LIETUVOS BANKAS
EUROSISTEMA

CO_2 Footprint Report of the Bank of Lithuania

2020

Subject: activities of the building complexes of the Bank of Lithuania at Gedimino pr. 6, Totorių g. 2/4, Žalgirio g. 90, Žirmūnų 151, Vilnius, and Maironio g. 25, Kaunas, and the staff working therein.

Goal: to assess the CO_2 footprint generated by the activities of the Bank of Lithuania.

Period: 2020.

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1. Assessment methodology for the CO_2 footprint

Assessment thresholds

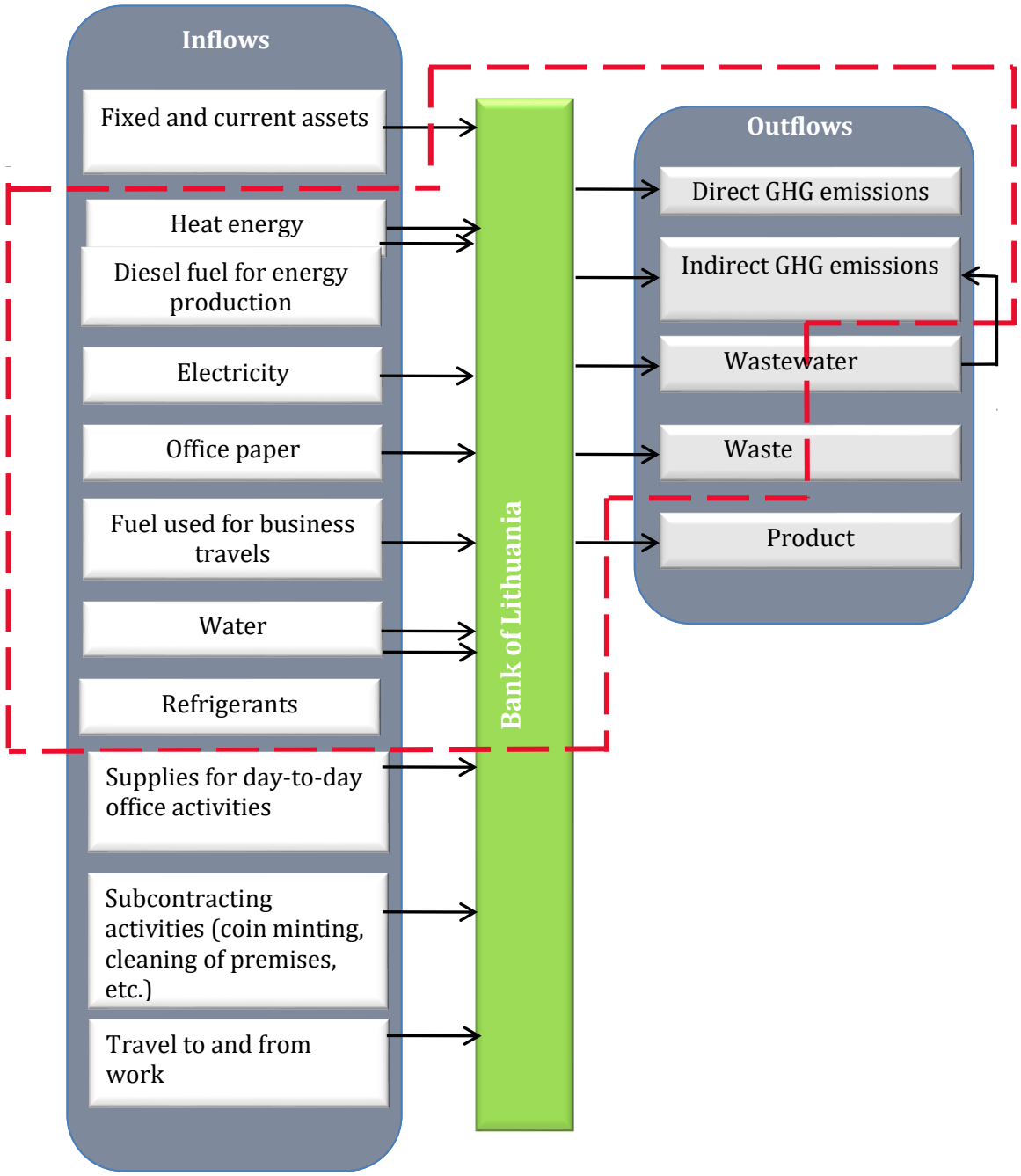
The Bank of Lithuania operates in the following building complexes: Totorių g. 4, Vilnius, Totorių g. 2, Vilnius, Gedimino pr. 6, Vilnius (Complex 1), Žirmūnų 151, Vilnius (Complex 2), Maironio g. 25, Kaunas (Complex 3), and Žalgirio g. 90, Vilnius (Complex 4).

The CO_2 footprint is calculated in terms of office activities, excluding activities carried out for the Bank of Lithuania by companies that are not directly controlled by the Bank, such as euro banknote production and euro coin minting, office services, and supply of goods.

To run the offices, electricity is purchased in all the buildings, heat energy is supplied from district heating networks, water is supplied from district water supply networks and wastewater is discharged into district sewage networks and the municipal wastewater treatment plant. To protect against power outages, three building complexes have diesel generators installed. Frost machines are used to meet the need for cooling. Municipal waste is collected every working day, while paper is sorted separately and collected once a week.

The CO_2 footprint assessment includes the flow diagram showing the inflows and outflows (Figure 1). Inflows are the facilities and natural resources that are used in the activities of the Bank of Lithuania. Outflows are the products, waste generated and emissions from the activities of the Bank of Lithuania.

Figure 1 Flow diagram of the CO_2 footprint of the Bank of Lithuania



The red dotted line defines the inflows and outflows that are included in the CO_2 footprint assessment (see Figure 1).

The assessment does not include fixed and current assets, i.e. greenhouse gas (GHG) emissions resulting from the production or disposal of acquired fixed or current assets (e.g. GHG emissions from computer production).

GHG emissions from business travel by land and air are included in the CO_2 footprint calculation. Only the GHG emissions resulting from the fuel consumed by vehicles are assessed. Air emissions occurring during the life cycle of a vehicle (from production to disposal) are not included in the CO_2 footprint calculation of the Bank of Lithuania. Staff members' travel to and from work is not included in the assessment.

Only office paper is included in the assessment for day-to-day office activities, as a significant amount of paper is used for administrative operations. Other supplies (e.g. stationery, coffee) are not included because the generated GHG emissions are relatively low compared to other activities, while the time spent on accounting is disproportionately high.

GHG emissions from subcontractors' activities are not included, because the Bank of Lithuania is not in a position to assess subcontractors' activities, whereas subcontractors do not calculate the CO2 footprint.

The red dotted line (see Figure 1) crosses the outflows 'Wastewater' and 'Waste'; this is because air emissions resulting from the electricity consumption of the pumps used to collect the wastewater are taken into account when calculating GHG emissions from wastewater treatment, but air emissions from the treatment of the company's wastewater at the municipal wastewater treatment plant are not included in the CO_2 footprint calculation. For the purpose of calculating GHG emissions, waste management air emissions resulting from the transport of waste are taken into account, but air emissions resulting from waste management are not included in the CO_2 footprint calculation.

2. Calculation of GHG emissions

GHG emissions are calculated by multiplying the activity level by the GHG emission factor that characterises the activity in question (fuel combustion, chemical process, etc.):

$E = VL \cdot TR$,

where:

E – GHG emissions, t CO_2;

VL – activity level, pcs.;

TR – pollution factor, t CO_2/pcs.

It is essential that the pollution factors (GHG emission factors) used are derived from reliable sources and are relevant to the site under consideration. Where site-specific pollution factors are not available, conservative default values must be applied. The values of the pollution factors used and the literature sources are given in Table 1.

Table 1. Values of the pollution factors (GHG emission factors)

Ref. No.	Fuel, energy, activity	Units of measurement	Pollution factor, t CO_2/pcs.
1.	Diesel fuel	t	3.1393
2.	Petrol	t	3.2594
3.	Heat energy	MWh	0.17
4.	Electricity	MWh	0.6
5.	Green electricity	MWh	0.018
6.	Extraction, production, and lifting of drinking water	m^3	0.0002916
7.	Wastewater collection	m^3	0.0006624
8.	Garbage trucks	km	0.002022
9.	White paper	t	0.31

3. Grouping of GHG emissions by assessment scopes

The CO_2 footprint is calculated by dividing GHG emission sources into three scopes:

- direct air emissions from energy production or other activities related to the combustion of fuels on the territory of or at facilities owned by the Bank of Lithuania (Scope 1);
- indirect air emissions from the consumption of energy produced outside the Bank (Scope 2);
- GHG emissions that occur outside the Bank of Lithuania but are related to their activities, e.g. business travel (air travel, taxi services, etc.), etc. (Scope 3).

The list of GHG emission sources, grouped by assessment scopes, is provided in Table 2. The grouping follows the most popular standards, including: LST EN ISO 14064-1:2012 Greenhouse gases - Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals (ISO 14064-1:2006); GRI Sustainability Reporting Standards (G305); WRI-WBCSD The GHG Protocol Corporate Accounting and Reporting Standard.

Table 2. GHG emission sources by assessment scopes

Scope 1	Scope 2	Scope 3
Stationary sources of pollution	Electrical energy consumption	Business travel
✓ Production of electricity by own generators		✓ Taxi services in Lithuania ✓ Flights
Mobile sources of pollution	Heat energy consumption	Waste management
✓ Road transport owned by the Bank of Lithuania		✓ Waste removal from the premises of the Bank of Lithuania
Use of refrigerants		Water consumption
✓ Frost machines operated in buildings		✓ Extraction, production, and lifting of drinking water ✓ Wastewater collection
		Administrative operations
		✓ Use of paper

4. Calculating the CO_2 footprint

4.1. Assessment of direct GHG emissions (Scope 1)

4.1.1. Stationary sources of pollution

A stationary source is a source with a fixed location. These sources include diesel generators in the buildings.

In 2020, diesel power generators consumed:

1. 20 l (0.017 t) at the building complex 1;
2. 30 l (0.025 t) at the building complex 2;
3. 20 l (0.017 t) at the building complex 3.

The total diesel fuel used in the buildings amounted to 70 l (0.059 t). The CO_2 emission factor for diesel fuel according to Table 1 is 3.1393 t CO_2/t. Combustion of this amount of diesel fuel resulted in the following emissions:

$E_{1\ kompleksas} = 0{,}017\ t \cdot 3{,}1393\ t\frac{CO_2}{\text{t}} = 0{,}053\ t\ CO_2$;

$E_{2\ kompleksas} = 0{,}025\ t \cdot 3{,}1393\ t\ CO_2/\text{t} = 0{,}078\ t\ CO_2$;

$E_{3\ kompleksas} = 0{,}017\ t \cdot 3{,}1393\ t\ CO_2/\text{t} = 0{,}053\ t\ CO_2$.

4.1.2. Mobile sources of pollution

Mobile sources are motor vehicles and other fuel-powered moving machinery. These sources include vehicles owned by the Bank. CO_2 emissions from mobile sources used for business travel are calculated on the basis of fuel consumption.

In 2020, the diesel-powered vehicles owned by the Bank of Lithuania and assigned to Complexes 1 and 2 combusted 1,698.78 l (1.44 t) of diesel fuel per complex. The vehicles assigned to Complex 3 combusted 3191.94 l (0.16 t) of diesel fuel. In total, diesel-powered vehicles consumed 3,589.50 l (3.04 t) of diesel fuel in 2020. The CO_2 emission factor for diesel fuel according to Table 1 is 3.1393 t CO_2/t. Combustion of this amount of diesel fuel resulted in the following emissions:

$E_{1\ kompleksas} = 1{,}44\ t \cdot 3{,}1393\ t\frac{CO_2}{\text{t}} = 4{,}52\ t\ CO_2$;

$E_{2\ kompleksas} = 1{,}44\ t \cdot 3{,}1393\ t\frac{CO_2}{\text{t}} = 4{,}52\ t\ CO_2$;

$E_{3\ kompleksas} = 0{,}16\ t \cdot 3{,}1393\ t\frac{CO_2}{\text{t}} = 0{,}50\ t\ CO_2$.

In 2020, the petrol-powered vehicles owned by the Bank of Lithuania and assigned to Complexes 1 and 2 combusted 1,916.38 l of petrol per complex, amounting to 3,832.76 l (2.86 t) of petrol in total. The CO_2 emission factor for petrol according to Table 1 is 3.2594 t CO_2/t. Combustion of this amount of petrol resulted in the following emissions:

$E_{1\ kompleksas} = 1{,}43\ t \cdot 3{,}2594\ t\frac{CO_2}{\text{t}} = 4{,}66\ t\ CO_{2;}$

$E_{2\ kompleksas} = 1{,}43\ t \cdot 3{,}2594\ t\ CO_2/\text{t} = 4{,}66\ t\ CO_{2.}$

4.1.3. Use of refrigerants

Refrigerant is a liquid that can boil and evaporate at low temperatures under atmospheric pressure. This material is used to transfer heat from lower to higher temperatures. Refrigerants used in the Bank's equipment include vehicle air-conditioning systems, domestic refrigerators, and air-conditioning systems used in buildings. This assessment only includes the refrigerants used in air-conditioning systems of buildings.

The Bank of Lithuania uses R-410A, R-407C and R-134a refrigerants in the refrigeration units. In 2020, the following amount of refrigerants was added to the refrigeration systems of the Bank of Lithuania:

1. Complex 1: R410A – 9.0 kg;
2. Complex 2: R407C – 10.5 kg.

For the calculation of refrigerant leakage, it is assumed that the amount of refrigerant leakage is equal to the amount of recharge, in which case the GHG emissions are calculated as follows:

$E_{Complex\ 1} = 0{,}009\ \text{t} \cdot 2\ 087{,}8\ \frac{t\ CO_2}{\text{t}} = 18{,}79\ t\ CO_2;$

$E_{Complex\ 2} = 0{,}0105\ \text{t} \cdot\ 1\ 774\ \frac{t\ CO_2}{\text{t}} = 18{,}63\ t\ CO_2.$

4.2. Assessment of indirect GHG emissions (Scope 2)

4.2.1. Electricity

In 2020, the Bank of Lithuania carried out a public procurement and purchased green electricity, as part of the application of responsible policy. From 1 July 2019, the Bank of Lithuania has been using electricity from renewable energy sources.

Electricity consumed from renewable energy sources:

Complex 1 – 812.65 MWh;

Complex 2 – 1,581.60 MWh;

Complex 3 – 322.43 MWh;

Complex 4 – 73.70 MWh.

$E_{el\ Complex\ 1} = 812{,}65\ MWh \cdot 0{,}0{,}18\frac{t\ CO_2}{MWh} = 14{,}63\ \ t\ CO_2;$

$E_{el\ Complex\ 2} = 1581{,}60\ MWh \cdot 0{,}018\ t\ CO_2/MWh = 28{,}47\ \ t\ CO_{2;}$

$E_{el\ Complex\ 3} = 322{,}43\ MWh \cdot 0{,}018\ t\ CO_2/MWh = 5{,}80\ \ t\ CO_2;$

$E_{el\ Complex\ 4} = 73{,}70\ MWh \cdot 0{,}018\ t\ CO_2/MWh = 1{,}33\ \ t\ CO_2$.

4.2.2. Heat energy

In 2020, the Bank of Lithuania consumed 2.089 GWh of heat for space heating and hot water production from district heating networks (810.64 MWh in Complex 1, 740 MWh in Complex 2, and 466 MWh in Complex 3). Building complex 4 uses electricity from renewable energy sources to generate heat, which amounts to 72.4 MWh of electricity.

$E_{h\ Complex\ 1} = 810{,}64\ MWh \cdot 0{,}17 \frac{t\ CO_2}{MWh} = 137{,}81\ \ t\ CO_2$;

$E_{h\ Complex\ 2} = 740\ MWh \cdot 0{,}17 \frac{t\ CO_2}{MWh} = 125{,}83\ \ t\ CO_2$;

$E_{h\ Complex\ 3} = 466\ MWh \cdot 0{,}17 \frac{t\ CO_2}{MWh} = 79{,}26\ \ t\ CO_2$;

$E_{h\ Complex\ 4} = 72{,}40\ MWh \cdot 0{,}018\ t\ CO_2/MWh = 1{,}302\ \ t\ CO_2$.

4.3. Other sources of GHG emissions (Scope 3)

4.3.1. Taxi services

In 2020, employees of Complexes 1, 2 and 4 of the Bank of Lithuania drove 2,515 km by taxi.

Taxi services are assessed on the basis of fuel consumption per distance travelled and emissions from fuel combustion. In the absence of data on the type of vehicles used, the fuel consumption is estimated on the following assumptions: taxis use diesel fuel, the engine capacity is 2.0 l, while the average annual fuel consumption is 6.53 l/100 km. The corresponding diesel fuel consumption amounts to 164.23 l.

Based on these assumptions, the CO_2 emissions from fuel combustion in taxi engines in 2020 were as follows:

$E_{Complex\ 1} = 0{,}139\ t \cdot 3{,}1393\ t \frac{CO_2}{\mathrm{t}} = 0{,}43\ t\ CO_2$;

$E_{Complex\ 3} = 0{,}139\ t \cdot 3{,}1393\ t \frac{CO_2}{\mathrm{t}} = 0{,}43\ t\ CO_2$;

$E_{Complex\ 4} = 0{,}139\ t \cdot 3{,}1393\ t \frac{CO_2}{\mathrm{t}} = 0{,}43\ t\ CO_2$.

4.3.2. Flights

Business flights are calculated on the basis of the flight route and the number of routes. The *Carbon Footprint Calculator* application is used for calculations, based on economy class flight routes in 2020. The developers of the *Carbon Footprint Calculator* have used credible sources to determine the emission factors; therefore, their interactive tool is used to calculate the flights.

The estimated CO_2 emissions from flights in 2020 amounted to 105.00 t CO_2, which is distributed equally to Complexes 1, 2 and 4, amounting to 35.00 t CO_2 per Complex.

4.3.3. Water consumption

Water is supplied to the Bank of Lithuania by water supply undertakings Uždaroji akcinė bendrovė VILNIAUS VANDENYS and Uždaroji akcinė bendrovė Kauno vandenys. In 2020, the total water consumption amounted to 6,294 m^3: 2,326 m^3 in Complex 1, 1,601 m^3 in Complex 2, 473 m^3 in Complex 3, and 1,894 m^3 in Complex 4 accordingly. The extraction, production and lifting of this water by pumps consumed a certain amount of electricity, thus generating GHG emissions. According to the revised and summarised benchmarking indicators for 2020 provided by the National Energy Regulatory Council for water supply undertakings, the relative electricity consumption by the level of sales of water supply services in 2020 for undertakings in Group I (this group includes Uždaroji akcinė bendrovė VILNIAUS VANDENYS and Uždaroji akcinė bendrovė Kauno vandenys) amounted to 0.050 kWh/m^3 for water production, and 0.436 kWh/m^3 for extraction of water from a 100 m depth and delivery (the previous year's indicator is used, given that data for the current year is published in June). The calculated GHG emission factor for the extraction, production and lifting of water is 0.2916 kg CO_2/m^3. The calculations resulted in emissions of 1.82 t CO_2in 2020, amounting to the below figures for separate complexes:

$$E_{water\ Complex\ 1} = 2\ 326\ m^3 \cdot \frac{\frac{0{,}2916}{1\ 000} t\ CO_2}{m^3} = 0{,}67\ t\ CO_2;$$

$$E_{water\ Complex\ 2} = 1\ 601\ m^3 \cdot \frac{0{,}2916}{1\ 000} t\ CO_2/m^3 = 0{,}47\ t\ CO_{2;}$$

$$E_{water\ Complex\ 3} = 473\ m^3 \cdot \frac{\frac{0{,}2916}{1000} t\ CO_2}{m^3} = 0{,}13\ t\ CO_2;$$

$$E_{water\ Complex\ 4} = 1\ 894\ m^3 \cdot \frac{0{,}2916}{1\ 000} t\ CO_2/m^3 = 0{,}55\ t\ CO_2.$$

4.3.4. Wastewater collection

GHG emissions from anaerobic treatment of wastewater at the wastewater treatment plants of Uždaroji akcinė bendrovė VILNIAUS VANDENYS and Uždaroji akcinė bendrovė Kauno vandenys are not included in the calculations because the data on wastewater treatment is not sufficient. However, the CO_2 footprint includes indirect GHG emissions due to the use of electricity for wastewater collection. Based on the above report for water consumption, the estimated GHG emission factor for wastewater collection is 0.6624 kg CO_2/m^3. The indirect air emissions from the electricity consumption of 6,294 m^3 for wastewater collection amounted to 4.16 t CO_2:

$$E_{wastewater\ Complex\ 1} = 2\ 326\ m^3 \cdot \frac{0{,}6624}{1\ 000} t\ CO_2/m^3 = 1{,}54\ t\ CO_2;$$

$$E_{wastewater\ COmplex\ 2} = 1\ 601\ m^3 \cdot \frac{\frac{0{,}6624}{1000} t\ CO_2}{m^3} = 1{,}06\ t\ CO_2;$$

$$E_{wastewater\ Complex\ 3} = 473\ m^3 \cdot \frac{\frac{0{,}6624}{1\,000}\ t\ CO_2}{m^3} = 0{,}31\ t\ CO_2;$$

$$E_{nuotekos4kompleksas} = 1\,894\ m^3 \cdot \frac{\frac{0{,}6624}{1\,000}\ t\ CO_2}{m^3} = 1{,}25\ t\ CO_2.$$

4.3.5. Waste removal

GHG emissions from waste removal are generated by fuel consumption of garbage trucks. To calculate air emissions, the repeatability and the distance travelled by garbage trucks to the locations of discharge are considered. As it is not possible to identify the specific vehicles used to transport the waste, a conservative European gross air emission factor of 0.002022 t Co2/km is chosen. The distance travelled is estimated from the location of the relative Complex to the regional mechanical biological treatment of municipal waste.

Table 3. Waste removal instances based on company data, waste transport distances and emissions

Waste generated	Times per year	Distance travelled, km	Emissions, t CO_2
Municipal waste from Complex 1	252	16	8.15
Municipal waste from Complex 2	252	14	7.13
Municipal waste from Complex 3	156	10	3.15
Paper (plastic) from Complex 1	52	16	1.68
Paper (plastic) from Complex 2	52	14	1.47
Paper (plastic) from Complex 3	4	10	0.08

The total CO_2 emissions from waste removal in 2020 amounted to 21.66 t CO_2. GHG emissions from waste management activities are not included in the calculation of the CO_2 footprint of the company.

4.3.6. Use of paper

The Bank of Lithuania uses A4 white paper (assessment data: 80 g/m^2, 500 sheets per pack, pack weight 2.5 kg). According to the Bank of Lithuania, the use of paper amounted to 2,287 t in 2020. During the lifecycle of paper, GHG emissions are generated by the production, transport and disposal phases. For the purposes of the calculation, paper is assumed to be produced in the European Union, and the emission factor of 0.31 t CO_2/t is applied, based on the activity report of the Confederation of European Paper Industries (CEPI). According to the report, this amount of paper consumption generates 0.31 t of CO_2 emissions per building complex:

$$E_{paper\ Complex\ 1} = 1{,}098\ t\ \cdot 0{,}31\ t\frac{CO_2}{t} = 0{,}34\ t\ CO_2;$$

$$E_{paper\ Complex\ 2} = 0{,}503\ t\ \cdot 0{,}31\frac{t\ CO_2}{t} = 0{,}15\ tCO_2;$$

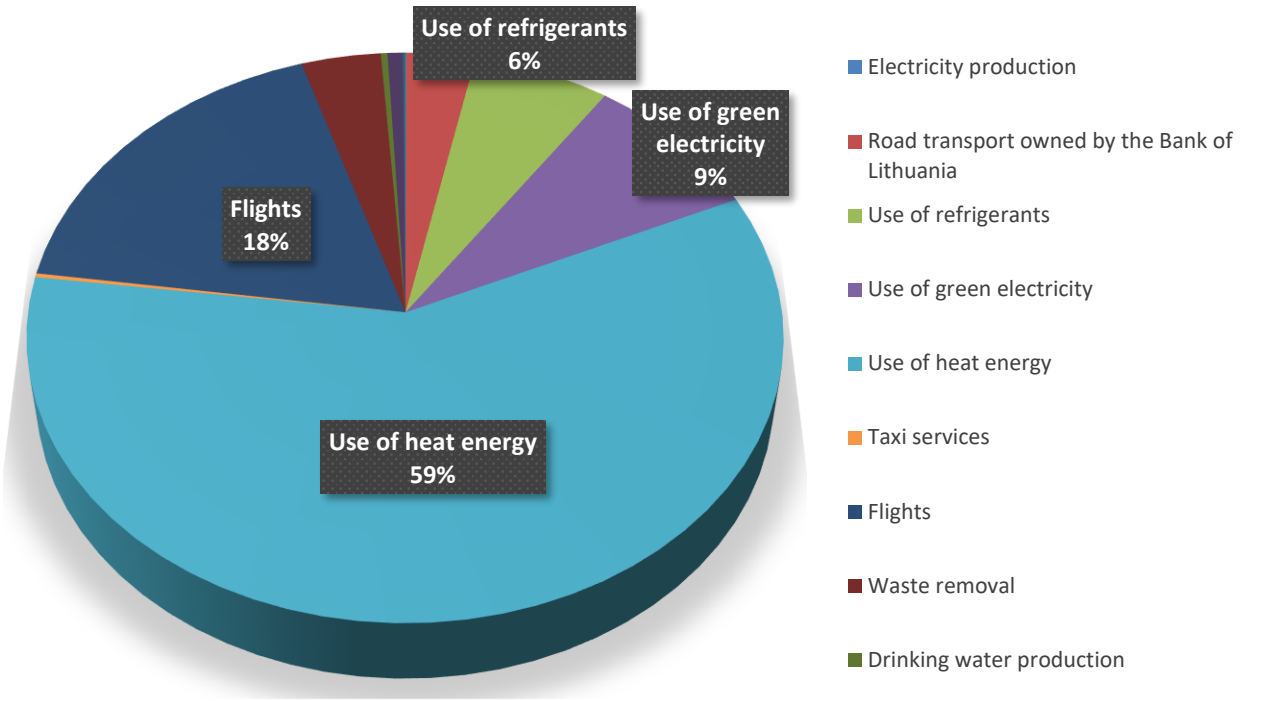
$$E_{paper\ Complex\ 3} = 0{,}205\ t\ \cdot 0{,}31\frac{t\ CO_2}{t} = 0{,}06\ t\ CO_2;$$

$$E_{paper\ Complex\ 4} = 0{,}480\ t\ \cdot 0{,}31\frac{t\ CO_2}{t} = 0{,}14\ t\ CO_2.$$

5. Summary of results

In 2020, the total CO_2 footprint of the Bank of Lithuania from all activities across all assessment scopes amounted to 585.51 t CO_2. Heat energy consumption accounts for 59%, flights account for 18%, green electricity consumption accounts for 9%, while the use of refrigerant accounts for 6% of this amount. The overall structure of the CO_2 footprint is shown in Figure 2.

Figure 2. Structure of the total CO_2 footprint of the Bank of Lithuania in 2020



The total CO_2 footprint per person amounted to 0.94 t CO_2.

The structure of the CO_2 footprint by assessment scopes and building complexes is shown in Table 4.

Table 4. The structure of the CO_2 footprint by assessment scopes and building complexes

Activity (scope)	Complex 1	Complex 2	Complex 3	Complex 4	Total, t CO_2
Scope 1	**28.02**	**27.89**	**0.553**	**0.00**	**56.46**
Production of electricity	0.053	0.078	0.053	0.00	0.18
Road transport of the Bank of Lithuania	9.18	9.18	0.50	0.00	18.86
Use of refrigerants	18.79	18.63	0.00	0.00	37.42
Scope 2	**152.44**	**154.30**	**85.06**	**2.63**	**394.43**
Consumption of green electricity	14.63	28.47	5.80	1.33	50.23
Heat energy consumption	137.81	125.83	79.26	1.30	344.20
Scope 3	**47.81**	**45.71**	**3.73**	**37.37**	**134.62**
Taxi services	0.43	0.43	0.00	0.43	1.29
Flights	35.00	35.00	0.00	35.00	105.00
Waste removal	9.83	8.60	3.23	0.00	21.66
Drinking water production	0.67	0.47	0.13	0.55	1.82
Wastewater collection	1.54	1.06	0.31	1.25	4.16
Use of paper	0.34	0.15	0.06	0.14	0.69
Total, t CO_2	**228.27**	**227.90**	**89.34**	**40.00**	**585.51**
Average number of staff	299	280	40	200	619
t CO_2/per person	**0.76**	**0.81**	**2.23**	**0.2**	**0.94**
Scope 1	**28.02**	**27.89**	**0.553**	**0.00**	**56.46**

6. Dynamics of the CO_2 footprint of the Bank of Lithuania

The Bank of Lithuania monitors their CO_2 footprint and implements measures to reduce the environmental impact of their activities.

However, an increase in CO_2 emissions is recorded for individual scopes, with the largest difference coming from the use of refrigerants. The use of old air-conditioning equipment in the building complexes of the Bank of Lithuania resulted in frequent equipment failures in 2019, which led to higher consumption of refrigerants.

From July 2019, the Bank of Lithuania has launched a public procurement of electricity from renewable energy sources. The contract was signed with the electricity supplier UAB Abotis. This has enabled the Bank of Lithuania to significantly improve the situation and reduce the CO_2 footprint.

The dynamics by activity scopes is shown in Table 5.

Table 5. The dynamics of the CO_2 footprint of the Bank of Lithuania by activity scopes

Activity (scope)	2020	2019	Difference
Scope 1	**56.46**	**262.288**	**-205.83**
Production of electricity	0.18	0.778	-0.598
Road transport of the Bank of Lithuania	18.86	27.23	-8.37
Use of refrigerants	37.42	234.28	-196.86
Scope 2	**394.43**	**1,489.31**	**-1,094.88**
Consumption of green electricity	50.23	24.56	+25.67
Heat energy consumption	344.20	457.96	-113.76
Scope 3	**134.62**	**459.11**	**-324.49**
Taxi services	1.29	5.91	-4.62
Flights	105	419.10	-314.10
Waste removal	21.66	21.66	0.00
Drinking water production	1.82	3.25	-1.43
Wastewater collection	4.16	7.40	-3.24
Use of paper	0.69	1.79	-1.10
Total, t CO_2	**585.51**	**2,210.71**	**-1,625.20**
Average number of staff	619	619	0
t CO_2/per person	**0.94**	**3.57**	**-2.63**

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