NET ZERO CITIES

EU MISSION PLATFORM | CLIMATE NEUTRAL AND SMART CITIES

Climate City Contract

2030 Climate Neutrality Investment Plan

2030 Climate Neutrality Investment Plan of Budapest

BUDAPEST

NetZeroCities has received funding from the H2020 Research and Innovation Programme under the grant agreement n°101036519.

Budapest towards climate-neutrality

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NET ZERO CITIES

Document history			
Date	**Version**	**Author**	**Changes**
January 2023	V1	BwB	/
June 2023	V2	BwB	The template was amended to include a front-page note "The IP template is to be followed closely, and cities should fill in every section to the level of detail that they have, remaining mindful of the CCC Checklist and guidance documents. If it is not possible to complete a section, please state why it cannot be filled out".
November 2023	V2.1	BwB	The template has been amended based on the experiences of Window 1 and Window 2 cities, with input from City Advisors, consortium partners, the European Commission and the EIB. Headline changes to the document include the introduction of tables 1, 7, 8 and 15 to provide more granular detail on the city's climate action history and prospective investments. Table guidelines have been provided for all tables to provide clarity on what data is required, and a task goal for each task identifies the key outcomes of each task within the IP.

Disclaimer

The content of this document reflects only the author's view. The European Commission is not responsible for any use that may be made of the information it contains.

The document contains indicators and economic data calculated with the use of the Economic Model provided by the Net Zero Consortium, the Municipality of Budapest has not carried out assessment or review of the methodology and the benchmarks the model operates with.

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Glossary of Terms

Acronym	Description
CCC	Climate City Contract
MFF	Multiannual Financial Framework
NGEU	Next Generation EU
RRF	Recovery and Resilience Facility
PPP	Public-Private Partnership
SECAP	Sustainable Energy and Climate Action Plan
CAPEX	capital expenditure
OPEX	operating expenditure
NPV	net present value
EV	electric vehicle
vkm	vehicle-kilometre
pkm	passenger-kilometre
ECF	European Climate Foundation
WACC	weighted average cost of capital
EEOS	Energy Efficiency Obligation Scheme
ESCO	energy service company
PED	positive energy district
ERDF	European Regional Development Fund
SUDOP	Spatial and Urban Development Operational Programme
EEEOP	Environmental and Energy Efficiency Operational Programme
ITOP	Integrated Transport Development Operational Programme
DROP	Digital Renewal Operational Programme
EBRD	European Bank for Reconstruction and Development
EEEF	European Energy Efficiency Fund
BOT	Build-Operate-Transfer
DBO	Design-Build-Operate
MEL	Monitoring Evaluation & Learning
ETS	EU Emissions Trading System
GHG	greenhouse gas
MoU	Memorandum of Understanding

1 Part A – Current State of Climate Investment

Part A "Current State of Climate Investment" is the **structural element** of the climate neutrality investment plan, putting the basis for the development of the plan through a detailed-oriented evaluation and assessment of the city's existing financial policies and funding/financing activities.

1.1 Module IP-A1: Existing Climate Action Funding and Financing

The Municipality of Budapest has allocated a significant amount of its budget to direct and indirect climate actions in recent years with a special focus on developing public transport, renovating municipality-owned buildings, and rehabilitating green spaces.

The Municipality had not had experience with green budgeting prior to starting the CCC process, although the investments and developments detailed in its strategic documents are annually or biannually monitored. The historical budget data listed below was generated specifically for the Investment Plan. It was gathered by the Mission Team with the support of the Department of Finance and Accounting, and the Department of Budget Planning and Supervision. The first version only serves the purpose of historically determining how much of the Municipality's and its companies' spending can be considered environmentally sustainable. However, later iterations will attempt to integrate green budgeting into the planning phase of the annual budget as well, with the aim of aiding fund allocation decisions.

Because no existing process had been in place to flag climate actions in the municipality's budget, items were chosen using the EU Taxonomy. Items in the budget were categorised according to the Taxonomy's climate change mitigation activities complemented by *environmental protection and restoration activities* and *disaster risk management* to account for green infrastructure investments as well. Activities were grouped together to make the flagging of each row of the tables of final accounts easier. This categorization is reflected in Tables 2, 3, 5 and 6 as well. The four tables distinguish between operating and non-operating costs to provide an accurate picture of the capital investments the Municipality and its companies have made but to also show how much of their operating costs were green, as the City spends significant amounts on upkeeping high-quality public services, such as public transport. It is important to note here, however, that green operating costs are not easily identifiable. Although the green budget methodology was standardised, different public companies might have flagged their operating costs as green differently. To simplify the process, one activity, the operation of public transport was categorized as entirely green.

It is also important to mention that the numbers below only include the budget of the Municipality of Budapest, its companies, and public institutions. The budgets of the independent 23 districts have not been included due to complexity, even though districts also spend a considerable amount of their budget on projects and developments that support the city's climate-neutral ambition.

1. Table: Historical municipal budget and budget for climate actions (in EUR)

Budget Data	2020	2021	2022	2023	2024
Municipal Budget (€)	*914 232 122*	*1 069 721 268*	*1 063 417 497*	*1 166 578 599*	*1 337 684 204*
Operating expenditure	*706 648 610*	*723 303 460*	*832 448 112*	*851 567 737*	*1 106 116 283*
Capital expenditure	*124 091 966*	*101 327 593*	*134 270 501*	*166 870 336*	*108 973 736*
Financing costs	*83 491 546*	*245 090 215*	*96 698 885*	*148 140 526*	*122 594 185*
Municipal Budget for Climate Actions & Projects (€)	*428 354 434*	*434 040 460*	*518 611 794*	*488 245 922*	*488 923 695*
Operating Expenditure	*364 194 088*	*353 646 619*	*411 735 547*	*342 286 452*	*459 119 553*
Capital Expenditure	*64 160 346*	*80 393 841*	*106 876 247*	*145 959 470*	*29 804 142*
Financing costs	-	-	-	-	-
% of Municipal Budget for Climate Actions & Projects (%)	***47%***	***41%***	***49%***	***42%***	***37%***
Operating Expenditure	***52%***	***49%***	***49%***	***40%***	***42%***
Capital Expenditure	***52%***	***79%***	***80%***	***87%***	***27%***
Financing costs	**-**	**-**	**-**	**-**	**-**

2. Table: Green spending of the Municipality from 2020 to 2024 (operating expenditure)

Fields of Action	Activity	Budget Allocation for Climate Actions and Projects in EUR				
		2020	2021	2022	2023	2024
Energy	Electricity generation using solar photovoltaic technology, concentrated solar power (CSP) technology, wind power, hydropower, geothermal energy, renewable non-fossil gaseous and liquid fuels and bioenergy	0	0	0	0	0
	Transmission and distribution of electricity	0	0	0	0	0
	Transmission and distribution networks for renewable and low-carbon gases	0	0	0	0	0
	Storage of electricity, thermal energy and hydrogen	0	0	0	0	0
	Manufacture of biogas and biofuels for use in transport and of bioliquids	0	0	0	0	0
	District heating/cooling distribution	0	0	0	0	0
	Cogeneration of heating/cooling and electricity or production of heating/cooling from solar energy, geothermal energy, non-fossil gas and liquid fuels, bioenergy, waste heat or from fossil gaseous fuels in an efficient district heating and cooling system	0	0	0	0	0
Water supply, sewerage, waste management and remediation	Construction, extension, operation and renewal of wastewater and water collection and treatment	3 681 916	3 797 837	4 393 144	4 223 809	6 070 922
	Recycling	0	1 003 268	1 528 280	403 034	0
	Anaerobic digestion of sewage sludge and bio-waste and composting	0	0	0	0	25 940
	Landfill gas capture and utilisation	0	0	0	0	0
	Underground permanent geological storage of CO2	0	0	0	0	0
	Sustainable urban drainage systems (SUDS)	1 568 357	1 584 296	1 557 686	0	1 569 390
Transport	Purchase, financing, rental, leasing and operation of sustainable modes of transport	0	0	0	0	0

	Sustainable transport infrastructure	347 690 460	315 299 115	359 666 615	289 962 756	396 933 022
Buildings	Construction of new buildings	0	0	0	0	0
	Acquisition and ownership of buildings	0	0	0	0	0
	Renovation of existing buildings	96 415	246 335	167 468	87 224	1 496 520
	Other decarbonisation measures for buildings	0	134 208	143 873	206 584	176 310
Information and communication	Professional, scientific and technical activities related to the reduction of greenhouse gas emissions and energy efficiency	66 701	1 800 106	2 125 988	2 214 970	2 339 302
Environmental protection and restoration activities	Conservation, including restoration, of habitats, ecosystems and species	11 090 239	29 753 045	41 987 466	44 931 321	50 341 572
Disaster risk management	Non-nature-based solutions for flood and drought risk prevention and protection, flood risk prevention and protection infrastructure, emergency services	0	28 410	160 521	236 252	0
	Nature-based solutions for flood and drought risk prevention and protection, flood risk prevention and protection infrastructure	0	0	4 506	20 502	166 575
Total in €		**364 194 088**	**353 646 619**	**411 735 547**	**342 286 452**	**459 119 553**

3. Table: Green spending of the Municipality from 2020 to 2024 (capital expenditure)

Fields of Action	Activity	Budget Allocation for Climate Actions and Projects in EUR				
		2020	2021	2022	2023	2024
Energy	Electricity generation using solar photovoltaic technology, concentrated solar power (CSP) technology, wind power, hydropower, geothermal energy, renewable non-fossil gaseous and liquid fuels and bioenergy	0	0	0	0	0
	Transmission and distribution of electricity	0	6 459	0	0	0
	Transmission and distribution networks for renewable and low-carbon gases	0	0	0	0	0
	Storage of electricity, thermal energy and hydrogen	0	0	0	0	0
	Manufacture of biogas and biofuels for use in transport and of bioliquids	0	0	0	0	0
	District heating/cooling distribution	0	0	0	0	0

	Cogeneration of heating/cooling and electricity or production of heating/cooling from solar energy, geothermal energy, non-fossil gas and liquid fuels, bioenergy, waste heat or from fossil gaseous fuels in an efficient district heating and cooling system	0	0	0	0	0
Water supply, sewerage, waste management and remediation	Construction, extension, operation and renewal of wastewater and water collection and treatment	11 184 968	16 810 908	15 255 372	48 485 626	3 560 962
	Recycling	20 283 518	20 118 005	14 570 815	273 576	37 345
	Anaerobic digestion of sewage sludge and bio-waste and composting	0	0	0	0	0
	Landfill gas capture and utilisation	0	0	0	0	0
	Underground permanent geological storage of CO2	0	0	0	0	0
	Sustainable urban drainage systems (SUDS)	0	0	0	0	0
Transport	Purchase, financing, rental, leasing and operation of sustainable modes of transport	8 495 546	7 068 755	5 467 447	26 263 156	660 631
	Sustainable transport infrastructure	22 149 789	29 587 301	65 466 337	53 783 920	12 736 883
Buildings	Construction of new buildings	0	7 990	0	0	0
	Acquisition and ownership of buildings	0	0	0	0	0
	Renovation of existing buildings	1 412 669	1 069 240	2 095 508	2 426 980	6 649 402
	Other decarbonisation measures for buildings	0	0	0	0	0
Information and communication	Professional, scientific and technical activities related to the reduction of greenhouse gas emissions and energy efficiency	61 580	397	100 853	10 339	622 968
Environmental protection and restoration activities	Conservation, including restoration, of habitats, ecosystems and species	334 405	4 282 226	2 511 445	1 005 275	5 079 305
Disaster risk management	Non-nature-based solutions for flood and drought risk prevention and protection, flood risk prevention and protection infrastructure, emergency services	118 003	50 394	1 408 470	13 710 597	456 648
	Nature-based solutions for flood and drought risk prevention and protection, flood risk prevention and protection infrastructure	119 870	1 392 166	0	0	0
Total in €		**64 160 346**	**80 393 841**	**106 876 247**	**145 959 470**	**29 804 142**

The tables below show the green spending of municipal companies from 2020 to 2024. As mentioned before, although a standardised methodology was developed, there can be differences in the way companies flagged their activities as green. Future iterations of the green budget could make the output more reliable and even more standardised by involving municipal companies in the development stage.

4. Table: Historical municipal company budget and budget for climate actions (in EUR)

Budget Data	2020	2021	2022	2023	2024
Municipal Company Budget (€)	*599 334 581*	*650 083 999*	*964 806 726*	*961 222 971*	*1 089 745 238*
Operating expenditure	*500 043 484*	*569 975 762*	*881 581 241*	*837 440 974*	*998 846 783*
Capital expenditure	*99 291 097*	*80 108 237*	*83 225 484*	*123 781 997*	*90 898 455*
Municipal Company Budget for Climate Actions & Projects (€)	*466 845 052*	*521 647 473*	*732 860 597*	*796 630 270*	*701 175 062*
Operating Expenditure	*409 669 845*	*469 045 009*	*679 192 349*	*702 386 296*	*660 255 625*
Capital Expenditure	*57 175 207*	*52 602 464*	*53 668 248*	*94 243 974*	*40 919 438*
% of Municipal Company Budget for Climate Actions & Projects (%)	***78%***	***80%***	***76%***	***83%***	***64%***
Operating Expenditure	***82%***	***82%***	***77%***	***84%***	***66%***
Capital Expenditure	***58%***	***66%***	***64%***	***76%***	***45%***

5. Table: Green spending of municipal companies from 2020 to 2024 (operating expenditure)

Fields of Action	Activity	Budget Allocation for Climate Actions and Projects in EUR				
		2020	2021	2022	2023	2024
Energy	Electricity generation using solar photovoltaic technology, concentrated solar power (CSP) technology, wind power, hydropower, geothermal energy, renewable non-fossil gaseous and liquid fuels and bioenergy	2 028 584	1 837 228	2 567 585	3 605 048	3 702 004
	Transmission and distribution of electricity	0	0	0	0	0
	Transmission and distribution networks for renewable and low-carbon gases	0	0	0	0	0
	Storage of electricity, thermal energy and hydrogen	0	0	0	0	0
	Manufacture of biogas and biofuels for use in transport and of bioliquids	1 132 194	1 044 803	1 249 199	2 132 919	2 529 016
	District heating/cooling distribution	12 461 283	13 057 796	14 907 503	18 510 481	10 342 663
	Cogeneration of heating/cooling and electricity or production of heating/cooling from solar energy, geothermal energy, non-fossil gas and liquid fuels, bioenergy, waste heat or from fossil gaseous fuels in an efficient district heating and cooling system	3 260 423	9 515 619	28 311 497	20 488 593	1 838 321
Water supply, sewerage, waste management and remediation	Construction, extension, operation and renewal of wastewater and water collection and treatment	134 119 691	140 486 936	151 897 356	175 396 548	184 423 354
	Recycling	345 583	22 908 189	70 767 454	89 529 185	733 345
	Anaerobic digestion of sewage sludge and bio-waste and composting	2 485 253	2 855 011	3 590 275	4 537 824	3 517 061
	Landfill gas capture and utilisation	0	0	0	0	0

	Underground permanent geological storage of CO2	0	0	0	0	0
	Sustainable urban drainage systems (SUDS)	1 247 592	1 233 076	1 226 566	1 235 639	1 235 658
Transport	Purchase, financing, rental, leasing and operation of sustainable modes of transport	251 318 530	274 932 752	403 104 339	385 296 443	450 388 637
	Sustainable transport infrastructure					
Buildings	Construction of new buildings		0	0	0	0
	Acquisition and ownership of buildings	0	0	0	0	0
	Renovation of existing buildings	1 225 316	1 061 797	1 518 560	1 586 367	1 464 625
	Other decarbonisation measures for buildings	45 396	97 276	36 316	44 523	60 187
Information and communication	Professional, scientific and technical activities related to the reduction of greenhouse gas emissions and energy efficiency	0	14 527	15 699	22 724	20 752
Professional, scientific and technical activities						
Environmental protection and restoration activities	Conservation, including restoration, of habitats, ecosystems and species	0	0	0	0	0
Disaster risk management	Non-nature-based solutions for flood and drought risk prevention and protection, flood risk prevention and protection infrastructure, emergency services	0	0	0	0	0
	Nature-based solutions for flood and drought risk prevention and protection, flood risk prevention and protection infrastructure	0	0	0	0	0
Total in €		**409 669 845**	**469 045 009**	**679 192 349**	**702 386 296**	**660 255 625**

6. Table: Green spending of municipal companies from 2020 to 2024 (capital expenditure)

Fields of Action	Activity	Budget Allocation for Climate Actions and Projects in EUR				
		2020	2021	2022	2023	2024
Energy	Electricity generation using solar photovoltaic technology, concentrated solar power (CSP) technology, wind power, hydropower, geothermal energy, renewable non-fossil gaseous and liquid fuels and bioenergy	1 939 371	1 661 408	1 850 878	964 603	3 396 321
	Transmission and distribution of electricity	0	0	37 771	413 730	277 562
	Transmission and distribution networks for renewable and low-carbon gases	0	0	0	0	0
	Storage of electricity, thermal energy and hydrogen	0	81 673	0	0	0
	Manufacture of biogas and biofuels for use in transport and of bioliquids	17 415	649 192	581 884	120 508	18 158
	District heating/cooling distribution	9 956 927	5 297 819	16 215 496	15 632 225	14 472 374
	Cogeneration of heating/cooling and electricity or production of heating/cooling from solar energy, geothermal energy, non-fossil gas and liquid fuels, bioenergy, waste heat or from fossil gaseous fuels in an efficient district heating and cooling system	559 442	1 098 894	1 799 836	3 850 523	505 577
Water supply, sewerage, waste management and remediation	Construction, extension, operation and renewal of wastewater and water collection and treatment	21 390 122	20 510 312	22 787 774	14 823 769	12 189 652
	Recycling	3 457 059	3 164 495	3 958 398	2 470 398	529 702
	Anaerobic digestion of sewage sludge and bio-waste and composting	49 892	18 747	7 981	0	4 974
	Landfill gas capture and utilisation	0	0	0	0	0

	Underground permanent geological storage of CO2	0	0	0	0	0
	Sustainable urban drainage systems (SUDS)	336 551	185 987	0	56 550	0
Transport	Purchase, financing, rental, leasing and operation of sustainable modes of transport	65 808	3 797	1 033	1 448	105 137
	Sustainable transport infrastructure	18 084 973	19 690 070	6 190 626	55 736 608	8 939 877
Buildings	Construction of new buildings	0	0	0	0	0
	Acquisition and ownership of buildings	0	0	0	0	0
	Renovation of existing buildings	1 269 776	189 901	198 980	60 634	230 558
	Other decarbonisation measures for buildings	36 316	0	0	108 962	233 463
Information and communication Professional, scientific and technical activities	Professional, scientific and technical activities related to the reduction of greenhouse gas emissions and energy efficiency	0	0	0	0	0
Environmental protection and restoration activities	Conservation, including restoration, of habitats, ecosystems and species	10 892	3 412	0	4 016	5 188
Disaster risk management	Non-nature-based solutions for flood and drought risk prevention and protection, flood risk prevention and protection infrastructure, emergency services	662	46 758	37 590	0	10 895
	Nature-based solutions for flood and drought risk prevention and protection, flood risk prevention and protection infrastructure	0	0	0	0	0
Total in €		**57 175 207**	**52 602 464**	**53 668 248**	**94 243 974**	**40 919 438**

1.2 Module IP-A2: Strategic Funding and Financing Evaluation

In Hungary, the financial resources of local governments and so the ability to invest in environmentally sustainable projects, are heavily influenced by allocations from the annual central budget. Beyond this, the Municipality has very limited own revenues to address climate change. Since 2011, the Hungarian government has systematically centralised responsibilities, and thus political power was taken away from local governments. The real turning point came, with the COVID-19 pandemic, when the financial independence of local governments was drastically reduced the following ways[1]:

- **Reduction in business tax revenue:** the largest revenue for municipalities is the business tax rate payable directly to municipalities, which has been halved by the national government from 2% to 1% for the years 2020, 2021 and 2022. This intervention alone reduced the revenues by HUF 81 billion over 3 years compared to what would have been received under the previous rules. Other sources of tax revenues are insignificantly low, as most are allocated to district local governments.
- **Increase in the solidarity contribution:** In 2018, the annual amount of the solidarity tax was only HUF 5 billion per year, which was the amount paid by the Municipality of Budapest to the central budget. The Government has increased this amount in a few years to such an extent that in 2023, HUF 58 billion would have to be paid for this purpose. This is a more than tenfold increase, and in total 136 billion HUF in additional expenditure since 2019.
- **Reduction from local fees**: During the 2020-2022 COVID period, the Hungarian government banned local governments from raising certain local fees for public services. The nationalisation of garbage collection fees resulted in HUF 10 billion loss. Municipalities were not allowed to increase parking fees, and the government also ordered public parking to be made free to reduce the need to use public transport. Most of the roughly HUF 10 billion revenue loss affected the municipalities of the districts, but 20-30% affected the treasury of the capital. Partly as a result of free parking, but also as a result of public fears of contagion, the use of public transport has fallen sharply and, as a consequence, the revenue it generates has been drastically reduced (approximately HUF 25,5 billion revenue loss in 2020 alone[2]).
- **Bank loans** and borrowing money, subject to government approval, have been rejected on multiple occasions.
- **Total lack of compensation for increasing energy prices**: the government has even raised the prices at which local authorities can access energy, putting the provision of public services under direct threat.

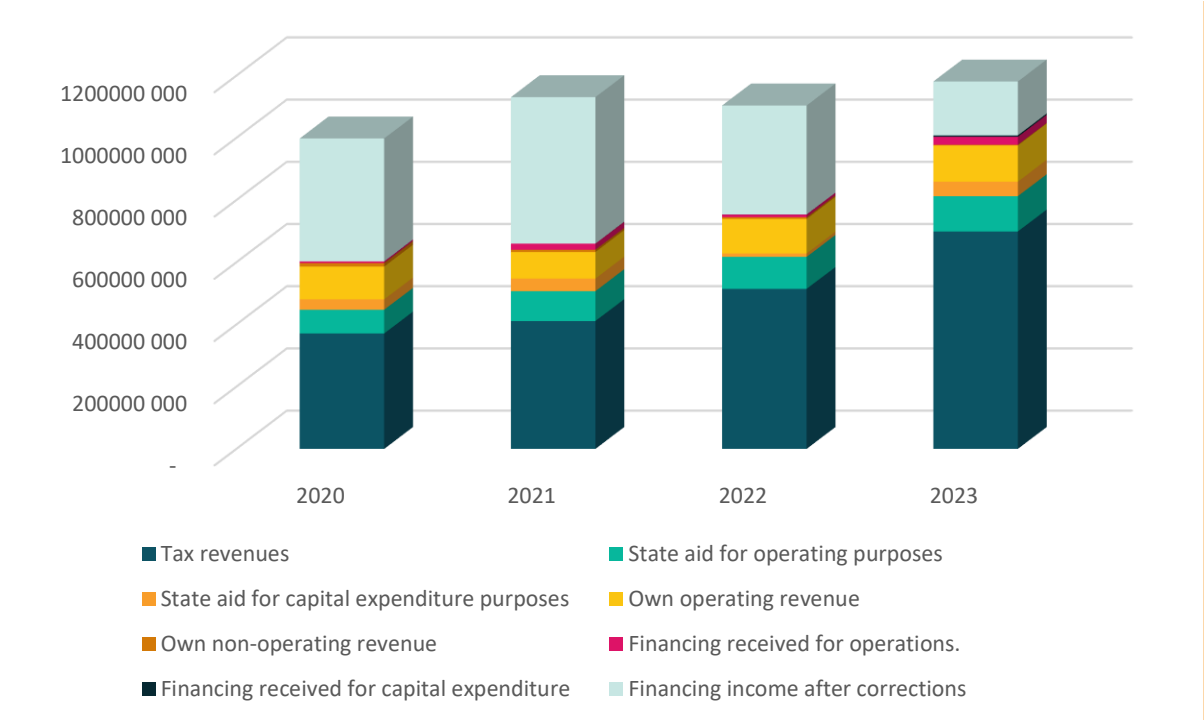
These deliberate financial measures have made it extremely challenging for local governments to direct resources towards the climate-neutrality transition, let alone to operate. This is well illustrated by the decrease in residuals (remaining balance) over the past five years. The amount of budget residuals was practically halved by the pandemic, and then further minimised by the crises caused by the war in Ukraine and the government's measures, reducing municipal revenues. If financial resources continue to weaken, the potential for implementing climate-friendly measures may be reduced. At the same time, the inability to transition to a climate-neutral economy could increase long-term costs for the city and put further constraints on capital deployment.

[1] Municipality of Budapest, *Így vette el a Kormány a Főváros megtakarításait* (2023), n.p., Available at: Budapest portál | Így vette el a Kormány a Főváros megtakarításait
[2] BKK Centre for Budapest Transport, *BKK 2020: csökkenő bevételek, stabil szolgáltatás* (2021), n.p., Available at: BKK 2020: csökkenő bevételek, stabil szolgáltatás

7. Table: List of Income Sources for the Municipality from 2020 to 2023 (in EUR)

Income Category	2020	2021	2022	2023	% of city budget in 2023
Budgetary income	**602 972 457**	**660 053 084**	**753 724 739**	**1 007 997 842**	**85%**
Tax revenues	371 164 397	411 151 460	514 448 252	699 067 113	59%
Building tax	204 641	204 641	204 641	358 091	0%
Business tax	369 527 572	409 064 444	506 290 187	688 462 387	58%
Tax on tourism	88 143	99 725	392 791	495 837	0%
Other local government revenues	1 344 042	1 782 651	7 560 633	9 750 802	1%
State aid for operating purposes	76 269 525	96 051 152	102 975 336	113 568 057	10%
State aid for capital expenditure purposes	33 254 869	40 290 936	10 780 296	46 494 202	4%
Own operating revenue	105 551 492	85 609 281	111 410 016	116 703 064	10%
Own non-operating revenue	11 267 709	7 305 927	5 170 498	1 866 973	0%
Financing received for operations	5 360 412	19 427 575	8 813 134	25 827 585	2%
Financing received for capital expenditure	104 052	216 752	127 209	4 470 851	0%
Financing income after corrections	**395 146 674**	**470 856 472**	**350 368 760**	**173 203 162**	**15%**
Total adjusted revenue	**998 119 136**	**1 130 909 556**	**1 104 093 499**	**1 181 201 001**	**100%**

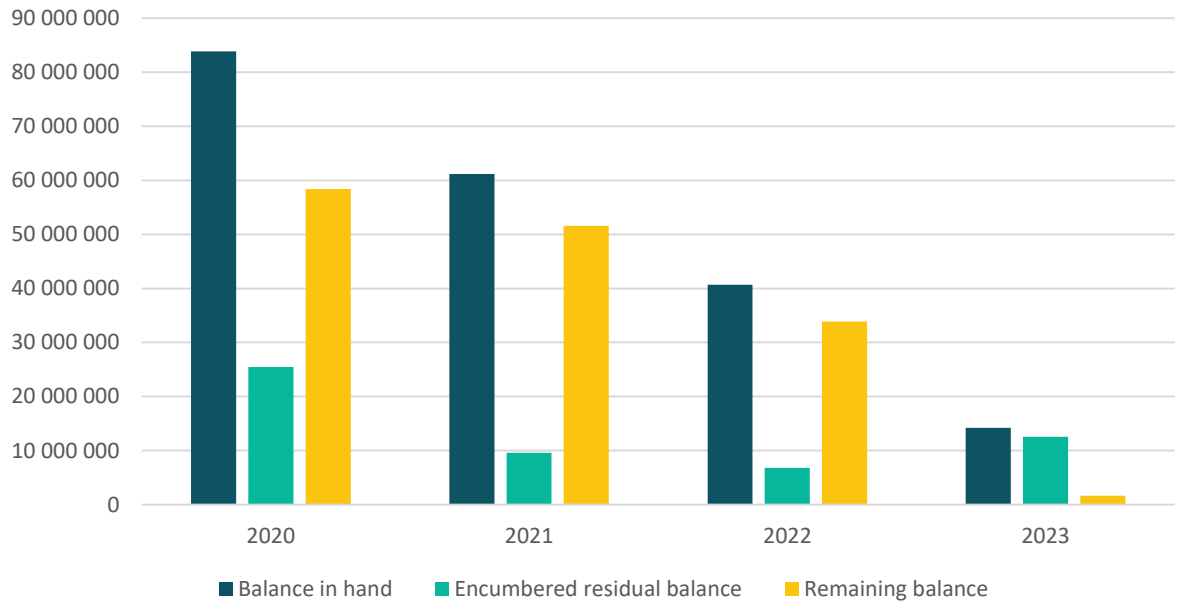
1. Figure: Income sources from 2020 to 2023 (in EUR)



8. Table: Budgetary balance of the Municipality of Budapest and its budgetary institutions between 2020 and 2023 (in EUR)

Year	Balance in hand (in EUR)	Encumbered residual balance (in EUR)	Remaining balance (in EUR)
2020	83 887 015	25 440 698	58 420 377
2021	61 188 287	9 616 915	51 571 373
2022	40 676 001	6 818 065	33 857 936
2023	14 222 838	12 579 413	1 643 425

2. Figure: The development of the budgetary surplus between 2020 and 2023 (in EUR)



The income of municipal companies is also an important source of green investments in Budapest. The table below includes the biggest public companies of the Municipality of Budapest and their income, with the amount received from the Municipality deducted to prevent double counting.

9. Table: Income sources of municipal companies on top of income received from the Municipality of Budapest between 2020-2024 (in EUR)

Municipal Company	2020	2021	2022	2023	2024
BKK - Centre for Budapest Transport total	506 866 407	523 974 060	622 412 451	659 278 859	800 041 505
Income received from the Municipality of Budapest	319 354 241	327 199 048	350 432 266	367 094 437	428 956 521
BKK - Centre for Budapest Transport	**187 512 166**	**196 775 012**	**271 980 185**	**292 184 422**	**371 084 984**

BKV - Budapest Transport Company total	448 440 381	508 066 099	568 030 517	598 320 191	571 895 705
Income received from BKK - Centre for Budapest Transport	354 768 553	350 090 163	402 930 951	433 454 205	554 291 260
Income received from the Municipality of Budapest	15 429 313	17 110 246	29 945 525	25 657 588	0
BKV - Budapest Transport Company	**78 242 516**	**140 865 689**	**135 154 041**	**139 208 399**	**17 604 445**
Budapest Public Roads total	34 989 328	35 570 404	39 094 272	42 380 422	44 778 013
Income received from the Municipality of Budapest	9 401 362	9 353 409	10 782 962	11 786 970	15 225 751
Budapest Public Roads	**25 587 966**	**26 216 995**	**28 311 310**	**30 593 452**	**29 552 262**
BKM - Budapest Public Utilities total	180 523 006	279 281 699	1 164 279 639	1 223 652 764	973 397 147
Income received from the Municipality of Budapest	0	12 797 292	44 034 768	48 966 466	52 950 783
BKM - Budapest Public Utilities	**180 523 006**	**266 484 407**	**1 120 244 871**	**1 174 686 298**	**920 446 363**
Budapest Sewage Works total	99 585 442	99 846 177	101 165 946	98 335 406	157 665 027
Income received from the Municipality of Budapest	0	0	0	0	0
Budapest Sewage Works	**99 585 442**	**99 846 177**	**101 165 946**	**98 335 406**	**157 665 027**
Budapest Waterworks total income	96 043 078	100 636 749	104 330 284	108 545 541	145 155 503
Income received from the Municipality of Budapest	0	0	0	0	0
Budapest Waterworks	**96 043 078**	**100 636 749**	**104 330 284**	**108 545 541**	**145 155 503**
Total	**667 494 175**	**830 825 029**	**1 761 186 638**	**1 843 553 518**	**1 641 508 584**

Due to the limited and unstable nature of its own income sources, EU funding has been the largest source of climate-neutral investment for Budapest and is expected to remain so in the coming years. In the past period, the Municipality of Budapest has implemented numerous projects funded from operational programmes including the Environmental and Energy Efficiency OP, Integrated Transport OP, Territorial and Settlement Development OP, and Competitive Central Hungary OP. These programmes have been mainly funded by the EU with additional support from the national government. However, there is uncertainty about the funding sources for the 2021–2027 Multiannual Financial Framework (MFF) and the Next Generation EU (NGEU) recovery package as well. Based on the agreements reached at the end of 2022, the provision of EU funding is subject to the fulfilment of several ‘rule of law’ conditions falling within the government's competence, thereby affecting the launch and implementation of many planned developments. As time goes by, it seems less and less likely that the

rule of law criteria will be met in line with EU requirements, especially for Recovery and Resilience Facility (RRF) funds, where the time limit for spending is very tight, there is a risk of a total loss of resources. For this reason, capital sources for the city from the 2014-2020 MFF were gathered to provide a clearer picture of the EU funding the city has so far received.

10. Table: List of Capital Sources for the City: Indirect EU/national funding from the 2014-2020 Multiannual Financial Framework

Type	Size range (in EUR)	Level	Description
Capital sources of the Municipality			
EEEOP-2.2.2-15-2016-00125	2 412 503	Public	Joint derogation wastewater disposal project of the municipalities of Budapest and Pilisborosjenő
EEEOP-2.1.5-16-2017-00001	43 538	Public	Development of water production wells in Budapest, addressing water quality and capacity risks
EEEOP-1.4.0-15-2021-00024	9 857 328	Public	Development of Pest-Northern Hungary flood protection sections 35, 101, 37 and 38
EEEOP-3.2.1-15-2017-00024	19 411 154	Public	Improvement of the waste management system in the capital, in particular the separate collection, transport and pre-treatment system
EEEOP-1.4.0-15-2015-00001	16 083 009	Public	Protection of the Csillaghegy bay
TOP-1.5 1-20-2020-00024	648 504	Public	Preparation of the strategic and project-level supporting documents of the Municipality of Budapest for the 2021-27 planning period
VEKOP-5.3.1.-15-2020-00020	2 543 841	Public	Road safety improvements in the XX. district of Budapest
VEKOP-5.3.1.-15-2020-00019	689 010	Public	Road safety improvements in the XV district of Budapest
VEKOP-5.3.1.-15-2020-00013	2 291 051	Public	Cyclist-friendly infrastructure improvements in the XIX. district of Budapest
VEKOP-5.3.1.-15-2020-00014	2 888 716	Public	Cyclist-friendly infrastructure improvements in the X. district of Budapest
VEKOP-5.3.1.-15-2020-00015	4 642 736	Public	Construction of a cycle path along the Rákos stream in the XIV, X and XVII districts of Budapest
VEKOP-5.3.1.-15-2020-00016	1 417 380	Public	Construction of a cycle path along the Rákos stream in the XIII. district of Budapest
VEKOP-5.3.1.-15-2020-00018	1 315 563	Public	Cyclist-friendly infrastructure improvements in the IV. district of Budapest
VEKOP-5.3.1.-15-2020-00017	2 576 135	Public	Cyclist-friendly infrastructure improvements in the II., III. and XIII. districts of Budapest
EEEOP-5.2.2-16-2017-00116	2 659 078	Public	Energy modernisation of buildings of the Municipality of Budapest and its institutions
EEEOP-1.2.0-15-2016-00020	77 821	Public	Establishing a Climate Strategy and Climate Platform in Budapest
VEKOP-5.3.1.-15-2016-00003	648 508	Public	Road safety and cyclist-friendly improvements in the II. district of Budapest, identification number:
VEKOP-5.3.1.-15-2016-00007	198 125	Public	Road safety and cyclist-friendly improvements in the XI. district of Budapest, identification no:
EEEOP-2.2.2-15-2019-00148	6 625 162	Public	Budapest XIII. district, Béke square, construction of a main drainage sewer

KÖFOP-1.2.1-VEKOP-16-2017-00892	16 031	Public	Connecting Budapest Municipality to the ASP Centre
VEKOP-5.3.1.-15-2016-00006	1 815 824	Public	Road safety and cyclist-friendly improvements in the XVI. district of Budapest
Capital sources of municipal companies			
ITOP-3.1.0-15-2016-00007	22 049 287	Public	Extension of tram 1 to Etele Square
ITOP-3.1.0-15-2017-00013	32 425 422	Public	Budapest tram and trolleybus project Phase II
ITOP-3.1.0-15-2017-00016	10 093 385	Public	Budapest trolleybus vehicle procurement and related infrastructure development
ITOP-3.1.0-15-2016-00005	69 383 583	Public	Budapest tram and trolleybus project Phase II
TOP-5.4.0-09-11-2011-0001	687 254	Public	Planning tasks for the revision of the project "Creating interconnected tram transport in Buda
TOP-5.5.0-09-11-2011-0016	23 865 809	Public	Creation of the Buda tram interconnection, Széll Kálmán Square branch
TOP-5.5.0-09-11-2011-0015	8 890 079	Public	Creation of the Buda tram interconnection, Bem quay branch
TOP-5.5.0-09-11-2015-0005	5 171 222	Public	Purchase of additional low-floor trolleybuses in Budapest under the Transport Operational Programme
TOP-5.5.0-09-11-2012-0009	50 692 474	Public	Budapest tram and trolleybus vehicle development Phase I
ITOP-3.1.0-15-2023-00025	140 462 660	Public	Purchase of 51 trams for Budapest
EEEOP-5.2.8-17-2017-00007	179 411	Public	Building energy development of BKV Plc.
EEEOP-5.3.1-17-2017-00002	8 065 045	Public	Complete renovation of the heat centre, connection of new consumers to the district heating system, and upgrading of transmission lines
EEEOP-5.3.1-17-2017-00004	1 854 523	Public	Complete renovation of the heat centre, replacement of the heat centre circulation pump, connection of new consumers to the district heating system, installation of remote monitoring of the heat centre, modernisation of the transmission lines
EEEOP-5.3.1-17-2017-00006	8 880 677	Public	Connection of new customers to the district heating system, upgrading of transmission lines
EEEOP-5.3.1-17-2018-00034	6 378 971	Public	Complete renovation of the heat centre, connection of new consumers to the district heating system, modernisation of the district heating lines and boilers, installation of remote monitoring of the heat centre, extension of the Pannónia Street
EEEOP-5.3.1-17-2018-00035	8 657 233	Public	Connection of new consumers to the district heating system, construction of the Erzsébet bridge strategic and Apáczai-Csere János street backbone
EEEOP-5.3.1-17-2018-00038	585 282	Public	Conversion works for the cold energy supply of public buildings under the City Park Project
EEEOP-5.2.8-17-2017-00001	140 451	Public	Modernisation of the main buildings and solar panel installation at 281 Királyok útja sports centre.
EEEOP-2.1.5-16-2017-00001	16 742 866	Public	Development of tap wells
GZR-D-Ö-2016_2016-180	19 455	Public	Purchase of 5 Nissan e_NV200 Acenta vans
GZR-D-Ö-2016_2017-716	38 911	Public	Purchase of 10 Nissan e-NV200 electric cars

GZR-D-Ö-2016_2017-721	19 455	Public	Purchase of 5 Nissan e-NV200 electric cars
GZR-D-Ö-2018_2018N-639	15 564	Public	Purchase of electric cars
Total	**494 160 036**		

The Municipality has also participated in several directly funded projects, such as ATELIER, USER-CHI, FastTrack, and LIFE-IP HungAIRy, etc. Within the framework of the Territorial and Settlement Development OP 2014-2020 project development funds (approx. €600k) - co-financed by the European Regional Development Fund – studies and plans were prepared for the 2021-27 planning period (e.g. the Cycling Master Plan for the city).

11. Table: List of Capital Sources for the City: Direct EU funding

Type	Size Range (in EUR)	Level	Description	Implementation period
Horizon 2020	252 968	Public	**ATELIER** focuses on developing citizen-driven Positive Energy Districts (PEDs) in the two Lighthouse Cities Amsterdam (Netherlands) and Bilbao (Spain). Their successful implementations will then be replicated and tested for feasibility in the six Fellow Cities including Budapest.	2019.11.01-2024.10.31.
Horizon 2020	627 087	Public	As a result of **USER-CHI**, e-mobility stations equipped with electric charging infrastructure will be set up and a framework for cooperation with market-based service providers will be developed.	2020.02.01.-2024.07.31.
	122 500	Public		
LIFE, the Government of Hungary	1 535 499	Public	**LIFE-IP HungAIRy** project aims to solve one of the most significant environmental problems, improving unfavourable air quality in 10 Hungarian municipalities across 8 of the country's regions. It is realized through the development of emission databases, comprehensive awareness raising activities and the establishment of a national network of experts and consultants.	2019-2026
LIFE, Municipality of Budapest	221 204	Public	The **LIFE in Runoff** project fits in with Budapest's urban development and environmental strategies, contributing to the knowledge of practical experience in managing flash floods and the urban heat island effect at city level. Lead partner is the Municipality of District XII.	2021.07.01.-2025.06.30.

Horizon 2020	156 563	Public	The **SchoolFood4Change** project aims to provide sustainable and healthy eating opportunities for 600 000 children in over 3000 schools in 12 EU countries. It aims to achieve this through systemic innovation in the food chain, with three main objectives: sustainable and innovative food procurement, training of school catering professionals and catering staff, and developing and disseminating a whole school meal-centred approach.	2022.01.01.-2025.12.31.
Horizon 2020	25 000	Public	The overall aim of the **DivinFood** project is to increase the role of neglected and underutilised crops (NUC) in food chains for healthier diets and more sustainable food systems.	2022.03.01.-2027.02.28.
Horizon Europe	314 250	Public	**FOODCLIC** aims to connect people and policies from different sectors for an integrated approach to transform urban food environments and food systems.	2022.09.01.-2027.02.28.
Horizon Europe	460 625	Public	**ASCEND** aims at a participatory planning process for positive energy neighbourhoods, with the implementation of a small-scale demonstration investment.	2023.01.01. -2027.12.31.
Horizon Europe	129 250	Public	The **UP2030** project aims to achieve social, infrastructural and urban management transformation through novel climate-smart urban design methods to achieve climate neutrality. The project will develop a comprehensive methodology to enable partner cities to integrate climate-neutral aspirations into their urban planning instruments.	2023.01.01.-2025.12.31.
Horizon Europe	497 750	Public	The aim of the capital's **REALLOCATE** project is to transform streets into inclusive, green, safe and future-proof urban spaces, where communities live and thrive. The project enables researchers, mobility experts, urban planners and local citizens to collectively re-imagine our cities and redesign how we move from one place to another.	2023.05.01-2027.04.30.
Horizon Europe	809 646	Public	In the framework of the 100 Climate Neutral and Smart Cities Mission, Budapest was granted the **Budapest CARES** project (€1.5 million in direct EU funding) to support and speed up residential building energy efficiency projects both scientifically and institutionally.	2023.06.01. -2025.05.31.

European Urban Initiative, the Government of Hungary, the Municipality of Budapest	2 483 428	Public	The aim of the **AHA Budapest** project is to provide quality social rental housing to people experiencing housing poverty. One of its tasks is to develop innovative housing schemes that will both expand the supply of social rented housing and help energy-poor homeowners reduce their maintenance costs. And in AHA's demonstration project (Demo Hub), a disused school is being converted into modern housing and 26 families living in difficult circumstances are being provided with their own homes.	2024.03.01. - 2027.08.31.
Interreg Central Europe, Government of Hungary, Municipality of Budapest	37 240 00	Public	The overall objective of the **SOLAR4CE - CITIES** project is to provide an effective and successful solution to the social, economic, and environmental pressures caused by the recent energy crisis in the CEE region, which is highly dependent on natural gas imports.	2024.06.01 - 2027.05.31
LIFE, Municipality of Budapest	450 016	Public	The **Biodiverse City LIFE** project, which promotes complex habitat rehabilitation, will enable the restoration and conservation of three sites of particular natural value.	2021-2027
Total	**8 458 189**			

While grants have been a significant source of capital for Budapest's climate investments, it is clear to the city's leadership that its climate strategy cannot be implemented with EU funds and subsidies alone, and that well-structured involvement of private actors is also necessary.

One way to attract private capital is through public-private partnerships (PPP). The financing model is not widespread in Budapest. Nevertheless, an outstanding example of cooperation with businesses in the implementation of environmental goals is the cooperation with the Hungarian Oil and Gas Plc (MOL) on the city's public bike-sharing system, better known as MOL Bubi, that has been operating, expanding, and developing for a decade now. Since its introduction, the MOL Bubi has become one of the most popular means of transport in the capital. In 2023, passengers used the system more than 3,4 million times and travelled 7 million kilometres, according to the BKK Centre for Budapest Transport.[3] The number of collection points exceeded 200, 400 new bicycles were added, and tens of thousands of new users joined the system.

In addition to its positive impact on the environment and health, MOL Bubi offers mutual benefits to both sponsor and users. Under the sponsorship agreement, MOL covers half of the annual running costs, reinforcing its social and climate-friendly commitment. This allows the city to offer affordable user fees, with the full annual revenue going to the capital's own company, BKK Centre for Budapest Transport.

A good example of involving more private actors, though not a PPP, is the BKK Centre for Budapest Transport, which was modelled after Transport for London. Following its establishment, private actors were subcontracted to provide public transport services, creating competition and leading to the improvement of service quality.

[3]BKK Centre for Budapest Transport, *Közel 7 millió kilométert tekertek tavaly a MOL Bubizók* (2024), n.p., Available at: Közel 7 millió kilométert tekertek tavaly a MOL Bubizók (BKK.hu)

Besides PPPs, the city also takes on loans to fund its climate-friendly initiatives. However, in Hungary, Act CXCIV of 2011 on the Economic Stability of Hungary sets a borrowing limit for local governments. Municipalities may only enter debt-creating transactions and provide guarantees with the prior consent of the Government, with some exceptions. These exceptions include:

- Mandatory guarantees required by law for debt-creating transactions maturing within a calendar year
- Loans used to secure the pre-financing of a subsidy granted to the municipality indirectly from the European Union or another international organisation
- Reorganisation loans used in the course of debt settlement proceedings for the conclusion of a creditors' agreement
- Loans for development purposes not exceeding HUF 100 million

Another limitation is that total payment obligation of the municipality arising from the debt-creating transaction in the current year may not exceed 50% of the municipality's own revenues in any year until the end of the term of the debt-creating transaction. Except for developments arising from a commitment to an international organisation including the EU, the Municipality may not initiate new development if its total payment obligations for the current year, in respect of its debt-creating operations, equal or exceed 50% of its own revenue for that year.

Besides these limitations, the Municipalities access to climate funding has been further complicated by the government's rejection of the Municipality's request for a long-term development loan of HUF 28,5 billion and HUF 16,5 billion at the end of 2022 and 2023, respectively, which has hindered the timely implementation of planned investments and renovations.

Despite these challenges, the Municipality of Budapest has been striving to access market financing for its climate investments, as shown by its long-term cooperation with the European Investment Bank and other financial institutions. As most of these loans have already been drawn down in full, they are shown separately from the *List of Capital Sources for the City.* The total annual principal and interest repayments - over the entire duration of the maturities - do not exceed HUF 16 billion in any single year, and expenditure on loan repayment is budgeted within the financing expenditure of the respective annual budget.

12. Table: List of Capital Sources for the City: Loans

Loans	Size Range	Level	Description
Municipal Infrastructure Development Programme (2014-2039) financed by OTP Bank	20b HUF / 51,9m EUR	Private	*Projects financed:* Improvement of roads, bridges, cycle paths, pedestrian crossings, energy modernisation of institutional buildings
M3 metro line rolling stock renewal (2015-2030) Financed by a consortium of banks (ERSTE, OTP, MKB, K&H, UniCredit)	60b HUF / 155,6 m EUR	Private	*Project financed:* Renewal of the M3 metro line rolling stock
European Investment Bank "Urban Transport A" (2019-2051)	70,6b HUF/ 200m EUR	Private	*Projects financed:* Procurement of multifunctional electric rail freight vehicles, renovation of the Budafok junction complex, acquisition of escalator for M3 Deák tér stop

European Investment Bank "Urban Development A" (2019-2046)	33,8b HUF/ 100m EUR	Private	*Projects financed*: Urban and public transport related projects (e.g. extension and reconstruction of suburban and metro lines, reconstruction and extension of tram and trolleybus infrastructure, procurement of metro, trolleybus, bus and tram vehicles, reconstruction and widening of urban roads, bridge reconstruction, other developments related to P+R parking, shipping, logistics and intermodal centres
Total in HUF	**184,4**	**-**	**-**

Table 13 summarizes the debt servicing of the Municipality of Budapest from 2022 to 2051.

13. Table: Debt servicing of the Municipality of Budapest (in thousand EUR)

Debt servicing for loans taken	Total costs	2022	2023	2024 scheduled	2025 scheduled	2026 scheduled	2027-2051 scheduled
Municipal Infrastructure Development Programme (2014-2039) loan							
Total	86 773	15 102	58 377	5 819 673	5 594 701	5 378 893	49 040 558
M3 metro line rolling stock renewal (2015-2030) loan							
Total	210 123	74	29 343	17 949	17 177	16 445	55 153
European Investment Bank "Urban Transport A" (2019-2051) loan							
Total	357 401	15 326	29 145	93 602	9 983	10 426	283 162
European Investment Bank "Urban Development A" (2019-2046) loan							
Total	161 860	7 942	14 449	5 842	6 147	6 641	120 840
Total debt servicing	**816 157**	**38 444**	**131 314**	**5 852 826**	**5 628 008**	**5 412 405**	**49 499 713**

1.3 Module IP-A3: Barriers to Climate Investment

This section requires evaluation and identification of the range of **structural, policy, economic, and financial barriers for capital deployment in support of climate action.**

Barriers to Climate Investment

Lack of municipal funding

In recent years, the Municipality of Budapest has found itself in increasingly difficult financial circumstances that stems primarily from two sources: the increase of the so-called solidarity contribution and the modifications of the business tax. Budapest, as the richest municipality of Hungary has been paying solidarity contributions into the national budget to help poorer localities grow and develop since 2017. However, since 2019, when the political opposition won the local elections in Budapest, the fee

has increased tenfold, rising from only 5 billion forints in 2018 to 58 billion forints in 2023.[4] Moreover, due to changes in rules made by the government, business tax paid into the municipality's budget has significantly decreased compared to what would have been collected under the former rules. According to some calculations[5], the modifications to the rules meant a 40-billion-forint loss in 2020, 20 billion in 2021 and 21 billion in 2022. The loss of tax revenue seriously affects the performance of municipal functions, i.e. the normal functioning of the city, but is particularly detrimental to green investments. Among others, business tax is used to pay for street lighting, to subsidise public transport and to support old people's homes. Overall, in recent years, government regulations have diverted significant resources away from municipalities, limiting the scope for investment at the local level and even jeopardising the proper delivery of services. The current institutional framework in the capital is functionally fulfilling its role, but the lack of support for the operation and development of public services in the capital is raising new obstacles to achieving climate neutrality.

Uncertainty of EU funding

In addition to the above, there is also uncertainty about the funding sources for the 2021–2027 MFF and the NGEU recovery package as well. Based on the agreements reached at the end of 2022, the provision of EU funding is subject to the fulfilment of several 'rule of law' conditions falling within the government's competence, thereby affecting the launch and implementation of many planned developments. As time goes by, it seems less and less likely that the rule of law criteria will be met in line with EU requirements, so that especially for RRF funds, where the time limit for spending is very tight, there is a risk of a total loss of resources. This would mean a loss of HUF 300 billion in development funds for Budapest in the coming years.

Uncertainty is also reinforced by the fact that cities interested in accessing MFF and NGEU funds must apply through the national government, which often manages the allocation of funds according to its own interests. Although it is obligatory to allocate a certain proportion of the funds to Budapest as a geographical unit, the funds themselves are not transferred to the Municipality (or districts) as the sole beneficiary. Instead, national regulation forces the municipalities to apply for grants in consortium with and be supervised by different government bodies. This often hinders the optimal allocation of funds and makes project management considerably more complicated.

Besides obstacles to receiving EU funding, borrowing is also difficult since all loan requests go through and are approved by the national government, meaning that funding is highly dependent on the relationship between the national government and the Municipality of Budapest.

Lack of residential incentives

At the national level, a set of financial assistance programs have been implemented including a home renovation grant, a so-called "baby loan" for couples planning on starting a family, and a family housing allowance (CSOK) to help people with buying and renovating their homes. Just over the past few years, government spending on these programs exceeded 1000 billion forints[6], equivalent to 2,5 billion euros. However, it is imperative to take into account that these financial aids primarily serve family policy goals, rather than supporting social or environmental objectives. They lack energy retrofitting requirements,

[4] Municipality of Budapest, *Így vette el a Kormány a Főváros megtakarításait* (2023), n.p., Available at: Budapest portál | Így vette el a Kormány a Főváros megtakarításait
[5] Municipality of Budapest, *Így vette el a Kormány a Főváros megtakarításait* (2023), n.p., Available at: Budapest portál | Így vette el a Kormány a Főváros megtakarításait

[6] Habitat for Humanity, *Éves jelentés a lakhatási szegénységről* (2023), p. 17.

are predominantly available to married couples, and funds are primarily dispensed in the form of loans, with a requirement of maintaining a continuous two or three-year social security status, raising barriers for those living without job security and in energy-poverty to access these funds[7]. For the city to be able to reach climate neutrality, it would be crucial that national assistance programs are extended to poorer and non-familial households and include energy-efficiency requirements as well. Although a larger scale residential building renovation programme launched recently explicitly sets an energy efficiency target, the government has set an unjustifiably low quota for Budapest residents (of the HUF 108,24 billion, a maximum of HUF 6,39 billion can be used in Budapest.)

The problem of energy-inefficient households is also exacerbated by the public utility cost subsidies introduced by the government in 2013 that keep the price of gas, electricity, and district heating artificially low for residents. Originally, the price reduction applied equally to all consumers, regardless of their income or energy consumption, disincentivising people to save energy and invest in deep renovations. The subsidy was later modified after the energy crisis in 2022 to favour those with lower energy use. While this can incentivise people to lower their energy use, the biggest beneficiaries of the cost reduction are affluent households already living in more energy-efficient buildings, raising questions about the justness of the transition.

Lack of knowledge about the need of retrofitting

Although citizens in Budapest can be considered relatively environmentally conscious, they lack knowledge regarding the state and energy efficiency of their own homes. A survey[8] was carried out in November 2023 among 2000 owner-occupied households, where only 28,8% of the respondents in family houses plan (with concrete financial backing) or at least can think of necessary renovation measures in the coming 5 years. This ratio is even lower, 20% regarding the renovation of flats in multi-family buildings. Thus 70-80% of the respondents were not considering any type of intervention (be it energy-related or not) even if they had enough money. Regarding the renovation of the common spaces of multi-family buildings, there seems to be a higher interest: 39,3% of the respondents identified some renovation measures that should have already been implemented in the building. This ratio also highlights that most of the respondents could not even formulate a critique of the building.

This relatively low visibility of renovation needs can partly be explained by the assumption of the owners, that their property is in relatively good shape: 81% of family house owners considered that their property is in excellent or acceptable physical condition, while it was 87% regarding the state of the multi-family buildings.

The survey provides a snapshot from a very particular moment: it reflects the concerns of a society in a deep economic crisis. In connection with this, nonchalance and negligence can be observed in the sample about the need for retrofits in Budapest.

Economic Uncertainty

In recent years, Hungary has experienced economic turbulence due to the COVID-19 pandemic, high inflation, the energy crisis exacerbated by the war in Ukraine, halted EU funding and fluctuations in its currency. This economic uncertainty can strain budgets and slow down the speed of green investments.

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[7] https://habitat.hu/sites/lakhatasi-jelentes-2023/wp-content/uploads/sites/14/2024/01/Habitat_EvesJelentes2023_egybe_240116_02.pdf Habitat for Humanity, *Éves jelentés a lakhatási szegénységről* (2023), pp. 9-10.

[8] The survey was carried out as part of the Horizon Europe Budapest CARES project.

Lack of capacity and knowledge within the city administration

With the establishment of the Department for Climate and Environmental Affairs in 2019, followed by the Budapest Climate Agency in 2024, the city administration made considerable steps towards increasing its climate protection efforts. However, due to the lack of experience, reluctance to change and lack of financial room for manoeuvre in the public sphere, the exploration and implementation of alternative and innovative financial tools pose challenges to the Municipality.

14. Table: Barriers to Climate Investment

Financial Barriers to achieving Climate Neutrality	Typology of Barrier	Description	Sector and stakeholders involved
Lack of municipal funding	Political	In recent years, government regulations have diverted significant resources away from municipalities, limiting the scope for investment at local level.	European Union Government of Hungary Municipality of Budapest District municipalities
		Solution: Lobbying activity at both the EU and national levels, drafting professional materials, and building up reserves	
Uncertainty of EU funding	Political	The provision of EU funding is subject to the fulfilment of several conditions falling within the government's competence, making planning and budgeting uncertain.	European Union Government of Hungary Municipality of Budapest District municipalities
		Solution: Lobbying activity at both the EU and national levels, drafting professional materials, and building up reserves	
Borrowing ability of the Municipality is uncertain	Political	All loan requests go through and are approved by the national government.	Government of Hungary Municipality of Budapest District municipalities
		Solution: Lobbying activity at both the EU and national levels, drafting professional materials, and building up reserves	
Lack of residential incentives	Political	Incentives are not encouraging climate-friendly initiatives and are often counter-productive.	Government of Hungary Municipality of Budapest District municipalities Residents
		Solution: Rediverting municipal resources to fund incentives that directly encourage climate-protection initiatives.	
Lack of knowledge about the need of retrofitting	Behavioural	People have an overly optimistic view on the state of their homes, planning no energy retrofitting in the future.	Government of Hungary Municipality of Budapest District municipalities Residents Civil organizations
		Solution: Awareness raising campaigns for residents, and one-stop-shop services with the help of civil organizations.	

Economic uncertainty	Economic and behavioural	High inflation, and an unpredictable economy can burden budgets and slow down green investments. **Solution:** Cost savings in internal operation, keeping the project portfolio up to date, flexibility regarding scheduling decisions.	Government of Hungary Municipality of Budapest District municipalities Private and public companies Residents
Lack of capacity and knowledge within the city administration	HR-related	The exploration and implementation of alternative and innovative financial tools would require capacities and capabilities from the Municipality that it currently lacks. **Solution:** Extensive internal training programmes and the increase of capacities to facilitate investment deployment	Municipality of Budapest District municipalities

2 Part B – Investment Pathways towards Climate Neutrality by 2030

Part B "Investment Pathways towards Climate Neutrality by 2030" is in place to capture the actions and needs for mobilising and delivering the funding and financing needed for climate neutrality. This Part of the Investment Plan will be aligned with and build upon the Action Plan.

2.1 Module IP-B1: Cost Scenarios for Climate Neutrality

This chapter focuses on the attempts to examine and analyse the overall costs associated with achieving climate neutrality by 2030 by implementing the activities described in the Action Plan. Previously, cost estimates for various climate protection actions were made in the Sustainable Energy and Climate Action Plan 2030 (SECAP), primarily based on design estimates, past projects, and market average prices. Table 15 presents sectoral costing estimates of actions of the Action Plan by fields.

Cost scenarios and indicators (Tables 15, 18, 19, 20 and 21) **under Part B were calculated using the methodology developed by the Net Zero City consortium**[9], where all the assumptions and their references can be found. The descriptions below include a summary of the main assumptions in each sector provided by the aforementioned methodology. Benchmarks and calculation methods were adopted as provided by the Net Zero City consortium, underlying assumptions and input data were not critically reviewed, nor changed, further sensitivity analysis had not been carried out.

In Table 15, the investments necessary for Budapest to achieve climate neutrality and their expected impacts are detailed. The table includes net present value (NPV) calculations for capital expenditures (CAPEX), operating expenses (OPEX), and the potential for CO_2 emission reductions across the following sectors.

Transportation

In the Transportation sector, the goal is to reduce the need for motorized transport, promote public and non-motorized transport modes, and advance the electrification of vehicles. The sector's total CAPEX for 2020-2030 amounts to €746 million, while the OPEX savings for 2020-2040 are estimated to reach €5493 million. Actions such as the development of urban transport networks, the introduction of electric vehicles, and the expansion of cycling infrastructure are expected to result in a total reduction of 886 kt of CO_2 by 2030. These initiatives not only contribute to emission reductions but also improve the quality of urban life.

CAPEX and OPEX were calculated based on the following assumptions regarding transport:

- Upfront investment costs
  - They are assumed to be near-zero for *reduced motorised passenger transportation need, increased car-pooling* and *optimized logistics*, as these levers are assumed to be driven mainly by digitalisation and primarily involves behavioural change or make use of already existing infrastructure and assets.
  - OPEX + CAPEX of 3,3 €/vkm for bus and 2,0 €/vkm for metro/tram. These costs are assumed to be ~60% CAPEX and ~40% OPEX

[9] The detailed methodology can be accessed at: https://netzerocities.app/group-capabilitybuildingprogrammebuildingastrongeconomiccase

- Upfront investments for walking/cycling of 0,02 €/pkm (including infrastructure and 'vehicle' costs)
- Charging infrastructure and investment costs based on research from the International Council on Clean Transportation
  - Cost of charging infrastructure: €850/EV (2020) & €600/EV (2030)
  - Increased investment costs for EVs of 8600€/car (2020), reaching cost parity by 2025
- Infrastructure costs include both home-charging and public/workplace charging and are assumed to be linear to numbers of EVs introduced. Cost per electric vehicle is reduced over time due to technology improvements and increased utilisation.
- Light duty trucks electrification
  - Charging infrastructure costs: assuming 150% of cost for passenger cars - €1300/truck (2020) to ~€800/ truck (2030)
  - Additional investment cost for electrified truck of ~€16 000/truck, assuming cost parity reached by 2030, 5 years later than passenger cars
- Heavy duty trucks electrification
  - Charging infrastructure costs: €17 000/heavy truck (2020) to €13 000/heavy truck (2030)
  - Additional investment cost for electrified truck of €82 000/truck (2020) to €29000/truck (2030)
- Assuming that bus charging infrastructure costs and investments are the same as for heavy trucks, since motor characteristics are similar between the two.
  - Charging infrastructure costs: €17 000/bus (2020) to €13 000/bus (2030), based on ECF (2018)
  - Additional investment cost for electrified buses of €81 600/bus (2020) to €30600/bus (2030), based on ECF (2018)
- Electricity transmission infrastructure costs are partly included in the cost of increased electricity need

- Net recurring costs/savings
  - Cost savings from reduced public transport (bus: 3,3 €/vkm, metro/tram: 2,9 €/vkm)
  - Fuel savings for cars calculated based on national average petrol prices
  - Cost savings from reduced car usage (excl. fuel) of 0,06 €/vkm)
  - Increased cost of electricity based on household electricity prices
  - Cost savings on logistics based on decreased vehicle kilometres and total cost of ownership (0,43 €/km5 for light duty trucks, and 0,67 €/km6 for heavy trucks).
  - Assuming no decrease in labour, as the initiative and logistics (other than chauffeurs) increase significantly
  - Increased fuel consumption per vehicle-kilometre, since increased load factor means heavier trucks.
- Co-benefits

- All emission reduction and co-benefits are calculated as net improvements compared to baseline
- Value of NOx (12 600 €/tonne inside city, 21 300 outside city), PM2.5 (252 000 €/tonne inside city, 70 000 outside city) and PM10 (22300 €/tonne)
- Value of accidents reduction (cars: 0,014 €/pkm, buses: 0.008 €/pkm)
- Value of noise reduction (cars: 0,006 €/pkm, buses: 0,004 €/pkm, trains: 0,008 €/pkm)
- Health co-benefits from walking/cycling of 0,3 €/pkm
- Value of NOx (12 600 €/tonne inside city, 21 300 outside city), PM2.5 (252 000 €/tonne inside city, 70 000 outside city) and PM
- Value of accident reduction: light trucks: 0,046 €/tonne km, heavy trucks: 0,010 €/tonne km
- Value of noise reduction (light trucks: 0,016 €/tonne km, heavy trucks: 0,008 €/tonne km)

Buildings & Heating

In the Buildings & Heating sector, the focus is on retrofitting existing buildings and constructing new, energy-efficient buildings. The sector's CAPEX is substantial, totalling €7746 million, while OPEX savings for 2020-2040 are estimated at €3264 million. Energy retrofitting, the renovation of public buildings, and the modernization of lighting systems will all contribute to reducing CO_2 emissions, which are expected to decrease by 1766 kilotons by 2030. These actions are projected to yield significant long-term cost savings and energy efficiency improvements.

CAPEX and OPEX were calculated based on the following assumptions regarding buildings and heating:

- Upfront investment costs
  - Dependent on how ”deep” the renovations are.
    - In 2018 the minor heating renovations cost 57 €/m^2 and the extensive heating renovations cost 125 €/m^2
    - The costs of minor renovations are assumed to be constant until 2030 and extensive renovations are assumed to decrease by 1% per year
  - The differences in costs between minimum building standard (1074 €/m2 in 2018) and the better perfoming buildings (1222 €/m^2 in 2018) in the decarbonisation scenario are estimated as the cost for ”new built to nZEB standard” today, increased again by the average percentage cost increase for following the ”nZEB” standard.
    - These costs are both projected to decrease by 1% per year until 2030
  - Cost of lighting upgrade: 0.6 EUR/m2, cost of appliance upgrade: 5,9 EUR/m^2 & appliance
    - These costs are assumed to decrease at same rate as minor heating renovations (1% per year) until 2030
  - District heating: Fossil – 446 EUR/MWh, Biomass 370 EUR/MWh, Electric heat pumps / geothermal – 347 EUR/MWh,Waste – 460 EUR/MWh, network/infrastructure – 1431 EUR/MWh.
  - Local heating: Fossil – 238 EUR/MWh, Biomass – 219 EUR/MWh, Electric heat pumps / geothermal – 320 EUR/MWh. Based on average levelized cost of heat production in Europe, assuming lifetime of 20 years (50 for network) and 4% WACC

- Net recurring costs/savings
    - Cost savings from reduced energy consumption (based on cost of heating of 76 EUR/MWh
    - Cost savings from reduced electricity consumption (based on cost of electricity of 0,17 EUR/kWh
    - District heating: Fossil – 66 EUR/MWh, Biomass – 82 EUR/MWh, Electric heat pumps / geothermal – 41 EUR/MWh, Waste – (-17) EUR/MWh (savings)
    - Local heating: Fossil – 74 EUR/MWh, Biomass/waste – 47 EUR/MWh, Electric heat pumps/ geothermal – 61 EUR/MWh
- Value of co-benefits
    - All emission reduction and co-benefits are calculated as net improvements compared to baseline
    - Value of NOx (12 600 €/tonne inside city, 21 300 outside city), PM2.5 (252 000 €/tonne inside city, 70 000 outside city) and PM

Electricity

The Electricity sector aims for decarbonization and the integration of renewable energy sources. The sector's CAPEX is estimated at €2794 million, while the OPEX savings for 2020-2040 may reach €3117 million. Actions such as the utilization of solar energy will significantly enhance the city's energy security and reduce CO2 emissions by 1648 kilotons by 2030.

CAPEX and OPEX were calculated based on the following assumptions regarding electricity:

- Upfront investment costs
    - District heating: Fossil – 446 EUR/MWh, Biomass 370 EUR/MWh, Electric heat pumps / geothermal – 347 EUR/MWh,Waste – 460 EUR/MWh, network/infrastructure – 1431 EUR/MWh.
    - Local heating: Fossil – 238 EUR/MWh, Biomass – 219 EUR/MWh, Electric heat pumps / geothermal – 320 EUR/MWh. Based on average levelized cost of heat production in Europe assuming lifetime of 20 years (50 for network) and 4% WACC
- Net recurring costs/savings
    - District heating: Fossil – 66 EUR/MWh, Biomass – 82 EUR/MWh, Electric heat pumps / geothermal – 41 EUR/MWh, Waste – (-17) EUR/MWh (savings)
    - Local heating: Fossil – 74 EUR/MWh, Biomass/waste – 47 EUR/MWh, Electric heat pumps/ geothermal – 61 EUR/MWh
- Value of co-benefits
    - All emission reduction and co-benefits are calculated as net improvements compared to baseline
    - Value of NOx (12 600 €/tonne inside city, 21 300 outside city), PM2.5 (252 000 €/tonne inside city, 70 000 outside city) and PM

Waste

In the Waste sector, the primary focus is on increasing recycling rates and reducing waste. The CAPEX for this sector is €16 million, with OPEX savings for 2020-2040 estimated at €26 million. Actions such as expanding composting capacity and promoting selective waste collection are expected to reduce CO2 emissions by 84 kilotons by 2030. These initiatives support sustainable waste management and the advancement of the circular economy.

All in all, the capital expenditure of all planned actions between 2020 and 2030 is €11,302 million and the estimated savings on operational expenditure (OPEX) in the period 2020-2040 may reach €11 900 million with a total reduction of CO_2 emission by 4 384 kilotons by 2030.

CAPEX and OPEX were calculated based on the following assumptions regarding waste:

- Upfront investments
    - CAPEX is differing between the treatment methods, with sorting/recycling being the costliest and landfill being the cheapest alternative.
    - CAPEX: Landfill - 18 €/tonne. Incineration – 36 €/tonne. Composting – 21 €/tonne. Sorting – 77 €/tonne. Sorting plastics – 108 €/tonne.
    - Plastic is much more expensive to sort and recycle, and therefore it has separate values for the cost calculations.
- Net recurring costs/savings
    - Recurring costs are similar to upfront investments, with sorting/recycling being the expensive alternative, and landfill the cheap alternative.
        - Plastic is the most expensive material regarding OPEX for sorting (164 €/tonne) while the other materials have an average cost of 116€/tonne.
        - OPEX: Landfill – 11 €/tonne. Incineration - 39 €/tonne. Composting – 32 €/tonne. Sorting – 116 €/tonne. Sorting plastics – 164 €/tonne.
        - Assuming collection cost being the same, independent of where the waste is sent after being collected (landfill, incineration, or to a sorting station).
    - Sorting is assumed to have the same split between CAPEX and OPEX as composting has.
    - Revenues/cost savings come from selling sorted material or using the incineration process to recover energy. Landfill gives no revenues.
        - Revenues from incineration: 23 €/tonne. Based on energy generated (0,6 MWh / tonne waste) and energy price (40 EUR/MWh).
        - Revenues from selling sorted material:
            - Paper – 158 €/tonne. Metal – 193 €/tonne. Plastics – 315 €/tonne. Glass – 52 €/tonne. Organic waste – 10 €/tonne.
- Value of co-benefits
    - All emission reduction and co-benefits are calculated as net improvements compared to baseline
    - Value of NOx (12 600 €/tonne inside city, 21 300 outside city), PM2.5 (252 000 €/tonne inside city, 70 000 outside city) and PM

15. Table: Sectorial Costing (Net Present Value - NPV)

Fields of Action	Action / Indicator	NPV Investment Expense - CAPEX (MEUR 2020-2030)	NPV Operational Savings - OPEX (MEUR 2020-2040)	Year 2030 kton CO2e Reduction	NPV MEUR Investment Expense / Year 2030 kton CO2e Reduction	NPV Co-benefits (MEUR 2020-2040)
Transportation	*Reduced motorized passenger transportation need*	*€ -*	*€ 1 833*	*171*	*€ -*	*€ 477*
	Shift to public & non-motorized transport	*€ (218)*	*€ 883*	*188*	*€ 1,16*	*€ 831*
	Increased carpooling	*€ -*	*€ 986*	*84*	*€ -*	*€ 264*
	Electrification of cars + motorcycles	*€ (161)*	*€ 402*	*115*	*€ 1,41*	*€ 64*
	Electrification of buses	*€ (31)*	*€ 74*	*31*	*€ 1,00*	*€ 64*
	Optimized logistics	*€ -*	*€ 1 211*	*257*	*€ -*	*€ 579*
	Electrification of trucks	*€ (336)*	*€ 104*	*41*	*€ 8,19*	*€ 42*
Buildings & Heating	*Building renovations (envelope)*	*€ (4 829)*	*€ 1 055*	*431*	*€ 11,20*	*€ 371*
	New energy-efficient buildings	*€ (22)*	*€ 37*	*12*	*€ 1,78*	*€ 13*
	Efficient lighting & appliances	*€ (1 310)*	*€ 886*	*221*	*€ 5,92*	*€ 25*
	Decarbonizing heating generation	*€ (1 585)*	*€ 1 285*	*1101*	*€ 1,44*	*€ 469*
Electricity	*Decarbonizing electricity generation*	*€ (2 794)*	*€ 3 117*	*1648*	*€ 1,70*	*€ -*
Waste	*Increased waste recycling*	*€ (16)*	*€ 26*	*84*	*€ 0,20*	*€ 3*
Total		***€ (11 302)***	***€ 11 900***	***4384***	***€ 2,58***	***€ 3 203***

Note: negative numbers denote outflows of money (investment / cost) and positive numbers denote inflows of money (savings / co-benefits)

Table 16 offers a more granular, project-level breakdown of key investments in Budapest. The project sheets include groups of individual projects, with each project costing at least 5 billion HUF and each group totalling a minimum of 20 billion HUF. The final two sheets cover smaller but equally important projects. This approach ensures that the most important, capital-intensive projects are presented. The stakeholder split is indicative, reflecting successful models and what has worked in the past. Project budgets are indicative and based on 2023 prices in case of any further use of the project list should be subject to review.

16. Table: Capital Intensive Projects

Fields of Action	Action / Indicator	Capex (€m)	Opex (€m) / 10 years	Cost Effectiveness (EUR/tCO_2e)	Investment (Split by Stakeholders)
Transportation	Trolley bus procurement and infrastructure development				
		92,2b HUF / 239,2m EUR	*50,5b HUF / 131,0m EUR*	*8 700 t CO2e /year 4 255 EUR/tCO_2e*	*20% Municipality, 80% EU and National Funds*
		Project Description: The project aims to increase the share of public transport in Budapest, improve its accessibility and reduce CO_2 emissions from passenger transportation, and improve the accessibility of public transport by the procurement of new trolleybuses and extending the trolley infrastructure. The project includes: • The procurement of 56 articulated and 11 solo trolleybuses with self-propelled capacities of 10-15-30 km to convert the existing bus lines 5, 7, 7E, 8E, 108E, 110, 110E, 112, and 133E into trolleybus routes • Purchase of 40 self-propelled trolleybuses capable of 10-20 km with full batteries • Infrastructure development related to the supply of 48 Solaris trolleybuses delivered • The construction of 7 km of trolleybus overhead line along Rákóczi-Thököly út in Budapest VII, VIII and XIV districts. This includes expanding the transformer substation capacity • Creation of a new trolleybus line along Kőbányai út, Baross utca, Kiskörút, Bajcsy-Zsilinszky út, Margit híd, Szentendrei út to replace the current bus line 9. This will include installing overhead lines for parts of the route • Procurement of 25 solo trolleybuses with self-propelled capacities of 12-20 km to convert the current bus line 9 into a trolleybus route			

Fields of Action	Action / Indicator	Capex (€m)	Opex (€m) / 10 years	Cost Effectiveness (EUR/tCO2e)	Investment (Split by Stakeholders)
Transportation	Tram developments				
		78b HUF / 202,3m EUR	*3b HUF / 7,8m EUR*	*210t CO2e / year 100 047 EUR/tCO2e*	*20% Municipality, 80% EU and National Funds*
		Project Description: The project aims to increase the share of public transport in Budapest, improve its accessibility and reduce CO_2 emissions from passenger transportation, improve the level of mobility integration and the accessibility of the public transport backbone network, and reduce travel time and transfer times. The project includes: • Implementation of the southern extension of tram line 3 • Connecting Budapest tram lines between Deák tér and Lehel tér			

Fields of Action	Action / Indicator	Capex (€m)	Opex (€m) / 10 years	Cost Effectiveness (EUR/tCO_2e)	Investment (Split by Stakeholders)
Transportation	Electric bus procurement and infrastructure				
		41,5b HUF / 107,6m EUR	*9,6b HUF / 24,9m EUR*	*1 780t CO2e / year 7 443 EUR/tCO_2e*	*20% Municipality, 80% EU and National Funds*

		Project Description: The aim of the project is to replace as many significantly overloaded and polluting buses as possible and to operate them in locations (e.g. Margaret Island, the historic city centre, the Buda hills) where it is of paramount importance to improve air quality by using locally environmentally friendly buses. The project includes: • The purchase of electric buses (40 solo electric buses with charging infrastructure) • The purchase of 200 plug-in hybrid electric buses (100 articulated, 100 solo) • The installation of at least 100 electric charging stations for 200 plug-in hybrid electric buses

Fields of Action	**Action / Indicator**	**Capex (€m)**	**Opex (€m) / 10 years**	**Cost Effectiveness (EUR/tCO$_2$e)**	**Investment (Split by Stakeholders)**
Transportation	Cycling infrastructure development				
		52,3b HUF *135,7m EUR*	*26,2b HUF* *68,0m EUR*	*1 370t CO2e / year* *14 868 EUR/tCO$_2$e*	*100% EU and National Funds*
		Project Description: The aim of the project is to increase the share of cycling, partly by replacing private car journeys, thereby reducing CO_2 emissions from transport in Budapest, improving air quality and meeting climate objectives by creating a safe and attractive cycling network. The project includes: • The construction of cycle lanes in North Pest (B1, B3, B4) along Lehel street, Béke street, Rózsa street, outer Szilágyi street, Váci street, Róna street, Stefánia street Dózsa György street, Mogyoródi street, Késmárk street, covering approximately 7 km • The development of the main cycling network in South Pest and Csepel by upgrading existing and completing missing elements of the B7 cycle grid. This aims to create an interconnected, safe, and comfortable main cycling network, over about 27 km • The design of some elements of the East Pest cycle lanes (B2, B9, B30), along Kossuth Lajos street, Rákóczi road, Kerepesi road, Budafoki road, Kőbányai road, Helsinki road, Határ road, Keresztúri road, covering approximately 16 km • The development of the main South Buda cycle network by upgrading existing and completing missing elements of the B4 cycle lane in order to create an interconnected, safe and comfortable main cycling network, over about 5 km • The development of elements of the Hungária ring (B20) cycle lane • The development of a bicycle lane on the Great Boulevard • The development of the Budapest section of EuroVelo 6, Phase II			

Fields of Action	**Action / Indicator**	**Capex (€m)**	**Opex (€m)**	**Cost Effectiveness (EUR/tCO$_2$e)**	**Investment (Split by Stakeholders)**
Transportation	Public space developments				
		54,6b HUF / 141,6m EUR	*27,3b HUF / 70,8m EUR*	*255t CO2e / year* *83 294 EUR/tCO$_2$e*	*30% Municipalities, 70% EU and National Funds*
		Project Description: The aim of the project is to create green and diverse public spaces, with spaces suitable for travel by all modes of transport, favouring active, sustainable modes of transport and providing space for meeting and leisure functions.			

		The project includes: • Complex development of healthy streets - creating human-centred, humanised public spaces through traffic calming, reallocation of public space, active transport modes, and significantly improving walking conditions • Complex renovation of the lower quay between Kossuth Lajos tér - Havas utca (RAK-PARK) • Redevelopment of the public spaces of the upper quay of Buda: Fő utca and its terraces, Felhévíz, renewal of Bem József square in several phases (DUNA-BUDA)

Fields of Action	Action / Indicator	Capex (€m)	Opex (€m) / 10 years	Cost Effectiveness (EUR/tCO_2e)	Investment (Split by Stakeholders)
Transportation	District heating projects				
		24,5b HUF / 63,7m EUR	*n/a*[10]	*6 200t CO2e/ year 10 274 EUR/tCO_2e*	*20% Municipality, 80% EU and National Funds*
		Project Description: The aim of the project is to extend district heating and make it more green. The project includes: • Overhead transmission line reconstruction works (replacement of the protective duct line with a directly buried pre-insulated line, with the renovation and construction of structures) in the years 2024-2027. • Pannónia street 2xDN400 mains extension phase II from Markó street to Bank street in V. district • The development of the North Pest heat district Phase I-II: Preparation of permit and construction plans for the 2xDN500 district heating backbone to supply the heat district			

Fields of Action	Action / Indicator	Capex (€m)	Opex (€m)	Cost Effectiveness (EUR/tCO_2e)	Investment (Split by Stakeholders)
Buildings & Heating	Budapest Climate Agency: support for the energy retrofits of multi-family buildings				
		1 000b HUF / 2 594m HUF	*n/a*[11]	*2 800 EUR/tCO_2e*	*20-30% grant (Municipality of Budapest, district municipalities, national and EU funds), 70-80% financial instruments (e.g. commercial banks)*
		Project Description: The total number of residential buildings in Budapest is 200 939 and the number of dwellings is 961 061. Within the residential buildings, the share of detached houses is 79% and the share of multi-family (condominium) houses (more than 3 flats/house) is 21%. When looking at the number of dwellings, the proportion of dwellings in single-family houses is 20% and in multi-family buildings 80%. Typical multi-family buildings are, for example, social-realist, block or other traditional apartment buildings built after the Second World War but before the 1980s. This group has about 7,100 units. Their common characteristic is that they have a high energy saving potential, up to 80% if complex renovation is carried out.			

[10] Accurate OPEX data is not yet available.
[11] Accurate OPEX data is not yet available.

		There are about 6,900 prefabricated 'panel' buildings in Budapest. They also have a high energy-saving potential. On average, 50% can be saved by insulation and window replacement, and up to 65% by complex renovation. In view of the above, the first renovation programme planned to be launched by the Budapest Climate Agency will target the renovation of these multi-family buildings built during the socialist era. The advantage of these buildings is that the technical solutions are uniform, the buildings are not structured, are not protected for their architectural value and can therefore be insulated cost-effectively. The Municipality of Budapest will also involve the district municipalities in the financing, in order to provide non-refundable support. This will be coupled with a soft loan from commercial banks, supplemented by a 20-30% contribution from the households. The Budapest Climate Agency will coordinate the whole process of residential renovation (mediation between the stakeholders, energy efficiency assessment, planning, financing, and construction).

Fields of Action	**Action / Indicator**	**Capex (€m)**	**Opex (€m)**	**Cost Effectiveness (EUR/tCO$_2$e)**	**Investment (Split by Stakeholders)**
Buildings & Heating	Budapest Climate Agency: support for the energy retrofits of family houses				
		1 000b HUF / 2 594m HUF	*n/a*[12]	*3 400 EUR/tCO$_2$e*	*20-30% grant (Municipality of Budapest, district municipalities, national and EU funds), 70-80% financial instruments (e.g. commercial banks)*
		Project Description: When looking at homes as units of CO_2 emitters, consumption and emissions are highest (kWh/m2/year) in detached houses, which consume more energy than apartment buildings and have high CO_2 emissions, especially in the case of adobe houses, historicist interwar houses and so-called 'Kádár cubes' (characteristic, small, modernist housing structure, built in the Socialist era in Hungary). There are about 38,400 of these Kádár cubes in Budapest. They are enormous energy wasters, but simple methods such as insulation and window replacement can save over 50% of the energy, and they have a high energy saving potential. In the case of complex renovation, this can exceed 80%. In addition, there is still a high potential in the category of single-family houses built between 1946 and 1960, of which about 20,000 are located in Budapest. For the energy efficiency retrofits of these family houses the Budapest Climate Agency will provide a one-stop-shop service covering the whole process of residential renovation (assessment, planning, financing, construction) through a customer service network. This network will be coordinated by the Budapest Climate Agency with the help of district authorities and NGOs. This front office service will be provided by the RenoPONT network, launched under the Horizon-funded RenoHUB project. The launching of this renovation program requires the creation of an innovative financing model of several components, involving both national and international funds. The data collected from the population clearly show that a substantial wave of major refurbishments may only be realized if there are non-refundable financial supports available, as only around 30% of these households stated that has any savings.			

[12] Accurate OPEX data is not yet available.

Fields of Action	Action / Indicator	Capex (€m)	Opex (€m)	Cost Effectiveness (EUR/tCO_2e)	Investment (Split by Stakeholders)
Buildings & Heating	Budapest Climate Agency: support for the exchange of solid fossil heating systems in residential buildings				
		1b HUF / 2,6m EUR – pilot 100b HUF / 259m EUR	*n/a*[13]	*3 400 EUR/tCO_2e*	*100% EU and national funds (pilot)*
		Project Description: The highest number of energy-poor households in the multi-apartment buildings reside in buildings constructed before 1946. This has significant consequences for interventions: they are rather expensive, since insulations are only partially applicable, and window changes together with extensive heating modernization need to be carried out. For single-family houses, the distribution of energy poverty seems more even: equal in numbers in pre-1946, and 1946-1990 buildings. The use of obsolete solid fuel appliances or their irregular, highly polluting and inefficient use is most common in energy-poor households. In Budapest, there has been no comprehensive programme to address this problem in the past, due to the cumulative disadvantages of investments in terms of technology, financing and management. From a technological point of view, a solution has to be found that ensures low CO_2 (and other air pollutant) emissions, while the switch to gas heating is limited, and modern heating methods are expensive, moreover, their improper operation can generate maintenance problems. Financing must take into account not only the fact that for the investment there's no attainable self-financing or credit, but also that operation costs must be kept low (including future maintenance). Moreover, these households are less integrated into society, and as a result, they are not in a position to manage the investments themselves. In view of the above circumstances, the first task is to launch a small-scale pilot project, which will allow the project to be scaled up and the problem to be addressed comprehensively at the Budapest level.			

Fields of Action	Action / Indicator	Capex (€m)	Opex (€m)	Cost Effectiveness (EUR/tCO_2e)	Investment (Split by Stakeholders)
Buildings & Heating	Budapest Climate Agency: support for the energy efficiency improvement of municipal buildings				
		500b HUF / 1 297m EUR	*n/a*[14]	*4 200 EUR/tCO_2e*	*20% Municipality, 70% EU and National Funds, 10% EEOS (energy efficiency obligation scheme)*
		Project Description: The Municipality of Budapest and the municipalities of the districts maintain a large number of institutions and companies, thus operating a significant number of buildings and facilities. The largest energy consumers in terms of building stock are BKV Budapest Transport Ltd, Budapest Waterworks and Budapest Spa and Thermal Baths Ltd, but social institutions, educational and cultural institutions and health care institutions also consume a significant amount of energy. In the case of these municipal buildings, in addition to traditional energy retrofit investments, the Budapest Climate Agency will also support the introduction of energy management systems and the sale of savings through the Energy Efficiency Obligation Scheme (EEOS). In addition to the EEOS, the Climate Agency will also			

[13] Accurate OPEX data is not yet available.
[14] Accurate OPEX data is not yet available.

		explore the possibility of involving ESCOs to finance institutional investments, in order to develop new, longer-term sustainable and scalable schemes, instead of the previous practice of 100% non-refundable financing, typically through Operational Programmes.

Fields of Action	Action / Indicator	Capex (€m)	Opex (€m)	Cost Effectiveness (EUR/tCO_2e)	Investment (Split by Stakeholders)
Buildings & Heating	Innovative urban solutions by creating PED districts				
		60b HUF / 155,6m EUR	*n/a*[15]	*4200 EUR/tCO_2e*	*0,5% Municipality of Budapest, 0,5% district municipalities, 99% financial institutions*
		Project Description: A new urban planning approach and methodology introduced by the European Union, the so-called positive energy district (PED), is planned to be developed and tested in Budapest. The concept is based on the idea that the amount of energy produced in a district exceeds the amount of energy consumed. There are already some successful initiatives in Europe on the concept of positive energy districts, and the EU intends to create 100 or so more such pilot projects in the next few years. The Municipality of Budapest is also a member of such an international programme (ATELIER), and in Budapest, the planning process has started and a concrete development project is under preparation (ASCEND). The positive energy district concept goes beyond the level of individual buildings because it treats a larger block or neighbourhood as a single entity. Thus, it looks at several buildings, different facilities, infrastructure (e.g. street lighting, transport) and areas together, both in terms of energy consumption and energy production potential. This has the advantage over a building-level approach in that it opens up the possibilities for the location of energy production units, and also addresses several factors and segments, not just buildings. It also allows the various elements of the planning unit to be linked together, i.e. the concept also builds on the use of energy communities and smart grid systems. In Budapest, the pilot intervention will be located at 45 Megyeri Street and its surroundings in District 4, where the transformation of a building that used to be a school, the installation of solar panels on buildings, smart bus stops and electric charging points, and the greening of public spaces will be among the activities.			

Fields of Action	Action / Indicator	Capex (€m)	Opex (€m)	Cost Effectiveness (EUR/tCO_2e)	Investment (Split by Stakeholders)
Buildings & Heating	Public lighting upgrade with LED lumineers				
		9,8b HUF / 25,4m EUR	*n/a*[16]	*n/a*[17]	*10% Municipality, 20% Energy Efficiency Obligation Scheme, 70% investors/grants*
		Project Description: The project aims the replacement of 40.000 bulbs of the public lighting system with energy efficient LED lumineers. The resulted reduction in energy consumption can mount to 3.3 GWh.			

[15] Accurate OPEX data is not yet available.
[16] Accurate OPEX data is not yet available.
[17] Emission reduction data is not yet available.

Fields of Action	Action / Indicator	Capex (€m)	Opex (€m)	Cost Effectiveness (EUR/tCO_2e)	Investment (Split by Stakeholders)
Buildings & Heating	Technological interventions				
		14,6b HUF / 37,9m EUR	*n/a*[18]	*461t CO2e/ year*[19] *82 213 EUR/tCO_2e*	*20% Municipality, 20-30% grant, 50-60% investor*

		Project Description:
		The projects include:
		• The reconstruction of heat exchanges - 50 heat exchanges per year, 200 heat exchanges over 4 years. The total refurbishment of 200 heat exchanges is estimated to save 11 259 GJ/year of primary energy per year.
		• Waste treatment plant improvement –
		  ○ Bunkertér bridge crane replacement
		  ○ Replacement and upgrading of absorber atomiser unit
		• The electrical and mechanical upgrading of the Csepel powerhouse – it will include the installation of modern, energy-efficient equipment, together with other related electrical, mechanical and architectural upgrades
		• Installation of an electric boiler (pilot project) - preparation, planning and design of the district heating pipeline.
		• The alternative supply of the Tököli wastewater treatment plant in order to further expand our solar systems up to the given consumption of the wastewater treatment plant (1.32 GWh). This would require the construction of a 2.4km medium voltage 10 kV line from our transformer house. In addition, a 1 MW solar system, e.g. in Ráckeve, to meet the energy needs of the wastewater treatment plant.
		• Green hydrogen project (pilot - R&D project) - using green electricity to produce hydrogen through water decomposition, which can be used for combined district heating after the installation of a small gas turbine.			

2.2 Module IP-B2: Capital Planning for Climate Neutrality

This module focuses on the existing and possible sources of funding for each project of the Action Plan. The financing of these projects relies mainly on grants from the EU, as well as project-related support originating from the central budget of Hungary. Some projects will also involve loans, and the Municipality plans to leverage innovative financing options, which is crucial, given its high dependency on external financing actors. According to Table 18, the City of Budapest covers only 7% of all expenses, with the largest share of contributions by the private sector (59%) and residents (22%). This underscores the importance of engaging stakeholders and looking for alternative financing opportunities beyond municipal and EU funding.

Possible sources of financing

[18] Accurate OPEX data is not yet available.
[19] The CO_2e reduction does not include the full emission reduction potential, as not all individual projects have accurate data about emission reductions yet.

Funds from the European Union play a significant role in funding the projects of the Action Plan. Operational programmes of the 2021-2027 EU financial cycle that are relevant for Budapest are the following:

- Through the Spatial and Urban Development Operational Programme Plus (SUDOP Plus), HUF 83,562 billion is available for the Municipality, mainly for infrastructure development projects (development of housing infrastructure, clean urban transportation, climate adaptation, public space renewal).
- Through the Environmental and Energy Efficiency Operational Programme Plus (EEEOP Plus), the theoretical funding possibility of projects located in Budapest is ensured, However, this may partially include the budget allocated to Budapest as part of projects covering the whole territory of Hungary. Energy efficiency measures undertaken by companies can also be financed through the EEEOP.
- Through the Integrated Transport Development Operational Programme Plus (ITOP Plus), transportation development projects will be financed (ITOP Plus – 1.1.0-23 Strengthening clean urban-suburban transport in Budapest and its agglomeration settlements; the total amount of support is HUF 501,6 billion.)
- Through the Digital Renewal Operational Programme Plus (DROP Plus), Budapest's projects related to the high-tech and green transition - promoting the uptake of digital solutions and the shift to a climate-neutral, circular and more resilient economy through the use of data – can be financed.

The Next Generation EU, the European Commission's recovery support package, addressing the crisis caused by coronavirus, was set up with a financial framework for several years. Under this package, the most significant potential funding for Budapest may come from the RRF. The 'Sustainable, green transportation', the 'Energy (green transition)', and the 'Transition to a circular economy' components can potentially provide funding opportunities for relevant projects. More specifically, investments in urban and suburban vehicle fleets, such as tram and public transport vehicle procurements, could be financed through RRF sources.

Besides the cohesion funds and recovery instruments, more resources need to be involved to bridge the financing gap of activities. Most of the possible funding sources are under direct management by European institutions. The most important potential resources include, among others, the following programmes and funds:

- LIFE – Nature conservation, climate protection. The Herman Ottó Institute Nonprofit Ltd. successfully applied for the HungAIRy project in collaboration with 19 project partners, including Budapest. The project's goal is to improve air quality across eight regions and ten municipalities in Hungary through various measures, including the development of emissions databases, the installation of new monitoring stations, public awareness activities, and the creation of an expert network.
- Horizon Europe – Research and development
- ELENA – provides financial support for technical tasks focused on implementing energy efficiency, distributed renewable energy, and urban transportation programs.
- European Urban Initiative – Participatory planning, innovative urban solutions to address the challenges cities facing
- CEF Transport – Sustainable transport
- EIT KICs – Aiding different green activities of the city in achieving its innovation and sustainability goals

- URBACT – Aimed at fostering knowledge exchange and collaboration among cities to promote sustainable urban development
- Interreg Europe and Interreg Central Europe
- Interreg Danube Programme – Foster cooperation and innovation across the Danube Region to promote sustainable development
- Driving Urban Transitions – is an intergovernmental research and innovation program addressing key challenges of urban transitions
- Norway Grant – Environment and energy efficiency, green industry innovation, climate change mitigation and adaptation

Regarding loans, the Municipality has a framework agreement with the EIB. The organisation also provides loans directly to companies, including for environmental projects, but it does not offer financing directly to individuals. It has to be noted that all borrowing by the capital and its companies is subject to government approval, which has recently been systematically denied. Beyond EIB loans, there are other opportunities available for funding relevant activities of the Municipality and other stakeholders, mostly through refundable sources:

- The European Bank for Reconstruction and Development's (EBRD) purpose is to develop market economies and the private sector in Central and Eastern Europe. The Bank supports a wide range of projects, including energy, infrastructure, transport, industry, agriculture and financial sectors.
- The European Energy Efficiency Fund's (EEEF) purpose is to support energy efficiency and renewable energy projects and to build public–private partnerships for climate financing in the European Union, especially for municipalities, utilities and public institutions.
- MNB Green Capital Requirement – In February 2019, the MNB (Hungarian National Bank) launched a special capital requirement reduction program, allowing Hungarian credit institutions to ease their capital burden under regulatory requirements by increasing their green portfolios. The program extends to the application of discounts for loans issued to individuals, businesses, and municipalities.
- The Hungarian Development Bank (MFB) aims to promote sustainable economic growth, regional development, and social cohesion in Hungary. It focuses on financing projects that contribute to these goals, including infrastructure development, innovation, and environmental sustainability.
- Finally, there are several commercial banks in Hungary that provide tailor-made loans related to energy efficiency to municipalities, businesses, and citizens (green loans, home renovation loans etc.).

Beyond these, innovative sources of financing will be explored to contribute to a more efficient implementation of interventions laid down in the Action Plan:

- In Hungary, **ESCO** (Energy Service Company) financing has been predominantly utilized by municipalities for projects like street lighting modernization and solar panel development. However, the ESCO market in Hungary faces several challenges, such as underdeveloped infrastructure, a lack of clear legal definitions, and difficulties in distinguishing ESCO contracts from financial leasing under current legislation. Moreover, the process of public procurement further complicates the implementation of true ESCO models, as it often requires separate procurement for project preparation and execution, which contradicts the integrated approach

typical of ESCO projects.[20] However, the National Energy Strategy emphasizes the use of ESCO-type financing solutions as essential for meeting the energy efficiency goals of the next decade, so the changes in this area will be inevitable.

- Within the framework of the **Energy Efficiency Obligation Scheme**, in the near future, the Municipality plans to raise funds to cover further investments from the sale of certified energy-saving units from energy efficiency investments of its own institutions and companies, but in the longer term, the involvement of the public in EEOS should be explored and supported in the field of residential developments, thus providing an innovative financing method for residential investments.
- **Crowdfunding** can optimally complement local governments' own or other resources. Public buildings that primarily serve community functions, such as cultural or educational institutions, or buildings that are highly characteristic of a given locality (historic sites, heritage buildings), are ideal candidates for crowdfunding campaigns. These campaigns are likely to mobilize many residents and local entrepreneurs.
- Some typical forms of **Public-Private Partnership** are widespread at the local level: service and operation agreements (e.g., for waste management) and leasing contracts are in place. However, more complex models, such as BOT[21] (Build-Operate-Transfer) or DBO[22] (Design-Build-Operate) could be applied. In Budapest, the most famous is the MOL Bubi public bike-sharing system, which offers a sustainable transportation alternative for city residents. The project is jointly funded and operated by the Municipality of Budapest, BKK Centre for Budapest Transport and MOL Plc., with the private sector playing a significant role in the system's development and maintenance.
- The **Energy Efficiency Obligation Scheme** can also be a source of financing for energy efficiency initiatives as it obliges designated actors in the energy market to achieve a certain level of energy savings for end-users in proportion to their energy sales.
- **Green bonds** can also be an alternative financing source, which are fixed-income instruments specifically earmarked to raise funds for projects that have positive environmental and climate benefits. Hungary's first green bond issuance took place in 2020, and since then, it has financed several sustainable projects, including the development of railway infrastructure, energy efficiency upgrades of public buildings, and nature conservation projects. The issuance and use of green bonds are regulated by the Green Bond Issuance Guidelines of the Hungarian National Bank, which ensures compliance with international standards and strengthens investor confidence.[23]

Due to the regulatory and administrative barriers, the lack of awareness and information, municipalities still do not fully utilize the potential of these forms of funding in Hungary, thus, additional efforts should be made to make use of these funding opportunities.

Additional sources of financing on the different fields of action are summarised below:

[20] SUDOP Plusz Financial instrument ex ante assessment (https://archiv.palyazat.gov.hu/download.php?objectId=1098493, downloaded: 6.8.2024)
[21] The BOT (Build-Operate-Transfer) model involves a private entity financing, constructing, and operating a project for a specific period before transferring ownership to the government or public sector.
[22] The DBO (Design-Build-Operate) model entails a single contractor being responsible for designing, building, and operating a facility, often with the public sector retaining ownership throughout the project's lifecycle.
[23] Green bonds Framework 2023 (https://akk.hu/content/path=green-bond-framework-2023-item-hu, downloaded 6.8.2024)

17. Table: Possible source of Funding of actions

Field of Action	Possible source of Funding
Reduced motorized passenger transportation need	ERDF or other indirect EU funds, DUT, LIFE (HungAIRy) Municipality's own budget
Shift to public & non-motorized transport	ERDF or other indirect EU funds, DROP, Interreg, LIFE, Horizon, EUI, Norway Grant, URBACT
Increased car-pooling	PPP (already 4 car sharing actors on the market), Municipality's own budget, governmental support
Electrification of cars + motorcycles	Horizon, LIFE, CEF, Norway Grant, Interreg, RRF, governmental support, loans
Electrification of buses	Horizon, LIFE, CEF, Norway Grant, Interreg, RRF, Municipality's own budget, governmental support, loans
Optimized logistics	LIFE (HungAIRy), Interreg, Horizon, EUI, DUT
Electrification of trucks	Horizon, CEF, Norway Grant, Interreg, RRF, loans
Building renovations (envelope)	ERDF or other indirect EU funds, EEEOP Plus, RRF, Horizon, ESCO, PPP, Crowdfunding, EUI, Municipality's own budget, governmental support, loans
New energy-efficient buildings	ERDF or other indirect EU funds, RRF, Horizon, Interreg, EUI, DUT, ESCO, Municipality's own budget, governmental support, loans
Efficient lighting & appliances	ERDF or other indirect EU funds, RRF, Horizon, EUI ESCO, Municipality's own budget, governmental support, loans
Decarbonizing heating generation	ERDF or other indirect EU funds, EEEOP Plus, DROP, RRF, LIFE, Interreg, Norway Grant, EUI, Municipality's own budget, governmental support, loans
Decarbonizing electricity generation	ERDF or other indirect EU funds, DROP, RRF, LIFE, Interreg, Norway Grant, EUI, PPP, Municipality's own budget, governmental support, loans
Increased waste recycling and waste reduction	LIFE, Norway Grant, URBACT, Municipality's own budget

While most actions can be partially financed by the sources above, due to the large share of contributions by the private sector (59%) and residents (22%) it is paramount to engage stakeholders and examine not only the financing opportunities for municipal projects but also the resources available to residents, businesses, and institutions. Furthermore, to mobilize stakeholders, it is inevitable to provide them with a balanced mix of incentives and disincentives.

Table 18 presents the costs of each identified action, broken down by stakeholders, using a top-down approach and the methodology of Net Zero Cities consortium.

18. Table: Capital Planning by Stakeholder - Total Investment-CAPEX (Cash Basis MEUR 2020-2030)

Field of Action	Action / Indicator	Citizens (€)	Private Sector (€)	Municipality (€)	Transport Operators (€)	Utility Providers (€)	Total (€)
Transport	*Reduced motorized passenger transportation need*	€ -	€ -	€ -	€ -	€ -	€ -
	Shift to public & non-motorized transport	€ (46)	€ -	€ (16)	€ (205)	€ -	€ (267)
	Increased car-pooling	€ -	€ -	€ -	€ -	€ -	€ -
	Electrification of cars + motorcycles	€ (140)	€ (38)	€ (4)	€ -	€ -	€ (182)
	Electrification of buses	€ -	€ -	€ -	€ (41)	€ -	€ (41)
	Optimized logistics	€ -	€ -	€ -	€ -	€ -	€ -
	Electrification of trucks	€ -	€ (67)	€ (10)	€ (339)	€ -	€ (415)
Buildings & Heating	*Building renovations (envelope)*	€ (3 963)	€ (1 415)	€ (283)	€ -	€ -	€ (5 661)
	New energy-efficient buildings	€ (8)	€ (16)	€ (3)	€ -	€ -	€ (26)
	Efficient lighting & appliances	€ (1 081)	€ (386)	€ (77)	€ -	€ -	€ (1 544)
	Decarbonizing heating generation	€ (345)	€ (123)	€ (291)	€ -	€ (1 064)	€ (1 822)
Electricity	*Decarbonizing electricity generation*	€ (2 324)	€ (830)	€ (166)	€ -	€ (38)	€ (3 358)
Waste	*Increased waste recycling*	€ -	€ -	€ (20)	€ -	€ -	€ (20)
TOTAL		**€ (7 905)**	**€ (2 875)**	**€ (869)**	**€ (585)**	**€ (1 102)**	**€ (13 336)**
% of Total		**59%**	**22%**	**7%**	**4%**	**8%**	**100%**
Euros Per Capita (2030 population)		€ (5 075)	€ (1 846)	€ (558)	€ (376)	€ (707)	€ (8 562)

Note: negative numbers denote outflows of money (investment / cost) and positive numbers denote inflows of money (savings / co-benefits)

19. Table: Capital Planning (Cash Basis MEUR 2020-2030)

Field of Action	Action / Indicator	Cost to Municipality - Investment Expense – CAPEX	Cost to Other Stakeholders - Investment Expense - CAPEX	% of Municipality CAPEX Covered
Transport	*Reduced motorized passenger transportation need*	€ -	€ -	-
	Shift to public & non-motorized transport	€ (16)	€ (251)	6%
	Increased car-pooling	€ -	€ -	-
	Electrification of cars + motorcycles	€ (4)	€ (178)	2%
	Electrification of buses	€ -	€ (41)	0%
	Optimized logistics	€ -	€ -	-
	Electrification of trucks	€ (10)	€ (406)	2%
Buildings & Heating	*Building renovations (envelope)*	€ (283)	€ (5 378)	5%
	New energy-efficient buildings	€ (3)	€ (23)	1%
	Efficient lighting & appliances	€ (77)	€ (1 466)	5%
	Decarbonizing heating generation	€ (291)	€ (1 531)	15%
Electricity	*Decarbonizing electricity generation*	€ (166)	€ (3 192)	5%
Waste	*Increased waste recycling*	€ (20)	€ -	100%
TOTAL		**€ (869)**	€ (12 467)	

Note: negative numbers denote outflows of money (investment / cost) and positive numbers denote inflows of money (savings / co-benefits)

2.3 Module IP-B3: Economic and Financial Indicators for Monitoring, Evaluation and Learning

This section describes the Monitoring, Evaluation and Learning (MEL) framework to be set up to effectively track the progress of the implementation of the Investment Plan, with a view to evaluate the impact of green investments, estimate their emission reduction and co-benefits, as well as mapping and monitoring deviations of capital investment planning processes.

The existing monitoring system, which is linked to green investments, is responsible for following up the implementation of measures defined in the SECAP of Budapest. The system uses a group of indicators to measure the progress of the implementation of actions and mandates biannual reporting of indicator values. Every two years, a summary report on monitoring - that is the progress towards fulfilling indicator targets – is produced and annexed to the SECAP. Moreover, the emissions inventory is updated every year and included in the annual Budapest Environmental Status Assessment, presented to and accepted by the General Assembly. The existing system will also integrate the monitoring of the CCC, as far as possible.

The basis of the CCC's MEL framework is a set of robust economic and financial indicators (see Tables 20 and 21), aligned with the climate neutrality commitments of Budapest, and with the measures of the Action Plan. Key indicators across various fields of action include the reduction of motorized passenger transportation need (20% by 2030); the annual renovation rate of buildings (from 2 to 4,5%); the decrease of the share of electricity produced using fossil fuels (from 34 to 2%) and the recycling rate of paper/metal/plastic/glass/organic waste (from 10-20% to 80-90%).

Some data needed for identifying actual indicator values are already collected and available. Beyond these, necessary data collection will be aligned with existing exercises, e.g., those linked to the monitoring process of the SECAP, as far as possible. Data for the SECAP is collected annually from responsible departments and companies of the Municipality. Nevertheless, the different nature of actions and the specificities of the CCC's indicator system offer limited opportunities to closely link different data collection procedures and set up common databases. In most cases, unique primary data will be collected to update indicator values, involving also other stakeholders if necessary. Progress on indicators will be presented to the General Assembly and communicated to the public through the official website of the Municipality.

The standard monitoring process of the CCC will include a review of the Investment Plan once in 2 years to assess the pace of implementation, and the progress of indicators. Deviations from target values will be identified, and duly analysed and corrective measures will be defined either in terms of taking actions to address lagging and capital deployment deficiencies more effectively or in terms of adjusting target values (in case of shortcomings in the planning process).

Beyond monitoring the implementation of actions and the timely progress of indicator values, the MEL framework will also make it possible to analyse collected data and to conduct evaluations in order to assess effectiveness, efficiency and, above all, the impact of measures. The conclusions of these analyses and evaluations provide useful feedback for updating the CCC as far as both the content of actions, and target value of indicators are concerned and can also feed into the planning process of other future strategic documents or activities of the city linked to climate neutrality or sustainability. The list of intended evaluations can be laid down in an evaluation plan outlining also the provisional resources allocated to conducting them and a draft schedule. The plan can be reviewed and updated as part of the review of the Investment Plan.

20. Table: Economic Indicators by Sector

Fields of Action	Indicator	Indicator Unit	Indicator Baseline	Indicator Target
Transport	Reduced motorized passenger transportation need	% reduction by 2030		20%
	Reduced passenger kilometers by car through shift to public & non-motorized transportation	% reduction in car passenger kilometers by 2030		40%
	Car-pooling	average passengers per car	1,3	1,6
	Electrification of cars + motorcycles by 2040	% of fleet electrified	1%	55%
	Electrification of buses	% of fleet electrified	10%	50%
	Optimization of trucking logistics - light duty trucks (< 3,5 t)	average utilization of maximum load weight for light duty trucks (< 3.5t)	23%	85%
	Optimization of trucking logistics - heavy duty trucks (> 3,5 t)	average utilization of maximum load weight for heavy duty trucks (< 3.5t)	45%	85%
	Electrification of light duty trucks <3,5t by 2040	% of fleet electrified	0%	90%
	Electrification of heavy duty trucks <3,5t by 2040	% of fleet electrified	0%	60%
Buildings & Heating	Building renovation (envelope)	% annual renovation rate	2,0%	4,5%
	New buildings built to top performing standard	% of buildings built to the top standard	14%	20%
	Efficient lighting and appliances	% annual renovation rate	2,0%	5,0%
	Heating technologies	share of heating as district heating	28%	35%
	Decarbonizing district heating	share of district heating produced using fossil fuels	90%	49%
	Decarbonizing district heating	share of district heating produced using electric heat pumps	0%	35%
	Decarbonizing district heating	share of district heating produced using bio fuels	0%	0%
	Heating technologies	share of heating as local heating	72%	65%
	Decarbonizing local heating	share of local heating produced using fossil fuels	94%	40%
	Decarbonizing local heating	share of local heating produced using electric heat pumps	2%	56%
	Decarbonizing local heating	share of local heating produced using bio fuels	4%	4%
Electricity	Renewable / fossil fuel electricity production	share of electricity produced using fossil fuels	34%	2%
Waste	Paper recycling	% recycling rate	20%	85%
	Metal recycling	% recycling rate	20%	90%
	Plastic recycling	% recycling rate	15%	85%
	Glass recycling	% recycling rate	10%	85%
	Organic recycling	% recycling rate	17%	80%

21. Table: Financial Indicators by Sector

Sector	Subsector	NPV Investment Expense - CAPEX (MEUR 2020-2030)	NPV Operational Savings - OPEX (MEUR 2020-2040)	NPV Co-benefits (MEUR 2020-2040)	NPV Return on Investment (ROI) (MEUR 2020-2040)	% Return on Investment (ROI)	Year 2030 kton CO2e Reduction	NPV MEUR Investment Expense / Year 2030 kton CO2e Reduction
Transport	*Reduced motorized passenger transportation need*	€ -	€ 1 833	€ 477	€ 2 310	0%	171	€ -
	Shift to public & non-motorized transport	€ (218)	€ 883	€ 831	€ 1 497	688%	188	€ 1,16
	Increased car-pooling	€ -	€ 986	€ 264	€ 1 250	0%	84	€ -
	Electrification of cars + motorcycles	€ (161)	€ 402	€ 64	€ 304	189%	115	€ 1,41
	Electrification of buses	€ (31)	€ 74	€ 64	€ 107	342%	31	€ 1,00
	Optimized logistics	€ -	€ 1 211	€ 579	€ 1 790	0%	257	€ -
	Electrification of trucks	€ (336)	€ 104	€ 42	€ (190)	-57%	41	€ 8,19
Buildings & Heating	*Building renovations (envelope)*	€ (4 829)	€ 1 055	€ 371	€ (3 402)	-70%	431	€ 11,20
	New energy-efficient buildings	€ (22)	€ 37	€ 13	€ 28	129%	12	€ 1,78
	Efficient lighting & appliances	€ (1 310)	€ 886	€ 25	€ (399)	-30%	221	€ 5,92
	Decarbonizing heating generation	€ (1 585)	€ 1 285	€ 469	€ 169	11%	1101	€ 1,44
Electricity	*Decarbonizing electricity generation*	€ (2 794)	€ 3 117	€ -	€ 323	12%	1648	€ 1,70
Waste	*Increased waste recycling*	€ (16)	€ 26	€ 3	€ 13	77%	84	€ 0,20
TOTAL		**€ (11 302)**	**€ 11 900**	**€ 3 203**	**€ 3 801**	**34%**	**4384**	**€ 2,58**

*** Note: negative numbers denote outflows of money (investment / cost) and positive numbers denote inflows of money (savings / co-benefits)**

3 Part C – Enabling Financial Conditions for Climate Neutrality by 2030

Part C "**Enabling Conditions for Climate Neutrality by 2030**" is the third section of the Investment Plan and is intended to identify other enabling factors the city needs to consider in the implementation of the Investment Plan.

3.1 Module IP-C1: Climate Policies for Capital Formation and Deployment

The allocation of capital will need to be optimised between both public and private sources across the portfolio outlined in the Action Plan to meet the cost of the actions identified for reaching climate neutrality over time.

The Municipality of Budapest is committed to making environmental sustainability a cornerstone of its operations. In 2019, the newly elected City Council pledged to build a green, opportunity-rich, and democratically functioning city. Affirming its vision, the city has identified three strategic pillars, including creating a green Budapest, and integrating climate protection into the municipality's operation. However, the dual self-government system in Budapest, wherein the Municipality of Budapest coexists with the independent local governments of the city's 23 districts, makes universal city-wide policymaking challenging. Despite these difficulties, the Municipality is engaging in constant dialogue with district municipalities to synchronise regulations and prioritize environmental sustainability in policymaking.

The policies listed below include EU, national and local policies that enable capital deployment to reach climate neutrality in Budapest. The non-exhaustive list features the most important legislative measures and may be complemented in future iteration of the CCC.

22. Table: List of Climate Policies to Enable Capital Deployment

Climate Policy	Policy Status (Enacted, In Process, Development, etc.)	Description of the policy (sector, targeted audience, etc.)	Intended Outcome for Capital Formation
EU Directives			
EU Emissions Trading System (ETS) Directive (2003/87/EC)	Enacted	The EU' emissions trading system (ETS) is one of the world's largest carbon markets and aims to reduce GHG emissions of companies by putting a price on carbon. It received a few updates in 2023 to boost emission reductions, including: • a more ambitious reduction goal of 62% by 2030 • a faster reduction of the cap • a separate new ETS for buildings, road transport and fuels in new sectors • gradual phasing out of free allowances for specific sectors • increased funding for decarbonising ETS sectors	The mechanism directs investments to lowering GHG emissions in ETS sectors.

Energy Taxation Directive (2003/96/EC)	Enacted	The directive is part of the Fit for 55 package, a set of proposals aimed at aligning EU policies with its climate objectives. Revised in 2021, the new directive includes a change to minimum tax rates that reflect the environmental impact of fuels and electricity, as well as by broadening the taxable base and removing some of the current exemptions and tax reductions. The revised directive aims to ensure that the most polluting fuels are taxed the highest, providing incentives for producers, users and consumers to switch to greener sources.	The directive directs investments to using more sustainable energy sources.
Clean Vehicles Directive (2009/33/EC)	Enacted	This directive requires that energy efficiency and environmental criteria be included in the procurement of vehicles for public service contracts, promoting cleaner transport technologies.	The directive directs investments to lowering the GHG emissions in the transport sector.
Energy Performance of Buildings Directive (2010/31/EU)	Enacted	The directive is part of the Fit for 55 package, a set of proposals aimed at aligning EU policies with its climate objectives. It was revised in 2024 with the aim of facilitating renovations, particularly those of the worst-performing buildings in the EU. Some of the measures of the revised directive include: • the gradual introduction of minimum energy performance standards for non-residential buildings • a binding target to decrease the average energy performance of the national residential building stock by 16% by 2030 compared to 2020 • an enhanced standard for new buildings to be zero-emission along with the calculation of whole life-cycle carbon for new buildings • the introduction of building renovation passports • a gradual phase-out of boilers powered by fossil fuels • one-stop-shops for the energy renovations of buildings	The directive directs investments to lowering the GHG emissions in the building sector.
Energy Efficiency Directive (2012/27/EU)	Enacted	This directive requires Member States to improve energy efficiency, including reducing energy consumption in buildings. It emphasizes achieving energy efficiency targets and developing renovation strategies. The directive is	The directive directs investments to lowering GHG emissions in all energy-related sectors.

		part of the Fit for 55 package, a set of proposals aimed at aligning EU policies with its climate objectives. It was revised in 2023, whereby energy efficiency targets were raised, the annual energy savings obligation (Article 8) by 2028 was more than doubled, a stronger focus was placed on alleviating energy poverty, the scope of energy audit obligations was expanded, and the definition of efficient district heating and cooling was modified.	
Directive on the Deployment of Alternative Fuels Infrastructure (2014/94/EU)	Enacted	This directive regulates the development of infrastructure for alternative fuels, such as electric vehicle charging stations, to promote energy efficiency and low carbon emissions in the transport sector.	The directive directs investments to lowering the GHG emissions in the transport sector.
Renewable Energy Directive (2018/2001/EU)	Enacted	Also known as RED II, this directive aims to increase the share of renewable energy in the EU's overall energy consumption. Member States are required to set national targets to increase the use of renewable energy sources. The directive is part of the Fit for 55 package, a set of proposals aimed at aligning EU policies with its climate objectives. It was revised in 2023 with a new binding target of at least 42,5% (up from 32%) set for the share of renewables in EU energy consumption by 2030. To facilitate the further uptake of renewables, new measures were put into place including sector-specific targets for renewables, a policy framework promoting electric vehicles and smart charging, and easier and faster permitting procedures for renewable energy and infrastructure projects.	The directive directs investments to lowering GHG emissions in all sectors.
EU Regulations			
Land use, land use change and forestry (LULUCF) Regulation (2018/841/EU)	Enacted	The regulation is part of the Fit for 55 package, a set of proposals aimed at aligning EU policies with its climate objectives. Revised in 2022, the regulation sets a more ambitious EU-level target for carbon removal and binding targets for each member state.	The regulation directs investments to lowering the GHG emissions in the land use and forestry sector.
Governance of the Energy Union and Climate Action Regulation (2018/1999/EU)	Enacted	This regulation requires Member States to develop National Energy and Climate Plans every five years, outlining their energy efficiency, renewable energy, and emission reduction targets.	The regulations directs investments to lowering GHG emissions in all sectors.

EU Taxonomy Regulation (2020/852/EU)	Enacted	The EU Taxonomy is classification system that helps organizations determine, which of their activities support the EU's climate neutrality ambition by 2050 and other, broader environmental goals. It is a key tool of the EU to ensure market transparency, set a common definition of environmentally sustainable economic activities and direct investments towards sustainable projects and initiatives in all sectors.	The taxonomy directs investments to lowering GHG emissions in all sectors.
Effort sharing regulation (2023/857/EU)	Enacted	The regulation is part of the Fit for 55 package, a set of proposals aimed at aligning EU policies with its climate objectives. Updated in 2023, the regulation aims to reduce GHG emissions in the ESR sectors by 40% (up from 29%) by 2030. It sets new and binding 2030 targets for each member state in a fair and cost-effective manner.	The regulation directs investments to lowering the GHG emissions in road transport, agriculture, buildings, small industries and waste.
Alternative Fuels Infrastructure Regulation (2023/1804/EU)	Enacted	The regulation sets several mandatory national targets for the deployment of alternative fuels infrastructure in the EU, for road vehicles, vessels and stationary aircraft. Its specific objectives are: to ensure minimum infrastructure to support the required uptake of alternative fuel vehicles across all transport modes to ensure full interoperability of the infrastructure to ensure comprehensive user information and adequate payment options at alternative fuels infrastructure	The regulation directs investments to lowering the GHG emissions in the transport sector.
Regulation on methane emissions reduction (2024/1787/EU)	Enacted	The regulation is part of the Fit for 55 package, a set of proposals aimed at aligning EU policies with its climate objectives. Revised in 2024, the regulation aims to establish new rules to reduce methane emissions in the energy sector, including monitoring and reporting methane emissions and limiting the release of methane at energy production plants.	The regulation directs investments to lowering the GHG emissions in the energy sector.
Nature Restoration Law (Regulation 2024/1991 of the European Parliament and of the Council)	Enacted	The regulation sets binding targets to restore degraded ecosystems. It targets no net loss of green urban space and tree cover by 2030 in urban ecosystems.	The regulation directs investments to capturing and storing carbon.
National Acts			
Act XCIII of 1990 on Duties	Enacted	While it is not specifically focused on sustainability or CO_2 reduction, it can have indirect effects on environmental goals. The Act	The regulation provides favourable conditions for

		governs the imposition and collection of duties on various activities, which can include environmental levies or fees. For example, it can facilitate the introduction of fees for activities that impact the environment, such as carbon emissions or pollution. The also encourages the uptake of GHG-free mobility mode. Under the law, the acquisition of the ownership of such vehicles or the right to the property relating to them is exempt from duty.	investments, lowering the GHG emissions in the transport sector.
Act LXXXII of 1991 on Motor Vehicle Tax	Enacted	The Act outlines the framework for levying taxes on vehicles based on various criteria such as engine capacity, type, and age. The Act aims to generate revenue for local governments while encouraging vehicle owners to maintain their vehicles properly. It incorporates provisions to adjust tax rates and exemptions, including those related to environmental considerations, like emissions and fuel type. It encourages the uptake of GHG-free mobility mode by regulating electromobility services. Under the law, environmentally friendly cars are exempt from vehicle tax and company car tax.	The regulation provides favourable conditions for investments, lowering the GHG emissions in the transport sector
Act CX of 2003 on Registration Tax	Enacted	The law aims to encourage the uptake of GHG-free mobility mode by regulating electromobility services. Under the law, registration tax on environmentally friendly cars is HUF 0.	The regulation provides favourable conditions for investments, lowering the GHG emissions in the transport sector.
Act LXXVII of 2010 on the Protection of the Built Environment	Enacted	The Act focuses on preserving historical and cultural values within the built environment. Its main objectives include protecting monuments and architectural heritage, as well as maintaining urban and architectural values. The Act regulates the restoration and maintenance of protected buildings and the approval of construction and modification projects. Regarding energy-related aspects, the Act itself does not provide detailed regulations on energy performance. However, it mandates that the Minister responsible for constructions must establish rules for determining the energy characteristics of buildings. For specific energy efficiency	The Act directs investments to lowering the GHG emissions in the building sector.

		requirements, other legislation such as energy efficiency laws and regulations apply.	
Act LVII of 2015 on Energy Efficiency	Enacted	The 2015 Act LVII on Energy Efficiency forms the foundation of Hungary's energy efficiency policy. Its goal is to reduce energy consumption and achieve energy efficiency targets. The Act mandates the implementation of energy efficiency measures across various sectors, including industry, transport, and households, and sets mandatory energy efficiency objectives. It also regulates the framework for energy efficiency programs and subsidies, and requires performance monitoring and reporting. The Act aligns with the European Union's energy efficiency directives and supports Hungary's sustainable energy use objectives.	The Act directs investments to lowering the GHG emissions in all sectors.
Act LXXVI of 2017 on Energy Efficiency	Enacted	The 2017 Act LXXVI on Energy Efficiency builds on Hungary's energy efficiency framework, updating and expanding the previous legislation. It establishes a mandatory energy efficiency obligation scheme for large energy consumers and outlines specific measures to reduce energy consumption across various sectors. The Act requires the development of national energy efficiency plans and mandates regular reporting and monitoring of progress. It also provides for support and incentives for energy efficiency improvements. This legislation aims to align Hungary's energy efficiency efforts with EU regulations and contribute to the country's overall energy and climate goals. The Energy Efficiency Obligation Scheme was launched in 2021, the obligated parties can be energy distribution companies, retail energy sales companies, transport fuel distributors and retail fuel sales companies.	The Act directs investments to lowering the GHG emissions in all sectors.
National Decrees			
Government Decree 176 of 2008 on the Energy Certification of Buildings	Enacted	The Government Decree 176/2008 (VI. 30.) on the Energy Certification of Buildings regulates the energy performance assessment of buildings in Hungary. It mandates that all new and significantly renovated buildings must obtain an energy performance certificate. This certificate provides a detailed evaluation of the building's energy use, including aspects like	The Decree directs investments to lowering the GHG emissions in building sector.

		insulation, heating, and cooling systems. The decree aims to improve energy efficiency and reduce environmental impact by setting clear standards and requirements for energy performance. It aligns with EU directives, supporting Hungary's goals for sustainability and energy efficiency.	
Government Decree 299 of 2017 on the Mandatory Purchase and Premium-Type Support for Electricity Produced from Renewable Energy Sources	Enacted	Government Decree sets out the framework for supporting and incentivizing renewable energy projects. The Decree establishes a support scheme that includes feed-in tariffs and premium payments for electricity generated from renewable sources such as solar, wind, and biomass. It outlines eligibility criteria for receiving financial support, the application process, and the terms for compliance. The Decree aims to boost the integration of renewable energy into Hungary's electricity grid, contribute to the country's climate goals, and enhance the sustainability of the energy sector. It aligns with EU directives on renewable energy and reflects Hungary's commitment to increasing the share of renewables in its energy mix.	The Decree directs investments to lowering the GHG emissions in energy sector.
Government Decree 253 of 1997 on National Urban Planning and Building Requirements	Enacted	This regulation outlines the standards for land use, spatial development, and building practices to ensure organized and sustainable urban growth. It includes provisions for zoning, architectural design, and infrastructure development, aiming to harmonize construction activities with environmental and community needs. The Decree provides a framework for municipalities to develop and enforce local planning regulations, ensuring consistency with national requirements. Its goal is to promote orderly development, enhance liveability, and address environmental impacts in urban areas.	The Decree directs investments to lowering the GHG emissions in building sector.
Municipal regulations			
Municipal Decree 92/2011.(XII. 30.) of the General Assembly of the Municipality of Budapest on the regulation of freight traffic in the administrative area of Budapest	Enacted	Budapest regulates access to different parts of the city. There are 11 protected zones and 15 restricted zones in Budapest. Protected zones are historical sites or recreational green sites with no vehicular traffic at all (regulated by Municipal Decree 30/2010). Restricted zones are certain parts of the city where heavy duty vehicles need an entry permit to	The regulation directs investments to lowering the GHG emissions in the transport sector.

		enter. The cost of the permit depends on their total weight and vehicle emissions.	
Municipal Decree 31/2013 (IV. 18.) of the General Assembly of the Municipality of Budapest on the conditions of operation of the passenger taxi service and the service mediating and organising the passenger taxi service, on the order of the establishment and use of taxi stations and on the official price of the passenger taxi service	Enacted	Passenger taxi services can be operated with a car of at least 55 kW and EURO 5 environmental rating. In the case of factory hybrid passenger cars, the total power of all propulsion engines must be taken into account. As from 1 January 2024, only (a) passenger cars with a power of at least 55 kW and an environmental performance class EURO 6 or higher; or (b) fully electric passenger cars may be put into service as new taxis.	The regulation directs investments to lowering the GHG emissions in the transport sector.
Municipal Decree 30/2010 (VI.4.) of the General Assembly of Budapest on the uniform establishment of the vehicle waiting regime in the administrative area of the Capital of Budapest, on the waiting fee and on the regulation of the storage of out-of-service vehicles.	Partly enacted	Parking permits and subsidies for residents vary by district but there are good examples of districts implementing stricter parking regulations. These measures include abolishing free parking for residents and limiting the number of cars a household can park within the district.	The regulation can directly raise capital for environmentally sustainable projects
Municipal Decree 69/2008 (XII. 10.) of the General Assembly of Budapest on the Smog Alert Plan of the Capital	Enacted	The regulation stipulates that if the short-term air pollution levels pose risks to the population, immediate restrictive measures may be enacted, including restricting the traffic of the most polluting vehicles.	The regulation provides unfavourable conditions for the most polluting cars, discouraging their use.
Green budgeting	Under development	The Municipality is developing a green budget. The first version only serves the purpose of historically determining how much of the Municipality's and its companies' spending can be considered environmentally sustainable. However, later iterations will integrate green budgeting into the planning phase of the annual budget as well, with the aim of aiding and influencing fund allocation decisions.	Green budgeting will facilitate the tracking and support of green investments.

Urban planning instruments	Enacted	Urban planning instruments such as the Urban Structural Plan (Zoning Plan), Budapest Planning Regulations (Land-use Regulation), Building Regulations for the Danube Bank, Building Regulations for the City Park, the City Image Manual (TAK) and Regulation (TKR) all integrate environmental protection aspects.	The planning instruments provide favourable conditions for sustainable urban living encompassing all sectors.

3.2 Module IP-C2: Identification and Mitigation of Risks

Unexpected or uncertain events in both the external and internal environment have a significant impact on the implementation of any strategy or investment process. Therefore, risk management plans encompassing the identification, evaluation, and mitigation of threats, are critical components of the implementation plans in the strategic documents of the Municipality of Budapest.

The identification and assessment of potential risk factors are based on expert estimates, primarily drawing from the experiences of previous similar strategic plans and project-based developments. Threats affecting the implementation of these strategies are evaluated based on the likelihood of their occurrence and their magnitude of impact on execution. Due to unforeseen events (e.g., lately the coronavirus pandemic) and unexpected changes in the political or economic environment, the strategic documents of the Municipality of Budapest define risk management plans that incorporate conservative, pessimistic ex-ante estimates.

Risk management plans are revisited and adjusted as necessary whenever the strategic document is under review. Depending on the specific document, these intervals can be 1-2 years (e.g., the Sustainable Energy and Climate Action Plan 2030 of Budapest is updated every 2 years, and the Integrated Urban Development Strategy established an annual city report within its monitoring system). Additionally, the Department of Budget Planning and Supervision of the Municipality of Budapest continuously monitors and analyses emerging financial and funding risks linked to any financial activities of the city and initiates necessary mitigating measures.

Table 23 below outlines and analyses the risks identified in relation to the Climate Action Plan. The risk management plan associated with the framework below is based on four steps:

- Risk Identification
  - Behavioural risks of stakeholders
  - Regulatory and policy-related risks
  - External, macroeconomic, and market risks
  - Project-specific risks (technical, financial, coordination)
- Risk Assessment
  - Categorising risks based on the severity of their impact and probability of occurrence
  - Scenario analysis: modelling and evaluating the potential impacts in different future scenarios
- Risk Mitigation
  - Thorough planning and collaboration with concerned stakeholders
  - Diverse project portfolio

    - Adjusting the pace of implementation as necessary
- Continuity
    - Continuous project-level monitoring,
    - Review of monitoring indicators defined in Module IP-B2 (Chapter **Hiba! A hivatkozási forrás nem található.**)
    - Regular reporting

Despite the implementation of mitigation measures, certain risks cannot be prevented or entirely eliminated. For instance, the unpredictability of EU funding, political shifts in municipal administration, legislative changes, and macroeconomic fluctuations will persist as residual risks. Continuous monitoring and adaptive planning are essential to effectively manage these risks to ensure the achievement of project objectives.

Table 23 identifies potential risks, their magnitude, and a general mitigation plan to prevent risk escalation for each action identified in the Action Plan. Residual risks are not included in the table. In general, it can be said that risks within the Municipality's control (e.g. public transport, public space developments) are largely mitigable, while those outside the direct control of the city administration (e.g. renovations, electricity generation), tend to have more residual risks.

23. Table: Climate Investment Plan Risk Framework

Fields of Action	Sectoral Project	Risks Identified	Description of Risk	Likelihood of occurrence	Risk Priority	Mitigation of Risk
Transport	*Reduced motorized passenger transportation need*	Resistance to behavioural change	People's habits are difficult to change. There is a risk, residents will not opt out of motorized transportation.	High	High	Creating incentive schemes, awareness-raising programs
		Conflicting measures	Carbon mitigation actions such as developing public transport and promoting electric vehicles can conflict motorization reducing measures.	Medium	Medium	Coordinated planning to ensure measures complement each other, regular reviews and adjustments based on feedback
	Shift to public & non-motorized transport	Resistance to behavioural change	People's habits are difficult to change. There is a risk, residents will not opt out of motorized transportation.	High	High	Creating incentive schemes, awareness-raising programs
		Public opposition	Actions restricting individual motorization can lead to political risk.	Medium	High	Gradual implementation, participatory processes and tactical urbanism tools
	Increased carpooling	Resistance to behavioural change	Carpooling is a relatively novel phenomenon in Hungary. There is a risk it will not spread quickly enough.	Medium	Medium	Creating incentive schemes, awareness-raising programs, involve businesses through their commuting mobility plans
	Electrification of cars & motorcycles	Insufficient infrastructure	There is a risk that the pace of infrastructure development will not be sufficient to supply the growing number of electric vehicles	Medium	High	Accelerated development of charging infrastructure, incentives for private sector investment
	Electrification of buses	Insufficient infrastructure	There is a risk that the pace of infrastructure development will not be sufficient to supply the growing number of electric vehicles	High	High	Accelerated development of charging infrastructure, access to funds for trolley bus infrastructure developments, incentives for private sector investment
		Procurement risks	High initial costs and changes in government policies can impact the	Medium	Medium	Thoroughly prepared public procurement procedures, consultation with policymakers

			procurement process or operational viability			
	Optimized logistics	Insufficient infrastructure	Potential conflicts with existing urban infrastructure/utilities, which can delay the implementation of a sustainable city logistics policy framework	Medium	Medium	Comprehensive planning and coordination of infrastructure investment, utilizing smart logistics
		Private sector resistance	Businesses may not adopt the new policies due to lack of awareness, inconvenience, or potential financial drawbacks	Medium	Medium	Early engagement of stakeholders, awareness campaigns, clear enforcement strategies
	Electrification of trucks	Insufficient infrastructure	There is a risk that the pace of infrastructure development will not be sufficient to supply the growing number of electric vehicles	Medium	High	Accelerated development of charging infrastructure, incentives for private sector investment
		Private sector resistance	Private actors may oppose due to high investment costs and operational changes causing economic disadvantage	Medium	High	Active conversation with freight transport companies, collaboration opportunities, gradual changes in legislation
Buildings & Heating	*Building renovations (envelope)*	Gentrification of certain areas	Extensive renovations may lead to increased property values and rents, displacing lower-income residents	Medium	Medium	Inclusive planning processes, rent control measures, and affordable housing projects
		Labour and resource shortage	Big waves of renovations can lead to shortage of labour and resources	High	High	Supporting the consistent pace of renovations through a predictable incentive and policy framework
	New energy-efficient buildings	Construction delay	Delays in construction due to regulatory issues or bottlenecks in the supply chain	Medium	Medium	Monitoring supply chain stability, strong project management
	Efficient lighting & appliances	Construction delay	Delays in construction due to regulatory issues or bottlenecks in the supply chain	Medium	Medium	Monitoring supply chain stability, strong project management
	Decarbonizing heating generation	Construction delay	Delays in construction due to regulatory issues, lack of incentives or bottlenecks in the supply chain	Medium	Medium	Monitoring supply chain stability, strong project management
		Non-supportive legislation	Permitting for geothermal powerplants for district heating delayed by the central authorities	High	High	Increase communication with the authorities, active lobbying

Electricity	*Decarbonizing electricity generation*	Feasibility risks	Lack of storage facilities, market fluctuations, rapid technological advancements, stakeholder engagement, and construction delays impact the economic feasibility	Medium	Medium	Investment in scalable technologies, accelerate sustainable storage capacity implementation, tracking economic indicators, cooperation with private sector
		Implementation uncertainties	There are projects not under the control of the Municipality that have a considerable effect on the decarbonization of electricity generation such as the construction of the Paks II nuclear power plant	High	High	Close cooperation and dialogue with the national government
Waste	*Increased waste recycling*	Resistance to behavioural change	Although recycling is relatively accepted by the population, there is a risk that inconvenience, and perceived ineffectiveness diminish participation	Medium	Low	Creating incentive schemes, awareness-raising programs
City Wide Risks (Cross Cutting)		Unpredictable regulatory framework and lack of cooperation with the national level	Changing national regulations and funding policies make long-term reliance on grants or possibility to produce and/or use appropriate own budgetary sources difficult.	High	High	Close cooperation and dialogue with the national government and district municipalities
		Unpredictable EU funding	EU proceedings against Hungary could result in the persistent suspension of EU funding, reducing the number of projects that can be implemented.	High	High	Lobbying and the strengthening of diplomatic relations. Looking for alternative sources of funding
		Macroeconomic risks	High inflation, high energy prices and the unfavourable change in the exchange rate can all slow down or stop climate investments.	High	High	Building reserves, maintaining fiscal stability of the municipality and creating a contingency plan
		Changes in the political composition of the municipal administration	A considerable change in the political composition of the city administration can result in a change in strategic directions and the diversion of funds dedicated to climate protection interventions.	Medium	High	Broad cooperation, the adoption of a strategic document based on the needs of the residents and the development needs adopted by consensus
		Vis maior events	An unexpected, sudden event with a major impact (e.g. natural disaster, pandemic, terrorism) that significantly	Low	High	Building reserves and creating a contingency plan

		affects the budget of the Municipality and its organisations, thus reducing the funds available for strategic implementation			

3.3 Module IP-C3: Capacity Building and Stakeholder Engagement for Capital and Investment Planning

The climate neutrality strategy of the city, including its Investment Plan is developed and implemented by the Mission Group, a collaborative governance structure involving the Municipality, private and public companies, academia, and the civil sector. It is led by the Mission Team, a core group of people within the city administration solely responsible for managing the mission process. They establish the working modality, oversee, and coordinate the creation of the city's climate-neutral strategy, involve stakeholders, as well as support and facilitate the work of the Mission Group. In developing the Investment Plan, the team was actively supported by the Department of Finance and Accounting, and the Department of Budget Planning and Supervision, which help establish the Municipality' capacity to fund climate investments and explore new tools for capital deployment such as green budgeting. Nevertheless, it is important to mention that the Municipality has limited skills and capacities to create a comprehensive investment plan. While the city has previously costed its own projects before, it lacks experience in determining the total costs borne by other stakeholders. Moreover, the city has so far relied on its own funds, national and international grants, and loans to invest in climate-friendly solutions and has limited experience with alternative funding sources and models. Given the limited amounts of funds available to the Municipality, it would be essential that new funding opportunities are explored, and stakeholders are mobilized.

To build capacity internally, the Municipality of the City of Budapest intends to submit a project proposal for the recent Enabling City Transformation Call of NetZeroCities. In case of a successful application, the project would entail building the capacity and capabilities of the city government and associated local actors through training (e.g. e-learning), workshops, and other forms of learning.

Additionally, a green budget is being developed. A first version serves the purpose of historically determining how much of the Municipality's and its companies' spending can be considered environmentally sustainable. Later iterations will attempt to integrate green budgeting into the planning phase of the annual budget with the aim of aiding and influencing fund allocation decisions. Moreover, the Municipality will also facilitate the exploration of alternative funding mechanisms through the Budapest Climate Agency. The Agency primarily focuses on facilitating residential retrofitting, but the funding schemes they develop could be applied to other areas as well.

To build capacity externally, especially for financial actors, workshops are held for the Mission Group to allow for knowledge and capacity sharing. Connecting different actors is important to accelerate the spread of new environmentally sustainable technologies and to avoid working is silos. Workshops have so far been held for 18 medium- and large companies (both public and private) and will continue to expand to reach as many actors in the city as possible. These workshops are also key for the city to recruit companies for the Mission Group and develop a closer relationship with them. Through the workshops overlaps between the municipality and companies' actions, therefore main areas of cooperation were identified. Personal meetings had been organised with each company to clarify the cooperation framework. Table 24 contains the companies - and main cooperation areas - the municipality established contact with. With each company, the Municipality of Budapest is planning to sign a Memorandum of Understanding (MoU) to establish the framework for the cooperation. The listed companies are interested and motivated to implement and support projects to achieve decarbonisation targets within and beyond their main fields of action, aligned with their sustainability strategies.

As for residents, and non-financial stakeholders, incentive schemes have been and are being developed to support capital deployment. Most notably, public transport in the city is heavily subsidized for the elderly, children under 14, students and people with disabilities. Moreover, a funding scheme for residential building retrofitting is being developed as part of the Budapest CARES project and coordinated by the Budapest Climate Agency. The Municipality can also engage stakeholders and

encourage green investments without bearing significant costs. For example, the city has negotiated with real estate developers to incorporate additional green investments at their building sites in return for the relaxation of certain building restrictions or requirements. These initiatives and other incentive schemes are vital in facilitating capital deployment by non-financial actors.

The Municipality of Budapest aims to establish long-term and mutually beneficial cooperation with private stakeholders, especially with large- and medium sized companies. The Mission Team with the help of Budapest Global have already engaged some companies and made progress in facilitating cooperation to promote circular economy and improved waste management, and to upscale e-mobility and city logistics solutions. Future iterations must be made with a wider range of companies to utilize synergies between the climate protection activities of the capital city and companies, to identify further areas of cooperation and to promote collaboration between companies. The Municipality aims to strengthen the involvement of the Budapest Global NGO, and to open new platforms - such as events, newsletters, etc - to ensure the long-term engagement and involvement of private stakeholders. In Table 24. current pipeline of cooperation initiative with business is presented. Table 25 presents the current resources mobilized by the Municipality of Budapest available to citizens and NGOs.

24. Table: Stakeholder Engagement Mapping

Stakeholders involved	Required Investment Total (€) – as given by the economic model	Network	Influence	Interest	Level and Type of Engagement
European Investment Bank	2 881m	Lending organisations	Influence on the loans issued for climate-protection measures.	Investing in technologies and projects that will be an integral part of the future.	The Municipality has a framework agreement with the EIB.
Commercial banks		Lending organisations	Influence on the funding of projects and the loans issued for climate-protection measures.	Investing in technologies and projects that will be an integral part of the future.	Commercial banks have provided loans for: development of cycle paths, pedestrian crossings, energy modernization of institutional buildings, and the renewal of the M3 metro line rolling stock
E. ON Hungária		Budapest global private companies	Investing in environmentally sustainable projects – influence in electromobility	Interest in the widespread adoption of electromobility and uptake of EVs, and utilisation of sustainable energy	The MoU is being concluded, management decision is

			and energy distribution and production	solutions and decarbonizing and offsetting its own emissions	made 2024 autumn.
ALTEO Group		Budapest local private companies	Investing in environmentally sustainable projects – influence on electromobility and energy production, storage	Interest in sustainable energy solutions in relation to energy production, storage and trade. Additionally, interest in the widespread adoption of electromobility, uptake of EVs, waste management and decarbonizing and offsetting its own emissions	The MoU is signed.
WIGO		Budapest private companies	Investing in environmentally sustainable projects – influence on electromobility	Interest in the uptake of sharing economy - widespread adoption of car-sharing services, electromobility and uptake of EVs, and decarbonizing and offsetting its own emissions	The MoU is signed.
Waberer's		Budapest private companies	Investing in environmentally sustainable projects – influence on logistics	Interest in providing sustainable logistics services using the latest technologies.	Potential areas of cooperation are currently being explored.
MOL		Budapest local private companies	Investing in environmentally sustainable projects	Decarbonizing and offsetting its own emissions	The company is the sponsor of the city's public bike sharing system Negotiation on MoU will start 2024 autumn
K&H Bank LLC.		Budapest global private companies	Investing in environmentally sustainable projects – influence on finance and lending, built environment, green infrastructure and	Interest in promoting retail lending to facilitate energy efficiency improvements in among residents. Interest in investing in environmental and social development projects.	The MoU is being concluded as the points of agreement are finalised.

			social development.	Decarbonizing and offsetting its own emissions through improved energy efficiency and uptake of sustainable mobility among employees.	
Magnet Bank		Budapest private companies	Investing in environmentally sustainable projects, influence on finance, lending, and investment	Interest in developing green financial products, responsible investments, improving consumer awareness, investing in community development and environmental development projects.	The MoU is being concluded as the points of agreement are finalised.
Telekom		Budapest global private companies	Investing in environmentally sustainable projects, influence on circular economy and digitisation	Interest in promoting sustainable development through digitisation. Decarbonizing and offsetting its own emissions in relation to energy efficiency improvements, investing in environmental and social development projects.	Potential areas of cooperation are currently being explored.
IKEA		Budapest global private companies	Investing in environmentally sustainable projects, influence on circular economy, retail and logistics.	Interest in promoting circular economy: improving sustainability of production and use of sustainable raw materials, increasing product life cycle. Decarbonizing and offsetting its own emissions through improved energy efficiency, waste management and mobility. Decreased resource use and measures for climate adaptation.	The MoU is being concluded under signature.
Nestlé		Budapest global private companies	Investing in environmentally sustainable projects, investing in circular economy and	Interest in promoting circular economy, improving consumer awareness, and investing in	The MoU is signed.

			sustainable manufacturing solutions.	environmental protection projects. Decarbonizing its own emissions within its production – improvements in resource use, energy efficiency, logistics and waste management.	
Gedeon Richter Plc.		Budapest private companies	Investing in environmentally sustainable projects to decrease ecological footprint of pharmaceutical manufacturing.	Interest in investing in projects to decrease environmental impact of production – decreased resource use, improved manufacturing and waste management. Interest in supporting environmental protection investments.	The MoU is being concluded as the points of agreement are finalised.
Colliers		Budapest global private companies	Investing in environmentally sustainable projects in relation to the built environment.	Interest in promoting sustainable building practices and environmentally friendly technologies. Decarbonizing and offsetting its own emissions – sustainable mobility and investment in GI development projects.	The MoU is being concluded as the points of agreement are finalised.
Kinnarps		Budapest global private companies	Investing in environmentally sustainable projects, influence on circular economy and sustainable furniture production.	Interest in promoting circular economy and manufacturing more sustainable products through improved life cycle, sustainable materials, and consumer awareness.	The MoU is being concluded as the points of agreement are finalised.
Graphisoft Park SE		Budapest local private companies	Investing in environmentally sustainable projects in relation to the built environment – real estate development and management.	Interest in improving environmental sustainability of real estate management – improved energy efficiency and production, protection, and development of green infrastructure.	The MoU is being concluded as the points of agreement are finalised.
CPI Group			Investing in environmentally sustainable	Interest in improving environmental sustainability of real	The MoU is being finalized as we conclude

			projects in relation to the built environment – real estate development and management.	estate management – improved energy efficiency and production, protection, and development of green infrastructure.	the points of agreement.
KÉSZ Group			Investing in environmentally sustainable projects in relation to the built environment – real estate development and management.	Interest in promoting sustainable building practices, environmentally friendly technologies, and circular economy. Decarbonizing and offsetting its own emissions through sustainable mobility, improved energy efficiency, investments in GI development projects.	The MoU is being concluded as the points of agreement are finalised.

25. Table: Stakeholder Activity Cost

Stakeholders involved	Activity	Cost to Municipality (€)
Citizens	Public transport free for people under 14 and over 65 and subsidized for students and people with disability	Because no registration is required for transport, the number of people using public transport for free is unknown. The tariff system has also changed from March 1st 2024, whereby people can use the subsidized Pest county pass in Budapest as well. The pass is, however, issued by MÁV, the national railway company, not Budapest.
Citizens	Grant for the retrofitting of residential homes	2,5b HUF / 6,5m EUR
Citizens	Free parking for vehicles with green license plates[24]	Because of the different parking zones and fares, the cost cannot be determined
Citizens	Participatory budgeting: Green Budapest category	120m HUF/ 311k EUR per year
Citizens	Awareness-raising campaigns	100m HUF / 259k EUR
Citizens	Facade greening grant	50m HUF/ 130k EUR per year

[24] From 1 September 2024, only fully electric and zero-emission cars will be eligible for green licence plates. The green licence plates previously issued for hybrid electric vehicles will be replaced by white ones.

Citizens	Courtyard greening grant, aimed at encouraging the greening of downtown buildings	30m HUF/ 78k EUR per year
Civil organizations	Budapest Environmental Protection Fund	28m HUF / 73k EUR per year
Citizens	Condominium green space grant	22m HUF / 57k EUR per year
Citizens Real estate developers	Negotiation with real estate developers to incorporate additional green investments (e.g. solar panels, cycle lanes, green space) at their building sites in return for the relaxation of certain building restrictions or requirements	The exact cost of the activity is hard to determine. The salaries of dedicated teams working on stakeholder engagement can be considered related costs.
Civil organizations	Climate protection working group for civil organizations	The exact cost of the activity is hard to determine. The salaries of dedicated teams working on stakeholder engagement can be considered related costs.