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TOWARDS A CLIMATE NEUTRAL CEDEFOP

FINAL REPORT
CEDEFOP

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FINAL REPORT

FEASIBILITY STUDY AND PATHWAYS

Contract details
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1. Introduction

The European Union aims to become climate neutral by 2050. This target as well as intermediate greenhouse gas (GHG) emission reduction milestones, have recently seen a political agreement through the adoption of the European Climate Law. This ambition requires strong efforts from all parts of the economy and society. EU institutions and bodies have exemplary roles in leading the transition to climate neutrality in their area of operations. In that context, on April 5th, 2022, The European Commission adopted a new communication and action plan on "Greening the Commission" for the institutions to reach corporate climate neutrality in its operations and reduce its environmental footprint by 2030.

In this context, decentralised agencies must contribute to the effort and lead by example. Cedefop has already undertaken efforts to be a climate-friendly organisation. Its 2014 environmental policy committed management and staff to support an environmentally sustainable organisation by reducing the consumption of natural resources and pollution in their daily work. In 2016, Cedefop introduced its Environmental Management System (EMS) following the same principles of ISO:14001 or the Eco-Management and Audit Scheme (EMAS). Following this scheme and under its EMS, Cedefop is monitoring its CO_2 emissions with the current target of maintaining or going below 2016 emissions. To further reduce its emissions, Cedefop has undertaken several initiatives, including an energy efficiency audit and study leading to an energy efficiency strategy adopted by the management in autumn 2021, and tangible actions such as the increased use of entirely virtual or hybrid meetings or the decreased number of staff's business travel. Nevertheless, there is significant potential for broadening the scope of GHG emissions monitoring and increasing the level of ambition for GHG emissions reduction.

With the increased EU climate ambition, Cedefop's Management is committed to shifting from being a climate-friendly organisation to becoming a climate-neutral one. Such a decision requires a good understanding of the GHG emissions from Cedefop's activities, including on-site and off-site emissions, assessing the potential of GHG mitigation measures, identifying strategies for achieving climate neutrality and the definition of a clear pathway towards neutrality by 2030.

This technical report includes the carbon footprint assessment of Cedefop for 2019. The external services presented in the carbon footprint only comprise canteen, security, and cleaning services following a FTE-based approach. The rest of the external services, mainly composed of consultancy, will not be incorporated in the carbon footprint[1].

The final calculations will form the basis for assessing measures and creating a strategy for decarbonisation together with Cedefop.

[1] This scope of external service categories was determined as for purchased services only a spend-based approach could be applied due to lacking supplier specific data. Due to the high uncertainty of this calculation approach, it was decided together with Cedefop to limit the scope to the categories reported by other EU organisations i.e. especially the EU Environmental Agency.

2. Description of methodology

In this section, we define and present the methodology, the greenhouse gases considered, the principle of CO_2 equivalents and global warming potential (GWP), scope 1, scope 2 and scope 3 definition, direct and indirect emissions, and operational and organisational scopes.

2.1 Standards (GHG Protocol, ISO, etc.)

Cedefop's carbon footprint calculation follows the Greenhouse Gas Protocol[2] (developed by the World Resources Institute and the World Business Council for Sustainable Development) and considers the ISO 14064-1 Standard. Besides, the guidance document 'Calculating, reporting, reducing and compensating greenhouse gas emissions - Guidelines for European Institutions and Bodies', a methodology commonly used by EU institutions for corporate carbon footprinting, was also considered.

These methodologies apply to any organisation (industries, public administration, tertiary sector). The methods consist in reviewing all physical flows that concern an organisation (persons, materials, energy) and allocating the emissions generated in carbon dioxide equivalent (CO_2e). The calculations are based on multiplying activity data collected by the organisation (kWh, km driven, amount of food distributed) with a corresponding emission factor (expressed in $kgCO_2e/kWh$, $kgCO_2e/km$, $kgCO_2e/litre$, etc.):

*Activity data * Emission factor = Emissions in CO_2e*

The GHG emissions are therefore calculated, activity by activity. This method allows to identify all GHG emissions that occur directly on the organisation's premises as well as indirectly, for instance, at the service providers (airlines, subcontractors, caterers, etc.).

2.1.1 Greenhouse gases taken into account

All GHG covered in the Kyoto protocol are considered as well as the water vapour due to aviation activities.

Table 1 - Greenhouse gases inventory

Greenhouse gases
Kyoto-gas (CO_2, CH_4, N_2O, HFC, PFC, SF_6, NF_3)
Water vapour (aircraft)

2.1.2 Conversion to tonnes CO_2 equivalents [tCO_2e]

All greenhouse gases (GHG), such as carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), Sulfur hexafluoride (SF_6), refrigerants (HFCs, PFCs, CFCs), are converted into CO_2 equivalent using the Intergovernmental Panel on Climate Change (IPCC) 100-years global warming potential (GWP) coefficients.

One ton of CO_2 equivalent (tCO_2e) is scientifically defined as "the amount of CO_2 emission that would cause the same radiative forcing as an emitted amount of a well-mixed greenhouse gas or a mixture of well-mixed greenhouse gases, all multiplied with their respective GWPs to take into account the differing times they remain in the atmosphere" (IPCC).

[2] World Business Council for Sustainable Development & World Resources Institute - The Greenhouse Gas Protocol, A Corporate Accounting and Reporting Standard – Revised edition - Corporate Standard | Greenhouse Gas Protocol (ghgprotocol.org)

Table 2 - Global Warming Potential Values

Gas	GWP 100-year time horizon, DEFRA (2022)
Carbon Dioxide (CO_2)	1
Methane (CH_4)	28
Nitrous Oxide (N_2O)	298
Hydrochlorofluorocarbons (HFC)	12 – 14,800[3]
Perfluorocarbons (PFC)	7,390 – 17,340
Sulphur Hexafluoride (SF_6)	22,800
Nitrogen Triflouride (NF_3)	17,200

2.1.3 Direct and indirect / upstream emissions

The greenhouse gas emissions are calculated from data and emission factors. In accordance with the Greenhouse Gas Protocol Value Chain Standard also GHG emissions along an organisation's value chain should be considered to comprehensively manage an organisation's emissions. When doing so, all emissions such as from production, transportation, use, and disposal are taken into account.

Carbon accountants distinguish between "direct" and "indirect" emissions. The latter are also called "upstream" emissions. According to the GHG Protocol[4] the following definition is:

- **Direct GHG emissions** are emissions from sources that are owned or controlled by the reporting entity.
- **Indirect GHG emissions** are emissions that are a consequence of the activities of the reporting entity but occur at sources owned or controlled by another entity.

The GHG Protocol further categorizes these direct and indirect emissions into three scopes[5]:

- **Scope 1:** All direct GHG emissions, e.g. natural gas combustion for heating, gasoline combustion for company cars, refrigerant leaks.
- **Scope 2:** Indirect GHG emissions from consumption of purchased electricity, heat or steam.
- **Scope 3:** All other indirect emissions, such as the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the reporting entity, electricity-related activities (e.g. T&D losses) not covered in Scope 2, outsourced activities, waste disposal, etc.

Scope 3 consists of 15 categories defined by the GHG protocol. They are a consequence of the activities of the reporting organisation but occur from sources not owned or controlled by the organisation.

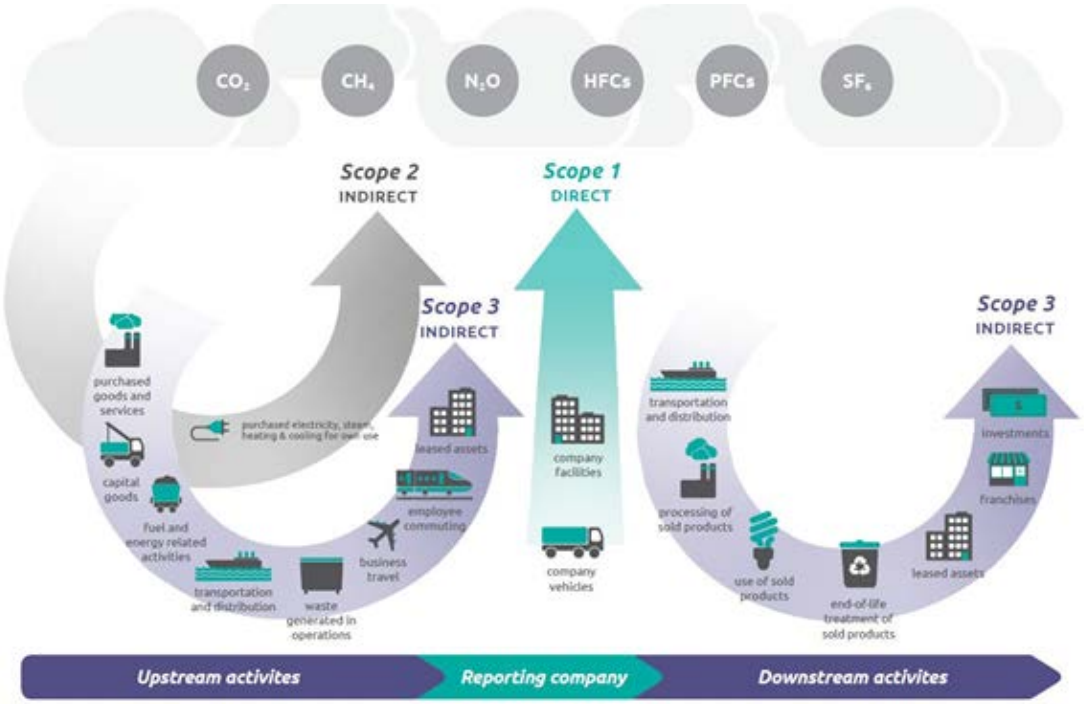
The graphic below represents all the sources of emissions distributed among the three different scopes.

[3] The 100-year time horizons for hydrochlorofluorocarbons depend on the specific kind of HFC and subsequently results in a large range of values; see https://www.oecd.org/dev/1923119.pdf, pg. 2

[4] GHG Protocol, Corporate Standard | Greenhouse Gas Protocol (ghgprotocol.org), visited on 16/03/2023

[5] GHG Protocol, Corporate Standard | Greenhouse Gas Protocol (ghgprotocol.org), visited on 16/03/2023

Figure 1 - Overview of GHG Protocol scopes and emissions across the value chain



As per GHG protocol definition, upstream activities involve a flow of the materials consisting of raw materials, components and energy that are needed to produce the goods from the suppliers to the organisation where the activities will take place. In the downstream activities, goods are sent to distribution sites and from there to retailers or customers. Regarding Cedefop's activities, the second category (downstream activities) is not relevant as not applicable.

3. System boundaries

When considering GHG emissions, the organisation's system boundaries need to be defined: the operational and the organisational boundaries.

This chapter gives a clear picture of GHG emissions included in the boundaries. Limitations of the boundaries are also highlighted and explained, and recommendations are provided on additional sources of emissions that could be considered in a future Cedefop's GHG neutrality strategy.

3.1 Organisational boundary

According to the operational control approach from the Greenhouse Gas Protocol, the carbon footprint of Cedefop covers the following organisational boundary: Cedefop consists of one entity with one building at this site.

The building is located in Pylaia, Thessaloniki (Evropis 123 street) and is owned by Cedefop (total area of building approx. 9,372 m^2 plus approx. 1,000 m^2 open space area for parking). In 2019, the number of staff was 121 (113 staff, plus 8 non-'staff': 4 Seconded national experts and 4 trainees). A small number of Cedefop employees (2) operate in an office in Brussels. As this office falls under the scope of the EU Commission's strategy and due to the low number of employees this was considered negligible for the carbon footprint of Cedefop. Besides due to an additional lack of data availability, this was excluded in the scope of this carbon footprint.

3.2 Operational boundary

The operational system boundary considers the activities resulting in emissions for calculating the Corporate Carbon Footprint (CCF). While Scope 1 and 2 emissions sources have to be considered to comply with the GHG Protocol, Scope 3 emission sources can be added voluntarily. Thus, each reporting organisation can decide if they want to report Scope 3 emissions and which categories out of the 15 Scope 3 emission sources defined by the GHG protocol, are reported.

Before starting the CCF calculation for 2019, Cedefop and Ramboll discussed and agreed on a number of scope 3 emissions sources relevant to Cedefop's business activities. For comparability reasons, other EU institutions and their reported scope 3 emission sources were considered. Based on this, it was decided to include the following emission sources for the 2019 calculation.

The operational boundary considered for Cedefop's carbon footprint 2019 is the following:

- **Scope 1 – Own direct fuel consumption and direct losses (activities and emissions on site)**
    1. Building fuel consumption (fuel oil)
    2. Fuel from company vehicles
    3. Refrigerant losses

- **Scope 2 - Purchased energy (activities on site and emissions off site)**
    1. Electricity

- **Scope 3 – Other indirect sources (Activities and emissions off site)**
    - Upstream activities (cradle-to-gate[6])

[6] The term "cradle-to-gate" describes the carbon impact of a product starting from its production stage and ending when it is ready to be sold in stores.

1. Purchased Goods and Services
    a. Purchased external services: Security, cleaning, canteen[7]
    b. Purchased goods: paper for daily office use, reports, and publications
    c. Water
2. Capital Goods[8]
    a. Buildings[9]: according to construction material and type of building
        i. Type of material construction: unspecified, steel, concrete
        ii. Type of building: office, parking, underground, technical areas, and restaurant
    b. IT equipment
        i. PC desktop
        ii. Laptops
        iii. Tablets
        iv. Printers
        v. Smartphones
        vi. Servers, switches, routers
        vii. Cameras
        viii. Software
3. Fuel and energy related activities (not included in Scope 1 or Scope 2). Upstream emissions (cradle-to-gate) of purchased energy (extraction, production and transportation of fuel consumed in the energy production plant and the losses that occurs during energy distribution) from electricity
4. Employees' business travel
    a. Air travel: Radiative forcing Index (RFI) = 2
    b. Non air travel (Rail, bus, automobiles, other modes of travel)
    c. Accommodation (hotel stays)
5. Visitors' travel for meetings/conferences
    a. Air travel: Radiative forcing Index (RFI) = 2
    b. Non air travel (Rail, bus, automobiles, other modes of travel)
    c. Accommodation
6. Employee commuting
7. Waste generated in operations
    a. Household / residual waste
    b. Paper and cardboard

[7] This scope of external service categories was determined as for purchased services only a spend-based approach could be applied due to lacking supplier specific data. Due to the high uncertainty of this calculation approach, it was decided together with Cedefop to limit the scope to the categories reported by other EU organisations i.e., especially the EU Environmental Agency. Since canteen services are not completely externalised to suppliers, those activities are only partly covered in this category in Cedefop's carbon footprint.

[8] This category includes all upstream (i.e., cradle-to-gate) emissions from the production of capital goods (or fixed assets) purchased or acquired by the reporting company in the reporting year. Capital goods are final products that have an extended life and are used by the company to manufacture a product; provide a service; or sell, store, and deliver merchandise. Examples of capital goods include equipment, machinery, buildings, facilities, and vehicles. Except for emissions from Cedefop's building, capital good emissions are accounted in the year of procurement.

[9] Lifetime of buildings / amortisation value is estimated to 25 years in line with Cedefop's accounting amortisation rate.

c. Plastics and metal
d. Organic waste
e. Wastewater
f. Treatments considered: landfill and recycling (based on local waste treatment practices) for solid wastes and wastewater treatment for wastewater

3.2.1 Evaluation status of each Scope 3 categories from the GHG Protocol

The following table presents the Scope 3 categories and their relevance for Cedefop as well as explanations on data or calculation limits.

Table 3 - Evaluation status and explanation of Scope 3 sources (from GHG Protocol) inclusions in the study

Sources of Scope 3 emissions	Evaluation status[10]	Explanation
Purchased goods and services	Relevant, calculated for some categories. Could be improved.	External services (including security and cleaning) are included using an FTE based approach as the persons performing these services are working entirely onsite. Another common approach would be to include them as spend-based emissions, however, this would not reflect an accurate picture of Cedefop's emission. Purchased goods (paper and food) are included based on weight.
Capital goods	Relevant, calculated	IT equipment was reported per piece and software was reported as spend-based. Data on buildings was included on a square meter basis.
Fuel-and-energy-related activities (not included in Scope 1 or 2)	Relevant, calculated	Fuel-and-energy-related activities were based on energy consumption data collected for scope 1 and 2.
Upstream transportation and distribution	Not relevant, see explanation	The emissions associated to the upstream transport or distribution of goods are not considered and not relevant as it is not applicable to Cedefop's activities.
Waste generated in operations	Relevant, calculated. Could be improved.	Waste amounts were based on rough assumptions (extrapolation of estimated volumes disposed of on a regular basis). Data quality could be improved if weighted amounts were provided.
Business travel	Relevant, calculated	Business travel was based on an internal business travel booking tool
Visitor Travel	Relevant, calculated	Visitor travel was based on reimbursement of visitors / guests invited by Cedefop for meetings/conferences
Employee commuting: Daily home-work travel	Relevant, calculated	Employee commuting was calculated via a survey shared with Cedefop employees

[10] The relevance is based on the activity of Cedefop and on an assessment of the contribution to total GHG emissions. Additionally, it was considered if other EU institutions reported on certain emission categories to ensure comparability. When not relevant an explanation is given.

Sources of Scope 3 emissions	Evaluation status[10]	Explanation
Upstream leased assets	Not relevant, see explanation	Not relevant as Cedefop is owner of its building and does not lease any other building.
Downstream transportation and distribution	Not relevant, see explanation	Not relevant to Cedefop's activities.
Processing of sold products	Not relevant, see explanation	Not relevant to Cedefop's activities.
Use of sold products	Not relevant, see explanation	Not relevant to Cedefop's activities.
End of life treatment of sold products	Not relevant, see explanation	Not relevant to Cedefop's activities.
Downstream leased assets	Not relevant, see explanation	Not relevant to Cedefop's activities.
Franchises	Not relevant, see explanation	Not relevant to Cedefop's activities
Investments	Not relevant, see explanation	Not relevant to Cedefop's activities.

4. Data collection

The general approach for the calculation of a CCF is based on activity data and emission factors. Activity data must be gathered within the organisation or from relevant suppliers in order to demonstrate the amount of fuel and energy consumption, distances related to business travel, etc. Emission factors can be found in public databases (e.g., Defra 2019 or ADEME) or can be derived from scientific studies. These factors provide values of CO_2e per kilometer (km), kilowatt-hour (kWh) or ton of material. By multiplying relevant activity data with appropriate emission factors and adding up the results, a carbon footprint is calculated.

For the calculation of Cedefop's CCF, a tailor-made Excel-tool has been developed by Ramboll. Within this Excel-tool, all agreed-upon emission sources were calculated in different tabs of the document, while the summary tab at the beginning of the document reveals the total results. Calculation was based upon activity data provided by Cedefop.

For data collection purposes, Cedefop identified different contact persons who collected the needed data. This data was then gathered per emission source in the Excel tables by the Project Manager and shared with Ramboll. This section provides a description of the selected emission factors, their sources, and the calculations made when necessary.

4.1 Scope 1 Emissions

Scope 1 emissions cover all direct emissions within the defined system boundary, which would occur directly from sources owned or controlled by Cedefop such as emissions from combustion of stationary facilities, vehicles, fugitive gases or process emissions.

It is important to note that every source of scope 1 and 2 emissions has associated scope 3 emissions related to its upstream activities. This is identified separately in the tables for clarity.

4.1.1 Fuel oil for heating

Cedefop uses fuel oil to heat its building. Fuel oil emissions are calculated by multiplying the consumption with appropriate emissions factors. Activity data on fuel oil consumption for heating has been collected and is listed in Table 4. The source of data is based on the data Cedefop shared with Ramboll.

Table 4 - Fuel oil consumption and emissions at Cedefop office building

	Consumption [litre]	Scope 1 Emissions [t CO_2e]	Scope H3 Emissions [t CO_2e]
Fuel oil	24,395	77.57	14.70

4.1.2 Company-owned vehicles

Emissions resulting from the operation of company-owned vehicles present another small scope 1 emissions source for Cedefop.

Company vehicle emissions can be calculated based on reported distances or fuel consumptions, taking into account the fuel type or size of the vehicle only if distances are being reported, as size greatly influences the emissions per distance travelled.

Two company vehicles, owned or leased, have been reported for the site at Thessaloniki in 2019. The calculation approach differentiates the vehicles according to size (small, medium, large) and fuel type (diesel, petrol, hybrid, electric). Based on these parameters, a relevant emission factor

was selected and multiplied by the consumed litres of fuel. The emission factor was provided by DEFRA. The consumption in litres and the respective CO_2e emissions are listed in Table 5.

Table 5 - Overview of fuel consumption and emissions from company vehicles

Type of Vehicle	Type of Fuel	Consumption [litre]	Scope 1 Emissions [t CO_2e]	Scope 3 Emissions [t CO_2e]
Large	Diesel	360	0.93	0.22
Large	Petrol	666	1.47	0.40
		Total	2.40	0.62

4.1.3 Refrigerants

At Cedefop, refrigerants are used for cooling purposes for air conditioning and fridge devices. Emissions from refrigeration and air conditioning result from leakage over the operational life of the equipment and disposal at the end of the life of the equipment. The emission factor was provided by DEFRA.

Refilling due to refrigerant gas leakage is a small but relevant source of GHG emissions at Cedefop, as these emissions can mostly be avoided through regular equipment maintenance.

Leakages occurred in 2019 for refrigerants R407F and R134a.

Table 6 - Overview of emissions from refrigerant leakages

Refrigerant	Refill Quantity [t]	Scope 1 Emissions [t CO_2e]
R407F	0.007	11.86
R134a	0.008	10.73
	Total	22.59

4.2 Scope 2 Emissions

Scope 2 emissions relate to all indirect, energy-related emissions. For Cedefop, this includes electricity.

4.2.1 Electricity

Aligned with the GHG protocol, electricity was calculated using the market- and location-based approaches. The market-based approach considers the electricity mix of the organisation's electricity provider, while the location-based approach reflects the average electricity mix on the country level. Emissions from electricity consumption are based on site-specific consumption and market-based emissions factors, which refer to the supplier-specific electricity mix. The emission factor for the location-based approach was provided by ADEME.

Electricity consumption is a significant contributor to Cedefop's carbon footprint, as no green electricity is consumed.

Table 7 - Overview of electricity consumption and emissions

Consumption [kWh]	Scope 2 Emissions [t CO_2e]		Scope 3 Emissions [t CO_2e]	
	Market-based	Location-based	Market-based	Location-based
884,115	420.54	634.79	110.01	158.7

4.3 Scope 3 Emissions

Scope 3 emissions relate to all other indirect emissions along the value chain. In coordination between Cedefop and Ramboll, applicable scope 3 emissions to be included in the calculation were identified and comprise purchased goods and services, capital goods, waste treatment, business travel (including visitor travel) and employee commuting.

4.3.1 Purchased Goods and Services

The emission source associated with purchased goods and services is significant for Cedefop. It is separated into categories aligned with the EU Commission reporting, the EU Environmental Agency reporting, and other EU organisations: paper, canteen, and service contracts. Emissions resulting from the purchased goods are provided by weight, whereas procured services were included on a FTE-basis.

Suggestions for data improvement

For the future, Cedefop should aim for more precise calculations in collaboration with its most relevant suppliers as the spend-based approach entails high uncertainty, although it is common practice due to the lack of more accurate data.

4.3.1.1 Paper

Paper is purchased for both typical office use and printing, as well as for publication purposes. The emission factors for new paper are provided by the ADEME.

Table 8 - Overview of paper purchase

Purpose	Quantity [t]	Scope 3 Emissions [t CO_2e]
Office printing	2.03	0.60
Publications	7.70	2.29
Total	9.73	2.89

4.3.1.2 Canteen

The cafeteria at Cedefop's premises offers its employees food daily. For the carbon footprint, food had been classified into generalised categories to facilitate the data collection and calculations. An overview of the categories of purchased foods is provided in Table 9, and other purchased materials in Table 10.

Table 9 - Overview of canteen food purchases and emissions

Food type	Quantity [t]	Total Scope 3 Emissions [t CO_2e]
Fruits	13.2	10.26
Vegetables	1.90	1.60
Meat	3.79	62.76
Fish	1.10	8.26
Dairy products	2.37	8.03
Eggs	0.11	0.09

Bread, flour and pasta	1.81	2.03
Rice and cereals	0.65	0.88
Sugar	0.40	0.80
Oil	0.82	3.12
Coffee	0.85	2.70
	Total	100.53

Table 10 - Overview of canteen materials purchases and emissions

Product	Quantity	Unit	Scope 3 Emissions [t CO_2e]
Disinfectant	0.24	t	1.07
Chemicals	400.00	€	0.64
Cardboard	900.00	€	0.81
Paper	0.5	t	0.15
Water	6,000	l	>0.01
	Total		2.67

Additionally, water purchased to be used in the building is also accounted for.

Table 11 - Overview of other purchased materials (water) and emissions

Material	Quantity [litre]	Scope 3 Emissions [t CO_2e]
Water	1,682,000	0.58

4.3.1.3 Services contracts

The procurement of external services is a relevant activity at Cedefop. Emissions from external services can only be calculated on spend-based data due to lack of more precise data. Accounting services on a spend-basis is common practice although it reduces accuracy in assessing the carbon footprint in this category. Gaining supplier-specific data still represents a challenge in practice which is why the spend-based method is a commonly used calculation approach. It provides a very rough and general indication of the relevance of emissions resulting from purchased services.

At Cedefop, the external services relevant for the present category are performed on-site. Therefore, the approach chosen is to consider the FTEs and their related emissions as already reflected in Cedefop's utilities consumption (water, electricity). This approach is also followed by other EU institutions such as the EEA.

The rough estimate of the carbon footprint calculated following a spend-based methodology is provided below for information. However, the provided amount is not included in the total carbon footprint.

Suggestions for data improvement

The spend-based emission factors were provided in ADEME. More detailed information from the service providers would decrease uncertainty and allow more accurate results. Other calculation approaches may include:

- Supplier-specific method: collect supplier specific scope 1 and 2 emissions generated by the supplier to provide the respective service for Cedefop. This can include emissions from electricity consumption, heating and cooling, travelling, transportation, purchased products such as cleaning agents, etc. As a first step Cedefop could identify its most relevant suppliers in terms of GHG emissions and start this data collection process with those suppliers before rolling it out to further service providers. The requirement of this information could be taken up already in the tendering process.

- Average data method: for the most relevant suppliers, the essential emission sources related to the provision of their services for Cedefop could be identified. For consultancy services this could entail the number of working hours (emission source: energy consumption of IT, heating and cooling of office space, business travel to Cedefop) or purchased material such as cleaning agents and commuting to Cedefop's premises for cleaning services, etc. These data could be collected from Cedefop's suppliers and proxies could be used to calculate the emissions e.g. based on the working hours.

Table 12 - Overview of purchased external services (not included in the total carbon footprint)

Service	Quantity [EUR]	Scope 3 Emissions [t CO_2e]
Cleaning services	95,664	153.06
Canteen contractor	15,500	4.96
Security services	138,022	22.08
	Total	180.1

For transparency reasons, more detailed information on Cedefop's additional purchased services including consulting services (e.g., translation, legal services) will be provided in a separate chapter.

4.3.2 Capital goods

4.3.2.1 Building

Construction of Cedefop building started in 1995 and was completed in 1999. The building emissions were accounted for based on the square meters and were amortised over 25 years. While the GHG Protocol does not foresee the amortisation of capital goods emissions from buildings, it is well required by the guidance document for EU institutions for corporate carbon footprinting[11] and, therefore, also applied by other EU institutions. A 25-year amortisation period was chosen to ensure alignment with Cedefop's amortisation rate.

The following table describes the building information used for calculating this category's emissions.

Table 13 - Overview of building areas and emissions

Type of Area	Area [m^2]	Total Scope 3 Emissions [t CO_2e]
Office area	4,934	92.57
Conference rooms and restaurant	1,638	30.73
Underground garage	680	17.84
Basement (storage, electro-mechanical equipment, IT equipment etc.)	2,120	39.77
Open parking area	1,000	2.92
	Total	183.83

4.3.2.2 IT equipment

IT equipment represents another relevant category of capital goods at Cedefop. For the IT equipment, the ADEME provides an emission factor expressed per unit. For purchased software, a spend-based emission factor was applied.

The following table describes the IT equipment and associated emissions.

[11] 'Calculating, reporting, reducing and compensating greenhouse gas emissions - Guidelines for European Institutions and Bodies'

Table 14 - Overview of IT equipment and emissions

IT Category	Quantity	Unit	Total Scope 3 Emissions [t CO_2e]
Desktops	60	Pieces	10.14
Laptops	37	Pieces	5.77
TV	1	Pieces	0.50
Tablet	2	Pieces	0.13
Camera	4	Pieces	0.10
Mobile phone	11	Pieces	0.36
Printer	5	Pieces	0.44
Server	2	Pieces	1.20
Rack	4	Pieces	2.00
Network switch	14	Pieces	1.13
Air condition separate unit	1	Pieces	0.24
Software	3,400	€	1.36
		Total	23.37

Depreciation values were not applied for IT equipment which is in line with the GHG Protocol.

For the forthcoming carbon calculations, if possible, Cedefop could collect from suppliers the life cycle emission factor of any new acquisition. This would decrease uncertainty, allow more accurate results and provide additional levers for further decarbonisation.

4.3.3 Waste generated in operations

Waste disposal covers all waste generated onsite. It is understood that waste generated during Cedefop operations is separated but mostly landfilled due to local waste management practices. The emission factors were provided by ADEME.

Suggestions for data improvement

As the municipality collects generated waste, Cedefop could not provide precise weight amounts for waste. However, rough estimations were made based on estimated volumes collected on a regular basis. Cedefop extrapolated these amounts. In the future, further relevant waste categories, such as electronic waste or battery waste, should be collected if respective waste was generated. Measuring waste amounts based on actual weight data would also increase the accuracy of emissions in this category.

Apart from waste, wastewater was also considered in this category.

Table 15 - Overview of waste disposal and waste water and related emissions

Waste fraction	Quantity	Unit	Waste Treatment	Total Scope 3 Emissions [t CO_2e]
Wastewater	1,121,333	Litres	Recycling (wastewater treatment plant)	0.79
Residual waste	10.29	Tons	Landfill	6.25
Paper	6.17	Tons	Recycling	0.87
			Total	7.92

4.3.4 Business travel

Business travel includes emissions from the transportation of employees for business activities. Travel distances were collected for air, car, taxi, bus and rail travel. Specific emissions factors were applied for air and rail travel based on the distance. As the EU institutions' guidelines recommended, a RFI factor of 2 was applied to calculate air travel emissions.

For air travel, the calculation distinguishes between:

- Domestic: <464 km one-way; Economy
- Short-haul: 464-3,700 km one-way; Economy or Business and
- Long-haul: >3,700 km one-way; Economy, Premium economy, or Business

The emission calculation is based on distances between departure and arrival destinations and the mode of transport indicated. Table 16 shows an overview of the transport mode, the travelled kilometres and the generated CO_2e emissions.

The emission factors selected correspond to the DEFRA database and include well-to-tank (WTT) emissions[12].

Accommodation based on hotel stays is included in this category's total scope 3 emissions, as shown in Table 17.Accommodation emission factors correspond to the DEFRA database.

Table 16 - Overview of business travel emissions

Transport mode	Distance travelled [km]	Total Scope 3 Emissions [t CO_2e]
Domestic	33,769	10.05
Short-haul	1,239,519	225.25
Long-haul	157,814	27.59
Rail	6,167	0.06
Bus	1,572	0.20
Taxi	1,785	0.33
Car	4,071	0.91
	Total	264.39

Table 17 - Overview of Cedefop accomodation emissions associated with travel

Category	Total Scope 3 Emissions [t CO_2e]
Accommodation	21.06

4.3.5 Visitor travel

Cedefop invites guests to events and meetings in Greece and other locations, predominantly in Europe and therefore pays for the visitors' travel. Considering this, emissions from visitor travel are included in Cedefop's carbon footprint. For the calculation, the same methodology is applied here as for the employee's business travel category. Data was provided via the reimbursement tool used by Cedefop. Visitor travel data is only available for the travels reimbursed by Cedefop. Accommodation is included in this category, as shown separately[13] in Table 19.

[12] A Well-to-Tank emissions factor, also known as upstream or indirect emissions, is an average of all the GHG emissions released into the atmosphere from the production, processing and delivery of a fuel or energy vector.

[13] The 43.10 t CO_2e related to accommodation are included in the overall visitor travel emissions representing 165.69

Table 18 - Overview of visitor travel emissions

Transport mode	Distance travelled [km]	Total Scope 3 Emissions [t CO_2e]
Domestic	13,077	7.20
Short-haul	585,170	156.04
Long-haul	11,621	2.45
	Total	165.69

Table 19 – Overview of visitor accomodation emissions

Category	Total Scope 3 Emissions [t CO_2e]
Accommodation	43.10

4.3.6 Employee commuting

Employee commuting includes emissions from the transportation of employees between their homes and worksite. An employee survey for collecting primary data was conducted. Approximately 45% of Cedefop's employees who worked for Cedefop in 2019 completed the survey. The data was then extrapolated to the total number of employees.

Table 20 presents some statistics taken from the survey analysis.

Table 20 – Employee commuting survey analysis

Data insights	2019
Average number of days commuted (in 2019) per employee per week	4 days
Typical commuting method	Car
Average distance travelled (one way – km)	7.6

All respondents commuted from home to work by car, with petrol for the majority (63% of respondents), followed by diesel fuel (33%) and one hybrid vehicle (2%).

Table 21 presents the emissions associated with daily employee commuting.

Table 21 – Employee commuting emissions

Emissions source	Total Scope 3 Emissions [t CO_2e]
Employee commuting	73.26

4.4 Uncertainty evaluation of activity data and emission factors

The certainty of the carbon footprint highly depends on the quality of the activity data and the certainty of the emission factors (EF) applied.

The following table provide a quality assessment of the activity data provided by Cedefop, the source of uncertainty for the emissions factors, and advice for improvement to reduce overall uncertainty for the forthcoming carbon footprints.

Table 22 – Data quality assessment for the 2019 Carbon Footprints

Data type	Data provided	Data Quality	Improvements for data quality	EF Certainty
Fuel oil for heating	Consumption of fuel oil provided in litres.	High	n/a	High

Data type	Data provided	Data Quality	Improvements for data quality	EF Certainty
Electricity	Consumption provided in kWh.	High	n/a	Medium (30-50% uncertainty)
Company-owned vehicles	Vehicles identified (brand, model), size provided, and consumption quantity in litres in 2019 provided.	High	n/a	High
Refrigerants	A description of all items for the cooling systems was provided. The total quantity of refrigerant gas leakages and refrigerant types were also provided per items.	High	n/a	High
Waste	Several different types of waste were reported. Treatment is partly specified.	Low	Actual weight amounts per waste type as well as additional waste categories, e.g. battery waste would increase accuracy of the data	High
Commuting	A survey had been conducted to record the different transportation modes and distances, as well as the days worked at the office and at home.	Medium	A higher participation rate in the commuting survey could increase the accuracy as less extrapolation would be required	High
Business travel and Visitors' meeting	Information from the business travel booking tool (mode of transport, km) for business trips and hotel nights provided.	High	n/a	High
Paper	Kg of paper type and format provided.	High	Some providers communicate on their products emission factors which would allow supplier specific calculations.	Medium (20% uncertainty)
Canteen	Kg of food gathered in broad categories, other material in kg or spend-based, water in litres.	High	n/a	High
Services contracts	Cleaning services, canteen contractor, and security contracts – provided in FTEs.	Medium	Data provided as FTE data ensure medium quality. Supplier specific information would improve the accuracy of the emissions.	Low (80% uncertainty)

Data type	Data provided	Data Quality	Improvements for data quality	EF Certainty
Capital goods – Buildings	Information on surface and the construction year for the building provided. Some information regarding construction materials.	High	n/a	Medium (15-50% uncertainty)
Capital goods – IT equipment	Number of units of IT inventory and details regarding the type of IT equipment considered. According to the replacement policy, is formally set at 4 years, but may range up to 5-7 years or longer depending on the item.	High	Some providers communicate on their products emission factors. Adapting the depreciation closer to the reality for each equipment.	Low (50% uncertainty)

4.5 Data owners

The table below reports Cedefop contact persons that provided the various data necessary for the Carbon Footprint.

Table 23 – Data collection contact persons

Cedefop contact	Function	Operation	Data
Konstantinos ZIOGAS	Security officer – service coordinator	Facilities	Heating
			Electricity
			Refrigerants
Thomas MELLIOS	Expert – Information systems		Company owned vehicles
			Waste disposal
			Water supply & treatment
Michail CHRISTIDIS	Head of Service	Procurement & Finance	Purchased goods & services
Spyros ANTONIOU	Expert – Cybersecurity	ICT	Capital goods
Athanassios SIAPERAS	Expert – Service coordinator		
Alexandros PAPADOPOULOS	Facilities assistant	Inventory / Office supplies	
Josefina KIORPELIDOU	Assistant to the Head of department – internal control coordination	Administration	Business and visitor travel
Aleka LANTZONI	Assistant – Imprest account		

5. Carbon footprint results 2019

This section outlines the results of the corporate carbon footprint calculation for Cedefop.

5.1 Overall Corporate Carbon Footprint

Following the calculation approach described in section 4, Cedefop's CCF for the reporting period of 2019 is calculated to be

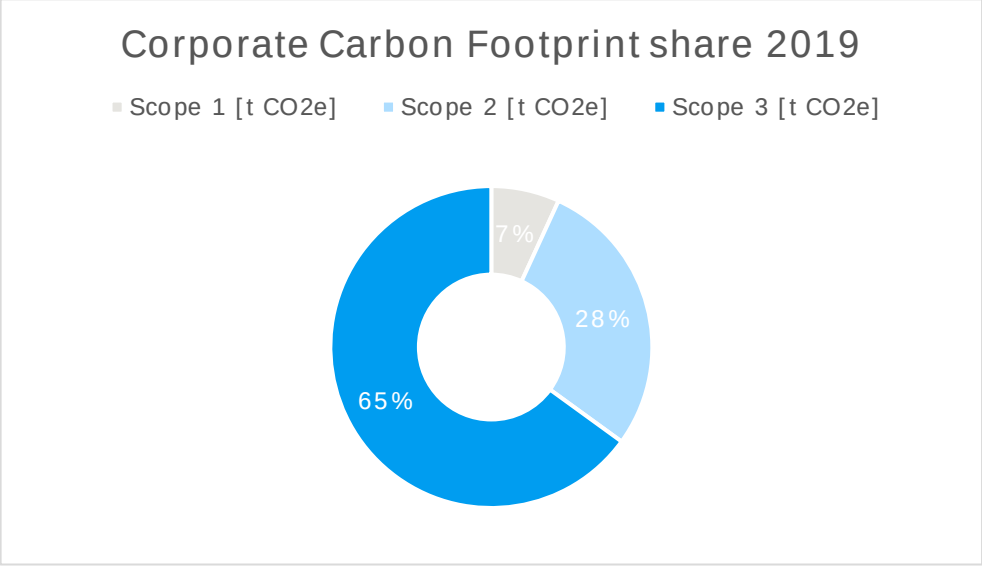
1,494.68 t CO_2e

This is equivalent to approximately 466,000 litres of diesel consumption. Table 24 and Figure 2 display an overview of Cedefop's emissions from each scope, identifying scope 3 emissions to be the main contributor to the CCF, with a share of 65%.

Table 24 - Total carbon emissions and emissions per scope

Scope	Emissions [t CO_2e]	Share [%]
Scope 1	102.56	7
Scope 2	420.54	28
Scope 3	971.58	65
Total	**1,494.68**	**100**

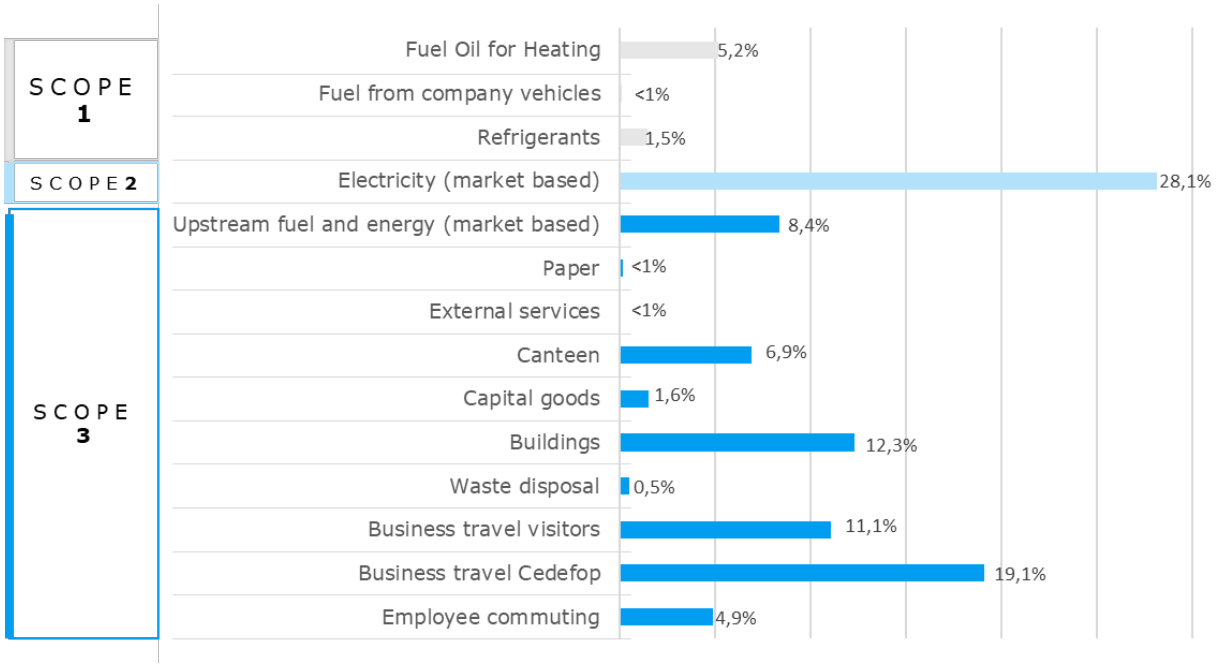
Figure 2 - Share of CO_2e emissions per scope



5.2 Carbon Footprint per Emissions Source

For further understanding and in-depth analysis of the emissions, a more detailed depiction of the emissions sources is required. Thus, Figure 3 displays Cedefop's emissions per emissions source as defined by the operational boundary.

Figure 3 - Share of CO_2e emissions per emission source



Within scope 1, fuel oil for heating comprises the largest portion at 5% of the total contribution to Cedefop's carbon footprint.

In scope 2, electricity represents the only relevant emission source, with 28,1% of the total Cedefop carbon footprint.

Within scope 3, Cedefop's business travel represent the most important emission source at 19%, followed by the building and the visitors' travels (respectively 12% and 11%). These categories are followed by upstream fuel and energy (8%), canteen (7%) and employee commuting (5%).

Electricity (scope 2) is the largest contributor of all included categories with 28%.

6. Key issues related to Cedefop context

Before presenting the mitigation measures to reduce Cedefop's emissions, it is essential to understand the context in which the organisation operates. The policies, measures and national circumstances of the country in which Cedefop is located can represent both opportunities and hurdles to implementing mitigation measures. Understanding this specific context is therefore essential to provide tailored and efficient measures that will provide a long-term reduction in carbon emissions.

6.1 Rebound effects, and "carbon leakage", caused by teleworking

Although it is argued that teleworking can reduce GHG emissions due to a decrease in commuting and office energy use, it would be overly simplistic to assume that these emissions are entirely avoided. Instead, there may be a shift in emissions from the office to the employee's home. Diving into the literature focusing on the topic, Hook et al. (2020)[14] argue that 70% of studies found that teleworking reduces energy consumption, while another 30%, that are deemed methodologically rigorous, indicate that the benefits of teleworking could be offset, in part or entirely, by longer commutes or other rebound effects [15][16].

Yet, research striving to quantify the magnitude of this rebound effect remains limited and focuses on specific national contexts. For instance, the French Ecologic Transition Agency found that in the French context, the total rebound effects of teleworking, which include extra trips, home relocation, videoconference use, and energy use at home, reduce the positive environmental effects of teleworking by an average of 31% (resulting in an increase of +84 kg CO_2e/year for one day of teleworking per week, as initially calculated by ADEME in 2015)[17]. However, according to them, if teleworking is combined with a reduction in office space and flex office, the environmental benefits can increase up to 52% per day of telework.

6.1.1 Different types of rebound effects

Developing a comprehensive and precise understanding of the rebound effects associated with teleworking requires distinguishing the different types of rebound effects. By understanding their differences, one can develop more targeted strategies to mitigate them.

There are three main typologies of the rebound effects, and they are displayed in Table 25 and detailed in the following sections.

[14] Hook, A., Sovacool, B. K., & Sorrell, S. (2020). A systematic review of the energy and climate impacts of teleworking. Environmental Research Letters, 15(9), 093003. https://iopscience.iop.org/article/10.1088/1748-9326/ab8a84/pdf

[15] Balepur P N, Varma K V and Mokhtarian P L 1998 Transportation impacts of center-based telecommuting: interim findings from the neighborhood telecenters project Transportation 25 287–306| Request PDF (springer.com) https://link.springer.com/article/10.1023/A:1005048329523

[16] Chakrabarti S 2018 Does telecommuting promote sustainable travel and physical activity? J. Transp. Health 9 19–33 | Request PDF (sciencedirect.com) https://www.sciencedirect.com/science/article/abs/pii/S2214140517309258

[17] ADEME (2020). Caractérisation des effets rebond induits par le télétravail https://librairie.ADEME.fr/mobilite-et-transport/3776-caracterisation-des-effets-rebond-induits-par-le-teletravail.html#:~:text=Hors%20effets%20sur%20l'immobilier,les%20b%C3%A9n%C3%A9fices%20environnementaux%20du%20t%C3%A9l%C3%A9travail

Table 25 – Typologies of rebound effects

Impact type	Description
Direct rebound effect	The direct rebound effect refers to the increase in consumption or use of a resource or service that directly results from the efficiency gains or cost savings achieved through the adoption of a new practice[18].
Indirect impacts	The indirect rebound effect refers to the secondary effects that result from the efficiency gains or cost savings achieved through the adoption of a new practice[19].
Structural/long term rebound effect	The structural rebound effect refers to the long-term changes in the economy, technology, and social behaviour that result from the adoption of a new practice. These changes can lead to a shift in the demand for resources and can either increase or decrease energy consumption or resource use[20].

6.1.2 Direct rebound effects of teleworking

The direct rebound effects of teleworking are arguably the most significant to consider, as they can offset some or all of the environmental benefits of teleworking. They occur when the energy savings achieved through teleworking lead to an increase in the consumption of other goods and services that require energy. Such rebounds have received extensive attention in the literature, and scholars have even worked on measuring their magnitude. While ADEME (2020)[21] identified up to 16 direct rebound effects associated with teleworking, the following section summarises the four most prominent effects cited in the literature.

1. One of the main direct rebound effects associated with teleworking is the **changes in day-to-day mobility.** They refer to the changes in travel patterns and transportation choices and emerge for several reasons: (1) the vehicle not used to travel to the place of work is available to other members of the household and (2) proximity to the place of life encourages new travel (micro-shopping, new associative activities, sports or family, transport of a relative, etc.). According to ADEME (2020)[22], while teleworking reduces the need for commuting to a centralized office, it may lead to increased travel for other purposes, such as running errands, leisure activities or driving a relative somewhere. Instead of using one trip for different purposes, for example, going to work and doing grocery shopping, individuals might multiply single-purpose drives in a week. Of course, the total number of daily trips taken by each individual may vary depending on the household's task distribution, and the frequency of teleworking. These changes in mobility patterns can lead to an increase in carbon emissions from transportation, offsetting the emissions reductions from reduced commuting. For ADEME, these new mobility possibilities

[18] Castro, C. G., Trevisan, A. H., Pigosso, D. C., & Mascarenhas, J. (2022). The rebound effect of circular economy: Definitions, mechanisms and a research agenda. Journal of Cleaner Production, 345, 131136. | Request PDF (sciencedirect.com) https://www.sciencedirect.com/science/article/pii/S0959652622007685

[19] Ibid.

[20] Ibid.

[21] ADEME (2020). Caractérisation des effets rebond induits par le télétravail https://librairie.ADEME.fr/mobilite-et-transport/3776-caracterisation-des-effets-rebond-induits-par-le-teletravail.html#:~:text=Hors%20effets%20sur%20l'immobilier,les%20b%C3%A9n%C3%A9fices%20environnementaux%20du%20t%C3%A9l%C3%A9travail

[22] ibid

could result in an average of 1201 km of extra personal trips with the vehicle per year for one day of teleworking per week, equivalent to 67.7 kg CO_2e per year[23].

2. The **relocation effect** is another significant direct rebound effect associated with teleworking, where individuals may choose to move to more rural or distant areas because they no longer need to live close to their workplace. The potential impacts of this relocation effect are numerous, including an increase in housing size, which may lead to a rise in energy use at home, an increase in car use due to reduced public transport availability or lower accessibility in rural areas, and in extreme cases, more polluting transportation methods like air travel when living in even more distant locations. According to ADEME (2020)[24], this relocation effect could significantly diminish the positive impacts of teleworking. While reliable data on the subject is rare, ADEME found that the impact of an employee living in Nice, France, taking a plane three times a year to go to an office located in Paris would spend 322 kg CO_2e. Similarly, a worker who lives 30 km away from a train station and takes a 400 km train to Paris twice a week spends 13,5 kg CO_2e.
3. **Increased home consumption** is another direct rebound effect associated with teleworking, where individuals may use more energy and resources in their homes due to spending more time there[25]. Previous studies have assumed that this rising energy consumption is related to the increasing use of heating, air conditioning or lighting equipment[26]. In addition, teleworkers may need to use more energy to prepare and cook meals at home rather than eating out or using office kitchens, which can contribute to the rebound effect. However, it is important to note that the magnitude of this rebound effect may vary depending on individual behaviours and home characteristics, such as the energy efficiency of the home and appliances, the climate, and the preferences and habits of the teleworker.
4. Finally, when teleworking becomes the norm, it can be accompanied by 'flex office policies' that can **increase energy consumption and emissions at the office**. In a flex office arrangement, the energy required to power the lighting, heating, and cooling systems is spread across multiple individuals using the space at different times. This means there is a higher likelihood that the energy-consuming systems will remain on even when the space is not in use to its full capacity, leading to higher energy consumption. While this is a significant yet recent phenomenon, ADEME identifies three different scenarios which have considerably different impacts. In the first scenario, teleworking without a flex office policy only results in a marginal reduction in energy consumption at the office, estimated to be a reduction of 6.7 kg CO_2e per year per day of the week teleworked in the French context. In the second scenario, teleworking is coupled with an unorganized flex office, resulting in a positive rebound effect of 292.5 kg CO_2e per year. The third scenario is the organized and optimized flex office, which results in a reduction of 234 kg CO_2e per year per day of the week teleworked.

[23] ibid

[24] ADEME (2020). Caractérisation des effets rebond induits par le télétravail https://librairie.ADEME.fr/mobilite-et-transport/3776-caracterisation-des-effets-rebond-induits-par-le-teletravail.html#:~:text=Hors%20effets%20sur%20l'immobilier,les%20b%C3%A9n%C3%A9fices%20environnementaux%20du%20t%C3%A9l%C3%A9travail

[25] ClimateXchange (2021). Emissions impact of home working in Scotland https://www.climatexchange.org.uk/media/4941/emissions-impact-of-home-working-in-scotland-cxc-june-2021.pdf

[26] Eco Act (2020) Whitepaper, https://info.eco-act.com/hubfs/0%20-%20Downloads/Homeworking%20emissions%20whitepaper/Homeworking%20Emissions%20Whitepaper%202020.pdf

6.1.3 Indirect rebound effect of teleworking

In addition to direct rebound effects, teleworking can also lead to indirect rebound effects. The indirect rebound effect refers to the secondary effects resulting from the efficiency gains or cost savings achieved through adopting a new practice. While these effects are well documented in the literature, it is more challenging to quantify their impact.

An indirect rebound of teleworking is related to **increased non-work travels**[27] [28] [29] [30]. Indeed, teleworking may free up time that workers can use for other activities, including leisure travel. For some employees, teleworking may provide more flexibility in their work schedule, making it easier to take extended weekend trips abroad. Since teleworking allows them to work from anywhere with an internet connection, they may be more likely to take advantage of this flexibility and travel during weekends or other days off[31]. The extent of the increase in non-work travel and its impact on the environment depends on various context-specific factors, including the characteristics of the area where the worker lives, accessibility and number of people in the household.

Another indirect rebound effect is the **surge in the utilization of ICT equipment,** such as computers and screens[32] [33] [34]. Indeed, teleworking may require employees to have their own computer, smartphone, and other ICT devices at home to be able to work effectively. This can lead to a doubling in the production and consumption of these devices. Such technologies have the potential to escalate energy usage and lead to higher GHG emissions from several perspectives: the production, operation, and disposal of infrastructure and equipment[35]. This shift in ICT equipment usage could have a positive or negative environmental impact depending on the baseline scenario[36].

[27] Hook, A., Sovacool, B. K., & Sorrell, S. (2020). A systematic review of the energy and climate impacts of teleworking. Environmental Research Letters, 15(9), 093003. https://iopscience.iop.org/article/10.1088/1748-9326/ab8a84/pdf

[28] Cerqueira, E. D. V., Motte-Baumvol, B., Chevallier, L. B., & Bonin, O. (2020). Does working from home reduce CO2 emissions? An analysis of travel patterns as dictated by workplaces. Transportation Research Part D: Transport and Environment, 83, 102338. https://doi.org/10.1016/j.trd.2020.102338

[29] Tenailleau, Q. M., Tannier, C., Vuidel, G., Tissandier, P., & Bernard, N. (2021). Assessing the impact of telework enhancing policies for reducing car emissions: Exploring calculation methods for data-missing urban areas–Example of a medium-sized European city (Besançon, France). Urban Climate, 38, 100876. | Request PDF (sciencedirect.com) https://www.sciencedirect.com/science/article/abs/pii/S2212095521001061#:~:text=regarding%20vehicle%20fleets.-,Our%20results%20confirms%20the%20efficiency%20of%20telework%20for%20reducing%20emissions,up%20to%20a%20factor%20ten).

[30] Riley et al (2021). Emissions impact of home working in Scotland https://era.ed.ac.uk/handle/1842/37935

[31] ADEME (2020). Caractérisation des effets rebond induits par le télétravail https://librairie.ADEME.fr/mobilite-et-transport/3776-caracterisation-des-effets-rebond-induits-par-le-teletravail.html#:~:text=Hors%20effets%20sur%20l'immobilier,les%20b%C3%A9n%C3%A9fices%20environnementaux%20du%20t%C3%A9l%C3%A9travail

[32] Hook, A., Sovacool, B. K., & Sorrell, S. (2020). A systematic review of the energy and climate impacts of teleworking. Environmental Research Letters, 15(9), 093003.

[33] ADEME (2020). Caractérisation des effets rebond induits par le télétravail https://librairie.ADEME.fr/mobilite-et-transport/3776-caracterisation-des-effets-rebond-induits-par-le-teletravail.html#:~:text=Hors%20effets%20sur%20l'immobilier,les%20b%C3%A9n%C3%A9fices%20environnementaux%20du%20t%C3%A9l%C3%A9travail

[34] Obringer et al (2021). The overlooked environmental footprint of increasing Internet use | Request PDF (sciencedirect.com) https://www.sciencedirect.com/sdfe/pdf/download/eid/1-s2.0-S0921344920307072/first-page-pdf

[35] Hook, A., Sovacool, B. K., & Sorrell, S. (2020). A systematic review of the energy and climate impacts of teleworking. Environmental Research Letters, 15(9), 093003.

[36] ADEME (2020). Caractérisation des effets rebond induits par le télétravail https://librairie.ADEME.fr/mobilite-et-transport/3776-caracterisation-des-effets-rebond-induits-par-le-teletravail.html#:~:text=Hors%20effets%20sur%20l'immobilier,les%20b%C3%A9n%C3%A9fices%20environnementaux%20du%20t%C3%A9l%C3%A9travail

Similarly, another indirect effect of teleworking can be the **growing reliance on Internet-based services related to teleworking**, such as videoconferencing, cloud storage, and emails. While video conferencing is in most scenarios less energy-consuming than in person meetings[37], and using the cloud is a sensibly greener option than printing paper documents[38], these activities have an environmental cost. Internet usage has a carbon footprint ranging from 28 to 63 g CO_2e per gigabyte (GB)[39], videoconferencing is one of most energy-intensive internet-based services generating roughly 1g of CO_2e per minute of use[40], and using the cloud is also extremely carbon-intensive. Yet, the extent to which these activities are related to teleworking is still uncertain. While the Carbon Trust (2021)[41] highlighted that during the pandemic, data traffic over the Internet increased, telecommunications operators reported only minor increases in energy consumption[42]. This indirect rebound effect will require more attention in the coming years.

6.1.4 Structural rebound effect of teleworking

In addition to direct and indirect rebound effects, teleworking can also have significant long-term or structural rebound effects that can further offset the environmental benefits of teleworking. Structural rebound occurs when changes in behaviour or technology led to long-term changes in the way energy is used. Although these rebound effects are still little-known, several studies have highlighted the importance of considering them, particularly in scenarios where teleworking practices become permanent [43] [44] [45] [46].

The advent of teleworking has presented an opportunity for people to work from home, which has significantly reduced commuting time and associated costs. However, it has also led to a structural rebound effect known as **urban sprawl**. The rise of teleworking has seen people move from urban areas to suburbs and rural areas, which has resulted in an increase in the expansion of cities. This increase in urban sprawl can be seen in many cities worldwide, as people look for more affordable housing and larger living spaces, leading to a strain on infrastructure and an increase in carbon

[37] ONG et al (2014). Comparison of the energy, cabron and time costs of videoconferencing and in-person meetings | Request PDF (sciencedirect.com) https://www.sciencedirect.com/science/article/abs/pii/S0140366414000620

[38] Moodie (2014). Is digital greener than paper? The Guardian https://www.theguardian.com/sustainable-business/digital-really-greener-paper-marketing

[39] Obringer et al (2021). The overlooked environmental footprint of increasing Internet use | Request PDF (sciencedirect.com) https://www.sciencedirect.com/sdfe/pdf/download/eid/1-s2.0-S0921344920307072/first-page-pdf

[40] Greenspector (2022). The impact of our videoconferencing uses on mobile and PC! 2022 edition https://greenspector.com/en/videoconferencing-apps-2022/

[41] Carbon Trust (2021) Homeworking Report https://www.vodafone-institut.de/wp-content/uploads/2021/06/CT_Homeworking-report-June-2021.pdf

[42] Obringer et al (2021). The overlooked environmental footprint of increasing Internet use | Request PDF (sciencedirect.com) https://www.sciencedirect.com/sdfe/pdf/download/eid/1-s2.0-S0921344920307072/first-page-pdf

[43] [43] ADEME (2020). Caractérisation des effets rebond induits par le télétravail https://librairie.ADEME.fr/mobilite-et-transport/3776-caracterisation-des-effets-rebond-induits-par-le-teletravail.html#:~:text=Hors%20effets%20sur%20l'immobilier,les%20b%C3%A9n%C3%A9fices%20environnementaux%20du%20t%C3%A9l%C3%A9travail

[44] e Silva, J. D. A., & Melo, P. C. (2018). Does home-based telework reduce household total travel? A path analysis using single and two worker British households. Journal of Transport Geography, 73, 148-162. | Request PDF (sciencedirect.com) https://www.sciencedirect.com/science/article/abs/pii/S0966692317307019#:~:text=The%20results%20indicate%20that%20among,association%20for%20two%2Dworker%20households.

[45] Bloomberg (2021). The environmental implications of the return to the office https://www.bloomberg.com/news/articles/2021-03-29/is-telecommuting-really-greener-it-depends

[46] IEA (2020). Working from home can save energy and reduce emissions. But how much? https://www.iea.org/commentaries/working-from-home-can-save-energy-and-reduce-emissions-but-how-much

emissions from transportation [47] [48] [49] [50] [51]. Some suggest mitigating this rebound effect by implementing policies that promote sustainable urban development, reduce commuting time, and provide affordable housing to mitigate the adverse environmental effects of urban sprawl.

Additionally, one structural rebound effect associated with teleworking is the potential for individuals to have a higher purchasing power, as teleworking can reduce transportation costs and expenses associated with office-based work. However, this increased purchasing power can lead to an increase in the consumption of goods and services, including those with negative environmental impacts.

As teleworking continues to become more prevalent, it is likely that other structural and long-term rebound effects will be discovered in the coming years. This is because the long-term impacts of any major social and economic shift can be difficult to fully understand and predict, particularly in the early stages of the trend. Additionally, environmental impacts associated with teleworking may evolve and become more complex over time. For example, as **new technologies** are developed and adopted such as 5G, cloud services, online working platforms and AI are incorporated into our daily lives, there may be changes in how energy is consumed in teleworking contexts.

Moreover, overall patterns of **transportation and urban development may shift** in ways that are difficult to fully anticipate. Ultimately, the full range of structural and long-term rebound effects associated with teleworking will likely only become clear over time, as the trend continues to evolve, and new research are conducted. As we continue to explore the implications of remote work, it will be important to remain vigilant and adaptive, adjusting practices as needed to ensure that the benefits of teleworking are maximized while minimizing any negative consequences.

6.2 Measures to influence staff behaviour with regard to home-office environment and commuting (nudging/signalling measures)

While policy changes and technological advancements can contribute significantly to reducing an organisations' carbon footprint, changing individual behaviour is also essential in achieving this goal. Nudging and signalling measures are techniques that are employed to encourage sustainable behaviour. Nudging involves subtle modifications to the environment or information presentation to influence behaviour in a positive way. For instance, a company may make recycling bins more visible to encourage recycling. Signalling, on the other hand, refers to the use of certifications, labels, and other visible indicators to demonstrate commitment to sustainable behaviour. The purpose of signalling measures is to provide clear and recognizable evidence of an individual or organisation's dedication to sustainability, which can encourage others to make more sustainable choices.

[47] Moglia, M., Hopkins, J., & Bardoel, A. (2021). Telework, hybrid work and the United Nation's Sustainable Development Goals: towards policy coherence. Sustainability, 13(16), 9222. | Request PDF (researchgate.net) https://www.researchgate.net/publication/353958683_Telework_Hybrid_Work_and_the_United_Nation's_Sustainable_Development_Goals_Towards_Policy_Coherence

[48] IEA (2020). Working from home can save energy and reduce emissions. But how much? https://www.iea.org/commentaries/working-from-home-can-save-energy-and-reduce-emissions-but-how-much

[49] Riley et al (2021). Emissions impact of home working in Scotland https://era.ed.ac.uk/handle/1842/37935

[50] e Silva, J. D. A., & Melo, P. C. (2018). Does home-based telework reduce household total travel? A path analysis using single and two worker British households. Journal of Transport Geography, 73, 148-162. | Request PDF (sciencedirect.com) https://www.sciencedirect.com/science/article/abs/pii/S0966692317307019#:~:text=The%20results%20indicate%20that%20among,association%20for%20two%2Dworker%20households.

[51] Moglia, M., Hopkins, J., & Bardoel, A. (2021). Telework, hybrid work and the United Nation's Sustainable Development Goals: towards policy coherence. Sustainability, 13(16), 9222. | Request PDF (researchgate.net) https://www.researchgate.net/publication/353958683_Telework_Hybrid_Work_and_the_United_Nation's_Sustainable_Development_Goals_Towards_Policy_Coherence

Nudging and signalling measures provide a non-coercive way to encourage individuals to make environmentally friendly choices. These measures aim to guide people towards more sustainable behaviour by making small changes to the environment or the way information is presented. By implementing nudges and signals, organisations can encourage employees to adopt more sustainable practices, ultimately leading to a reduction in the organisation's overall carbon footprint. In this way, nudging and signalling measures are crucial tools for any organisation seeking to make meaningful contributions to addressing climate change.

Brief benchmark of 10 nudging/signalling measures

A brief benchmark of 10 efficient and widespread nudging and signalling measures was conducted.

Nudging measures:

1. **Social norms:** By establishing a culture of sustainability and environmental responsibility, the organisation can encourage employees to adopt environmentally friendly practices in their daily work. For example, the implementation of policies such as reducing paper usage, encouraging the use of public transportation, or cycling, and promoting energy-efficient practices can showcase to employees that the organisation values sustainability and encourages responsible environmental behaviour. These social norms can also foster a sense of shared responsibility among employees, encouraging them to collaborate and support each other in adopting sustainable practices.
2. **Default settings:** Default settings can influence behaviour by making a certain option the default or preferred choice. For example, setting double-sided printing as the default option on a printer nudges individuals towards using less paper. By making the sustainable option the default choice, individuals are more likely to adopt sustainable behaviour without even thinking about it.
3. **Challenging employees:** Setting personal sustainable goals and challenges to employees can provide a sense of purpose and encourage employees to take action to reduce their environmental impact both at the office and in their own homes. For instance, employees could commit to changing their diet for a certain amount of time by committing to the Veganuary[52] initiative.
4. **Offering rewards:** Rewards use positive reinforcement to encourage and reinforce certain behaviours. Rewards can be tangible, such as gift cards or prizes, or intangible, such as recognition or praise. For instance, companies' organisations offer preferred parking spots, discounts on parking passes, or other rewards to employees who carpool to work.
5. **Promoting sustainable digital practices:** Since the ICT consumes a lot of energy in a company, setting a list of 'good ICT practices' to follow can provide clear guidelines and reminders for employees to follow. This can nudge employees towards adopting sustainable behaviour and help to embed these practices into the workplace and home culture. This could be encouraging employees to power down their devices when not in uses, urging to work on local applications instead of the cloud which is energy-consuming, and suggesting keeping both professional and personal devices for longer as this has huge environmental benefits.

[52] Veganuary 2023 https://veganuary.com/

Signalling measures:

1. **Carbon footprints**: Organisations can calculate and disclose their carbon footprint, which is a measure of their greenhouse gas emissions. By disclosing their carbon footprint, organisations can signal to stakeholders that they are aware of their impact on the environment and are taking steps to reduce it.
2. **Sustainability targets:** Organisations can set sustainability targets, such as reducing greenhouse gas emissions or water usage, and publicly report on their progress towards these targets. This can signal to stakeholders that the organisation is committed to continuous improvement in sustainability. For instance, implementing EMAS or an EMS can be valuable tools to monitor and set targets. EMAS provides a comprehensive framework for target establishment and progress tracking. Similarly, an EMS offers a structured approach to establish and monitor objectives aligned with decarbonisation strategies. By incorporating EMAS or implementing an EMS, organisations effectively track targets, measure performance, and showcase progress to stakeholders.
3. **Environmental certification**: Employers can pursue environmental certifications, such as B Corp[53], LEED[54], ISO 14001[55] or EMAS[56] to signal their commitment to sustainability and encourage other employees to adopt more sustainable practices.
4. **Employee engagement and training**: Organisations can engage employees in sustainability initiatives and provide training on sustainability topics. This can signal to employees that the organisation is committed to sustainability and can help build a culture of sustainability within the organisation.
5. **Stakeholder engagement:** Organisations can engage with stakeholders such as employees, customers, and local communities to understand their concerns and incorporate their feedback into sustainability initiatives. This can signal to stakeholders that the organisation values their input and is committed to being a responsible member of society.

In conclusion, a combination of education, incentives, infrastructure, performance indicators, and leadership can be effective in influencing staff behaviour with regard to different sectors within an organisation (ICT, commuting, energy). By implementing these measures, organisations can reduce their environmental impact, promote a more sustainable workplace culture and gain trust of stakeholders.

6.3 Implications / opportunities of Cedefop being located in Greece, owning its building

It is important to **consider the national context in which an organisation proposes a decarbonization pathway** because the feasibility, effectiveness, and impact of different decarbonization actions can vary greatly depending on the country's unique circumstances. The availability and cost of renewable energy sources, the level of government support for decarbonization initiatives, the technological capabilities of different industries, and the attitudes and behaviours of the public towards sustainability can all vary greatly between countries. All these factors can affect the feasibility and effectiveness of different decarbonization pathways.

Therefore, when proposing a decarbonization pathway in the context of Cedefop, it is essential to consider the Greek context in which Cedefop operates. By doing so, Cedefop can tailor its

[53] https://www.bcorporation.net/en-us/certification/

[54] https://www.usgbc.org/leed

[55] https://www.iso.org/fr/iso-14001-environmental-management.html

[56] https://green-business.ec.europa.eu/eco-management-and-audit-scheme-emas_en

decarbonization strategies to the unique circumstances and challenges of Greece, maximize its impact, and increase the likelihood of achieving its decarbonization goals.

6.3.1 Energy

Regarding the energy, the current structure of Greece's energy system is dominated by fossil fuels. This could present a significant hurdle to organisations willing to reduce their Scope 2 emissions. Yet, opportunities exist in this domain. Indeed, **Greece has a significant potential for renewable energy generation[57],** particularly in the areas of solar, wind, geothermal, and biomass energy, which could help organisations reduce their reliance on fossil fuels. The country's high solar irradiation levels make it an ideal location for solar energy generation, and its wind resources are particularly strong in the Aegean islands and the north-western part of the country. Additionally, Greece has several geothermal resources and a significant potential for biomass production. By investing in renewable energy generation and energy storage solutions, organisations operating in Greece can reduce their reliance on fossil fuels, lower their carbon footprint, and promote sustainable economic growth.

Additionally, the Greek government has implemented a number of **policies and incentives to encourage renewable energy investment[58]**, which can provide further financial benefits to organisations. They will be mentioned later in this report.

6.3.2 Transportation

The limited provision of direct public transportation options from Thessaloniki city centre and its surroundings **to Cedefop** presents a challenge for the organisation looking to promote sustainable transportation options for its employees. While Thessaloniki has an extensive public transportation system, including buses and trains, there is only one bus passing by Cedefop and no direct connection from the centre or from the airport to Cedefop. This means that employees who work at Cedefop must either drive or take multiple forms of public transportation to reach their workplace, both of which can be more carbon-intensive than direct options. Cycling is also not a recommended option due to the winding and dangerous roads to Cedefop and the high temperatures in summer.

Additionally, the lack of direct public transportation[59] can be a barrier to encouraging employees to use sustainable transportation options, as it may require additional time and effort to plan and navigate multiple forms of transportation. However, despite these challenges, Cedefop can still promote sustainable transportation options like carpooling or using electric vehicles to reduce the carbon footprint of its employees' commutes.

Moreover, transportation between Thessaloniki and Athens poses a challenge for Cedefop looking to promote more sustainable transportation options, as **air travel and the potential limitations of train travel can be a concern**. While air travel is one of the most carbon-intensive modes of

[57] Borgen Project (2022) Renewable Energy in Greece https://borgenproject.org/renewable-energy-in-greece/

[58] PV magazine (2021). Greece's recovery plan to invest €10bn in clean energy https://www.pv-magazine.com/2021/04/01/greeces-recovery-plan-to-invest-e10bn-in-clean-energy/

[59] Papagiannakis, A., Vitopoulou, A., & Yiannakou, A. (2021). Transit-oriented development in the southern European city of Thessaloniki introducing urban railway: typology and implementation issues. European Planning Studies, 29(1), 117-141. | Request PDF (researchgate.net) https://www.researchgate.net/publication/339148217_Transit-Oriented_Development_in_the_Southern_European_city_of_Thessaloniki_introducing_urban_railway_typology_and_implementation_issues

transportation, train travel in Greece has also been recently associated with safety concerns[60], which may discourage Cedefop from promoting it as a sustainable option. However, there is **an opportunity for Cedefop to collaborate with initiatives that are pushing for better and safer train lines** between the two cities, which could provide a more sustainable and safe transportation option for their employees. Collaborating with these initiatives could involve advocacy support to help promote investment in safer and more sustainable train travel options, which could ultimately benefit not only the organisation and its employees but also the wider community. Furthermore, promoting train travel between Thessaloniki and Athens could help reduce carbon emissions associated with air travel, promote a culture of sustainable travel, and contribute to the overall decarbonization of transportation in Greece.

6.3.3 Electric transportation

Since 2020, the **Greek government has introduced tax incentives to promote the sales of electric cars, motorcycles, and bicycles**, as a part of its ten-year climate plan aimed at reducing carbon emissions. Presently, electric cars constitute 0.3% of all the vehicles on the Greek roads, which is considerably lower than many other European nations[61]. The government aims for one in three new vehicles to be electric by 2030.

The Greek program called "I move electrically" was launched in the end of 2020 and will run until 2024. It aims to accelerate the transition to EVs providing incentives both for company and private electric vehicles and charging stations[62]. The program has four goals:

- Fleet renewal,
- Development of smart charging infrastructure,
- Reduction of CO_2 emissions,
- Cost savings for citizens.

Greece subsidizes mainly private cars and light commercial vehicles. Fiscal and local incentives have been provided including road tax exemptions, reduction of Value Added Tax (VAT), tax amortization benefit, free entry into bus lanes for BEVs & PHEVs with CO_2 below 50 g/km and free circulation of EVs in the Metropolitan Area of Athens[63]. **The subsidy for individuals reaches 30% of the car's retail value** (before tax). An additional subsidy was offered to buy a home charger or write off an old car. The subsidy applies only to the purchase of electric vehicles, not plug-in hybrid cars[64].

6.3.4 Environment: urban heat island effect

In Thessaloniki, the urban heat island, which refers to a phenomenon that occurs when urban areas experience higher temperatures than surrounding rural areas, is particularly pronounced. This is due to the city's urban landscape and Mediterranean climate[65] [66]. Indeed, the city is characterized

[60] Reuters (2023). Greek rail services to resume gradually from March 22 https://www.reuters.com/world/europe/greek-rail-services-resume-gradually-march-22-2023-03-14/

[61] https://www.fleeteurope.com/fr/new-energies/greece/article/greece-introduces-tax-breaks-electric-cars?a=BUY03&curl=1

[62] https://www.sciencedirect.com/science/article/pii/S2046043023000023

[63] https://blog.wallbox.com/what-you-should-know-about-ev-incentives-in-greece/

[64] https://www.gov.gr/en/ipiresies/polites-kai-kathemerinoteta/periballon-kai-poioteta-zoes/kinoumai-elektrika,

[65] Urban Heat Island and Future Projections: A Study in Thessaloniki, Greece | Request PDF (researchgate.net) https://www.researchgate.net/publication/352352148_Urban_Heat_Island_and_Future_Projections_A_Study_in_Thessaloniki_Greece

[66] Eftychiadou O. (2017) Urban heat island in Thessaloniki city, Greece: a geospatial analysis https://core.ac.uk/download/pdf/236205304.pdf

by a high density of buildings and roads, which absorb and retain heat, leading to elevated temperatures. The use of air conditioning and other cooling measures further contributes to the urban heat island effect. The impact of the urban heat island effect can be significant, with higher temperatures contributing to decreased air quality, increased energy consumption, and negative impacts on human health and wellbeing.

While the urban heat island effect is commonly associated with cities, it is still relevant for organizations and companies located slightly outside urban areas, such as Cedefop. Even in suburban or rural settings, infrastructure, paved surfaces, and human activities can contribute to localized heat build-up. Considering the urban heat island effect is important for such organizations as it can impact the local climate, energy consumption, and employee or customer comfort.

The urban heat island effect is a significant environmental challenge that can have negative impacts on human health, energy consumption, and air quality. But it presents an opportunity for organisations to take action and implement sustainable practices by promoting biodiversity and contributing to a more liveable and resilient urban environment. More concretely, reducing the urban heat island effect can help organisations reduce energy consumption.

One way organisations like Cedefop can contribute to reducing the urban heat island effect is by **implementing cool roofs and pavements**. These are roofing and pavement materials that reflect more sunlight and absorb less heat compared to traditional roofing and paving materials. By using cool roofs and pavements within its facilities and operations, Cedefop can help reduce the overall heat generated by its activities and contribute to a more comfortable and energy-efficient indoor environment.

Another way Cedefop can contribute to reducing the urban heat island effect is through **urban greening initiatives**. This can include **planting trees, shrubs, and other vegetation within its facilities** and operations, or supporting community-based greening initiatives in the wider Thessaloniki region. Urban greening can help absorb heat, reduce energy consumption, and promote biodiversity, while also contributing to a more pleasant and attractive urban environment. Cedefop took a step towards this direction during the covid period by ensuring accessibility to a biodiversity garden to staff to promote work and meetings taking place outside in a green enjoyable environment rather than inside.

In addition, Cedefop could implement **green infrastructure** initiatives such as **green roofs and walls**, which can also absorb heat, reduce energy consumption, and promote biodiversity. Green infrastructure can help mitigate the heat island effect and promote sustainable practices, while also providing additional benefits such as improved air quality and stormwater management.

Finally, organisations like Cedefop could participate in **community-based initiatives and partnerships** to address the urban heat island effect. By collaborating with local municipalities, non-governmental organisations, and community groups, Cedefop can help promote sustainable practices and contribute to a more coordinated and comprehensive approach to reducing the urban heat island effect in Thessaloniki.

6.3.5 Building

With the ownership of its own building, Cedefop has a unique opportunity to implement sustainable measures and contribute to its decarbonisation strategy. Main opportunities for the mitigation of buildings emissions include the following:

- **An improved office space management,** should reduce significantly the GHG emissions:
  - Avoidance of a part of the building surface in relation with a new organisation of offices with a wider variety of space environment and more flexibility for the use of desks.

- Selectively heating, cooling, and lighting specific parts of a building. For example, if certain areas of an office are not regularly used, such as storage rooms or conference rooms, it may be more efficient to limit or reduce heating, cooling, and lighting in those areas to save energy and reduce utility costs.
- Management of office spaces and closing of zones in specific periods such as holidays.

o **A better management of the energy consumption,** based on the improvement of the building structure and energy consumption management

- Insulation of certain building zones based on the recommendation of energy audits
- New windows with higher insulation level have also been considered but the rate of return on investments is very low as it would be very expensive to replace the windows.
- Automation of cooling systems (e.g., through presence sensors, warnings and centralised management).
- Staff sensitisation for efficient temperature management.

o **A continuous equipment replacement with least energy-consuming choices**

- Best energy labels and reliability indicators for electric appliances such as hot water supplies, fridges or coffee machines, and IT appliances such as servers and laptops.

7. Proposed measures to reduce emissions

This chapter presents the measures that have been identified, assessed and proposed for the GHG emission reduction action plan of Cedefop.

7.1 Methodology

In this part, we define and present the methodology that we used to build the list of mitigation measures and assess their impact and cost.

7.1.1 Methodology for the selection of mitigation measures

The identification of mitigation measures followed the following steps:

- Identification of mitigation measures integrated in action plans of other similar institutions, companies and tools;
- Identification of mitigation measures based on interviews and ideation box share with Cedefop's staff;
    - The consultation of Cedefop's staff resulted in 14 actions suggested for mitigation, as described in the table below.

Table 26 - Measures proposed by the staff

#	Measures	Description
6.1	Rationalise budget spending and purchases	All purchases should be reduced, justified and double-checked on their necessity (FAC, ICT, etc). Every purchase has a footprint.
6.2	Increase circular economy among staff members	Develop and promote dedicated space on intranet to share, exchange or sell household appliances, furniture or kids' stuff (car seats, bikes, skis)
6.3	Develop Green VET learning project (core business)	
6.4	Insulate windows, Install double-glazing	Office windows at least in some offices are not insulated at all: cold and heat come in resulting in waste of energy
6.5	More information and training to staff	To become individually green
6.6	Raise awareness on digital pollution	Inform/train staff on digital footprint and waste
6.7	Apply BISOU method (French)	Besoin (Do I need it?) Immediate (Do I need it now?) Similar (Do I have something similar) Origin (Does it come nearby?) Utile (Is it useful?)
6.8	Geothermal	Explore the possibility, coupled with PV and heat pumps will provide high level of autonomy for Cedefop. Heating and cooling
6.9	Lifespan of purchases, Expand the lifetime of furniture	The lifespan of all material such as furniture has to be redefined, upper and down time limits should be thought of again
6.10	Reduce plastic water bottles	Add a tap water cooler on every floor to reduce the use of water bottled in plastic
6.11	Closure of the Centre in the hottest and coldest months of the year	In combination with 100% telework, no heating or cooling in common spaces and offices
6.12	Enhance recycling at all levels	Look into how Cedefop can enhance its recycling performance and effectiveness
6.13	Cedefop supports local green actions	Cedefop to consider cooperation or support to local green actions and initiatives e.g. planting trees
6.14	Add recycle bins for plastic in the offices	

- Selection of mitigation measures based on a first analysis of their relevance, feasibility and impact;
    - The **applicability of measures** was determined by considering both internal and external factors. Internal factors refer to factors within the organisation, such as building characteristics, staff behaviour, and available funding in Cedefop. External factors refer to outside influences that can affect the feasibility of a measure, such as government regulations or the availability of resources in a given national context. By considering both external and internal factors, it is possible to evaluate a measure's feasibility and potential impact.
- Formalisation and final assessment of mitigation measures.

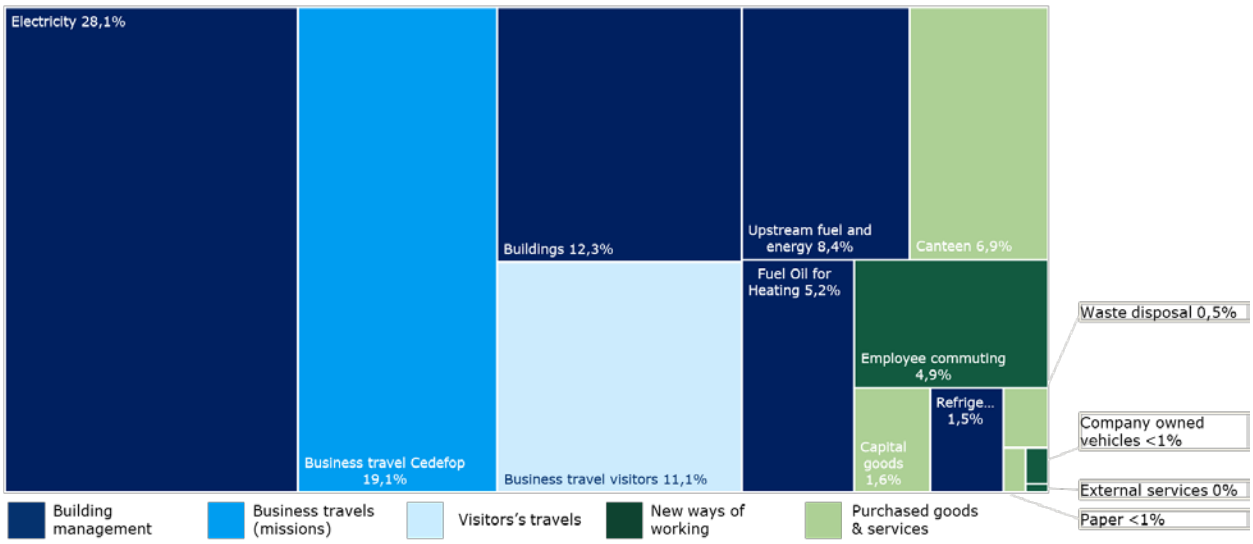
By engaging with Cedefop and conducting on-site observations of the organisation's operations, it was possible to identify the measures that had already been implemented and those that were still required to mitigate the organisation's carbon footprint effectively. **By building on existing initiatives, Cedefop can create a more cohesive and integrated approach to decarbonisation, leading to more effective outcomes**. Mitigation measures considered but not kept for Cedefop are mentioned in each section with related explanations.

Mitigation measures have been grouped in five action domains:

- **Building Management**: Actions reducing carbon emissions related to electricity and heating consumptions and refrigerants.
- **Business Travel (missions):** Actions reducing carbon emissions related to travel of staff for missions (flights, trains, accommodations).
- **Visitors' Travels:** Actions reducing carbon emissions related to travel of visitors paid by Cedefop (trains, flights, hotels).
- **New ways of working**: Actions reducing carbon emissions related to daily commuting.
- **Purchase goods and services:** Actions reducing carbon emissions related to waste and the purchase of goods (IT equipment, etc.) and services (canteen's operation and menu, security, etc..)

The sources of emissions are thus associated with the domains of action as presented in the figure below.

Figure 4 – Emission sources associated with the domains of actions



7.1.2 Methodology for the assessment of the mitigation potential

The impact of mitigation measures was calculated based on the following hypotheses:

- 2019 is the baseline;
- 2030 is the time horizon of full implementation of measures.

Factors and key hypotheses for calculation are sourced in public reports. Impact results are expressed in CO_2 equivalent (CO_2e) and GHG protocol rules were used when necessary.

Within each action domain, measures are defined and assessed based on a comprehensive set of qualitative and quantitative criteria that include plausibility (implementation, co-benefits, and drivers), feasibility (investment and operational costs, applicability and site sensitivity), and impact. The assessment framework is summarised in the following table.

Note that the calculation done in this chapter assumes constant staff.

Table 27 - Measure assessment framework

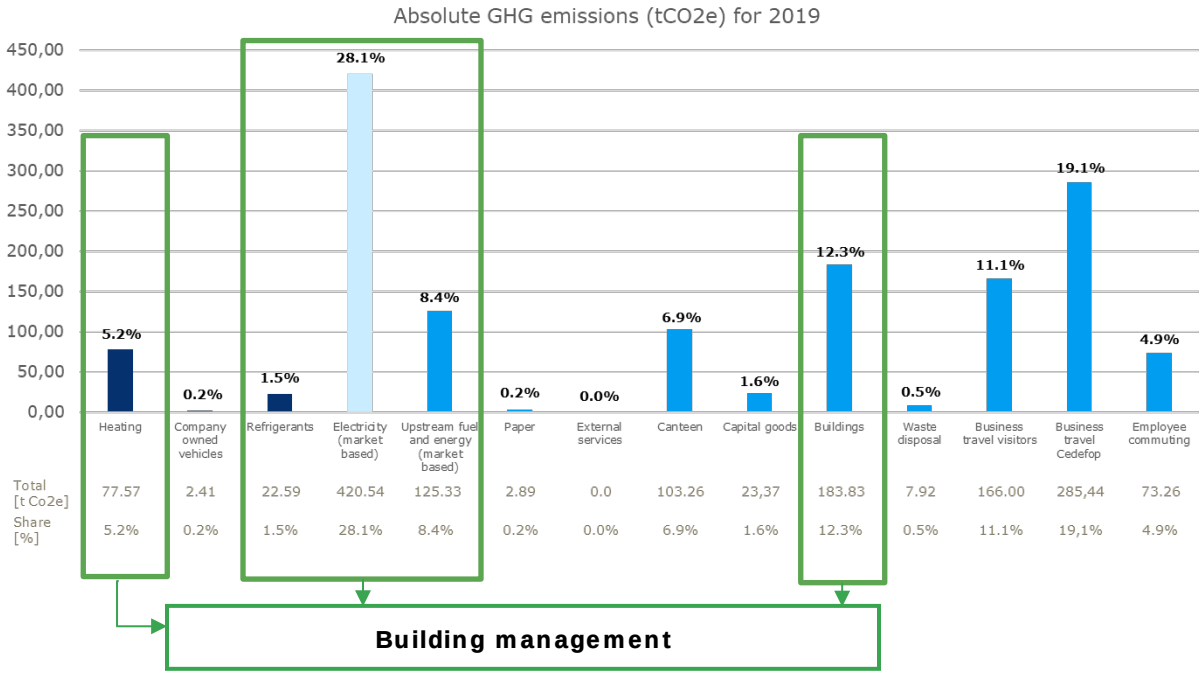
Criterion	Details	Values
Plausibility for Cedefop		
Planning	The implementation of the measures is assumed in terms of implementation timeline (start date, preparation and implementation, measure life expectancy). Measures based on simple management change show a very short preparation and implementation period, in contrast with measures requiring investment or incremental process.	• Start date (year) • Preparation period (between 1 and 9 years) • Implementation period (between 1 and 8 years)
Key drivers	The key drivers for success and failure are mentioned. They include requirement for new procedures, senior management support, training or market availability, etc.	• Capacity building • Behavioural aspects • Finance • Technology • Communication

Criterion	Details	Values
		• Legal aspects
Co-benefits	The co-benefits of the measures are mentioned. They can refer to stress reduction, improvement of work productivity, social relations, better quality of life, cost savings or environmental aspects.	• Health • Social • Work productivity • Cost • Environment
Feasibility for Cedefop		
Cost	The cost impact of the measures is evaluated, based on the available Cedefop data and complementary cost benchmark. An uncertainty ratio is then applied to the evaluated values (10% for low, 20% for medium, 30% for high).	• Capital expenditure cost (CAPEX): estimated cost expense or savings (in €) • Operating cost (OPEX): estimated yearly expense or savings (in €)
Human resources	Human resources for the implementation and monitoring of measures are assessed to help Cedefop understand implications of different measures and their ambitions. Depending on the measures and Cedefop's context it can be existing or additional resources.	• Number of FTE (Full Time Equivalent)
Ambition and impact to Cedefop		
Level of ambition	The ambition of the measures is described in terms of the extent of change that is expected and used to compute its impact. It is supposed to be comprehensible by non-expert.	• Share of an indicator (for instance 30% space reduction, 100% of buildings monitored)
Mitigation potential	The climate mitigation impact of a measure is assessed independently first and combined then. The impact presented for each mitigation measures can't be added to other mitigation measures impact (it would not take in account overlapping impacts).	• Emissions in tonnes of CO_2.equivalent per year • Percentage of 2019 Cedefop carbon footprint • Percentage of 2019 Cedefop action domain carbon footprint (e.g. of action domains: Building management, Business travel (Missions), etc.)

7.2 Building management

7.2.1 Current situation

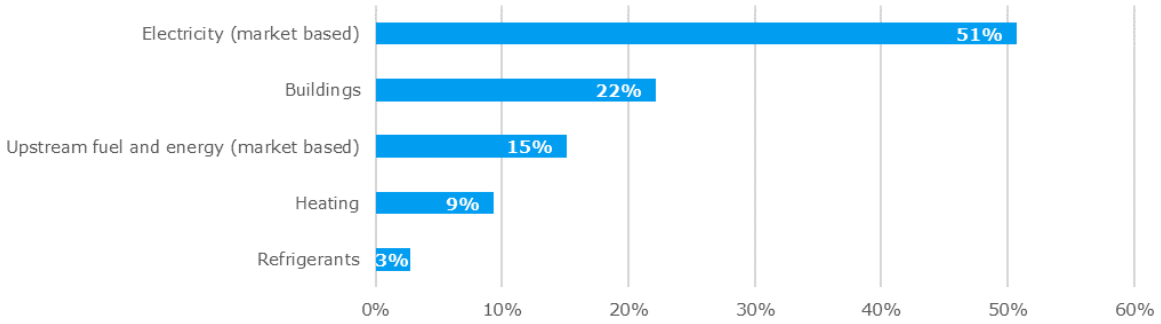
Figure 5 - Absolute GHG emissions (tCO_2e) for 2019 with building management categories highlighted



The building management domain relates to heating, refrigerants, electricity, upstream fuel and energy and buildings emissions and **is a significant source of emissions representing more than half (55,5%) of Cedefop's 2019 total carbon footprint.**

The graph below illustrates the split of building management related emissions per emission sources.

Figure 6 - Building management emissions split



As illustrated, half of these emissions come from electricity consumption since only a minor part of the electricity from the grid mix is considered as green. The building contributes to a quarter of the building management related emissions. However, it is worth noting that these emissions have been calculated based on a 25-year depreciation rate, which means that by 2024, they will not be included in Cedefop's carbon footprint anymore. The remaining 25% of building management

related emissions are divided among upstream fuel and energy emissions (15%), heating emissions (9%), and refrigerant emissions (3%). Although the last category accounts for a small portion of the building's and Cedefop's total carbon footprint, it is still relevant and can be avoided by regularly maintaining equipment.

7.2.2 Contextual evolution

Since 2019, Cedefop has taken the opportunity to re-evaluate several aspects of building management. In fact, in May 2021, Cedefop conducted an energy audit and cost saving analysis of its building. It was the opportunity to evaluate the cost and benefits of potential improvements in energy efficiency. In the meantime, several measures have already been implemented and others have been considered for Cedefop's decarbonisation strategy.

In addition to that, the lockdown due to the Covid-19 pandemic, has forced the organisation to review its way of working with an increase of teleworking suggesting new opportunities in office space management. In fact, with fewer people coming every day to Cedefop's premises, one can think of new ways of organising the working space.

7.2.3 Overview of mitigation measures

The table below lists the identified mitigation measures related to building management, their associated applicability and whether they have already been initiated by Cedefop.

Table 28 - Mitigation measures in the building management domain

#	Measures considered	Applicability	Already initiated
1.0	**Decarbonisation of district heating**	**No**	**n/a**
1.1	**Office space management**	Yes	No
1.2	**Building insulation**	Yes	Partially
1.3	**Heating and cooling management**	Yes	Partially
1.4	**Electricity management**	Yes	Partially
1.5	**Greening the premises**	Yes	Partially

Six categories of mitigation measures in building management have been identified. Each category addresses a different aspect of the energy use and emissions of the building, and together they cover the major sources of emissions identified above in Figure 5 and Figure 6.

The six categories are described below:

- **Decarbonisation of district heating:** Decarbonisation of district heating refers to reducing or eliminating the carbon emissions associated with generating and distributing heat in a given area and transitioning to low-carbon or renewable energy sources.
- **Office space management:** The measures related to office space management aim at optimizing the use of office space. In the case of Cedefop, 4 potential ways of optimizing the space have been identified:

  - The reduction and/or optimisation of office surface,
  - The closure of office zones during holidays,
  - The reduction of average surface per employee (less space on average, not less space per desk),
  - The implementation of a staff presence and room booking dynamic monitoring tool.
- **Building insulation:** In line with the energy audit performed for Cedefop in 2021, further measures to reduce heat transfer and energy loss, such as insulating walls, roofs, and floors, could be implemented.
- **Heating and cooling management:** Heating and cooling management involves the implementation of measures to optimize the heating and cooling systems within Cedefop's building. This could include:
  - Upgrade the heating and cooling management system which is aimed at controlling and optimising the heating and cooling of buildings. It would require the installation of sensors, thermostats, timers, or automation systems that would adjust the temperature, humidity, and ventilation in the building based on occupancy, weather conditions, and other factors.
  - The monitoring of refrigerant gases to avoid leakages.
  - The adoption of a low carbon heating and cooling solutions such as the heat pumps (including geothermal heat pump) that uses a small amount of electricity to move heat from a low-temperature source, such as the outside air, to a higher-temperature location, such as the inside of a building. In the summer, the process can be reversed, and heat is moved from inside the building to the outside.
- **Electricity management:** With similar perspective, Cedefop could implement new measures to optimise its electricity system:
  - Similarly, to the heating management system, the electricity management system will help Cedefop manage and optimise the use of electricity within the building (e.g. sensors in the office keeping the light on while someone is in and switching it off when the office is empty) to reduce energy consumption and improve energy efficiency. This goes hand in hand with optimising electric appliances such as lights and servers.
  - Cedefop could (will) also increase the use of renewable energy and reduce the environmental impact of building operations, such as installing solar panels.
- **Greening the premises:** When an organisation like Cedefop has a significant concrete building, greening the premises and its surrounding can support its decarbonisation strategy. This can include the building of a biodiversity area, transforming part of the concrete building with green terrace and optimising the carbon capture with Cedefop's surrounding land.

7.2.4 Measures already initiated

Besides office space management, Cedefop has already implemented or partially initiated numerous mitigation measures to reduce its building's carbon footprint:

- **Building insulation:** Upon conducting an energy audit of its building in 2021, Cedefop decided to insulate part of its building to reduce energy consumption and improve thermal

comfort during both the winter and summer months. However, only the rear part of the building will be insulated in 2024 as it was deemed not cost-effective to insulate the entire building.

- **Heating and cooling management:** In the past years, Cedefop started optimising heating management by implementing sensors and automatic temperature setpoints. Using these tools, the heating system can be more precisely controlled, ensuring that heat is only used when and where it is needed rather than constantly running at full capacity. This reduces energy waste and lowers the overall cost of heating the building. Sensors have been installed in common spaces and offices, yet, while the ones in the common spaces are centrally managed, the ones in the offices are set manually.
- **Electricity management:**
    - All common space lighting was replaced with LEDs in 2021 and extended to offices in 2022. There is still room for improvement as not all light bulbs have been replaced with LEDs. In addition, light exposure has been reduced in certain areas to minimise energy use and reduce the organisation's carbon footprint.
    - Cedefop also installed sensors in offices and promoted good practices to manage electricity consumption.
    - Furthermore, Cedefop's plan to install photovoltaic panels this year (2023) is estimated to produce 287.383,95 kWh per year equivalent to a third of its yearly electricity consumption. By installing these panels, Cedefop aims to reduce its carbon footprint by generating electricity from a renewable source instead of relying on non-renewable grid electricity. This will decrease its greenhouse gas emissions and reduce its dependence on fossil fuels.
- **Greening the premises:**
    - In 2021 Cedefop reorganised their **biodiversity garden** with a wifi connection, tables and plugs to enable the staff to use it for breaks or meetings. This garden provides a habitat for various plant and animal species, creating a more resilient ecosystem and enabling carbon dioxide absorption from the atmosphere, reducing greenhouse gas emissions. With this biodiversity garden, employees also get an outdoor green environment where they can work and hold meetings in a naturally cooled environment outside the building.
    - By **maintaining and enhancing the green areas** around the building, such as trees and vegetation, Cedefop has increased the amount of carbon captured from the atmosphere through photosynthesis. Cedefop also contributes to enhancing the biodiversity in the surrounding areas, creating a healthier ecosystem.

7.2.5 Measures not selected

The decarbonisation of **district heating** was considered not applicable since Cedefop does not benefit from it. The heating and cooling needs of the building are met through a central heating and cooling system.

7.2.6 Mitigation potential of measures considered

As mentioned in the methodology section, for each mitigation measure, three levels of ambition are assessed: Business-as-usual, Medium and High.

Table 29 – Detailed levels of ambition for building management mitigation measures

#	Measures	Business-as-usual ambition	Medium ambition	High ambition
1.1	**Office space management**	• N/A	• Closure of offices depending on occupancy to reduce the need for cooling/heating (e.g. if an office has multiple desks, it is first fully occupied before another office is opened) • Closure of office zones during holidays (e.g. of one floor to avoid the cooling and lights of common areas) • Room booking system to optimise office space use	• Transformation of the office space for another usage under the constraint of no revenue generation (e.g. a NGO) • Transformation of office space to make it more collaborative (hot desking, open spaces, meetings rooms, phone booth)
1.2	**Building insulation**	• Insulation of the rear part of the building to improve its energy efficiency • Installation of smart blind system (2022)	• N/A	• Windows retrofitting (as described in the energy audit) • Roof insulation from the inside • Cool pavements
1.3	**Heating and cooling management**	• Monitoring of refrigerant gases	• Upgrade of heating & cooling equipment with natural gas burner • Further optimisation of temperature setpoint • Sensitisation of staff about good practices	• Upgrade centralised heating & cooling management system with centralised management of offices sensors • Replacement of current heating / cooling system by heat pumps
1.4	**Electricity management**	• Replacement of lighting with LED in the common areas of the building (2020) and in the offices (end of 2022) • When replacing appliances, purchase the highest energy efficiency standards • Installation of sensors for automatic switch off (stairs, offices, standby devices) • Sensitisation and training of staff for good practices (technical solutions, new rules, etc.) • Installation of photovoltaic panels (2023)	• N/A	• Implementation of a centralised electricity management system • Improvement of electrical equipment energy efficiency

1.5	**Greening the premises**	• Creation of a biodiversity garden on the premises (2019)	• N/A	• Creation of a green terrace on the rooftop of the building • Enlargement of existing biodiversity garden

The mitigation potential of each measure is calculated considering the combination of external factors and mitigation measures managed by Cedefop is then calculated. Staff is considered stable. The graph below represents the mitigation potential of each measure as a standalone measure (meaning the mitigation potential cannot be added as they impact each other). A combined version of measures' impact is presented in chapter 8 on pathways.

Figure 7 – Mitigation potential of measures for the building management domain

The mitigation potential presented in the graph above and in the table below is the standalone mitigation potential for each measure. However, in practice, some measures are overlapping with each other, and therefore the total mitigation potential is not the result of a simple sum of the individual mitigation potential. The combination of measures is taken into account further in the present report when presenting pathways forward for Cedefop.

7.2.7 Detailed analysis of mitigation measures

In this section, we will first highlight the identified key drivers and obstacles, as well as the co-benefits of each measure. Then, the expected mitigation potential (both in tCO2 et in % of Cedefop total CCF), costs (OPEX and CAPEX) and FTEs will be provided for each measure and each scenario (business-as-usual, medium ambition and high ambition). The elements included in these numbers are explained in the "comments" section in each table. Only the elements having a cost, savings or mitigation impact have been included in the tables presented below. In addition, rebound effect has been included when applicable and possible to measure.

Table 30 - Key drivers and co-benefits for building management

#	Measures	Identified key drivers for implementation	Identified key obstacles for implementation	Identified co-benefits
1.1	**Office space management**	• Increased homeworking leading to a reduction of office space needs • Consistency among the various improvement measures (office space management & electricity management)	• Resistance to change related to the dynamic desk system ("hot desk policy") & the loss of individual offices • Renting of office space as a European agency (security and monetary issues)	• Increased collaborative working practices and team interaction • Cost and resources savings • Benefits to society by offering the use of part of the building to NGO or non-profit organisations
1.2	**Building insulation**	• Ownership of the building by Cedefop • Ongoing insulation improvements	• Significant cost for implementation • PV on the roof prior to decision on insulting the roof	• Cost and resources savings • Improved thermal comfort for employees
1.3	**Heating and cooling management**	• Consistency among the various improvement measures (office space management & building insulation)	• Difficulty to find the correct level of interoperability with existing heating & cooling system	• Cost and resources savings • Improved thermal comfort for employees
1.4	**Electricity management**	• Ownership of the building by Cedefop • Consistency among the various improvement measures (office space management & building insulation) • Solar panels installation already planned	• Significant cost for implementation	• Cost and resources savings • Improved comfort through optimised lighting solutions
1.5	**Greening the premises**	• Provision of greener space to Cedefop's employees • Cooling the surroundings of Cedefop's building	• Significant cost for implementation • Additional roofing work required in preparation for the green terrace • Time and cost necessary for maintenance of green spaces	• Biodiversity enhancement • Provision of outdoor green space improving quality of break spaces for employees & well-being • Locally grown products for the cafeteria (olive oil)

		• Increased climate resilience/insulation of premises		• Improved building insulation

Table 31 - Building management - Overview of expected mitigation potential, costs and needed resources for the business-as-usual pathway

Business-as-usual ambition								
#	Measures	Mitigation potential ($t CO_2e$/year)	Mitigation potential (% of 2019 CCF)	CAPEX	OPEX	FTEs	Potential savings by 2030	Comments
1.1	**Office space management**	N/A	N/A	-	-	-	-	• No measure is planned under the business-as-usual pathway
1.2	**Building insulation**	18,55	1,24%	50.000 €	-	1 FTE	28.990 €	• **Insulation of the rear part of the building:** According to the energy audit[67], the insulation of the rear part of the building should allow for a CO_2 emissions reduction of around 18,55t of CO_2e, and the cost budgeted amounts to 50k€. In addition, 0,5 FTE over 2 years is expected to be dedicated to manage the project. The FTE is also expected to manage the PV projects amounting to 1 FTE in total. The expected monetary savings amount to 4.460€/ year, starting mid-2024, therefore adding up to 29k€ by 2030.
1.3	**Heating and cooling management**	N/A	N/A	-	-	-	-	• **Monitoring of refrigerant gases**
1.4	**Electricity management**	240,89	16,11%	113.050 €	7.000 €	-	157.785 €	• **Replacement of lighting with LED:** in 2022, LED were installed in the offices of Cedefop, for a budget of 6.250€, leading to a forecasted mitigation potential of 14,8t of CO_2e and costs savings amounting to 731,7€/year. • **Installation of PV:** in 2023, PV will be installed on Cedefop's premises for a forecasted budget of 106,8k€, projected 163,2t CO_2e emissions reduction, and yearly savings of around 21,6k€/year. These savings highly depend on the cost of electricity and may be higher than forecasted, considering the recent electricity price increase. An operating expense for the PV is to be forecasted, amounting to 1k€/year.[68]

[67] Energy audit Cedefop, conducted in 2021 on 2019 data

[68] Energy audit Cedefop, conducted in 2021 on 2019 data

Business-as-usual ambition								
#	Measures	Mitigation potential ($t CO_2e$/year)	Mitigation potential (% of 2019 CCF)	CAPEX	OPEX	FTEs	Potential savings by 2030	Comments
1.5	**Greening the premises**	0,14	0,01%	-	-	1 FTE	-	• **A biodiversity garden**, olive trees and green surroundings are present on Cedefop's premises. The mitigation potential, in relation to the 120 olive trees, has been roughly estimated to 0,14 tCO_2e per year.[69] • 1 FTE in total (0,1 FTE/year) has been estimated to take care of the biodiversity garden.

[69] The potential role of olive groves to deliver carbon dioxide removal in a carbon-neutral Europe: Opportunities and challenges - ScienceDirect

Table 32 - Building management - Overview of expected mitigation potential, costs and needed resources for the medium ambition pathway

Medium ambition pathway								
#	Measures	Mitigation potential ($t CO_2e$/year)	Mitigation potential (% of 2019 CCF)	CAPEX	OPEX	FTEs	Potential savings by 2030	Comments
1.1	**Office space management**	37,03	2,48%	-	-	-	25.680 €	• **Closure of office zones during holidays**: the mitigation potential of closing during holidays has been estimated on a 21 days/year basis for 100% office space (3 weeks in August). This seasonal closing could lead to a mitigation potential of 37,03 t CO_2e/ year, associated with potential savings of roughly 4k€/year, or more than 25k€ by 2030 if the measure is incrementally implemented starting in 2024. The resources required for the implementation of this measure are negligible.
1.2	**Building insulation**	18,55	1,24%	50.000 €	-	1 FTE	28.900 €	• No additional measure (*insulation of the rear part of the building*) from the Business-as-usual pathway is planned under the medium pathway
1.3	**Heating and cooling management**	26,59	1,78%	59.670 €	21.000 €	0,2 FTE	82.660 €	• **Upgrade heating / cooling equipment with natural gas burner**: according to the energy audit[70], the replacement of the heating oil burner with a natural gas burner could support a reduction of CO_2e emissions of 18,415t CO_2/year, for an estimated cost of approximately 40k€ of installation and 5k€ for the in-depth study preceding the project. [71] • **Further optimisation of temperature setpoints** (including installing the sensors in offices) has been estimated to have a mitigation potential of 10% of heating emissions, i.e. 9,65t CO_2e/year. The cost of upgrading has been estimated to be 3€/m2 of office space, leading to an expected investment of roughly 15k€ (to be shared with measure 1.4.). • **The sensitisation campaign** around best practices has been accounted for with an OPEX of 3k€ per year (covering measure 1.4 as well) • Finally, 0,2 FTE additional have been foreseen to support the projects of the above-cited measures.

[70] Energy audit Cedefop, conducted in 2021 on 2019 data

[71] Regarding this measure, it is important to note that the study has been conducted in 2021. Therefore, information retrieved from the energy audit should be considered with caution, taking into account the current context

Medium ambition pathway								
#	Measures	Mitigation potential (t CO_2e/year)	Mitigation potential (% of 2019 CCF)	CAPEX	OPEX	FTEs	Potential savings by 2030	Comments
1.4	**Electricity management**	240,89	16,11%	113.050 €	7.000 €	-	157.785 €	• No additional measure from the Business-as-usual pathway is planned under the medium pathway
1.5	**Greening the premises**	0,14	0,01%	-	-	1 FTE	-	• No additional measure from the Business-as-usual pathway is planned under the medium pathway

Table 33 - Building management - Overview of expected mitigation potential, costs and needed resources for the high ambition pathway

High ambition pathway								
#	**Measures**	**Mitigation potential** (t CO2e/year)	**Mitigation potential** (% of 2019 CCF)	**CAPEX**	**OPEX**	**FTEs**	**Potential savings by 2030**	**Comments**
1.1	**Office space management**	79,58	5,32%	10.000 €	-	1 FTE	56.110 €	Additional sub-measures from the medium pathways (zonal closing during vacation) have been considered for the high pathway: • **Transformation of office space to make it more collaborative**: The reorganisation of office spaces and the reduction of office space in use was estimated to have a mitigation potential of 79,58t CO_2e/ year due to the direct reduction of heating, cooling and electricity related to the office space reduction[72]. A rebound effect related to the construction material for the retrofitting and the reorganizing of the other floors has been estimated to 20,59kg CO_2e/year over 10 years[73]. The cost related to the retrofitting has yet to be estimated due to high levels of uncertainty. However, 10k€ have been budgeted under CAPEX to cover the study required if this measure was to be followed. An essential aspect of this measure is related to the change management required to change the approach to the workplace (from individual offices to open space and hot desking policy). Therefore, 1 FTE has been forecasted to manage the project and the change related to this mitigation measure (0,5 FTE/year over 2 years).
1.2	**Building insulation**	41,75	2,79%	185.000 €	-	1,5 FTE	28.644 €	Additional sub-measures from the two other pathways (insulation of the rear part of the building) have been considered for the high pathway:

[72] The assumption taken here is that the 4th floor would be the part to be closed/offered for another purpose (representing almost 800m2, or 8,33% of the total surface of Cedefop's building)

[73] https://resources.taloen.fr/resources/documents/7765_191210_poids_carbone_ACV_vdef.pdf

High ambition pathway								
#	**Measures**	**Mitigation potential** (t CO2e/year)	**Mitigation potential** (% of 2019 CCF)	**CAPEX**	**OPEX**	**FTEs**	**Potential savings by 2030**	**Comments**
								• **Windows retrofitting** presents a mitigation potential of 8,6t CO_2e/year[74] for an estimated CAPEX of 125k€ and potential savings amounting to 2k€/ year[75][76] • Finally, **roof retrofitting** has been roughly estimated to lead to a mitigation potential of 20% of the last floor's heating and cooling-related emissions and costs. However, this measure would require a study to define its costs and precise mitigation and savings potentials. The mentioned study's costs have been considered in the CAPEX for 10k€. However, this option has been ruled out following the audit due to its low return on investment. In addition, PV have been installed in the meantime and do not allow for roof retrofitting. • **Roof insulation from the inside** could be considered by Cedefop and should be assessed with a dedicated study to assess the costs and mitigation potential

[74] ibid

[75] ibid

[76] The savings potential should be considered carefully taking into account the changes on energy markets since the energy audit was conducted

High ambition pathway								
#	Measures	Mitigation potential (t CO2e/year)	Mitigation potential (% of 2019 CCF)	CAPEX	OPEX	FTEs	Potential savings by 2030	Comments
1.3	**Heating and cooling management**	55,06	3,68%	187.800 €	21.000 €	0,2 FTE	156.856 €	Additional sub-measures from the two other pathways (replacement of the heating oil burner with a natural gas burner) have been considered for the high pathway: • **The enhancement of the BMS** with centralised management offices sensors has been estimated to have a mitigation potential of 20% of heating emissions, i.e. 35t CO_2e/year. The cost has been estimated to be 5€/m^2 of office space, leading to an expected investment of roughly 15k€ (to be shared with measure 1.4.). • **The installation of heat pumps,** as described in the energy audit[77] is associated with a 20,3t CO_2e/year mitigation potential for an estimated cost of 100k€ and potential savings amounting to 17k€ per year (i.e. 89k€ by 2030 if installed in 2025) • Finally, 0,2 FTE additional have been foreseen to support the projects of the above-cited measures
1.4	**Electricity management**	294,00	19,67%	113.050 €	7.000 €	-	156.291 €	Additional sub-measures from the two other pathways (LED installations, PV installations) have been considered for the high pathway: • **The installation of a centralised BMS** (including for offices) has been estimated to have a mitigation potential of 15% of lighting emissions, i.e. 0,009t CO_2e/year. The cost has been included in measure 1.3 above. • **The purchase of energy efficient appliances** has not been included as it is business-as-usual practice to renew them. However, a 20% reduction of electricity consumption of appliances has been included in the mitigation potential. • The cost and FTE related to the sensitisation campaign are included in measure 1.3 above.

[77] Energy audit Cedefop, conducted in 2021 on 2019 data

High ambition pathway								
#	**Measures**	**Mitigation potential** (t CO2e/year)	**Mitigation potential** (% of 2019 CCF)	**CAPEX**	**OPEX**	**FTEs**	**Potential savings by 2030**	**Comments**
1.5	**Greening the premises**	0,14	0,01%	197.492 €	-	1 FTE	-	Additional sub-measures from the two other pathways have been considered for the high pathway • **The green terrace** has been subject to a study estimating the costs to 197,5k€. However, the potential savings and mitigation potential in terms of CO2 emissions have not been assessed due to high uncertainty.

7.2.8 Conclusion

We consider that office space management and heating and cooling management action domains each have a reduction potential of respectively 5,32% and 3,68% of the total 2019 carbon footprint of Cedefop. In addition, the building insulation measure represents a mitigation potential of 2,79% of the total 2019 Cedefop carbon footprint.

The most impactful measure is the installation of photovoltaic panels on Cedefop's building, which alone could support a CO2 emissions reduction of 11,25%. Together with the other electricity management measures (installation of LEDs and sensors and a centralised management system), the electricity management measures can lead to 19,67% of the total 2019 emissions of Cedefop.

On the other hand, the greening of the premises, despite having significant co-benefits such as comfort for meetings and support of biodiversity, has a low mitigation potential of 0,01% of the total 2019 carbon footprint of Cedefop.

The costs related to the insulation of the building and the installation of PV (respectively 50k€ and 113k€) have already been planned by Cedefop. Additional measures can be undertaken as described above, some coming with considerable additional costs (e.g. the window retrofitting, heat pump and heating system). However, the potential savings displayed in Table 32 were calculated based on data from the energy efficiency audit of 2021[78]. Since then, the context has changed (e.g., energy prices), and potential savings should be reviewed to integrate the latest trends.

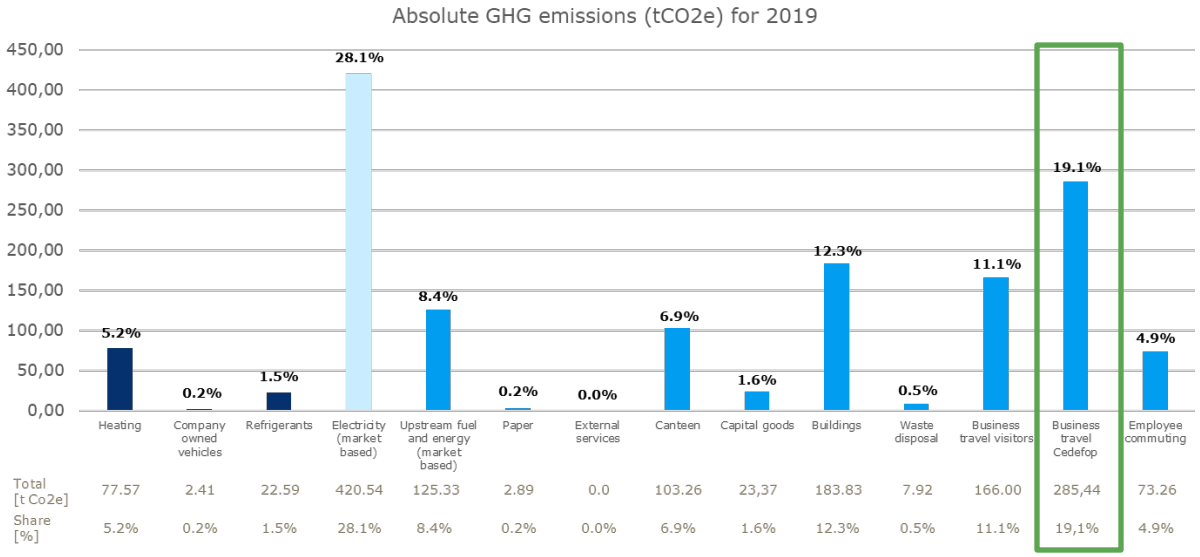
Finally, it is essential to note that some of the presented measures, especially the ones impacting office space management, may face important obstacles on the employee side and would require significant change management.

[78] Cedefop – Energy Audit Report under European Directive 2012/27/EE (EED – Energy Efficiency Directive) – Samaras & Associates S.A. Consulting Engineers

7.3 Business travels (Missions)

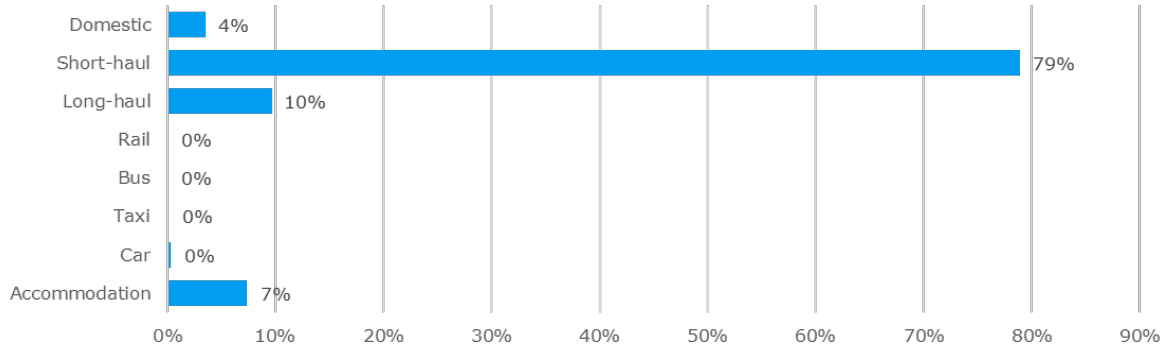
7.3.1 Current situation

Figure 8 - Absolute GHG emissions (tCO2e) for 2019 for business travel for Cedefop's employees



Business travel (missions)[79] is the second most significant emission source and represent by itself 19% of Cedefop's 2019 total carbon footprint. As presented in the figure below, the short-haul flights[80] are the most significant emission source related to business travel representing 79% of total business travel's emissions. Long-haul flights[81], domestic flights[82] and accommodation emissions represent together a fifth of business travels total emissions with respectively, 10%, 7% and 4%. Impact related to travel by train, bus, taxi or car is not significant.

Figure 9 – Business travels emissions split



[79] 385 missions in 2019

[80] Short-haul flights: 464-3,700 km one-way; Economy or Business

[81] Long-haul flights: >3,700 km one-way; Economy, Premium economy, or Business

[82] Domestic flights: <464 km one-way; Economy

7.3.2 Contextual evolution

Several internal and external contextual parameters were considered when drafting mitigation measures for business travels.

The COVID-19 pandemic has drastically impacted business travel emissions due to the restrictions imposed on physical travels. Cedefop has replaced its business trips with online meetings, cutting down the budget for business trips by 65% compared to 2019[83]. Nevertheless, travel, and the associated networking opportunities, appears to be part of Cedefop's "core business" and it is key to safeguard the Agency's core business objectives. Therefore, face-to-face meetings are held whenever the online or hybrid mode is not suitable and carbon emissions for both flights and hotel accommodation are offset.

From an external point of view, despite being the third-largest airport in Greece after Athens International Airport and Heraklion International Airport, Thessaloniki Airport is not as well-connected as Athens Airport. Often, to reach a destination from Thessaloniki Airport, at least one connecting flight is required. In addition, the train between Thessaloniki and Athens is currently not an option considered by Cedefop due to the lack of safety on the railway line between the two cities.

For the mission travels, the evolution of aviation emissions (reduction by 2030 due to energy efficiency and biofuel development, IEA's hypothesis) is considered a relevant external factor and reflected in the mitigation potential assessment. The following hypothesis have been considered:

- **Sustainable Aviation Fuels** should reach 10% of fuel in 2030 (0.1% in 2018) with a considered impact of 65% emission reduction compared to fossil fuel. This is based on IEA's perspectives[84] and EU RED II requirements for a 65% emission reduction to consider alternative fuels being sustainable.
- **Energy efficiency** of planes generates a decrease of 15% in fuel consumption by 2030: this hypothesis is based on IEA's reduction rhythm trend observed between 2010 and 2019 (1.5% per year[85]).

7.3.3 Overview of mitigation measures

In the Table 34, identified mitigation measures related to business travels are listed.

[83] https://www.cedefop.europa.eu/en/news/cedefop-travels-green

[84] https://www.iea.org/commentaries/are-aviation-biofuels-ready-for-take-off

[85] https://www.iea.org/reports/aviation

Table 34 - Measures considered for business travels

#	Measures considered	Applicability	Already initiated
2.0	**Improvement of aviation technologies**	**Yes**	**No**
2.1	**Travel guidance (reasons for travel)**	Yes	No
2.2	**Train / bus promotion**	Yes	No
2.3	**Carbon budget on missions**	Yes	No
2.4	**Low carbon accommodations**	Yes	No
2.5	**New travel culture campaign**	Yes	Partially
2.6	**Lobbying for secure train connections**	Yes	No

Six applicable mitigation measures were identified:

- **Improvement of aviation technologies:** As explained above, this refers to the development and use of new technologies in the aviation industry to reduce greenhouse gas emissions and other negative environmental impacts of air travel. This could include improvements in aircraft design, engine technology, alternative fuels, and other innovations that can make air travel more efficient and less polluting.
- **Travel guidance (reasons for travel):** Travel guidance refers to the review of the internal travel policy or the development of a travel guidance document to give clear guidelines to Cedefop's employees regarding missions. To illustrate, the new travel guidance could consist in:
  - Encouraging the use of low-emission modes of transportation, such as trains for minimum-length travel (e.g. Brussels – Paris or Brussels – Amsterdam),
  - Reducing unnecessary travel by promoting remote work or teleconferencing as an alternative to business travel,
  - Assessing networking opportunities to decide whether or not to go on a mission,
  - Gathering different meetings in the same mission to avoid multiple round-trips by plane to the same or nearby location,
  - Defining the appropriate number of staff joining a mission,
  - Requiring a minimum length for the missions.
- **Train / bus promotion**: Although train promotion is not currently an option between Thessaloniki and Athens, Cedefop could still encourage the use of trains for travel to and from Brussels and other nearby cities. This could be facilitated by providing clear guidelines and an overview of the cities that can be easily reached by train
  - This could involve advising staff on train and bus transportation options for shorter distance travel, instead of air travel, where feasible,
  - Making train and bus transportation more accessible by setting up pick-up and drop-off points near event venues.

- **Carbon budget on missions**: Similarly to having mission budget in euros, Cedefop could implement a mission budget in CO_2. A carbon budget is a limited amount of emissions allocated to an individual, department or organisation to emit in a given period (usually in kilogram or tonne of CO_2 per year). Carbon budgeting restricts the GHG emissions allowance of an organisation for it to meet its emissions reduction targets. Organisational targets should refer to scientific literature to be in line with the IPCC 1.5-degree scenario and use robust tools such as those provided by the Science-Based Targets[86] Initiative, in order to determine what carbon reduction effort would represent the organisation's "fair share". A carbon budget's limit can also be self-defined rather than based on scientific assessments, particularly in the initial period of implementation, for instance by letting individuals or departments set their own budget limit[87].

  This could be implemented by setting a clear budget to specific teams or departments and performing a meticulous monitoring of travels throughout the year (through an Excel document for instance).

- **Low carbon accommodations:** This involves suggesting to Cedefop's employees low-carbon accommodations that Cedefop will have pre-selected. To do so, Cedefop could look into accommodations that have:
  - Environmental certifications such as the BBCA label in France[88];
  - Implemented energy efficiency measures such as the use of energy-efficient lighting, heating and cooling systems, and appliances or the use of renewable energy sources.
  - Implemented waste reduction programs such as recycling and composting programs or the use of reusable towels and linens;
  - Serve vegetarian, locally sourced and organic food, etc.
- **New travel culture campaign:** This measure pertains to promoting sustainable and responsible travel practices among Cedefop employees. Although this may not directly impact Cedefop's carbon footprint, it is expected to remove some obstacles as employees become more receptive to making efforts and changing their travel behaviour, whether for business or leisure.
- **Lobbying for secure train connections:** Given the environmental impact of air travel, promoting the use of trains as a more sustainable option can contribute to reducing carbon emissions. However, as explained above safety concerns on the railway line between Thessaloniki and Athens have been a barrier to wider adoption. As an important employer in Thessaloniki and a European Union agency, Cedefop could advocate for increased security measures towards local authorities for the railway connection between the two cities.

7.3.4 Measures already initiated

Cedefop has already implemented two initiatives to reduce greenhouse gas emissions from business travel.

[86] Science Based Target is a framework providing clearly defined pathways for organisations to reduce emissions in line with the Paris Agreement goals. For instance, specific rules about yearly emissions reduction targets to be reached are defined for an organisation to align with a 1,5°C trajectory. More than 2 000 companies and organisations are using this framework.

[87] Feasibility and scoping study for the commission to become climate neutral by 2030, Ramboll report for the DG CLIMA, European Commission https://climate.ec.europa.eu/system/files/2020-09/climate_neutral_commission_study_en.pdf

[88] ECObnb (2021).Green Labels for Sustainable Tourism: an all in one Guide https://ecobnb.com/blog/2021/07/green-labels-sus

- **Reduced number of in-person conferences and work trips**: Both inside and outside the organization, business travels's budget has decreased by more than 65% between 2019 and 2022. As a result, Cedefop has significantly reduced its environmental footprint in this area. It is important to note that this is largely a result of the pandemic, maintaining this decreased travel may require efforts.
- **Offsetting emissions**: Since 2023, Cedefop decided to offset all remaining emissions related to flights and accommodation.

7.3.5 Measures not selected

All of the proposed measures were considered applicable to Cedefop's context, and none were disregarded. However, it is worth noting that some measures are more applicable than others. For example, measures such as improving aviation technologies and lobbying for secure train connections face significant hurdles. The impact Cedefop can have on such parameter is uncertain and difficult to quantify.

7.3.6 Mitigation potential of measures considered

As mentioned in the methodology section, for each mitigation measure, three levels of ambition are assessed: Business-as-usual, Medium and High.

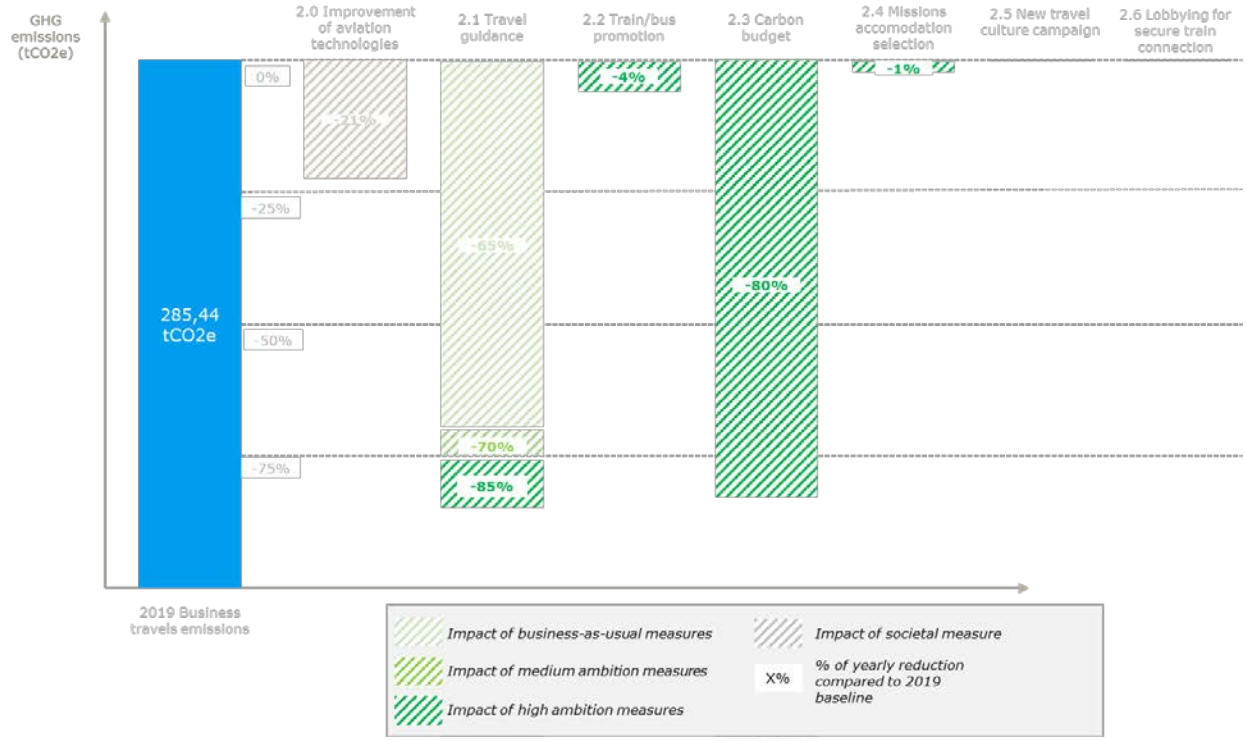
Table 35 – Detailed levels of ambition for business travels (missions) mitigation measures

#	Measures	Business-as-usual ambition	Medium ambition	High ambition
2.0	**Improvement of aviation technologies**	• N/A	• N/A	• Biofuels reaching 10% of fuel in 2030 • Energy efficiency of plane generating a decrease of 20% fuel consumption by 2030
2.1	**Travel guidance (reasons for travel)**	• Following the EC policy and guidelines in terms of travels • Maintain a 65/35 ratio of online/in-person participation to conferences and meetings	• Definition of clear guidance and internal policies to help staff adopting new practices of travel • Yearly monitoring of guidance respect with top management • Maintain a 70/30 ratio of online/in-person participation to conferences and meetings • Gathering different meetings in the same mission	• Maintain an 85/15 ratio of online/in-person participation to conferences and meetings
2.2	**Train / bus promotion**	• N/A	• Promote the use of train/bus for destinations with a train connection (500km limit)	• Train alternatives for trips between Athens and Thessaloniki • No-fly policy for destinations with a train connection (500km limit)
2.3	**Carbon budget on missions**	• N/A	• Assessment of the feasibility of setting up carbon budgets (quarterly monitoring available, etc.)	• Definition of the annual missions' carbon budget for Cedefop's departments • Definition of a process for carbon budgets allocation and management through years • Creation of a KPI on carbon budget and integrate in the annual activity report
2.4	**Low carbon accommodations**	• N/A	• Revision of accommodation list to provide environmentally friendly hotels	• Integration of mandatory selection of environmentally friendly accommodation in travel guidelines
2.5	**New travel culture campaign**	• N/A	• N/A	• Create communication tools for promotion of new ways of traveling and share good practices

2.6	**Lobbying for secure train connections**	• N/A	• N/A	• Advocate for more secure railway toward local authorities

The mitigation potential of each measure is calculated considering the combination of external factors and mitigation measures managed by Cedefop is then calculated. Staff is considered stable. The graph below represents the mitigation potential of each measure as a standalone measure (meaning the mitigation potential cannot be added as they impact each other). A combined version of measures' impact is presented in chapter 8 on pathways.

Figure 10 – Mitigation potential of measures for the business travels domain



7.3.7 Detailed analysis of mitigation measures

In this section, we will first highlight the identified key drivers and obstacles, as well as the co-benefits of each measure. Then, the expected mitigation potential (both in tCO2 et in % of Cedefop total CCF), costs (OPEX and CAPEX) and FTEs will be provided for each measure and each scenario (business-as-usual, medium ambition and high ambition). The elements included in these numbers are explained in the "comments" section in each table. Only the elements having a cost, savings or mitigation impact have been included in the tables presented below.

Table 36 - Key drivers and co-benefits for business travels (missions)

#	Measures	Identified key drivers for implementation	Identified key obstacles for implementation	Identified co-benefits
2.0	**Improvement of aviation technologies**	N/A	N/A	N/A
2.1	**Travel guidance (reasons for travel)**	• Collective definition of guidance for a better adoption by the staff • Top management implication in guidance through validation and implementation • Management support to tackle operational difficulties	• Reluctance to modify travel habits • Additional efforts required for the planning phase • Reduce effectiveness in fulfilling core mission of the Agency	• Optimised cost management • Better quality of life (reduction of short travels) • Discovery of travel alternatives applicable to leisure travels
2.2	**Train / bus promotion**	• Improved productive time estimated for train travels • Top management leading by example • Booking tools focused on train when possible	• Unsecured railway system in Greece	• Increased productive time during travels • Discovery of travel alternatives applicable to leisure travels
2.3	**Carbon budget on missions**	• Integration with existing internal process about mission management and easy to use guidance • Differentiated thresholds per departments based on needs and specificities	• Cedefop's core business put at risk with increased avoidance of flights • Reluctance to depend on a budget to organise missions	• Optimised cost management for business travels
2.4	**Low carbon accommodations**	• Existing labels on booking websites/ apps • Integration to the travel policy	• Reluctance to modify travel habits • Different labels per countries with different requirements	• Discovery of travel alternatives applicable to leisure travels
2.5	**New travel culture campaign**	• Importance of travel culture evolution endorsed by management		• Removal of some obstacles for business travel

		• New culture illustrated by examples, taking into account post-covid new ways of working		• Changes in travel behaviour for leisure
2.6	**Lobbying for secure train connections**	• Use of Cedefop's notoriety as European agency in Thessaloniki	• Reluctance of local authorities	• Better and more secured train connections for society

Table 37 - Missions (business travels) - Overview of expected mitigation potential, costs and needed resources for the business-as-usual pathway

Business-as-usual ambition								
#	Measures	Mitigation potential (t CO2e/year)	Mitigation potential (% of 2019 CCF)	CAPEX	OPEX	FTEs	Potential savings by 2030	Comments
2.0	**Improvement of aviation technologies**	N/A	N/A	N/A	N/A	N/A	N/A	• No measure is planned under the business-as-usual pathway
2.1	**Travel guidance (reasons for travel)**	185,53	12,41%	-	-	-	2.931.500 €	• **Maintain a 65/35 ratio of online/in-person participation to conferences and meetings**: the mitigation potential reflects a 65% reduction in travels emissions related to missions (including transports and accommodations). No costs are foreseen for this measure. However, savings amounting to up to 266k€/year can be forecasted, corresponding to 65% of the missions' travels cost of 2019 (including transportation, accommodation and per diem), or a total of 2.932k€ for the period running from 2020 to 2030.
2.2	**Train / bus promotion**	N/A	N/A	N/A	N/A	N/A	N/A	• No measure is planned under the business-as-usual pathway
2.3	**Carbon budget on missions**	N/A	N/A	N/A	N/A	N/A	N/A	• No measure is planned under the business-as-usual pathway
2.4	**Low carbon accommodations**	N/A	N/A	N/A	N/A	N/A	N/A	• No measure is planned under the business-as-usual pathway
2.5	**New travel culture campaign**	N/A	N/A	N/A	N/A	N/A	N/A	• No measure is planned under the business-as-usual pathway
2.6	**Lobbying for secure train connections**	N/A	N/A	N/A	N/A	N/A	N/A	• No measure is planned under the business-as-usual pathway

Table 38 - Missions (business travels) - Overview of expected mitigation potential, costs and needed resources for the medium ambition pathway

Medium ambition								
#	Measures	Mitigation potential (t CO2e/year)	Mitigation potential (% of 2019 CCF)	CAPEX	OPEX	FTEs	Potential savings by 2030	Comments
2.0	**Improvement of aviation technologies**	N/A	N/A	N/A	N/A	N/A	N/A	• No measure is planned under the medium pathway
2.1	**Travel guidance (reasons for travel)**	199,81	13,37%	-	-	1 FTE	3.054.500 €	• **Maintain a 70/30 ratio of online/in-person participation to conferences and meetings**: the mitigation potential reflects a reduction of 70% in travels emissions related to missions (including transports and accommodations). No costs are foreseen for this measure. However, savings amounting to up to 3.055k€ can be forecasted, corresponding to 70% of the missions' travels cost of 2019 (including transportation, accommodation and per diem). • 1 FTE has been considered to manage the projects related to measures 2.1, 2.2, and 2.4 for the medium ambition pathway
2.2	**Train / bus promotion**	Lever effect	Lever effect	N/A	N/A	N/A	N/A	• **Promote the use of train/bus for destinations with a train connection (500km limit):** The promotion of train and bus does not have a direct effect but rather a lever effect.
2.3	**Carbon budget on missions**	N/A	N/A	N/A	N/A	N/A	N/A	• **Assessment of the feasibility of setting up carbon budgets (quarterly monitoring available, etc.):** This assessment does not have a direct effect and will have to be driven internally through discussion with Cedefop's management.
2.4	**Low carbon accommodations**	Lever effect	Lever effect	N/A	N/A	N/A	N/A	• This measure does not have a direct effect but rather a lever effect by listing environmentally friendly accommodations
2.5	**New travel culture campaign**	N/A	N/A	N/A	N/A	N/A	N/A	• No measure is planned under the medium pathway
2.6	**Lobbying for secure train connections**	N/A	N/A	N/A	N/A	N/A	N/A	• No measure is planned under the medium pathway

Table 39 - Missions (business travels) - Overview of expected mitigation potential, costs and needed resources for the high ambition pathway

High ambition								
#	**Measures**	**Mitigation potential** (t CO2e/year)	**Mitigation potential** (% of 2019 CCF)	**CAPEX**	**OPEX**	**FTEs**	**Potential savings by 2030**	**Comments**
2.0	**Improvement of aviation technologies**	59,4	4,01%	N/A	N/A	N/A	N/A	• Societal action
2.1	**Travel guidance (reasons for travel)**	242,62	16,23%	-	-	1 FTE	3.482.950 €	• **Maintain a 85/15 ratio of online/in-person participation to conferences and meetings**: the mitigation potential reflects an 85% reduction in travels emissions related to missions (including transports and accommodations). No costs are foreseen for this measure. However, savings amounting to up to 3.483k€ can be forecasted, corresponding to 85% of the missions' travels cost of 2019 (including transportation, accommodation and per diem). • 1FTE has been considered to manage the projects related to measures 2.1, 2.2, and 2.4 for the high ambition pathway

High ambition								
#	Measures	Mitigation potential (t CO2e/year)	Mitigation potential (% of 2019 CCF)	CAPEX	OPEX	FTEs	Potential savings by 2030	Comments
2.2	**Train / bus promotion**	10,11	0,68%	-	-	-	-	Additional sub-measures from the medium ambition pathway (promote trips accessible by train) have been considered for the high pathway: • **No-fly policy for destinations with a train connection (500km limit):** In 2019, 34 flights took place between cities with a train connection under 500 km (between Brussels and London, Frankfurt, Munich and Berlin). The potential CO_2e reduction in emissions reflects the switch from plane to train for trips between those cities.[89] Potential costs and savings were deemed negligible for this measure as costs of train and plane tickets for the mentioned trip highly vary depending on the booking date and time. • **Switch from plane to train for trips between Thessaloniki and Athens**: in 2019, 77 flights took place between Athens and Thessaloniki. The additional (when compared with medium ambition) potential CO2e reduction in emissions reflects the switch of those flights to train connection[90]. • Potential costs and savings were deemed negligible for this measure as costs of train and plane tickets for the mentioned trip highly vary depending on the booking date and time.
2.3	**Carbon budget on missions**	228,35	15,27%	-	10.000 €	1 FTE	328.000 €	• The mitigation potential reflects a reduction of CO_2e emissions related to business travels by 80% • A feasibility study estimated to 10 k€ is to be foreseen if this measure is selected (to be shared with measure 3.4) • 1 FTE (0,5 FTE/year over 2 years) to conduct the project • Potential savings reflect 80% of the costs related to business travels[91]
2.4	**Low carbon accommodations**	2,11	0,14%	-	-	-	-	• The mitigation potential reflects a 10% reduction applied to the accommodation emissions.

[89] https://www.greenpeace.org/static/planet4-eu-unit-stateless/2021/10/135ec803-getontrack-gp-briefing-en-final.pdf ; https://www.umweltmobilcheck.de/

[90] This measure has been defined as high ambition as currently the safety level of the rail connection does not allow for such a switch. This measure is closely related to measure 2.6.

[91] This measure is standalone and is presented as an alternative to the other measures of the action domain.

High ambition								
#	**Measures**	**Mitigation potential** (t CO2e/year)	**Mitigation potential** (% of 2019 CCF)	**CAPEX**	**OPEX**	**FTEs**	**Potential savings by 2030**	**Comments**
								• The FTEs necessary are included under measure 2.1.
2.5	**New travel culture campaign**	Lever effect	Lever effect	-	3.000 €	-	-	• A budget of 3k€ is forecasted to support the awareness campaign
2.6	**Lobbying for secure train connections**	Lever effect	Lever effect	-	-	-	-	• The FTEs necessary are included under measure 2.1.

7.3.8 Conclusion

For the travels of Cedefop's staff, the main mitigation measure consists of reducing the number of trips. Indeed, Cedefop being located in Thessaloniki, there are currently no alternative to planes to reach other main cities where events and meetings are held and therefore travels are heavy GHG-emitting activities. If technological improvements are expected and could lead to a reduction in CO_2 emissions of Cedefop for up to 4,01% of the total emissions by 2030 without changing anything in the travels policy and practices, uncertainty is high, and one cannot only rely on potential technological improvements.

In addition to the two aspects mentioned above, considering alternatives to planes where possible (where a train connection exists under 500km) has been suggested. It could lead to a 0,21% reduction with existing safe train connections and up to a 0,68% reduction of total 2019 Cedefop emissions (3,54% of the Business travels emissions).

A complementary measure that could indirectly support the decarbonisation of Cedefop is to leverage lobbying opportunities for safer train connections in Greece, and more specifically between Thessaloniki and Athens.

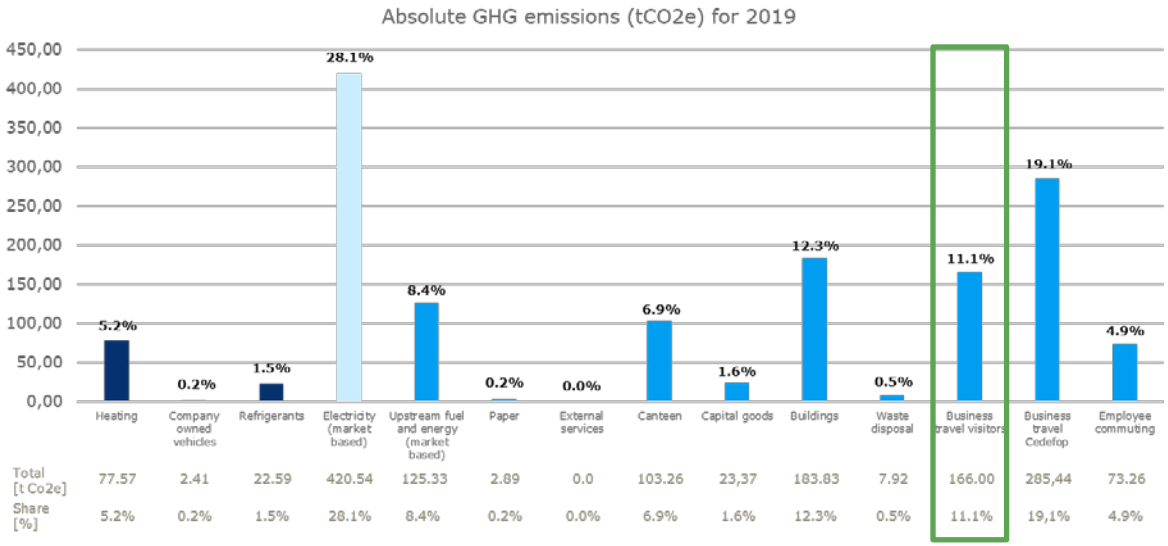
Alternatively, setting up a carbon budget has been proposed as a measure if other actions put in place are unsuccessful. A carbon budget could be allocated to individuals or departments to reduce the number of travels initiated.

Costs related to this action domain are mostly related to the human resources required to develop a travel policy and monitor the progress.

7.4 Visitors' travels

7.4.1 Current situation

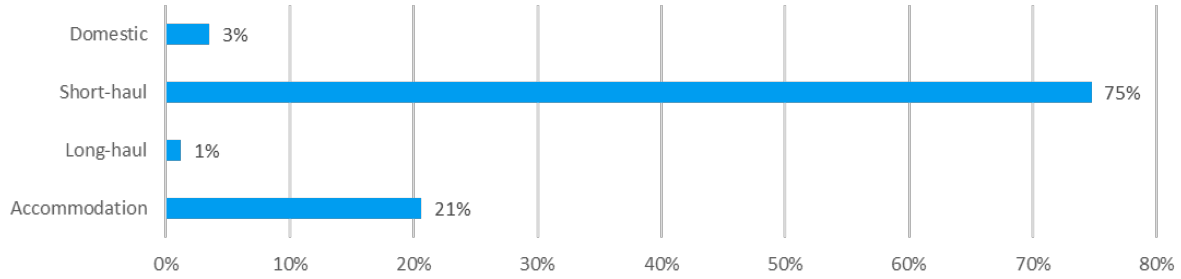
Figure 11 – Absolute GHG emissions (t CO_2 e) for 2019 for visitors' travels



Visitors' travels (paid by Cedefop) is an important source of emissions and account for 11,1% of Cedefop's 2019 total carbon footprint. Similarly to Cedefop's business travel, the short-haul flights for visitors' meetings in 2019 represent 75% of these emissions. The domestic and long-haul flights only account for 4% of the visitors meeting total emissions with, respectively, 3% and 1%. The second contributor is accommodation-related emissions representing 21% of visitors' travels. No other means of transport have been reported.

Over half of the flights were directed to Cedefop premises in Thessaloniki, while 16% of the flights were headed to Brussels, 10% to Paris, 9% to Rome, 5% to Vienna, and 2% to Aveiro. It's worth noting that out of the 118 flights to Brussels and Paris, 30% originated from countries that have excellent and rapid train connections to these two cities.

Figure 12 – Visitor meetings emissions split



7.4.2 Contextual evolution

Several internal and external contextual parameters were considered when drafting mitigation measures for visitors' travel.

There is currently no established travel policy for visitors attending meetings at Cedefop. However, a yearly budget is allocated and closely monitored for this purpose. Additionally, there are no specific guidelines or recommendations in place for selecting flights or utilizing alternative modes of transportation, such as trains.

Again, visitors' activities paid and supported by Cedefop, and the associated networking opportunities, are considered being part of Cedefop's "core business". A carbon challenge for Cedefop is then: how to reduce visitors' emissions while keeping a high level of networking?

Similarly to the previous section, regarding the external factors, it important to note that the COVID-19 pandemic has drastically impacted visitors' travels emissions due to the restrictions imposed on physical travels.

Factors related to the potential improvement of the aviation technologies were also considered in this section.

7.4.3 Overview of mitigation measures

In the table below, identified mitigation measures related to visitors' travels are listed. In the figure, their estimated impact is presented.

Table 40 - Measures considered for visitors' travels

#	Measures considered	Applicability	Already initiated
3.0	**Improvement of aviation technologies**	**Yes**	**No**
3.1	**Hybrid option for in-person events**	Yes	Yes
3.2	**Visitors' management staff guidance**	Yes	No
3.3	**Train promotion for visitors**	Yes	No
3.4	**Carbon budget for visitors**	Yes	No
3.5	**Low carbon hotels in Cedefop selection**	Yes	No

3.6	**Monitoring emissions of non-reimbursed visitors**	Yes	No

Six categories of mitigation measures were identified for visitors' travels:

- **Improvement of aviation technologies:** This measure was described in section 7.3.3.
- **Hybrid option for in-person events:** Hybrid meetings combine both in-person and virtual components, allowing participants to attend remotely while others attend in person. This could be done by encouraging attendees to use video conferencing platforms to connect virtually. To allow for better quality hybrid meetings, upgrade of meeting rooms is necessary.
- **Visitors' management staff guidance:** This involves setting guidelines and procedures for managing the travel arrangements of visitors to the organisation. One possible way to accomplish this is by disseminating "good practices" via training sessions or internal communication channels to Cedefop personnel in charge of accommodating visitors.
- **Train promotion for visitors**: Although train promotion is less of an option between Thessaloniki and Athens, Brussels and the other nearby cities remain well connected by train. Cedefop could promote its use by providing clear guidelines and an overview of reachable cities by train or assisting visitors in finding the right train connection. In addition, when a trip is not always doable exclusively by train (i.e. when leaving or returning to Thessaloniki), a combination of 1 flight and 1 train could be implemented.
- **Carbon budget for visitors**: Like business travel, Cedefop could implement a visitors travel budget in CO_2. A carbon budget is a limited amount of emissions allocated to an individual, department or organisation to emit in a given period (usually in kilograms or tonne of CO_2 per year).
- **Low carbon hotels in Cedefop selection:** This involves suggesting to visitors low-carbon accommodations that Cedefop will have pre-selected. This measure is further explained in the section 7.3.3.
- **Monitoring emissions of non-reimbursed visitors :** For the non-paid visits, Cedefop could start monitoring its visitors' emissions on a yearly basis. This would require from Cedefop to track emissions from flights, ground transportation, and accommodations. Based on the results of these emissions and in line with Cedefop's commitment, this could further evolve to a target setting for the non-paid visits and the definition of specific guidance.

7.4.4 Measures already initiated

In continuous improvement efforts, Cedefop already initiated one measure to reduce emission related to visitors' travel:

- **Reduced emissions related to and the recruitment process:** While job candidates before 2019 were systematically invited to Thessaloniki for interviews and written tests, these events are now always held online. This is a significant improvement because it reduces emissions related to the travel of candidates as well as those associated with the printing of documentation needed for these events.
- **Reduced emissions related to trainings:** Likewise, there has been a shift from physical trainings to online trainings. Although some trainings for staff are still happening physically, most of them are taking place online.

7.4.5 Measures not selected

All of the proposed measures were considered applicable to Cedefop's context, and none were disregarded.

7.4.6 Mitigation potential of measures considered

As mentioned in the methodology section, for each mitigation measure, three levels of ambition are assessed: Business-as-usual, Medium and High.

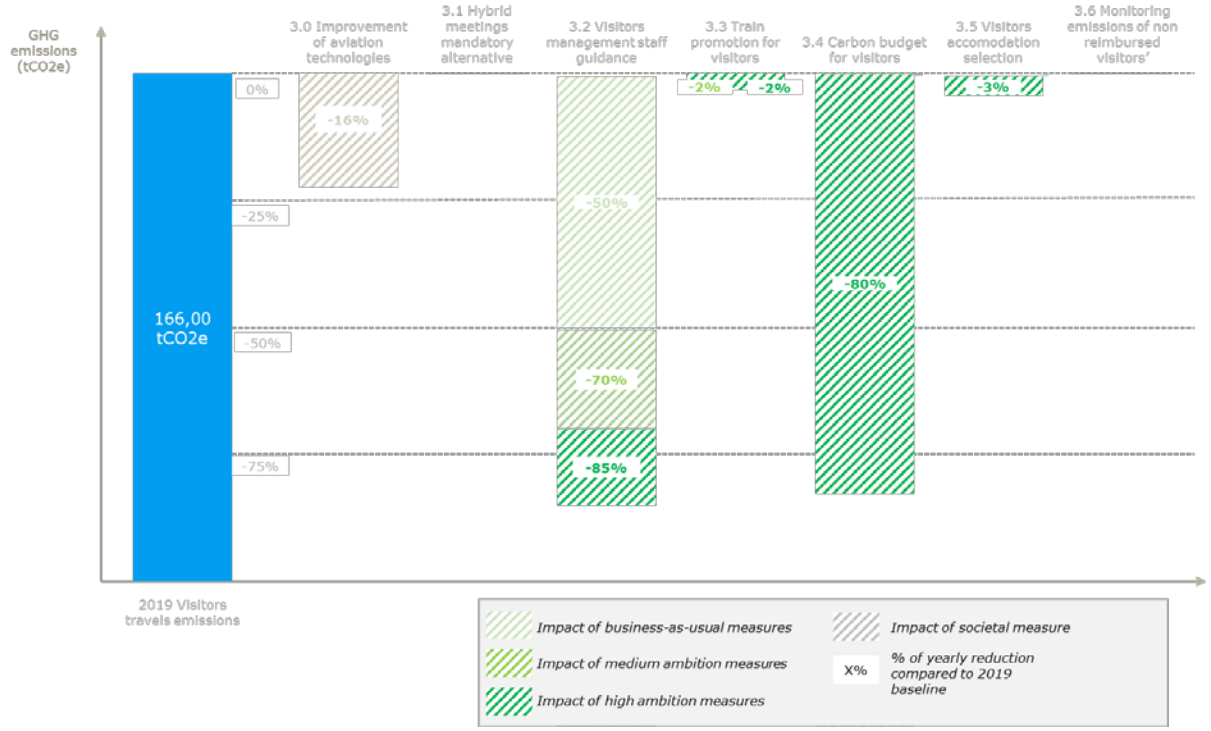
Table 41 – Detailed levels of ambition for visitors' travel mitigation measures

#	Measures	Business-as-usual ambition	Medium ambition	High ambition
3.0	**Improvement of aviation technologies**	• N/A	• N/A	• Biofuels reaching 10% of fuel in 2030 • Energy efficiency of plane generating a decrease of 20% fuel consumption by 2030
3.1	**Hybrid option for in-person events**	• Promotion of hybrid meetings	• Set up of an internal obligation of always offering a hybrid alternative to in-person Cedefop events	• Improvement of meeting rooms (more rooms, better equipment, other services) and equipment
3.2	**Visitors' management staff guidance**	• Following the EC policy and guidelines in terms of travels • Reducing number of onsite trainings and recruitment processes • 50% reduction of visitors' air travel	• Definition of clear guidance and internal policies to help visitors' meetings managers for adopting new practices of travel • Yearly monitoring of guidance respect with top management • 70% reduction of visitors' air travel	• Networking opportunities assessment to evaluate if the trip is necessary or not • Combining different events in the same trip • Switch the organizational model for in-person meetings and events: analyse the visitors pattern and organize in a location best suited to optimize train travels for the highest number of attendants (e.g. Brussels) • 85% reduction of visitors' air travel
3.3	**Train promotion for visitors**	• N/A	• Promote the use of train/bus for destinations with a train connection (< 500km)	• Train alternatives for trips between Athens and Thessaloniki • No-fly policy for destinations with a train connection (< 500km)
3.4	**Carbon budget for visitors**	• N/A	• Assessment of the feasibility of setting up carbon budgets (quarterly monitoring available, etc.)	• Definition of the annual carbon budget for visitors per department • Definition of a process for carbon budgets allocation and management through years • Creation of a KPI on carbon budget and integrate in the annual activity report

3.5	**Low carbon hotels in Cedefop selection**	• N/A	• Revision of accommodation list to provide environmentally friendly hotels	• Integration of mandatory selection of environmentally friendly accommodation in travel guidelines
3.6	**Monitoring emissions of non-reimbursed visitors**	• N/A	• Assessment of the feasibility of setting up a monitoring for non reimbursed visitors' emissions • Integration of visitors' unpaid emissions in the guidance to provide staff with rules	• Set up of a yearly monitoring for visitors' unpaid emissions

The mitigation potential of each measure is calculated considering the combination of external factors and mitigation measures managed by Cedefop is then calculated. Staff is considered stable. The graph below represents the mitigation potential of each measure as a standalone measure (meaning the mitigation potential cannot be added as they impact each other). A combined version of measures' impact is presented in chapter 8 on pathways.

Figure 13 – Mitigation potential of measures for the visitors' travels domain



7.4.7 Detailed analysis of mitigation measures

In this section, we will first highlight the identified key drivers and obstacles, as well as the co-benefits of each measure. Then, the expected mitigation potential (both in tCO2 et in % of Cedefop total CCF), costs (OPEX and CAPEX) and FTEs will be provided for each measure and each scenario (business-as-usual, medium ambition and high ambition). The elements included in these numbers are explained in the "comments" section in each table. Only the elements having a cost, savings or mitigation impact have been included in the tables presented below below.

Table 42 - Key drivers and co-benefits for visitors' travels

#	Measures	Identified key drivers for implementation	Identified key obstacles for implementation	Identified co-benefits
3.0	**Improvement of aviation technologies**	N/A	N/A	N/A
3.1	**Hybrid option for in-person events**	• New working habits following covid period	• Reluctance to remote meetings • Occasional technological issues	• Increased productivity by getting the right people in the right meetings • Travel time gain • Cost savings
3.2	**Visitors' management staff guidance**	• Collective definition of guidance for a better adoption by the staff • Top management implication in guidance through validation and implementation • Management support to tackle operational difficulties	• Reluctance to change habits on the visitor's side • Additional efforts required for the planning phase • Reduction in effectiveness to fulfil the core mission of the agency	• Better quality of life (reduction of short travels) • Discovery of travel alternatives applicable for leisure travels • Cost savings
3.3	**Train promotion for visitors**	• Well prepared communication to visitors (arguments in line with internal guidelines such as productive time, plane/train combination possibilities identified, reference to climate policy, etc.) • Flexibility allowed regarding visitors' individual constraints	• Reluctance to impose constraints on visitors • Unsecured railway system in Greece	• Increased productive time during travels • Discovery of travel alternatives applicable for leisure travels • Cost savings
3.4	**Carbon budget for visitors**	• Integration with existing internal process about mission management and easy to use guidance • Differentiated thresholds per departments based on needs and specificities	• Reluctance to impose constraints on visitors	• Cost savings

3.5	**Low carbon hotels in Cedefop selection**	• Existing labels on booking websites/ apps • Integration to the travel policy	• Reluctance to change habits on the visitor's side • Different labels per countries with different requirements	• Discovery of travel alternatives applicable for leisure travels
3.6	**Monitoring emissions of non-reimbursed visitors**	• Visitors disclosing their mean of transportation on a voluntary basis	• Access to precise data due to confidentiality	• Cedefop leading by example through exhaustive emissions monitoring

Table 43 - Visitors travels - Overview of expected mitigation potential, costs and needed resources for the business-as-usual pathway

Business-as-usual ambition								
#	Measures	Mitigation potential (t CO2e/year)	Mitigation potential (% of 2019 CCF)	CAPEX	OPEX	FTEs	Potential savings by 2030	Comments
3.0	**Improvement of aviation technologies**	N/A	N/A	N/A	N/A	N/A	N/A	• No measure is planned under the business-as-usual pathway
3.1	**Hybrid option for in-person events**	Lever effect[92]	Lever effect	-	-	-	-	• The mitigation potential of the **hybrid / remote meetings** has been included in the visitors' travels mitigation potential (measure 3.2.)
3.2	**Visitors' management staff guidance**	83,00	5,55%	N/A	N/A	N/A	2.109.250 €	• **50% reduction of visitors' air travel:** The mitigation potential reflects a 50% reduction in travels emissions related to visitors travels (including transport and accommodations). No costs are foreseen for this measure. However, savings amounting to up to 192k€/year can be forecasted, corresponding to 50% of the visitors' travels cost of 2019 (including transportation and accommodation), or a total of 2.109 k€ for the period running from 2020 to 2030.
3.3	**Train promotion for visitors**	N/A	N/A	N/A	N/A	N/A	N/A	• No measure is planned under the business-as-usual pathway
3.4	**Carbon budget for visitors**	N/A	N/A	N/A	N/A	N/A	N/A	• No measure is planned under the business-as-usual pathway
3.5	**Low carbon hotels in Cedefop selection**	N/A	N/A	N/A	N/A	N/A	N/A	• No measure is planned under the business-as-usual pathway
3.6	**Monitoring emissions of non-reimbursed visitors**	N/A	N/A	N/A	N/A	N/A	N/A	• No measure is planned under the business-as-usual pathway

[92] "Lever effect" is indicated when the measure has no direct effect but is a lever for decarbonisation of Cedefop

Table 44 - Visitors travels - Overview of expected mitigation potential, costs and needed resources for the medium ambition pathway

Medium ambition								
#	Measures	Mitigation potential (t CO2e/year)	Mitigation potential (% of 2019 CCF)	CAPEX	OPEX	FTEs	Potential savings by 2030	Comments
3.0	**Improvement of aviation technologies**	N/A	N/A	N/A	N/A	N/A	N/A	• No measure is planned under the medium ambition pathway
3.1	**Hybrid option for in-person events**	Lever effect	Lever effect	-	-	-	-	• **Set up of an internal obligation of always proposing hybrid meetings for visitors:** The mitigation potential has been included in the visitors' travels mitigation potential (measure 3.2.)
3.2	**Visitors' management staff guidance**	116,20	7,77%	N/A	N/A	N/A	2.197.750 €	• **70% reduction of visitors' air travel**: The mitigation potential reflects a 70% of reduction in emissions related to visitors travels (including transports and accommodations). No costs are foreseen for this measure. However, savings amounting to up to 200k€/year can be forecasted, corresponding to 70% of the visitor's travels cost of 2019 (including transportation, accommodation), or a total of 2.198 k€ for the period running from 2020 to 2030. • 1FTE (0,5FTE over 2 years) has been considered under the business travels' mitigation measures
3.3	**Train promotion for visitors**	Lever effect	Lever effect	N/A	N/A	N/A	N/A	• **Promote the use of train / bus for destinations with a train connection (< 500km):** The promotion of train and bus does not have a direct effect but rather a lever effect.
3.4	**Carbon budget for visitors**	N/A	N/A	N/A	N/A	N/A	N/A	• **Assessment of the feasibility of setting up carbon budgets (quarterly monitoring available, etc.):** This assessment does not have a direct effect and will have to be driven internally through discussion with Cedefop's management.
3.5	**Low carbon hotels in Cedefop selection**	Lever effect	Lever effect	N/A	N/A	N/A	N/A	• This measure does not have a direct effect but rather a lever effect by listing environmentally friendly accommodations

Medium ambition								
#	Measures	Mitigation potential (t CO2e/year)	Mitigation potential (% of 2019 CCF)	CAPEX	OPEX	FTEs	Potential savings by 2030	Comments
3.6	**Monitoring emissions of non-reimbursed visitors**	Lever effect	Lever effect	N/A	N/A	N/A	N/A	• This measure does not have a direct effect but rather a lever effect by assessing the possibility to monitor the emissions

Table 45 - Visitors travels - Overview of expected mitigation potential, costs and needed resources for the high ambition pathway

High ambition								
#	Measures	Mitigation potential (t CO2e/year)	Mitigation potential (% of 2019 CCF)	CAPEX	OPEX	FTEs	Potential savings by 2030	Comments
3.0	**Improvement of aviation technologies**	25,81	1,73%	N/A	N/A	N/A	N/A	• Societal action
3.1	**Hybrid option for in-person events**	Lever effect	Lever effect	500.000 €	-	-	-	• **Improvement of meeting rooms** (more rooms, better equipment, other services) and equipment: the costs has been estimated to amount to around 500k€ to upgrade the AV equipment of all Cedefop's meeting rooms • The FTE required to conduct the project are included in measure 1.1 Building management
3.2	**Visitors' management staff guidance**	141,10	9,44%	15.000 €	N/A	1 FTE	2.506.025 €	• **85% reduction of visitors' air travel:** The mitigation potential reflects an 85% of reduction in emissions related to visitors' travels (including transports and accommodations). No costs are foreseen for this measure. However, savings amounting to up to 228 k€/year once fully implemented can be forecasted, corresponding to 85% of the visitors travels cost of 2019 (including transportation, accommodation), or a total of 2.506 k€ for the period running from 2020 to 2030. • The FTE related to the travel guidance part is included in the business travels action domain. • For a change of approach in meetings and events organization in another location taking into account the travelling patterns of participants, a study must be conducted. A CAPEX of 15 k€ has been forecasted to cover the study costs. Mitigation potential and potential savings should be assessed as part of the study. 1 FTE has been forecasted (0,5 over 2 years) to support the study.

High ambition								
#	Measures	Mitigation potential (t CO2e/year)	Mitigation potential (% of 2019 CCF)	CAPEX	OPEX	FTEs	Potential savings by 2030	Comments
3.3	**Train promotion for visitors**	3,83	0,26%	N/A	N/A	N/A	N/A	Additional sub-measures from the medium ambition pathway (promote trips accessible by train) have been considered for the high pathway: • **Switch from plane to train for trips between Thessaloniki and Athens**: 2019, 13 flights took place between Athens and Thessaloniki. The additional (when compared with medium ambition) potential CO2e reduction in emissions reflects the switch of those flights to train connection[93]. • 1FTE (0,5FTE over 2 years) has been considered under the business travels' mitigation measures. • Potential costs and savings were deemed negligible for this measure as costs of train and plane tickets for the mentioned trip highly vary depending on the booking date and time. • **Identification of the destinations for which a train alternative exists (<500km) and implementation of a no fly policy for those trips:** In 2019, 30 flights took place between cities withs a train connection under 500 km (Brussels, Amsterdam, Berlin, Paris, London). The potential CO2e reduction in emissions reflects the switch from plane to train for trips between those cities.[94] • Potential costs and savings were deemed negligible for this measure as costs of train and plane tickets for the mentioned trip highly vary depending on the booking date and time. • 1FTE (0,5FTE over 2 years) has been considered under the business travels' mitigation measures.

[93] This measure has been defined as high ambition as currently the safety level of the rail connection does not allow for such a switch. This measure is closely related to measure 2.6.

[94] https://www.greenpeace.org/static/planet4-eu-unit-stateless/2021/10/135ec803-getontrack-gp-briefing-en-final.pdf ; https://www.umweltmobilcheck.de/ ; https://www.eurostar.com/rw-en/travel-info/eurostar-experience/greener-way-to-go ; https://www.thalys.com/sites/thalys.com/files/2018-09/bilan-carbone-en.pdf

High ambition								
#	Measures	Mitigation potential (t CO2e/year)	Mitigation potential (% of 2019 CCF)	CAPEX	OPEX	FTEs	Potential savings by 2030	Comments
3.4	**Carbon budget for visitors**	132,80	8,88%	N/A	N/A	N/A	236.000€	• The mitigation potential reflects a reduction of CO_2e emissions related to visitors' travels by 80% • A feasibility study estimated to 10 k€ is to be foreseen if this measure was selected (already included under measure 2.3) • 1 FTE (0,5 FTE/year over 2 years) to conduct the project (included in measure 2.3) • Potential savings reflect 80% of the costs related to visitors travels[95]
3.5	**Low carbon hotels in Cedefop selection**	4,31	0,29%	N/A	N/A	N/A	N/A	• The mitigation potential reflects a 10% reduction applied to the accommodation emissions. The FTEs necessary are included under business travels action domain
3.6	**Monitoring emissions of non-reimbursed visitors**	Lever effect	Lever effect	N/A	N/A	N/A	N/A	• This measure does not have a direct effect but rather a lever effect by monitoring the emissions

[95] This measure is a standalone one that is presented as an alternative to the other measures of the action domain.

7.4.8 Conclusion

Similar to the business travels of Cedefop's staff, the main mitigation measure consists of reducing the number of trips. Indeed, Cedefop being located in Thessaloniki, there is currently no alternative to planes to reach other main cities where events and meetings are held and therefore travels are heavy GHG-emitting activities. If technological improvements are expected and could lead to a reduction in CO2 emissions of Cedefop for up to 1,73% of the total emissions by 2030 without changing anything in the travels policy and practices, uncertainty is high, and one cannot only rely on potential technological improvements.

In addition to the two aspects mentioned above, considering alternatives to planes where possible (where a train connection exists under 500 km) has been suggested. It could lead to a 0,16% reduction with existing safe train connections and up to a 0,26% reduction of total 2019 Cedefop emissions (2,31% of the visitors emissions). This measure also includes the possibility of combining a direct flight and a train instead of multiple connecting flights when a train connection is not possible.

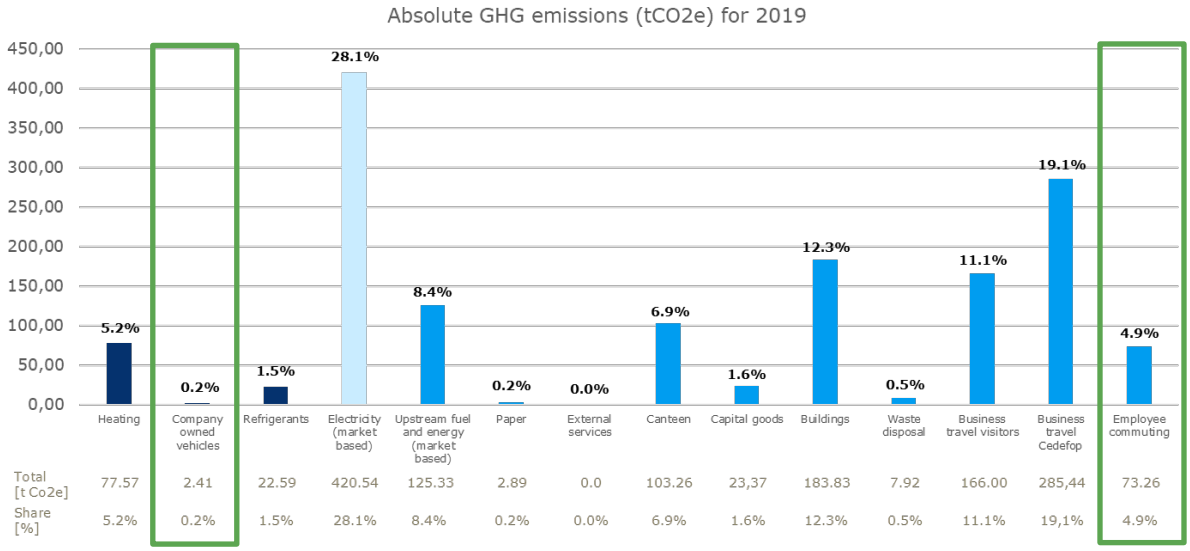
Given the particular location of Cedefop in Thessaloniki, another approach to meetings and events has been suggested as an alternative. This approach would consist of planning in-person events/conferences/meetings in an optimal location in central/western Europe, where most participants could travel by train or other low-carbon alternative. The mitigation potential and cost of this new innovative approach have yet to be assessed, and should be part of a feasibility study, should this measure be chosen. The cost for such a study has been forecasted to 15k€.

Other costs related to this action domain are mostly related to the human resources required to develop a travel policy and monitor the progress.

7.5 New ways of working

7.5.1 Current situation

Figure 14 – Absolute GHG emissions (tCO_2e) for 2019 for new ways of working



Employee commuting represents only 5,1% of Cedefop's 2019 emissions, yet it is an important lever for reducing GHG emissions, particularly since the advent of teleworking.

New ways of working may be defined in many ways. The approach is relatively recent and has gained attention with **the COVID-19 pandemic, which accelerated the digital transition at work**. New ways of working enable **flexibility in the time and location** at which staff can carry out their tasks, to allow for better autonomy, productivity and work-life balance while also reducing the individual carbon footprint of staff members through **reduced workspace and commuting**.

7.5.2 Contextual evolution

Regarding employee commuting, several factors have been taken into account when considering mitigation strategies.

Since the pandemic, Cedefop has, like many other organisations, implemented remote working policies and flexible schedules, which helps reduce employees' commuting and associated emissions. A survey conducted in April 2023 by Ramboll suggests that the average number of days commuted in 2019 was 4 days per week and employee. The typical commuting method was the car and the average distance travelled (one way) was 7.6 km. With the new working policies, it is likely that the need for daily commuting to and from the office has decreased.

As explained in section 6, while teleworking generally decreased overall emissions related to transportation, there is increasing evidence of a rebound effect[96]. In fact, there is a potential

[96] In the case of teleworking, rebound effects may be due to increased energy consumption at home (from non-green power consumption, increased heating and cooling needs) and over time possible choice of more remote locations associated with longer distances for work and non-work trips and more floor spaces for housing (due to lower property costs/rents).

increase in residential energy consumption due to the need for employees to use more energy for heating, cooling, and electricity in their homes.

In recent years, increasing opportunities have emerged for driving electric vehicles. In Greece, since 2020, the plan 'I move electrically' [97] subsidies part of the purchase of electric vehicles. The national objective set by the Greek government is that, by 2030, 1 in 3 vehicles in operation should be electric vehicles. The exact subsidy opportunities are detailed in section 6.3.3. This represents an opportunity to decrease further the emissions associated with commuting and was considered in this section.

7.5.3 Overview of mitigation measures

In the table below, identified mitigation measures related to new ways of working are listed.

Table 46 – Mitigation measures on new ways of working

#	Measures considered	Applicability	Already initiated
4.0	**Commuting network evolution**	No	
4.1	**Teleworking impact tracking (rebound effect at home not included)**	Yes	No
4.2	**Remote meeting support**	Yes	Yes
4.3	**Long distance commuting optimisation**	No	
4.4	**Carpooling optimisation**	Yes	No
4.5	**Bike infrastructure**	No	
4.6	**Electric vehicles promotion**	Yes	Partially

For the 'new ways of working' domain, seven categories of measures were identified amongst which three were judged non applicable. More detail about each measure is provided below:

- **Commuting network evolution**: This measure refers to the potential improvement of public transportation infrastructure and services in Greece in the coming years. Indeed, one can expect that actual public transport will be improved and will allow Cedefop's employees to use buses to commute in the future. This would encourage using more sustainable modes of transportation and reducing carbon emissions associated with daily commuting.
- **Teleworking impact tracking (rebound effect at home not included)**: Teleworking has become an increasingly popular trend following the pandemic and has remained since then. To support a decrease in carbon footprint, Cedefop could start monitoring the direct and indirect impacts of teleworking development through a yearly survey for example. To empower employees to actively engage in this effort, Cedefop could provide them with the necessary tools to assess their carbon footprint while teleworking and create discussion

[97] Govgr (2022). I move electrically https://www.gov.gr/en/ipiresies/polites-kai-kathemerinoteta/periballon-kai-poioteta-zoes/kinoumai-elektrika

opportunities on how Cedefop could help them reducing their personal/teleworking carbon footprint.

- **Remote meeting support**: As an alternative to in-person meetings, and to maximise teleworking opportunities, Cedefop could ensure the provision of videoconference facilities and policies to encourage and facilitate remote meetings.
- **Long-distance commuting optimization:** For staff doing long-distance commuting the organisation could inform and support them in voluntarily reducing their carbon emissions, through the promotion of more sustainable modes of transportation and teleworking where appropriate. One possibility is to encourage staff to come to the office less frequently but for longer durations. Another one would be suggesting staff living far from the office to plan all in-person meetings on the same day to avoid coming several times in the week.
- **Carpooling optimization**: This measure involves raising awareness among staff about the environmental impact of car commuting and developing a carpooling platform to encourage car sharing and the reduction of emissions.
- **Bike infrastructure**: With the aim of encouraging more sustainable modes of transportation and reducing carbon emissions associated with daily commuting, Cedefop could improve the bike infrastructure and its capacity on its premises.
- **Electric vehicles promotion**: As most of Cedefop's employees commute by car, a measure could be to encourage staff to use electric vehicles. This could be done by offering incentives or allowances for the purchase or use of electric vehicles by employees.

7.5.4 Measures already initiated

Cedefop implemented policies that could already reduce carbon emission related to commuting.

- **Remote meeting support:** Accelerated by the pandemic, Cedefop has set up the necessary infrastructure to ensure that meetings could be held online or in a hybrid format.
- **Flexible working policy**: Since January 2023, Cedefop's policy has allowed each staff member to work up to three days a week at home. Since most employees come to Cedefop by car, such a policy means fewer cars on the road and reduced emissions from transportation. Potential indirect emissions linked to teleworking could include increased heating and electricity consumption within the household.
- **Electric charging stations**: Cedefop has installed two electric charging stations for employees' electrical vehicles. While their use is still low, Cedefop may consider installing more of them, should there be more demand in the future.

7.5.5 Measures not selected

Several measures were evaluated non-applicable for the 'new ways of working' domain:

- The **evolution of the commuting network** in Greece cannot be relied upon as a solution for building mitigation measures because transportation infrastructure development takes time and is unpredictable in the case of Thessaloniki. Therefore, while improvements to the

commuting network would be beneficial, it cannot be a solution in the short- or mid-term to achieve significant carbon reduction targets.

- Informing and supporting staff to voluntarily reduce their **long-commuting emissions** cannot represent a mitigation measure since there is no long commuting. Most staff commute a maximum of 20km to come to Cedefop.
- In the case of **bike infrastructure** and improving the capacity of bike stands in Cedefop's premises, it is important to note that this measure was not considered feasible due to safety (winding roads) and health (heatwave during summer period) concerns.

7.5.6 Mitigation potential of measures considered

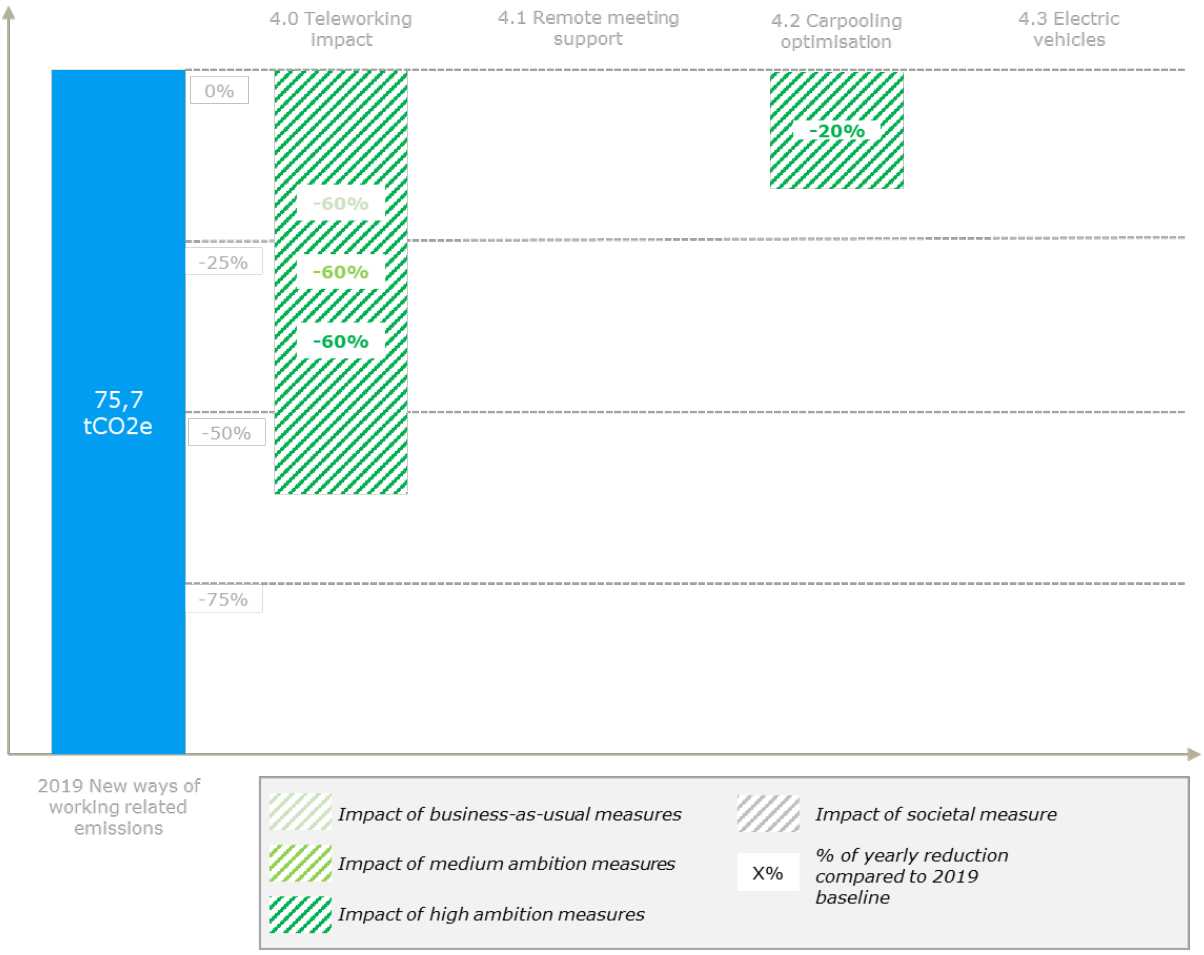
As mentioned in the methodology section, for each mitigation measure, three levels of ambition are assessed: Business-as-usual, Medium and High.

Table 47 – Detailed levels of ambition for new ways of working mitigation measures

#	Measures	Business-as-usual ambition	Medium ambition	High ambition
4.0	**Teleworking impact tracking (rebound effect at home not included)**	• Allowance of 3 days of teleworking per week for each employee	• Provision to staff of tools to assess their carbon footprint at home and create discussion opportunities	• Monitoring of direct and indirect impact of teleworking development (through yearly survey for instance)
4.1	**Remote meeting support**	• Improve remote working equipment • Promote online and hybrid meetings	• Set up of an internal obligation of always proposing hybrid meetings for staff	• N/A
4.2	**Carpooling optimisation**	• N/A	• Promotion of carpooling effects • Assessment of the implementation of a platform to carpool between employees	• Implementation of a platform to carpool between employees
4.3	**Electric vehicles promotion**	• Installation of 2 electric car chargers in Cedefop's garage	• Promote available tax allowances or subsidies to purchase an electric vehicle • Replace Cedefop's vehicle with an electric one	• N/A

The mitigation potential of each measure is calculated considering the combination of external factors and mitigation measures managed by Cedefop is then calculated. Staff is considered stable. The graph below represents the mitigation potential of each measure as a standalone measure (meaning the mitigation potential cannot be added as they impact each other). A combined version of measures' impact is presented in chapter 8 on pathways.

Figure 15 – Mitigation potential of measures for the new ways of working domain



7.5.7 Detailed analysis of mitigation measures

In this section, we will first highlight the identified key drivers and obstacles, as well as the co-benefits of each measure. Then, the expected mitigation potential (both in tCO2 et in % of Cedefop total CCF), costs (OPEX and CAPEX) and FTEs will be provided for each measure and each scenario (business-as-usual, medium ambition and high ambition). The elements included in these numbers are explained in the "comments" section in each table. Only the elements having a cost, savings or mitigation impact have been included in the tables presented below.

Table 48 - Key drivers and co-benefits for new ways of working

#	Measures	Identified key drivers for implementation	Identified key obstacles for implementation	Identified co-benefits
4.0	**Teleworking impact tracking (rebound effect at home not included)**	• Increased teleworking due to pandemic • No interference with private life choices	• Data privacy concerns/issues • Reluctance of employees to track their day-to-day commuting practices • Complexity of data collection	• Improved environmental awareness of the staff
4.1	**Remote meeting support**	• Provision of qualitative remote meeting equipment (interoperability, sound quality) • Management guidance to avoid saturation of remote meetings in a day	• Costs of support • Risk of hyperconnectivity	• Improved work-life balance • Increased cooperation opportunities
4.2	**Carpooling optimisation**	• Easy to use platform • Promotion and lead-by-example from the management	• Potential reluctance to carpool (different habits, worries for comfort and flexibility)	• Costs savings in terms of fuel spent for the employees
4.3	**Electric vehicles promotion**	• Willingness of Cedefop's top management to support car fleet renewal • Installation of 2 electric vehicle charging stations on Cedefop's premises	• Costs of buying a new vehicle despite the tax allowance	• Traffic noise reduction

Table 49 - New ways of working - Overview of expected mitigation potential, costs and needed resources for the business-as-usual pathway

Business-as-usual ambition								
#	Measures	Mitigation potential (t CO2e/year)	Mitigation potential (% of 2019 CCF)	CAPEX	OPEX	FTEs	Potential savings by 2030	Comments
4.0	**Teleworking impact** (rebound effect at home not included)	45,40	3,04%	N/A	N/A	N/A	N/A	• **Allowance of 3 days of teleworking per week for each employee:** The mitigation potential reflects the reduction of 60% of CO2 emissions related to commuting from employees (3 days/week)
4.1	**Remote meeting support**	Lever effect[98]	Lever effect	-	-	-	-	• **Improve remote working equipment & promote online and hybrid meetings:** These measures do not have a direct effect but rather a lever effect by making remote meetings easier • The costs and FTEs have been included under measure 3.1.
4.2	**Carpooling optimisation**	N/A	N/A	N/A	N/A	N/A	N/A	• No measure is planned under the business-as-usual pathway
4.3	**Electric vehicles promotion**	Lever effect[99]	Lever effect	-	-	-	-	• **Installation of 2 electric car chargers in Cedefop's garage:** This measure does not have a direct effect but rather a lever effect by allowing employees to charge their electric vehicle on Cedefop's premises

[98] "Lever effect" is indicated when the measure has no direct effect but is a lever for decarbonisation of Cedefop

[99] "Lever effect" is indicated when the measure has no direct effect but is a lever for decarbonisation of Cedefop

Table 50 - New ways of working - Overview of expected mitigation potential, costs and needed resources for the medium ambition pathway

Medium ambition								
#	Measures	Mitigation potential (t CO2e/year)	Mitigation potential (% of 2019 CCF)	CAPEX	OPEX	FTEs	Potential savings by 2030	Comments
4.0	**Teleworking impact** (rebound effect at home not included)	45,40	3,04%	-	-	0,2 FTE	-	• The mitigation potential reflects the reduction of 60% of CO2 emissions related to commuting from employees (3 days/week) • 0,2 FTE has been forecasted to develop the best practice guidance for employees (to be shared with measures 4.2 and 4.3) • A free tool could be suggested to employees to assess their carbon footprint[100]
4.1	**Remote meeting support**	Lever effect[101]	Lever effect	-	-	-	-	• This measure does not have a direct effect but rather a lever effect by making remote meetings easier. • The costs and FTEs have been included under measure 3.1.
4.2	**Carpooling optimisation**	Lever effect	Lever effect	-	-	-	-	• This measure does not have a direct effect but rather a lever effect by raising awareness among employees about carpooling. • The FTE required for this measure have been included in measure 4.0
4.3	**Electric vehicles promotion**	Lever effect	Lever effect	-	-	-	-	In addition to installation of electric charging station in the business-as-usual scenario, the following measure has been added under the medium ambition scenario: • **Replacement of existing vehicle with an electric one**: the mitigation potential will highly depend on the car purchased and especially on the electricity mix used. A rebound effect should be also accounted for the construction of the car. Potential savings or costs are equally hardly predictable as it depends on the costs of fuel vs electricity. • The FTE required for this measure have been included in measure 4.0

[100] Such as https://www.carbonfootprint.com/calculator.aspx

[101] "Lever effect" is indicated when the measure has no direct effect but is a lever for decarbonisation of Cedefop

Table 51 - New ways of working - Overview of expected mitigation potential, costs and needed resources for the high ambition pathway

High ambition								
#	Measures	Mitigation potential (t CO2e/year)	Mitigation potential (% of 2019 CCF)	CAPEX	OPEX	FTEs	Potential savings by 2030	Comments
4.0	**Teleworking impact** (rebound effect at home not included)	45,40	3,04%	-	5.000 €	0,3 FTE	-	• The mitigation potential reflects the reduction of 60% of CO2 emissions related to commuting from employees (3 days/week) • 0,3 FTE has been forecasted to develop the best practice guidance for employees (to be shared with measure 4.2 and 4.3) • A 5k€ OPEX has been forecasted to set up the survey and analyse it. An additional 0,1FTE has been added to support with the matter • A free tool could be suggested to employees to assess their carbon footprint[102]
4.1	**Remote meeting support**	Lever effect	Lever effect	-	-	-	-	• No additional measure from the previous pathways.
4.2	**Carpooling optimisation**	15,13	1,01%	-	29.316 €	0,2 FTE	-	• The setup of a carpooling platform combined with the communication campaign has been estimated to have a mitigation potential of 20% of reduction of commuting emissions, or 14,65 t CO2e/year • 0,4 FTE over 6 months have been forecasted to conduct the setting up of the platform and surrounding activities • The monthly cost for a platform has been estimated to 349€/month, or around 29,3k€ by 2030 • No savings are to be expected as Cedefop does not cover employees' commuting
4.3	**Electric vehicles promotion**	Lever effect	Lever effect	-	-	-	-	• No additional measure from the previous pathways.

[102] Such as https://www.carbonfootprint.com/calculator.aspx

7.5.8 Conclusion

The new ways of working action domain are organised around four categories of measures.

With a teleworking policy currently allowing three days per week, the generalization of teleworking already has the potential to decrease commuting emissions by almost 44 t CO2e/ year. However, teleworking does not provide only GHG reductions. Indeed, it can lead to a significant rebound effect, as extensively explained in section 6.1 above. Therefore, it is proposed to introduce a self-monitoring tool and/or a yearly survey to raise staff awareness on this key issue and monitor the teleworking practices of staff. Costs consist of 5k€ to set up a survey and human resources to support the different initiatives.

The remote meeting support measure has already been introduced by Cedefop essentially as a support measure to enable each member of staff to work remotely and easily connect to any meeting. Therefore, its mitigation potential is related to the lever it procures to other action domains to reduce emissions.

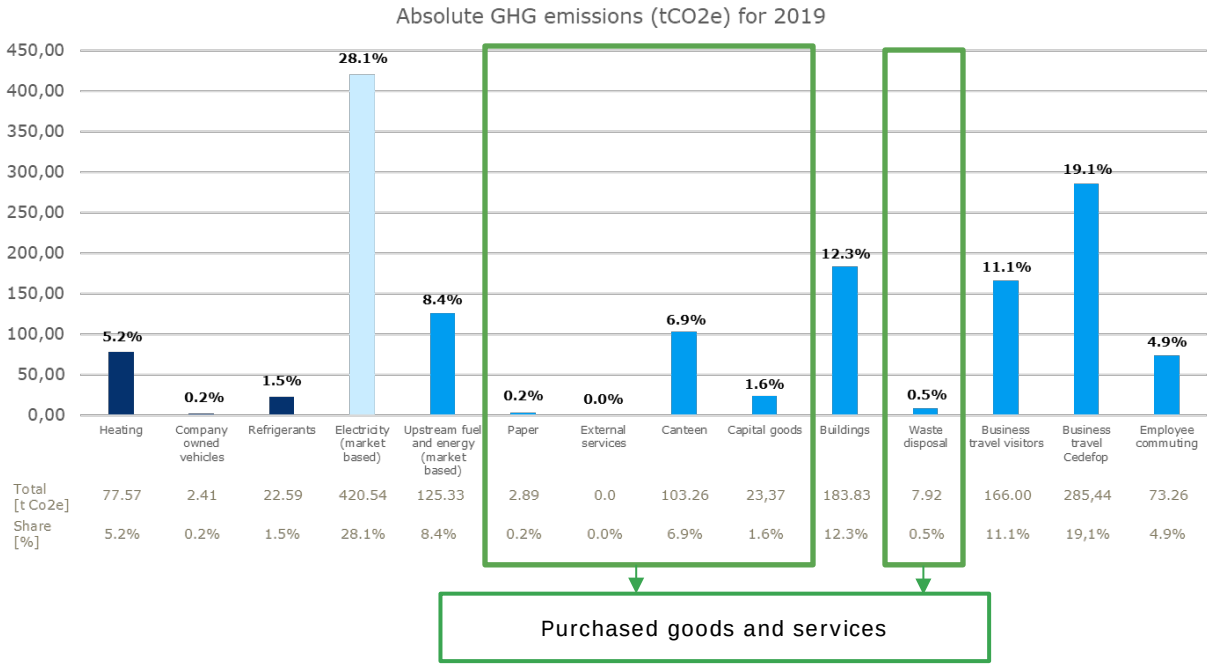
Considering the low public transport offering to reach Cedefop's premises, providing awareness and tools to encourage carpooling among staff members has been suggested as the best option to reduce commuting-related emissions. This could have the potential to reduce commuting emissions by 20%. However, costs and human resources would be involved in developing the awareness campaign and set up and maintain the carpooling platform (estimated to 349 €/month).

Finally, supporting the uptake of electric vehicles has also been proposed as a mitigation measure. Considering that Cedefop has already installed two charging stations on its premises and is looking to replace its sole vehicle with an electric one, the additional measure consists in raising awareness of incentives (e.g. tax allowances). This could be included in a "good practice" guidance/ communication campaign, along with the other action domain measures.

7.6 Purchase of goods and services and waste

7.6.1 Current situation

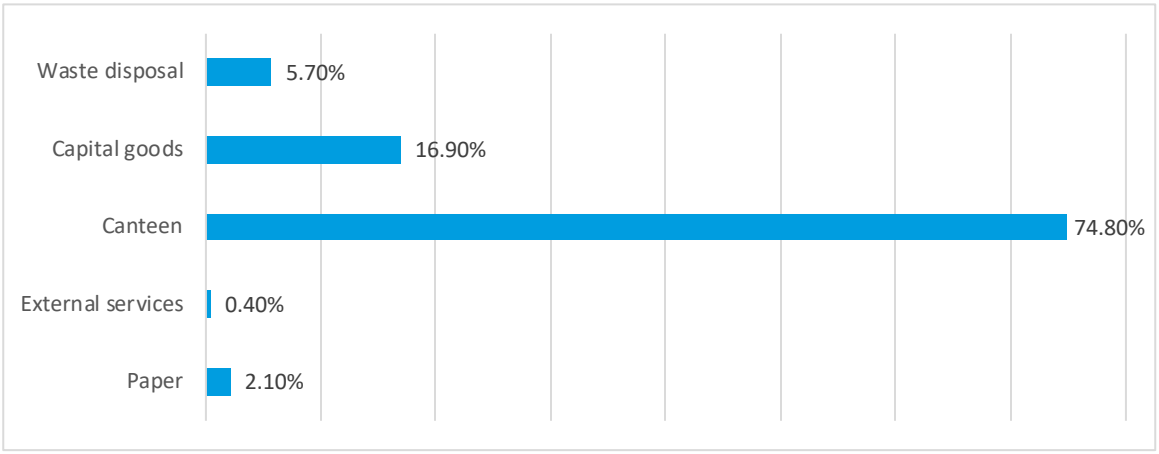
Figure 16 – Absolute GHG emissions (tCO_2e) for 2019 for purchased goods and services and waste



Purchased goods, services and waste domain relates to company owned vehicles, paper, external services, canteen, capital goods and waste disposal and represents the fourth largest contributor to Cedefop's 2019 total emissions (9,2%).

The graph below illustrates the split of purchased goods, services and waste domain related emissions per emission sources.

Figure 17 – Purchase of goods and services and waste emissions split



As illustrated, most of these emissions (75% of the purchased goods and services related emissions) are related to the canteen. This is mainly due to meat consumption accounting for 60% of canteen's emissions and representing only 14% of the total food quantity consumed by Cedefop. The production of meat, particularly beef and lamb, requires a lot of resources including land, water, and feed and necessitates significant use of fossil fuels in the production, transportation, and processing of these resources. Fruits represents 10% of canteen emissions but account for 49% of the total food quantity consumed by Cedefop. Fish and dairy products remain significant contributors, both accounting for 8% of the total emissions. The impact of the rest of food types, products and water remain low.

Capital goods represent the second largest source of purchased goods and services emissions (17%). The remaining emission sources, waste disposal and paper contribute to less than 1% of Cedefop's total carbon footprint and around 4% of the purchase goods and services and waste domain.

7.6.2 Contextual evolution

Similarly to the other domain, several internal and societal contextual factors were taken into account to draft mitigation measures in the field of purchased goods, services, and waste.

It is becoming more and more recognised that the food choices made by an organisation can significantly impact its carbon emissions. Indeed, food production and consumption contribute to greenhouse gas emissions through various stages of production, including transportation, processing, and packaging.

More recently, the global climate impact of digitalisation has been an increasing matter of concern. More and more individuals and organisations are now aware that the use of IT equipment, data centres and cloud services indeed have a significant impact on the planet[103]. This is a good sign because it means that staff members are increasingly inclined to adopt sustainable behaviours (e.g. keeping their devices longer). Yet, it is to be noted that perspectives of the sector, in general, are not that clear. On the one hand, the increased use of devices and data should increase electricity demand and associated emissions. On the other hand, data centres' energy consumption has been capped since 2015[104] and a decoupling between growth of use and growth of energy demand of the sector is observed.

In recent years, EU institutions have recognized the importance of green procurement in reducing their carbon footprint. Green procurement involves choosing products and services that are environmentally friendly and sustainable, such as those with lower carbon emissions or made from recycled materials. Cedefop and the EU Commission have started to implement green procurement practices by including environmental criteria in their procurement procedures and contracts. For instance, they may require suppliers to provide information on the environmental impact of their products or services or specify that certain environmental standards must be met. By integrating green procurement into their operations, Cedefop and the EU Commission are taking steps to reduce their carbon footprint and promote sustainability.

7.6.3 Overview of mitigation measures

In the table below, identified mitigation measures related to purchase and waste topic are listed.

[103] International Energy Agency analysis (December 2020) mention 1,5% while French Carbon Think Tank Shift Project mention 4% (https://theshiftproject.org/wp-content/uploads/2019/07/Excutive-Summary_EN_The-unsustainable-use-of-online-video.pdf)

[104] See International Energy Agency analysis (December 2020) : https://www.iea.org/commentaries/the-carbon-footprint-of-streaming-video-fact-checking-the-headlines

Table 52 - Mitigation measures for purchase of goods and services and waste

#	Measures considered	Applicability	Already initiated
5.0	Reduction of meat consumption	**Yes**	**Partially**
5.1	IT devices lifespan optimisation	**Yes**	**Partially**
5.2	Low level of paper consumption	**Yes**	**Partially**
5.3	Green procurement	**Yes**	**Partially**
5.4	Cloud and local server optimisation	**Yes**	**Partially**

- **Reduction of meat consumption:** As presented above, meat consumption has a significant impact on the carbon footprint. Therefore, reducing it will be key in order to lower Cedefop's overall emissions. This could mean offering a vegetarian option every day, having a no-meat day or increasing awareness among staff about the carbon footprint of meat consumption and its impact on the environment.
- **IT devices lifespan optimisation**: This measure involves optimizing the lifespan of IT devices by employing energy-efficient devices, reducing the number of devices used, repairing them when possible, recycling the old devices and encouraging "Bring Your Own Device" (BYOD) policies.
- **Low level of paper consumption**: Maintaining a low level of paper would require encouraging staff to use digital documents instead of paper and to implement policies to reduce paper usage, such as double-sided printing, recycling, and the use of electronic signatures.
- **Green procurement:** Green procurement should be understood here as integrating environmental technical requirements in procurement procedure as well as defining criteria that support the proposals with the lower environmental impact. This measure also involves incorporating environmental criteria into the monitoring of the contracts to ensure that suppliers are using sustainable practices and materials.

  It could take the form of a sustainable supplier engagement plan which would encourage suppliers to take a role towards climate responsibility. To do so, they would have to disclose information about their sustainability strategy and their sustainability report as well as provide more accurate data that would feed Cedefop's carbon footprint. Another information that could be required is the carbon footprint of the activities performed specifically for Cedefop.
- **Cloud and local server optimization**: To reduce energy consumption and carbon emissions linked to cloud and local servers, organisation can apply energy-efficient methods to data servers, using cloud-based IT solutions, and integrating green criteria into cloud IT procurements.

7.6.4 Measures already initiated

For the purchased goods and services and waste domain, Cedefop has already partially implemented several measures among the six typologies of measures presented above.

- **No printing policy:** Since 2019, Cedefop has implemented a no-printing policy. Reports are no longer printed nor disseminated to clients and institutions, neither in-house nor by the Publications Office; they are sent digitally. Additionally, since 2019 all internal processes and procedures have been digitised and digital signatures were introduced, and thus have become paperless. This policy decreases GHG emissions significantly by minimising the use of paper, ink, and energy related to publications' printing, transportation, and disposal (waste management).
- **'Low-carbon' canteen with little waste:** By cooking food in-house, Cedefop reduces food emissions; indeed, non-transformed food is generally less polluting since it requires fewer resources, energy, and chemicals to produce and transport it. Moreover, products used for cooking are primarily European or Greek, which should also contribute to reducing emissions related to the transportation of ingredients. Since 2019, Cedefop has also the offering of the canteen to one dish of the day to adapt to lower attendance on a daily basis. In addition to that, Cedefop's canteen also offer staff with one vegetarian option per day.

  Second, the cafeteria produces very little waste. In terms of food waste, employees can buy leftover food from each service at the end of the day. Such a policy successfully managed to reduce food waste to almost zero. Employees are also encouraged to bring their containers to collect leftovers, suppressing emissions related to disposable food boxes. Regarding plastic waste, Cedefop has installed water fountains on each building floor, effectively reducing the number of single-use plastic bottles bought.
- **IT management**: Since 2019, Cedefop has moved parts of its IT tools to the cloud, including services such as MS365 and Teams and hosting platforms such as Livelink (intranet and collaboration) to Sharepoint. Previously, these services were hosted on around four internal servers.

  The IT department also worked on extending the lifespan of Cedefop's IT equipment, with routers dating back to 2013 and Wi-Fi controllers from 2008. Laptops and desktops are also kept in use for 5-6 years rather than the standard four years. This is a significant measure since expanding the life of a device is one of the most virtuous actions that can be taken to minimise the environmental impact of the ICT sector within organisations[105].

- **Green cleaning services:** Cedefop requires its cleaning company contractor to use cleaning products that are green-labelled and designed to minimize emissions during production and usage. These products adhere to various eco-friendly principles such as being biodegradable, generating less waste, and requiring only cold water instead of energy-intensive hot water.

7.6.5 Measures not selected

No measure was disregarded in the area of purchased good and services since all were judged applicable and relevant to Cedefop's context. There does not seem to be any major technological, organisational or monetary hurdle in implementing these measures. Rather the opposite, most of the measures in the area of purchased goods and services can also have the potential of reducing costs. For instance, using devices for longer or recycling them can help decrease the IT budget while consuming less meat should also be cost-effective.

[105]European Economic and Social Committee (2019). Identifying the impact of the circular economy on the Fast-Moving Consumer Goods Industry: opportunities and challenges for businesses, workers and consumers – mobile phones as an example https://circulareconomy.europa.eu/platform/sites/default/files/impact_of_ce_on_fmcg_-_mobile_phones_case_study.pdf

7.6.6 Mitigation potential of measures considered

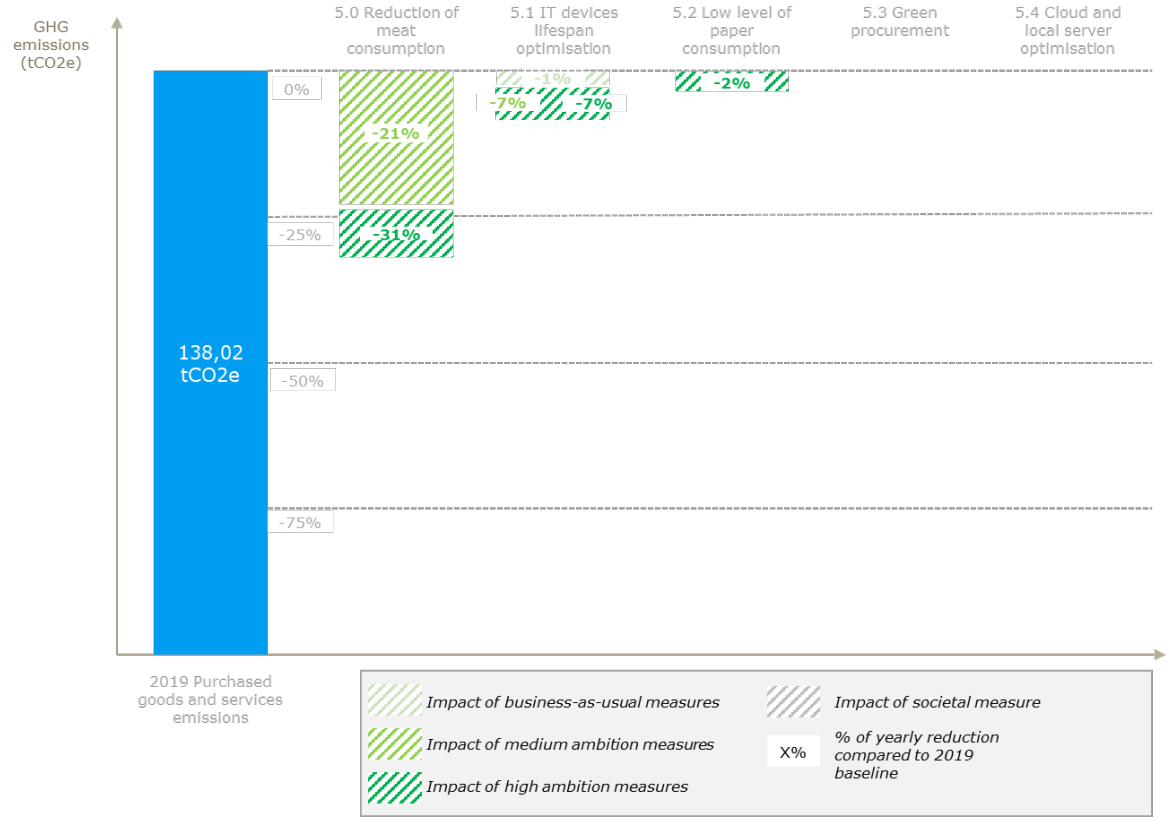
As mentioned in the methodology section, for each mitigation measure, three levels of ambition are assessed: Business-as-usual, Medium and High.

Table 53 – Detailed levels of ambition for purchase of goods and services and waste mitigation measures

#	Measures	Business-as-usual ambition	Medium ambition	High ambition
5.0	**Reduction of meat consumption**	• Provision of one vegetarian option per day	• Introduction of one then two days of only vegetarian lunch per week	• Introduction of more than 3 days of only vegetarian lunch per week (If we want to reduce dramatically meat consumption by 2030, meat consumption should drop by approx.70% by 2030.)
5.1	**IT devices lifespan optimisation**	• Extension of Cedefop's IT equipment lifespan • Provision of old devices to NGO or schools • Promotion of available and cost-efficient repair options and salvage spare parts from unrepairable devices. • Recycling of old broken devices	• Extension of Cedefop's IT equipment lifespan from 4 to 7 years	• Set up of procurement monitoring system (Local purchase, local repairing/refurbishing) • Higher extension of IT devices lifespan
5.2	**Low level of paper consumption**	• No printing policy (2019) • Set up monitoring system of printed papers	• N/A	• N/A
5.3	**Green procurement**	• N/A	• Set up a sustainable supplier engagement plan starting with the largest contractors	• Extend the sustainable supplier engagement plan to all suppliers • Monitoring and tracking of all the suppliers
5.4	**Cloud and local server optimisation**	• Moving IT tools to the cloud (2019) • Use EC Green Public Procurement guidelines for cloud services	• N/A	• N/A

The mitigation potential of each measure is calculated considering the combination of external factors and mitigation measures managed by Cedefop is then calculated. Staff is considered stable. The graph below represents the mitigation potential of each measure as a standalone measure (meaning the mitigation potential cannot be added as they impact each other). A combined version of measures' impact is presented in chapter 8 on pathways.

Figure 18 – Mitigation potential of measures for the purchase of goods and services and waste domain



7.6.7 Detailed analysis of mitigation measures

In this section, we will first highlight the identified key drivers and obstacles, as well as the co-benefits of each measure. Then, the expected mitigation potential (both in tCO2 et in % of Cedefop total CCF), costs (OPEX and CAPEX) and FTEs will be provided for each measure and each scenario (business-as-usual, medium ambition and high ambition). The elements included in these numbers are explained in the "comments" section in each table. Only the elements having a cost, savings or mitigation impact have been included in the tables presented below.

Table 54 - Key drivers and co-benefits for new ways of working

#	Measures	Identified key drivers for implementation	Identified key obstacles for implementation	Identified co-benefits
5.0	Reduction of meat consumption	• Awareness campaigns about climate impact of meat and health relevance • Progressive evolution of meals	• Reluctance from staff for no-meat days	• Health benefits
5.1	IT devices lifespan optimisation	• Further expand efforts already in place	• Reluctance to use an older phone or other appliance for longer instead of renewing it	• Cost savings on device non-renewals • Reduction in use of other resources such as rare metals (metals needed in IT equipment) and water (for extraction processes and manufacturing) • Reduction in IT waste generation
5.2	Low level of paper consumption	• N/A (already in place)	• N/A (already in place)	• Resource savings • Decreased waste generation
5.3	Green procurement	• Participation to EC Green Public Procurement guideline definition • Long-term monitoring	• Higher cost of green products	• Greener product providers – virtuous circle
5.4	Cloud and local server optimisation	• Existing EC Green Public Procurement guidelines for cloud services	• N/A	• Productivity: get data better organised

Table 55 - Purchased goods and services - Overview of expected mitigation potential, costs and needed resources for the business-as-usual pathway

Business-as-usual								
#	Measures	Mitigation potential (t CO2e/year)	Mitigation potential (% of 2019 CCF)	CAPEX	OPEX	FTEs	Potential savings by 2030	Comments
5.0	**Reduction of meat consumption**	Lever effect	Lever effect	-	-	-	-	• Provision of one vegetarian option per day: This measure does not have a direct effect but rather a lever effect by offering vegetarian meals
5.1	**IT devices lifespan optimisation**	7,79	0,52%	-	-	-	159.764 €	• The mitigation potential results from **the extension of the lifespan from 4 to 6 years** • The savings reflect the lower renewal rate of IT appliances. It has been estimated to be roughly 14,5k€/ year, or 159,8€ by 2030
5.2	**Low level of paper consumption**	2,31	0,15%	N/A	N/A	N/A	N/A	• The mitigation potential results from the **no-printing policy** already in place • The savings have been estimated to be negligible
5.3	**Green procurement**	N/A	N/A	N/A	N/A	N/A	N/A	• No measure is planned under the medium ambition pathway
5.4	**Cloud and local server optimisation**	No data available for assessment	No data available for assessment	N/A	N/A	N/A	N/A	• Use EC Green Public Procurement guidelines for cloud services: This measure could not be estimated as no data was available for assessment.

Table 56 – Purchased goods and services - Overview of expected mitigation potential, costs and needed resources for the medium ambition pathway

Medium ambition								
#	Measures	Mitigation potential (t CO2e/year)	Mitigation potential (% of 2019 CCF)	CAPEX	OPEX	FTEs	Potential savings by 2030	Comments
5.0	**Reduction of meat consumption**	28,43	1,90%	-	-	-	-	• **One then two days of only vegetarian lunch per week**: the mitigation potential reflects the reduction potential when reaching 2 days of only vegetarian lunch at the canteen
5.1	**IT devices lifespan optimisation**	10,01	0,67%	-	-	-	188.607 €	• The mitigation potential results from **the extension of the lifespan from 4 to 7 years** • The savings reflect the lower renewal rate of IT appliances. It has been estimated to be roughly 18,7k€/ year, or 188,6k€ by 2030
5.2	**Low level of paper consumption**	2,31	0,15%	N/A	N/A	N/A	N/A	• No additional measure from the Business-as-usual pathway is planned under the medium pathway
5.3	**Green procurement**	N/A	N/A	N/A	N/A	N/A	N/A	• No measure is planned under the medium ambition pathway
5.4	**Cloud and local server optimisation**	No data available for assessment	No data available for assessment	N/A	N/A	N/A	N/A	• No additional measure from the Business-as-usual pathway is planned under the medium pathway

Table 57 - Purchased goods and services - Overview of expected mitigation potential, costs and needed resources for the high ambition pathway

High ambition								
#	Measures	Mitigation potential (t CO2e/year)	Mitigation potential (% of 2019 CCF)	CAPEX	OPEX	FTEs	Potential savings by 2030	Comments
5.0	**Reduction of meat consumption**	42,64	2,85%	-	-	-	-	• **More than 3 days of only vegetarian lunch per week:** the mitigation potential reflects the reduction potential when reaching 3 days of only vegetarian lunch at the canteen
5.1	**IT devices lifespan optimisation**	10,01	0,67%	-	-	-	188.607 €	• No additional measure from the Business-as-usual and medium pathway is planned under the medium pathway
5.2	**Low level of paper consumption**	2,31	0,15%	N/A	N/A	N/A	N/A	• No additional measure from the Business-as-usual and medium pathway is planned under the medium pathway
5.3	**Green procurement**	No data available for assessment [106]	No data available for assessment	N/A	N/A	1 FTE	N/A	• 1 FTE has been foreseen (0,5 FTE/ year over 2 years) to develop green procurement policy and guidelines. This covers measures 5.4 and 5.5 as well [107]
5.4	**Cloud and local server optimisation**	No data available for assessment	No data available for assessment	N/A	N/A	N/A	N/A	• No additional measure from the Business-as-usual pathway is planned under the medium pathway

[106] The measures 5.3, 5.4 and 5.5 are related to the external services that have been calculated following a spent-based methodology. Therefore, the mitigation potential of proposed measures cannot be assessed as the baseline data is not yet available.

[107] Green procurement guidance should be developed within Cedefop, following the EC Green Public Procurement guidelines: Green Public Procurement - Environment - European Commission (europa.eu)

7.6.8 Conclusion

For this action domain, proposed measures can be divided into two broad categories: the ones for which detailed data were available and for which precise GHG emissions could be calculated, and the others for which the emissions were calculated following a spent-based methodology.

For the first category, including the reduction of meat, the IT equipment lifespan optimisation, and the low paper consumption, we estimate that the most impactful measure is the meat reduction, with a mitigation potential reaching over 42t CO2e/year (2,55% of the total CCF) with the high ambition scenario. On the savings side, IT equipment lifespan optimisation is the most promising, amounting to over 18k€/year.

Regarding the second category, no mitigation potential, costs, or savings could be estimated at this stage. Developing green procurement guidance and collecting more accurate data would allow assessing the environmental impact of those services more accurately and therefore estimate the potential costs and savings.

8. GHG emissions reduction targets and pathways for Cedefop

In the present chapter, we build on the analysis of emissions reductions measures in Chapter 7 to identify possible (bottom-up) emissions reduction targets and pathways.

8.1 Methodology

Three scenarios are assessed:

- A **high ambition scenario** combines all measures as described and assessed in their high level of ambition, including the business-as-usual and medium pathways' measures
- A **medium level ambition** scenario combines all measures as described and assessed in their medium level of ambition, including the business-as-usual pathway's measures
- A **business-as-usual pathway**, including only the measures already implemented by Cedefop since 2019 or scheduled to be implemented in the upcoming years.

In this way, the scenarios can be used as a range of possibilities between what could be considered lower and upper boundaries. In practice Cedefop will have the possibility to freely adjust the level of ambition of each measure and define a level of ambition for themselves.

The scenarios follow a number of principles:

- **Base year:** The year 2019 is used because this is the best reference point, and also because some mitigation measures are already taking place (e.g., new ways of working in 2020 and 2021)
- **Objective set at 2030**: 2030 is chosen for the target year, meaning that at this time full committed pathway should be implemented.
- **Implementation schedule**: GHG emissions are calculated for a ten-year period, and their impact is spread between 2020 and 2030 following an implementation schedule. Implementation of mitigation measures is generally progressive throughout the decade and impact is considered proportional to their level of implementation.
- **Covid effect on travel emissions (missions and visitors' meetings):** The modelling of scenarios takes in account that the travel budget has been reduced by 50% in comparison to 2019 as of 2022. To reflect that, the four key mitigation measures reducing missions and visitors' meetings - leading to a reduction of nearly 70/30 ratio online/in-person participation to conferences and meetings for the medium ambition scenario (85/15 for the high ambition scenario) – are considered fully implemented already in 2020 in the business-as-usual scenario, and partly implemented in the medium and high ambition scenarios (see schedule of implementation below).

Table 58 - Illustration of the implementation schedule of travel measures in the high ambition scenario

2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
70%	70%	70%	80%	90%	100%	100%	100%	100%	100%	100%

- **Growth of Cedefop:** The staff of Cedefop is not foreseen to increase in the future. Therefore, it is considered stable in the pathway calculations.

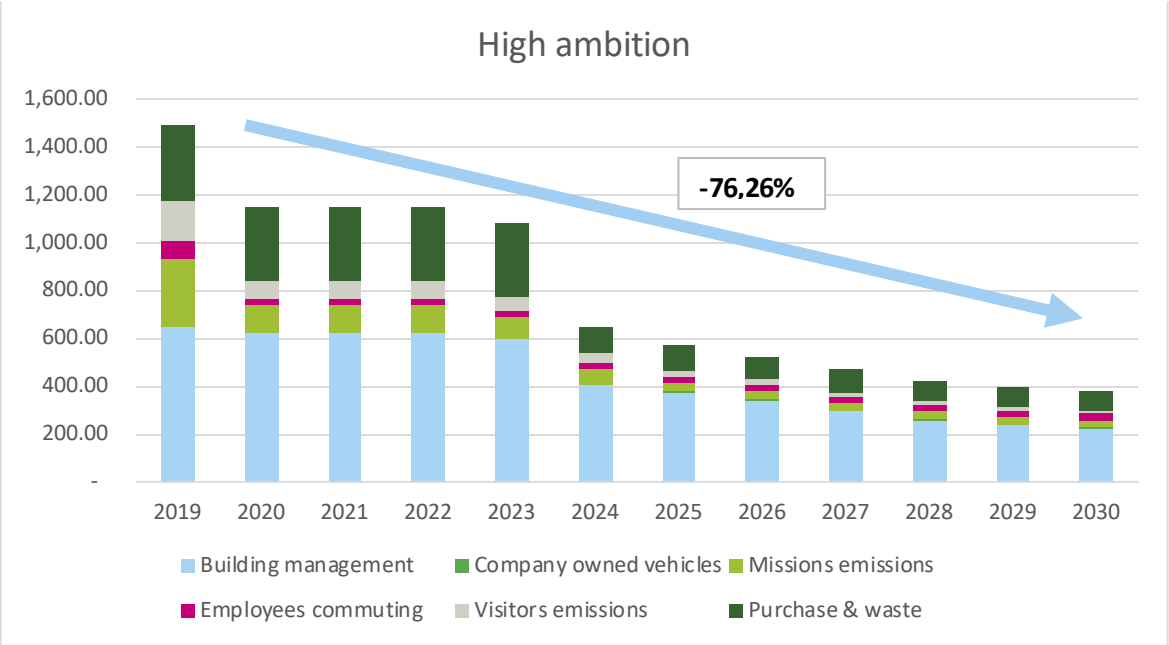
- **Impact calculation**: The estimations of the total GHG emissions reduction take into account the cumulative effect of the different measures. Indeed, most of the measures within a specific action domain are interconnected. Therefore, our model takes into account the impact that a measure can have on another one. As a result, the total GHG emissions reduction is not equal to the sum of each individual absolute mitigation potential as presented in Chapter 7 of this report.
- **Human resources**: Human resources are needed to steer the mitigation action plan, implement measures, train staff, monitor progress and impact (in terms of GHG-emissions) and communicate to ensure collective support. The need for human resources varies slightly from one scenario to another: 2 to 3 FTE for the implementation phase of the main projects, and then to 0,3 to 1 yearly FTE to steer recurrent actions.
- **Cost assessment**: Costs and savings are estimated for the three scenarios (CAPEX and OPEX). A major part of mitigation measures implementation is supposed to be done in 2024 (and investment costs related) while savings are recurrent and taking into account the level of implementation of measures.
- **Building amortization**: The amortization period of the building (and therefore the associated carbon footprint) ends in 2023. Therefore, the 183,83 tCO2e associated to the building will be taken out of each pathway from 2024 on.

8.2 A high ambition scenario: 76 % emission reduction (by 2030, based on 2019's carbon footprint)

8.2.1 Total GHG abated by 2030

The high ambition scenario reaches a 76% absolute emissions reduction in 2030 in comparison to the 2019's carbon footprint. The relative emission reduction is 76% per FTE.

Figure 19 - Cedefop's carbon footprint perspectives in a high ambition scenario



Different mitigation measures are responsible for this reduction in emissions:

- The **staff guidance / policy for missions (and/or budget constraints)** is expected to reduce 85% of physical missions and related emissions. This measure has the highest impact representing 21,28% of the emissions abated between 2019 and 2030 in this scenario.
- The **installation of PV** scheduled for 2023 is expected to provide a reduction of 168,2 t CO2e per year. The measure has the second highest impact representing 14,75% of the emissions abated between 2019 and 2030 in this scenario.
- The **staff guidance/policy for visitors' meetings (and/or budget constraints)** is expected to reduce 85% of visitors' physical meetings and related emissions. The measure has also a high impact representing 12,38% of the emissions abated between 2019 and 2030 in this scenario.
- Adding **electricity management measures** (including switching to LED, purchasing electricity efficient appliances, installing a centralised electricity management system and sensors in the offices) is expected to significantly reduce the electricity consumption of Cedefop. The measure is expected to decrease 11,04% of the emissions between 2019 and 2030 in this scenario.
- **Other measures** represent 23,55% of the emissions abated between 2019 and 2030 in this scenario: the optimization and reorganization of the office space (6,98% of the emissions abated between 2019 and 2030), the reduction of meat consumption (3,74% of the emissions abated between 2019 and 2030), building insulation (2,27% of the emissions abated between 2019 and 2030), and other measures (11,10% of the emissions abated between 2019 and 2030)
- **Contextual evolutions** (improvement of aviation technologies and district heating decarbonisation) represent 0,34% of the emissions abated between 2019 and 2030 in this scenario.

These high ambitions require commitment and involvement from the senior management in the governance of the new policy for business travels and visitors, including defining a new travel culture, doing yearly reporting on guidance respect, training managers to disseminate good practices and ensure targets are met and surveying behavioural change. Alternatively, a carbon budget could be established to nudge management and staff. This scenario also assumes that the remaining missions and visitors travels between cities with a train connection under 500 km are done using train, as well as the trips between Thessaloniki and Athens, which will highly depend on the improvement of the safety on the latter connection (by 2027). Investments relative to all these measures are considered relatively low (see section about costs of the scenario).

Better building management (insulation, space reduction and better heating and electricity management) has a sensitive emission reduction impact but will also generate budget savings, as presented in the cost section, even if it requires upfront investments.

8.2.2 Total costs of measures by 2030

Costs

An overview of costs and savings related to this scenario implementation is presented below. The details explaining all costs considered are available in sections related to cost of each mitigation measures (sections 7.2,7.3,7.4,7.5,7.6).

Table 8.59. Costs and savings of the high ambition scenario in euro

	Ambition high										
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
CAPEX	-	-	6.250	106.800	285.175	270.175	221.429	304.229	121.429	121.429	121.429
OPEX - Costs (others)	-	-	-	-	13.188	21.188	8.188	8.188	8.188	8.188	8.188
OPEX - Savings	- 473.336	- 473.336	- 473.336	- 498.070	- 584.895	- 651.376	- 670.227	- 680.191	- 687.135	- 691.741	- 691.842
TOTAL (CAPEX+OPEX) (€)	- 473.336	- 473.336	- 467.086	- 391.270	- 286.532	- 360.014	- 440.611	- 367.774	- 557.518	- 562.124	- 562.225
TOTAL (CAPEX+OPEX) on the period (€)	- 473.336	- 946.671	- 1.413.757	- 1.805.027	- 2.091.559	- 2.451.572	- 2.892.183	- 3.259.957	- 3.817.475	- 4.379.600	- 4.941.825

This scenario requires an investment of 1.558 k€:

- 693 k€ for building management:
  - 10k€ for a study on office space reorganization,
  - 185 k€ for the insulation (rear part, windows, study for the roof insulation),
  - 40 k€ for the replacement of the heating system from oil to natural gas burner,
  - 47,8 k€ for the installation of sensors in offices and the installation of a centralised management system (for heating and electricity),
  - 100 k€ for the installation of heat pumps,
  - 6 k€ for the replacement of LED in the offices,
  - 197k€ for the green terrace project.
- 865 k€ for implementation of other measures such as the improvement of meeting rooms to support hybrid meetings (500 k€) and 15 k€ to conduct a study to map visitors' patterns and change the approach to meetings and events organization

This scenario also generates savings regarding 2019 expenses:

- Building management measures could generate up to 398k € of savings in total
- The reduction of both business and visitors' travels could generate close to 6M € in total of savings
- The optimization of the IT equipment lifespan could generate up to 19k€/ year of savings
- The installation of PV could generate up to 22 k€/year of savings (44 k€/year with 2023 energy prices)

Ultimately this scenario is expected to generate much more savings than costs (6,5 M€ savings on the 10 years period in comparison with 2019 expense).

Human resources

Table 8.60. FTE required in the high-level ambition scenario

	High ambition - FTEs										
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
TOTAL Human Resources (FTE)	**0,1**	**0,1**	**0,1**	**0,1**	**3,2**	**2,66**	**1,16**	**0,16**	**0,16**	**0,16**	**0,16**

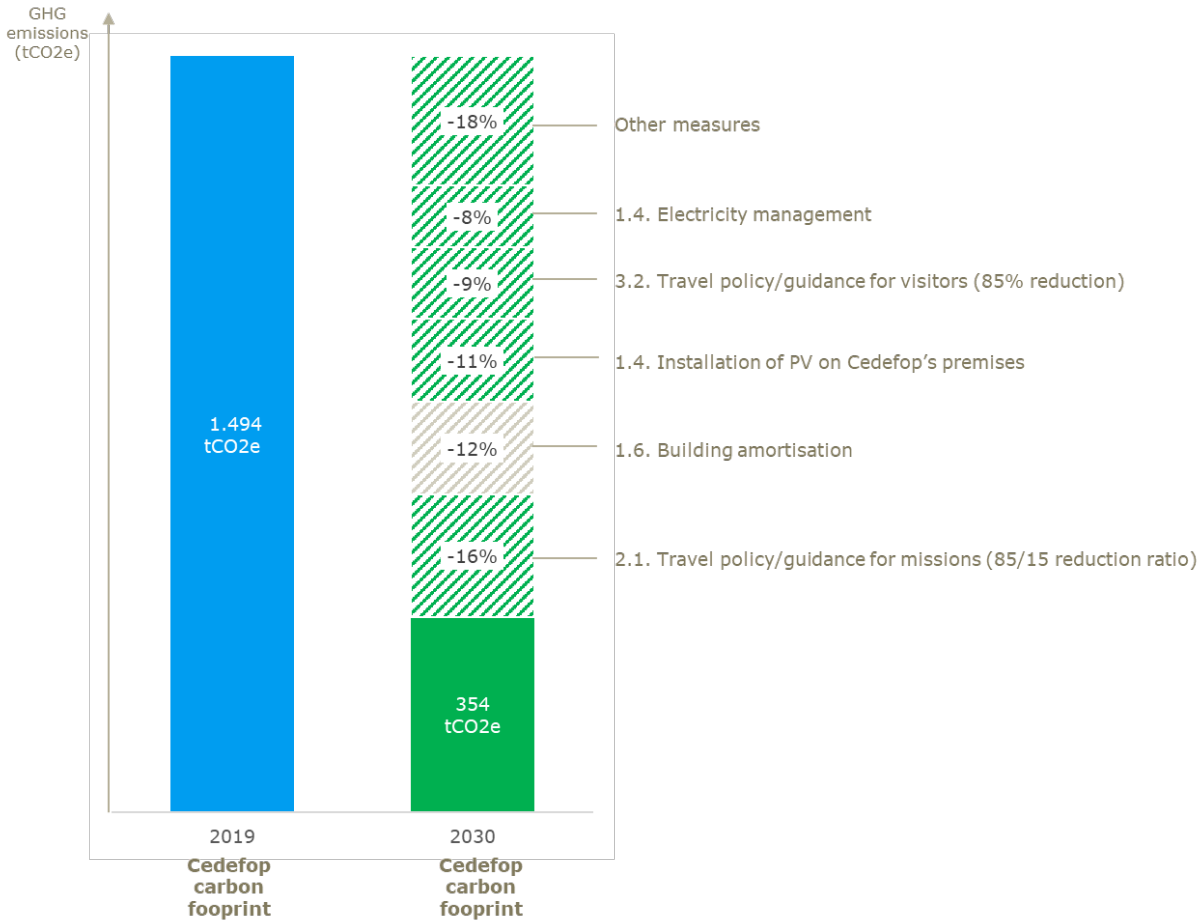
It is estimated that less than 3,2 FTE are required for the implementation of the actions. 1,2 FTE is estimated to manage the various building management projects in 2024, 1 FTE to develop travel related guidance (both for visitors and business travels), 0,4 to support the new ways of working measures, and 0,5 FTE to develop green procurement guidance. Details on the FTE needs can be found for each measure in chapter 7.

8.2.3 Conclusion

Table 8.61. Overview of main impacts of the measures in the high ambition scenario

Name of the measure	Reduction of Cedefop 2019 Carbon footprint in %	Costs
2.1 Travel guidance/policy for missions. Considered avoiding 85% of physical missions and related emissions.	**-16%**	**Implementation costs:** *Costs for carbon budgets considered in measure 2.3* **Yearly savings:** up to 383k€ of yearly savings (85% of 2019 missions' expenses)
Building amortization	**-12%**	No cost impact considered
1.4 Installation of PV on Cedefop's premises	**- 11%**	**Implementation costs:** 107k€ are identified for the installation **Yearly savings:** up to 22k € of yearly savings
3.2. Travel guidance/policy for visitors. Considered avoiding 85% of physical missions and related emissions.	**- 9%**	**Implementation costs:** Costs for carbon budget and change in organisation principles considered in measure 2.3 and 3.2. **Yearly savings:** up to 251k€ of yearly savings (85% of 2019 expenses)
1.4 Electricity management. Including switch to LED, energy efficient appliances and centralised management system	**-8%**	**Implementation costs:** 6k€ for are identified for the installation of LED and around 24 k€ for the installation of sensors and a smart building centralised management system (to be shared with heating) **Yearly savings:** 925 € of yearly savings
Other measures	**-18%**	See details in chapter 7
Societal evolutions (Sustainable Alternative)	**-0,26%**	No cost impact considered

Illustration 1. Overview of main impacts of the measures in the high ambition scenario

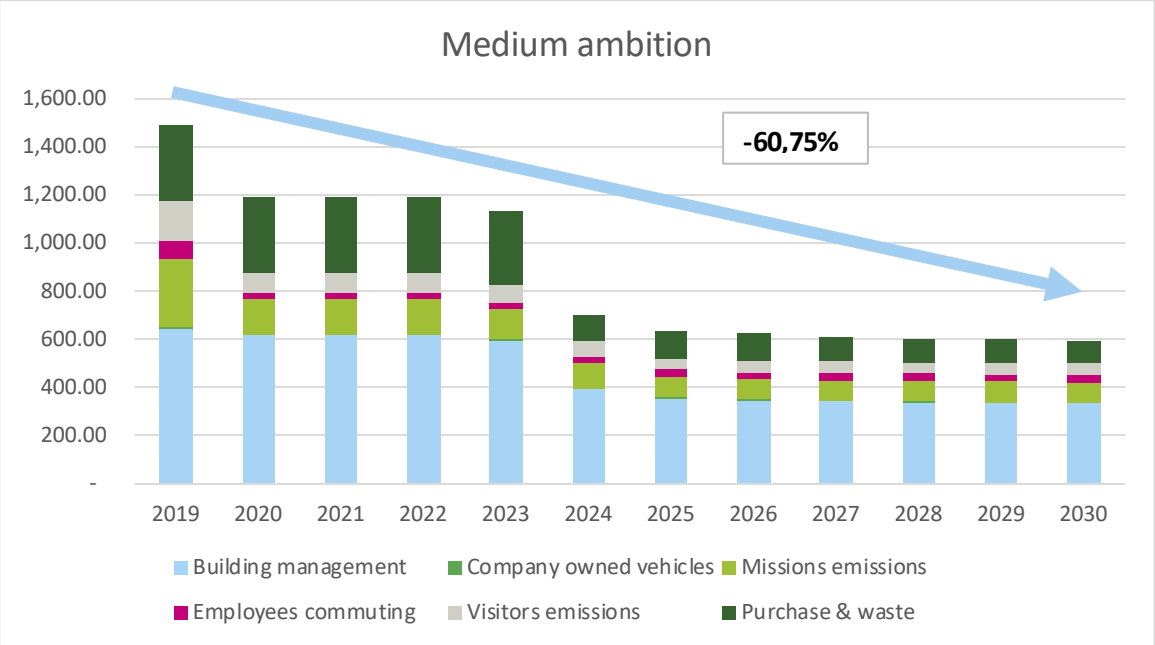


8.3 A medium ambition scenario: 60% emission reduction

8.3.1 Total GHG abated by 2030

The medium ambition scenario reaches a 60% absolute emissions reduction in 2030 in comparison to 2019's carbon footprint.

Figure 20 - Cedefop's carbon footprint perspectives in a medium ambition scenario



Different mitigation measures are responsible of this reduction of emissions:

- The **staff guidance/ policy for missions (and/or budget constraints)** is expected to reduce 70% of physical missions and related emissions. The measure has the highest impact representing 22,00% of the emissions abated between 2019 and 2030 in this scenario.
- The **installation of PV** scheduled for 2023 is expected to provide a reduction of 163,2 t CO_2e per year. The measure has the second highest impact representing 18,52% of the emissions abated between 2019 and 2030 in this scenario.
- The **staff guidance/policy for visitors' meetings (and/or budget constraints)** is expected to reduce 70% of visitors' physical meetings and related emissions. The measure has also a high impact representing 12,79% of the emissions abated between 2019 and 2030 in this scenario.
- Adding **electricity management measures** (including switching to LED, purchasing electricity efficient appliances, installing sensors in the offices) is expected to significantly reduce the electricity consumption of Cedefop. The measure is expected to represent an impact of 8,01% of the emissions abated between 2019 and 2030 in this scenario.
- **Other measures** represent 18,44% of the emissions abated between 2019 and 2030 in this scenario: temporary closing of office space in low occupancy periods (4,08% of the emissions abated between 2019 and 2030), building insulation (2,04% of the emissions abated between 2019 and 2030), the reduction of meat consumption (3,13% of the

emissions abated between 2019 and 2030) and other measures (9,18% of the emissions abated between 2019 and 2030)

This medium ambition mainly relies on measures that are being taken and changes that are being observed in 2020 and 2021 but still need to be monitored and sustained to deliver impact over the next decade.

8.3.2 Total costs of measures by 2030

Costs

An overview of costs and savings related to this scenario implementation is presented below. The details explaining all costs considered are available in sections related to cost of each mitigation measures (Chapter 7)

Table 8.62. Costs and savings of the medium ambition scenario

	Ambition medium										
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
CAPEX	-	-	6.250	106.800	69.670	40.000	-	-	-	-	-
OPEX - Costs (others)	-	-	-	-	4.000	4.000	4.000	4.000	4.000	4.000	4.000
OPEX - Savings	- 473.189	- 473.189	- 473.482	- 478.637	- 504.733	- 552.910	- 555.643	- 555.693	- 555.744	- 555.794	- 555.845
TOTAL (CAPEX+OPEX) (€)	- 473.189	- 473.189	- 467.232	- 371.837	- 431.063	- 508.910	- 551.643	- 551.693	- 551.744	- 551.794	- 551.845
TOTAL (CAPEX+OPEX) on the period (€)	- 473.189	- 946.378	- 1.413.610	- 1.785.447	- 2.216.510	- 2.725.420	- 3.277.063	- 3.828.757	- 4.380.500	- 4.932.295	- 5.484.139

This scenario requires an investment of 223k€ for implementation of measures such as a the insultation of the building (50k€), the installation of PV (107k€), the replacement of the heating system (40k€), and the switch to LED lamps.

This scenario also generates savings regarding 2019 expenses:

- Evolution of travel practices could generate up to 525 k€/year of savings (including both business and visitors' travels).
- Installation of PV could generate up to 22 k€/year of (44 k€/year with 2023 energy prices)
- Optimization of IT equipment lifespan could generate 19k€/ year of savings.
- Optimization of heating and cooling systems could generate 13k€/year of savings

Ultimately this scenario is expected to generate much more savings than costs (5 M€ savings over the 10 years period in comparison with 2019 expense). Details on savings per measure can be found in Chapter 7.

Human resources

Table 8.63. FTE required in the medium-level ambition scenario

	Medium ambition - FTEs										
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
TOTAL Human Resources (FTE)	**0,1**	**0,1**	**0,1**	**0,1**	**2**	**1,15**	**0,15**	**0,15**	**0,15**	**0,15**	**0,15**

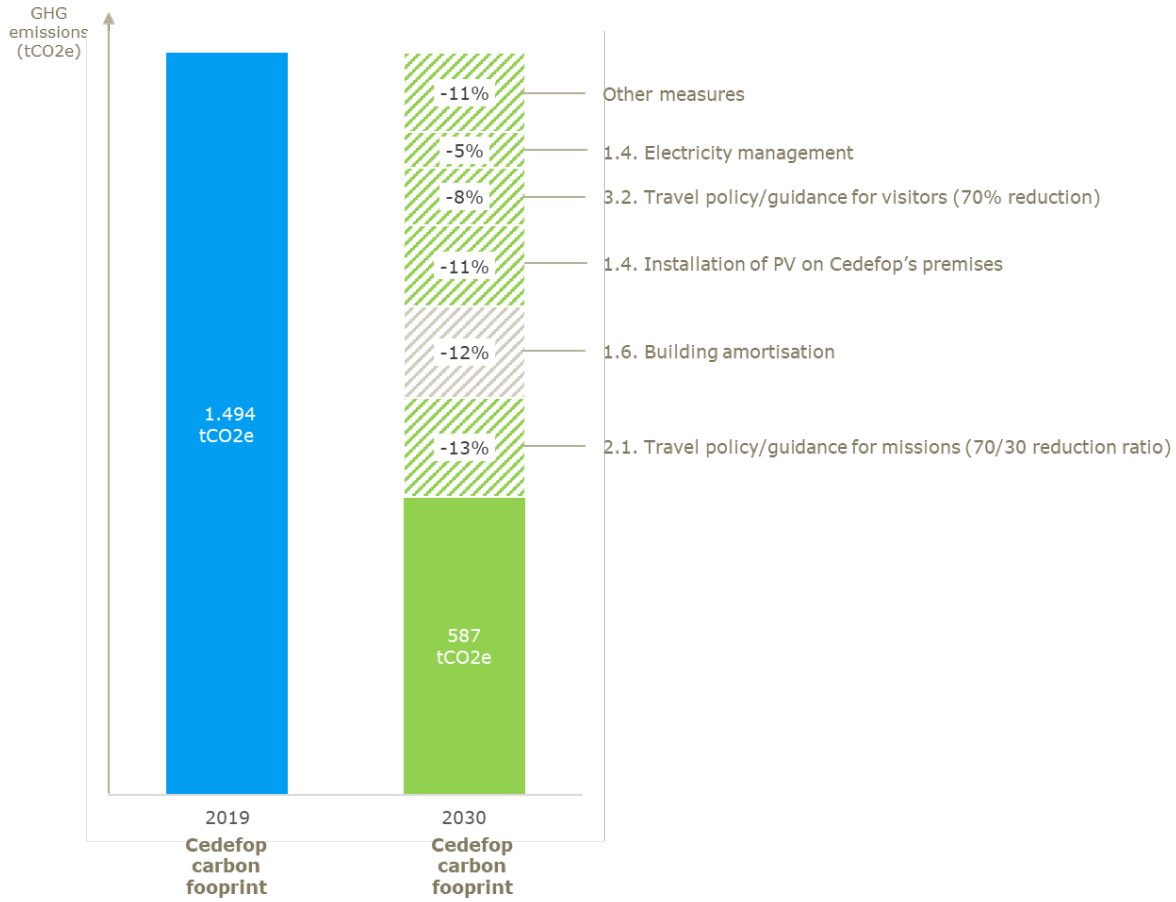
It is estimated that 2 FTE are required for the implementation of the actions. 0,7 FTE is estimated to manage the various building management projects in 2024, 0,5 FTE to develop travel related guidance (both for visitors and business travels), 0,2 to support the new ways of working measures, and 0,5 FTE to develop green procurement guidance. Details on the FTE needs can be found for each measure in chapter 7.

8.3.3 Conclusion

Table 8.64 – Overview of main impacts of the measures in the medium ambition scenario

Name of the measure	Reduction of Cedefop 2019 Carbon footprint in %	Costs
2.1 Travel guidance/policy for missions. Considered avoiding 70% of physical missions and related emissions.	**-13%**	**Implementation costs:** no costs foreseen for this measure **Yearly savings:** up to 287k€ of yearly savings (70% of 2019 missions' expenses)
Building amortization	**-12%**	No cost impact considered
1.4 Installation of PV on Cedefop's premises	**- 11%**	**Implementation costs:** 107k€ are identified for the installation **Yearly savings:** up to 22k€ of yearly savings
3.2. Travel guidance/policy for visitors. Considered avoiding 70% of physical missions and related emissions.	**- 8%**	**Implementation costs:** No costs foreseen for this measure **Yearly savings:** up to 207k€ of yearly savings (70% of 2019 expenses)
1.4 Electricity management. Including switch to LED, energy efficient appliances and centralised management system	**-5%**	**Implementation costs:** 6k€ are identified for the installation of LED **Yearly savings:** 732 € of yearly savings
Other measures	**-11%**	See details in chapter 7

Illustration 2. Overview of main impacts of the measures in the medium ambition scenario

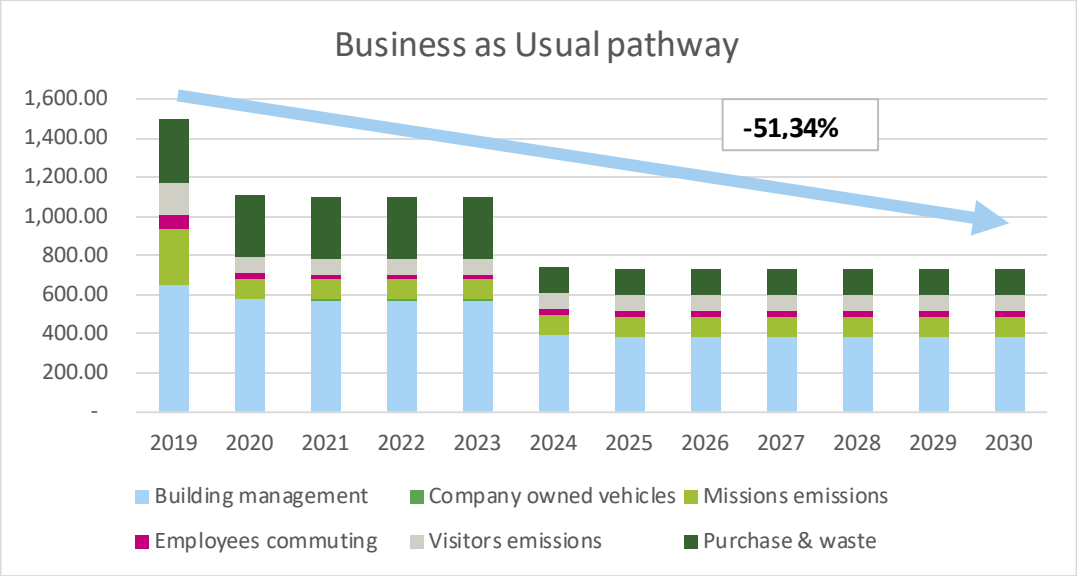


8.4 A business-as-usual scenario: 51% emission reduction

8.4.1 Total GHG abated by 2030

The business-as-usual scenario reaches a 51 % absolute emissions reduction in 2030 in comparison to 2019's carbon footprint.

Figure 21 - Cedefop's carbon footprint perspectives in a business-as-usual scenario



Different mitigation measures are responsible of this reduction of emissions:

- The **installation of PV** scheduled for 2023 is expected to provide a reduction of 163,2 t CO2e per year. The measure has the highest impact representing 21,91% of the emissions abated between 2019 and 2030 in this scenario.
- The **staff guidance/ policy for missions** (and/or budget constraints) is expected to reduce 65% of physical missions and related emissions. The measure has the second highest impact representing 24,18% of the emissions abated between 2019 and 2030 in this scenario.
- The **staff guidance/policy for visitors' meetings** (and/or budget constraints) is expected to reduce visitors' air travel and related emissions. The measure has also a high impact representing 10,81% of the emissions abated between 2019 and 2030 in this scenario.
- Adding **electricity management measures** (including switching to LED, purchasing electricity efficient appliances, installing sensors in the offices) is expected to significantly reduce the electricity consumption of Cedefop. The measure is expected to represent an impact of 9,47% of the emissions abated between 2019 and 2030 in this scenario.
- The **current teleworking policy** (3 days/week) is estimated to represent an impact of 5,92% of the emissions abated between 2019 and 2030 in this scenario (excluding the rebound effects).

- **Other measures** represent 3,75% of the emissions abated between 2019 and 2030 in this scenario: building insulation (2,42% of the emissions abated between 2019 and 2030) and other measures (1,33% of the emissions abated between 2019 and 2030)

The business-as-usual scenario relies only on measures that have already been implemented since 2019 or are scheduled to be implemented but still need to be monitored and sustained to deliver impact over the next decade.

8.4.2 Total costs of measures by 2030

Costs

An overview of costs and savings related to this scenario implementation is presented below. The details explaining all costs considered are available in sections related to cost of each mitigation measures (Chapter 7)

Table 8.65. Costs and savings of the business-as-usual ambition scenario

	BAU										
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
CAPEX	-	-	6.250	106.800	50.000	-	-	-	-	-	-
OPEX - Costs (others)	-	-	-	-	1.000	1.000	1.000	1.000	1.000	1.000	1.000
OPEX - Savings	- 472.774	- 472.774	- 473.506	- 473.506	- 497.336	- 499.566	- 499.566	- 499.565	- 499.566	- 499.566	- 499.566
TOTAL (CAPEX-OPEX) (€)	- 472.774	- 472.774	- 467.256	- 366.706	- 446.336	- 498.566	- 498.566	- 498.565	- 498.566	- 498.566	- 498.566
TOTAL (CAPEX+OPEX) on the period (€)	- 472.774	- 945.548	- 1.412.804	- 1.779.509	- 2.225.845	- 2.724.411	- 3.222.977	- 3.721.541	- 4.220.107	- 4.718.673	- 5.217.238

This scenario requires an investment of 163k€ for implementation of measures such as a the insultation of the building (50k€), the installation of PV (107k€), and the switch to LED lamps.

This scenario also generates savings regarding 2019 expenses:

- Evolution of travel practices could generate up to 504€/year of savings (including both missions and visitors' travels).
- Installation of PV could generate up to 22 k€/year of savings (44 k€/year with 2023 energy prices)
- Optimization of IT equipment lifespan could generate 14k€/ year of savings.

Ultimately this scenario is expected to generate much more savings than costs (4 M€ savings over the 10 years period in comparison with 2019 expense). Details on savings per measure can be found in Chapter 7.

Human resources

Table 8.66. FTE required in the business-as-usual scenario

	Business-as-usual - FTEs										
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
TOTAL Human Resources (FTE)	**0,1**	**0,1**	**0,1**	**0,1**	**0,6**	**0,6**	**0,1**	**0,1**	**0,1**	**0,1**	**0,1**

It is estimated that 0,6 FTE are required for the initialisation of the actions. 0,5 FTE is estimated to manage the various building management projects in 2024 and 2025, 0,1 FTE to ensure the maintenance of the green garden. Details on the FTE needs can be found for each measure in chapter 7.

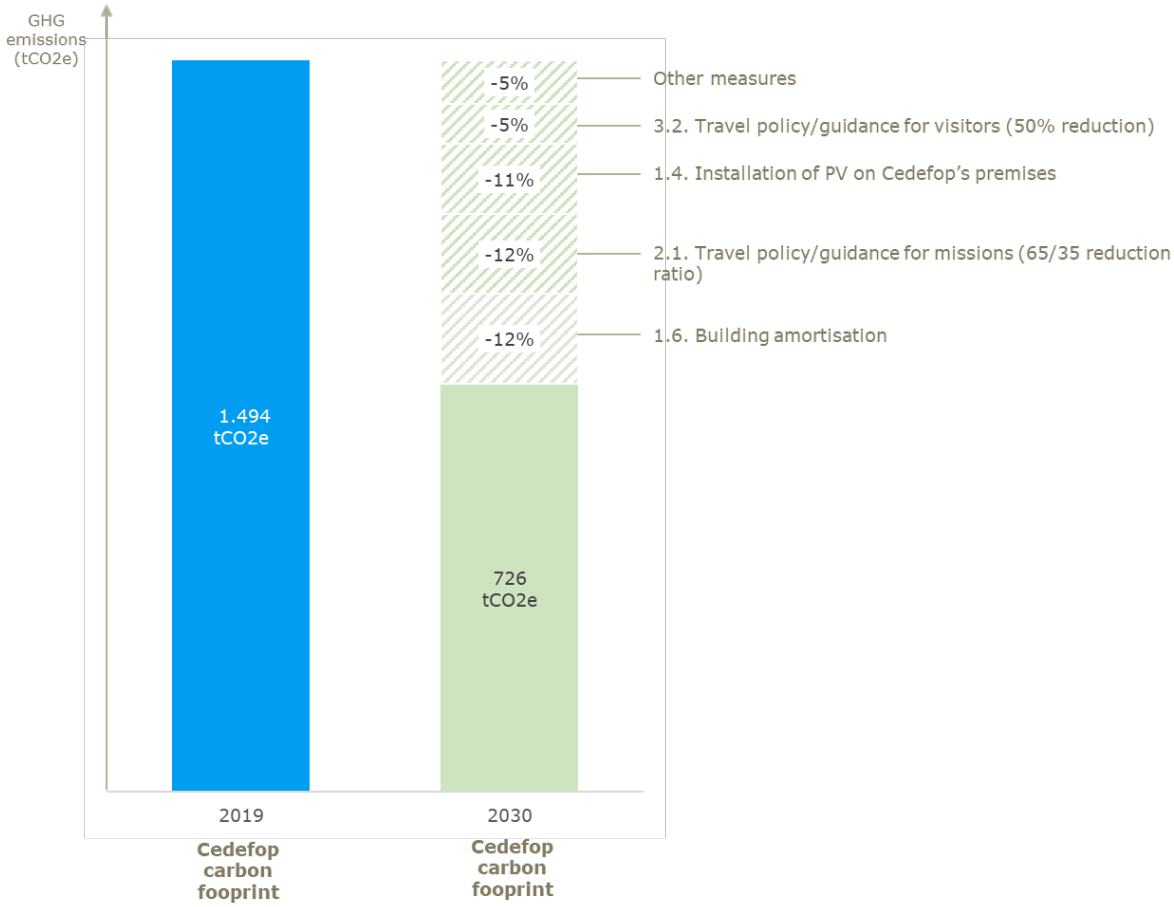
8.4.3 Conclusion

Table 8.67 – Overview of main impacts of the measures in the business-as-usual scenario

Name of the measure	Reduction of Cedefop 2019 Carbon footprint in %	Costs
Building amortization	**-12%**	No cost impact considered
2.1 Travel guidance/policy for missions. Considered avoiding 50% of physical missions and related emissions.	**-12%**	**Implementation costs:** no costs foreseen for this measure **Yearly savings:** up to 287k€ of yearly savings (70% of 2019 missions' expenses)
1.4 Installation of PV on Cedefop's premises	**- 11%**	**Implementation costs:** 107k€ are identified for the installation

		Yearly savings: up to 44k € of yearly savings
3.2. Travel guidance/policy for visitors. Considered avoiding 50% of physical missions and related emissions.	**- 5%**	**Implementation costs:** No costs foreseen for this measure **Yearly savings:** up to 207k€ of yearly savings (70% of 2019 expenses)
Other measures	**-5%**	See details in chapter 7

Illustration 3. Overview of main impacts of the measures in the business-as-usual scenario



9. Defining a roadmap for Cedefop

The present chapter presents the roadmap defined following Cedefop's top management decision and the co-creational workshop with Cedefop's topical experts, as well as the process followed. In addition, key aspects of the implementation, monitoring and way forward are highlighted.

9.1.1 Management decision

The first step of the roadmap definition, consisted in presenting the work conducted in the present study, the individual measures, and the pathways to the top management of Cedefop. The top management defined the following priorities:

- The medium ambition pathway is the minimum level of ambition that should be integrated and followed by the roadmap;
- Additional measures (from the high ambition pathway) should be included in priority if they directly target a reduction of fossil fuel related emissions and/or present no or low cost.

These priorities were exposed and shared with the topical experts to lay the basis of discussion during the co-creational workshop.

9.1.2 Co-creational workshop

In order to define the roadmap for the low carbon transition of Cedefop, a co-creational workshop has been organised with the following topical experts:

- CHRISTIDIS Michail
- DAVID CRAESCU Ramona Carmen
- GERMANOVA Rayna
- KIORPELIDOU Josefina
- KOSTAKIS George
- MELLIOS Thomas
- NIKOLAIDIS Dimitrios
- SIAPERAS Athanassios
- TZOLAS Ekaterina
- VAN LOO Jasper
- ZIOGAS Konstantinos

The process followed and results are described below.

9.1.3 Organisation of the co-creational workshop

The co-creational workshop was held online with the relevant staff responsible for each of the five action domains of Cedefop.

Prior to the workshop, participants received preparatory material to gain an understanding of the worked carried by the consultants and the results and pathways presented in the present report. In addition, a preparatory Excel filed was shared with the participants to collect their assessment on each proposed measure for the three defined pathways. They needed to rate the applicability, the importance, the timeframe and the expected reluctance from employees of each measure. This feedback collection supported the preparation of the workshop and was used for further discussion.

The workshop was held online and resulted in vivid and rich debates among the participants. The aim of the workshop was to discuss and validate or dismiss the defined measures as well as the timeframe for implementation.

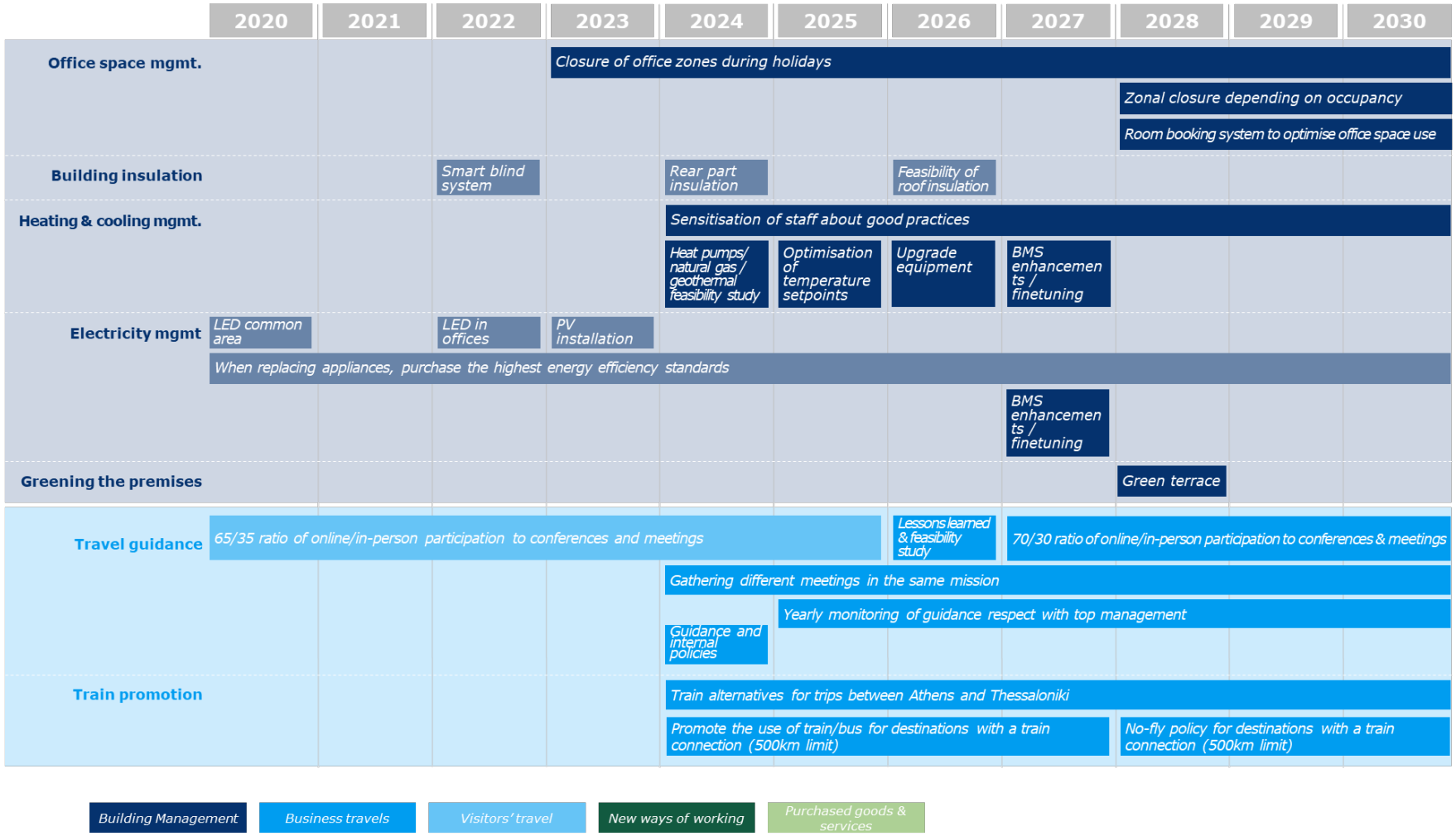
Some measures were excluded from the roadmap due to low leverage or high uncertainty outside of Cedefop's control, such as the travel emissions not paid by Cedefop (measure 3.6) and the further development of a secure and reliable train connection between Thessaloniki and Athens (measure 2.2).

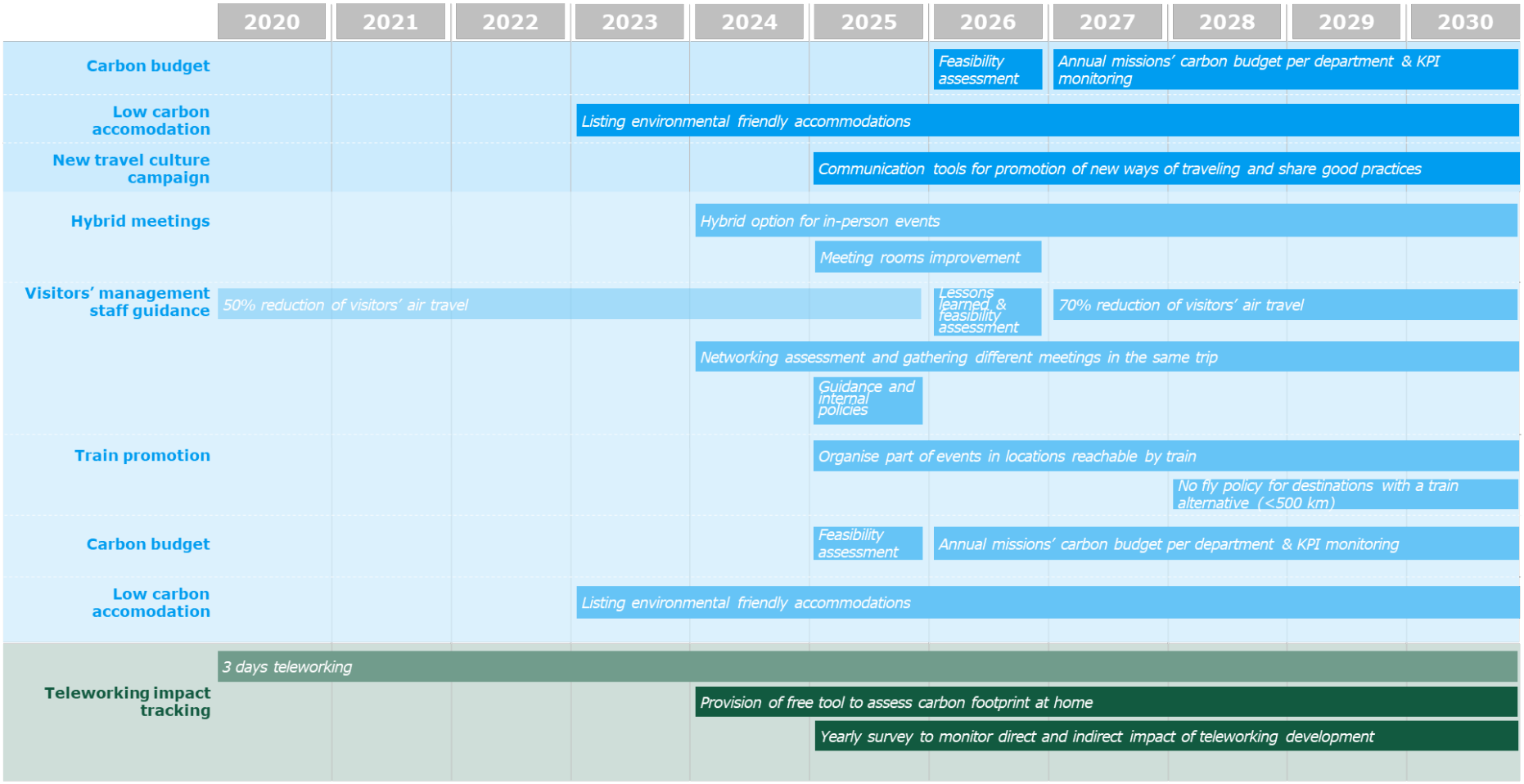
The reluctance of staff to some measures was also addressed. Indeed, as mentioned in section 9.4, some measures require considerable change in habits and may face resistance among the staff. During the co-creational workshop, potential reluctance was discussed regarding office space reorganisation measures, such as the conversion of individual office space into open space and hot desking policy.

Finally, some measures found a high rate for anticipated acceptance and enthusiasm. This is for example the case of the setup of carbon budgets to reduce the carbon emissions related to business travels. It was indeed anticipated as being more easily adopted and endorsed by the various departments especially if accompanied by detailed recommendations and guidelines on how to reduce emissions related to business and visitors' travels.

9.2 Final roadmap

The roadmap defined for Cedefop is presented in this section. This roadmap represents the ambition of Cedefop as of June 2023 and is slightly disassociated from the calculated mitigation potential, costs and savings. However, it is important to note that such action plan over multiple years is likely to be subject to changes due to new regulations, contextual changes, or unforeseen events.




2020
2021
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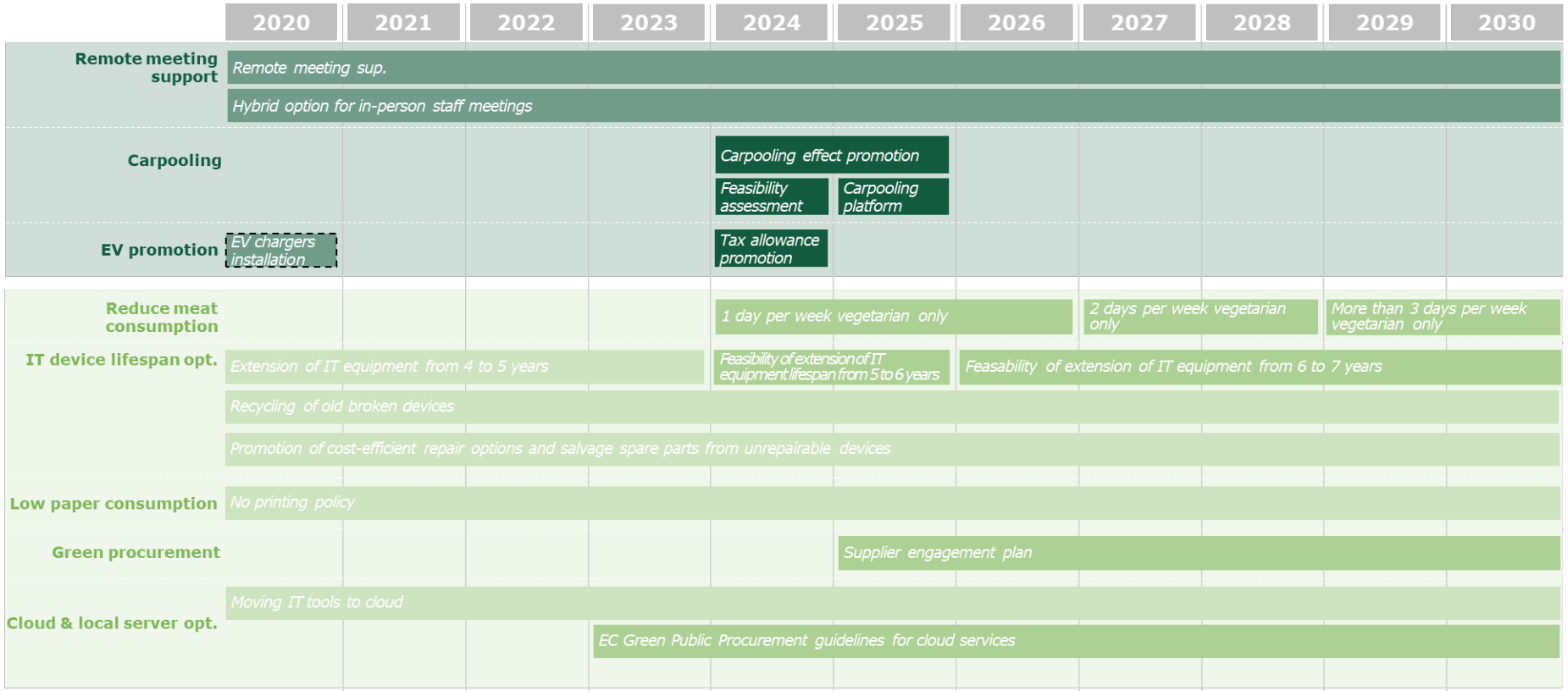
Carbon budget
Feasibility assessment
Annual missions' carbon budget per department & KPI monitoring
Low carbon accomodation
Listing environmental friendly accommodations
New travel culture campaign
Communication tools for promotion of new ways of traveling and share good practices
Hybrid meetings
Hybrid option for in-person events
Meeting rooms improvement
Visitors' management staff guidance
50% reduction of visitors' air travel
Lessons learned & feasibility assessment
70% reduction of visitors' air travel
Networking assessment and gathering different meetings in the same trip
Guidance and internal policies
Train promotion
Organise part of events in locations reachable by train
No fly policy for destinations with a train alternative (<500 km)
Carbon budget
Feasibility assessment
Annual missions' carbon budget per department & KPI monitoring
Low carbon accomodation
Listing environmental friendly accommodations
3 days teleworking
Teleworking impact tracking
Provision of free tool to assess carbon footprint at home
Yearly survey to monitor direct and indirect impact of teleworking development
Building Management
Business travels
Visitors' travel
New ways of working
Purchased goods & services


2020
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Remote meeting support
Remote meeting sup.
Hybrid option for in-person staff meetings
Carpooling
Carpooling effect promotion
Feasibility assessment
Carpooling platform
EV promotion
EV chargers installation
Tax allowance promotion
Reduce meat consumption
1 day per week vegetarian only
2 days per week vegetarian only
More than 3 days per week vegetarian only
IT device lifespan opt.
Extension of IT equipment from 4 to 5 years
Feasibility of extension of IT equipment lifespan from 5 to 6 years
Feasability of extension of IT equipment from 6 to 7 years
Recycling of old broken devices
Promotion of cost-efficient repair options and salvage spare parts from unrepairable devices
Low paper consumption
No printing policy
Green procurement
Supplier engagement plan
Cloud & local server opt.
Moving IT tools to cloud
EC Green Public Procurement guidelines for cloud services
Building Management
Business travels
Visitors' travel
New ways of working
Purchased goods & services

9.3 Resource implications

The economic implications (in terms of Opex, Capex and FTEs) of the measures presented in the roadmap above have been assessed previously in chapters 7 and 8 of the present report. Generally, costs of measures are rather limited, with the exception of a few Capex-intensive measures (e.g. building insulation, green space development). On the human resources side, measures will require significant resources at the beginning to coordinate projects and to support and conduct change management when measures will be initiated, especially with regards to the new ways of working and building management measures. However, in the long term, human resources required for the monitoring and support of measures are very limited.

On the other hand, potential savings have also been highlighted for each measure. Indeed, in most cases, the implementation of measures is also associated with long term reduction in expenses and costs savings. For example, building management measures (including insulation, space reorganisation and reduction) are heavily related to energy savings and therefore financial savings. Another example is the reduction of business travels, ultimately related to a reduction of travel costs.

Therefore, despite some capex and human resources required for measure implementation, the roadmap should be financially beneficial for Cedefop in the long term.

9.4 Behavioural change

The emission reduction domains defined in the present study (building management, business and visitors travels, new ways of working and purchased goods and services) all require significant behavioural change.

Building management, especially space reorganisation and reduction are related to strong changes of habits, including shifting from individual offices to open space and hot desking policy.

On the business travels side, implementing carbon budget, reshaping meeting and changing travelling habits (combine meetings, use combination of train and air travel) also present adoption challenges on the staff side. The change of travel culture, already experienced during and since the Covid-19 pandemic, could be supported by raising awareness and provide guidance to assess the alternatives (remote/hybrid meetings, combination of meetings and events, mean of transportation alternatives). In addition, the definition of carbon budgets could also support the change by incorporating quantitative targets and KPIs.

As for business travels reduction, new ways of working have already been widely experienced and implemented since the pandemic. Therefore, less change management is expected to be conducted on that side. The focus should be on improving already implemented practices.

Finally, the measures related purchased goods and services will mostly require changes on the procurement side and the suppliers.

9.5 Communication on the roadmap and Cedefop's ambitions

In order to reach its carbon reduction ambitions, it is key for Cedefop to communicate on their roadmap and ambitions to ensure optimal endorsement from staff and awareness of stakeholders.

Therefore, a communication plan should be defined and include the following elements:

- Internally, for Cedefop's staff, it is necessary to communicate transparently on the roadmap and ensure a high adoption rate. Transparency should be understood in this context as making the roadmap understandable and break it down to the level of implication for staff,

i.e. what it means for them, what are the specific actions expected from them, what are their KPI (as a unit or individual). In addition, it is key to raise awareness on climate issues to ensure the staff understands the necessity of these actions.

- Cedefop is the only EU institution in the city of Thessaloniki. With its unique position, communicating and liaising with local authorities and leading by example as an EU institution in Greece could lever the transition in the country or region.
- Some other EU institutions and agencies, such as the European Commission and the EEA have already opened the way for a low carbon transition and Cedefop is initiating its transition as part of a larger movement within the institutions. This momentum should be embraced by Cedefop and communication should be kept open (as it is already the case) with precursors such as the EEA, to share best practices and lessons learned.

Communication with the various stakeholders cited above should focus on the following elements:

- The commitments made by Cedefop and the means to achieve them: to ensure an optimal awareness from the start and allow for exchanges on best practices with other stakeholders (e.g. carbon budget with the EEA).
- The progresses achieved based on monitoring and defined KPIs: communicating on progress allows the stakeholders (including staff members) to follow the reduction path and the evolution of action implementation. This transparency also enables stakeholders to remain engaged with the process.
- The valuable lessons learned from the process and the implementation of the roadmap and measures: this enables an optimal process and implementation in other institutions and organisation by providing feedback on what works and what does not in Cedefop context.

9.6 Monitoring

Setting ambitions and defining a roadmap as described in the present chapter should be accompanied by a monitoring process to track progress and achievements.

As Cedefop will have a set of various measures, ranging from building insulation to carbon budget for travels, monitoring systems and KPIs should be defined for each measure as appropriate. The assessment of KPIs and targets will allow Cedefop to communicate as described in section 9.5, as well as adjust their ambition and actions depending on the results obtained.

While tracking individual measures is important, the main indicator to monitor as part of a carbon reduction strategy is the reduction in emissions in comparison to the baseline set in 2019. To ensure transparency such KPI should be included in the yearly reporting of Cedefop.

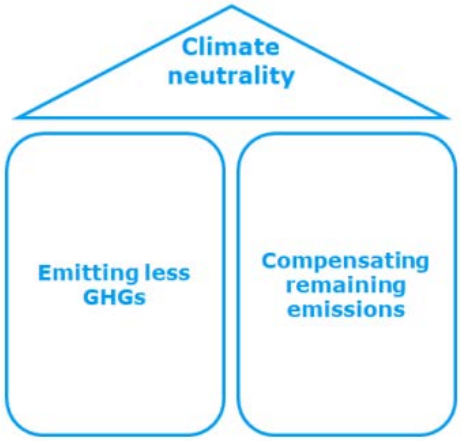
10. A word on climate neutrality[108]

Climate neutrality *"refers to the idea of achieving net zero greenhouse gas emission by balancing those emissions so they are equal (or less than) the emissions that get removed through the planet's natural absorption"*.[109] The concept of climate neutrality therefore describes the net result to achieve but leaves the options open on how to reach this status.[110]

Carbon neutrality, on the other hand, is more precisely defined and described. The PAS 2060 norm, from the British Standard Institute is the international norm that provides specifications to qualify carbon neutrality. According to the PAS 2060, carbon neutrality consists of a *"transparent process of calculating CO2 emissions, reducing those emissions and offsetting residual emissions so that net carbon emission equal zero".*[111] Following those principles, emissions that cannot be avoided should therefore be compensated by carbon credit from projects that reduce avoid and/or capture CO2 emissions.

Despite being different in some respects, both concepts highlight the necessity to significantly reduce the impact on climate change and ensure that GHG emissions decrease to remain below the warming threshold set by the Paris agreements. Any climate or carbon neutrality concept relies on **two pillars**: reducing emissions as much as possible and compensating emissions that cannot be eliminated. This is illustrated in Figure 22 below.

Figure 22 - Climate neutrality pillars



Source: "Towards a Climate neutral EEA"- European Environment Agency, Ramboll and CO2Logic, 2022

The various definitions and concepts surrounding climate neutrality has led to widespread criticism due to lack of clear guidelines and limits (e.g. theoretically, there are no limits in these frameworks and definitions on how much can be compensated, and therefore companies can claim neutrality without reducing their emissions and solely rely on compensation).

The "Net-zero" framework has been prioritised by the Science-Based Target Initiative[112] and the United Nations for its stricter definition and concepts. As all other climate neutrality concepts, it

[108] Inspired from "Towards a Climate neutral EEA"- European Environment Agency, Ramboll and CO2Logic, 2022

[109] A Beginner's Guide to Climate Neutrality | UNFCCC

[110] "Towards a Climate neutral EEA" – European Environment Agency, 2022

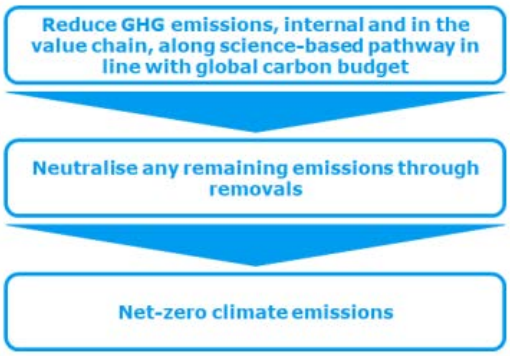
[111] "Towards a Climate neutral EEA" – European Environment Agency, 2022

[112] The SBTi is an initiative driven together by the UNGC, the Carbon Disclosure Project, the World Resource Initiative and the WWF

offers a balance of reduction and compensation of emissions. However, it also develops strict and clear specifications on reduction and accepted compensation mechanisms. The UNFCCC specifies that to reach "Net-zero", an organisation should "*reduce is emissions following pathways that respect the global carbon budget, with any remaining GHG emissions attributable to that [organisation] being fully neutralised by like-for-like removals (e.g. permanent removals for fossil carbon emissions) exclusively claimed by that [organisation], either within the value chain or through purchase of valid offset credits*".[113]

Therefore, reaching "net-zero" requires organizations to reach emission reduction respecting science-based carbon budgets and limits the compensation measures to removals matching the type and duration of the GHG emissions it aims to compensate. The SBTi follows strictly these principles and requires a heavy decarbonisation effort in operations and throughout the value chain (90-95% by 2050). According to the standard, "Net-zero" should be only claimed after such considerable decarbonisation has be realized and when the compensation of remaining emissions has been conducted through permanent removal mechanisms. Figure 23 below summarizes the steps to reach net-zero.

Figure 23 - Steps to "Net zero"



Source: "Towards a Climate neutral EEA"- European Environment Agency, Ramboll and CO2Logic, 2022

The considerations detailed in this chapter should be kept in mind and studied in depth by Cedefop if setting official targets for their climate change mitigation strategy.

[113] Race-to-Zero-Lexicon.pdf (unfccc.int)