eeef
EUROPEAN ENERGY
EFFICIENCY FUND

THE EUROPEAN ENERGY EFFICIENCY FUND

ADVANCING SUSTAINABLE ENERGY FOR EUROPE

IMPACT REPORT 2022

FOREWORD FROM GIORGIO CHIARION CASONI, CHAIRMAN OF THE BOARD OF DIRECTORS

Dear Reader,
A global energy crisis once again shows that governments need to take urgent action to increase energy efficiency and accelerate sustainable investments to reduce carbon dependence and drive the energy transition. While the IEA's latest 2022 Market Report indicates that the global economy is using energy 2% more efficiently than last year, still this is not enough and much remains to be done.

Since its launch in 2011, the eeef has been involved in raising awareness of energy efficiency across Europe, launching investment programmes with public authorities to modernise public infrastructure and providing funding to implement these programmes.

In 2022, in line with the Private-Public Partnership model, eeef welcomed two new private investors contributing around 100 million euros in senior shares to the Fund: a global insurance company and a corporate pension fund. New capital inflow marks an important milestone for the further growth of the eeef. It also underlines the importance of innovative public-private partnerships, promoted by the European Commission with the goal of contributing to climate change mitigation and making European cities and regions more sustainable.

By focusing on smaller to medium-sized investments, eeef offers market-based financing to commercially viable energy efficiency infrastructure and renewable energy projects within the public sector. During 2022, the Fund signed two forfaiting agreements for around 30 million euros in total. One project will finance the renovation of public street lighting and buildings, while the other addresses the energy efficiency upgrade and adjacent energy supply of public buildings. Both projects will immediately benefit from lower energy costs and CO_2 footprint after the implementation of the investment programme. The objective is to enable a substantial reduction of energy consumption while provide better comfort to final beneficiaries.

Following the successful completion of the first collaborative project with the European Investment Bank (EIB) under the eeef's Technical Assistance Facility (TAF) programme, eeef TAF continues its activities with European cities and regions to develop energy efficiency, public transport and renewable energy investments in line with the EU Taxonomy. In 2022, the eeef TAF signed two TA Agreements with the city of Sestao in Spain and the city municipality of Daugavpils in Latvia.

The eeef TAF aims to bridge the gap between sustainable energy plans and concrete investments through supporting all activities necessary to prepare investments into sustainable energy projects. The objective of the eeef TA is to enhance energy efficiency and create energy communities in the city by providing integral upgrades to municipal sites, modernising street lighting using LED technology, developing energy communities with solar PV systems, an e-mobility program and charging stations, and a digital platform.

To intensify the eeef's growth trajectory and strengthen its position as a major player in promoting sustainable energy in Europe, the Fund continues to support public authorities in breaking down the barriers they face when trying to increase the number of sustainable energy projects within their regions and cities. The eeef will keep expanding its project pipeline by focusing more on new countries, and by continuing its Technical Assistance Facility.

We will continue to put eeef at the service of the European energy transition. With its innovative combination of public and private financial resources, the Fund is a key player in supporting energy efficiency investments in Europe, which are increasingly necessary at this crucial time.

Giorgio Chiarion Casoni
Chairman of the Board of Directors
Director, InvestEU and financial institutions
European Commission

TABLE OF CONTENTS

HIGHLIGHTS 2022

230 million euros raised from investors

671,199 tonnes of carbon dioxide equivalents, cumulative carbon savings from Fund inception to Q4 2022

1,039,495 megawatt hours cumulative primary energy savings from Fund inception to Q4 2022

162 million euros currently committed to projects

53 public authorities benefited from the eeef's investments since the Fund's inception

197 million euros committed by the eeef since inception

17 active investments in 8 Member States and the UK

2 matured investments

10 eeef TAF projects in 4 Member States

EEEF'S INVESTMENT ACTIVITY REPORT

CARDENDEN, SCOTLAND, THE UNITED KINGDOM

€ 2.2 m senior debt facility to the Ore Valley Housing Association via the SPV Cardenden Heat and Power

ORLÉANS, FRANCE

€ 5.1 m shareholder loan and equity investment for the city of Orléans' CHP plant

RENNES, FRANCE

€ 6.9 m shareholder loan and equity investment for the city of Rennes' CHP plant

MADRID, SPAIN

€ 2.5 m forfaiting facility to the Universidad Politécnica de Madrid via Enertika

SANTANDER, SPAIN

€ 9.2 m forfaiting facility to the city of Santander to upgrade existing street lighting

GIJÓN, SPAIN

€ 19.5 m forfaiting facility to Gijón via Acciona ESCO to renovate lighting points on public streets and buildings

ALENTEJO REGION, PORTUGAL

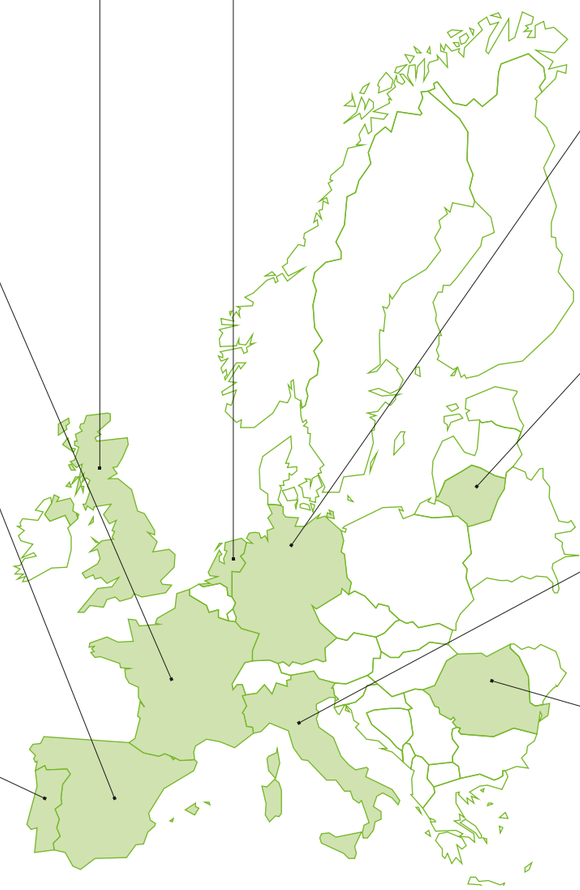
€ 12.1 m forfaiting facility to CIMAC via Alentejo Central Smartlight to upgrade existing street lighting

VILA DO CONDE, PORTUGAL

€ 5.1 m forfaiting facility to Vila do Conde via the Consortium ISETE/AMENER/I-TRES to upgrade existing street lighting

VENLO, THE NETHERLANDS

€ 8.5 m senior debt facility to the city of Venlo for smart public lighting



BERLIN, GERMANY

€ 0.9 m forfaiting facility to the Jewish Museum Berlin Foundation via the ESCO of Johnson Controls

MUNICH, GERMANY

€ 0.6 m forfaiting facility to the University of Applied Sciences via the ESCO of Johnson Controls

KLAIPEDA, LITHUANIA

€ 4.9 m shareholder loan and equity investment in the JV "Dancer Mobility" with Lithuanian electric bus manufacturer UAB "Vejo projektai"

VILNIUS, LITHUANIA

€ 10 m equity investment in the investment platform TIPS with the Public Investment Development Agency VIPA

BOLOGNA, ITALY

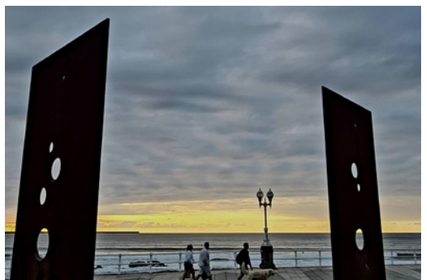
€ 30.2 m senior debt and VAT facility to Progetto ISOM for the upgrade of the University Hospital Sant'Orsola-Malpighi

ROZZANO, NOGARA AND CONCORDIA SAGITTARIA, ITALY

€ 8.7 m shareholder loan and equity investment in the JV Illuminated Cities with Siram by Veolia for a portfolio of investments

CLUJ-NAPOCA, BUCHAREST, MAGURELE, ALBA IULIA

€ 25 m subordinated loan to Banca Transilvania for on-lending into energy efficiency and renewable energy projects



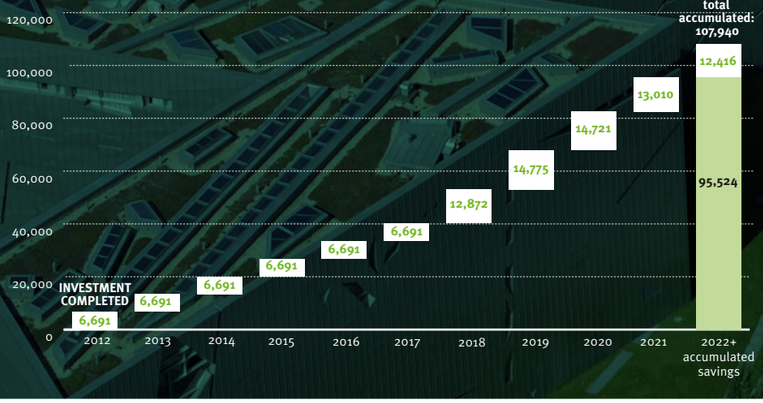
GERMANY

JEWISH MUSEUM BERLIN

The Jewish Museum Berlin and the energy service company (ESCO) Johnson Controls entered into an energy performance contract (EPC) for the museum to provide optimisation of the heating, ventilation and air conditioning and an efficient energy management system. The eeef's investment totalled EUR 0.9 m in the form of a forfaiting facility. The annual primary energy savings for 2022 equated to 12,416 MWh.

Annual Carbon Emission Savings (tCO_2e)

Annual Primary Energy Savings (MWh)



KEY FIGURES

TYPE OF INVESTMENT:

FORFAITING FACILITY

MATURITY:

13 YEARS

TOTAL PROJECT SIZE (€M):

1.4

ACTUAL T CO_2E EMISSION SAVINGS IN 2022:

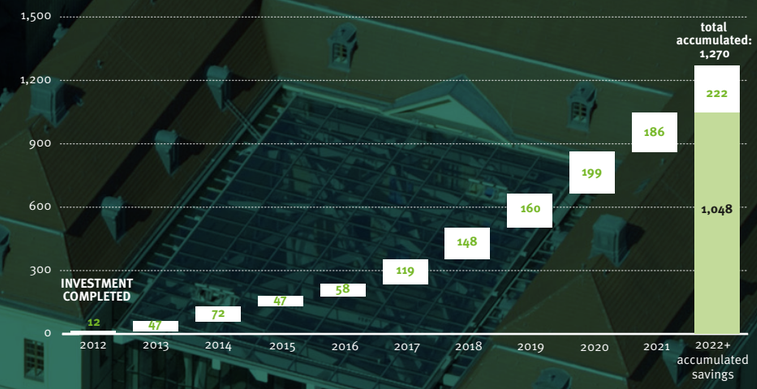
2,811

GERMANY

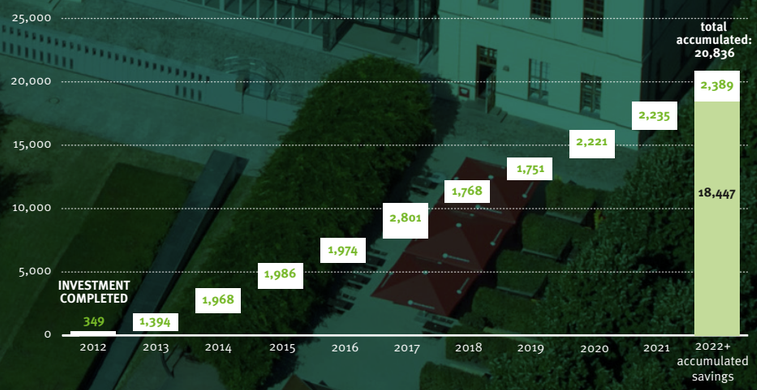
UNIVERSITY OF APPLIED SCIENCES MUNICH

The University of Applied Sciences Munich and the energy service company (ESCO) Johnson Controls entered into an energy performance contract (EPC) to provide a series of energy efficiency measures in the university, such as optimisation of the heating, lighting, metering, building management and pumping systems, as well as the installation of a 49.5 kW combined heat and power (CHP) plant. The eeef invested EUR 0.6 m in the project.

Annual Carbon Emission Savings (tCO_2e)



Annual Primary Energy Savings (MWh)



KEY FIGURES

TYPE OF INVESTMENT:

FORFAITING FACILITY

MATURITY:

10 YEARS

TOTAL PROJECT SIZE (€M):

1.1

ACTUAL T CO_2E EMISSION SAVINGS IN 2022:

222

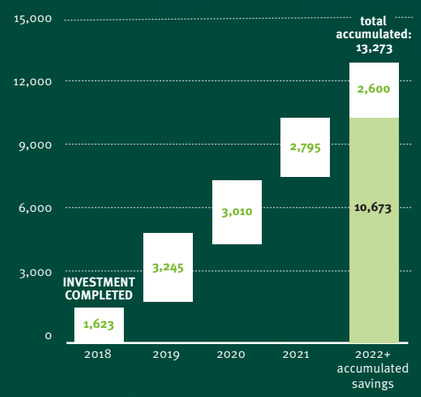
ENERGY EFFICIENCY

ITALY

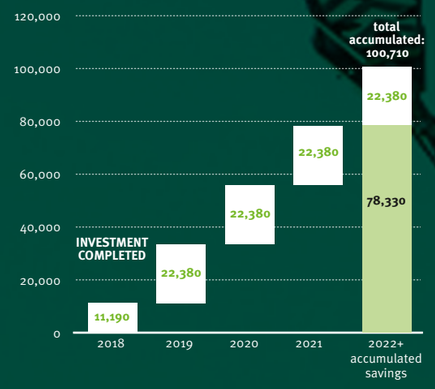
ILLUMINATED CITIES

The Città Illuminate S.r.l. (Illuminated Cities) is a Joint Venture (JV) between the eeef and Siram by Veolia, targeting a portfolio of street lighting projects in Italy, mainly benefitting small to medium-sized municipalities. The JV realised three projects in the Municipalities of Rozzano, Nogara and Concordia Sagittaria, in the provinces of Milano, Verona Venice, respectively. These projects will enhance public infrastructure whilst reducing public energy consumption. The eeef's investment totalled EUR 8.7 m via equity and shareholder loan.

Annual Carbon Emission Savings (tCO_2e)



Annual Primary Energy Savings (MWh)



KEY FIGURES

TYPE OF INVESTMENT:

EQUITY AND SHAREHOLDER LOAN

MATURITY:

12 YEARS

TOTAL PROJECT SIZE (€M):

10

ESTIMATED tCO_2E EMISSION SAVINGS IN 2022:

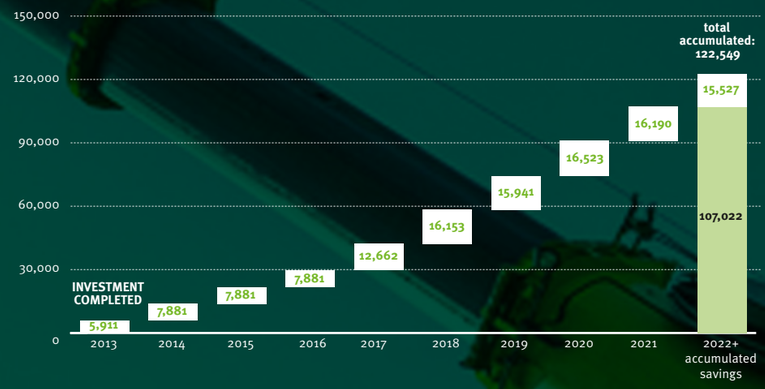
2,600

ITALY

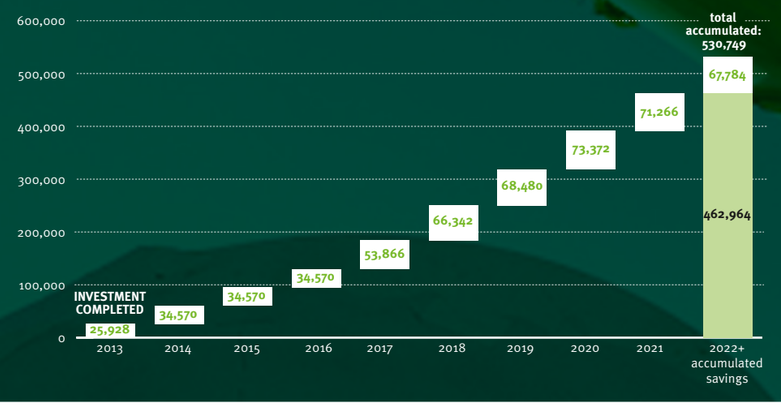
UNIVERSITY HOSPITAL SANT'ORSOLA-MALPIGHI

The project entity, Progetto ISOM (SPV), signed a concession agreement with the University Hospital. eeef provided a project and VAT bond facility of EUR 30.2 m. The initiatives are intended to improve the energy efficiency of the entire fluid production, distribution system and reduce energy consumption of the hospital facility through the adoption of energy-efficient equipment such as centrifugal chillers and absorbers, the reconstruction of the heat distribution networks, the renovation of heat exchange substations and the inclusion of an underground tri-generation plant for the combined production of cooling, heat and power.

Annual Carbon Emission Savings (tCO_2e)



Annual Primary Energy Savings (MWh)



KEY FIGURES

TYPE OF INVESTMENT:

SENIOR DEBT AND VAT FACILITY

MATURITY:

20 YEARS

TOTAL PROJECT SIZE (€M):

41

ACTUAL tCO_2E EMISSION SAVINGS IN 2022:

15,527

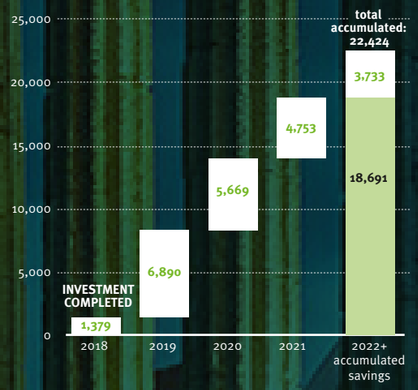
ENERGY EFFICIENCY

PORTUGAL

CIMAC

The eeef signed the 12-year forfaiting facility of EUR 12.1 m with I-Quatro LDA (ESCO) to implement the aggregated street lighting infrastructure transaction, with the mission to upgrade over 56,000 luminaires within 14 municipalities, including the UNESCO World Heritage site of Évora, represented by Comunidade Intermunicipal do Alentejo Central (CIMAC).

Annual Carbon Emission Savings (tCO_2e)



Annual Primary Energy Savings (MWh)

KEY FIGURES

TYPE OF INVESTMENT:

FORFAITING FACILITY

MATURITY:

12 YEARS

TOTAL PROJECT SIZE (€M):

16.6

ACTUAL T CO_2E EMISSION SAVINGS IN 2022:

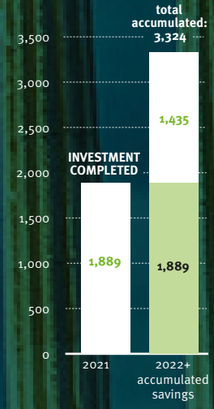
3,733

PORTUGAL

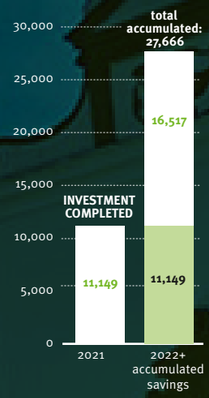
VILA DO CONDE

eeef signed the 12-year forfaiting facility of EUR 5.1 million with the consortium ISETE/AMENER/I-TRES (ESCO) to finance renovation of the street lighting infrastructure in the municipality of Vila do Conde in Portugal. The project completed the replacement of 18,547 sodium vapour lamps with energy-efficient LED luminaires throughout Vila do Conde.

Annual Carbon Emission Savings (tCO_2e)



Annual Primary Energy Savings (MWh)



KEY FIGURES

TYPE OF INVESTMENT:

FORFAITING FACILITY

MATURITY:

12 YEARS

TOTAL PROJECT SIZE (€M):

7.7

ESTIMATED T CO_2E EMISSION SAVINGS IN 2022:

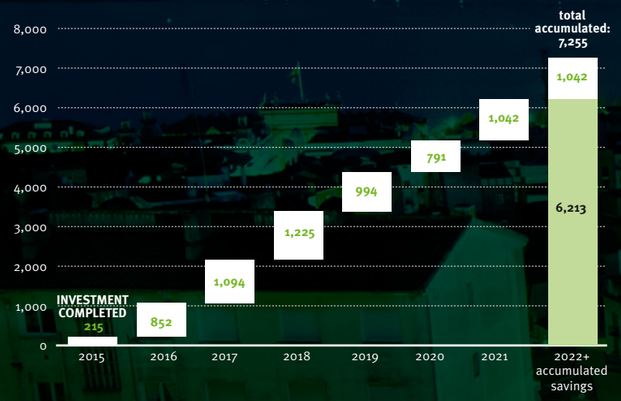
1,435

SPAIN

UNIVERSIDAD POLITÉCNICA DE MADRID

eeef provided financing of EUR 2.5 million for the replacement of existing oil boilers supplying hot water and heating to the Universidad Politécnica of Madrid ("UPM"). The project aimed to improve the heat and water supply systems across the campus and to reduce CO_2e emissions by switching to a cleaner fuel source. It replaced 63 gas oil boilers, consuming on average of 946,479 litres of gas oil per year, with 66 natural gas boilers in all 32 campus buildings.

Annual Carbon Emission Savings (tCO_2e)



Annual Primary Energy Savings (MWh)

KEY FIGURES

TYPE OF INVESTMENT:

FORFAITING FACILITY

MATURITY:

9 YEARS

TOTAL PROJECT SIZE (€M):

2.5

ESTIMATED TCO_2E EMISSION SAVINGS IN 2022:

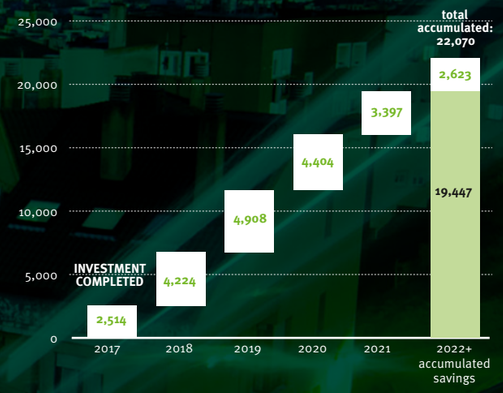
1,042

SPAIN

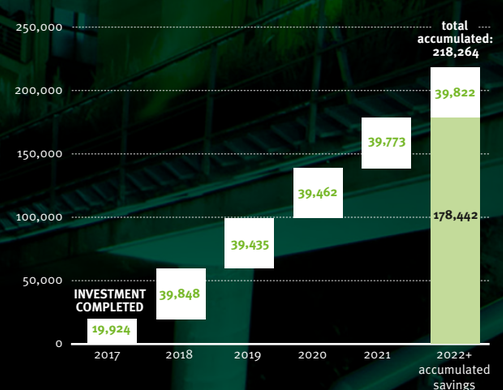
MUNICIPALITY OF SANTANDER

The project consists of the upgrade of the existing street lighting luminaires from predominantly high-pressure sodium vapour lamps to the last generation PHILIPS LEDs. 22 300 units of lighting points were replaced. A system of UVEX wireless sensors connects the whole infrastructure point by point with the city's digital communication network and the remote CEMILUX control system. The eeef provided a forfaiting facility with EUR 9.2 million to finance the project.

Annual Carbon Emission Savings (tCO_2e)



Annual Primary Energy Savings (MWh)



KEY FIGURES

TYPE OF INVESTMENT:

FORFAITING FACILITY

MATURITY:

14 YEARS

TOTAL PROJECT SIZE (€M):

9.2

ACTUAL TCO_2E EMISSION SAVINGS IN 2022:

2,623

SPAIN

GIJÓN

eeef and Acciona ESCO S.L. signed a forfaiting facility of € 19.5 million with a term of 11 years to finance the renovation of lighting points on public streets and buildings in the Municipality of Gijón, Spain, in alignment with a prepared investment programme within the eeef Technical Assistance Facility. The project involves the replacement of 42,000 luminaires on streetlights and in public buildings.

As per conservative estimates, the project is expected to deliver at least 48.02% in primary energy and CO_2 savings annually compared to the current baseline, representing 37,005 MWh and 2,446 tCO_2e, respectively.

KEY FIGURES

TYPE OF INVESTMENT:

FORFAITING FACILITY

MATURITY:

11 YEARS

TOTAL PROJECT SIZE (€M):

23.6

ESTIMATED TCO_2E EMISSION SAVINGS IN 2022:

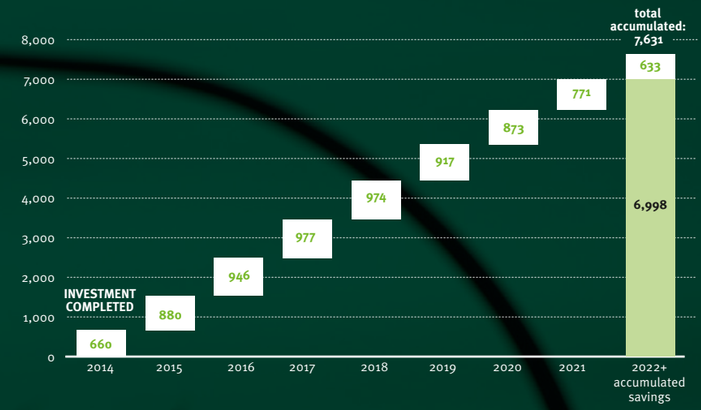
2,446

THE NETHERLANDS

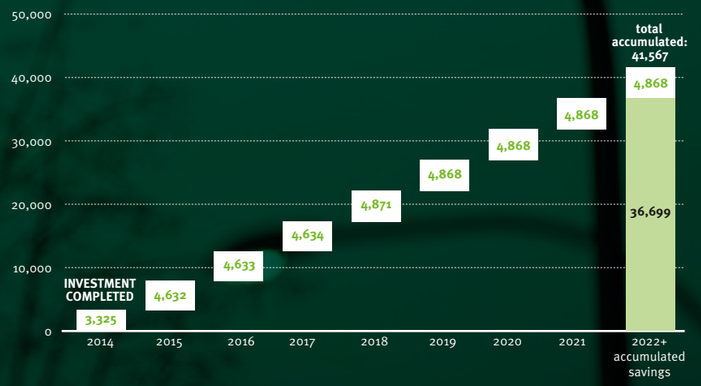
CITY OF VENLO

The city of Venlo and the eeef signed a long-term financing contract for EUR 8.5 m. The project upgrades the city's upgrading street lighting to reduce energy consumption and CO_2e emissions, as well as saving the public budget, as the city's existing public lighting was the largest energy consumer in its electricity bill. In total, 1,674 lighting poles were replaced and 17,270 luminaires were exchanged with LED technology.

Annual Carbon Emission Savings (tCO_2e)



Annual Primary Energy Savings (MWh)



KEY FIGURES

TYPE OF INVESTMENT:

SENIOR DEBT

MATURITY:

15 YEARS

TOTAL PROJECT SIZE (€M):

8.6

ACTUAL TCO_2E EMISSION SAVINGS IN 2022:

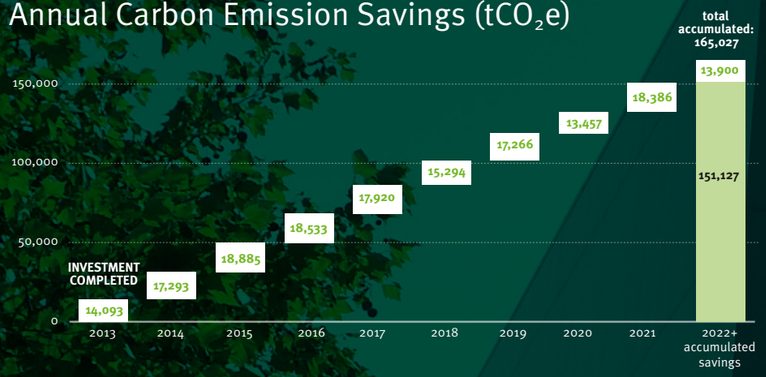
633

FRANCE

CITY OF ORLÉANS

Dalkia France and eeef invested in the Orléans Biomasse Énergie, the project's special purpose vehicle (SPV), which operates a combined heat and power (CHP) plant with an installed capacity of 7.5 MW in electricity and 17 MW in thermal heat. The plant supplies heat to the city of Orléans and sells electricity to Électricité de France (EDF). The project enables a decentralised energy supply for the City of Orléans using an existing district heating network. The Fund invested EUR 5.1 million in the SPV.

Annual Carbon Emission Savings (tCO_2e)



Annual Primary Energy Savings (MWh)

KEY FIGURES

TYPE OF INVESTMENT:

EQUITY AND SHAREHOLDER LOAN

MATURITY:

19 YEARS

TOTAL PROJECT SIZE (€M):

36.0

ACTUAL T CO_2E EMISSION SAVINGS IN 2022:

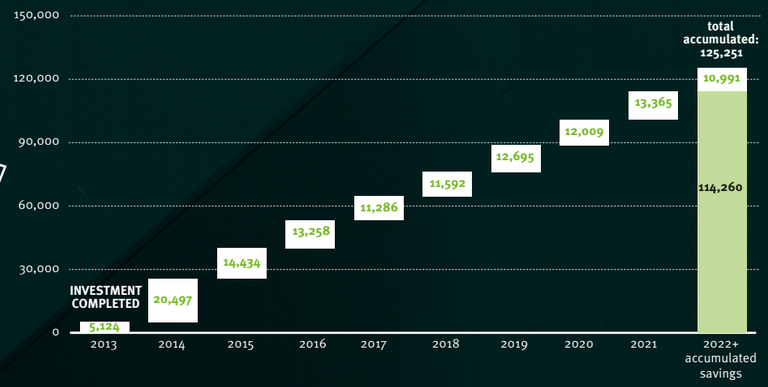
13,900

FRANCE

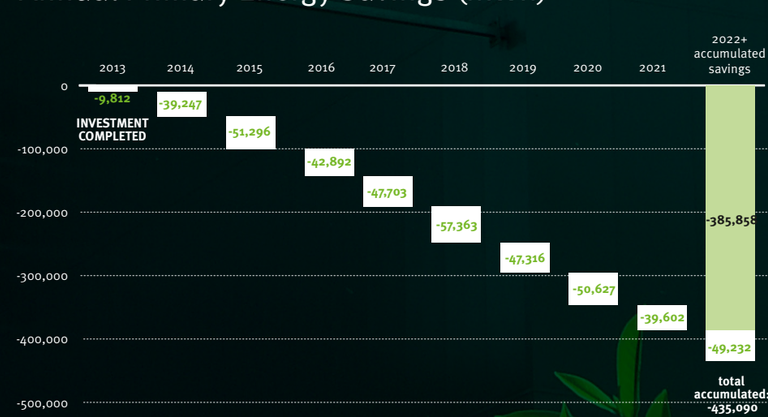
CITY OF RENNES

Dalkia France and eeef invested in the Rennes Biomasse Énergie, the project's SPV, which operates a CHP facility with an electrical output of 10.4 MW and a thermal output of 22 MW over 20 years. The project enables a decentralised energy supply for the City of Rennes using an existing district network. The Fund invested EUR 6.9 million in the SPV.

Annual Carbon Emission Savings (tCO_2e)



Annual Primary Energy Savings (MWh)



KEY FIGURES

TYPE OF INVESTMENT:

EQUITY AND SHAREHOLDER LOAN

MATURITY:

20 YEARS

TOTAL PROJECT SIZE (€M):

47.6

ACTUAL T CO_2E EMISSION SAVINGS IN 2022:

10,991

LITHUANIA

DANCER MOBILITY

eeef and UAB “Vejo Projektai”, a Lithuanian manufacturer of electric buses, established a Joint Venture “Dancer Mobility” to provide all-inclusive operational lease services of electric buses manufactured in Lithuania to public authorities. Dancer Mobility will finance the purchase of e-buses and their operation in the framework of all-inclusive operational leases provided by the company to public authorities and covering the bus usage, charging infrastructure, green energy supply and full maintenance. The eeef investment totalled EUR 4.9 million.

Annual Carbon Emission Savings (tCO_2e)

Annual Primary Energy Savings (MWh)

KEY FIGURES

TYPE OF INVESTMENT:

EQUITY AND SHAREHOLDER LOAN

MATURITY:

UP TO 10 YEARS

TOTAL PROJECT SIZE (€M):

6.2

ESTIMATED tCO_2E EMISSION SAVINGS IN 2022:

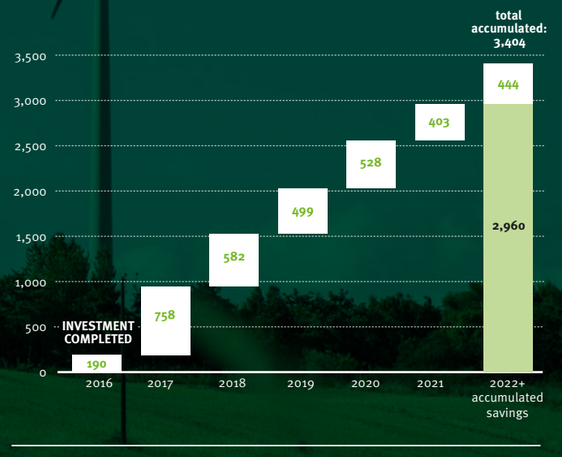
1,344

UNITED KINGDOM

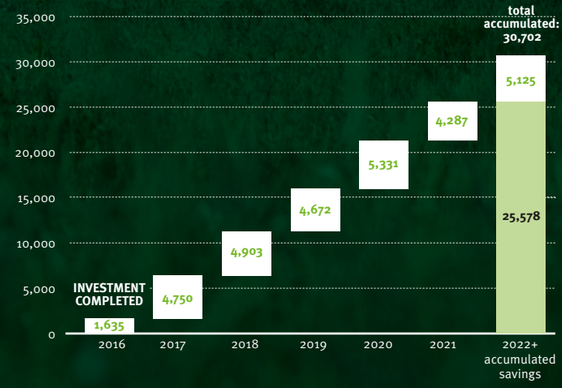
ORE VALLEY HOUSING ASSOCIATION

The eeef provided a loan of EUR 2.2 million to Cardenden Heat and Power (CHAP), a subsidiary of the Ore Valley Housing Association (OVHA), for the development of a project scope for an onshore wind turbine and the replacement of over 170 outdated gas boilers in residential buildings owned by the housing association in the Fife council area in Scotland. The boilers were leased to OVHA, and the wind plant benefits from the national Feed in Tariff.

Annual Carbon Emission Savings (tCO_2e)



Annual Primary Energy Savings (MWh)



KEY FIGURES

TYPE OF INVESTMENT:

SENIOR DEBT

MATURITY:

16 YEARS

TOTAL PROJECT SIZE (€M):

4.3

ACTUAL tCO_2E EMISSION SAVINGS IN 2022:

444

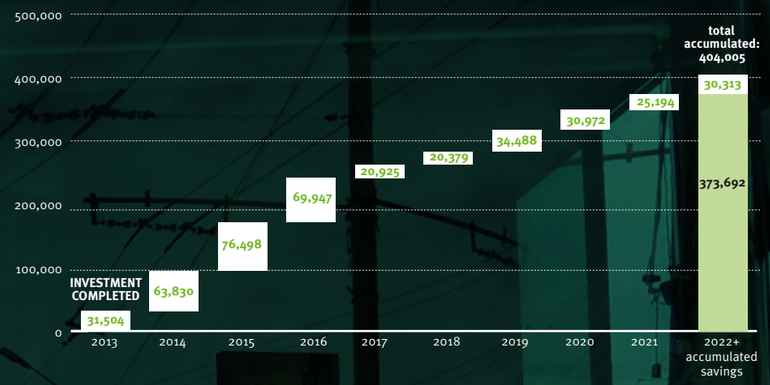
ROMANIA

BANCA TRANSILVANIA

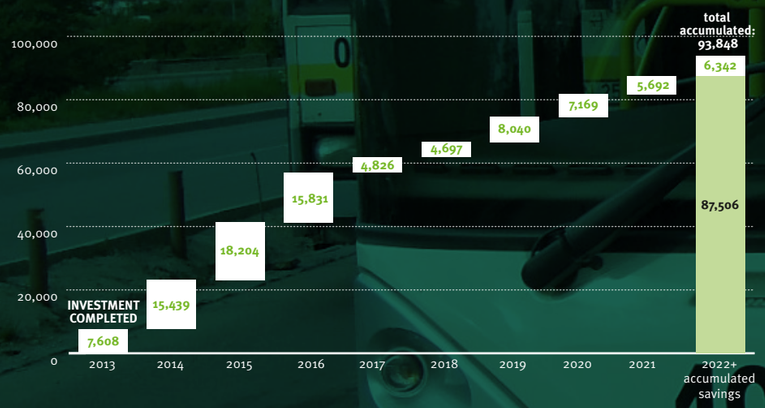
Banca Transilvania (BT), one of the leading banks in Romania, has received green lending of EUR 25 million from eeef to support energy efficiency and renewable energy investments in Romania. BT is using eeef funding to give financial support to public and private building owners, homeowner/condominium associations, municipalities, public sector entities and private sector companies acting on behalf of the public sector.

At the end of 2022, BT had financed and enabled 91 projects with cumulative savings of 404,005 MWh in primary energy.

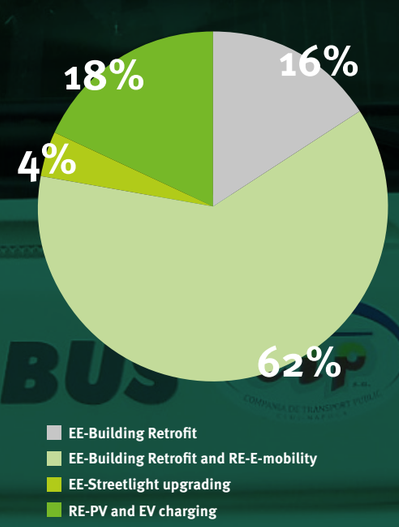
Annual Primary Energy Savings (MWh)



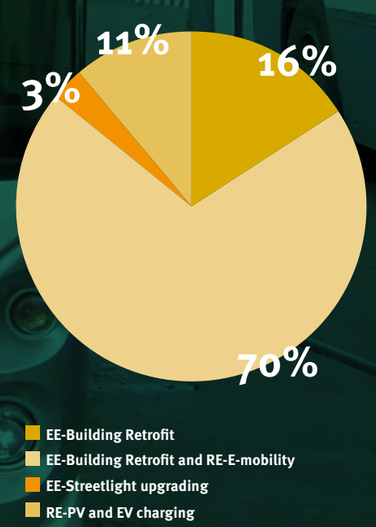
Annual Carbon Emission Savings (tCO_2e)



2022 Primary Energy Savings Contribution from Invested Sub-project Type



2022 CO_2e Savings Contribution from Invested Sub-project Type



KEY FIGURES

TYPE OF INVESTMENT:

SUBORDINATED DEBT

MATURITY:

10 YEARS

TOTAL PROJECT SIZE (€M):

25.0

ESTIMATED TCO_2E EMISSION SAVINGS IN 2022:

6,342

PORTFOLIO FACTS

ACTIVE SUBLOAN PROJECTS BY THE END OF 2022:

83

TONS OF CUMULATIVE CO_2E SAVINGS FOR ALL FUNDED PROJECTS:

93,848

TECHNOLOGIES FUNDED IN THE 83 ACTIVE SUBLOAN PROJECTS:

4

MEGAWATT HOURS OF CUMULATIVE PRIMARY ENERGY SAVINGS FOR ALL FUNDED PROJECTS:

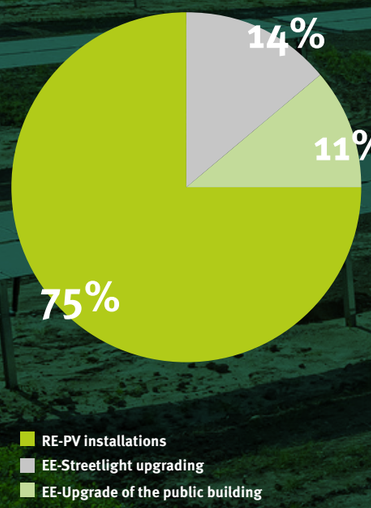
404,005

LITHUANIA

VIPA

The Public Investment Development Agency (VIPA) of Lithuania, together with the eeef, agreed to set up a Sustainable Resources Investment Development platform (TIPS), which aims at financing sustainable investments contributing to the direct effects of climate change mitigation. The eeef investment is EUR 10 million. TIPS aims to finance “green” investments that generate energy savings, reduce CO_2 emissions, and promote renewable energy use in Lithuania.

2022 CO_2e and Primary Energy Savings Contribution from Invested Sub-project Type



KEY FIGURES

TYPE OF INVESTMENT:
EQUITY

TOTAL PROJECT SIZE (€M):
12

MATURITY:
UP TO 12 YEARS

ESTIMATED TCO_2E EMISSION SAVINGS IN 2022:
3,099

PORTFOLIO FACTS

ACTIVE APPROVED PROJECTS WITH 8 COUNTERPARTIES:
9

TECHNOLOGIES FUNDED IN THE APPROVED PROJECTS:
4

TONS OF CUMULATIVE CO_2E SAVINGS FOR THE APPROVED PROJECTS:
3,099

MEGAWATT HOURS OF CUMULATIVE PRIMARY ENERGY SAVINGS FOR THE APPROVED PROJECTS:
40,909

PROJECT ASSESSMENT AND MONITORING

Eligible projects
The eeef can invest in a range of energy efficiency, clean urban transport and small-scale renewable energy technologies, providing the carbon or primary energy savings investment criteria are met. Each project must achieve at least 30% primary energy and/or carbon savings compared to baseline. The Fund may only invest when savings and other investment criteria are fulfilled.

Project Assessment and Monitoring
As the eeef can finance a variety of technologies, the initial technical assessment and ongoing monitoring of investments must strike the correct balance between accuracy and practicality of implementation.

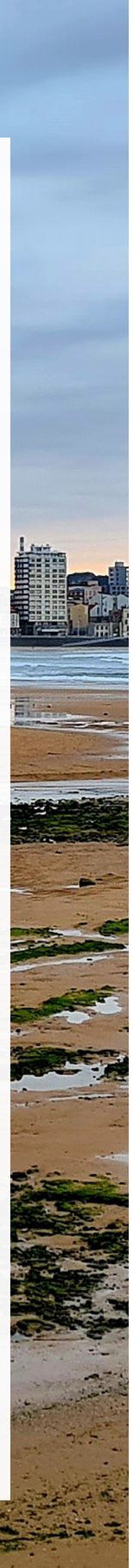
How the eeef evaluates technical eligibility is based on the project's technology and loan size; for example, small standard (e. g. street lighting) project savings can be calculated using validated calculations from the Investment Manager's carbon environment impact management (CEIM) tool, greenstem™ (greenstem). For projects with higher investment volumes and/or more complex technologies, detailed energy analyses are required in the form of third-party validated reports.

As part of the Fund's due diligence process and for the duration of the loan, the eeef evaluates and monitors the project's savings performance in alignment with the International Performance Monitoring and Verification Protocol (IPMVP), which requires every project to establish a baseline energy consumption and then conduct a post-project implementation assessment.

The Investment Manager's CEIM team reviews the technical details of all eeef investments and works with project managers to enter relevant data points into greenstem. The Fund provides guidance to project partners on how to conduct project analysis via third-party-validated annual audit templates. This ensures the entire portfolio reports using a consistent methodology.

greenstem™
All of the eeef portfolios-reported impact indicators are tracked in greenstem™, a proprietary web-based tool from the Investment Manager that automatically and consistently calculates anticipated and realised energy, primary energy, and carbon savings. As of the end of 2022, greenstem™ is in the process of rebuilding and migrating its platform to provide a more resilient, secure and functional solution. To ensure data compatibility and avoid data loss, the eeef aims to include the impact metrics for the years under review in the new platform until the platform transfer is safely completed. For small loans and standard technologies, greenstem™ completes calculations based on project-specific data inputs and project location/technology conversion factors. The tool stores up-to-date energy and emission conversion factors to ensure a consistent reporting approach across the portfolio. Factor sources include the Chartered Institution of Building Services Engineers for technology benchmark data and the Intergovernmental Panel on Climate Change for the conversion of energy data into greenhouse gas emissions. Electricity emission factors are sourced from the International Energy Agency and are updated annually in line with ISO 14064-2, the carbon accounting standard followed. All calculations and data sources used within the tool have been validated by a third-party engineering company.

greenstem™ provides comprehensive, timely and accurate reporting charts and dashboards that have been configured specifically for eeef user groups. The tool is flexible and can be customised to include additional technologies in the portfolio.



SOCIAL AND ENVIRONMENTAL MANAGEMENT SYSTEM (SEMS)

The eeef aims to conduct its operations in line with the highest expectations regarding social and environmental responsibility. The eeef's social and environmental management system (SEMS) defines the respective roles and responsibilities of the Fund and its partner institutions in promoting social and environmental sustainability. eeef's SEMS also outlines the performance requirements and procedures, and assesses and manages the Social and Environmental adverse risks in relation to eeef investments.

In general, these shall be in accordance with the European Investment Bank ("EIB") Statement on Environmental and Social Principles and Standards, EU Directives on Environmental Impact Assessment ("EIA"), and IFC Performance Standards[1]. Regarding impact management strategy, eeef is aligned to Operating Principles for Impact Management. For both types of investments – direct and financial institution investments – the eeef SEMS has specific performance requirements and procedures that are applied.

Compliance with these is assessed during the due diligence process and monitored later on throughout the lifetime of the project.

The SEMS also serves as a mechanism to ensure the investment does no significant harm (DNSH) to any environment and social objective and follows good governance practices. Adherence to the DNSH is derived by matching the IFC Performance Standards with the targets defined in Art. 17 of Regulation (EU) 2020/852. eeef considers the principal adverse impacts (PAIs) of its investment decisions on sustainability factors defined by the Sustainable Finance Disclosure Regulation (SFDR)[2]. For a detailed description of eeef's SEMS policy, please refer to our webpage: https://www.eeef.lu/social-environmental-standards.html

The environmental and social (E&S) screening checks areas such as the following, as well as other E&S issues and reputational risk:

1. GENERAL ENVIRONMENTAL AND SOCIAL ISSUES:

EU policy, legal context and compliance, environmental impact assessment process, E&S principles and standards

2. ENVIRONMENT, BIODIVERSITY AND CLIMATE CHANGE:

Environmental/transboundary impacts, protected areas, critical habitants, biodiversity, forestry, cultural heritage, vulnerability to climate change, climate change mitigation, resource efficiency and pollution prevention

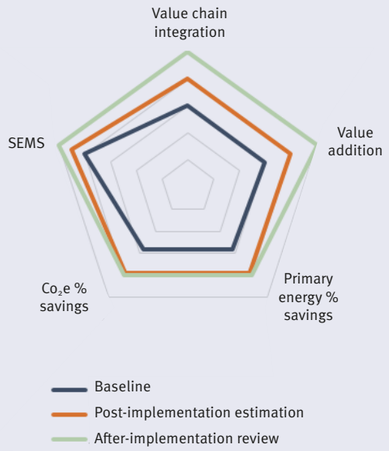
3. SOCIAL:

Social assessment, involuntary resettlement, vulnerable groups, indigenous people, labour standards, etc.

1 IFC Performance Standards: https://www.ifc.org/wps/wcm/connect/co2c2e86-e6cd-4b55-95a2-b3395d204279/IFC_Performance_Standards.pdf?MOD=AJPERES&CVID=kTjHBzk

2 Regulation (EU) 2019/2088 of the European Parliament and of the Council of 27 November 2019 on sustainability-related disclosures in the financial services sector

Going forward, analysis of the new projects in the due diligence phases will allow the Fund to assess actual and potential areas of impact with more precision, as well as provide comparability across various investments and reporting periods. As a visualisation tool to depict the five impact dimensions, the “impact spider” will be reverted to. Following is an example of such an “impac spider” for a sample direct investment project under construction.



PRIMARY ENERGY AND GREENHOUSE GAS EMISSIONS SAVINGS 2022

The eeef’s projects aim to achieve at least 30% primary energy savings on an annual basis (higher for the building sector) and a 30% reduction in CO_2 equivalents for transport and renewable energy projects. The quality of the methodology used to calculate the expected savings of projects is crucial. This allows the eeef to ensure its projects satisfy international standards regarding CO_2e and primaryenergy-saving reporting. Due to the wide variety of technologies included in the eeef’s portfolio, the Investment Manager has developed a standardised approach to calculating the project energy, primary energy and carbon savings for the eeef’s most common project technologies.

Carbon emission savings and primary energy savings were reported for the entire portfolio of investments/signed commitments for a range of energy efficiency and renewable technologies, including including CHP biomass, small-scale wind and electric vehicles. Once a project has been in operation for a full year, the eeef receives annual audits stating its actual energy consumption.

Year-on-year consumption variances are expected due to a number of factors, such as weather advances in static data, and therefore project savings can change annually. As shown below, these projects achieved total accumulated savings of 619,514 t CO_2e and 988,700 MWh of primary energy savings through the end of 2022.

All project savings are calculated following the International Performance Measurement and Verification Protocol (IPMVP) for energy accounting and ISO 14064 for carbon accounting. All methodologies used by the eeef are validated by a global engineering company. Currently, all projects with concrete data are reporting in alignment with these guidelines, and all new projects are aligned with these frameworks. Project savings represent the savings amount contributed from total project investment size, i.e. from eeef investment stake and remaining investor(s)’ stake into the respective project. The eeef uses up-to-date and project-specific conversion factors from sources including the International Energy Agency and the Greenhouse Gas Protocol. For some projects within the portfolio, factors cannot be updated due to project specifics, so they continue to report on factors issued within the loan documentation. All cumulative numbers are based on investments loan maturity. EE means energy efficiency, CUT means clean urban transport, RE means renewable energy. The entire project portfolio covers EE, CUT and RE projects. The cumulative Banca Transilvania savings represent 83 subprojects. The cumulative VIPA savings entail approved 9 subprojects. The respective portfolio’s

KEY TECHNOLOGIES

CURRENTLY INCLUDED IN THE PORTFOLIO:

Building upgrades | Street lighting | Wind and solar | Combined heat and power | Electric cars

Project Name	Reporting as of Q4 2022 [1–6]			
	Cumulative Primary Energy Savings (MWh)	Primary Energy Savings (%)	Cumulative CO_2e Savings (t CO_2e)	Carbon Savings (%)
City of Orléans	-326,702	-47	165,027	60
City of Rennes	-435,090	-44	125,251	47
Jewish Museum Berlin	107,940	75	24,445	79
University of Applied Sciences Munich	20,836	41	1,270	26
Illuminated Cities	100,710	56	13,273	56
University Hospital S. Orsola-Malpighi	530,749	29	122,549	32
City of Venlo	41,567	60	7,631	60
CIMAC	177,170	78	22,424	78
Banca Transilvania	404,005	50	93,848	50
Universidad Politécnica de Madrid	13,447	15	7,255	36
Municipality of Santander	218,264	80	22,070	80
Ore Valley Housing Association	30,702	99	3,404	96
Dancer Mobility	27,276	92	4,032	100
Vila do Conde	27,666	66	3,324	66
VIPA	40,909	97	3,099	97
Gijón	9,251	48	612	48
Total (all projects)	988,700	50	619,514	63
Total (EE & CUT only)	1,750.492	63	-	-

17 investments/signed commitments achieved CO_2e and primary energy savings

percentage savings are calculated based on all subproject savings. Projects contribute to cumulative savings until the sub-loan has matured from the portfolio – i. e. at loan maturity.

For carbon savings, cumulative and percentage savings are based on the entire portfolio, percentage savings use the average. For primary energy, cumulative and percentages saving are presented for projects from the portfolio which provide primary energy savings, ie. Energy efficiency and clean urban transport projects. For the sake of completeness, the cumulative and percentage primary energy savings are also provided for all projects. Cumulative data include calculations from financial close to loan maturity. Savings are for total project investment volume (ie. eeef and non-eeef investments). Savings are based on estimations for projects under construction and with less than one year of operations and actual data for projects, which have been in operation for over one year. For example, as of end of 2022, Vila do Conde and Illuminated Cities projects are still within one year operation after the approved project completion; Gijón project is still under construction. Therefore, we also use estimation here. As for Universidad Politécnica de Madrid savings are based on preliminary data, which has not been finalised before this report was issued.

EU TAXONOMY ALIGNMENT ASSESSMENT

The European Union Regulation 2020/852 – better known as "EU Taxonomy for sustainable activities" ("Taxonomy") – is a regulation in the context of environmentally sustainable investments and an important tool for market transparency. The instrument enables investors to classify economic activities more easily and to decide whether economic activities are environmentally sustainable and, thus, worth investing in from an environmental perspective. As an ex-post study, the Taxonomy has the potential to determine to what extent the active eeef-investments to date have been channeled into sustainable activities, and ultimately to guide eeef to continue and enhance its previous impact creation.

For this reason, eeef has engaged an external consultant with experience in evaluating sustainable activities – Arcadis Italia S.r.l. ("Arcadis"). Arcadis supports its clients for the entire life cycle of natural and built assets, specialising in urban regeneration, land reclamation design, water treatment, and sustainable buildings and industrial settlements design. Building on its extensive market experience since 2008, the firm was commissioned by eeef to conduct an independent Taxonomy alignment assessment for its portfolio of current investments. More specifically, eeef wanted to know which activities within its portfolio contribute substantially to climate change mitigation and, at the same time, to determine whether that economic activity causes no significant harm to any of the other environmental objectives as defined within the Taxonomy. In addition, the analysis should categorise the activities into transitional and enabling activities as well as identify mitigation measures about potential risks regarding climate change, pollution, biodiversity, among others, to reach the activities' impact targets by utilising a more sustainable and climate friendly way of operating.

The eeef Taxonomy alignment assessment included 15 active investments as of 1 January 2023. The projects of the partner institutions Banca Transilvania (4 taxonomy activities), VIPA (4 taxonomy activities), and Ore Valley Housing Association (2 taxonomy activities) were individually analysed on sub-project level before being grouped into the respective taxonomy activity. For Banca Transilvania and VIPA, the active sub-loan projects, respectively sub-projects, as of the end of December 2022, were examined.

Generally, the Taxonomy alignment analysis is based on a tool known as "EU Taxonomy Compass", which aims to make the Taxonomy contents easier to access through a visual representation of sectors, activities and criteria included in the Taxonomy. Following this tool and on the basis of the documentation provided by eeef, Arcadis has conducted each project examination in five steps:

1. IDENTIFICATION OF ELIGIBILITY BY ACTIVITY

NACE (Statistical Classification of Economic Activities in the European Community) codes describing the economic activities related to the project have been identified. Furthermore, the correct alignment path for indications provided by the EU Taxonomy Compass, with identification of the sector and the economic activity, has been defined.

The activities can be categorised into three different types:

- Activities that in and of themselves contribute substantially to one of the six environmental objectives as described in step 2.
- Transition activities: Activities for which there are no technologically and economically feasible low-carbon alternatives but that support the transition to a climate-neutral economy.
- Enabling activities: Activities that enable other activities to make a substantial contribution to one or more of the environmental objectives.

2. THRESHOLD CRITERIA FOR SUBSTANTIAL CONTRIBUTION

The alignment with the requirements of the Substantial Contribution Criteria, which are specific for each economic activity as defined by the EU Taxonomy Compass, has been confirmed. The contribution is categorised into six environmental objectives: (i) climate change mitigation, (ii) climate change adaptation, (iii) sustainable use and protection of water and marine resources, (iv) transition to a circular economy, (v) pollution prevention and control, (vi) protection and restoration of biodiversity and ecosystems.

3. "DO NO SIGNIFICANT HARM" DUE DILIGENCE

The alignment with the requirements of all DNSH criteria, which are specific for each economic activity as defined by the EU Taxonomy Compass has been confirmed. This analysis should confirm that the assets' targets and way of operating do not cause any significant harm to the other environmental objectives defined by the Taxonomy.

4. MINIMUM SOCIAL SAFEGUARD

The alignment with the requirements of the Minimum Social Safeguards has been confirmed.

5. CALCULATION OF PERCENTAGE ALIGNED

The proportion of turnover aligned with the Taxonomy has been calculated.

Results:
The analysis concluded that out of the 15 investments analysed, all projects are fully aligned with the Taxonomy. More concretely, all analysed projects contribute to the 1st EU environmental objective (climate change mitigation) through an eligible activity while causing no significant harm to any of the other five EU environmental objectives. Most project activities can be classified as either enabling or transitional. Moreover, the projects comply with minimum social safeguards laid down in the Taxonomy and fulfil the Technical Screening Criteria. According to the Taxonomy alignment assessment carried out by Arcadis, the current eeef investment portfolio can be certified as being environmentally sustainable in terms of the Taxonomy.

EVALUATION WORKFLOW AND RESULTS

15 EEEF-INVESTMENTS GROUPED INTO 9 TAXONOMY ACTIVITIES

1. IDENTIFICATION OF ELIGIBILITY

TRANSITION

RENOVATION OF EXISTING BUILDINGS

- Banca Transilvania – building retrofit

URBAN AND SUBURBAN TRANSPORT, ROAD PASSENGER TRANSPORT

- Banca Transilvania – purchase of electric buses
- Dancer Mobility

HIGH-EFFICIENCY CO-GENERATION OF HEAT/COOL AND POWER FROM FOSSIL GASEOUS FUELS

- University Hospital S. Orsola-Malpighi, Bologna

ENABLING

INSTALLATION, MAINTENANCE AND REPAIR OF CHARGING STATIONS FOR ELECTRIC VEHICLES IN BUILDINGS AND PARKING SPACES ATTACHED TO BUILDINGS

- Banca Transilvania – EV charging

INSTALLATION, MAINTENANCE, AND REPAIR OF RENEWABLE ENERGY TECHNOLOGIES

- Banca Transilvania – renewable energy sources (solar) stations
- VIPA – solar on buildings

INSTALLATION, MAINTENANCE, AND REPAIR OF ENERGY EFFICIENCY EQUIPMENT

- Jewish Museum Berlin – optimisation of HVAC[1] and installation of efficient energy management system
- Santander – smart public lighting
- Universidad Politécnica de Madrid – heating infrastructure upgrade
- OVHA – replacement of gas boilers in residential buildings
- City of Venlo – street lighting
- VIPA – street lighting
- VIPA – heating infrastructure upgrade
- Vila do Conde – smart public lighting
- Gijón – smart public lighting
- CIMAC – smart public lighting
- Illuminated Cities (North) – smart public lighting

ELIGIBLE

PRODUCTION OF HEAT/COOL FROM BIOENERGY

- Orléans Biomasse Energie – biomass[2]
- Rennes Biomasse Energie – biomass[3]

ELECTRICITY GENERATION FROM WIND POWER

- OVHA – construction of small-scale onshore wind farms

ELECTRICITY GENERATION USING SOLAR PHOTOVOLTAIC TECHNOLOGY

- VIPA – solar power plants

2. THRESHOLD CRITERIA FOR SUBSTANTIAL CONTRIBUTION

100%

- CLIMATE CHANGE MITIGATION
- CLIMATE CHANGE ADAPTATION
- SUSTAINABLE USE AND PROTECTION OF WATER AND MARINE RESOURCES
- TRANSITION TO A CIRCULAR ECONOMY
- POLLUTION PREVENTION AND CONTROL
- PROTECTION AND RESTORATION OF BIODIVERSITY AND ECOSYSTEMS

3. "DO NO SIGNIFICANT HARM" DUE DILIGENCE

100%

- SIGNIFICANT HARM
- NO SIGNIFICANT HARM

4. MINIMUM SOCIAL SAFEGUARD

100%

- MINIMUM SOCIAL SAFEGUARD NOT CONFIRMED
- MINIMUM SOCIAL SAFEGUARD CONFIRMED

5.

- CALCULATION OF % ALIGNED

100% TAXONOMY ALIGNED 15/15 INVESTMENTS

1 Heating, Ventilation and Air Conditioning

2 The use of biomass is subject to the requirements of Article 29 of Directive (EU) 2018/2001 and the greenhouse gas emission savings from the use of biomass in co-generation installations are at least 80% in relation to the GHG emission saving methodology and fossil fuel comparator set out in Annex VI to Directive (EU) 2018/2001. There is not a clear declaration for the compliance of the biomass to Article 29 of Directive (EU) 2018/2001, but from the positive opinion released by the "PREFECTURE DE LA REGION CENTRE ET DU LOIRET" of 06/07/2009 and the DALKIA Biomass Supply plan summary Arcadis has found data which confirm compliance with Article 29 of Directive (EU) 2018/2001.

3 The use of biomass is subject to the requirements of Article 29 of Directive (EU) 2018/2001 and the greenhouse gas emission savings from the use of biomass are at least 80% in relation to the GHG emission saving methodology and fossil fuel comparator set out in Annex VI to Directive (EU) 2018/2001. But these requirements are not applied to heat generation installations with a total rated thermal input below 2 MW.

EU TAXONOMY ALIGNMENT | EVALUATION OVERVIEW BY PROJECT STUDIED

	INVESTMENT	DESCRIPTION	ALIGNED	TAXONOMY ACTIVITY	TYPOLOGY	MEASURES	DNSH[1]
	Banca Transilvania	building retrofit in Magurele and Alba Iulia	■	renovation of existing buildings	**transitional** activity for climate change mitigation	eeef and Banca Transilvania, one of the leading banks in Romania, signed a financing agreement for a green on-lending facility. Provision of financing to public and private building owners, homeowner associations and municipalities, public sector entities and private sector companies acting on behalf of the public sector	●
		purchase of electric buses	■	urban and suburban transport, road passenger transport	**transitional** activity for climate change mitigation	eeef and Banca Transilvania, one of the leading banks in Romania, signed a financing agreement for a green on-lending facility. Provision of financing to public and private building owners, homeowner associations and municipalities, public sector entities and private sector companies acting on behalf of the public sector	●
		EV charging stations	■	installation, maintenance and repair of charging stations for electric vehicles in buildings (and parking spaces attached to buildings)	**enabling** activity for climate change mitigation	eeef and Banca Transilvania, one of the leading banks in Romania, signed a financing agreement for a green on-lending facility. Provision of financing to public and private building owners, homeowner associations and municipalities, public sector entities and private sector companies acting on behalf of the public sector	●
		renewable energy sources (solar)	■	installation, maintenance and repair of renewable energy technologies	**enabling** activity for climate change mitigation	eeef and Banca Transilvania, one of the leading banks in Romania, signed a financing agreement for a green on-lending facility. Provision of financing to public and private building owners, homeowner associations and municipalities, public sector entities and private sector companies acting on behalf of the public sector	●

1 DNSH: “Do no significant harm”. See Step 3 of the Taxonomy alignment analysis for more information.

Aligned: ■ fully aligned ■ partially aligned ■ not aligned

DNSH (do no significant harm): ● no significant harm ● significant harm

EVALUATION OVERVIEW BY PROJECT STUDIED

	INVESTMENT	DESCRIPTION	ALIGNED	TAXONOMY ACTIVITY	TYPOLOGY	MEASURES	DNSH[1]
	City of Orléans	combined heat and power plant on biomass[2]	■	production of heat/ cool from bioenergy	neither on the list of the enabling nor transitional activity for climate change mitigation and adaptation, but considered an **eligible** activity	Dalkia won a public tender realised under a French Regulation Commission Tender (“CRE3”) for electricity/ heat generation fired by biomass	●
	City of Rennes	combined heat and power plant on biomass[3]	■	production of heat/ cool from bioenergy	not on the list of the enabling nor transitio-nal activity for climate change mitigation and adaptation, but considered an **eligible** activity	combined heat and power CHP biomass plant achieving significant carbon savings whilst still generating heat aligned with baseline requirements. The project enables a decentralised energy supply for the City of Rennes using an existing district network. The biomass required is locally sourced within a 100 km radius of the plant.	●
	OVHA	gas boilers upgrade	■	installation, main-tenance and repair of energy efficiency equipment	**enabling** activity for climate change mitigation	gas boiler upgrade of more than 170 homes owned by the local housing association	●
		onshore wind farms	■	electricity generation from wind power	neither on the list of the enabling nor transitional activities for climate change mitigation and adapta-tion, but considered an **eligible** activity	construction of small-size onshore wind farms in the Fife region	●

2 The use of biomass is subject to the requirements of Article 29 of Directive (EU) 2018/2001 and the greenhouse gas emission savings from the use of biomass in co-generation installations are at least 80% in relation to the GHG emission saving methodology and fossil fuel comparator set out in Annex VI to Directive (EU) 2018/2001. There is not a clear declaration for the compliance of the biomass to Article 29 of Directive (EU) 2018/2001, but from the positive opinion released from the “PREFECTURE DE LA REGION CENTRE ET DU LOIRET” of 06/07/2009 and the DALKIA Biomass Supply plan summary Arcadis has found data which confirm compliance with Article 29 of Directive (EU) 2018/2001.

3 The use of biomass is subject to the requirements of Article 29 of Directive (EU) 2018/2001 and the greenhouse gas emission savings from the use of biomass in co-generation installations are at least 80% in relation to the GHG emission saving methodology and fossil fuel comparator set out in Annex VI to Directive (EU) 2018/2001.

Aligned: ■ fully aligned ■ partially aligned ■ not aligned

DNSH (do no significant harm): ● no significant harm ● significant harm

EVALUATION OVERVIEW BY PROJECT STUDIED

	INVESTMENT	DESCRIPTION	ALIGNED	TAXONOMY ACTIVITY	TYPOLOGY	MEASURES	DNSH[1]
	Jewish Museum Berlin	energy efficiency upgrade of the Jewish Museum Berlin	■	installation, maintenance and repair of energy efficiency equipment	**enabling** activity for climate change mitigation	replacement of the building management system and lighting management system. installation of the metering system. reconciliation of heating system hydraulics. optimisation of the ventilation system	●
	S. Orsola-Malpighi Hospitals	energy efficiency upgrade of the S. Orsola-Malpighi Hospital	■	high-efficiency co-generation of heat/cool and power from fossil gaseous fuels	**transitional** activity for climate change mitigation	upgrade of entire fluids production and distribution system of the hospital trigeneration plant with a district heating and cooling network of 15 km and two new thermal plants	●
	Illuminated Cities	portfolio of street lighting upgrades with smart city features	■	installation, maintenance and repair of energy efficiency equipment	**enabling** activity for climate change mitigation	upgrade of the public lighting infrastructure to LED technology according to a fully smart city approach. lighting integrates multiple services, including applications such as remote control and management systems, video surveillance, wi-fi and charging stations for electric vehicles	●
	City of Venlo	street lighting upgrade of the City of Venlo	■	installation, maintenance and repair of energy efficiency equipment	**enabling** activity for climate change mitigation	The City of Venlo upgrades the existing street lighting network of the city with energy-efficient LED lamps. The existing O&M contract for the street lighting network with a private service company stays in place and includes the upgraded lighting points	●

Aligned: ■ fully aligned ■ partially aligned ■ not aligned

DNSH (do no significant harm): ● no significant harm ● significant harm

EVALUATION OVERVIEW BY PROJECT STUDIED

	INVESTMENT	DESCRIPTION	ALIGNED	TAXONOMY ACTIVITY	TYPOLOGY	MEASURES	DNSH[1]
	Municipality of Santander	street lighting PPP for the City of Santander	■	installation, maintenance and repair of energy efficiency equipment	**enabling** activity for climate change mitigation	conversion of existing streetlights to energy-efficient LEDs (22,300)	●
	Universidad Politécnica de Madrid	new heating infrastructure for Universidad Politécnica de Madrid	■	installation, maintenance and repair of energy efficiency equipment	**enabling** activity for climate change mitigation	energy efficiency measures in 32 buildings of the university. substitution of 63 oil-based boilers with gas-based. installation of 6,800 thermal valves in the heating system and solar panels. Installation of global management service	●
	CIMAC	street lighting upgrade in 14 municipalities via inter-municipal entity	■	installation, maintenance and repair of energy efficiency equipment	**enabling** activity for climate change mitigation	replacement of existing street lights with ca. 56,000 energy-efficient LED lighting points to upgrade, among others UNESCO World Heritage site of Évora	●
	Vila do Conde	street lighting upgrade in Vila do Conde municipality	■	installation, maintenance and repair of energy efficiency equipment	**enabling** activity for climate change mitigation	replacement of existing streetlights with ca. 18,972 energy-efficient LED lighting points	●

Aligned: ■ fully aligned ■ partially aligned ■ not aligned

DNSH (do no significant harm): ● no significant harm ● significant harm

EVALUATION OVERVIEW BY PROJECT STUDIED

	INVESTMENT	DESCRIPTION	ALIGNED	TAXONOMY ACTIVITY	TYPOLOGY	MEASURES	DNSH[1]
	VIPA	new heating infra-structure for public buildings	■	installation, main-tenance and repair of energy efficiency equipment	**enabling** activity for climate change mitigation	financing “green” investments that generate energy savings, reduce CO_2 emissions, and promote renewable energy use in Lithuania	●
		street lighting in Kaunas	■	installation, main-tenance and repair of energy efficiency equipment	**enabling** activity for climate change mitigation	financing “green” investments that generate energy savings, reduce CO_2 emissions, and promote renewable energy use in Lithuania	●
		renewable energy sources (solar on buildings)	■	installation, main-tenance and repair of renewable energy technologies	**enabling** activity for climate change mitigation	financing “green” investments that generate energy savings, reduce CO_2 emissions, and promote renewable energy use in Lithuania	●
		renewable energy sources (solar power plants)	■	electricity generation using solar photovol-taic technology	neither on the list of the enabling nor transitional activities for climate change mitigation and adapta-tion, but considered an **eligible** activity	financing “green” investments that generate energy savings, reduce CO_2 emissions, and promote renewable energy use in Lithuania	●

Aligned: ■ fully aligned ■ partially aligned ■ not aligned

DNSH (do no significant harm): ● no significant harm ● significant harm

EVALUATION OVERVIEW BY PROJECT STUDIED

	INVESTMENT	DESCRIPTION	ALIGNED	TAXONOMY ACTIVITY	TYPOLOGY	MEASURES	DNSH[1]
	Dancer Mobility	sustainable mobility in European cities	■	urban and suburban transport, road passenger transport	**transitional** activity for climate change mitigation	all-inclusive operational lease services of electric buses manufactured in Lithuania to public authorities	●
	Gijón	smart energy in Gijón: energy efficiency and smart management	■	installation, maintenance and repair of energy efficiency equipment	**enabling** activity for climate change mitigation	energy audit of public street lighting. energy audit of public buildings. implementation of renewable energy sources projects	●

Aligned: ■ fully aligned ■ partially aligned ■ not aligned

DNSH (do no significant harm): ● no significant harm ● significant harm

CARBON EMISSIONS AND SAVINGS MONITORING

The Taxonomy generally supports the Sustainable Finance Disclosure Regulation (SFDR) – an EU regulation on the disclosure of information on the sustainability of investment decisions. Among other requirements, the SFDR requires financial advisors and financial market participants to publish information about negative environmental and social impacts caused by the investments. These negative impacts are known as “Principal Adverse Impacts” (PAIs).

In this context, eeef endeavours to provide more transparency and a deeper understanding of the carbon emissions generated by its investments, which is also part of 14 mandatory PAIs. The following is an illustration of the carbon emissions (Scope 1 and Scope 2) per project, with further explanation.

Scope 1 carbon emissions are emissions generated from sources that are controlled by the company issuing the underlying assets[1]. In eeef's case, Scope 1 refers to emissions directly generated from our invested asset. For our projects biomass Cogeneration (Combined Heat and Power- CHP) plants in the City of Orléans and City of Rennes, the scope 1 emissions are from the carbon emissions during the process where the CHP Plant is fueled by recycled wood chips and transform the input fuel into the electricity and heat as output. For eeef’s project of University Hospital S. Orsola Malpighi, the tri-generator (Heat, Power and Cooling) plant also consumes natural gas in the process of different forms of energy production. The carbon emission by the tri-generator attributed to natural gas as a fuel is considered here as scope 1 emissions. As for the project in Universidad Politécnica de Madrid, the upgraded boiler is fueled by the natural gas in order to generate heating, the scope 1 carbon emissions in this process are from the natural gas consumption in the boiler.

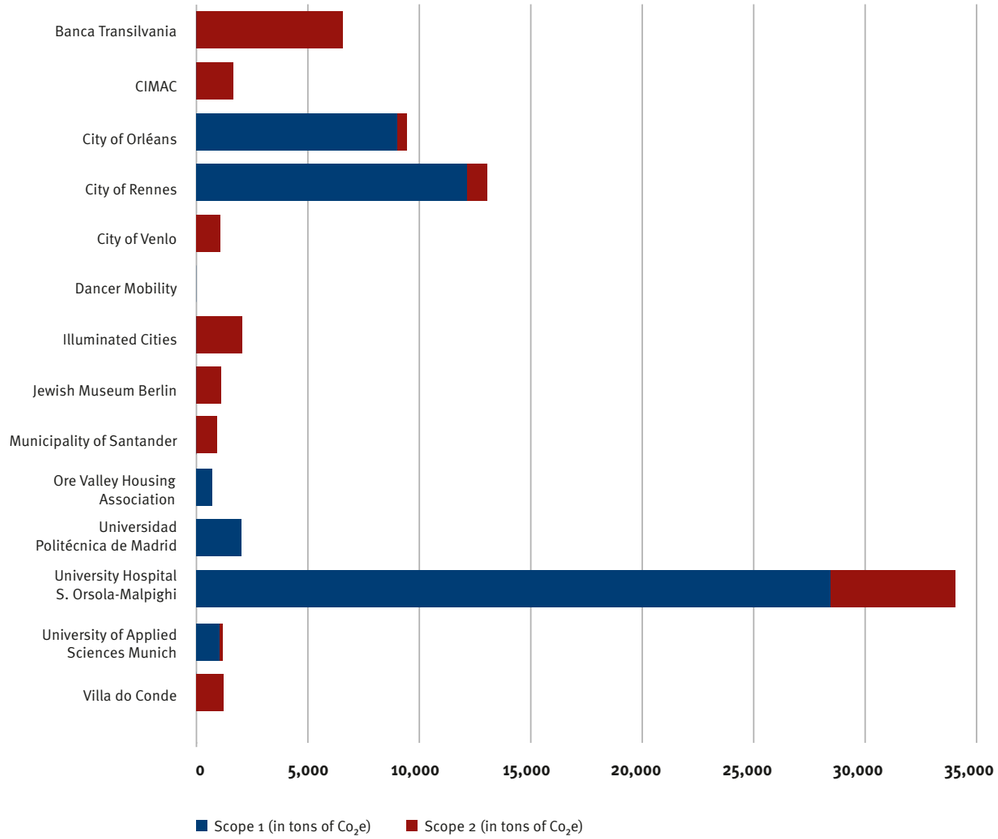
Scope 2 carbon emissions: "purchased" emissions through energy usage (electricity, heat, steam cooling), including purchased energy used for production of goods, namely emissions from the consumption of purchased electricity, steam, or other sources of energy generated upstream from the company that issues the underlying assets. In eeef ‘s case, Scope 2 refers to the emission from the energy (electricity, heat for instance) purchased for and consumed by our invested asset itself. For our streetlights upgrading projects, like City of Santander and Vila do Conde, the scope 2 emissions are from the emissions from the electricity itself which is purchased from corresponding Spanish and Portuguese national grid. For Jewish Museum Berlin, the scope 2 emissions are from purchased district heating and the electricity from the German national grid.

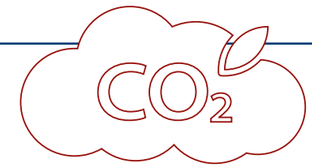
eeef deduced the Scope 1 and Scope 2 Carbon emissions of each investment from the respective annual project's energy savings summary and report received. Project Gijón is not included in the chart, as the project reached the financial close in Q3 2022 and was still in the early stage of installation per end of 2022. Hence, no 2022 emission data available. We expect to report its carbon emission when the project is finalized and in operation in 2023.

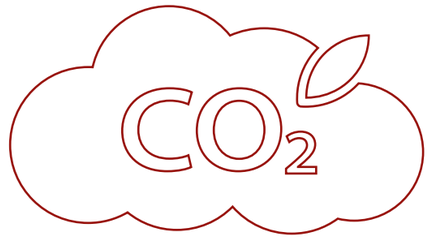
Scope 3 carbon emissions: all indirect emissions that occur in the value chain of the reporting asset and are not covered under Scope 1 and Scope 2, including both upstream and downstream emissions, in particular for sectors with a high impact on climate change and its mitigation; in eeef's case, Scope 3 is currently not available.

1 Scope 1,2 and 3 emissions classification here are according to GHG Protocol Corporate Standard (https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf)

SCOPE 1 AND SCOPE 2 CARBON EMISSION OF THE INVESTED PROJECTS IN 2022







BLUEMARK VERIFICATION

In 2020, eeef engaged in the annual public disclosure of its alignment with Operating Principles for Impact Management (Impact Principles). Impact Principles support the development of the impact investing industry by establishing a common discipline around the management of impact investments, and promote transparency and credibility by requiring annual disclosures of impact management processes with independent verification. In 2021, eeef's impact management system was independently verified by BlueMark, a leading provider of impact verification services in the impact investing market. BlueMark was incubated and launched in January 2020 by Tideline, a leading women-owned impact investing consultancy, with a mission to strengthen trust in impact investing and to help bring more accountability to the impact investment process. Going forward, the Fund is committed to bringing its impact management process to close to the best practice and most recognisable industry standards. With the independent assessment from BlueMark, eeef is eager to improve its impact management in the coming year. The chart below summarises findings using four ratings: advanced, high, moderate and low.

This next verification is expected to be performed in 2024.

	OPERATING PRINCIPLES FOR IMPACT MANAGEMENT	ALIGNMENT*
Strategic Intent	1. Define strategic impact objective(s), consistent with the investment strategy	HIGH
	2. Manage strategic impact on a portfolio basis	HIGH
Origination & Structuring	3. Establish the Manager's contribution to the achievement of impact	MODERATE
	4. Assess the expected impact of each investment, based on a systematic approach	HIGH
	5. Assess, address, monitor, and manage potential negative impacts of each investment	ADVANCED
Portfolio Management	6. Monitor the progress of each investment in achieving impact against expectations and respond appropriately	HIGH
Impact at Exit	7. Conduct exits considering the effect on sustained impact	LOW
	8. Review, document, and improve decisions and processes based on the achievement of impact and lessons learned	MODERATE

* Advanced – limited need for enhancement at present
High – a few opportunities for enhancement
Moderate – several opportunities for enhancement
Low – substantial enhancement required

EEEF CONTRIBUTION TO SUSTAINABLE DEVELOPMENT GOALS

The European Energy Efficiency Fund works actively to contribute to the internationally recognised United Nations (UN) goals for sustainable development, the so-called Sustainable Development Goals (SDGs). The Fund registered its partnership for UN SDGs and mapped its impact against the following SDGs 7, 11, 13 at the beginning of 2020. The sustainable progress of each goal is now measured with eeef defined indicators, which are closely aligned to the SDGs framework.

SDG 7 is mapped against the amount of eeef's renewable energy & energy efficiency projects contributing to doubling the global rate of improvement in energy efficiency

14 PROJECTS
in Energy Efficiency

2 PROJECTS
in Renewable Energy

1 PROJECTS
Clean Urban Transport

*Population reached is calculated based on the estimation considered for each individual project.

For eeef investment the estimation of people reached is based on the percentage amount of the population of the city or region achieved through eeef investments (e.g. number of staff, students, professors, patients, etc.)

SDG 11 is mapped against the annual number of people impacted through all eeef's projects

~ 7 MILLION
people are reached*

SDG 13 is mapped against the number of countries and public authorities in which eeef has been engaged via its projects since inception (all eligible due to public link)

9 COUNTRIES
8 Member States and the UK

53 PUBLIC AUTHORITIES

POPULATION REACHED THROUGH EEEF INVESTMENT ACTIVITIES

eeef investment projects	City/region	Annual population reached	Notes on population reached
Jewish Museum Berlin	Berlin	700,000	Average number of visitors per year who have visit the Jewish Museum Berlin since its opening in 2001.
University of Applied Sciences Munich	Munich	19,592	The total number of students, academic and non-academic staff as of 2019.
City of Orléans	Orleans	57,120	Part of population benefiting from either heat or power of the CHP project in the City of Orleans.
University Hospital S. Orsola-Malpighi	Bologna	20,000	The total number of academic staff (professors, lectures), students, patients and non-academic staff.
Banca Transilvania (BT)	Multiple cities in Romania	4,857,343	The population in the city or region that has benefitted from the sub-loan funding of BT.
City of Rennes	Rennes	85,680	Part of population benefiting from either heat or power of the CHP project in the City of Rennes.
City of Venlo	Venlo	100,536	The total population of city of Venlo (census 2015) is considered as reached population.
Universidad Politécnica de Madrid	Madrid	46,000	The total number of students, academic and non-academic staff working on the campus of UPM.
Ore Valley Housing Association	Cardenden	6,533	The total number of residents and tenants who live in the project area (based on the reported figures from OVHA).
Municipality of Santander	Santander	572,044	The total population of the city of Santander, including the average number of tourists visiting the city of Santander each year.
Illuminated Cities	Rozzano	42,557	The total population living in the municipality included the pipeline at the closing date.
CIMAC Portugal	CIMAC Region	167,000	The total population living in 14 municipalities (census 2011) that are located in the Alentejo Central Region in Portugal where the upgrade of luminaires would be performed.
Dancer Mobility	Klaipeda	0	People reached will be estimated based on the number of the population using public transport. The project seeks to replace 10 diesel buses in Klaipeda. There are no busses used from the project yet.
Vila do Conde	Vila do Conde	79,533	The total population of Vila do Conde as of census 2011.
VIPA	Multiple regions in Lithuania	1,033	The first project approved by the Investment Platform has reached 474 households. To reach the number of beneficiary people, this number has been multiplied by the average household size of 2.18 persons.*
Gijón	Gijón population	269,311	The total population of the city of Gijón (census 2021) is considered as reached population.
Total		7,026,814	

* Source: Oficialiosios statistikos portalas

The population reached through eeef investment projects is an annualised figure and is estimated using a prudent approach. Each figure is derived from the estimate considered for each individual project based on the population of the city and/or the region achieved as a result of eeef activities (e.g., calculation number of staff, students, professors, patients, etc.) as reported in the investment committee proposal.


1905
UDALETXEA

THE EEEF'S TECHNICAL ASSISTANCE FACILITY

AN OVERVIEW

- EUR 389,500 approved for Ferrara Province
- EUR 400,000 approved for the City of Gijón
- EUR 340,000 approved for the Italian Ministry of Ministry of Defence
- EUR 180,000 approved for Kaunas District Municipality
- EUR 400,000 approved for the Autonomous Province of Bolzano
- EUR 160,000 approved for Ukmergė District Municipality
- EUR 195,000 approved for Šilutė District Municipality
- EUR 195,000 approved for the Klaipėda University Hospital
- EUR 199,500 approved for the City of Sestao
- EUR 180,000 approved for the Daugavpils City Municipality

The Fund set up the eeef Technical Assistance Facility (eeef TAF) to catalyse investments in public entities (EU Member States) in the energy efficiency sector, small-scale renewable and/or public urban transport. The TAF directly allocates consultancy services to the TA beneficiaries. Some of the services provided are e.g., energy audits, feasibility studies, public procurement assistance, calculations of benefits and preparing investment programmes.

To date, the eeef has approved ten public beneficiaries across Spain, Italy, Lithuania and Latvia, which are currently receiving consultancy services in various forms with the common aim of bringing the projects to fruition. eeef expects to deliver over €146.7 m worth of commercially viable investments. Six of the eeef TAF programmes have already published tenders (Ferrara Province TA, Modena TA, Kaunas TA, Gijón TA, Silute TA and Ukmergė TA).

Even though the TAF's scope of work ends once the public beneficiary has launched the tender, the Fund's support is not limited to providing technical assistance services; it also aims to reach closing and provide project financing through various financial instruments to ensure that the projects materialise. It is the eeef's intention that the TAF remains active for the foreseeable future, with the mission to turn public sector climate mitigation projects into reality.

146.7 million euros envisaged total project investment volume supported by the eeef TAF

58,331 MWh per year estimated primary energy savings

4 countries involved

55.26 potential total leverage factor (weighted average)

20,217 tCO_2e per year estimated carbon equivalent emission savings

15 public and municipal authorities involved

IMPACT AND OUTCOMES (2017–2022)

Joining the efforts of the EU 2030 framework for climate and energy and the 2050 climate-neutral objectives, the Fund increased the primary energy savings and greenhouse gas emissions (CO_2 equivalents) reduction of all its TA projects from 20% to a 30% target. Overall, the cumulative primary energy savings expected from the ten TA projects will save energy to nearly 58,331 MWh (equivalent to 48.5%) and reduce CO_2 emissions to 20,217 tCO_2e (49.7%). The table below shows the impact measurement breakdown of each project:

TABLE: IMPACT MEASUREMENT

#	TA Projects	Country	Tender published, Yes (Y)/Not (N)	Sector	Building (B)/lighting points (LP), in numbers	Annual population reached	Expected energy saved, (%) per year	Expected emission avoided, tCO_2eq (%) per year	Leverage factor, (x)
1	City of Gijón	ES	Y	EE (street lighting/ building), RE (PV)	42, 960 (LP)/ 85 (B)	271,780	30	30	57.54
2	Ferrara Province	IT	Y	EE (street lighting/ building)	26,557 (LP)/ 9 (B)	345,691	ca. 40	48	79.23
3	Ducal Palace of Modena	IT	Y	EE (thermal systems & public building)	5 (B)	186,741	51	51	26.49
4	Province of Bolzano	IT	N	EE (building)	62 (B)	533,373	58	48	92.54
5	Kaunas	LT	Y	EE (street lighting)	8,989 (LP)	96,441	63	63	20.55
6	Ukmergė	LT	Y	EE (building)	5 (B)	33,471	34	48	24.24
7	Silute	LT	Y	EE (building)	11(B)	14,968	45	45	46.16
8	Klaipeda U Hospital	LT	N	EE (building)	3 (B)	162,690	ca. 49	ca. 49	36.97
9	City of Sestao	ES	N	EE (street lighting, building, e-mobility)/ RE (energy communities using PV)	2,586 (LP)/ 13 (B)/	27,533	55	55	68.84
10	Daugavpils	LV	N	EE (street lighting)	9,000 (LP)	79,120	60	60	43.35
TOTAL					**90,092 (LP)/ 193 (B)**	**1,751,808**	**48.5**	**49.7**	**55.26**

From 2017 to 2022, the TAF programme has been supporting (i) energy efficiency measures, such as street lighting upgrades (i.e., installation of green technology, the replacement of luminaires and traffic lights, IoT nodes, a digital platform to manage and monitor the energy flow acting as a small smart grid solution, etc.), public buildings renovation and retrofit, (ii) renewable energy solutions, including the development of energy communities using PV programs, building-integrated PV systems, the installation of aerothermal and hydrothermal systems, etc.), and (iii) urban transport, such as an e-mobility program (i.e., e-car, e-bikes, charging stations, etc.). Results show 90,092 lighting points and 193 buildings to be renovated. Additionally, eight buildings/structures with an area of ca. 4,281 m^2 are expected to be reserved for energy communities. More information about this will be presented in the next report.

So far, 15 public and municipal authorities will benefit from the TAF programme (including 48 elderships referring to the projects in Lithuania). The population reached through its energy-related activities will be around 1,751,808 inhabitants. Generally, it takes one and a half years for each municipality to publish the tender and two years to complete the preparation of the programme (selection of winner ESCO and signature of contract). After completing the TA programme, each project goes to the implementation phase (estimated 10 – 15 years). It comprises the construction phase, which takes two to three years for each project, and continues with the operational phase of ca.12 years. Therefore, it is expected that the benefits of the TAF programme will continue to be leveraged after two to three years of completing the project preparation. Up to now, the Ferrara TA project, Gijón TA project, and Kaunas TA project have been completed.

eeef expects to expand its support to more regions. Currently, it is in preliminary discussions with further public authorities in Spain (Asturias and Catalonia region) for potential projects. eeef expects to achieve contractual closing with both public authorities by 2023.

Funding

In December 2016, the Fund and the European Investment Bank ('EIB') signed the ELENA Contract (1 February 2017 – 30 June 2021) for funding project development services (PDS). The eeef TAF received total funds of EUR 1.8 m from the EIB – European Local Energy Assistance ('ELENA') TA Facility under the Horizon 2020 Programme of the European Union. eeef successfully fulfilled its commitment to supporting ambitious public beneficiaries in developing sustainable energy investment programmes.

From the TAF inception to date, the eeef has contributed ca. EUR 2.2 m (including the reimbursement of the Ferrara TA project in 2020 of EUR 408,975), which was supplemented by the ELENA funds of EUR 1.8 m until mid-2021.

The eeef's TAF available for projects has, in total, reached over EUR 4 m, of which ca. EUR 2.7 m are already committed to ten signed projects respectively, and the remaining to other fees and eeef costs (i.e., external experts, TA management fees, etc.) leading to ca. of EUR 900,000 available for new projects. Please note, eligible costs of EUR 379,500 have been included for the two new TA agreements signed in 2022 and self-financed by the Fund). New funding is expected to come in 2023 to support more public beneficiaries.

NEW EEEF TAF PROGRAMMES

THE CITY OF SESTAO IS THE NINTH PUBLIC AUTHORITY TO JOIN THE EEEF TO COLLABORATE ON THE NEW EEEF TECHNICAL ASSISTANCE FACILITY

The City of Sestao is located in the province of Biscay, northern Spain, on the West bank of the estuary of the Nervion River, which leads to the Cantabrian Sea. The city delimits with the municipalities of Barakaldo, Portugalete, and Trapagaran. It has a population of circa 27,342 inhabitants. It is one of the 26 municipalities that belong to the Greater Bilbao Metropolitan Area.

The City of Sestao is a town and municipality in the autonomous Basque Country in Spain. It is strategically well positioned, being located only 2 km away from Bilbao, Biscay's capital city, to which it is well-connected through roads, such as trains, cycling lanes, and waterways. The municipality has the greater plant of Galindo, which ranks among Spain's 5 largest installations.

On 6 April 2022, the eeef and the City of Sestao signed a TA agreement to develop the SESMART project "Sestao Energy Smart Management": Active-Resilient-Transformative. The City of Sestao seeks to prepare this ambitious investment programme to achieve its energy efficiency goals by providing integral upgrades in four municipal sites (5 public buildings), modernising the street lighting system, developing energy communities with solar PV systems and/or installing PV panels, developing an e-mobility program and a digital platform.

The project volume for the programme is circa EUR 13.7 m. This will facilitate Sestao in reaching the required renovation and energy levels to contribute to the local and national targets.

Recent developments
The TA works have started. The energy documents and data collection have been completed. The economic analysis is currently being prepared. The tender is expected to be published by H1/2023.

THE DAUGAVPILS CITY MUNICIPALITY IS THE TENTH PUBLIC AUTHORITY TO JOIN THE EEEF TO COLLABORATE ON THE NEW EEEF TECHNICAL ASSISTANCE FACILITY

The Daugavpils City Municipality is the second largest city, located in south-eastern Latvia on the banks of the Daugavpils River. It is one of the nine Republic Cities (Daugavpils, Jēkabpils, Jelgava, Jūrmala, Liepāja, Rēzekne, Riga, Valmiera, and Ventspils) and has a population of circa 82,000 inhabitants. It is considered a multicultural and multi-ethnic city.

In July 2022, the eeef and the Daugavpils City Municipality signed a TA Agreement to enhance energy efficiency in the city by upgrading its public street lighting infrastructure. The objective is to prepare and implement a street lighting modernisation project by upgrading circa 7,664 to 9,000 luminaires, 141 cabinets, 80 km of cables, and ca. 2,000 (units) poles, etc.

According to the preliminary assessment, the total investment needed to implement the sustainable investment programme is circa EUR 7.8 m. This will enable Daugavpils City Municipality to reach a more efficient and smart street lighting system, improved lighting quality, and energy levels that contribute to the local and national targets.

The TA Consultants appointed by eeef will provide energy audits/a feasibility study, technical consultations, evaluation of the economic viability of each investment including financial analysis, and structuring the tender documents to align with the PPP/ESCO model. Legal advisory services concerning these tasks will be provided.

Recent developments
TA works have started. In December 2022, energy inventories were finalised and submitted to the municipality for review.

ENERGY MARKET OUTLOOK AND DECARBONISATION GOING FORWARD

by Rahul Pratap Singh

Following the Paris Agreement in 2015, the Intergovernmental Panel on Climate Change, comprising 195 governments, published a special report about global warming above pre-industrial levels of 1.5°C. Furthermore, the report concluded that global warming of 2°C is likely to trigger irreversible catastrophic changes in the climate systems, rendering the planet inhabitable.

European Union (EU) pledged allegiance to contain global warming by targeting the main culprit – greenhouse gases (GHG) emissions – and set forth a **2030 Climate and Energy Framework** to serve as the interim milestone towards achieving a **100% decarbonised Europe by 2050**.

The framework seeks an energy transition by 2030 in the EU based on greater energy efficiency (32.5% compared to 2007 baseline) and the gradual elimination of fossil fuels in favour of higher renewable energy sources in final energy consumption (32% contribution in 2030) and low GHG emission (at least 40% reduction compared to 1990 levels)[1].

These interim targets lay down a tangible and quantifiable trajectory for the EU to pursue. The targets have been further cascaded down to the 27 member states, who are free to develop country-specific. Furthermore, there are roughly 4 mitigation strategies that aim address the decarbonisation challenge: **energy efficiency, fossil fuel reduction, renewable energy promotion, and electrification.**

Energy efficiency helps decarbonise by cutting down the energy consumption. But it is somehow the least attention-grabbing strategy compared to the other 3 strategies. In its most basic form, energy efficiency is about improving insulation, lowering losses in heating/cooling, replacing or optimising equipment, etc. However, as the impact of energy efficiency is distributed across multiple interventions and numerous sites, e.g., 1000s of streetlights, it is difficult to visualise. But it plays an important role in key sectors: power, building-heating, industrial and transport, among others. However, leaving the remaining 3 strategies unsupported by energy efficiency would delay decarbonisation owing to higher pressure on new clean energy supplies and render higher energy costs on consumers.

The 2nd strategy is to lower fossil fuel dependency in the energy sectors. Fossil fuels have a high carbon density and hence excessively high GHG emissions. For example, in 2015, fossil fuels supplied roughly 73% of the total energy consumed in EU, accounted for only around 25% of the electricity and heat generation but emitted nearly 75% of its GHG emissions. Likewise, gas accounts for 33% of final energy consumption in buildings heating and emits nearly 66% of GHG emissions.

The 3rd strategy of decarbonisation is large-scale deployment of renewable energy sources. Leading up to 2030, the deployments of renewable energy will increase the most well-known technologies: solar PV, wind, hydro, biomass, and geothermal, among others. The sizable investments, technological advancements, and policy steering in the last decades helped renewable energy sources, especially wind and solar parks, generate cheaper electricity than coal counterparts. This has significantly altered the competitive landscape in favour of renewable energy sources acting as cheaper zero-carbon energy to support decarbonisation.

Sectors such as power, building-heating, transportation, and industry have usually worked on specific disconnected infrastructures and fuels. But the 4th strategy, electrification coupled with digitalisation, can can overcome these sectoral barriers – e.g., electric vehicles and electric heat pumps can draw power from the cheaper zero-carbon energy grid. Furthermore, combined with digitalisation, electrification offers opportunities to balance energy demand & supply gaps – e.g., on days when heating systems in buildings take excess power, electric vehicle batteries can feed electricity back to the grid to prevent scarcity.

These four mitigation strategies need to be implemented in parallel and to their full possibility to stand a chance of accomplishing the decarbonisation goal by 2050. Let us briefly look at the application of decarbonisation in the context of 2 carbon-intensive sectors.

Applying decarbonisation to the building sector:
According to the European Commission, the energy consumption in nearly 75% of EU buildings is inefficient because the design considerations and implementation date back to times when energy efficiency requirements for buildings were limited or nearly inexistent[2]. Furthermore, these buildings are very much in full use with needs for space and water heating. Over 50% of buildings in the EU are still fitted with inefficient, fossil fuel (gas or oil or hard coal) driven boilers, boilers that, in many cases, have.

1 **Energy efficiency:** Buildings need to lower the final energy demand by improving the thermal insulation of building shells and increasing the efficiency of heating/cooling systems. To achieve the necessary reductions in energy consumption, renovation rates need to pick up and double while all new buildings should be (nearly) zero energy buildings.

2 **Fossil fuel reduction:** By combining an overall decrease in energy demand along with electrification and zero-carbon energy supply, there should be a significant drop in the consumption of coal and oil. The aim should be to lower dependency until the total of coal and oil from the building-heating sector.

3 **Renewable energy:** Specific local circumstances govern the renewable energy potential, the feasibility of a district heating & cooling, and the needs for thermal energy. Geothermal energy, biomass from waste, and waste heat from industrial processes are some of the possibilities for sustainably delivering renewable heat for buildings and district heating networks.

4 **Electrification:** Heat pumps are a good example of implementing electrification in an efficient and cost-effective form to support decarbonisation. These pumps convert one unit of zero-carbon electricity into units of heating or cooling. According to estimates, more than 45 million households will have electric heating by 2030[3] and over 85% of EU households by 2050[4].

Applying decarbonisation to the land transport sector:
Transport is a big challenge, because it is the individual sector with the highest overall EU GHG emissions and an increasing GHG emissions profile in the future. In 2015, this sector accounted for around a third of all final energy consumption in the EU and for two-thirds of overall oil consumption. The emissions in this sector are dominated by road transport, which in 2015 was responsible for 73% of overall emissions[5]. Apart from small contributions from biofuels towards decarbonisation, electric vehicles will make a growing contribution.

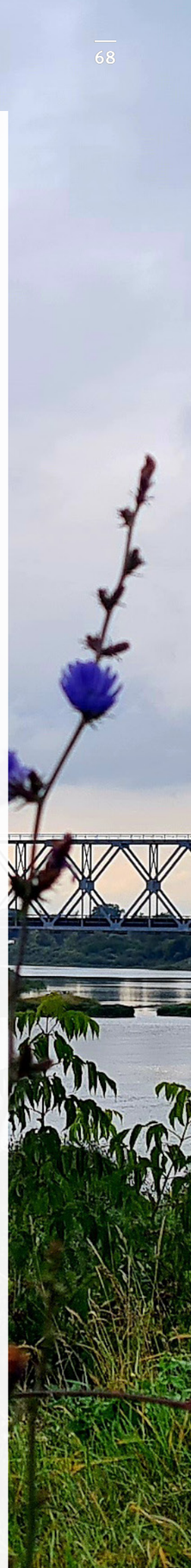
1 **Energy efficiency:** A most cost-effective way of decarbonisation land transport is transitioning towards more efficient modes of public transport (such as rail, buses), improving overall system efficiency, better urban planning, digital technology to encourage private users to switch to public transport. Furthermore, technological progress and design innovation can ensure the conventional and electric vehicles to be more fuel efficient than preceding models.

2 **Fossil fuel reduction:** According to a research report from Wood Mackenzie, up to 700 million Electric Vehicles (EVs) could be on the roads by 2050 compared to just over 10 million at the end of 2020. Likewise, the global electric bus market is expected to grow at 14% CAGR by 2030 – in Europe alone, the electric bus market is expected to reach 30,000 by 2030. Such growing number of EVs accompanied by zero-carbon electricity and charging infrastructure would significantly lower demand for fossil fuels for land transport.

3 **Renewable energy:** While the transition from petrol to electric cars helps, a bigger dent could be achieved through a modal shift – transitioning to rail, public transport, shared mobility, cycling and walking. The volume of electrified rails, passenger rail transport, and public electric buses should outpace the

1 https://climate.ec.europa.eu/eu-action/climate-strategies-targets/2030-climate-energy-framework_en
2030 climate & energy framework (europa.eu)

2 https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/energy-performance-buildings-directive_en
3 https://www.woodmac.com/press-releases/europe-to-install-45-million-heat-pumps-in-the-residential-sector-by-2030/
4 https://joint-research-centre.ec.europa.eu/jrc-news-and-updates/bringing-low-carbon-heating-systems-our-homes-2021-12-16_en
5 https://www.agora-energiewende.de/fileadmin/Projekte/2019/EU_Big_Picture/153_EU-Big-Pic_WEB.pdf



increase in passenger road transport. Likewise, freight transport should move towards electrified rail freight solutions. The pace at which cities will embrace this transition will depend on population densities, public infrastructure, planning processes and infrastructure investment

4 Electrification: Direct electrification of locomotives with zero-carbon fuels will support decarbonisation. The increase in electrification will be driven by a greater uptake of electric vehicles and an increase in electrified rail services. In addition, a rapid decline in battery costs and implementing Battery as a Service should help affordability and the behavioural shift towards decarbonisation.

As the decarbonisation approach explained here is based on a more efficient use of energy and the progressive replacement of polluting sources of energy by zero-carbon ones, it is sector-agnostic and easily applicable to any other energy-intensive sector.

Apart from the climate aspect, public health benefits and technical feasibility, decarbonisation has also evidenced good economic sense to the financiers. As we move forward to a 100% decarbonised Europe by 2050, the 2030 Climate and Energy framework will need to be supported by a strong political will, stable regulatory framework, growing investor appetite and suitable market conditions.

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