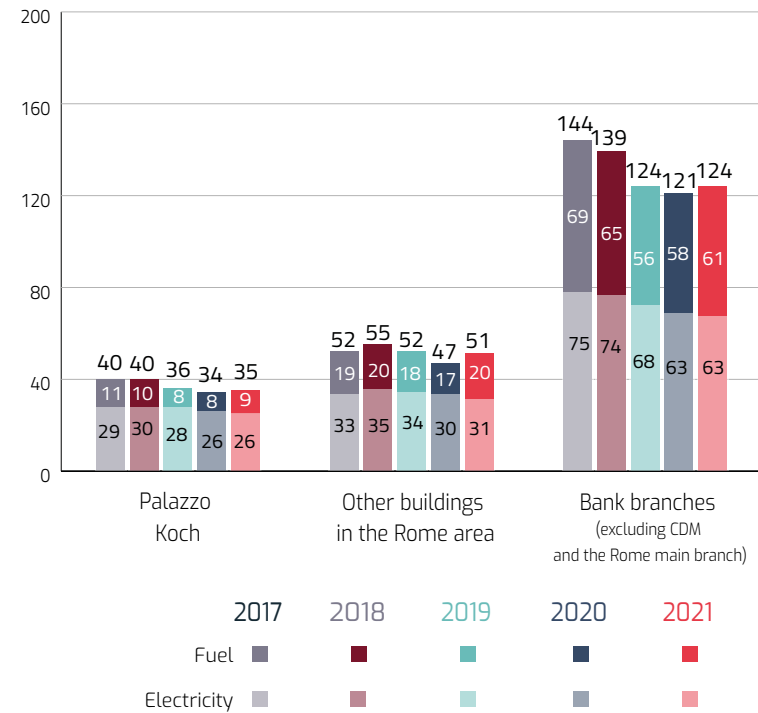
Since 2022, in line with the provisions of [Law 34/22](#), the necessary

<sup>1</sup> For further details, see *Analisi trimestrale del sistema energetico italiano*, ENEA, 2022.

## ENERGY - BANK OF ITALY

Energy consumption (terajoules)

FIGURE 5



measures were taken to limit the consumption of fossil fuels by regulating the temperature in the workplace (not less than 27 °C in summer and not more than 19 °C in winter).

Looking ahead, new systems will be designed with ways to deactivate heating and cooling in spaces not occupied by staff, with benefits in terms of reduced energy consumption.

# water

We are trying to progressively reduce 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 cooled water).

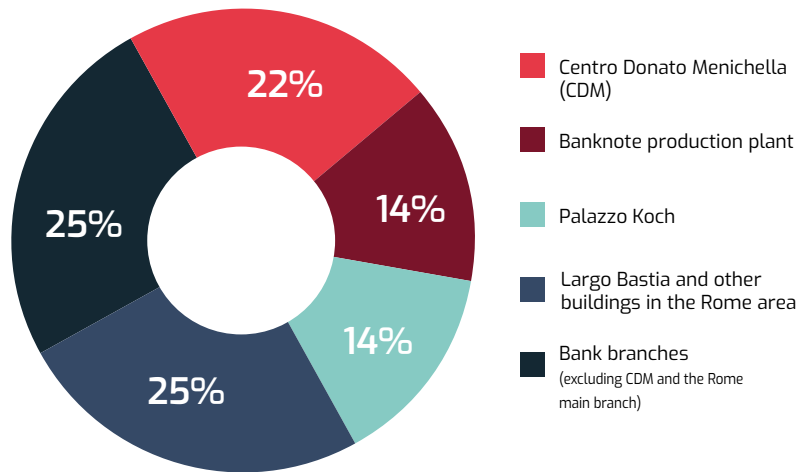
The Centro Donato Menichella, Palazzo Koch and the banknote production plant are the sites with the highest number of people; they consume about half of the total drinking water used (Figure 6; Table a9).

In 2021 total consumption was around 239,000 cubic metres, slightly up from the previous year (+2.2 per cent) but still below 2019 levels (-14 per

## WATER - BANK OF ITALY

Drinking water consumption (per cent)

FIGURE 6

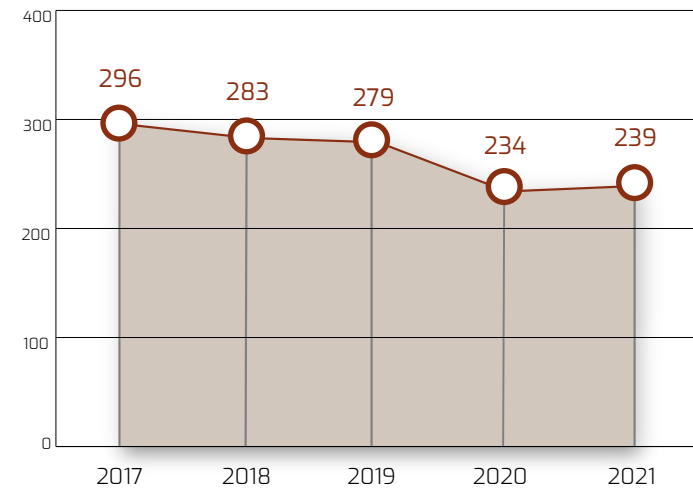


cent), mainly because of the reduced number of people in the workplace compared with the pre-pandemic period (see Figure 7 and Table a8).

## WATER - BANK OF ITALY

FIGURE 7

Drinking water consumption (thousands of cubic metres)



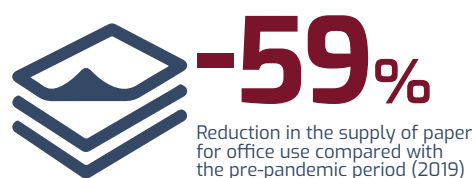
During the year, a number of water reduction and efficiency interventions were adopted. These include: the replacement of a reverse osmosis system with a water softener at the Reggio Calabria branch; the repair of a well at the Arezzo branch, so that non-drinking water can be used for the irrigation of green areas.

# paper

*We are committed to reducing paper consumption by streamlining and digitalizing processes and dematerializing documents and publications.*

## Office paper

In 2021, more than 82 per cent of the Bank's external communications were digital (92 per cent in terms of pages sent); internal communications have been exclusively digital for several years now. Increasingly, the general public has been making use of the platform 'Online Services for the Public', available since 2019, to send reports and access the Bank's information services.



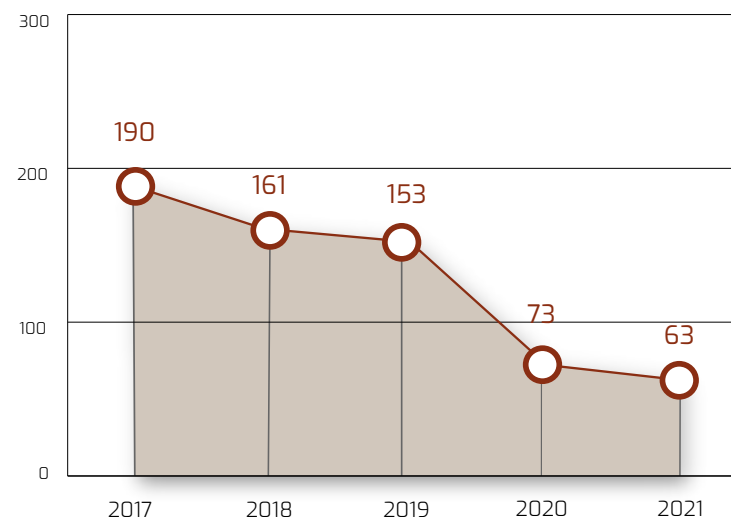
Almost all internal work processes are paperless, with the exception of some processes relating to state treasury services – which will be digitalized shortly – and of branch business processes. With regard to the latter, an IT application will become operational in October 2022 that will streamline work processes significantly and almost completely eliminate the use of paper forms, saving an estimated 5 million sheets per year.

The digitalization of the archives continued throughout 2021, with a substantial portion of the Bank of Italy's historical documentary heritage having been 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 any original paper documents registered after 2009 as long as certified digital copies are available. The extraordinary removal of unnecessary paper documents in 2019 was followed by the elimination of more documents in 2021, which allowed for the release of another 460 metres of shelf space in the archives and the recycling of more than 14 tonnes of paper.

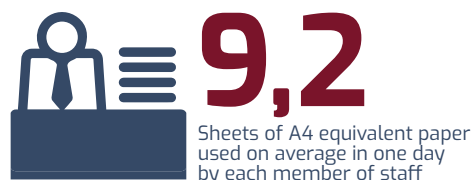
## PAPER - BANK OF ITALY

FIGURE 8

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



The Bank uses both regular and recycled paper. Regular office paper has the ecological standard [EU Ecolabel](#), which certifies compliance with the highest environmental standards at all stages of production. Recycled paper is produced entirely from post-consumer recycled fibres at a plant certified to the European EMAS standard and has EU Ecolabel and [Der Blaue Engel](#) certification.



In the two-year period 2020-2021, since most of the staff were working remotely, purchases of office paper more than halved compared with the pre-pandemic period (Figure 8; Table a10).

Recycled paper purchases have increased further to 63 per cent from 60 per cent a year earlier and from 27 per cent in 2012 (Figure 9 and Table a10).

## PAPER - BANK OF ITALY

Recycled office paper (per cent)

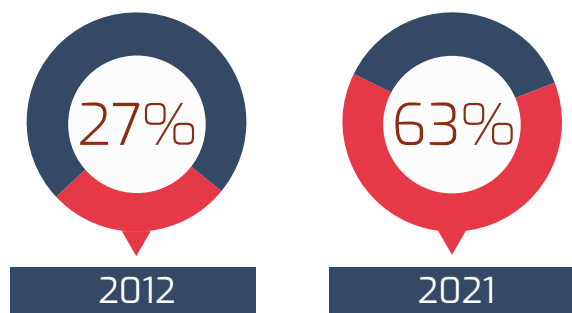


FIGURE 9

## Publications

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

Copies of other publications are only printed if requested 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, for the *Annual Report*, the number of copies printed went down from 7,000 in 2012 to 2,700 in 2019. After a further drop in 2020 and 2021 because of the small number of people that attended the event, in 2022 some 1,700 copies were printed, still well below pre-pandemic figures.

The Bank also prints [financial education publications](#), which are distributed mainly in schools. In 2021, the formats of these publications were redesigned to minimize the amount of paper used per booklet.

In order to reduce the environmental impact of the Bank's printing activity, a significant portion of the paper used for the publications is eco-certified with FSC or PEFC labels (66 per cent of total paper weight used in 2021), or EU Ecolabel for publications distributed on the occasion of the *Governor's 'Concluding Remarks'* and other published material (8 per cent of paper weight in 2021).

Over the next few years, the Bank intends to purchase only eco-certified paper. Furthermore, alternative publishing formats are being tested (such as the HTML language used for the *Environment Report 2021*), to improve information accessibility and readability.

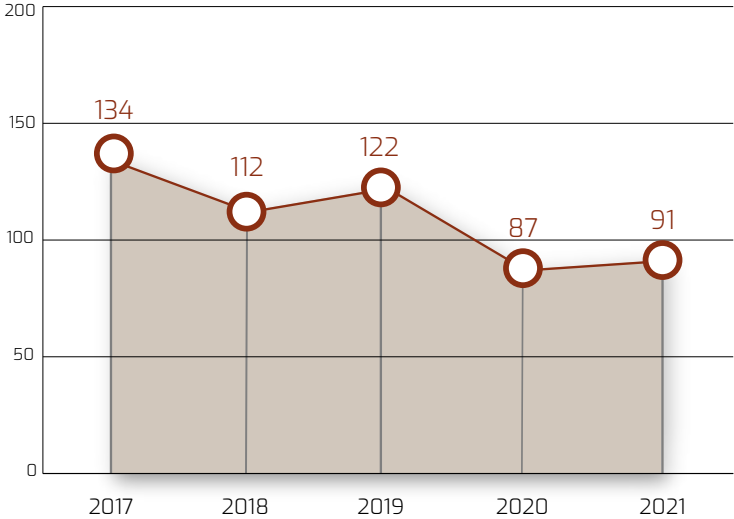


Last year, the overall consumption of paper used for publications and other published material (e.g. for conferences, calendars, etc.) rose by nearly 5 per cent compared with the previous year owing to an increase in the amount of *financial education booklets* printed (123,000 copies compared with 63,000 in 2020). However, overall consumption was still 25 per cent lower than in 2019 (Figure 10; Table a11).

**PAPER - BANK OF ITALY**

FIGURE 10

Use of paper for publications  
(thousands of kilograms)



# waste management

*The priorities for waste management are to reduce the quantity of waste at source and to promote re-use and recycling rather than disposal in landfills to achieve a circular economy.*

All office and staff canteen waste, as well as waste produced by the Bank's publications, is collected separately and sent for recycling (Table a13). Waste generated by the banknote production process is sent to recycling or energy recovery facilities (see the section 'Banknotes').

Before the pandemic, the Bank launched a project to become plastic free, by progressively replacing single-use plastic tableware with alternatives made of compostable material. In addition, drinking water dispensers were installed in the 17 staff canteens and, on a trial basis, in the offices of the Perugia and Florence branches, and steel water bottles were distributed to all employees.

As a result of the pandemic emergency, some of the initiatives adopted were suspended. Most of the drinking water dispensers in the canteens were deactivated as a precaution. As a result, over 280,000 plastic water bottles were distributed in the facilities of Rome and Frascati. Furthermore, in 2021 meals were often distributed with disposable tableware made exclusively of compostable material. On 1 April 2022, in light of the improvement in the public health situation, non-disposable dishes, cutlery and glasses were reintroduced in all staff canteens. Finally, a series of technical interventions are under way to progressively reactivate all drinking water dispensers, starting in July 2022.

## **Charitable donations of food and other goods**

Charitable donations of food and other goods, such as furniture and computers, contribute to the reduction of waste and promote a circular economy.

In 2021, the number of unconsumed staff canteen meals, which were then donated to charitable organizations, was 1,450 (against 1,430 in 2020 and more than 8,000 in 2019). In Rome and Frascati, 100 old pairs of glasses and 100 second-hand mobile phones were collected from employees and donated to social welfare charities.

The number of items of furniture that were no longer fit for purpose in the Bank and were donated to parishes, schools and non-profit associations upon request increased from 300 in 2020 to over 1,000 a year later. The number of items disposed of because no longer re-usable also increased from 785 to 1,200.

In 2022, the Milan branch donated 54 used PCs to Caritas Ambrosiana to be given to Ukrainian minors hosted at the charity's facilities. The computers will be used by the youngsters for remote education – still in place in Ukraine – and to keep in touch with their families and friends.

# banknotes

Together with the ECB and the other central banks of the Eurosystem, the Bank of Italy contributes to reducing the environmental impact of the production, distribution, recirculation and disposal of euro banknotes.

## Eurosystem initiatives

In 2020, the Bank of Italy joined a working group on the product environment footprint (PEF) of banknotes set up by the ECB to determine, using standard methodologies, the ecological impact of cash and compare its environmental performance with that of other kinds of payment instruments. The method was based on an in-depth analysis of all stages of the life cycle of banknotes, quantifying the resources used and identifying the most impactful ones, in order to design actions aimed at optimising their use. Following an analysis of the production processes, in 2021 the study was extended to the areas of distribution, recirculation and destruction of banknotes. Non-financial operators, cash handlers, banks and Poste Italiane were involved in the collection of data for their key role in cash circulation. The results of the study will be made available over the course of 2022 for subsequent publication.

## Banknote production

The Bank of Italy prints banknotes at a production plant that has been certified in accordance with the ISO 14001 environmental standard since 2004. Numerous initiatives are under way to reduce both energy consumption in the building (see the section 'Energy'), and the environmental impact of the production process.

In 2021, the modernization of the building's industrial waste treatment system was finalized. More specifically, in addition to enhanced plant supervision and monitoring functions, a new system for the continuous measurement of pollutants was installed. The data from the system will flow into the monitoring station.

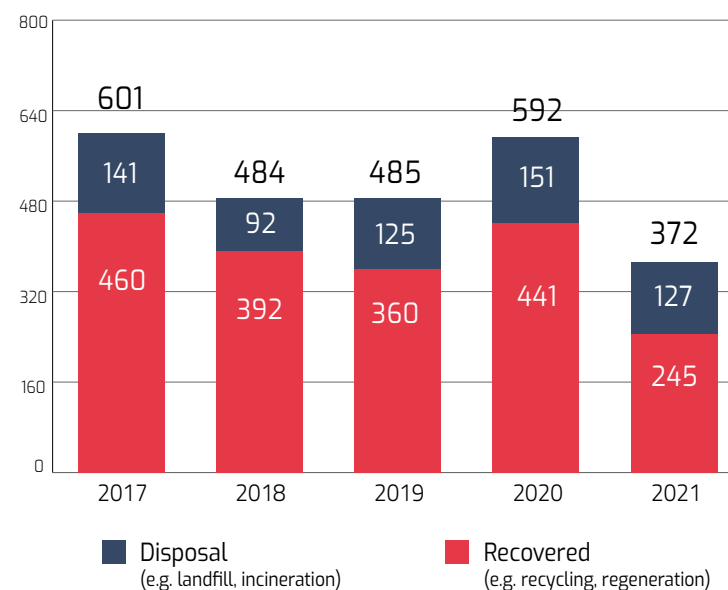
Testing was successfully completed on a different way to manage the machinery cleaning cloths with a view to reducing the volume of waste produced. The cloths will be washed by specialized firms and then put back into the production cycle instead of being disposed of as waste.

Over the last five years, most of the special waste from the banknote

## WASTE - BANKNOTE PRODUCTION PLANT

FIGURE 11

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



production process has been sent to recovery facilities (e.g. recycling, regeneration, waste-to-energy incineration, waste storage; see Figure 11 and Table a14).

### **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. During the sorting process, any banknotes that are worn or damaged – and therefore unfit for circulation – are shredded.

The ECB has recently revised the criteria for managing shredded banknotes, asking central banks to stop using landfill disposal by 2022.

In line with many other Eurosystem central banks, the Bank of Italy gives precedence to energy recovery from this kind of waste, which is the most appropriate way of dealing with it from an environmental perspective.

Figure 12 shows the amount of paper waste produced in the last five years by shredding worn banknotes (Table a14). In 2021, 88 per cent was sent to waste-to-energy plants or to plants for the production of secondary solid fuel, slightly more than the previous year (Figure 13). By the end of 2022, in compliance with the ECB's instructions, the Bank will send the remaining

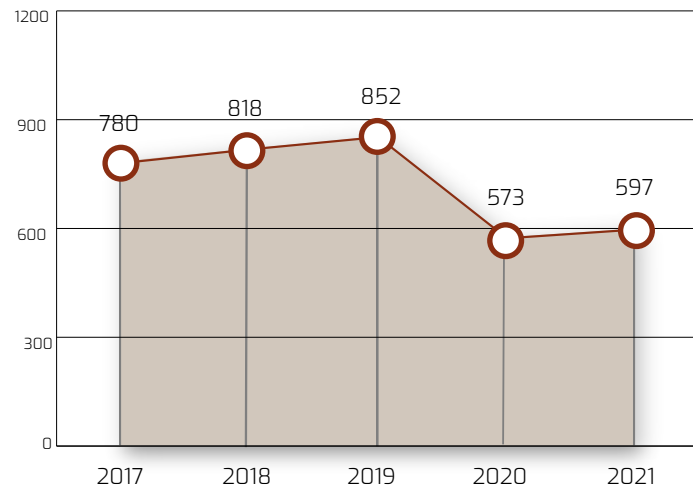


share of worn banknotes currently incinerated or disposed of in landfills to waste-to-energy plants.

### WASTE - BANK OF ITALY

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

FIGURE 12

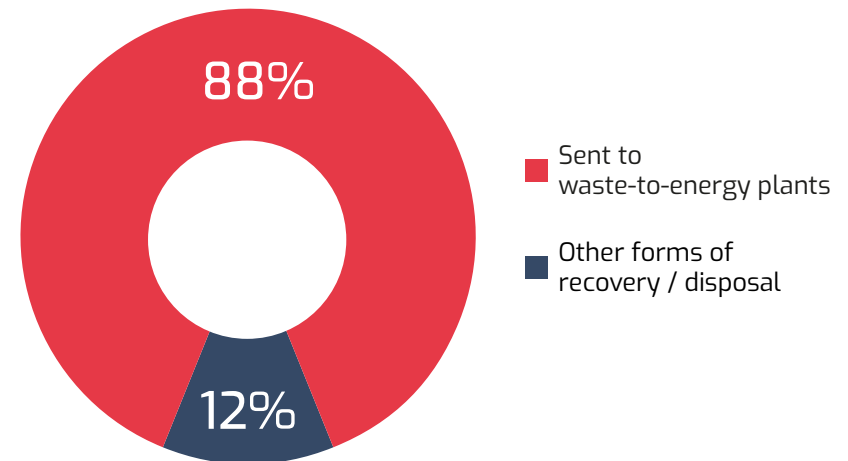


As part of a research project carried out by the Faculty of Engineering of the 'Federico II' University of Naples on the reuse of end-of-life products in construction, the Naples branch of the Bank of Italy supplied a small amount of shredded worn banknotes to the University laboratory to make samples of bricks and lime-based plaster. The preliminary findings are encouraging: worn banknote fragments in the lime enhance the material's flexural strength in comparison with both the samples made without additives and those made by adding waste products such as plastic and hemp.

### WASTE - BANK OF ITALY

Ways of treating waste produced in 2021 by shredding worn banknotes (percentage in terms of weight)

FIGURE 13



# sustainable mobility

*Using one of the various means of transportation for commuting to and from work and for business trips has an impact on the environment in terms of CO<sub>2</sub> emissions and pollutants. The Bank is committed to promoting remote working, reducing commutes and encouraging the use of environmentally sustainable means of transport and electric mobility.*

## **Remote working**

In 2021, the Bank relied extensively on remote working to protect employees' health and ensure continuity of the services offered to the public. On average, 59 per cent of work was performed remotely, which has not changed since 2020, against 4 per cent in 2019.

In general, remote working has a positive impact on the environment, also in terms of reducing overall greenhouse gas emissions (see the box: 'The environmental impact of remote working and the joint research project with ENEA').

Since the state of emergency came to an end on 1 April 2022, the Bank has been operating with the new hybrid work model in which on site working coexists and integrates with remote working arrangements on a stable basis. Within the framework of this organizational change, the Bank has defined a plan consisting of 21 actions to be implemented in the short and medium term on the key variables (management and organizational systems, IT, logistics) with expected benefits also in terms of environmental sustainability (for further information see the section 'Commitment to culture, society and the environment' in the '*Report on Operations and Activities of the Bank of Italy, Key figures for 2021*').

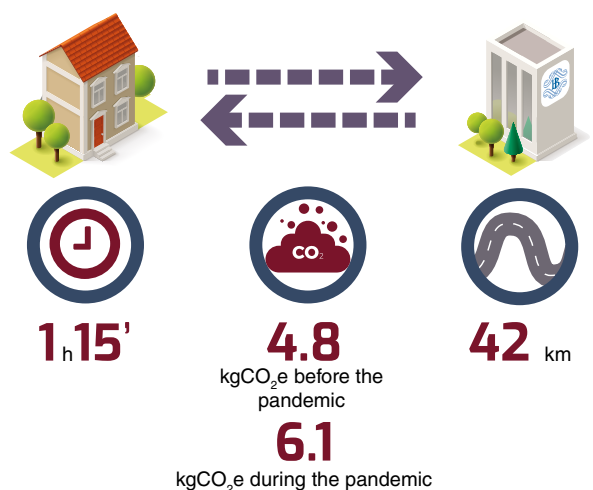
## **THE ENVIRONMENTAL IMPACT OF REMOTE WORKING AND THE JOINT RESEARCH PROJECT WITH ENEA**

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 associated atmospheric emissions; (c) an increase in household consumption. Based on preliminary estimates, in 2021 household emissions as a result of the Bank's employees working remotely amounted to 70 tonnes of CO<sub>2</sub> equivalent emissions. The initial assessment only included the electricity consumed by one computer and one source of lighting (see the subsection 'Indirect transport-related greenhouse gas emissions' in the section 'Greenhouse gas emissions' in the Methodological Notes).

The Bank of Italy signed a cooperation agreement with the Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA) to develop a joint research project on the impact of remote working on energy use and greenhouse gas emissions. Within the framework of this project the Bank is funding a [scholarship](#) for university graduates to develop a methodology to evaluate the environmental impact of remote working.

## Commuting

In December 2020, all employees were asked to fill in a questionnaire to assess the distance and time of their commute. Responses showed that, on average, each employee makes a daily round trip of 42 km to and from work, taking approximately one hour and 15 minutes. Daily greenhouse gas (GHG) emissions per employee were 4.8 kg before and 6.1 kg during the pandemic. This reflects the decreased use of public transport during the health emergency.



The data was used to estimate emissions associated with travels to and from work of Bank employees and commutes of external staff (Carabinieri police officers, maintenance, cleaning and canteen workers; consultants; etc.) who work at the Bank's premises (the calculation assumes the external staff to do the same commute and use the same means of transport as in-house employees). Overall, thanks to the use of remote working, GHG emissions from travelling to and from work fell to 3,340 tonnes, 43 per cent

less than in 2019 (see Table a2).

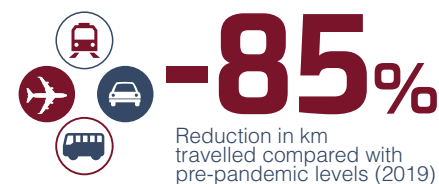
In 2022, a new questionnaire on travel to and from work will be distributed to all employees to update the calculation of the associated GHG emissions and identify possible actions to lower them.

In order to reduce the amount of fossil fuels used for commute, electric vehicle charging stations for cars, motor bikes, and electric bicycles are available at the Bank's main offices in Rome and Frascati. A project is also being studied to install fast-charging stations for employees' private vehicles in the Bank's parking areas at a discounted price.

The fleet of corporate shuttle buses was expanded with the latest procurement contract and a new route was added. Furthermore, starting in March 2023, four routes will be serviced exclusively by methane-powered buses, less polluting than traditional diesel buses.

## Business travel

In comparison with 2020, the total number of kilometres travelled by air fell again by 57 per cent, whereas those travelled by train increased by 44 per cent so that, for the first time, more distance was covered by rail than by air (see Figure 14 and Table a15).



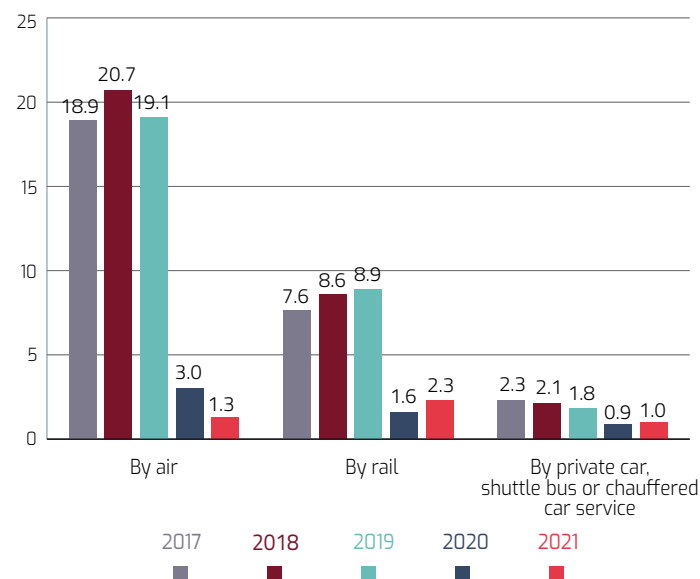
Overnight stays on business trips nearly doubled from 2020, with some 98 per cent in hotels located in Italy. The total number of kilometres travelled in private or rented cars was in line with the previous year but 52 per cent less than in 2019 (see Table a15).

In 2021, over 3.5 million calls and 450,000 online meetings were made via distance communication tools, 33 per cent more than a year earlier, as well as 3,000 events held via videoconferencing systems thanks to enhanced helpdesk services. The remote communication infrastructure was strengthened and a further 11 sets of videoconferencing equipment

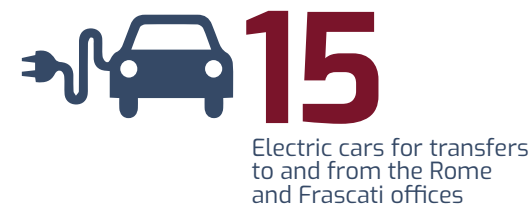
### BUSINESS TRAVEL - BANK OF ITALY

Distances travelled by means of transport (millions of kilometres)

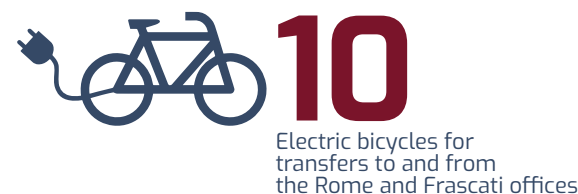
FIGURE 14



were installed, in addition to the 125 already in place. Moreover, in 2021 a new communication and collaboration platform was put to the test.



In 2022, all the Bank's directorates and branches have been encouraged to promote the use of distance communication and collaboration tools for tasks that can be carried out remotely and which would otherwise require employees to travel outside their assigned workplace.





# green procurement

*The Bank is committed to reducing its ecological footprint, including by means of its green procurement policy, in order to help guide the market towards developing more eco-sustainable jobs, goods and services.*

Tender procedures comply with the [minimum environmental standards](#) issued by the Ministry of Ecological Transition. Moreover, in its procurement tenders, the Bank of Italy: (a) requires possession of environmental certifications (ISO 14001 or EMAS) for access to tender procedures; (b) requires ecological clauses for the provision of services; (c) requires eco-labels for the goods and services covered by the contract; 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 and social responsibility.

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

In 2021, a total of 107 high-value procurement procedures were started, including both calls for tenders and negotiated contracts: ecological or social responsibility clauses were included in 22 of them (in 2020, 34 out of 82 procurement processes were green ones; see Table a16). A significant share of the procedures involved services for which it might be quite difficult or irrelevant to set environmental criteria (e.g. the purchase of intangibles such as software, databases, professional or insurance services).

A number of environmental requirements were included in the call for tenders for furniture, with a view to promoting sustainable manufacturing processes and incentivizing circular economy. In addition to the supplier's environmental certification, tenderers were required to supply lower-impact furniture in terms of materials and processes, including the following specifications: (a) no environmentally hazardous substances in component manufacturing; (b) reclaimed wood or wood from forests that are responsibly and sustainably managed; (c) recycled plastics and packaging made from recycled materials; and (d) items that can be disassembled at end of life for recovery and recycling of materials.

In tender procedures for staff shuttle and rental car services, tenderers were awarded points for holding environmental certifications and using low environmental impact means of transport, such as hybrid or electric vehicles.

In tenders for branch reception services, the Bank rewarded tenderers holding ISO 14001 or EMAS environmental certification, ISO 45001 occupational health and safety certification, and SA8000 social accountability certification. In the call for tenders for hotel services for Sadiba, the Bank's training centre in Perugia, extra points were awarded to tenderers holding an environmental certification, or supplying consumables and staff uniforms that are [EU Ecolabel](#) certified. In line with the requirements of the other tender procedures for canteen services, the Ancona and Livorno branches awarded points to companies donating uneaten food to charities and non-profits, as well as using local food or care farm products.

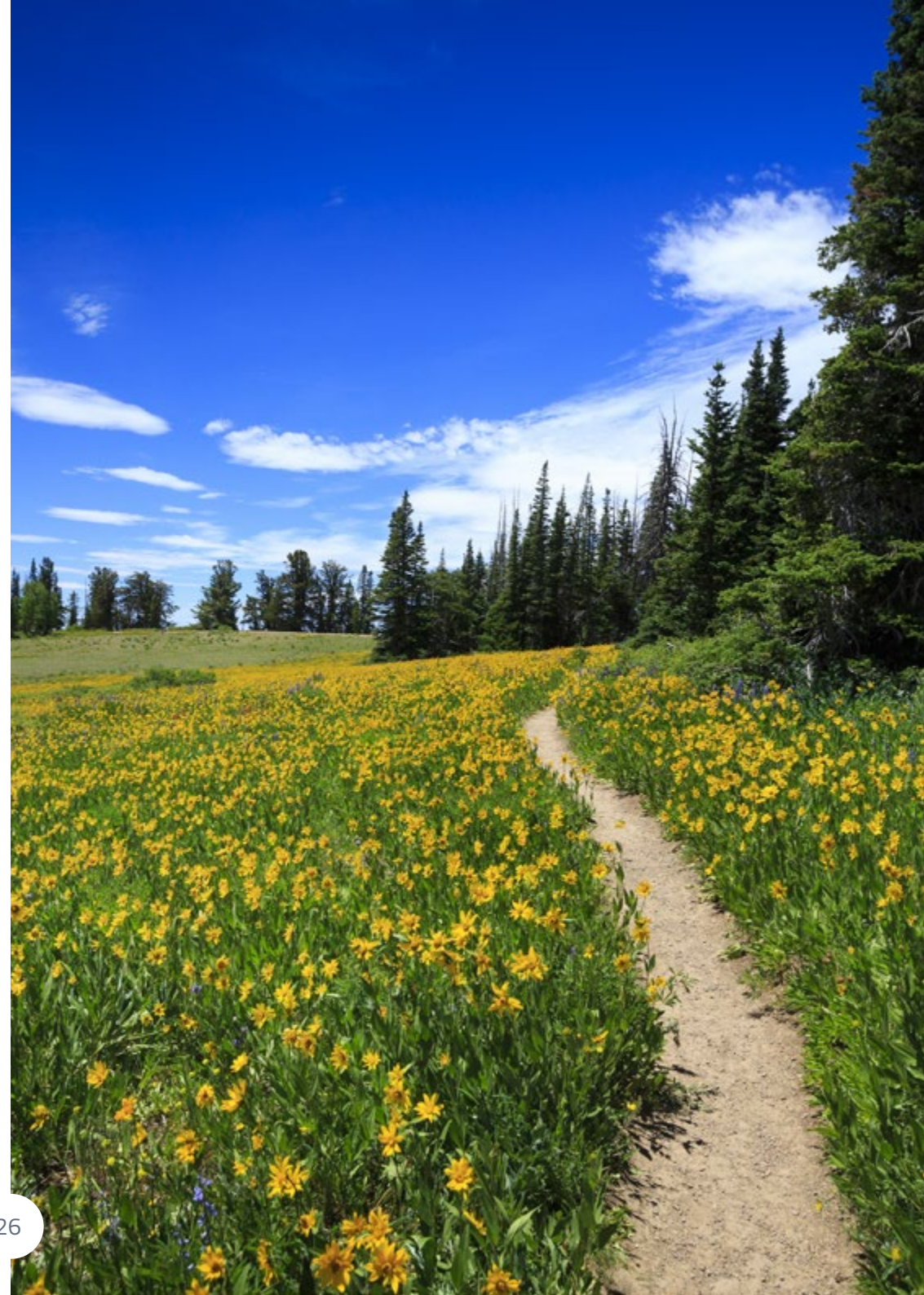
In the tenders for the new evaporative cooling towers and the emergency power plant to be installed at the Centro Donato Menichella, new specifications were introduced in order to: reduce energy consumption and

noise emissions; encourage the use of green materials (e.g. biodegradable oils); mitigate the landscape impact of the new plants. The tenders for extraordinary maintenance work on the internal façades of the buildings at Via dei Mille and Piazza Indipendenza in Rome required thermal insulation work and the replacement of the old wooden windows with double-pane windows, which are much more efficient in terms of thermal and energy insulation.

In tenders for the acquisition of IT equipment, extra points are awarded to companies that provide less energy-intensive solutions, as certified by [Energy Star](#) or other similar programmes. Moreover, in the tender for the acquisition of IT equipment handling and installation services, extra points were awarded to companies holding an ISO 14001 or equivalent certification and using exclusively electric vehicles.

In all tender procedures for the procurement of raw materials (e.g. watermark paper and inks) and security features involved in printing banknotes, contractors must: maintain accreditation in accordance with [Decision ECB/2020/24](#), which provides for specific environmental requirements including ISO 14001 certification; comply with existing ECB environmental decisions; agree to environmental checks by the ECB and report the occurrence of any serious environmental incidents. Moreover, in the tender process for the acquisition of a new system to be installed at the euro banknote printing plant for shredding, compressing and briquetting worn notes, environmental certification was a prerequisite for bidding.

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

*The Bank contributes to environmental protection and to economic and social growth, including through sustainable investment.*

Environmental, social and governance (ESG) considerations have been integrated into the Bank's investment decisions since 2019, alongside the traditional financial risk, return and liquidity assessments. This strategy only applies to those investments over which the Bank can decide in full autonomy but does not include monetary policy operations, which are managed by the Eurosystem.

## SUSTAINABLE INVESTMENT - BANK OF ITALY

Weighted average carbon intensity of the equity portfolio in euros, 2018-21 (tonnes of CO<sub>2</sub>e per million euros of sales)

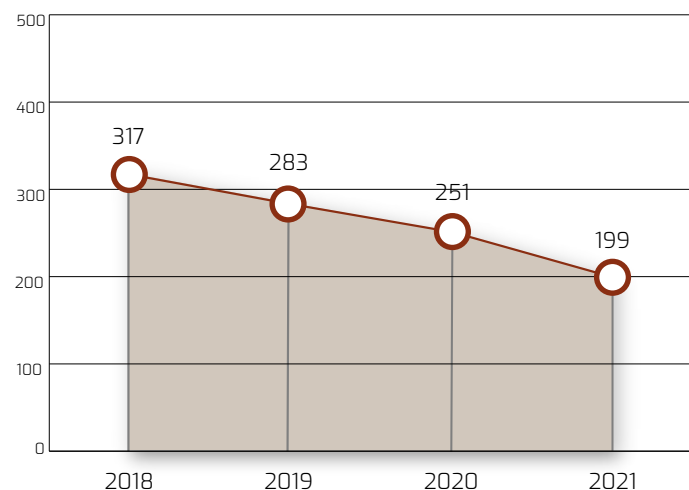


FIGURE 15



In 2021, the Bank published its [Responsible Investment Charter](#), outlining the key principles and criteria for the sustainable management of its financial investments.

The Charter sets three specific commitments: encouraging the disclosure of ESG profile information by firms and financial system operators; integrating ESG principles into the management of the Bank's financial investments; and communicating sustainability results on a regular basis. In line with the third target, in May 2022 the Bank published its first [Report on sustainable investments and climate-related risks](#), which explains how sustainability profiles are integrated into investment decisions, strategies and risk management, as well as illustrating sustainability metrics and results.

Over the last few years, the Bank has made substantial progress in this respect: for the internally managed equity portfolio (worth €16.1 billion and accounting for over 90 per cent of the Bank's private-sector investments), the weighted average carbon intensity has been reduced by 37 per cent compared with 2018, the year prior to the launch of the sustainable investment strategy (Figure 15; Table a17).

The weighted average carbon intensity is 24 per cent lower than the benchmark. Compared with the benchmark, the portfolio also gave better

results in terms of use of electricity (-21 per cent), water (-14 per cent) and waste production (-28 per cent).



In addition to equity instruments, the scope of sustainable investments was further extended to bond portfolios, including securities issued by supranationals and agencies to fund environmental sustainability projects (green bonds), as well as corporate bonds. For the latter, the carbon intensity of the bond portfolio went from 161.0 to 138.3 tonnes of CO<sub>2</sub> equivalent per million euros of sales revenue (Table a17), down by 14 per cent from 2019.



# biodiversity

*Protecting biodiversity is a challenging aim and one which we are committed to 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'), Centro Donato Menichella in Frascati and Sadiba in Perugia.

The Polo Tuscolano spans approximately 25 hectares and includes archaeological sites as well as over 500 trees scattered throughout the area, including near the buildings and in the car parks. The Centro Donato Menichella stands in an area of approximately 32 hectares, which boasts around 1,000 olive trees, as well as other plant species. In the Sadiba green areas, covering 7 hectares, there are over 2,660 trees, including 700 cypresses, 400 olive trees, 170 pine trees, 80 holm oaks and 100 fruit trees, as well as numerous shrubs and aromatic plants. The park is also home to different kinds of animals, including various species of birds (e.g. sparrows, swallows, woodpeckers and magpies) and squirrels.

The Bank ensures management and conservation to keep all green areas fully healthy, protect trees and constantly improve the entire green heritage through: tracking and monitoring plans; new tree plantings in harmony with the surrounding landscape; olive harvesting and oil production for charity.

Moreover, in the Rome and Frascati areas, the Bank will launch theme gardens, cultural itineraries and guided tours to leverage this unique heritage and raise awareness of biodiversity and environmental issues.

For example, the Polo Tuscolano will offer four educational itineraries in a hortus romanus surrounded by the Acqua Felice aqueduct and a Roman cistern, which was used to harvest rainwater. Botanical species and crops were identified through a historical approach, based on studies of Rome and Pompei gardens dating back to the same period (1st-2nd century B.C.) and of the wall paintings in Villa Livia, (Prima Porta, Rome).

The Centro Donato Menichella will run a preservation programme covering a portion of the olive trees in the area, creating a new park with walking trails.

Besides green heritage protection and development, green walls will be introduced in some work areas in order to create greater harmony between the artificial office space and the natural landscape. Upon completion of the renovation works in the building at Via Milano 60 in Rome, green vertical and horizontal panels will be installed on the façades (see the section 'Energy') to help reduce urban pollution as well as for screening purposes.

In 2022, the Bank signed an agreement with the [Comando Unità forestali, ambientali e agroalimentari](#) (CUFA), a special unit of the Carabinieri police force tasked with forest, environmental and agri-food protection. As part of this agreement, targeted initiatives for the reforestation, preservation and enhancement of green areas, biodiversity protection, environmental education and training will be rolled out over a three-year period. The first initiative revolves around a reforestation project to be undertaken in Italy to partially offset the Bank's GHG emissions by planting local or compatible species and, where possible, creating specific natural habitats for the purposes of biodiversity protection.

# eco-friendly culture

*The Bank of Italy works with other institutions on sustainable finance and makes its own contribution to setting the national and international positions on the issues involved. In its role as supervisory authority, it helps to ensure that financial intermediaries perform sound and prudent ESG risk management. It also shares the findings of its research and analysis on the relationships between the economy, finance, energy and the environment and it participates in educational initiatives to raise awareness of environmental issues.*

## **International cooperation**

In the context of [Italy's G20 Presidency](#), the Bank, in cooperation with the Ministry of Economy and Finance, contributed to identifying priority agendas for the Finance Track, which include economic policies for climate change mitigation and a more sustainable growth model. The Bank participates in the Sustainable Finance Working Group, which produces in-depth analyses on the following topics: corporate sustainability reporting; developing new metrics for responsible investment; strengthening the role of financial institutions in supporting the goals of the Paris Agreement and the UN Agenda 2030. The Group also produced the [G20 Sustainable Finance Roadmap](#), published in October 2021. Again in the context of the G20, the Bank worked with the Ministry of Economy and Finance to hold the [International Conference on Climate Change](#) in Venice and spark debate on the tools required to achieve climate neutrality.

The Bank has contributed to the work of several international bodies, such as the [Basel Committee](#), which in 2021 started to assess how to incorporate

climate risks into the current prudential framework. In June 2022, the Committee published the [principles](#) for the effective management and supervision of climate-related financial risks although the introduction of minimum requirements is still under discussion. The Bank also participates in the activities of the [Financial Stability Board \(FSB\)](#) according to a [plan](#) published by the latter in July 2021 to improve the availability, comparability and quality of information on climate risks and to ensure consistency in supervision across jurisdictions.

Together with the Innovation Hub of the Bank for International Settlements (BIS), the Bank of Italy organized the [G20 Techsprint 2021](#), an international contest to reward the best solutions for three challenges in the field of sustainable finance: data collection and analysis; analysis of transition and physical climate-related risks; and better connecting projects and investors. As of January 2022, the Bank is a member of the steering committee of the [Network for Greening the Financial System \(NGFS\)](#), which is composed of more than 116 central banks and supervisory authorities.

The network coordinates study projects 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 working group Net Zero for Central Banks, which will research topics including sustainable investment, central banks' reports on climate and environmental risks, and initiatives to reduce the carbon footprint of internal operations.

## **EU projects**

The Bank also participates in the joint group of the [European Central Bank](#)



(ECB) and the [European Systemic Risk Board \(ESRB\)](#), which has promoted a shared approach for analysing climate-related risks to financial stability. In the field of banking and financial supervision, the Bank participates in the work of the [European Banking Authority \(EBA\)](#), which has developed its [action plan](#) based on the mandate provided by the current regulatory framework. In June 2021, the EBA published a [report](#) on the integration of environmental, social and governance (ESG) factors into banking and corporate investment risk management and into prudential supervision. Moreover, in January 2022 it issued a [technical standard](#) for the public disclosures required of banks on their ESG risk exposures. In May 2022, the EBA made available for consultation a [working document](#) assessing the possible need to introduce some specific prudential requirements for environmental exposures.

Within the framework of the Single Supervisory Mechanism (SSM), the Bank worked with other national authorities to draft their [supervisory expectations](#) in terms of climate and environmental risks, which were published by the ECB in 2020, and it participated in the first [assessment exercise](#) conducted by the latter on the European banking system in 2021. Last year the Bank of Italy launched a series of interviews on climate risks with banks and asset management companies (SGRs) and in April 2022 published its own [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, supervisory units will use the document as a base for their initial dialogue with individual intermediaries on the degree to which they are meeting supervisory

expectations and on their plans for implementing them.

This year the Bank also took part in the ECB survey on European banks' compliance with supervisory expectations, covering a sample of 21 less significant Italian banks.

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 Ecological Transition, and they participate in the work of the Committee for Natural Capital, coordinated by the Ministry.

The Bank gives technical support to the Ministry of Economy and Finance in relation to the negotiations on legislative proposals arising from the EU Commission's [Action Plan on Sustainable Finance](#) and also participates in the work of the [Italian Observatory on Energy Poverty](#).

Moreover, its experts sit on the inter-institutional board sponsored by the [Italian Banking Association](#) (ABI) to identify possible interventions for the modernization of energy use in buildings in Italy.

Last year the Bank returned to participating in the activities of [ABI Lab's Green Banking Observatory](#), which conducts research and studies on internal operations' environmental impact management and drafts environmental reporting guidelines.

### **Analysis and research, conferences and publications**

In 2021 the Bank made a major push on research on sustainable finance, the impact of climate change on economic and financial stability, and the manufacturing system in Italy (see the section on Commitment to culture, society and the environment in the [Report on Operations and Activities of the Bank of Italy – Key Figures on 2021](#)). The key findings were shared through different channels: the participation of Governing Board members and Bank representatives in external conferences; the publication of research papers in the Bank's series; and the organization of conferences and workshops.

Between July 2021 and July 2022, the Governor and other members of the Governing Board gave speeches at 25 events on [sustainable finance](#) (the main ones are listed in Figure 16) and 10 publications were issued on the same topic. The Bank's website contains a new section on sustainable finance with all the papers published by its researchers.

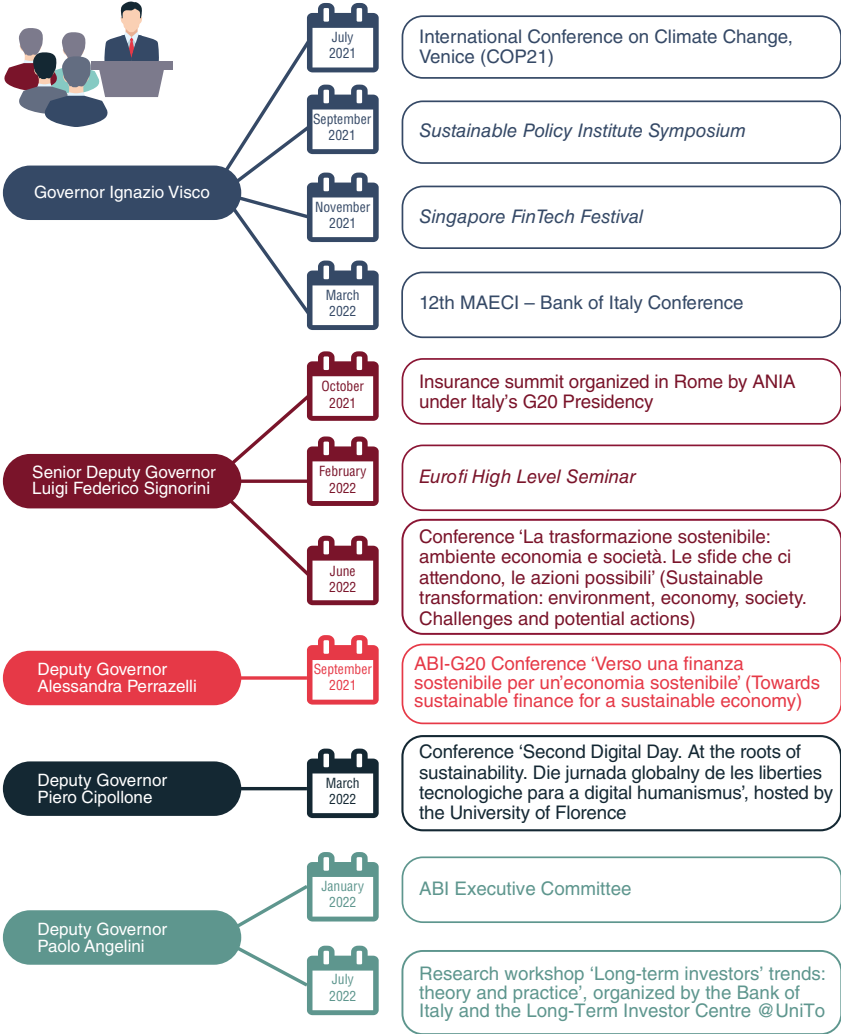
Moreover, the Bank has hosted several events and workshops, including a joint [conference](#) with the Bank of England, to encourage the debate among central banks and academia on state-of-the-art research on finance and zero net emissions' policies.

As part of cooperation projects with international experts and the central banks of countries included in the European Neighbourhood Policy, as well as other emerging economies, in January 2022 the Bank held the [webinar](#) '*Central banking, climate risks and sustainable finance*'.



FIGURE 16

Main speeches on environmental sustainability given by Governing Board members in external conferences between July 2021 and July 2022



*Twenty years after Kyoto*

*Opening remarks*

*An Overview of the Work of the G20 under the Italian Presidency*

*Energy transition, finance and climate: challenges and opportunities*

*Ensuring a prosperous future for people and the planet*

*Outcomes of Italy's G20 Presidency*

*Decision making for sustainable development in climate emergency and transition*

*Opening remarks*

*The Role of Central Banks for Green Finance*

*An overview and initial assessment of the recent European Commission's proposal to change prudential rules for banks*

*Long-term investing and sustainable finance: challenges and perspectives*

### Other educational initiatives

The Bank worked with *Scuola nazionale dell'Amministrazione* to design and launch two new 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'*).

In the 2021-22 school year the Bank offered more than 250 'Work Experience Projects' (PCTOs), 11 of which covered environmental topics. They were held at the Bank's headquarters in Rome and in the Ancona, Brescia, Catania, Catanzaro, Naples, Palermo, Perugia and Salerno branches. A total of 125 students took part in these programmes, online or in blended mode.

In 2022, internal staff were offered five training courses: *'Agenda 2030 and sustainable development'*; *'Sustainable finance and climate risks'*; *'Energy transition and climate change'*; *'Carbon neutrality'*; *'Sustainability reporting'*.



# statistical tables

This section collects 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 <sub>x</sub> ) and sulphur dioxide (SO <sub>2</sub> ) 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 Green procurement   |
| "        | a17 Sustainable investments   |

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 its value is not known;
- .. the value is nil or less than half of the final digit shown.

**Table a1**

|   | <b>Staff (1)</b><br><i>(units)</i> |              |              |              |              |
|---|------------------------------------|--------------|--------------|--------------|--------------|
|   | 2017                               | 2018         | 2019         | 2020         | 2021         |
| Employees                                 | 6,562                              | 6,424        | 6,337        | 6,416        | 6,330        |
| Staff seconded to other organizations (2) | 237                                | 265          | 256          | 255          | 299          |
| <b>Total employees</b>                    | <b>6,799</b>                       | <b>6,689</b> | <b>6,593</b> | <b>6,671</b> | <b>6,629</b> |

(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<br>(tonnes of CO <sub>2</sub> equivalent) |               |               |               |
|---|---------------|---------------|---------------|
|   | 2019          | 2020          | 2021          |
| <b>Direct emissions: Scope 1</b>                        |               |               |               |
| From stationary combustion                              |               |               |               |
| Heating fuels   | 9,359         | 9,481         | 10,443        |
| Fuels for generators                                    | 44            | 88            | 64            |
| From mobile combustion (car fleet)                      | 22            | 16            | 18            |
| From leakages of fluorinated greenhouse gases           | 70            | 950           | 483           |
| <b>Total (A)</b>  | <b>9,495</b>  | <b>10,535</b> | <b>11,008</b> |
| <b>Indirect emissions: Scope 2 (market-based)</b>       |               |               |               |
| From imported energy                                    |               |               |               |
| Electricity (1)   | 0             | 0             | 0             |
| District heating  | 168           | 208           | 220           |
| Centralized heating                                     | 43            | 44            | 60            |
| <b>Total (B1)</b>                                       | <b>211</b>    | <b>252</b>    | <b>280</b>    |
| <b>Indirect emissions: Scope 2 (location-based)</b>     |               |               |               |
| From imported energy                                    |               |               |               |
| Electricity (2)   | 25,998        | 22,762        | 20,955        |
| District heating  | 168           | 208           | 220           |
| Centralized heating                                     | 43            | 44            | 60            |
| <b>Total (B2)</b>                                       | <b>26,209</b> | <b>23,014</b> | <b>21,235</b> |
| <b>Indirect emissions: Scope 3</b>                      |               |               |               |
| From transportation                                     |               |               |               |
| Business travel   | 4,259         | 851           | 608           |
| Nights spent in hotels for business trips               | 1,121         | 196           | 383           |
| Bank staff commuting                                    | 6,030         | 3,054         | 3,342         |
| Remote working of Bank staff                            | 6             | 76            | 70            |
| External staff commuting                                | 3,363         | 3,391         | 3,597         |
| <b>Total (C1)</b>                                       | <b>14,779</b> | <b>7,568</b>  | <b>8,000</b>  |

continues

follows: Table a2

| GHG emissions<br>(tonnes of CO <sub>2</sub> equivalent)                   |               |               |               |
|---|---------------|---------------|---------------|
|   | 2019          | 2020          | 2021          |
| From products used by the Bank  |               |               |               |
| Energy-related activities (3)   | 3,624         | 2,905         | 3,134         |
| Water   | 468           | 442           | 440           |
| Paper for publications  | 115           | 82            | 85            |
| Office paper  | 131           | 62            | 52            |
| Toner cartridges  | 112           | 67            | 71            |
| Furniture   | 555           | 562           | 570           |
| IT equipment  | 1,544         | 2,545         | 1,770         |
| Canteen services  | 3,217         | 1,725         | 1,737         |
| <b>Total (C2)</b>   | <b>9,766</b>  | <b>8,390</b>  | <b>7,859</b>  |
| From banknotes  |               |               |               |
| Transportation of paper and ink for the production of banknotes           | 542           | 107           | 379           |
| Paper and ink for the production of banknotes                             | 807           | 870           | 748           |
| Waste from the banknote production process                                | 65            | 78            | 63            |
| Transportation of banknotes   | 1,286         | 1,626         | 1,171         |
| Waste consisting of shredded banknotes                                    | 120           | 68            | 56            |
| <b>Total (C3)</b>   | <b>2,820</b>  | <b>2,749</b>  | <b>2,417</b>  |
| <b>Total (C)=(C1)+(C2)+(C3)</b>   | <b>27,365</b> | <b>18,707</b> | <b>18,276</b> |
| <b>Total emissions (market-based) (A)+(B1)+(C)</b>                        | <b>37,071</b> | <b>29,494</b> | <b>29,564</b> |
| <b>Total emissions (location-based) (A)+(B2)+(C)</b>                      | <b>63,069</b> | <b>52,256</b> | <b>50,519</b> |
| GHG emissions per employee (market-based) (tCO <sub>2</sub> e/employee)   | 5.8           | 4.6           | 4.7           |
| GHG emissions per employee (location-based) (tCO <sub>2</sub> e/employee) | 10.0          | 8.1           | 8.0           |

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.



**Table a3**

| <b>Leakages of fluorinated greenhouse gases</b><br>(kilograms) |      |       |       |  |
|--|------|-------|-------|--|
| FLUORINATED GAS  | 2019 | 2020  | 2021  |  |
| R32  | –    | 1.0   | 1.0   |  |
| R134A  | –    | 307.0 | 57.0  |  |
| R407C  | 36.0 | 135.0 | 38.8  |  |
| R410A  | 0.4  | 98.5  | 142.4 |  |

**Table a4**

| <b>Energy consumption</b><br>(gigajoule)                 |                |                |                |                |                |
|--|----------------|----------------|----------------|----------------|----------------|
|  | 2017           | 2018           | 2019           | 2020           | 2021           |
| Electricity  | 293,974        | 298,964        | 294,792        | 275,026        | 270,097        |
| <i>of which: self-produced (1)</i>                       | 133            | 145            | 141            | 242            | 222            |
| Diesel oil for generators                                | 1,223          | 772            | 584            | 1,187          | 854            |
| District heating   | 3,242          | 2,914          | 2,802          | 3,564          | 3,727          |
| Methane gas for heating                                  | 154,133        | 158,256        | 158,265        | 159,957        | 176,823        |
| Heating oil  | 6,658          | 3,935          | 3,482          | 3,654          | 3,384          |
| Fuels for car fleet                                      | 303            | 221            | 234            | 151            | 181            |
| <b>Total</b>   | <b>459,533</b> | <b>465,062</b> | <b>460,159</b> | <b>443,539</b> | <b>455,066</b> |
| Energy consumption per square metre (GJ/m <sup>2</sup> ) | 0.56           | 0.58           | 0.57           | 0.56           | 0.58           |
| Energy consumption per employee (GJ/employee)            | 70.0           | 72.4           | 72.6           | 69.1           | 71.8           |

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)<br>(per cent) |      |      |      |  |
|---|------|------|------|--|
| SOURCE  | 2019 | 2020 | 2021 |  |
| Wind  | 28.7 | –    | 60.7 |  |
| Hydroelectric                                     | 24.4 | 73.5 | 14.4 |  |
| Solar   | 46.9 | –    | 24.9 |  |
| Thermal - solid biomass                           | –    | 26.5 | –    |  |

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

Table a6

| Emissions of nitrogen oxides (NO <sub>x</sub> ) and sulphur dioxide (SO <sub>2</sub> )<br>from fossil fuels<br>(kilograms) |       |       |       |       |       |
|--|-------|-------|-------|-------|-------|
|  | 2017  | 2018  | 2019  | 2020  | 2021  |
| Nitrogen oxides (NO <sub>x</sub> )   | 4,872 | 4,826 | 4,794 | 4,868 | 5,326 |
| Sulphur dioxide (SO <sub>2</sub> )   | 413   | 267   | 237   | 274   | 250   |

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

Table a7

| Energy consumption by facility<br>(gigajoule)     |                |                |                |                |                |
|---|----------------|----------------|----------------|----------------|----------------|
|   | 2017           | 2018           | 2019           | 2020           | 2021           |
| <b>Electricity (1)</b>                            |                |                |                |                |                |
| Palazzo Koch                                      | 29,230         | 29,701         | 28,330         | 26,024         | 26,371         |
| Centro Donato Menichella (CDM)                    | 81,283         | 85,412         | 87,254         | 83,020         | 79,681         |
| Banknote production plant                         | 53,440         | 51,466         | 48,018         | 46,674         | 45,088         |
| Largo Bastia                                      | 22,988         | 24,455         | 29,600         | 27,828         | 25,712         |
| Other buildings in Rome                           | 33,298         | 34,777         | 34,026         | 29,571         | 31,415         |
| Branches (2)                                      | 74,958         | 73,925         | 68,148         | 63,096         | 62,684         |
| <b>Total electricity</b>                          | <b>295,197</b> | <b>299,736</b> | <b>295,376</b> | <b>276,213</b> | <b>270,951</b> |
| <b>Energy for heating and transport (3)</b>       |                |                |                |                |                |
| Palazzo Koch                                      | 11,189         | 10,181         | 8,266          | 8,303          | 9,249          |
| Centro Donato Menichella (CDM)                    | 40,313         | 40,580         | 44,080         | 47,383         | 52,513         |
| Banknote production plant                         | 21,109         | 25,394         | 33,782         | 31,684         | 34,511         |
| Largo Bastia                                      | 4,349          | 3,913          | 4,627          | 4,836          | 6,874          |
| Other buildings in Rome                           | 18,616         | 19,966         | 18,388         | 16,695         | 19,560         |
| Branches (2)                                      | 68,760         | 65,292         | 55,640         | 58,425         | 61,408         |
| <b>Total energy for heating and transport (3)</b> | <b>164,336</b> | <b>165,326</b> | <b>164,783</b> | <b>167,326</b> | <b>184,115</b> |
| <b>Total energy</b>                               |                |                |                |                |                |
| Palazzo Koch                                      | 40,419         | 39,882         | 36,596         | 34,327         | 35,620         |
| Centro Donato Menichella (CDM)                    | 121,596        | 125,992        | 131,334        | 130,403        | 132,194        |
| Banknote production plant                         | 74,549         | 76,860         | 81,800         | 78,358         | 79,599         |
| Largo Bastia                                      | 27,337         | 28,368         | 34,227         | 32,664         | 32,586         |
| Other buildings in Rome                           | 51,914         | 54,743         | 52,414         | 46,266         | 50,975         |
| Branches (2)                                      | 143,718        | 139,217        | 123,788        | 121,521        | 124,092        |
| <b>Total energy</b>                               | <b>459,533</b> | <b>465,062</b> | <b>460,159</b> | <b>443,539</b> | <b>455,066</b> |

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 3 representative offices abroad. – (3) Includes methane gas, district heating, heating oil and fuels for car fleet.

Table a8

| Water consumption<br>(cubic metres)                                |                |                |                |                |                |
|--|----------------|----------------|----------------|----------------|----------------|
|  | 2017           | 2018           | 2019           | 2020           | 2021           |
| Drinking water   | 296,239        | 282,942        | 278,523        | 234,010        | 239,143        |
| Non-drinking water   | 263,037        | 219,665        | 166,028        | 186,365        | 178,697        |
| <b>Total</b>   | <b>559,276</b> | <b>502,607</b> | <b>444,551</b> | <b>420,375</b> | <b>417,840</b> |
| Drinking water consumption per employee (m <sup>3</sup> /employee) | 85.2           | 78.2           | 70.2           | 65.5           | 66.0           |

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

Table a9

| Water consumption by facility<br>(cubic metres) |                |                |                |                |                |
|---|----------------|----------------|----------------|----------------|----------------|
|   | 2017           | 2018           | 2019           | 2020           | 2021           |
| <b>Drinking water</b>                           |                |                |                |                |                |
| Palazzo Koch                                    | 43,423         | 38,651         | 37,857         | 33,744         | 34,001         |
| Centro Donato Menichella (CDM)                  | 53,018         | 49,522         | 59,767         | 55,206         | 53,057         |
| Banknote production plant                       | 26,650         | 23,389         | 23,463         | 24,363         | 33,277         |
| Largo Bastia                                    | 3,042          | 3,564          | 6,041          | 3,529          | 2,651          |
| Other buildings in Rome                         | 66,629         | 69,716         | 63,781         | 48,114         | 57,239         |
| Branches (1)                                    | 103,477        | 98,100         | 87,614         | 69,054         | 58,918         |
| <b>Total drinking water</b>                     | <b>296,239</b> | <b>282,942</b> | <b>278,523</b> | <b>234,010</b> | <b>239,143</b> |
| <b>Non-drinking water (2)</b>                   |                |                |                |                |                |
| Palazzo Koch                                    | 73             | 2              | 2              | ..             | 1              |
| Centro Donato Menichella (CDM)                  | 143,001        | 125,501        | 98,638         | 114,028        | 109,300        |
| Banknote production plant                       | 93,060         | 77,950         | 45,324         | 59,392         | 56,493         |
| Largo Bastia                                    | 16,701         | 11,177         | 10,789         | 6,530          | 9,163          |
| Other buildings in Rome                         | 4,893          | 2,056          | 8,572          | 4,073          | 2,540          |
| Branches (1)                                    | 5,309          | 2,979          | 2,703          | 2,342          | 1,200          |
| <b>Total non-drinking water</b>                 | <b>263,037</b> | <b>219,665</b> | <b>166,028</b> | <b>186,365</b> | <b>178,697</b> |
| <b>Total water</b>                              |                |                |                |                |                |
| Palazzo Koch                                    | 43,496         | 38,653         | 37,859         | 33,744         | 34,002         |
| Centro Donato Menichella (CDM)                  | 196,019        | 175,023        | 158,405        | 169,234        | 162,357        |
| Banknote production plant                       | 119,710        | 101,339        | 68,787         | 83,755         | 89,770         |
| Largo Bastia                                    | 19,743         | 14,741         | 16,830         | 10,059         | 11,814         |
| Other buildings in Rome                         | 71,522         | 71,772         | 72,353         | 52,187         | 59,779         |
| Branches (1)                                    | 108,786        | 101,079        | 90,317         | 71,396         | 60,118         |
| <b>Total water</b>                              | <b>559,276</b> | <b>502,607</b> | <b>444,551</b> | <b>420,375</b> | <b>417,840</b> |

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 cooling water for the production plants and water for the irrigation of green areas.



Table a10

| Office paper purchases<br>(tonnes)            |              |              |              |             |             |
|---|--------------|--------------|--------------|-------------|-------------|
|   | 2017         | 2018         | 2019         | 2020        | 2021        |
| White paper with EU Ecolabel certification    | 97.8         | 86.6         | 69.2         | 29.1        | 23.1        |
| Recycled paper with EU Ecolabel certification | 92.6         | 74.2         | 83.4         | 44.0        | 39.5        |
| <b>Total</b>                                  | <b>190.4</b> | <b>160.8</b> | <b>152.6</b> | <b>73.1</b> | <b>62.6</b> |
| Share of recycled paper to the total          | 49           | 46           | 55           | 60          | 63          |

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

Table a11

| Use of paper for publications<br>(tonnes)              |              |              |              |             |             |
|--|--------------|--------------|--------------|-------------|-------------|
|  | 2017         | 2018         | 2019         | 2020        | 2021        |
| White paper  | 134.1        | 99.3         | 121.3        | 27.5        | 22.9        |
| White paper with EU Ecolabel, FSC, PEFC certifications | ..           | 12.9         | 0.8          | 59.3        | 67.9        |
| <b>Total</b>   | <b>134.1</b> | <b>112.2</b> | <b>122.1</b> | <b>86.8</b> | <b>90.8</b> |

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

Table a12

| Toner cartridges<br>(units and kilograms)              |       |       |       |       |       |
|--|-------|-------|-------|-------|-------|
|  | 2017  | 2018  | 2019  | 2020  | 2021  |
| Total toner cartridges per office (units)              | ....  | ....  | 5,387 | 3,278 | 1,103 |
| Total toner cartridges used to print publications (kg) | 4,233 | 4,446 | 4,389 | 2,982 | 3,568 |

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

Table a13

| Waste generation (1)<br>(kilograms)       |        |        |        |
|---|--------|--------|--------|
|   | 2019   | 2020   | 2021   |
| Archival document waste                   | 32,410 | 8,350  | 14,200 |
| Decommissioned furniture (2)              | 36,540 | 23,550 | 36,240 |
| Paper and cardboard packaging (2)         | 49,990 | 49,490 | 15,110 |
| Waste from publication printing processes | 3,770  | 5,080  | 2,970  |

(1) Excludes waste from the life cycle of banknotes. – (2) Includes only waste generated in the Rome and Frascati buildings.



Table a14

| Banknotes<br>(units)  | 2019    |         |         | 2020 |  |  | 2021 |  |  |
|---|---------|---------|---------|------|--|--|------|--|--|
|   |         |         |         |      |  |  |      |  |  |
| Euro banknotes produced (million notes)   | 791     | 692     | 663     |      |  |  |      |  |  |
| Paper and ink purchased for the production of banknotes (kg)  | 813,524 | 894,370 | 763,888 |      |  |  |      |  |  |
| Transportation of paper and ink for the production of banknotes (km travelled)                      | 62,046  | 49,549  | 47,802  |      |  |  |      |  |  |
| Waste from the banknote production process (kg)   | 131,417 | 67,666  | 108,224 |      |  |  |      |  |  |
| Transportation of banknotes to and between the branches of the Bank of Italy (litres of diesel oil) | 484,413 | 591,617 | 371,862 |      |  |  |      |  |  |
| Transportation of banknotes to and from other central banks (No. of flights)                        | 133,904 | 151,162 | 147,485 |      |  |  |      |  |  |
| Waste consisting of shredded worn banknotes (kg)  | 24      | 32      | 21      |      |  |  |      |  |  |

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

Table a15

| Business travel<br>(thousands of kilometres and units) | 2017          |               | 2018          |              | 2019         |  | 2020 |  | 2021 |  |
|--|---------------|---------------|---------------|--------------|--------------|--|------|--|------|--|
|  |               |               |               |              |              |  |      |  |      |  |
| By air   | 18,891        | 20,652        | 19,111        | 3,019        | 1,287        |  |      |  |      |  |
| By train   | 7,617         | 8,571         | 8,900         | 1,565        | 2,254        |  |      |  |      |  |
| By corporate shuttle bus                               | 246           | 247           | 284           | 214          | 294          |  |      |  |      |  |
| By chauffeured car                                     | 287           | 230           | 254           | 35           | 10           |  |      |  |      |  |
| By private car   | 1,746         | 1,585         | 1,225         | 659          | 694          |  |      |  |      |  |
| <b>Total business travel</b>                           | <b>28,787</b> | <b>31,285</b> | <b>29,774</b> | <b>5,492</b> | <b>4,539</b> |  |      |  |      |  |
| Overnight stays  | ....          | ....          | 50,118        | 8,663        | 16,741       |  |      |  |      |  |
| of which: in Italy                                     | ....          | ....          | 41,783        | 7,532        | 16,464       |  |      |  |      |  |

Table a16

| Green procurement (1)<br>(number of tenders)       | 2019 |    | 2020 |  | 2021 |  |
|--|------|----|------|--|------|--|
|  |      |    |      |  |      |  |
| Tenders with environmental and social criteria (2) | 38   | 34 | 22   |  |      |  |
| Total tenders                                      | 105  | 82 | 107  |  |      |  |

(1) The values refer to the number of resolutions to contract out registered in the reference year for tenders above the EU threshold. – (2) Includes all tender procedures for which at least one environmental or social criterion has been envisaged in: the requirements for access to the tender procedure, the scores for the bid specifications, the characteristics of the good or service purchased.

Table a17

| Sustainable investment<br>(environmental footprint indicators) | 2019  |       | 2020  |  | 2021 |  |
|--|-------|-------|-------|--|------|--|
|  |       |       |       |  |      |  |
| <b>Euro-area equity portfolio</b>                              |       |       |       |  |      |  |
| Weighted average carbon intensity (1)                          | 283.0 | 251.0 | 198.5 |  |      |  |
| Weighted average energy intensity (2)                          | 2.0   | 1.6   | 1.4   |  |      |  |
| <b>Euro-denominated corporate bond portfolio</b>               |       |       |       |  |      |  |
| Weighted average carbon intensity (1)                          | 161.0 | 118.0 | 138.3 |  |      |  |
| Weighted average energy intensity (2)                          | 1.4   | 1.7   | 1.4   |  |      |  |
| <b>Euro-denominated government bond portfolio</b>              |       |       |       |  |      |  |
| Weighted average carbon intensity (3)                          | 262.0 | 262.0 | 174.2 |  |      |  |
| Weighted average energy intensity (4)                          | 2.6   | 2.6   | 2.6   |  |      |  |

See the section 'Environmental indicators for investment' in the Methodological Notes.

(1) Grams of CO<sub>2</sub>e per euro of sales revenue. – (2) Gigajoules of energy per thousand euros of sales revenue. – (3) Tonnes of CO<sub>2</sub>e per 2017 GDP per capita in USD millions. – (4) Exajoules of energy per 2011 GDP per capita in USD.

# methodological notes

This section contains methodological information such as: details of the perimeter of the buildings and activities to which the indicators and information contained in the Environment Report refer (organizational boundaries); the standards and guidelines used; 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 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.

## Organizational boundaries

The data in this edition of the Environment Report were updated as of 31 December 2021 and refer to organizational boundaries consisting of:

- staff of the Bank, 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, authorized garages), branches operating in Italy, including the Sadiba Center in Perugia, closed branches, and the London, New York and Tokyo Delegations.

The figures showing the words 'Bank of Italy' in the header 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 Carabinieri police officers was not taken into account, even if the respective activities were carried out continuously within the buildings.

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, 2021 \(ABI Lab Guidelines\)](#).

As regards specifically 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 Greenhouse gases – 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 on 31 December 2021 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 1990-2019. National Inventory Report 2021 \(NIR 2021\)](#) and in particular Annex 6 National Emission Factors;
- the [Common Reporting Format 2021 \(CRF 2021\)](#), published together with the NIR 2021, and in particular Table 1.A(a)54;
- 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 report [Climate change 2021: 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 [database](#) of the emission factors 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 of business travel, the following were used:

- the [International Civil Aviation Organization \(ICAO\)](#) calculator for emission factors, the length of aircraft sections and the weight of fuel used for each leg;
- 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 related to the provision of canteen services, the [database](#) of emission factors of the French programme Agribalyse 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 gasoline) 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 of the three representative offices was obtained by multiplying the average methane gas consumption of the branches opened in the reference year (expressed in Smc/m<sup>3</sup> of heated volume) by the volume (in m<sup>3</sup>) 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 of rented buildings was obtained by multiplying the consumption in the reference year (expressed in Smc/m<sup>3</sup> heated volume) of the most similar building - in terms of plant characteristics and building envelope - by the volume of the rented building. For 2021, 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**

| <b>Conversion factors by fuel type</b><br>(GJ per litre of fuel and GJ per Smc of methane gas) |                              |
|--|------------------------------|
| FUEL   | GJ produced per unit of fuel |
| Gas oil for generators   | 0.0360192 GJ/l               |
| Methane gas for heating  | 0.034287 GJ/Smc              |
| Heating oil  | 0.0360192 GJ/l               |
| Diesel fuel for transport  | 0.0359352 GJ/l               |
| Motor gasoline   | 0.0316868 GJ/l               |

Source: calculations based on 2021 NIR and 2021 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'.

*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/m<sup>3</sup>) by the volume of each office. For the purposes of 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 reading 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 m<sup>3</sup>/employee) was multiplied by the number of staff employed by each office or working in the rented building.

*Paper consumption and toner.* – Actual consumption of office paper and toner is not available: therefore, data on purchases were used. The daily consumption of sheets of A4 equivalent paper was calculated on the basis of the average number of working days, i.e. 220. In the case of the printing activities of institutional publications, actual consumption of paper and toner was reported.

## **Greenhouse gas emissions**

### ***Direct emissions from fixed and mobile combustion***

International standards ISO 14064 and GHG Protocol classify greenhouse gas emissions in 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 indirect emissions:

- 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 related 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<sub>2</sub>), methane (CH<sub>4</sub>) and dinitrogen monoxide (N<sub>2</sub>O): the 2021 greenhouse gas emissions have been calculated using the factors shown in Table B.

**Table B**

| <b>Emission factors by fuel type</b><br><i>(grams of greenhouse gases emitted per litre of fuel and per Smc of methane gas)</i> |                             |                               |                                  |
|---|-----------------------------|-------------------------------|----------------------------------|
| FUEL  | Emissions of carbon dioxide | Emissions of methane          | Emissions of dinitrogen monoxide |
| Gas oil for generators  | 2650.2 gCO <sub>2</sub> /l  | 0.25217 gCH <sub>4</sub> /l   | 0.072038 gN <sub>2</sub> O/l     |
| Natural gas for heating   | 1976 gCO <sub>2</sub> /Smc  | 0.08572 gCH <sub>4</sub> /Smc | 0.034287 gN <sub>2</sub> O/Smc   |
| Heating oil   | 2650.2 gCO <sub>2</sub> /l  | 0.25217 gCH <sub>4</sub> /l   | 0.072038 gN <sub>2</sub> O/l     |
| Diesel fuel for transportation  | 2646.8 gCO <sub>2</sub> /l  | 0.003948 gCH <sub>4</sub> /l  | 0.099036 gN <sub>2</sub> O/l     |
| Motor gasoline  | 2323.6 gCO <sub>2</sub> /l  | 0.31938 gCH <sub>4</sub> /l   | 0.029526 gN <sub>2</sub> O/l     |

Source: calculations based on 2021 NIR and 2021 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'.

The greenhouse gas emissions associated with the use of each fossil fuel, expressed in tonnes of carbon dioxide equivalent (tCO<sub>2</sub>e), 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)<sup>1</sup>, using the formula: tCO<sub>2</sub>e = tCO<sub>2</sub> + 27.9 tCH<sub>4</sub> + 273 tN<sub>2</sub>O.

*Fluorinated greenhouse gases.* – Direct emissions related to fluorinated greenhouse gas leakages from air conditioning and heat pumps have been calculated using the GWPs published in the report 'Climate change 2021: the physical science basis'. The calculation of emissions in terms of tCO<sub>2</sub>e is performed by multiplying the mass in tonnes of each refrigerant gas by its GWP (Table C).

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



Table C

| GWP of fluorinated greenhouse gases for which leakages occurred in the three-year period 2019-2021 |                  |
|--|------------------|
| 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 related to electricity consumption, calculated according to the market-based and location-based methodologies respectively.

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 provisions of the supply contract. Since 2013, the Bank of Italy has been purchasing electricity exclusively from renewable sources 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 factor, based on the average consumption mix of the Italian grid, from which electricity is consumed (the so-called 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 2021.<sup>2</sup>

<sup>2</sup> These factors were calculated on the basis of those reported in the NIR 2021 and the 2021 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 the calculation of the emissions for the years prior to 2021.

Table D

| Emission factors for electricity<br>(grams of greenhouse gases emitted per kWh of electricity purchased) |                             |                              |                                  |
|--|-----------------------------|------------------------------|----------------------------------|
|  | Emissions of carbon dioxide | Emissions of methane         | Emissions of dinitrogen monoxide |
| Electricity  | 278 gCO <sub>2</sub> /kWh   | 0.0172 gCH <sub>4</sub> /kWh | 0.0030 gN <sub>2</sub> O/kWh     |

Source: calculations based on 2021 NIR and 2021 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'.

The greenhouse gas emissions associated with the use of electricity, expressed in tCO<sub>2</sub>e, 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<sub>2</sub>e = tCO<sub>2</sub> + 27.9 tCH<sub>4</sub> + 273 tN<sub>2</sub>O.

*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,<sup>3</sup> which for 2019 was 212.2 gCO<sub>2</sub>/kWh.

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

*Business travel by air.* – Indirect greenhouse gas emissions from air travel have been estimated using the ICAO online calculator, which provides the kilometres and emissions for each air leg; these are calculated on the basis

<sup>3</sup> See Ispra Emission factors [database](#), Serie storiche emissioni, Fattori di emissione per la produzione ed il consumo di energia elettrica in Italia.

of: (a) aircraft used to travel on individual routes; (b) the routes followed; (c) passenger load factors.

In line with the information provided by Ademe, the carbon dioxide equivalent value obtained by the calculator was then multiplied by a radiative forcing index (RFI)<sup>4</sup> of 2.

*Business travel by train.* – Indirect greenhouse gas emissions from train journeys are estimated using the [Ecopassenger](#) online calculator. The mileages related to the journeys were taken from the online calculator [Ecotransit World](#).

*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<sup>5</sup> of 167.04 gCO<sub>2</sub>e/km. Emissions for the use of chauffeured cars were calculated by multiplying the number of journeys by the length of a mean leg (considered to be 30 km) and by the above-mentioned Ispra factor. The overall emission value for business travel by car does not include the use of taxis and driverless hire cars due to data unavailability.

*Corporate shuttle buses.* – The company's collective transport 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 the kilometres of each run are multiplied by the average factor supplied by Ispra<sup>6</sup> of 634.63 gCO<sub>2</sub>/km. Emissions from corporate shuttle buses are then included in the indirect emissions related 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 of 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). From the analysis of the responses, it was possible to calculate the daily carbon dioxide equivalent emissions per employee of 4.837 kgCO<sub>2</sub>e before the pandemic (until February 2020 included) and 6.103 kgCO<sub>2</sub>e during the pandemic (the rise is caused by the increased use of private transport during the health emergency). Emissions from staff

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<sup>4</sup> Radiative forcing is the metric used by the IPCC to assess the human-induced imbalance to 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, a RFI of 2 was chosen: for each kilogram of carbon dioxide equivalent emitted for the combustion of the fuel, one additional kilogram is then taken into account for other aviation-related effects.

<sup>5</sup> See Ispra Emission factors [database](#), Serie storiche emissioni, Banca dati dei fattori di emissione medi del trasporto stradale in Italia, auto private (Passenger cars).

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<sup>6</sup> See 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).

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 travel on the same home-work journey and to use the same means of transportation or combination as internal staff.

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

- (a) consumption of a Lenovo ThinkPad T490 PC<sup>7</sup> calculated by multiplying its energy absorption of 24.1 W by 8 hours of operation;
- (b) consumption of one or more compact fluorescent lamps, with a total absorption of 30 W, for 4 hours per day of operation<sup>8</sup>.

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

<sup>7</sup> 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.

<sup>8</sup> The consumption has been estimated on the basis of the [INAIL prescriptions](#) on the lighting of the working environments.

energy mix (for 2021, 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 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**

| <b>Indirect emission factors related to fuel consumption</b><br><i>(grams of carbon dioxide equivalent per litre and Smc of methane gas)</i> |                               |
|--|-------------------------------|
| ORIGIN   | Emissions                     |
| Petrol   | 597.32 gCO <sub>2</sub> e/l   |
| Gas oil  | 626.11 gCO <sub>2</sub> e/l   |
| Methane gas  | 262.99 gCO <sub>2</sub> e/Smc |

Source: Defra.

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

The Guarantee of Origin (GO) certificates make it possible to derive for each year the composition of the sources from which the renewable energy purchased originates. Indirect emissions related to the purchase of renewable electricity were then calculated using the factors in Table F, provided by Ademe.<sup>9</sup>

<sup>9</sup> Ademe, Scope 2: émissions indirectes – énergie, Electricité, moyens de production, renouvelable.



Table F

| Indirect emission factors related to the renewable energy purchased by the Bank<br>(grams of carbon dioxide equivalent per kWh of electricity) |           |
|--|-----------|
| ORIGIN   | Emissions |
| Hydropower   | 13        |
| Wind   | 16        |
| Solar  | 44        |
| Heat from solid biomass  | 41        |

Source: Ademe.

For district heating energy, indirect emissions have been estimated using the factor provided by Defra of 25.95 gCO<sub>2</sub>e/kWh.

*Indirect emissions from water consumption.* – The estimate of indirect emissions from the consumption of water was made by using, for both drinking and non-drinking water, the factor provided by Defra of 1,052 gCO<sub>2</sub>e/m<sup>3</sup>, which also takes into account the final treatment and purification phase.

*Indirect emissions related to purchases of office paper and paper for publications.* – The data on kilograms of paper purchased have been multiplied by the factors provided by Defra, i.e. 920 gCO<sub>2</sub>e/kg for white paper and 740 gCO<sub>2</sub>e/kg for recycled paper; an additive factor of 21 gCO<sub>2</sub>e/kg has been added to these factors, to take into account emissions at the final disposal or recovery stage.

*Indirect emissions related to toner consumption.* – Emissions related to toner consumption have been estimated using a factor of 3.003 gCO<sub>2</sub>e per page in A4 equivalent format: the highest factor included in Ademe's [Guide Sectoriel](#)

2012<sup>10</sup> was chosen conservatively, increased by 30%, 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 multiplying this emission factor by the number of sheets of A4 equivalent paper purchased by the Bank, as no data on paper consumption is available (see the item '*Fuel consumption, electricity, water, paper and toner*').

*Indirect emissions related to the purchase of furniture.* – The emissions have been estimated using a monetary factor provided by Ademe<sup>11</sup> which estimates the emissions related to the purchase of office furniture at 500 gCO<sub>2</sub>e 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.

*Indirect emissions related 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<sub>2</sub>e 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 related to the purchase of videoconferencing equipment, for which life cycle emission information is not available, were estimated using the factor provided by Ademe<sup>12</sup> for televisions larger than 49 inches. For emissions relating to the purchase of servers, network equipment, data storage equipment and other network

<sup>10</sup> Ademe, Guide Sectoriel 2012, Tableau 28: Facteurs d'émissions cartouches et toners d'impression.

<sup>11</sup> Ademe, Scope 3: émissions indirectes – autres, Achat de services, Ratio monétaires, Meubles et autres biens manufacturés.

<sup>12</sup> Ademe, Scope 3: émissions indirectes – autres, Achat de biens, Machines et équipements, Informatique et équipement de bureau, ordinateurs et équipements périphériques, Télévision >49 pouces.

<sup>13</sup> Agribalyse, tableau pour les produits alimentaires, prêts à être consommés.

hardware, it was preferred to use, where they exist, the data shown on the manufacturer's technical sheets; 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 related 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 Roman area in 2019 was carried out in collaboration with the current operator of the service. Using the emission factors provided by the [Agribalyse](#) programme<sup>13</sup> for agricultural and food products, covering the whole life cycle, total emissions in carbon dioxide equivalent were calculated and then divided by the number of meals provided by those canteens in 2019 (excluding coffee bars): the calculation made it possible to obtain the value of the emissions per meal delivered of 5.227 kgCO<sub>2</sub>e. This factor was then multiplied by the number of meals provided in 2019, 2020 and 2021 in all seventeen internal canteens of the Bank, six of which are in Rome, one in Frascati and ten at the same number of branches.

*Indirect emissions related to waste disposal and recovery.* – In order to calculate these indirect emissions, the kilograms of archive waste were taken into account and, only for the buildings in Rome and Frascati, furniture, packaging

<sup>13</sup> Agribalyse, tableur pour les produits alimentaires, prêts à être consommés.

of paper and cardboard and waste produced for the printing of the Bank's publications (see the item '*Waste generation*'). As regards furniture, an average weight of 30 kg per piece of furniture removed was conservatively assumed. For each type of waste and final treatment (disposal or recovery), the relevant factors provided by Defra were used (Table G).

**Table G**

| <b>Indirect emission factors related to waste disposal and recovery</b><br>(grams of carbon dioxide equivalent per kilogram 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        | 458.2     |

Source: DEFRA.

#### ***Indirect greenhouse gas emissions related 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 (920 gCO<sub>2</sub>e/kg); (b) for inks, the factor provided by Ademe<sup>14</sup> for offset printing inks (1.870 gCO<sub>2</sub>e/kg).

*Transportation of raw materials for banknote production.* – For air transport, the ICAO calculator has been used to determine the weight (in kilograms) of

<sup>14</sup> See Ademe, Scope 3: émissions indirectes – autres, Achat de biens, Autres produits manufacturés, Consommables de bureau, fourniture de bureau, imprimante, cartouche d'encre, Encre couleur impression offset.

the fuel consumed to travel between the airport of departure and the airport of arrival (assuming, as a precautionary measure, that transport is always exclusive); greenhouse gas emissions were then obtained by multiplying this weight by the aviation spirit factor, provided by Defra of 3,218.6 gCO<sub>2</sub>e 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,<sup>15</sup> i.e. 454.3 gCO<sub>2</sub>e/km.

*Transportation of banknotes.* – For air transport, the ICAO calculator has been used to determine the weight (in kilograms) 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 for that purpose); greenhouse gas emissions were then obtained by multiplying this weight by the aviation spirit factor, provided by Defra of 3,218.6 gCO<sub>2</sub>e 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 landborne transportation, greenhouse gas emissions were obtained by multiplying the litres of total diesel consumed by the average emission factor of 0.03594 GJ/l, provided by Ispra in the NIR 2021.

*Waste related 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 kilograms of waste have been

<sup>15</sup> See Ispra Emission factors database, 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<sub>2</sub> 2019 g/km totale.

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 wastes 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).

### Emissions of other pollutants

Consumption of gas oil, natural gas and gasoline also results in emissions of nitrogen oxides (NO<sub>x</sub>) and sulphur dioxide (SO<sub>2</sub>). The emissions of these pollutants have been calculated using the factors shown in Table H.<sup>16</sup>

Table H

| Emission factors by fuel type<br>(grams of NO <sub>x</sub> and SO <sub>2</sub> per litre, per Smc or per GJ fuel) |                              |                              |
|---|------------------------------|------------------------------|
| FUEL  | Emissions of nitrogen oxides | Emissions of sulphur dioxide |
| Gas oil for generators  | 1.80096 gNO <sub>x</sub> /l  | 1.68840 gSO <sub>2</sub> /l  |
| Natural gas for heating   | 0.988 gNO <sub>x</sub> /Smc  | 0.01 gSO <sub>2</sub> /Smc   |
| Heating oil   | 1.80096 gNO <sub>x</sub> /l  | 1.68840 gSO <sub>2</sub> /l  |
| Diesel fuel for transport   | 191.173 gNO <sub>x</sub> /GJ | 0.285 gSO <sub>2</sub> /GJ   |
| Motor gasoline  | 59.262 gNO <sub>x</sub> /GJ  | 0.263 gSO <sub>2</sub> /GJ   |

Source: calculations based on ISPRA.

<sup>16</sup> These factors were calculated on the basis of those reported in the Ispra database of Emission factors, Fattori di emissione dalla combustione in Italia anno 2019, table Non industrial.

### 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.<sup>17</sup>

WACI is calculated as a weighted average of the carbon intensity of each company, where carbon intensity is the ratio between the sum of the company's direct and indirect emissions from imported energy (*Scope 2*) – expressed in tCO<sub>2</sub>e – and the respective turnover in millions of euros. The weighting is based on the weight of the security in the portfolio. For government bonds, carbon intensity is the ratio of the country's greenhouse gas emissions – expressed in tCO<sub>2</sub>e – to GDP per capita in millions of dollars. The weighted average electricity intensity is calculated as the weighted average of the electricity intensities of each company, represented by the ratio between the electricity consumption of the portfolio companies, expressed in GJ, and their turnover in thousands of euros. As with the WACI, the weighting is based on the weight of the security in the portfolio. For government bonds, the electricity intensity is defined as the ratio of the country's primary energy demand, expressed in exajoules (EJ), to GDP per capita in dollars.

### Waste generation

This item reports exclusively on available data for: (a) archive waste; (b) furniture, paper and cardboard packaging, and waste produced for the printing of the Bank's publications, for the buildings in Rome and Frascati only; (c) waste related 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.



<sup>17</sup> For more details, see Banca d'Italia's 2021 [Report on Sustainable Investment and Climate Risks](#).

## GRI information feedback table

Table I shows the correspondence between the indicators required by the GRI reporting standards, the pages of the Environment Report 2022 and the statistical tables where the indicators are contained.

**Table I**

### Indicators required by the Global Reporting Initiative (GRI) reporting standard

| STANDARD GRI | 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 ( <i>Scope 1</i> )   | 5-7            | a2-a3, a6          |
| 305-2        | Indirect GHG emissions from energy consumption ( <i>Scope 2</i> )   | 5-7            | a2                 |
| 305-3        | Other indirect GHG emissions ( <i>Scope 3</i> )   | 5-7            | a2                 |
| 305-4        | GHG emissions intensity   | –              | a2                 |
| 305-5        | Reduction of GHG emissions  | 6-7            | a2                 |
| 305-7        | Nitrogen oxides (NO <sub>x</sub> ), sulfur oxides (SO <sub>x</sub> ), and other significant air emissions | –              | a6                 |
| 306-3        | Waste generated   | 18-21          | a13-a14            |
| 308-1        | Supplier environmental assessment   | 25-26          | a16                |





**Banca d'Italia  
per l'ambiente**

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