Covenant of Mayors
for Climate & Energy
EUROPE

Reporting Guidelines

March 2020

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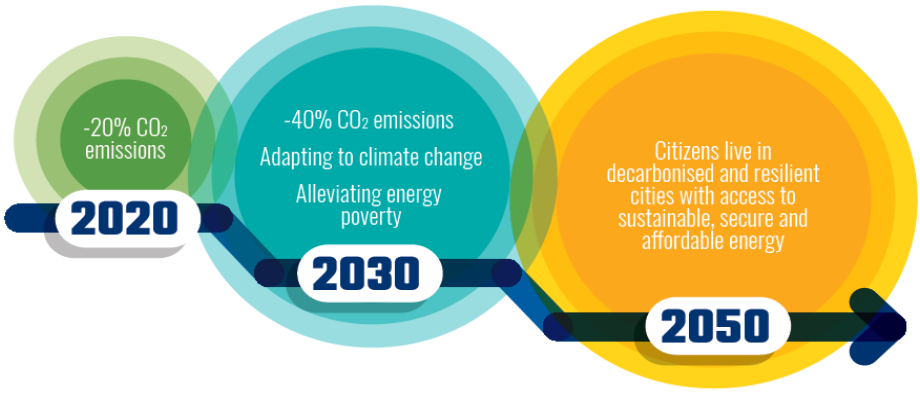
I. INTRODUCTION

The Covenant of Mayors for Climate and Energy brings together local and regional authorities voluntarily committing to implementing the European Union's climate and energy objectives in their territory. Signatory local authorities share a vision of decarbonised and resilient cities, where citizens have access to secure, sustainable and affordable energy. Signatories pledge to **reduce CO_2 emissions by at least 40% by 2030 and to increase their resilience to the impacts of climate change.**



To facilitate this process, the Covenant of Mayors provides signatories with a **data compilation and reporting framework** which is unique in Europe. It assists them in following a systemic climate and energy planning and in monitoring processes at the local level.

The **Covenant reporting and monitoring framework** has been developed in close consultation with practitioners from local and regional authorities, climate and energy experts and with the methodological support of the European Commission's Joint Research Centre (JRC). The regular process of consultation allows for the further development and refinement of the framework to ensure it aligns with the practice and methodologies most commonly used by local authorities in Europe. Over the course of 2019, the Covenant framework was aligned with the recommendations of the Common Reporting Framework by the Global Covenant of Mayors for Climate and Energy.

Covenant signatories are asked to use the Covenant of Mayors **reporting platform – *MyCovenant*[1]** to report and monitor the data of their Sustainable Energy and Climate Action Plan – SECAP (further referred to as action plan), via the so-called SECAP template[2]. Reported data allows signatories to demonstrate the concrete impact of their actions in the field and their climate ambitions. It gives essential feedback on local activities to national, European and international policy-makers. The Covenant framework allows signatories to collect and analyse data in a structured and systematic manner, and serves as a basis for good climate and energy management and for tracking progress in implementation.

This document provides **step-by-step guidelines** to signatories on how to report information in the various sections of the Covenant reporting platform - *MyCovenant*. It has been developed by the Covenant of Mayors Europe Office in collaboration with the JRC to assist signatories in understanding the Covenant reporting framework and successfully completing the reporting process. The guidelines are complemented with practical recommendations and useful resources.

[1] Accessible at https://mycovenant.eumayors.eu/site/landing.
[2] An offline version of the template in an Excel format, to be used as an internal working document only, is available at https://www.covenantofmayors.eu/support/library.html. The only official version of the template is available in *MyCovenant*.

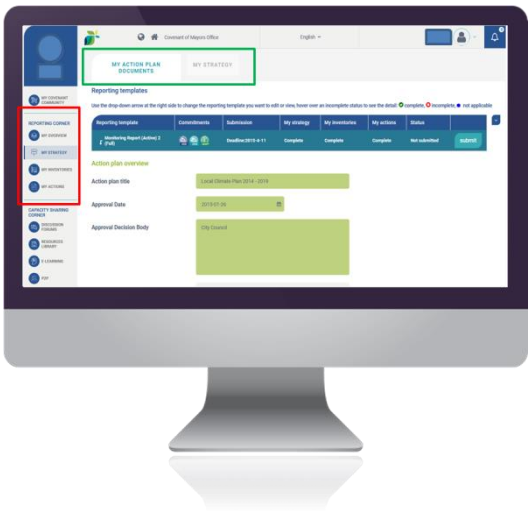
II. THE COVENANT OF MAYORS PROCESS

Local authorities joining the Covenant of Mayors for Climate and Energy initiative commit to submitting an action plan within two years of the formal signing to the initiative (through a duly signed adhesion form). The action plan defines **mitigation target(s) and adaptation goal(s)** and is based on a **Baseline Emission Inventory (BEI)** and a **Risk & Vulnerability Assessment (RVA)** which provide an analysis of the current situation at a given moment. They serve as a basis for defining a comprehensive **set of actions** that local authorities plan to undertake in order to reach the climate mitigation and adaptation goals. Signatories also commit to **reporting on progress on these actions every two years.**

Step-by-step reporting

The step-by-step reporting and monitoring process for all Covenant signatories is presented below:

1. Log in myCovenant
2. Complete My Strategy, My Inventories, My Actions
3. Upload action plan document(s)
4. Submit template
5. Monitor progress

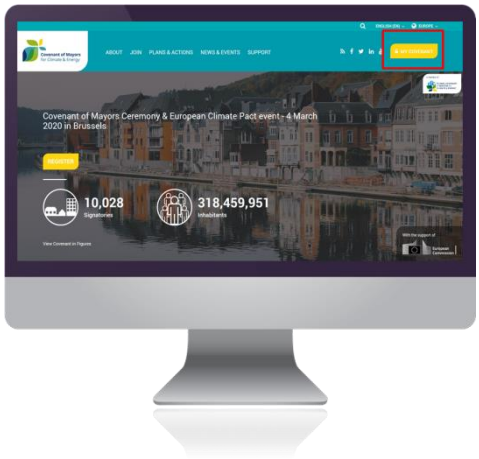


The **Reporting corner** in *MyCovenant* navigates through the main reporting components (red box). Each of the Reporting corner components contains several **reporting and monitoring sections** in the upper top part (green box). You will be required to complete data in each of these sections.

MyCovenant must be completed **in English only**. All **green-coloured fields are mandatory** fields. If not completed, an error message will appear at the end of the respective section. All white-coloured fields are optional fields.

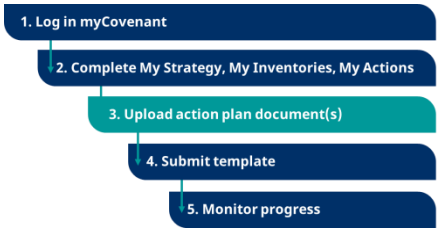
MyCovenant is accessible from the Covenant of Mayors website by clicking on the MY COVENANT button or via mycovenant.eumayors.eu. To log in, you need to use the email and password which you received during registration stage.

If you forgot/do not know your username, contact the **Helpdesk at info@eumayors.eu**.
If you forgot/do not know your password, you can reset it via the **reset password link** in the sign-in window.

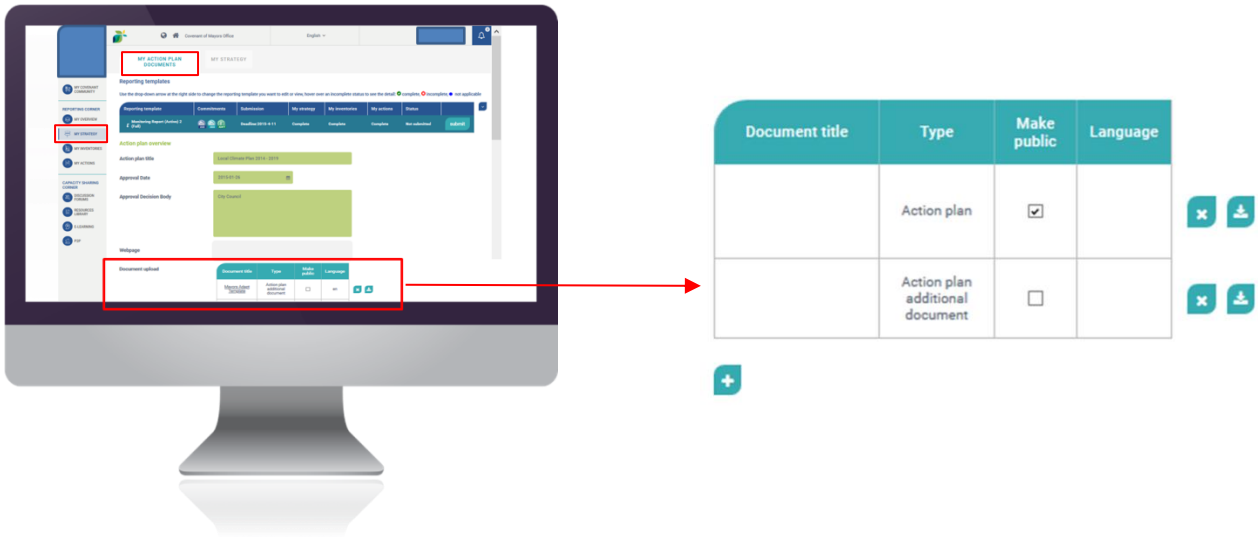


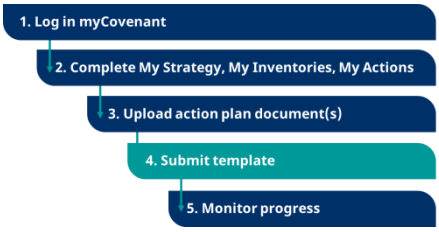
The sections **My Strategy, My Inventories, My Actions** are the core of the Covenant reporting and monitoring framework. The table below provides an overview of these sections in *MyCovenant*. It also indicates the respective chapters in these guidelines which explain in detail how to complete the sections:

Reporting corner	Reporting and monitoring sections
MY STRATEGY	• **MY STRATEGY:** Specify your targets and commitments, administrative structure, involved stakeholders, budget information, etc. > ***see Chapter V for details***
MY INVENTORIES	• **EMISSION INVENTORY:** Specify all mitigation-related data (energy consumption, electricity production, etc.) > ***see Chapter VI for details*** • **RISKS AND VULNERABILITIES:** Specify all adaptation-related data (climate hazards, vulnerable sectors, adaptive capacity, etc.) > ***see Chapter VII for details***
MY ACTIONS	• **MY ACTIONS OVERVIEW:** Specify aggregated data for your mitigation and adaptation actions > ***see Chapter VIII for details*** • **MY ACTIONS DETAILS:** Specify details for each mitigation and/or adaptation action, and/or energy poverty, including key actions > ***see Chapter VIII for details***



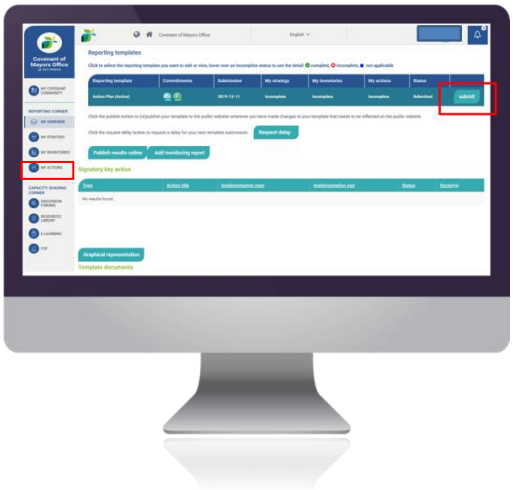
To upload documents in *MyCovenant*, (i) go to **My Strategy** in the Reporting corner; (ii) click the **My Action plan documents** tab; and (iii) scroll down to 'Documents upload' (see image below). All documents should be uploaded in a **pdf format**, in the **national language**, unless an English translation is available. The uploading of at least one action plan document (e.g. mitigation action plan/adaptation action plan/integrated mitigation and adaptation action plan) is mandatory. This plan(s) shall be **duly approved by the municipal council** or equivalent decision-making body. The upload of additional documents is optional.





Only once you have completed the respective reporting sections of *MyCovenant* (Step 2) and uploaded the action plan document(s) (Step 3), is it possible to submit your action plan to the Covenant of Mayors.

To submit your action plan, go to **My Overview**, and click the submit button.



MyCovenant has an **automatic integrated verification system** that identifies any errors (matching against value ranges or predefined values), validates the data format (text, number, date, hyperlink, single or multiple choice), and detects missing mandatory information. It has integrated algorithms which reduce the margin for human error, e.g. when calculating the emission inventory. If errors are detected, the system displays **notification error messages** at the bottom of each respective table in *MyCovenant*.

My Overview indicates wether all required sections in *MyCovenant* have been properly completed, using the following legend:

✅ complete, ❌ incomplete, 🔵 not applicable

Note that **you will only be able to submit your data after correcting all errors** throughout the reporting and monitoring template.

Feedback by JRC

In order to ensure that the submitted action plans align with the Covenant principles, the JRC carries out an **assessment** of the action plans submitted in *MyCovenant*. The analysis is guided by a set of **eligibility criteria** (see below). Unless these criteria are met, the action plan will not be accepted. In all cases JRC, carries out an assessment of the plan and provides a **feedback report** with recommendations for improvement of the action plan. The feedback report is shared with each signatory through a certified e-mail system within six months of submission.

Eligibility criteria – the minimum requirements

- The action plan must be **approved by the Municipal Council** or an equivalent body.
- The action plan must clearly specify the Covenant **mitigation target** (i.e. at least 40% CO2 emission reduction by 2030) **and adaptation goal.**
- The action plan must be based on and include the results of a comprehensive **Baseline Emission Inventory** (BEI) and **Climate Risk & Vulnerability Assessment** (RVA).
- *MyCovenant* must be **completed correctly** and the data reported must be coherent and complete.
- The BEI must cover the **key sectors of activity** (at least three out of four key sectors).
    - For **mitigation**, the action plan must cover the key sectors of activity (Municipal buildings, Tertiary buildings, Residential buildings and Transport) (at least two out of three selected key sectors), including, at least **3 key actions**.
- The RVA must identify the **most relevant climate hazards** and **vulnerable sectors**
    - For **adaptation**, the action plan must include a set of actions, including, at least **3 key actions.**

For more specific technical questions on the methodological requirements or questions related to the JRC feedback reports, contact:

- JRC Mitigation team at JRC-COM-TECHNICAL-HELPDESK@ec.europa.eu
- JRC Adaptation team at JRC-COM-ADAPT@ec.europa.eu

Progress is monitored via submission of a **monitoring report every two years** after the action plan's submission date. The aim of monitoring is to assess the progress made towards the targets set in the action plan's strategy.

Monitoring is an integral part of every planning cycle that allows corrective measures to be planed. As such, the monitoring report in *MyCovenant* is not a separate section; instead, the monitoring report is a set of additional fields in the various template sections under Step 2. These fields are specifically dedicated to monitoring and are automatically generated by *MyCovenant*. They only become available after the submission of the action plan, at the monitoring stage.

The table below indicates the additional information/updates on monitoring for each section in *MyCovenant*.

Reporting corner	Reporting and monitoring sections
MY STRATEGY	• **MY STRATEGY:** Indicate progress towards the target, staff capacity allocated for plan implementation, budget spent so far, describe the monitoring process
MY INVENTORIES	• **EMISSION INVENTORY:** Update energy consumption, production and emissions factors submitting a Monitoring Emission Inventory (MEI) • **RISKS AND VULNERABILITIES:** Update, as needed, all the previously reported data; note that there are no additional fields for monitoring
MY ACTIONS	• **MY ACTIONS OVERVIEW:** Update progress of implementation • **MY ACTIONS DETAILS:** Update progress of implementation

Table 1 Frequency of reporting includes an indication of the minimum reporting requirement at the different stages of the Covenant process.

Using **My Overview**, you can always go back to previous versions of the template and see what data has been reported in the past.

III. FREQUENCY OF REPORTING

Table 1 below includes the associated **frequency of reporting** for the different sections of *MyCovenant.*

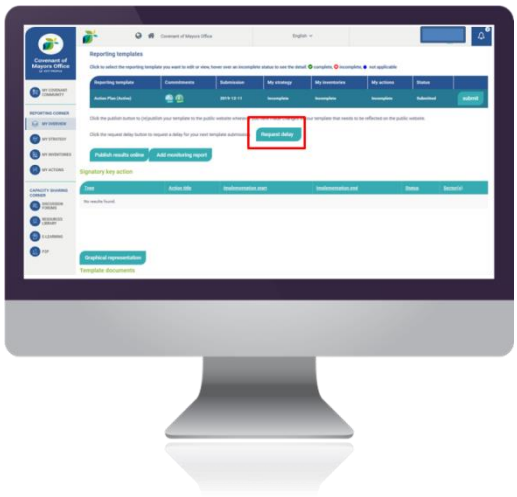
	Registration	Action plan	Monitoring	
	Year 0	Within 2 years	Within 4 years	Within 6 years
My strategy	*o*	✓	✓	✓
Action plan documents upload	*o*	✓	*o*	*o*
Emission inventory	*o*	✓ *(BEI*)*	*o*	✓ *(MEI*)*
Risk & vulnerabilities assessment	*o*	✓	✓	✓
Mitigation actions	*o*	✓ *(min. 3 key actions)*	✓	✓
Adaptation actions	*o*	*o*	✓ *(min. 3 key actions)*	✓
Energy poverty actions	*o*	*o*	✓ *(min. 1 key action)*	✓

Table 1 Frequency of reporting

Legend: ✓ Mandatory | *o* Optional

BEI = Baseline Emission Inventory; MEI = Monitoring Emission Inventory

The **action plan** must be submitted **within two years following the adhesion date**, i.e. the date when the Municipal Council (or equivalent decision-making body) formally decided to join the Covenant of Mayors. In practical terms, this means that you need to complete the following sections of *MyCovenant*: (i) **My strategy**, (ii) **Emission inventory**, (iii) **Risks & vulnerabilities**, (iv) **My Actions** and upload the officially adopted action plan following the frequency of reporting indicated in Table 1.



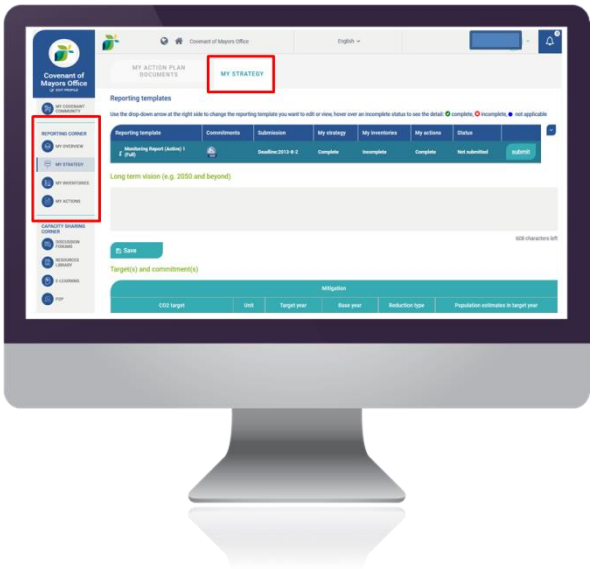
Covenant signatories (or Coordinators on behalf of their associated signatories) can request an extension where circumstances outside the local authority's control delay the submission of the action plan or monitoring results by the official deadline. To do so, they are invited to request an extension (*delay*) via *MyCovenant* (see image) or to contact the Helpdesk at info@eumayors.eu.

IV. GUIDANCE MATERIALS

Below is a list of guidance materials developed by the Covenant of Mayors Office and the JRC to assist signatories in designing and implementing their strategies and action plans.

Title	Description
Guidebook 'How to develop a Sustainable Energy and Climate Action Plan (SECAP)': **Part 1:** The SECAP process, step-by-step towards low-carbon and climate-resilient cities by 2030 **Part 2:** Baseline Emission Inventory (BEI) and Risk and Vulnerability Assessment (RVA) **Part 3:** Policies, key actions, good practices for mitigation and adaptation to climate change and financing SECAP(s)	The guidebook developed by the JRC offers signatories a set of methodological principles, procedures and best practices to develop their action plans. Part 1 relates to the overall process and strategy; Part 2 gives an insight into the elaboration of municipal assessments (BEI and RVA); and Part 3 describes technical issues, measures and policies that can be implemented at the local level.
Quick reference guides: Joint Sustainable Energy & Climate Action Plan Monitoring SECAP implementation Grouped SECAP analysis	These documents offer practical guidance and examples on topics such as monitoring an action plan, the joint approach to developing an action plan and the financing opportunities available for the implementation of action plans.
E-learning platform (available in *MyCovenant*)	The modules provide practical guidance, recommendations and examples related to the preparation, implementation, monitoring and financing of action plans, including both mitigation and adaptation.
Urban Adaptation Support Tool (Urban-AST)	This tool offers local authorities guidance on the entire adaptation cycle, including assessing risks and vulnerabilities. It includes references to useful resources, such as reports, tools, case studies. Developed by the Covenant of Mayors Office and the European Environment Agency.
Webinars *(available in the Library on the Covenant website)*	The webinars developed by the Covenant of Mayors Office address a variety of climate and energy topics. The webinars feature practical experiences of signatories and present lessons learned. A compilation of adaptation-focused webinars is available here.

V. MY STRATEGY



This section provides an overview of the mitigation and adaptation strategy.

To access the My Strategy tab in *MyCovenant*, click **My strategy** in the Reporting corner and select the **My strategy** navigation tab.

Long-term vision (e.g. 2050 and beyond)

Specify the long-term vision (maximum 700 characters, including spaces) that will shape the climate and sustainable energy future of your municipality. A vision includes information on milestones, priority sectors, desired social/environmental/economic outcomes and potential benefits or opportunities, among others. The long-term vision should cover mitigation, adaptation and energy poverty and be co-developed with the active engagement of a broader group of stakeholders from across the municipality.

Target(s) and commitment(s)

Mitigation target(s)

The first fields refer to your overall mitigation target(s), which is expressed as a **percentage of GHG/CO_2 emissions reduction**. Your target should be a **minimum 40% reduction by 2030**. You must indicate the baseline year against which the target(s) is defined. If your action plan includes more than one target, it is **highly recommended to keep the same baseline year for all targets.**

> The commitment taken within the Covenant framework is linked to EU targets: CO_2 emissions reduction of **at least 40% by 2030**. Your CO_2 reduction target cannot be lower.

The target can be set as an **absolute reduction** (percentage of quantity of CO_2 emissions in the baseline year) or as a **per capita reduction**. In the latter case, the emissions of the baseline year are divided by the number of inhabitants in the same year, and the percentage emission reduction target is calculated on that basis. The per capita approach is generally opted for to facilitate progress tracking when the population is expected to change significantly. Select the option that best corresponds to your context. Should you opt for the per capita reduction target, indicate the **population projections for the respective time horizon(s)**.

In case you have a **longer-term target**, i.e. beyond 2030, you can specify this reduction target as well, including the baseline year and the time horizon to which the target relates. If you have only defined a longer-term target in your action plan, you are required to extrapolate your 2030 target and include it as part of your action plan.

The image below shows an example of the completed mitigation goals table.

Mitigation					
CO2 target	Unit	Target year	Base year	Reduction type	Population estimates in target year
20	%	2020	2005	Absolute	100000
40	%	2030	2005	Absolute	100000
90	%	2050	2005	Absolute	112000

Adaptation goal(s)

The second field refers to your adaptation goal(s). Describe the adaptation goal(s) in qualitative/ descriptive terms and/or in quantitative terms. One goal is mandatory and additional adaptation goals are optional. For each/all goal(s), specify the unit (as applicable), target and baseline years and progress achieved to date (e.g. on track, ongoing, achieved, adjusted, etc. and explain, as needed).

The image below shows an example of the completed adaptation goals table.

Adaptation				
Goal	Unit (% or other)	Target year	Base year	Progress Towards The Target
Contain water withdrawal from groundwater (<45 Mln)	m3/year	2025	2012	on track
Ensure a minimum flow of Reno river (>1,87)	m3/s	2025	2012	ongoing

Once completed, click the ‘Save’ button.

Administrative structure

Choose the relevant type of administrative structure from the following:

- **Mono-sectoral**: (officer(s) of) one sectoral department assigned* within the municipal administration
- **Multi-sectoral**: several different departments assigned* within the municipal administration
- **Multi-level**: several departments assigned* at different level(s) of governance (e.g. provincial/regional)

**Assigned*: formally appointed to develop the plan and follow up on its implementation

Include any details in the ‘Comments’ box.

The image below shows an example of the completed ‘Administrative structure’ table.

Type of administrative structures	
Mono-sectoral - (one officer of) one sectoral department assigned within the municipal administration	☐
Multi-sectoral - several departements assigned within the municipal administration	☐
Multi-level - several departments assigned at different level(s) of governance (e.g. provincial/regional)	☐

Comments (click the arrow to expand or collapse)

Once completed, click the ‘Save’ button.

Staff capacity allocated

Specify the type of staff who have been allocated for the **preparation** of your action plan, both for mitigation and adaptation. The optional fields refer to the number of **full-time equivalent (FTE) jobs**, which are defined as total hours worked divided by average annual hours worked in full-time jobs. An FTE of 1.0 means that one person is equivalent to a full-time staff member, while an FTE of 0.5 means that the staff member works part-time.

Include any details in the 'Comments' box.

The image below shows an example of a completed 'Staff capacity allocated' table.

Type	Plan preparation			Plan implementation		
	Mitigation	Adaptation	(Estimated) Full-time equivalent job(s)	Mitigation	Adaptation	(Estimated) Full-time equivalent job(s)
Local authority	☑	☑	0.6	☑	☑	1
Other level(s) of governance (e.g. Covenant coordinator or supporter)	☐	☐		☐	☐	
External consultant	☑	☑	0.4	☑	☑	0.5
Other	☐	☐		☐	☐	
Total			1.00			1.50

Comments ⌄ (click the arrow to expand or collapse)

The 'Plan implementation' part of the table will only become visible during the ***monitoring stage***. You can specify the staff foreseen during the implementation of your action plan.

Once completed, click the 'Save' button.

Stakeholders engagement

Specify the type of stakeholders engaged in the development of the plan. Optionally, further define the type of stakeholders (for local authority staff, use the free-text box), their engagement level, engagement method(s) and engagement purpose.

Include any details in the 'Comments' box.

With respect to the engagement method, the following options are possible:

- **Survey**: Method used to collect data from a pre-defined group of respondents to gain information and insights on various topics of interest. A survey involves asking people for information through a questionnaire.
- **Workshop:** A period of discussion or practical work on a particular subject in which a group of people share their knowledge or experience.
- **Focus group:** Method consisting of interviews in which a small, but demographically diverse group of people, is asked about their perceptions, opinions, beliefs, and attitudes towards an idea, or solution. Questions are asked in an interactive setting where participants are free to talk with other group members.
- **Citizen jury:** Form of deliberative mini-public where a small group of citizens are randomly selected to deliberate on a given policy issue and provide recommendations to the organizing entity.

The image below shows an example of the completed 'Stakeholders engagement' table.

Type		Stakeholders engaged	Engagement level	Engagement method(s)	Engagement purpose
Local authority's staff	☑	Climate and energy department	High	☐ Survey ☐ Workshop ☐ Focus group ☐ Citizen jury ☑ Other (specify) Monthly staff meetings	☑ Information ☑ Consultation ☐ Advice ☐ Co-production ☑ Co-decision ☐ Implementation
External stakeholders at local level	☑	☐ Academia ☑ Business & private sector ☐ Trade-unions ☐ Citizens ☑ NGO & civil society ☐ Education sector ☐ Other (specify)	High	☑ Survey ☑ Workshop ☐ Focus group ☐ Citizen jury ☐ Other (specify)	☑ Information ☑ Consultation ☐ Advice ☑ Co-production ☐ Co-decision ☐ Implementation
Stakeholders at other levels of governance	☑	☐ National government and/or agency(ies) ☑ Sub-national government(s) and/or agency(ies) ☐ Other (specify)	Moderate	☐ Survey ☑ Workshop ☐ Focus group ☐ Citizen jury ☐ Other (specify)	☐ Information ☐ Consultation ☐ Advice ☑ Co-production ☐ Co-decision ☐ Implementation

Comments (click the arrow to expand or collapse)

Once completed, click the 'Save' button.

Budget

This section is dedicated to the budget overview for the implementation of the actions outlined in your action plan. It is split into the budget foreseen for carrying out mitigation and adaptation actions. Specify the **overall budget foreseen** for plan implementation (mandatory), in Euro, and the **percentage of this budget allocated to mitigation and adaptation actions**. The 'Budget spent so far' part of the table will only become visible during the monitoring stage. Then, specify the **time period** to which the indicated budget refers. Further, select the type of applicable **financing sources** and their percentage share of the overall budget.

Include any details in the 'Comments' box.

The image below shows an example of the completed 'Budget' table.

Overall budget foreseen for plan implementation			Budget spent so far		
Total (€)	Mitigation (%)	60	Total (€)	Mitigation (%)	
5224281263	Adaptation (%)	40	0	Adaptation (%)	

Budget period 2005 2020 15 year

Financing sources		Share (in % of overall budget)
Local authority's own resources	☑	90
External		
- Public	☐	
- Private	☐	
Not allocated to any sources	☑	10

Comments (click the arrow to expand or collapse)

Once completed, click the 'Save' button.

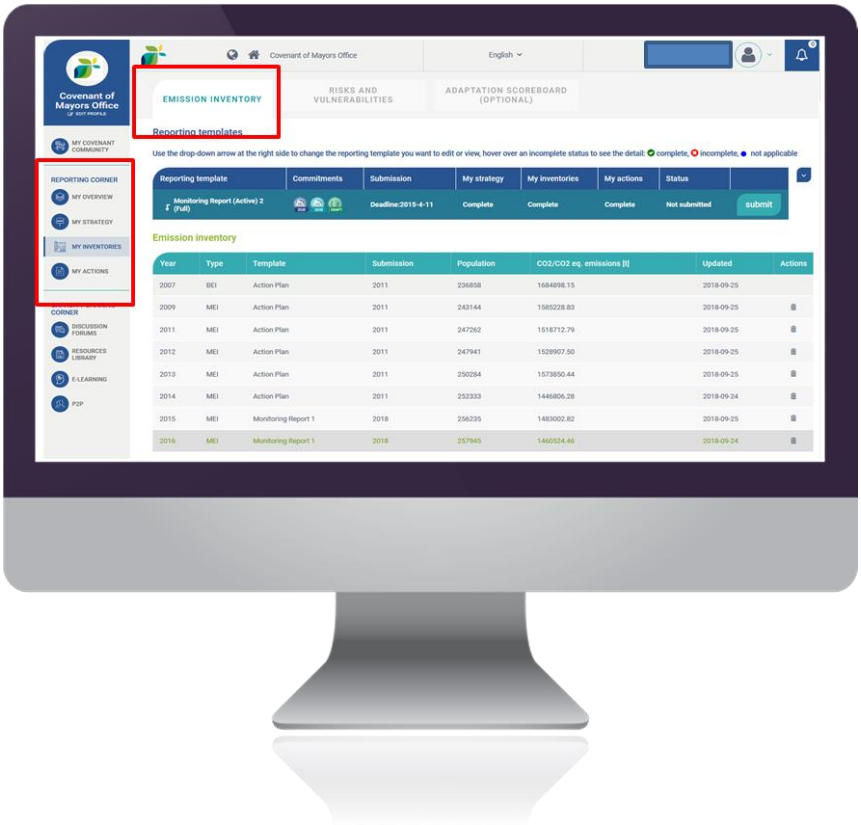
Monitoring process

Describe in the free-text field how you are planning to monitor the implementation of your action plan, e.g. number of revisions foreseen, corresponding timeframe, etc. Once completed, click the 'Save' button.

VI. EMISSION INVENTORY

Developing a **Baseline Emission Inventory (BEI)** is the starting point for the development of the mitigation part of your action plan. In this section you will be able to complete the BEI and the **Monitoring Emission Inventory (MEI)** to track progress.

In *MyCovenant* select **My inventories** in the Reporting corner, the select the **Emission inventory** navigation tab.

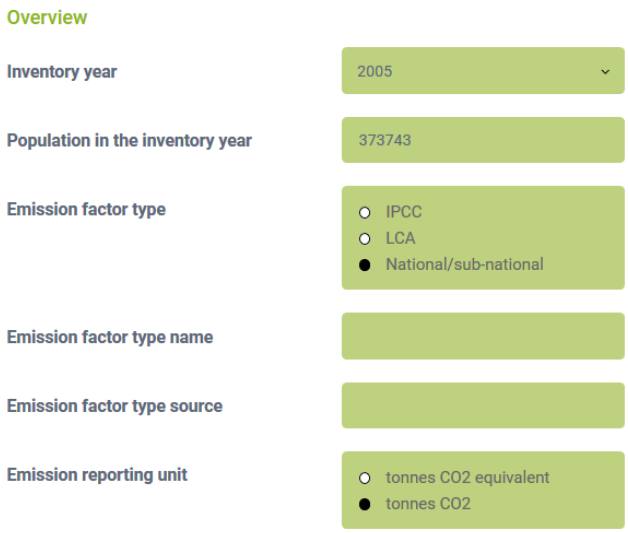


This section is divided into three main parts:

- **Final energy consumption** – in which you should report the final energy consumption data by sector and energy carrier;
- **Energy supply** – in which you should report data related to municipal green electricity purchases and local energy production;
- **CO_2 emissions** – in which you should report the emission factors applied. The CO_2 emissions per sector and energy carrier are automatically calculated.

This section of the reporting template must be completed **within two years** of joining the Covenant of Mayors.

Overview



You will need to complete the following fields:

- **Inventory year:** The first inventory year refers to the baseline year, i.e. the year against which the achievements of the emission reductions in your target year are measured. In the online template, the baseline year is pre-filled since it is specified under your overall CO_2 emissions reduction target in *My Strategy* section. Whenever you add a MEI, you should indicate the year it refers to.
- **Population in the inventory year:** Specify the number of inhabitants in the inventory year.
- **Emission factor type:** Select the type of emission factor used from the following options:
  - **IPCC (Intergovernmental Panel on Climate Change)** – emission factors for fuel combustion, based on the carbon content of each fuel.
  - **LCA (Life Cycle Assessment)** – emission factors for the overall life cycle of each energy carrier, i.e. including not only the GHG emissions due to fuel combustion but also emissions of the entire energy supply chain (exploitation, transport and processing).
  - **National/sub-national emission factors** – factors which have been validated by a public body. When you select this option you will need to specify the emission factors used and provide the source/validating body.
- **Emission reporting unit:** Select the emission reporting unit adopted between the following options: (i) **tonnes CO_2** – if you choose to report only CO_2 emissions; (ii) **tonnes CO_2 equivalent** – if you choose to also include other GHGs such as CH_4 and N_2O, e.g. from non-energy related sectors such as waste and wastewater management.

Once completed, click the 'Save' button.

CO_2 emission factors

Indicate the **emission factors** that you have used for your CO_2 emissions calculation. You can visualise default fuel emission factors in this table. The emission factors are displayed based on the emission factor approach and reporting unit previously selected. If you have used these default values, you can simply select them. Default emission factors for local emission inventories are regularly published by the JRC.

The image below shows an example of the completed 'CO_2 emission factors' table.

CO2 emission factors

Inventory year	CO2 emission factors adopted [t/MWh]															
	Electricity		District heating and cooling	Fossil fuels								Renewable energies				
	National	Local		Natural gas	Liquid gas	Heating oil	Diesel	Gasoline	Lignite	Coal	Other fossil fuels	Plant oil	Biofuel	Other biomass	Solar thermal	Geothermal	Biogas
2005	0.483	0.482	0.245	0.202	0.227	0.279	0.267	0.249									
2007	0.483	0.483	0.235	0.202	0.227	0.279	0.267	0.249					0		0		
2009	0.483	0.482	0.237	0.202	0.227	0.279	0.267	0.249					0		0		
2011	0.483	0.475	0.235	0.202	0.227	0.279	0.267	0.249			0.273		0		0		
2013	0.483	0.474	0.217	0.202	0.227	0.279	0.267	0.249					0		0		

We strongly recommend **replacing the default emission factors with country-specific emission factors or your own** emission factors based on the detailed properties of the fuels used within your territory.

With regards to the electricity emission factor, you should report your **national emission factor for electricity** (NEEFE), and if applicable your **local emission factor for electricity** (EFE). The latter only applies if there are local energy production plants in the territory of your local authority. The table below provides an overview of both national and local electricity emission factors.

Emission factor	Definition	When to apply
National (NEEFE)	Emission factor for non-locally produced electricity. It refers to the energy mix used to produce electricity in the national or regional grid.	If there is no local electricity production and no municipal green electricity purchases.
Local (EFE)	Emission factor adjusted for locally produced electricity and/or green electricity purchases.	If you have local electricity production plants in the territory of your local authority and/or municipal purchases of certified green electricity.

Annex VII includes the National and European Emission Factors for Electricity Consumption (NEEFE).

The **local electricity emission factor** could be calculated by applying the formula described in Chapter 5 of the JRC Guidebook 'How to develop a Sustainable Energy and Climate Action Plan' – Part 2.[3] Likewise, the **heat/cold emission factor** (EFH) should reflect the energy mix used to produce the heat/cold. It is calculated by applying the formula described in Chapter 5 of the Guidebook 'How to develop a Sustainable Energy and Climate Action Plan' – Part 2.[3]

Once completed, click the 'Save' button.

[3] Bertoldi P. (editor), Guidebook 'How to develop a Sustainable Energy and Climate Action Plan (SECAP) – Part 2 - Baseline Emission Inventory (BEI) and Risk and Vulnerability Assessment (RVA), EUR 29412 EN, Publications Office of the European Union, Luxembourg, 2018, ISBN 978-92-79-96929-4, doi:10.2760/118857, JRC112986

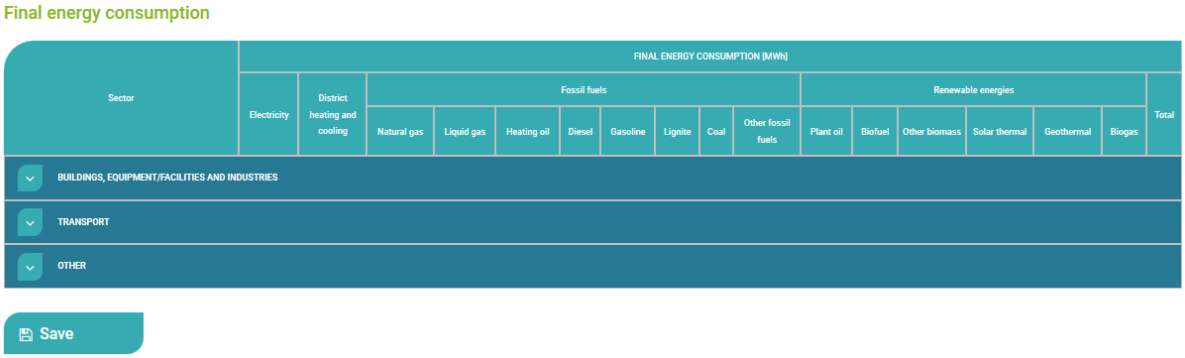
Use of notation keys

To accommodate limitations in data availability (e.g. absence of emissions data, non-occurrence of an emission source category) the following **notation keys** may be used in the Emission inventory tab:

- **"NO"** (not occurring): An activity or process does not occur or exist within the city. This notation key may also be used for insignificant sources (if the size of emissions is smaller than any other sub-sector reported.).
- **"IE"** (included elsewhere): GHG emissions for this activity are estimated and presented in another category in the same inventory or covered by a dedicated reporting system (e.g. ETS). This notation key may be used where it is difficult to disaggregate data into multiple sub-sectors. This notation key can also be used when waste is used for generating energy. In these circumstances IE can be used in the relevant waste sub-sector.
- **"C"** (confidential): GHG emissions which could lead to the disclosure of confidential information, and as such are not reported publicly. For instance, certain military operations or industrial facilities may not permit public data disclosure where this impacts security.
- **"NE"** (not estimated): GHG emissions occur but have not been estimated or reported. NE cannot be used for emission sources that are mandatory requirements (e.g. key sectors).

Note: By default, the notation key 'NE' is applied to the entire Emission inventory tab. You will be able to select other notation keys from the drop-down menu in each cell. When data is available it is recommended that you type in **a numeric value** – simply click the respective cell and select 'Type value'.

Final energy consumption



The rows of the table refer to several **sectors** (and sub-sectors), while the columns refer to the **energy carriers** (e.g. electricity, heat/cold, natural gas, etc.) used in the respective sectors within the territory of your local authority. Final energy consumption is reported in **MWh** for each energy carrier and each sector for the given year.

The sectors are grouped into three macro-sectors: (i) **Buildings, equipment/facilities and industries**, (ii) **Transport**, (iii) **Other**. Within each macro-sector, sub-sectors are detailed. The platform signatories allows to report at different sectoral levels in order to accommodate a certain degree of **flexibility**.

Covenant key sectors

Four key sectors have been defined. They are considered the main sectors in which local authorities can influence energy consumption and consequently reduce related CO_2 emissions.

The Covenant key sectors are indicated with a 'key' icon: in *MyCovenant* and are the following:

- Municipal buildings, equipment/facilities
- Tertiary (non-municipal) buildings, equipment/facilities
- Residential buildings
- Transport

As a minimum, **data for three out of the four Covenant key sectors** shall be reported in the Emission inventory. Optionally, data for additional sectors can be reported.

Mitigation actions, reported in the 'Actions' tab, must address **at least two out of the selected key sectors**.

Annex I provides an overview of the sectors that can be included in the emission inventory under the macro-sector '**Buildings, equipment/facilities and industries'**, and the data that needs to be reported under each sector.

It is possible to report **aggregated data** at sector level under '**Other'**. It is possible to report data aggregated at macro-sector level under '**Buildings, equipment/facilities and industries not allocated'**.

The image below shows an example of a completed section for 'Buildings, equipment/facilities and industries' in the 'Final energy consumption' table.

Sector	FINAL ENERGY CONSUMPTION [MWh]																
	Electricity	District heating and cooling	Fossil fuels								Renewable energies						Total
			Natural gas	Liquid gas	Heating oil	Diesel	Gasoline	Lignite	Coal	Other fossil fuels	Plant oil	Biofuel	Other biomass	Solar thermal	Geothermal	Biogas	
BUILDINGS, EQUIPMENT/FACILITIES AND INDUSTRIES																	
Municipal buildings, equipment/facilities	51624.10	1685.40	72945.50	177.60	5604.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	132037.20
- Municipal buildings, equipment/facilities	NE	NO	NO	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
- Public lighting	30538	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	30538.00
- Other	21086.1	1685.4	72945.5	177.6	5604.6	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	101499.20
Tertiary (non municipal) buildings, equipment/facilities	859424.90	7951.20	1029965.20	53683.50	0.00	17803.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1968828.40
- Institutional buildings	NE	NE	NE	NE	NO	NE	NO	NO	NO	NE	NE	NE	NE	NE	NE	NE	0.00
- Other	859424.9	7951.2	1029965.2	53683.5	NE	17803.6	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	1968828.40
Residential buildings	498999	27792.4	2663810.1	11517.5	3131.7	41541.6	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	3246792.30
Industry	300170.00	0.00	521425.80	47338.80	7067.70	57017.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	933020.20
- Industry Non-ETS	300170	NE	521425.8	47338.8	7067.7	57017.9	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	933020.20
- Industry-ETS	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
Buildings, equipment/facilities non allocated	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
Subtotal	1710218.00	37429.00	4288146.60	112717.40	15804.00	116363.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6280678.10

The **'Transport'** macro-sector is divided in three sub-sectors. Each sub-sector is split according to the transport mode. If you do not have transport data disaggregated by transport mode, you can report aggregated data under **'Other'**.

Signatories only need to report emissions from **journeys occurring inside the municipality boundaries**. For '**Local and domestic waterways**', only consider emissions from journeys that are fully confined within the municipality boundaries (i.e. both start and end inside the municipality, such as sightseeing cruises). For '**Local aviation**' only consider emissions from journeys that are fully confined within the municipality boundaries (i.e. both start and end inside the city, such as sightseeing or emergency helicopters and other local aviation).

The image below shows an example of a completed section for 'Transport' in the 'Final energy consumption' table.

When '**Transport**' is selected as 'key sector', data shall be reported for **at least one of the sub-sectors**.

It is possible to **report aggregated data** at sector level under **'Other'**. It is possible to report **data aggregated at macro-sector level** under '**Transport not allocated**'.

Sector	FINAL ENERGY CONSUMPTION [MWh]																
	Electricity	District heating and cooling	Fossil fuels								Renewable energies						Total
			Natural gas	Liquid gas	Heating oil	Diesel	Gasoline	Lignite	Coal	Other fossil fuels	Plant oil	Biofuel	Other biomass	Solar thermal	Geothermal	Biogas	
BUILDINGS, EQUIPMENT/FACILITIES AND INDUSTRIES																	
TRANSPORT																	
Municipal fleet	0.00	0.00	135.00	0.00	0.00	4392.00	626.00	0.00	0.00	0.00	0.00	275.00	0.00	0.00	0.00	0.00	5428.00
- Road	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
- Other	NE	NE	135	NE	NE	4392	626	NE	NE	NE	NE	275	NE	NE	NE	NE	5428.00
Public transport	9085.00	0.00	0.00	0.00	0.00	36164.00	0.00	0.00	0.00	0.00	0.00	2054.00	0.00	0.00	0.00	0.00	47303.00
- Road	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
- Rail	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
- Local and domestic waterways	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
- Other	9085	NE	NE	NE	NE	36164	NE	NE	NE	NE	NE	2054	NE	NE	NE	NE	47303.00
Private and commercial transport	749.00	0.00	2477.00	3914.00	0.00	1639227.00	300263.00	0.00	0.00	0.00	0.00	104685.00	0.00	0.00	0.00	0.00	2051315.00
- Road	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
- Rail	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
- Local and domestic waterways	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
- Local aviation	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
- Other	749	NE	2477	3914	NE	1639227	300263	NE	NE	NE	NE	104685	NE	NE	NE	NE	2051315.00
Transport non allocated	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
Subtotal	9834.00	0.00	2612.00	3914.00	0.00	1679783.00	300889.00	0.00	0.00	0.00	0.00	107014.00	0.00	0.00	0.00	0.00	2104046.00

The image below shows an example of a completed section 'Other' in the 'Final energy consumption' table.

Sector	FINAL ENERGY CONSUMPTION [MWh]																
	Electricity	District heating and cooling	Fossil fuels								Renewable energies						Total
			Natural gas	Liquid gas	Heating oil	Diesel	Gasoline	Lignite	Coal	Other fossil fuels	Plant oil	Biofuel	Other biomass	Solar thermal	Geothermal	Biogas	
BUILDINGS, EQUIPMENT/FACILITIES AND INDUSTRIES																	
TRANSPORT																	
OTHER																	
Agriculture, Forestry, Fisheries	3526	NE	NE	81245.8	NE	15499.8	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	100271.60
Other non allocated	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0.00
Subtotal	3526.00	0.00	0.00	81245.80	0.00	15499.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100271.60
Total	1715671.00	37429.00	4332352.90	213787.10	15804.00	1001894.20	1009402.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8326340.90

Under the **'Other'** macro-sector you can report data related to **'Agriculture, forestry and fisheries'**. Report any other sector(s) different from the sectors available in the Emission inventory under **'Other not allocated'**.

Once completed, click the 'Save' button.

Certified green electricity

Certified green electricity means electricity produced from renewable energy sources covered by guarantees of origins (as per Article 15 of directive 2009/28/EC (RED I) and in the Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources (RED II)). All green electricity purchased by the local authority as well as by other actors within the municipality's boundaries should be included.

The image below shows an example of a completed 'Certified green electricity' table.

"NO" = not occurring, "IE" = included elsewhere, "NE" = not estimated, "C" = confidential

Certified green electricity	Renewable electricity [MWh]	CO2/CO2eq. Emission factor [t/MWh]
Purchases Guarantees of Origins (within the municipality boundaries)	NE	
Sales Guarantees of Origins (within the municipality boundaries)	NE	

If you are using **IPCC emission factors**, then by default the certified green electricity emission factor is zero. If you are using **LCA emission factors**, you should indicate the CO_2 emission factor for the electricity purchased.

Once completed, click the 'Save' button.

Local/distributed electricity production (renewable energy only)

In the case of electricity generated exclusively from renewable energy sources, you should specify the respective amount of **locally generated electricity** (in MWh). You may choose to report the amount by each plant type or to report only the **total** in case detailed information is not available.

The image below shows an example of a completed 'Local/distributed electricity production (renewable energy only)' table.

"NO" = not occurring, "IE" = included elsewhere, "NE" = not estimated, "C" = confidential

Local renewable electricity plants	Renewable electricity produced [MWh]	Emission factor [t/MWh produced]	CO2/CO2eq. emissions [t]
Wind	0	0	0
Hydroelectric	0	0	0
Photovoltaics	25894.2	0	0
Geothermal	NE		0
Total	25894.20		0.00

If you are using **IPCC emission factors**, then by default the renewable electricity emission factor is zero. If you are using **LCA emission factors**, you should indicate the CO_2 emission factor for the renewable electricity generated.

Once completed, click the 'Save' button.

Local/distributed electricity production

In the case of **Combined Heat & Power** (CHP) plants, which generate heat and electricity simultaneously, or any other plants not listed, report the amount of electricity produced (in MWh), both from renewable energy and non-renewable energy sources. As some CHP plants are dual-fuel (or use a back-up fuel) it becomes relevant to distinguish the electricity production that comes from renewables and non-renewable sources. You should also report the amounts of energy sources used to generate electricity (in MWh) as well as the amount of CO_2 emissions (in tonnes) related to the electricity production (both from renewable energy and non-renewable energy sources).

The image below shows an example of a completed 'Local/distributed electricity production' table.

"NO" = not occurring, "IE" = included elsewhere, "NE" = not estimated, "C" = confidential

Local electricity production plants	Electricity produced [MWh]		Energy carrier input [MWh]														CO2/CO2 eq. emissions [t]	
	Electricity renewable	Electricity non renewable	Fossil fuels					Plant oil	Other biomass	Solar thermal	Geothermal	Biogas	Waste	Other renewable	Other		Fossil sources	Renewable sources
			Natural gas	Liquid gas	Heating oil	Lignite	Coal											
Combined Heat and Power	NE	22292.2	10531	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE		2991.9	NE
Other (ETS and large-scale plants > 20 MW not recommended)	102.5	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE		NE	NE
Total	102.50	22292.20	10531.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		2991.90	0.00

In the case of **CHP plants**, you **only** report the **electricity produced**, while the heat/cold produced is reported in the next table.

Once completed, click the 'Save' button.

Local heat/cold production

If heat/cold is supplied as a commodity to end-users within the territory of the local authority, report the amount of **heat/cold produced** (in MWh), both from renewable energy and non-renewable energy sources. You should also report the amount of energy sources used to generate heat/cold as well as the amount of CO_2 emissions (in tonnes) related to the heat/cold production (both from renewable energy and non-renewable energy sources). The image below shows an example of a completed 'Local heat/cold production' table.

"NO" = not occurring, "IE" = included elsewhere, "NE" = not estimated, "C" = confidential

Local heat/cold production plants	Heat/cold produced [MWh]		Energy carrier input [MWh]													CO2/CO2 eq. emissions [t]	
	Heat/cold renewable	Heat/cold non renewable	Fossil fuels					Plant oil	Other biomass	Solar thermal	Geothermal	Biogas	Waste	Other renewable	Other	Fossil sources	Renewable sources
			Natural gas	Liquid gas	Heating oil	Lignite	Coal										
Combined Heat and Power		42118	47109														
District heating (heat-only)		30468	19050		14919												
Other																	
Total	0.00	72586.00	66159.00	0.00	14919.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Once completed, click the 'Save' button.

Non-energy related sectors

In the emission inventory you may include emissions from **non-energy related sectors**. When reporting data from such sectors, activity data (e.g. amount of waste at the point of disposal or treatment) and CO_2 emissions equivalent (in tonnes) should be reported. Other direct emissions that are not related to fuel combustion include **fugitive emissions** from the disposal and treatment of waste (including wastewater) generated within the municipality boundaries and fugitive emissions from natural gas distribution systems (such as equipment or pipeline leaks).

The image below shows an example of a completed 'Non-energy related sectors' table.

Non-energy related sectors	CO2 eq. emissions [t]	Activity data [tons]
Waste management		
- Solid waste disposal	NE	
- Biological Treatment of Solid Waste	NE	
- Incineration and Open Burning of Waste	NE	
- Other	NE	
	CO2 eq. emissions [t]	Activity data [m3]
Waste water treatment and discharge	NE	
Other non-energy related such as fuggitive emissions	NE	

> Emissions from waste-to-energy, where waste/wastewater material is used directly as a fuel or converted into a fuel, are **not to be included** in this table.

Once completed, click the 'Save' button.

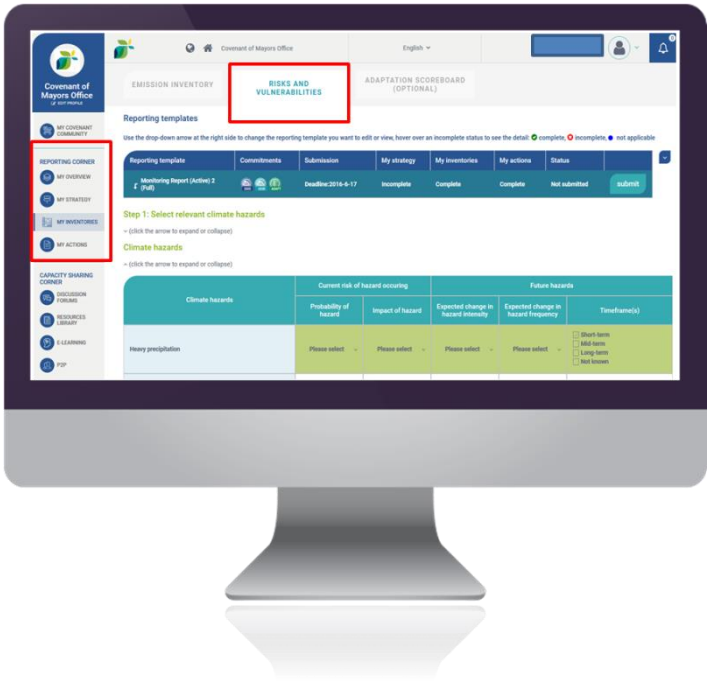
Emission inventory (calculated)

After completing all the data specified above, click the 'Generate emission table' button. The **emission inventory output table** is automatically calculated as the **product of final energy consumption** and the corresponding **emission factors**.

VII. RISK AND VULNERABILITY ASSESSMENT

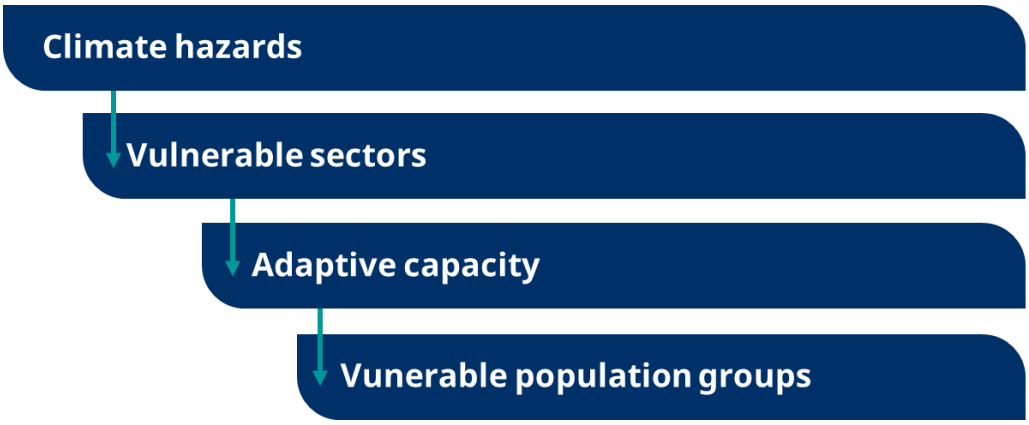
Developing a **Risk and Vulnerability Assessment (RVA)** is the starting point for the development of the climate change adaptation part of your action plan. In this section you will be able to complete the RVA and subsequently update it to monitor progresses made.

To access this part in *MyCovenant* select **My inventories** in the Reporting corner and select the **Risks and vulnerabilities** navigation tab.

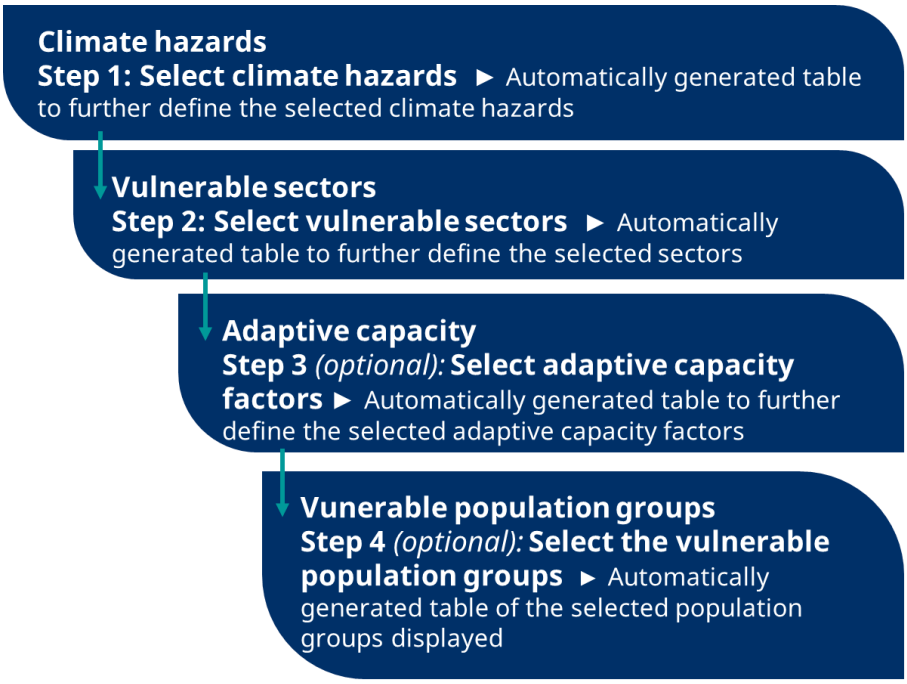


This section of the reporting template must be completed **within two years** of joining the Covenant of Mayors.

The RVA in *MyCovenant* consists of **four steps**:



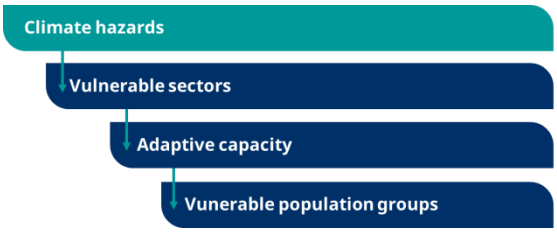
For the completion of these four steps, *MyCovenant* applies a **two-tier approach.** First, you make a **selection from a simple listing** (of hazards, sectors, etc.) and as a result of this, an **automatically generated table** is displayed which allows further definition. This approach is explained in greater detail in the image below:



The two-tier approach facilitates the reporting of information because the output tables are generated automatically based on the signatory's selection and do not contain any redundant information.

Definitions of climate hazards and sectors are available in the online template by hovering over the respective terms and in Annexes IV and V.

Climate hazards[4]



First, under **'Step 1: Select relevant climate hazards'**, select the climate hazards relevant to your local authority from the list. It is possible to choose main hazards and respective sub-hazards (marked with a hyphen). For example, 'Storms' is a main hazard, while 'Severe wind', 'Storm surge', etc. are its sub-hazards.

It is recommended that you select **the most relevant climate hazards** for your local authority. Selection of sub-hazards is *optional* and is only possible if the respective main hazard has been selected.

Once you have selected the climate hazards, click the 'Save' button. This action will collapse the list of climate hazards and display the **automatically generated 'Climate hazards' table**. This table is automatically prefilled to contain all the climate hazards selected above. In case you would like to change your selection, simply return to the list under 'Step 1: Select relevant climate hazards'.

[4] A hazard usually refers to climate-related physical events or trends or their physical impacts (IPCC).

In the 'Climate hazards' table, you will be required to specify the following, using drop-down menus:

- **Probability of hazard**, in the present, choosing one of the following values:
  - High = extremely likely that the hazard occurs (e.g. greater than 1 in 20 chance of occurrence)
  - Moderate = likely that the hazard occurs (e.g. between 1 in 20 and 1 in 200 chance of occurrence)
  - Low = unlikely that the hazard occurs (e.g. between 1 in 200 and 1 in 2,000 chance of occurrence)
  - Not known = city has not experienced or observed climate hazards in the past or has no way of accurately reporting this information based on evidence or data

- **Impact of hazard**, in the present, choosing one of the following values:
  - High = the hazard represents a high (or the highest) level of potential concern for your jurisdiction; when it occurs, the hazard results in (extremely) serious impacts to the jurisdiction and (catastrophic) interruptions to day-to-day life
  - Moderate = the hazard represents a moderate level of potential concern for your jurisdiction; when it occurs, the hazard results in impacts to your jurisdiction, but these are only moderately significant to day-to-day life
  - Low = the hazard represents a lower (the lowest) level of potential concern for your jurisdiction; when it occurs, the hazard results in impacts to your jurisdiction, but these are deemed less significant (or insignificant) to day-to-day life
  - Not known = city has not experienced or observed climate hazards in the past or has no way of accurately reporting this information based on evidence or data

- **Expected change in hazard intensity** and **Expected change in hazard frequency**, choosing one the following values for each: *Increase, Decrease, No change, Not known*

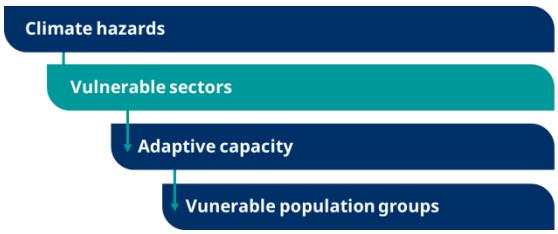
- **Timeframe(s)** that refer(s) to the expected changes, choosing one or more of the following values:
  - Short-term = 20-30 years from now
  - Mid-term = after 2050
  - Long-term = close to 2100
  - Not known = not possible to define

Once completed, click the 'Save' button.

The image below shows an example of a completed 'Climate hazards' table.

Climate hazards	Current risk of hazard occuring		Future hazards		
	Probability of hazard	Impact of hazard	Expected change in hazard intensity	Expected change in hazard frequency	Timeframe(s)
Heavy precipitation	Moderate	Moderate	Decrease	Decrease	☑ Short-term ☑ Mid-term ☑ Long-term ☐ Not known
- Heavy snowfall	Moderate	Moderate	Increase	Increase	☑ Short-term ☑ Mid-term ☐ Long-term ☐ Not known
Floods & sea level rise	Low	Low	Increase	Increase	☑ Short-term ☐ Mid-term ☐ Long-term ☐ Not known
Droughts & water scarcity	High	High	Increase	Increase	☐ Short-term ☑ Mid-term ☑ Long-term ☐ Not known
Wild fires	Low	Moderate	Not known	Not known	☑ Short-term ☐ Mid-term ☐ Long-term ☐ Not known

Vulnerable sectors[5]



First, under **'Step 2: Select relevant vulnerable sectors'**, select from the list those vulnerable sectors most relevant for each climate hazard. Note that the climate hazards selected in Step 1 are automatically prefilled.

At least one sector must be selected for each climate hazard. If not, an error message will be displayed at the bottom of the table. While multiple sectors can be selected, it is recommended that you select only the **most relevant vulnerable sector(s).**

Once you have selected the vulnerable sectors, click the 'Save' button. This action will collapse the list and display the **automatically generated 'Vulnerable sectors' table**. This table is prefilled to contain all vulnerable sectors and respective climate hazards selected above. If you would like to change your selection, simply return to the list under 'Step 2: Select relevant vulnerable sectors'.

In the 'Vulnerable sectors' table, you will be required to specify the **current vulnerability level** of each vulnerable sector, choosing one of the following values:

- High = sector is very likely to be affected by the climate hazard
- Moderate = sector is expected to be occasionally affected by the climate hazard
- Low = sector is unlikely to be affected by the climate hazard
- Not known = not possible to define

Optionally, you can specify a **vulnerability indicator**, along with its unit and numeric value, for each sector. The template includes a list of sample indicators, also available in Annex VI, which can serve as examples and sources of inspiration. Alternatively, you can type in an indicator on your own.

Once completed, click the 'Save' button.

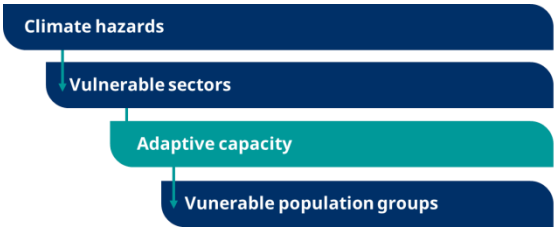
Signatories who reported sector-related data before January 2020, will need to report this data again using the revised structure. For reference, you can see your sector-related data reported before January 2020 in the *'Additional information reported by January 2020'* > *'Expected impacts in your local authority or region'* section at the end of the RVA.

The image below shows an example of a completed 'Vulnerable sectors' table.

Climate hazard	Vulnerable sectors	Level	Indicator
Heavy precipitation	Buildings	High	
Heavy precipitation	Energy	High	
Heavy precipitation	Waste	High	
Floods & sea level rise	Agriculture & Forestry	Moderate	
Droughts & water scarcity	Buildings	Moderate	
Wild fires	Waste	Moderate	

[5] Vulnerability (propensity or predisposition to be adversely affected) encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt (IPCC). Therefore, local authorities may be assessing different component(s) of vulnerability to different extent (e.g. sensitivity, exposure, adaptive capacity).

Adaptive capacity[6] *(optional)*



First, under **'Step 3: Select adaptive capacity factors'**, select from the list the most relevant adaptive capacity factor(s) for each vulnerable sector. Note that the vulnerable sectors and the climate hazards, selected previously in Steps 1 and 2, are automatically pre-filled.

As this section is optional, you can decide which adaptive capacity factor(s) to select, if any.

For each sector, it is possible to select from the following **adaptive capacity factors:**

- **Access to services:** Availability of and access to basic services (e.g. healthcare, education, etc.)
- **Socio-economic:** Interaction between economy and society, influenced by the availability of assets (e.g. economic health, employment, poverty, immigration); level of social awareness and cohesion
- **Governmental & institutional:** Existence of institutional environment, regulation and policies (e.g. restriction laws, preventive measures, urban development policies); local government leadership and competencies; staff capacity and existing organizational structures (e.g. knowledge and skills of staff, level of interaction between municipal departments/bodies); availability of budget for climate action
- **Physical & environmental:** Availability of resources (e.g. water, land, environmental services) and the practices for their management; availability of physical infrastructure and conditions for its use and maintenance (e.g. green-blue infrastructure, health and educational facilities, emergency response facilities)
- **Knowledge & innovation:** Availability of data and knowledge (e.g. methodologies, guidance, assessment and monitoring frameworks); availability of and access to technology and technical applications (e.g. meteorological systems, early warning systems, flood control systems) and the skills and capacities required for their use; potential for innovation

Note that each adaptive capacity factor is **positive**, i.e. it defines the **current ability to adapt** to climate change impacts at the sectoral level, not the deficit of adaptive capacity.

Once you have selected the adaptive capacity factors, click the 'Save' button. This action will collapse the list and display the **automatically generated 'Adaptive capacity' table.** This table is prefilled to contain all vulnerable sectors, their respective climate hazards and the adaptive capacity factors selected above. If you would like to change your selection, simply return to the list under 'Step 3: Select adaptive capacity factors'.

In the 'Adaptive capacity' table, you will be required to specify the **current adaptive capacity level** of each adaptive capacity factor, choosing one of the following values:

- High = high ability to adjust/adapt to potential climate change impacts
- Moderate = moderate ability to adjust/adapt to potential climate change impacts
- Low = low ability to adjust/adapt to potential climate change impacts
- Not known = not possible to define

[6] *Adaptive capacity* is the ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences (IPCC).

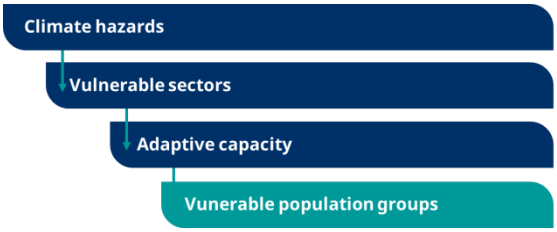
Optionally, you can specify an **adaptive capacity indicator**, along with its unit and numeric value, for each sector. The template includes a list of sample indicators, also available in Annex VI, which can serve as examples and sources of inspiration. Alternatively, you can type in an indicator on your own.

Once completed, click the 'Save' button.

The image below shows an example of a completed 'Adaptive capacity' table.

Vulnerable sectors	Climate hazards	Adaptive capacity factors	Level	Indicator
Buildings	Heavy precipitation Droughts & water scarcity	Access to services	High	
		Socio-economic	High	
Energy	Heavy precipitation	Socio-economic	Moderate	
Waste	Heavy precipitation Wild fires	Socio-economic	Moderate	
Agriculture & Forestry	Floods & sea level rise	Socio-economic	Low	

Vulnerable population groups *(optional)*



First, under '**Step 4: Select vulnerable population groups'**, select the most relevant vulnerable population group(s) for each climate hazard from the list. Note that the main climate hazards, previously selected in Step 1, are automatically pre-filled.

As this section is optional, you can decide which vulnerable population group(s) to select. If you consider all listed population groups are vulnerable to/impacted by a given hazard, you can select the option '*All*'.

Once you have selected the vulnerable population group(s), click the 'Save' button. This action will collapse the list and display the **automatically generated 'Vulnerable population groups' table**. This table contains all main climate hazards and the respective vulnerable population group(s) selected above. There are no further actions required. If you would like to change your selection, simply return to the list under 'Step 4: Select vulnerable population group(s)'.

The image below shows an example of a completed 'Vulnerable population groups' table.

Climate hazard	Population group
Heavy precipitation	Women and girls
Heavy precipitation	All
Storms	Persons with disabilities
Wild fires	Persons with disabilities

Comments

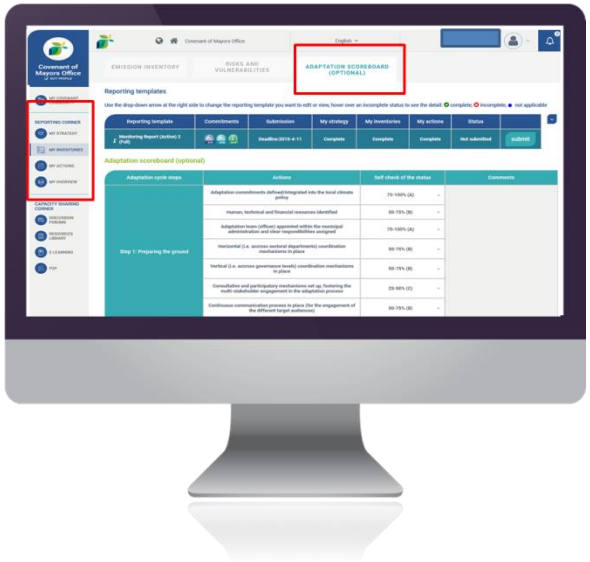
You can include any comments and notes concerning the above reported data, in free text format (maximum 700 characters, including spaces).

Additional information reported by January 2020 (no need to update further)

In January 2020 a revised version of *MyCovenant* was launched. As a result of this revision, some of the previously reported data, mostly in a free-text format, is no longer required (e.g. assessment of adaptation options, strategy in case of extreme events). In order to not lose this previously reported information, it has been bundled under the section 'Additional information reported by January 2020'.

This information is **read-only** and there is **no need to update it further**. For signatories reporting for the first time after January 2020, this section will be empty and there is no need to complete it.

Adaptation scoreboard *(optional)*



Optionally, before starting the completion of the RVA, it is possible to specify your local authority's status in the adaptation process. This can be done via the **Adaptation scoreboard**, which provides a self-assessment checklist. It follows the steps in the adaptation cycle, as described in the **Urban Adaptation Support Tool**.

For each step in the adaptation cycle, specify your self-check status, using the following percentage ranges:

- 0-20% (D): Not started or getting started
- 25-50% (C): Moving forward
- 50-75% (B): Forging ahead
- 75-100% (A): Taking the lead

A 'Comments' field is available to include any notes and comments.

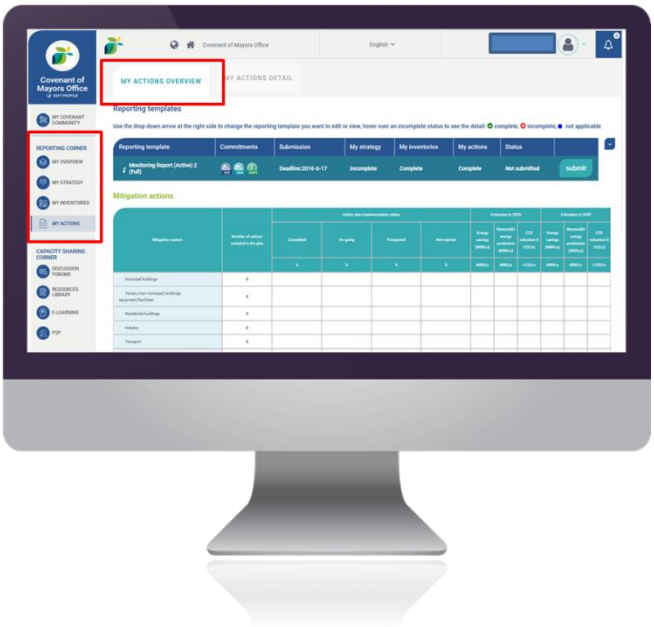
Once completed, click the 'Save' button.

VIII. ACTIONS

This section of the template provides (i) an **overview of all your actions** included in your official action plan and (ii) **details for reported actions**, including your key actions.

My actions overview

To access the overview of actions in *MyCovenant* select **My actions** in the Reporting corner and then select **My actions overview.**



You need to specify the **total number of actions per mitigation and adaptation sector** included in your official action plan - that is the plan adopted by your respective decision-making body. The mitigation and adaptation sectors listed are identical to the sectors in the emission inventory and RVA sections in *MyCovenant*.

Next, for both the mitigation and adaptation actions, you need to indicate the **status of implementation** (*completed*, *ongoing*, *postponed*, *not started*), in a percentage (approximate values). For mitigation actions, you need to also indicate the **total estimates for energy savings, renewable energy production and CO_2 reductions**.

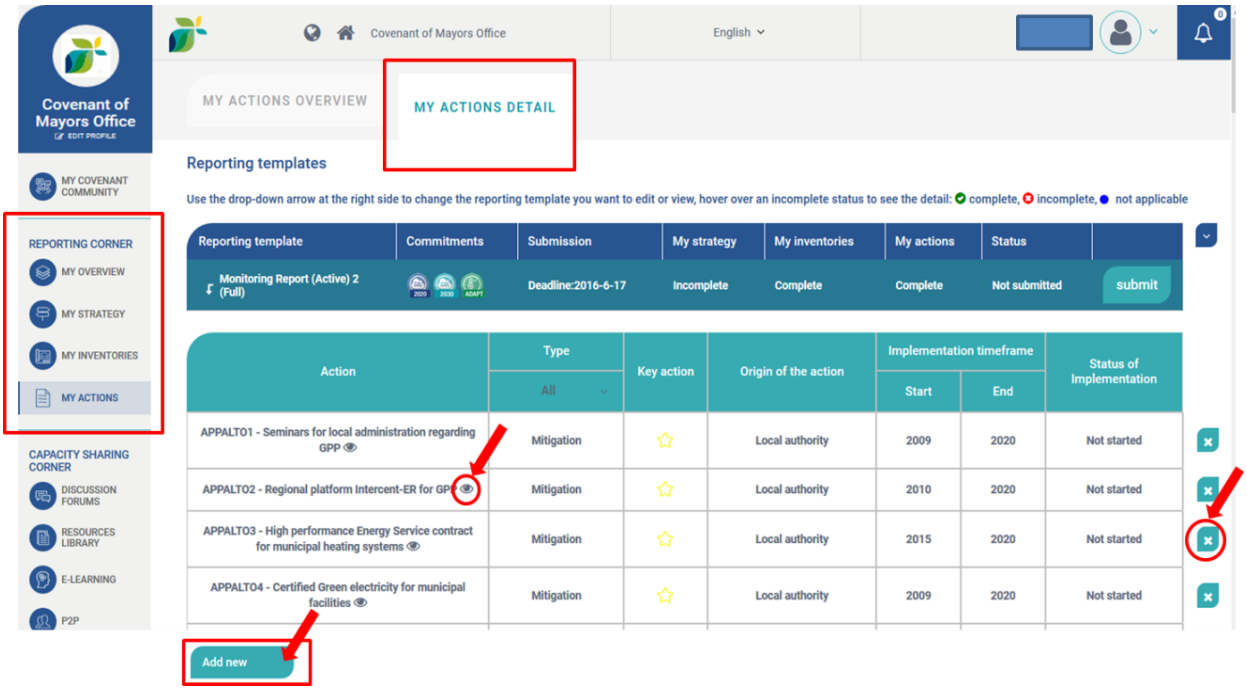
Note that the requested figures and percentages in this section are **approximate only**. Their aim is to provide a general overview of the actions included in the action plan, taking into consideration that only a few of the planned actions are reported in detail in *MyCovenant*.

My actions detail

To report actions in *MyCovenant* and to view/edit details of already reported actions, select **My actions** in the Reporting corner and then select **My actions details.**

There is no limit to the number of actions you can report in *MyCovenant*. It is highly recommended, however, that the **reported actions address the main sources of emissions and the climate hazards or vulnerable sectors** identified through the emission inventory and the RVA.

In order to **add a new action,** you need to click the “Add new” button at the bottom of the page (see next image).



The image above provides an overview of the actions already reported in *MyCovenant*. In addition to seeing a list of basic information, such as whether an action is a key action, its origin, timeframe and status of implementation, you can carry out the following:

- **Filter actions** by type (mitigation, adaptation, energy poverty).
- **View/ edit reported actions** by clicking the 'eye' symbol located after the title of each action – this will open up all data previously reported for the specific action; after editing, do not forget to click the Save or Save all buttons.
- **Delete actions** by clicking the 'X' button at the end of each action – you will need to confirm the deletion; note that once an action is deleted, it cannot be retrieved.

Key actions

'Key actions' are actions which are either **ongoing or completed.** In *MyCovenant* they are marked with a 'star' symbol

The **minimum requirements for actions** reported in *MyCovenant* are as follows:

- At least **3 key actions** addressing **mitigation**, to be reported within 2 years.
- At least **3 key actions** addressing **adaptation**, to be reported within 4 years.
- At least **1 key action** addressing **energy poverty**, to be reported within 4 years.

Key actions are published on the Covenant of Mayors website.

Below is a description of all data that needs to be reported for each individual action.

General information

- **Type of action:** Indicate whether the action tackles mitigation only or adaptation only or it is an integrated action, tackling several energy/climate aspects.

> Note that for the time being **energy poverty** can only be selected **in combination with mitigation and/or adaptation** and not on its own.

The following **combinations for integrated actions** are possible:

- Mitigation and adaptation
- Mitigation and energy poverty
- Adaptation and energy poverty
- Mitigation and adaptation and energy poverty

> When one **key action covers more than one area** (e.g. mitigation and adaptation), it is deemed to satisfy the minimum requirements for key actions for both mitigation and adaptation actions.

Deciding whether an action is reported as an integrated action, or not, is important because depending on this choice *MyCovenant* will automatically generate additional data fields, respectively on mitigation, adaptation, and/or energy poverty.

- **Title of action:** Specify a short descriptive title for your action.
- **Key action?:** Indicate whether this is a key action (i.e. either ongoing or completed). When an action is marked as key action, several additional fields will be generated and some fields will become mandatory.
- **Origin of the action:** Select whether the action has been initiated from one of the following: *the local authority; a Covenant coordinator or supporter; national entity; regional entity; mixed origin; other*.
- **Responsible body:** Specify the body responsible for the action, e.g. a specific department in the municipality; name of Covenant coordinator/supporter; name of national ministry; regional agency, etc.
- **Short description of the action:** Specify the nature of the action, its scope and any information which could provide a relatively good understanding of the action. Note that this field is **mandatory for key actions**.
- **Website address / Video link / Action picture:** Provide a link with further information/video resources related to the action, if any, and/or upload an image.
- **Implementation start / end**: Select the year when the action started/is planned to start and the year when it ended/is planned to end.
- **Implementation stats**: Select whether the action is *completed; not started; cancelled; ongoing.*
- **Action stakeholders:** Select all the relevant stakeholders involved in the action. Include any additional information in the comments box. Note that this field is **mandatory for key actions**.

Action funding

- **Total implementation cost:** Specify the total (planned) implementation cost for the action in Euro. Note that this field is **mandatory for key actions**.
- **Source of funding:** Select the source(s) of funding from the following (multiple selection possible): *local authority's own resources; regional funds and programmes; national funds and programmes; EU funds and programmes; public-private partnerships; private partnerships (e.g. a combination of private investements); other*.
- **Investment cost:** Specify the investment cost (cost of additional investment linked to the improvement of efficiency or reduction of CO_2) in Euro.
- **Non-investment cost:** Specify the investment cost (not related to the financing of the measure, but related to costs incurred to keep an item in good condition and/or good working order) in Euro.

Once completed, click the 'Save' button.

Mitigation action details

Mitigation action details will only appear if 'Mitigation' has been selected under 'Type of action' above.

To comply with the minimum requirements, **at least three key mitigation actions** must be reported within two years after joining the initiative.
Also, mitigation actions must cover at least **two out of three key mitigation sectors** selected in the emission inventory.

- **Sector:** Select the sector addressed by the action. The list of sectors is identical to the sectors in the Emission Inventory. Note that this field is **mandatory for key actions**.
- **Tool/Area of intervention:** Once a sector is selected, this field will be generated automatically. Select the most relevant tool/area of intervention for the selected sector.
- **Action area:** Once a sector is selected, this field will be generated automatically. Select the most relevant action area for the selected sector.
- **Energy savings:** Specify the energy savings from this action in MWh/year. Note that this field is **mandatory for key actions**.
- **Renewable energy production:** Specify the renewable energy produced from this action in MWh/year. Note that that this field is **mandatory for key actions**.
- **CO_2 reduction:** Specify the CO_2 reduction from this action in t CO_2/ year. Note that this field is **mandatory for key actions**.
- **Vulnerable population group(s) targeted:** Select the vulnerable population group(s) targeted through this action (multiple selections possible).
- **Financial savings:** Specify the sum of yearly energy saved times price of energy, in Euro.
- **Life expectancy of the action:** Specify the number of years over which the action generates energy and emission savings. This field can range from 1 to 35 years.
- **Return on investment:** Specify the gain or loss generated on an investment relative to the amount of money invested, as a percentage. Expected discounted financial savings minus discounted investment /divided by discounted investment *100.
- **Jobs created:** Specify the number of direct new jobs created, in full-time equivalent.
- **Other figures:** Use these fields to specify any other relevant figures, e.g. the size of a building in m^2, the length of a bicycle path in km, etc.

Once completed, click the 'Save' button.

Adaptation action details

Adaptation action details will only appear if 'Adaptation' has been selected under 'Type of action' above.

To comply with the minimum requirements, **at least three key adaptation actions** must be reported within four years after joining the initiative.
It is strongly recommended that adaptation actions address the **most relevant climate hazards and vulnerable sectors** identified in the RVA.

- **Climate hazard(s) addressed:** Select all the climate hazards addressed by the action. The list of climate hazards is identical to the climate hazards in the RVA. Note that this field is **mandatory for key actions**.
- **Sector(s):** Select the sector(s) addressed by the action (multiple selections possible). The list of sectors is identical to the sectors in the RVA.
- **Outcome(s) reached / Indicator:** Specify the main outcome(s) of the action. In case there are none yet, specify the expected outcomes. Specify an indicator for the most significant outcome, including its value, and associated unit. Note that the field 'Outcomes reached' is **mandatory for key actions**.
- **Vulnerable population group(s) targeted:** Select the vulnerable population group(s) targeted through this action (multiple selections possible).
- **Avoided cost:** Specify the approximate (expected) avoided damage costs or the accrued benefits following the implementation of the adaptation action, in Euro.
- **Life expectancy:** Specify the number of years over which the action helps to avoid costs.
- **Return on investment:** Specify the ratio of money gained or lost on the investment relative to the amount invested, as a percentage. Expected discounted financial savings minus discounted investment/divided by discounted investment *100.
- **Jobs created:** Specify the number of direct new jobs created, in full-time equivalent.
- **Other figures:** Use these fields to specify any other relevant figures.

Once completed, click the 'Save' button.

Energy poverty action details

Energy poverty action details will only appear only if 'Energy poverty' has been selected under 'Type of action' above.

To comply with the minimum requirements, **at least one key energy poverty action** must be reported within four years after joining the initiative.
Note that for the time being **energy poverty can only be selected in combination** with mitigation and/or adaptation, not on its own.

- **Vulnerable population group(s) targeted:** Select the vulnerable population group(s) targeted through this action (multiple selections possible). Note that this field is **mandatory for key actions**.
- **Outcome(s) reached / Indicator:** Specify the main outcome(s) of the action. In case there are none yet, specify the expected outcomes. Specify an indicator for the most significant outcome, including its value, and associated unit.

Once completed, click the 'Save' button. Alternatively, click the 'Save all' button to save all individual sections of the action tab (action details, funding, mitigation, adaptation, energy poverty).

ANNEXES

Annex I. Mitigation sectors

Sector	Description
Municipal buildings, equipment/facilities	
Municipal buildings, equipment/facilities	Buildings and facilities owned by the local authority. Facilities refer to energy consuming entities that are not buildings, such as wastewater treatment plants.
Public lighting	Public lighting owned or operated by the local authority (e.g. street lighting and traffic lights). Non-municipal public lighting is included in the sector of "Tertiary buildings, equipment/facilities".
Tertiary (non-municipal) buildings, equipment/facilities	
Tertiary (non-municipal) buildings, equipment/facilities	Buildings and facilities of the tertiary sector (services), for example offices of private companies, banks, commercial and retail activities, hospitals, etc.
Institutional buildings	Public buildings (non-municipal) such as schools, hospitals, government offices, publicly-owned water/waste/wastewater facilities, other facilities, etc.
Residential buildings	
Residential buildings	Buildings that are primarily used as residential buildings. Social housing should be included in this sector.
Industries	
Non-ETS	Refers to manufacturing and construction industries not covered in the EU Emissions Trading Scheme (EU-ETS).
ETS	Refers to manufacturing and construction industries covered in the EU-ETS. Integrating them in your emission inventories is not recommended, unless such plants were included in previous energy plans and CO_2 emission inventories of the local authority.
Others	Buildings, facilities and machinery of the primary sector (agriculture, forestry and fisheries), for example greenhouses, livestock facilities, irrigation systems, farm machinery and fishing boats.
Transport	
Municipal fleet	Vehicles owned and used by the local authority's administration.
Public transport	Bus, tramway, metro, urban rail transportation and local ferries used for passenger transport.
Private and commercial transport	Road, rail and boat transport in the territory of the local authority which refer to the transport of persons and goods not specified above (e.g. private passenger cars and freight transport).

Annex II. Non-energy related sectors

Sector	Description
Waste management	Refers to emissions not related to energy consumption, such as CH_4 from landfills.
Wastewater management	Refers to emissions not related to energy consumption, such as CH_4 and N_2O from wastewater treatment plants.
Other non-energy related	Refers to any other non-energy related sector. Negative numbers are allowed in this cell, if you need to report emissions reduction achieved through e.g. green infrastructures (not recommended for achieving the minimum 20% reduction target and only if you have a specific methodology and data to measure all carbon stock change on the territory).

Annex III. Glossary of key adaptation terms

Term	Definition
Adaptation	The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects (IPCC)
Risk & vulnerability assessment (RVA)	Determines the nature and extent of risk by analysing potential hazards and assessing vulnerability that could pose a potential threat or harm to people, property, livelihoods and the environment on which they depend (UNDRR)
Risk	The potential for consequences where something of value is at stake and where the outcome is uncertain, recognizing the diversity of values. Risk is often represented as probability or likelihood of occurrence of hazardous events or trends multiplied by the impacts if these events or trends occur. Risk results from the interaction of vulnerability, exposure, and hazard. The term risk is used primarily to refer to the risks of climate-change impacts (IPCC)
Climate hazard	The potential occurrence of a natural or human-induced physical event, trend or physical impact that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources. In this report, the term hazard usually refers to climate-related physical events or trends or their physical impacts (IPCC)
Vulnerability	The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt (IPCC)
Adaptive capacity	The ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences (IPCC)
Exposure	The presence of people, livelihoods, species or ecosystems, environmental functions, services, and resources, infrastructure, or economic, social, or cultural assets in places and settings that could be adversely affected (IPCC)
Sensitivity	The degree to which a system or species is affected, either adversely or beneficially, by climate variability or change. The effect may be direct (e.g. a change in crop yield in response to a change in the mean, range, or variability of temperature) or indirect (e.g., damages caused by an increase in the frequency of coastal flooding due to sea level rise) (IPCC)
Impact	Effects of extreme weather and climate events and of climate change on human and natural systems, e.g. on lives, livelihoods, health, ecosystems, economies, societies, cultures, services and infrastructure due to the interaction of climate changes or hazardous climate events occurring within a specific time period and the vulnerability of an exposed society or system (IPCC)
Adaptation strategy	Outlines the vision of the local authority for a more climate resilient future; specifies the priority areas of action as well as the mechanisms for stakeholder involvement, funding and resource mobilisation, continuous monitoring and review.
Adaptation actions (or measures)	Technologies, processes, and activities directed at enhancing our capacity to adapt (building adaptive capacity) and at minimising, adjusting to and taking advantage of the consequences of climatic change (delivering adaptation).

Annex IV. Climate hazards

Main hazards are in **bold** and sub-hazards are in *italic.*

Climate hazard	Definition
Extreme heat	Marked warming of the air or the invasion of very warm air, over a large area, lasting from a few days to a few weeks (WMO)
Extreme cold	Marked cooling of the air or the invasion of very cold air, over a large area (WMO)
Heavy precipitation	A marked precipitation event occurring during a period of 1h, 3h, 6h, 12h, 24h or 48h with a total precipitation exceeding a certain threshold defined for a given location (WMO)
Heavy storm	Rain with a rate of accumulation exceeding a specific value (e.g. 7.6 mm) or rainfall greater than or equal to 50 mm in the past 24 hours (WMO)
Heavy snowfall	Meteorological disturbance giving rise to a heavy fall of snow, often accompanied by strong winds or snowfall greater than or equal to 50 mm in the past 24 hours (WMO)
Fog	Suspension of very small, usually microscopic water droplets in the air, generally reducing the horizontal visibility at the Earth's surface to less than 1 km (WMO)
Hail	Precipitation of either transparent, or partly or completely opaque particles of ice of diameter very generally between 5 and 50 mm, which falls from a cloud either separately or agglomerated into irregular lumps (WMO)
Floods & sea level rise	The overflowing of the normal confines of a stream or other body of water, or the temporary rise in the level of the sea or a lake which results in the inundation of dry land (WMO, IPCC)
Flash / surface flood	Heavy or excessive rainfall in a short period of time that produce immediate runoff, creating flooding conditions within minutes or a few hours during or after the rainfall (WMO)
River flood	A flood that occurs over a wide range of river and catchment systems, on flood plains or wash lands as a result of flow exceeding the capacity of the stream channels and spilling over the natural banks or artificial embankments; also referred to as 'fluvial' flood (WMO)
Coastal flood	Higher-than-normal water levels along the coast caused by tidal changes or thunderstorms that result in flooding, which can last from days to weeks (WMO)
Groundwater flood	The emergence of groundwater at the ground surface away from perennial river channels or the rising of groundwater into man-made ground, under conditions where the 'normal' ranges of groundwater level and groundwater flow are exceeded (WMO)
Permanent inundation	Landmass completely covered with water (WMO)
Droughts & water scarcity	A period of abnormally dry weather long enough to cause a serious hydrological imbalance which may result in long-term water imbalances and insufficient water resources to satisfy long-term average requirements (IPCC, EEA)
Storms	An atmospheric disturbance that can manifest in strong winds and accompanied by rain, snow, or other precipitation and by thunder and lightning (WMO)
Severe wind	Differences in air pressure resulting in the horizontal motion of air, whereby the greater the difference in pressure, the stronger the wind. The severity of wind events is location-dependent (WMO)
Tornado	A violently rotating storm of small diameter produced in a very severe thunderstorm, appearing as a funnel cloud extending from the base of a cumulonimbus to the ground (WMO)
Cyclone (hurricane/typhoon)	Forms over tropical or subtropical waters, has a low pressure centre, spiral rain bands and strong winds. Depending on the location: hurricanes (Atlantic, Northeast Pacific), typhoons (Northwest Pacific), cyclones (South Pacific and Indian Ocean) (UNISDR)
Extratropical storm	A large-scale (1,000 km) storm in the middle or high latitudes with low central pressure and fronts with strong horizontal gradients in temperature and humidity. A major cause of extreme wind speeds and heavy precipitation especially in wintertime (IPCC)
Tropical storm	A well-organized warm-core tropical cyclone in which the maximum average surface wind (one-minute mean) is in the range 63-117 km/h (WMO)

Storm surge	The temporary increase in the height of the sea due to extreme meteorological conditions (low atmospheric pressure and/or strong winds) (IPCC)
Lightning / thunderstorm	Sudden electrical discharges manifested by a flash of light (lightning) and a sharp or rumbling sound (thunder) (WMO)
Mass movement	Any type of downslope movement of earth materials (UNISDR)
Landslide	A mass of material that has moved downhill by gravity, often assisted by water when the material is saturated. The movement of soil, rock, or debris down a slope can occur rapidly, or may involve slow, gradual failure (WMO)
Avalanche	A mass of snow and ice falling suddenly down a mountain slope and often taking with it earth, rocks and rubble of every description (WMO)
Rockfall	The sudden and very rapid downslope movement of unsorted mass of rock and soil due to heavy rain or rapid snow/ice melt (UNISDR)
Subsidence	Sinking of the ground due to groundwater removal, mining, dissolution of limestone, extraction of natural gas, earthquakes (UNISDR)
Wild-fire	Any uncontrolled and non-prescribed combustion or burning of plants in a natural setting such as a forest, grassland, brush land or tundra, which consumes the natural fuels and spreads based on environmental conditions (UNISDR)
Forest fire	Wild-fire in forested/wooded area (UNISDR)
Land fire	Wild-fire in a non-wooded area such as bush, grassland, scrub or pasture
Biological hazards	Exposure to living organisms and their toxic substances or vector-borne diseases that they may carry; examples are venomous wildlife and insects, poisonous plants, mosquitoes carrying disease-causing agents (UNISDR)
Water-borne disease	Conditions caused by pathogenic micro-organisms that are transmitted in water
Vector-borne disease	Infections transmitted by the bite of infected arthropod species, such as mosquitoes, ticks, bugs and flies when their widespread occurrence and sensitivity is due to climatic factors (JRC)
Airborne disease	Conditions caused by pathogens that can be transmitted through the air
Insect infestation	The pervasive influx, swarming and/or hatching of insects affecting humans, animals, crops, and perishable goods (UNISDR)
Chemical change	Changes in the usual chemical composition of air, water, soil, e.g. change of the CO2 atmospheric concentrations, ocean acidification, salt water intrusion
Saltwater intrusion	The mixing of saltwater with freshwater which can occur in either surface-water or groundwater bodies (OECD)
Ocean acidification	A reduction in the pH of the ocean over an extended period, typically decades or longer, which is primarily caused by the uptake of carbon dioxide (CO_2) from the atmosphere, but can also be caused by other chemical additions or subtractions from the ocean (IPCC)
Atmospheric CO2 concentrations	The concentration of carbon dioxide (CO2) that would cause the same radiative forcing as a given mixture of CO_2 and other forcing components. These values may consider only greenhouse gases (GHGs) or a combination of GHGs, aerosols and surface albedo change (IPCC)

Annex V. Adaptation sectors

Sector	Description
Buildings	Refers to any (municipal/residential/tertiary, public/private) structure or groups of structures, surrounding spaces, permanently constructed or erected on its site
Transport	Includes road, rail, air and water transport networks and related infrastructure (e.g. roads, bridges, hubs, tunnels, ports and airports). It comprises an extensive range of both public and private assets and services and excludes all related vessels, vehicles (and related parts and processes)
Energy	Refers to the energy supply service and related infrastructure (generation, transmission and distribution networks, all energy types). It includes coal, crude oil, natural gas liquids, refinery feedstocks, additives, petroleum products, gases, combustible renewables and waste, electricity and heat
Water	Refers to the water supply service and related infrastructure. It also covers water use (e.g. by households, industry, energy production, agriculture, etc.) and the (waste-, rain-) water management system that includes sewers, drainage and treatment systems (i.e. the process to render waste water fit to meet environmental standards or other quality norms, as well as to cope with excess rain or storm water)
Waste	Includes activities related to the management (including collection, treatment and disposal) of various forms of waste, such as solid or non-solid industrial or household waste, as well as contaminated sites
Land use planning	Process undertaken by public authorities to identify, evaluate and decide on different options for the use of land, including consideration of long term economic, social and environmental objectives and the implications for different communities and interest groups, and the subsequent formulation and promulgation of plans or regulations that describe the permitted or acceptable uses
Agriculture & forestry	Includes land classified / designated for agriculture & forestry use, as well as organisations and industries linked to creation and production within and surrounding the boundaries of the municipality. It includes animal husbandry, aquaculture, agroforestry, beekeeping, horticulture and other agriculture & forestry management and services in the area
Environment & biodiversity	Environment refers to green and blue landscapes, air quality, including urban hinterland. Biodiversity refers to the variety of life in a specific region, measurable as the variety within species, between species, and the variety of ecosystems
Health	Refers to the geographical distribution of the dominance of pathologies, information indicating the effect on health (biomarkers, decline of fertility, epidemics) or well-being of humans (fatigue, stress, post-traumatic stress disorder, death etc.) linked directly (heat waves, droughts, floods, etc.) or indirectly (water quality and availability, genetically modified organisms, etc.) to the quality of the environment. It also includes the health care service and related infrastructure (e.g. hospitals)
Civil protection & emergency	Refers to the operation of the civil protection and emergency services by or on behalf of public authorities (e.g. civil protection authorities, police, fire-fighters, ambulance, paramedic and emergency medicine services) and includes local disaster risk reduction and management (i.e. capacity building, coordination, equipment, emergency planning etc.)
Tourism	Refers to the activities of persons travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes not related to the exercise of an activity remunerated from within the place visited
Education	Refers to a variety of educational providers, schools, colleges, universities, organizations, agencies, businesses or form of national, regional or local government that have the agreement, contract, role, responsibility and purpose of providing a form of education to members of the public
ICT (Information & communication technologies)	Refers to different types of communications networks and the technologies used in them. The ICT sector combines manufacturing and services industries whose products primarily fulfil or enable the function of information processing and communication by electronic means, including transmission and display

Annex VI. Sample adaptation indicators

Sector-related indicators			
ID#	*Sector*	*Indicator*	*Unit*
1.1	Buildings	Number or percentage of (public/residential/tertiary) buildings damaged by extreme weather conditions/events	(per year / over a certain period)
1.2	Transport, Energy, Water, Waste, ICT	Number or percentage of transport/energy/water/waste/ICT infrastructure damaged by extreme weather conditions/events	(per year / over a certain period)
1.3	Land Use Planning	Percentage of grey/blue/green areas affected by extreme weather conditions/events (e.g. heat island effect, flood, rockfalls and/or landslides, forest/land fire)	%
1.4	Transport, Energy, Water, Waste, Civil Protection & Emergency	Number of days with public service interruptions (e.g. energy/water supply, health/civil protection/emergency services, waste)	No.
1.5	Transport, Energy, Water, Waste, Civil Protection & Emergency	Average length (in hours) of the public service interruptions (e.g. energy/water supply, public transport traffic, health/civil protection/emergency services)	hours
1.6	Health	Number of people injured/evacuated/relocated due to extreme weather event(s) (e.g. heat or cold waves)	(per year / over a certain period)
1.7	Health	Number of deaths related to extreme weather event(s) (e.g. heat or cold waves)	(per year / over a certain period)
1.8	Civil Protection & Emergency	Average response time (in min.) for police/fire-fighters/emergency services in case of extreme weather events	min.
1.9	Health	Number of water quality warnings issued	%
1.10	Health	Number of air quality warnings issued	No.
1.11	Environment & Biodiversity	Percentage of areas affected by soil erosion / soil quality degradation	%
1.12	Environment & Biodiversity	Percentage of habitat losses from extreme weather event(s)	%
1.13	Environment & Biodiversity	Percentage change in number of native species	%
1.14	Environment & Biodiversity	Percentage of native (animal/plant) species affected by diseases related to extreme weather conditions/events	%
1.15	Agriculture & Forestry	Percentage of agriculture lost due to extreme weather conditions/events (e.g. drought/water scarcity, soil erosion)	%
1.16	Agriculture & Forestry	Percentage of livestock losses from extreme weather conditions	%
1.17	Agriculture & Forestry	Percentage change in crop yield / evolution of the annual grassland productivity	%
1.18	Agriculture & Forestry	Percentage of livestock lost due to pests/pathogens	%
1.19	Agriculture & Forestry	Percentage of timber lost due to pests/pathogens	%
1.20	Agriculture & Forestry	Percentage change in Forest composition	%
1.21	Agriculture & Forestry	Percentage change in water abstraction	%
1.22	Tourism	Percentage change in tourist flows / tourism activities	%

1.23	Other	Annual direct economic losses (e.g. in commercial/agricultural/industrial/touristic sectors) due to extreme weather event(s)	€/year
1.24	Other	Annual amount of compensation received (e.g. insurance)	€/year

Adaptive-capacity related indicators			
ID#	*Adaptive capacity factor*	*Indicator*	*Unit*
2.1	Socio-economic	Percentage of public funds available to address a climate hazard and its impacts (e.g. fire, flood, heatwave, etc)	%
2.2	Socio-economic	Percentage share of vulnerable population groups (e.g. elderly (65+)/young (25-) people, lonely pensioner households, low-income/unemployed households, migrants and displaced people) - compared to national average in year X in country X	%
2.3	Socio-economic	Number of households educated in house energy/water/waste management	No.
2.4	Socio-economic	Population density (compared to national/regional average in year X in country/region X)	People per km^2
2.5	Socio-economic	Percentage of population living in risk areas (e.g. flood/drought/heat wave/ forest or land fire)	%
2.6	Governmental & institutional	Percentage change in green and blue infrastructure/areas (e.g. through new urban planning regulation/policy)	%
2.7	Physical & environmental	Length of transport network (e.g. road/rail) located in areas at risk (e.g. flood/drought/heat wave/ forest or land fire)	Km
2.8	Physical & environmental	Average time needed to reach a health facility	Hours
2.9	Physical & environmental	Percentage of areas non-accessible for emergency responses (e.g. firefighting services)	%
2.10	Physical & environmental	Percentage of areas (e.g. residential/commercial/agricultural/ industrial/touristic) at risk (e.g. flood/drought/heat wave/ forest or land fire)	%
2.11	Knowledge & technology	Hours needed to inform population of a risk via an early warning system	Hours

Annex VII. National and European Emission Factors for Electricity Consumption[7]

Every two years in the contest of the EU and Global Covenant of Mayors for Climate and Energy, the JRC provides an update of the emission factors for calculating CO_2 and CO_2 equivalent emissions, generated from electricity consumption.

The JRC-COM-NEEFE dataset includes the 1990-2015 time series of the National and European Emission Factors for Electricity Consumption (NEEFE) per country. This Annex is an extract of the full dataset and only includes the EU-28 countries.

The methodology and the general approach used are the same as those used in the previous versions (Koffi et. al, 2017). The NEEFE related to indirect emissions from electricity consumption are calculated by dividing total national CO_2 emissions due to electricity production from all input energy carriers by the total final electricity consumption. According to the methodological approach followed by local authorities (Bertoldi et. al, 2018), NEEFE have been calculated by applying two different approaches to the energy carriers used to produce electricity: the IPCC "standard" and the LCA (Life Cycle Assessment) emission factors. The IEA (International Energy Agency) national data[8] have been used for the energy consumed and the electricity produced per energy carrier.

Table A reports the NEEFE using the IPCC approach and accounting for CO_2 (tCO_2/MWh) emissions. The NEEFE, including CO_2, CH_4 and N_2O emissions (tCO_2eq/MWh) are provided in Table B. While in Table C NEEFE using the LCA approach and accounting for CO_2, CH_4 and N_2O emissions (tCO_2eq/MWh) are reported.

The GWPs (Global Warming Potential) used in Table B and Table C are based on the IPCC Fourth Assessment Report.

The Annex was developed by the JRC team: E. Lo Vullo; M. Muntean; M. Duerr, A. Kona and P. Bertoldi.

[7] These data are part of the JRC CoM Collection which is forthcoming in 2020 on the JRC Data Catalogue
[8] World Energy Balances (IEA), OECD Publishing, https://www.iea.org/topics/world-energy-outlook

Table A: National and European Emission Factors for Electricity Consumption: tCO_2/MWh

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Austria	0.28	0.28	0.22	0.21	0.23	0.25	0.26	0.26	0.23	0.22	0.20	0.22	0.22	0.26	0.25	0.26	0.23	0.22	0.21	0.19	0.27	0.23	0.19	0.17	0.15	0.17
Belgium	0.43	0.42	0.41	0.41	0.42	0.41	0.38	0.35	0.36	0.33	0.33	0.30	0.30	0.30	0.29	0.30	0.27	0.27	0.26	0.25	0.28	0.22	0.21	0.19	0.18	0.19
Bulgaria	0.96	0.87	0.98	1.01	0.91	0.86	0.80	0.88	0.90	0.83	0.82	0.94	0.85	0.91	0.91	0.88	0.85	0.96	0.90	0.87	1.08	1.06	0.91	0.79	0.84	0.85
Croatia	0.25	0.18	0.33	0.36	0.20	0.24	0.26	0.27	0.34	0.33	0.29	0.34	0.37	0.41	0.31	0.29	0.28	0.34	0.28	0.24	0.25	0.23	0.21	0.20	0.17	0.17
Cyprus	0.93	0.93	0.96	0.94	0.94	0.93	0.95	0.97	0.97	0.98	0.95	0.90	0.85	0.94	0.87	0.88	0.85	0.85	0.84	0.83	0.78	0.77	0.79	0.71	0.72	0.72
Czech Republic	0.98	1.02	1.00	1.05	1.02	1.02	0.99	0.99	1.00	0.96	1.08	1.05	1.02	0.99	0.98	0.92	0.90	0.99	0.91	0.89	1.13	0.92	0.86	0.81	0.81	0.79
Denmark	0.62	0.88	0.69	0.72	0.84	0.71	1.05	0.78	0.67	0.58	0.50	0.51	0.53	0.69	0.50	0.40	0.63	0.51	0.45	0.47	0.66	0.35	0.26	0.34	0.27	0.16
Estonia	2.44	2.09	2.09	1.88	2.03	2.09	2.03	1.90	1.90	1.95	1.84	1.76	1.66	1.88	1.83	1.81	1.48	1.92	1.67	1.45	2.04	1.88	1.59	1.98	1.95	1.56
Finland	0.18	0.19	0.15	0.19	0.25	0.22	0.30	0.25	0.19	0.18	0.16	0.21	0.23	0.32	0.27	0.15	0.26	0.23	0.17	0.18	0.34	0.18	0.12	0.15	0.13	0.09
France	0.15	0.17	0.13	0.10	0.09	0.11	0.11	0.10	0.14	0.12	0.11	0.09	0.09	0.10	0.09	0.11	0.10	0.10	0.09	0.10	0.12	0.09	0.09	0.08	0.06	0.06
Germany	0.75	0.75	0.73	0.73	0.73	0.71	0.72	0.68	0.68	0.64	0.64	0.66	0.64	0.61	0.60	0.59	0.60	0.62	0.59	0.57	0.61	0.56	0.57	0.59	0.57	0.56
Greece	1.23	1.16	1.20	1.18	1.16	1.17	1.02	0.97	0.96	0.97	1.03	1.01	0.96	0.95	0.94	0.92	0.85	0.87	0.84	0.82	0.79	0.82	0.81	0.76	0.68	0.60
Hungary	0.45	0.52	0.60	0.64	0.64	0.64	0.62	0.64	0.66	0.64	0.56	0.55	0.52	0.55	0.48	0.41	0.40	0.44	0.41	0.34	0.42	0.33	0.31	0.25	0.23	0.23
Ireland	0.90	0.90	0.91	0.88	0.88	0.87	0.85	0.84	0.84	0.81	0.76	0.79	0.73	0.65	0.64	0.62	0.57	0.55	0.53	0.50	0.52	0.47	0.52	0.46	0.46	0.47
Italy	0.57	0.55	0.54	0.52	0.51	0.55	0.52	0.51	0.51	0.49	0.50	0.48	0.50	0.51	0.50	0.48	0.48	0.48	0.46	0.41	0.45	0.40	0.39	0.34	0.33	0.33
Latvia	0.09	0.10	0.08	0.11	0.13	0.12	0.14	0.13	0.12	0.12	0.12	0.11	0.10	0.10	0.08	0.07	0.09	0.07	0.09	0.09	0.29	0.13	0.08	0.12	0.10	0.12
Lithuania	0.38	0.41	0.20	0.16	0.17	0.14	0.23	0.14	0.28	0.24	0.18	0.19	0.17	0.17	0.17	0.18	0.14	0.13	0.12	0.15	0.36	0.13	0.14	0.10	0.07	0.08
Luxembourg	0.42	0.44	0.41	0.40	0.30	0.18	0.15	0.09	0.03	0.03	0.03	0.06	0.18	0.16	0.18	0.19	0.18	0.16	0.14	0.18	0.19	0.14	0.15	0.09	0.09	0.06
Malta	1.95	1.33	1.23	1.66	1.49	1.25	1.22	1.17	1.16	1.12	1.01	1.26	1.17	1.18	1.14	1.28	1.18	1.27	1.07	1.09	1.02	1.02	1.04	0.84	0.80	0.40
Netherlands	0.55	0.54	0.54	0.55	0.55	0.57	0.54	0.53	0.52	0.47	0.47	0.50	0.49	0.49	0.49	0.46	0.43	0.46	0.45	0.46	0.55	0.43	0.44	0.43	0.48	0.52
Poland	1.41	1.48	1.50	1.47	1.50	1.41	1.36	1.33	1.30	1.30	1.29	1.28	1.27	1.29	1.24	1.23	1.22	1.16	1.10	1.09	1.23	1.07	1.02	1.02	0.95	0.93
Portugal	0.63	0.64	0.73	0.66	0.62	0.67	0.50	0.51	0.55	0.66	0.56	0.53	0.58	0.46	0.47	0.53	0.44	0.38	0.37	0.40	0.30	0.33	0.36	0.31	0.31	0.39
Romania	1.03	1.11	1.16	1.26	1.28	1.22	1.18	0.95	0.78	0.82	0.89	0.89	0.86	0.94	0.76	0.75	0.80	0.82	0.79	0.73	0.75	0.72	0.67	0.50	0.49	0.51
Slovak Republic	0.43	0.46	0.44	0.47	0.41	0.45	0.40	0.43	0.45	0.42	0.35	0.32	0.29	0.35	0.30	0.31	0.29	0.25	0.25	0.24	0.32	0.23	0.23	0.20	0.18	0.18
Slovenia	0.59	0.51	0.60	0.61	0.52	0.54	0.49	0.51	0.54	0.45	0.45	0.49	0.48	0.44	0.43	0.42	0.42	0.43	0.43	0.47	0.51	0.44	0.42	0.40	0.31	0.31
Spain	0.52	0.52	0.58	0.50	0.49	0.54	0.43	0.48	0.45	0.53	0.52	0.45	0.52	0.46	0.47	0.48	0.45	0.47	0.40	0.36	0.29	0.35	0.38	0.30	0.31	0.35
Sweden	0.01	0.02	0.02	0.02	0.03	0.03	0.05	0.03	0.03	0.03	0.02	0.03	0.03	0.04	0.03	0.02	0.02	0.02	0.02	0.02	0.07	0.02	0.01	0.02	0.01	0.01
United Kingdom	0.80	0.77	0.76	0.67	0.64	0.61	0.59	0.55	0.55	0.52	0.55	0.57	0.55	0.59	0.58	0.57	0.60	0.59	0.56	0.52	0.52	0.51	0.55	0.51	0.46	0.39
EU-28	0.55	0.55	0.53	0.50	0.50	0.50	0.50	0.48	0.47	0.46	0.46	0.45	0.46	0.46	0.44	0.44	0.44	0.45	0.42	0.40	0.43	0.39	0.39	0.37	0.36	0.35

Table B: National and European Emission Factors for Electricity Consumption: tCO_2 eq/MWh

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Austria	0.28	0.28	0.22	0.21	0.23	0.25	0.26	0.26	0.23	0.22	0.20	0.22	0.22	0.26	0.25	0.26	0.23	0.22	0.21	0.19	0.27	0.23	0.19	0.18	0.15	0.17
Belgium	0.43	0.42	0.41	0.41	0.43	0.41	0.38	0.35	0.36	0.33	0.33	0.30	0.30	0.30	0.29	0.30	0.27	0.27	0.26	0.25	0.28	0.22	0.22	0.19	0.18	0.19
Bulgaria	0.96	0.87	0.99	1.01	0.92	0.86	0.80	0.88	0.90	0.84	0.82	0.94	0.86	0.92	0.92	0.89	0.86	0.97	0.90	0.87	1.09	1.07	0.91	0.79	0.84	0.86
Croatia	0.25	0.18	0.33	0.36	0.20	0.24	0.26	0.28	0.34	0.33	0.29	0.34	0.38	0.41	0.31	0.29	0.28	0.34	0.28	0.24	0.25	0.23	0.21	0.21	0.18	0.17
Cyprus	0.94	0.93	0.96	0.94	0.94	0.94	0.96	0.98	0.98	0.98	0.96	0.90	0.86	0.94	0.88	0.88	0.86	0.86	0.84	0.83	0.78	0.78	0.79	0.71	0.72	0.72
Czech Republic	0.98	1.03	1.01	1.06	1.03	1.02	1.00	1.00	1.01	0.96	1.08	1.05	1.02	1.00	0.98	0.93	0.91	1.00	0.91	0.89	1.14	0.92	0.86	0.81	0.81	0.79
Denmark	0.63	0.88	0.70	0.72	0.85	0.71	1.05	0.79	0.67	0.58	0.50	0.52	0.53	0.69	0.50	0.41	0.63	0.51	0.45	0.47	0.66	0.36	0.26	0.34	0.27	0.17
Estonia	2.45	2.10	2.10	1.89	2.04	2.10	2.04	1.90	1.91	1.95	1.85	1.76	1.66	1.89	1.84	1.82	1.48	1.93	1.68	1.46	2.05	1.89	1.60	1.99	1.96	1.57
Finland	0.18	0.19	0.16	0.19	0.26	0.22	0.30	0.25	0.19	0.19	0.16	0.21	0.23	0.32	0.27	0.15	0.26	0.23	0.17	0.18	0.34	0.18	0.12	0.16	0.13	0.09
France	0.15	0.17	0.13	0.10	0.09	0.11	0.11	0.10	0.14	0.12	0.11	0.09	0.10	0.10	0.09	0.11	0.10	0.10	0.09	0.10	0.12	0.09	0.09	0.08	0.06	0.06
Germany	0.75	0.76	0.74	0.73	0.73	0.71	0.72	0.69	0.68	0.64	0.64	0.66	0.65	0.62	0.60	0.60	0.60	0.62	0.59	0.57	0.61	0.56	0.58	0.59	0.57	0.56
Greece	1.23	1.17	1.20	1.19	1.17	1.17	1.03	0.98	0.96	0.97	1.04	1.01	0.97	0.95	0.94	0.93	0.85	0.87	0.84	0.82	0.79	0.82	0.81	0.76	0.68	0.60
Hungary	0.45	0.52	0.60	0.65	0.64	0.64	0.62	0.65	0.66	0.65	0.57	0.56	0.52	0.55	0.48	0.41	0.40	0.44	0.41	0.34	0.43	0.33	0.31	0.25	0.23	0.23
Ireland	0.90	0.91	0.91	0.89	0.88	0.88	0.86	0.84	0.84	0.81	0.76	0.80	0.74	0.66	0.64	0.62	0.57	0.56	0.53	0.50	0.52	0.47	0.52	0.47	0.46	0.47
Italy	0.58	0.55	0.54	0.52	0.51	0.55	0.53	0.52	0.51	0.49	0.50	0.48	0.50	0.51	0.50	0.48	0.48	0.48	0.46	0.41	0.45	0.40	0.39	0.34	0.33	0.33
Latvia	0.09	0.10	0.08	0.11	0.13	0.12	0.14	0.13	0.13	0.12	0.12	0.11	0.10	0.10	0.08	0.07	0.09	0.07	0.09	0.09	0.29	0.13	0.08	0.12	0.10	0.12
Lithuania	0.38	0.41	0.20	0.16	0.17	0.14	0.23	0.14	0.28	0.24	0.18	0.19	0.17	0.17	0.17	0.18	0.14	0.13	0.12	0.15	0.36	0.13	0.14	0.10	0.07	0.08
Luxembourg	0.42	0.44	0.41	0.40	0.30	0.18	0.15	0.09	0.03	0.03	0.03	0.06	0.18	0.16	0.19	0.19	0.18	0.17	0.14	0.18	0.20	0.14	0.15	0.09	0.09	0.06
Malta	1.95	1.34	1.23	1.67	1.50	1.26	1.22	1.18	1.16	1.12	1.02	1.26	1.17	1.19	1.15	1.28	1.18	1.27	1.07	1.09	1.02	1.02	1.04	0.84	0.80	0.40
Netherlands	0.55	0.54	0.54	0.55	0.55	0.57	0.55	0.53	0.52	0.47	0.47	0.50	0.50	0.50	0.49	0.46	0.43	0.46	0.45	0.46	0.56	0.43	0.44	0.44	0.48	0.52
Poland	1.41	1.49	1.51	1.48	1.50	1.41	1.37	1.33	1.30	1.31	1.29	1.28	1.27	1.29	1.25	1.24	1.22	1.17	1.10	1.10	1.23	1.07	1.02	1.02	0.96	0.94
Portugal	0.64	0.64	0.74	0.67	0.62	0.68	0.50	0.51	0.56	0.66	0.56	0.53	0.59	0.46	0.47	0.53	0.45	0.38	0.38	0.40	0.31	0.33	0.36	0.32	0.31	0.39
Romania	1.03	1.11	1.16	1.27	1.28	1.23	1.18	0.96	0.78	0.83	0.90	0.89	0.87	0.94	0.77	0.75	0.80	0.82	0.80	0.73	0.76	0.73	0.67	0.50	0.49	0.52
Slovak Republic	0.43	0.46	0.45	0.47	0.41	0.45	0.40	0.43	0.45	0.42	0.35	0.32	0.29	0.35	0.30	0.31	0.29	0.26	0.25	0.24	0.33	0.23	0.23	0.20	0.18	0.18
Slovenia	0.59	0.51	0.60	0.61	0.53	0.54	0.49	0.51	0.54	0.45	0.45	0.49	0.49	0.44	0.43	0.42	0.42	0.43	0.43	0.47	0.51	0.44	0.42	0.40	0.31	0.31
Spain	0.53	0.52	0.58	0.51	0.49	0.55	0.43	0.48	0.46	0.53	0.52	0.45	0.52	0.46	0.47	0.48	0.45	0.47	0.40	0.37	0.29	0.36	0.38	0.30	0.31	0.35
Sweden	0.01	0.02	0.02	0.02	0.03	0.03	0.05	0.03	0.03	0.03	0.02	0.03	0.03	0.04	0.03	0.02	0.02	0.02	0.02	0.02	0.07	0.02	0.01	0.02	0.01	0.01
United Kingdom	0.80	0.77	0.76	0.67	0.64	0.61	0.60	0.55	0.56	0.52	0.55	0.57	0.55	0.59	0.58	0.57	0.60	0.60	0.56	0.52	0.52	0.51	0.56	0.52	0.46	0.39
EU-28	0.55	0.55	0.53	0.51	0.51	0.50	0.50	0.48	0.48	0.46	0.46	0.46	0.46	0.46	0.44	0.44	0.44	0.45	0.42	0.40	0.44	0.40	0.40	0.38	0.37	0.35

Table C: National and European Emission Factors for Electricity Consumption - LCA Approach: tCO2eq/MWh																										
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Austria	0.32	0.32	0.25	0.25	0.28	0.29	0.30	0.30	0.27	0.26	0.23	0.26	0.25	0.29	0.29	0.30	0.27	0.26	0.25	0.24	0.34	0.28	0.24	0.22	0.20	0.22
Belgium	0.46	0.44	0.43	0.44	0.45	0.44	0.40	0.37	0.39	0.36	0.35	0.32	0.33	0.33	0.32	0.34	0.31	0.31	0.30	0.30	0.33	0.26	0.26	0.23	0.21	0.23
Bulgaria	1.02	0.92	1.04	1.07	0.97	0.91	0.84	0.92	0.94	0.87	0.85	0.98	0.89	0.95	0.95	0.92	0.89	1.01	0.94	0.91	1.13	1.10	0.95	0.82	0.87	0.89
Croatia	0.29	0.20	0.38	0.41	0.24	0.27	0.29	0.31	0.39	0.38	0.32	0.38	0.42	0.46	0.34	0.32	0.31	0.38	0.31	0.27	0.28	0.26	0.24	0.23	0.19	0.19
Cyprus	1.07	1.06	1.10	1.08	1.07	1.07	1.10	1.12	1.12	1.13	1.09	1.03	0.98	1.07	1.00	1.01	0.98	0.98	0.97	0.95	0.89	0.89	0.91	0.82	0.83	0.83
Czech Republic	1.01	1.06	1.04	1.09	1.06	1.06	1.03	1.04	1.04	1.00	1.12	1.09	1.06	1.03	1.02	0.96	0.94	1.04	0.95	0.94	1.20	0.98	0.92	0.88	0.88	0.86
Denmark	0.66	0.93	0.74	0.76	0.90	0.76	1.13	0.85	0.73	0.64	0.55	0.57	0.59	0.75	0.56	0.46	0.69	0.56	0.50	0.52	0.78	0.41	0.30	0.38	0.31	0.20
Estonia	2.47	2.12	2.12	1.90	2.05	2.11	2.05	1.91	1.92	1.96	1.86	1.77	1.67	1.90	1.85	1.82	1.49	1.93	1.69	1.47	2.11	1.92	1.64	2.02	1.99	1.60
Finland	0.22	0.23	0.19	0.23	0.30	0.27	0.34	0.29	0.23	0.22	0.21	0.26	0.28	0.38	0.32	0.19	0.31	0.27	0.22	0.22	0.43	0.23	0.17	0.21	0.17	0.14
France	0.16	0.18	0.14	0.10	0.10	0.11	0.12	0.11	0.15	0.13	0.12	0.09	0.10	0.11	0.10	0.12	0.11	0.12	0.11	0.11	0.14	0.10	0.10	0.09	0.07	0.07
Germany	0.79	0.79	0.77	0.76	0.77	0.75	0.76	0.72	0.71	0.68	0.68	0.70	0.68	0.65	0.64	0.64	0.64	0.68	0.64	0.63	0.67	0.62	0.64	0.66	0.65	0.63
Greece	1.29	1.23	1.26	1.24	1.22	1.23	1.08	1.02	1.01	1.02	1.09	1.07	1.02	1.00	0.99	0.98	0.91	0.93	0.90	0.87	0.84	0.88	0.87	0.81	0.72	0.64
Hungary	0.48	0.56	0.65	0.70	0.69	0.69	0.68	0.70	0.71	0.70	0.61	0.60	0.57	0.60	0.53	0.48	0.46	0.51	0.49	0.41	0.51	0.39	0.36	0.30	0.28	0.27
Ireland	0.97	0.98	0.98	0.96	0.95	0.95	0.93	0.92	0.92	0.90	0.84	0.88	0.81	0.73	0.71	0.69	0.64	0.62	0.60	0.57	0.59	0.54	0.59	0.52	0.52	0.52
Italy	0.65	0.63	0.61	0.59	0.59	0.63	0.60	0.59	0.59	0.57	0.57	0.55	0.58	0.59	0.58	0.56	0.56	0.56	0.54	0.49	0.54	0.48	0.47	0.42	0.41	0.42
Latvia	0.11	0.12	0.10	0.12	0.15	0.13	0.16	0.15	0.14	0.14	0.14	0.13	0.12	0.12	0.10	0.09	0.11	0.09	0.11	0.11	0.36	0.16	0.12	0.18	0.16	0.20
Lithuania	0.44	0.48	0.23	0.19	0.19	0.16	0.27	0.16	0.33	0.27	0.21	0.22	0.21	0.20	0.20	0.21	0.17	0.16	0.15	0.18	0.45	0.17	0.17	0.13	0.10	0.11
Luxembourg	0.42	0.45	0.42	0.41	0.31	0.19	0.16	0.09	0.03	0.03	0.04	0.07	0.21	0.19	0.22	0.22	0.22	0.19	0.16	0.21	0.23	0.16	0.18	0.11	0.11	0.07
Malta	2.16	1.48	1.37	1.85	1.67	1.43	1.40	1.35	1.33	1.28	1.16	1.45	1.34	1.36	1.31	1.47	1.35	1.46	1.23	1.25	1.17	1.17	1.19	0.97	0.92	0.46
Netherlands	0.60	0.60	0.60	0.61	0.61	0.62	0.60	0.58	0.57	0.52	0.52	0.55	0.55	0.55	0.55	0.52	0.49	0.51	0.51	0.54	0.65	0.50	0.50	0.49	0.54	0.58
Poland	1.47	1.54	1.57	1.54	1.56	1.47	1.42	1.39	1.35	1.36	1.34	1.34	1.33	1.35	1.30	1.30	1.28	1.22	1.16	1.17	1.32	1.15	1.10	1.10	1.03	1.01
Portugal	0.71	0.71	0.82	0.74	0.68	0.75	0.55	0.56	0.62	0.73	0.62	0.59	0.65	0.51	0.53	0.59	0.50	0.43	0.43	0.45	0.36	0.39	0.42	0.37	0.37	0.46
Romania	1.15	1.23	1.27	1.38	1.39	1.33	1.28	1.04	0.85	0.89	0.96	0.96	0.93	1.01	0.81	0.80	0.85	0.86	0.84	0.76	0.80	0.76	0.70	0.53	0.52	0.55
Slovak Republic	0.46	0.49	0.47	0.51	0.45	0.48	0.43	0.46	0.48	0.45	0.38	0.34	0.31	0.37	0.32	0.33	0.31	0.27	0.27	0.27	0.37	0.27	0.28	0.24	0.22	0.23
Slovenia	0.61	0.53	0.62	0.63	0.54	0.56	0.51	0.53	0.56	0.46	0.47	0.51	0.51	0.46	0.45	0.44	0.44	0.45	0.46	0.50	0.54	0.47	0.45	0.43	0.33	0.33
Spain	0.55	0.55	0.62	0.53	0.52	0.58	0.46	0.51	0.49	0.57	0.56	0.49	0.57	0.50	0.52	0.54	0.50	0.52	0.46	0.42	0.34	0.40	0.43	0.35	0.36	0.40
Sweden	0.02	0.03	0.03	0.03	0.04	0.03	0.06	0.04	0.04	0.04	0.03	0.04	0.04	0.06	0.04	0.04	0.04	0.04	0.04	0.04	0.13	0.04	0.04	0.04	0.03	0.03
United Kingdom	0.85	0.82	0.81	0.72	0.69	0.66	0.65	0.60	0.61	0.57	0.61	0.63	0.61	0.65	0.65	0.64	0.67	0.67	0.64	0.60	0.60	0.59	0.63	0.59	0.54	0.47
EU-28	0.59	0.58	0.57	0.54	0.54	0.54	0.53	0.52	0.51	0.50	0.50	0.49	0.50	0.50	0.49	0.48	0.48	0.49	0.47	0.45	0.49	0.45	0.45	0.43	0.42	0.40

References

Bertoldi P. (editor), Guidebook *'How to develop a Sustainable Energy and Climate Action Plan (SECAP) – Part 2 - Baseline Emission Inventory (BEI) and Risk and Vulnerability Assessment (RVA)*, EUR 29412 EN, Publications Office of the European Union, Luxembourg, 2018, ISBN 978-92-79-96929-4, doi:10.2760/118857, JRC112986

European Environment Agency, Glossary. Available at www.eea.europa.eu/help/glossary#c4=10&c0=all&b_start=0

Global Covenant of Mayors for Climate and Energy, 2018: Common reporting framework and guidance note. Available at www.globalcovenantofmayors.org/our-initiatives/data4cities/common-global-reporting-framework/

IPCC, 2014: Annex II: Glossary [Mach, K.J., S. Planton and C. von Stechow (eds.)]. In: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, pp. 117-130. Available at www.ipcc.ch/site/assets/uploads/2019/01/SYRAR5-Glossary_en.pdf

IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, p. 151. Available at www.ipcc.ch/report/ar5/syr/

JRC, 2018: Guidebook 'How to develop a Sustainable Energy and Climate Action Plan (SECAP)', parts 1, 2, 3. Available at publications.jrc.ec.europa.eu/repository/handle/JRC112986

Koffi B, Cerutti A.K., Duerr M., Iancu A., Kona A., Janssens-Maenhout G., *Covenant of Mayors for Climate and Energy: Default emission factors for local emission inventories– Version 2017*, EUR 28718 EN, Publications Office of the European Union, Luxembourg, 2017, ISBN 978-92-79-71479-5; doi:10.2760/290197, JRC107518

UNDRR, DesInventar of the UN Office for Disaster Risk Reduction, Disaster Loss Data (DATA). Available at www.desinventar.net/definitions.html

World Meteorological Organization (WMO), 2016: Resolution 9 (Cg-17), Identifiers for cataloguing extreme weather, water and climate events. Available at ane4bf-datap1.s3-eu-west-1.amazonaws.com/wmocms/s3fs-public/event/related_docs/2016-06-20-P-TC-1752-P-RA-1770-CLW-CLPA-RES9_en.pdf?Du0Knsy.FrxbqT_XPGtqZFwT488mL7rL

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