



# **User guide**

# D5.2 Digital monitoring and visualization tool (Demonstrator)

#### December 2024



# Leader: Sonnenplatz Großschönau

# **Dissemination Level**

PU	Public	Х
СО	Confidential	

## History

Version	Description	Lead author	Date
V1	Download guide	SON	December 2024

# Disclaimer

This project has been developed in the framework of the PED Program, which is implemented by the Joint Programming Initiative Urban Europe and SET Plan Action 3.2. The Austrian part is supported by the Austrian Ministry of Climate Action, Environment, Energy, Mobility, Innovation, and Technology (BMK); the Romanian part is supported by a grant of the Ministry of Research, Innovation and Digitization CNCS/CCCDI – UEFISCDI, project number PED-JPI-SIMPLY POSITIVE, contracts number 325/2022 and 326/2022, within PNCDI III; the Dutch part is supported by the RVO (the Netherlands Enterprise Agency), reference number ERANETPED-02767306; and the Italian part is supported by a grant of the Ministry of Education and Merit - Department for Higher Education and Research, project number PED\_00042, from the Fund for Investment in Scientific and Technological Research (FIRST/FAR) and/or Special Accounting Account no. 5944.



Federal Ministry Republic of Austria Climate Action, Environment, Energy, Mobility, Innovation and Technology



Rijksdienst voor Ondernemend

Nederland

AUA

Ministero dell'Istruzione e del Merito



# **Executive Summary**

The present user guide is intended to support PED developers in using D5.2 Digital monitoring and visualization tool (Demonstrator), in order to:

- visualize progress towards PED achievement rate
- calculate environment-related KPIs (quantity of CO<sub>2eq</sub>) for various energy sectors and as on a yearly basis
- keep track of action implementation.

The guide is structured in 4 main sections:

- 1. Steps in defining a PED project
- 2. Guidelines on how to input yearly monitoring data
- 3. Description of the information provided in the dashboard for PED progress viewing
- 4. Input parameters including overall system architecture and emission factors used

The source code for the demonstrator can be found at: <u>https://github.com/DragosPatru/ped-</u> <u>monitor</u>. Using this source code and the affiliated technical documentation, the free-source Demonstrator can be further developed and updated by other developers.



# Table of Contents

1.	DEFI	NING A PED PROJECT	5
	1.1.	Select Define PED tab	. 5
	1.2.	Input profiling indicators	. 5
	1.3.	Input GHG emissions profiling indicators	6
	1.4.	Select applicable energy indicators	7
2.	INPU	ITTING MONITORING DATA	10
	2.1.	Updating conversion and emission factors	10
	2.2.	Inputting yearly data	13
	2.2.1	Inputting energy data	14
	2.2.2	Viewing centralized energy data	16
	2.2.3	Viewing centralized emissions data	17
	2.2.3	Inputting and monitoring actions progress	18
3. VI	EWIN	G THE OVERALL DASHBOARD AND PED PROGRESS	20
4.	INPU	IT PARAMETERS	22
	4.1.	System architecture	22
	4.2.	Emission factors used	28



# 1. Defining a PED project

#### 1.1. Select Define PED tab

In the main default view of the app, click on the right-hand panel to define a new PED *Please note that you can create multiple PED projects from your account.* 

PED Monitor	R / Peds Peds
Define PED	There is no PED defined at the moment. You can define one using the dedicated page.
	This papert as reviewed funding in the framework of the PED Porgram, which is implemented by the Joint Programming Installine Utan Europe and SET Pale Action 3.1. The papert is augmonted by the Joint Programming Installine Utan Europe and SET Pale Action 3.1. The papert is augmonted by the Joint Programming Installine Utan Europe and SET Pale Action 3.1. The papert is augmonted by the Joint Proc. (Poll-10) (Instel Action, Dorosov of Clinate Action,

#### 1.2. Input profiling indicators

When defining a PED, start by inputting the required information in the fields indicated below.

Please keep in mind that detailed explanations for each field is available for viewing by clicking the ? icon on the right of the field name.

Where applicable, the units of measurement are presented in brackets () at the end of the field name.

Fields market with \* are mandatory.

Please not that Primary Energy Factor is set at a default EU value of 1.9, but can be updated if another specific primary energy factor is available for your region.

Name •        ()       SELECT COUNTRY • •         Value required. No more than 250 characters       Description       I         Description       I       I         Value required.       ()       Value required.         Value required.       ()       Value required.         Value required.       ()       Value required.         Value required       ()       Value required.			
Value required. No more than 250 characters         Description         Baseline Year * • • • • • • • • • • • • • • • • • •	Name *🛛	0	SELECT COUNTRY * V
Description  Baseline Year *  Target	Value required. No more than 250 characters		
Baseline Year *  Target Year *  Target Year *  Target Year *  Target Year *  Value required. Greater than 2000 and less than Target Year'  Value required. Greater than 2000 and less than Target Year'  Value required  Size of Focus District (m <sup>2</sup> ) *  Population of Focus District *  Value required  Size of Area Size (sq. meters) *  Value required  Value required Value	Description		
Value required. Greater than 2000 and less than Target Year Value required. Greater than 2000 and less than Target Year Value required. Size of Focus District (m <sup>2</sup> ) *  Value required	Dasalina Vaar t		Tarnet Vaar *
Value required. Greater than 2000 and less than Target Year' Value required. Greater than 28 seline Year' Value required	Jaachine Tear 👻	0	larger rear 👻
Degree of energetic self-supply by RES in baseline year (%) *●     ●       Value required     ●       Size of Focus District (m²) *●     ●       Value required     ●       Value required     •	Value required. Greater than 2000 and less than 'Target Year'		Value required. Greater than 'Baseline Year'
Image: Contract C	Degree of energetic self-supply by RES in baseline year (%) *		
Value required  Size of Focus District (m <sup>2</sup> ) *  Population of Focus District *  Value required  Value require		0	
Size of Focus District (m*) *  Population of Focus District *  Population of Focus District *  Value required  Population of Focus District *  Value required  Average Household Income (EUR) *  Value required  Value required  Conting Degree Days	/alue required		
Value required	Size of Focus District (m²) *		Population of Focus District *
Value required Value required Value required Value required Average Household Income (EUR) **  Value required V		0	-
Build Up Area Size (sq. meters) * Average Household Income (EUR) *	/alue required		Value required
Value required Value required.	Build Up Area Size (sq. meters) *		Average Household Income (EUR) *
Value required Value required.		0	
Heating Degree Days	Value required		Value required.
Heating begiee bays • Cooling begiee bays •	Heating Degree Days 🔎		Cooling Degree Days 🚳

## 1.3. Input GHG emissions profiling indicators

In order to calculate environmental indicators (GHG emissions) for the focus district, emission factors are embedded in the system for most of the energy sources. However, in emission factors in the case of grid electricity and locally produced heat (or cold) are dependent on local characteristics.

In this sense, please input the emission factors for these types of energy sources, if they are applicable to your focus district. For each emission factor, please input the source. If one or both types of energy sources are unapplicable for your energy district, please input 0.

GHG emission(s)		
Factor for electricity - value (t CO2-eq/MWh) *	1	Factor for electricity - source *
Value required		Value required
Factor for heat/cold generated in the district (t CO2-eq/MWh) *	0	Factor for heat/cold generated in the district - source *
Value required		Value required

#### Grid electricity:

- Emission factors may be obtained: (1) from electricity provider (suggested) and should be updated anually; (2) from international databases such as IPPC
- all yearly conversion factors introduced in the tool must be from the same source (e.g. energy provider) for all the monitoring years
- Examples of open-source database: Joint Research Centre Data Catalogue -> please select the lates version of GHG Emission Factors for Electricity Consumption -> Table 3: CoM emission factors for national electricity for EU member states, Iceland and Norway: Life-cycle (LC) approach, GHG emissions in tonnes CO2-eq/MWh -> select the conversion factor closest to your baseline year -> yearly check the database for updates; link: <a href="https://data.jrc.ec.europa.eu/collection/id-00172">https://data.jrc.ec.europa.eu/collection/id-00172</a>

#### Locally produced heat (or cold):

- if local powerplants are in place for the district. Emission factors may be obtained: (1) from generation facility, based on specific studies; (2) from international databases such as IPPC
- all yearly emission factors introduced in the tool must be from the same source (e.g. IPPC) for all the monitoring years
- Examples of open-source database: Joint Research Centre Data Catalogue -> please select the lates version of GHG Emission Factors for Local Energy Use -> Table 1 & Table 2 -> select the conversion factor according to the source of energy used within your facility -> yearly check the database for updates; link: <a href="https://data.jrc.ec.europa.eu/collection/id-00172">https://data.jrc.ec.europa.eu/collection/id-00172</a>



#### 1.4. Select applicable energy indicators

In order to set up the framework for PED monitoring, please select ALL energy sources and types of energy sectors which apply to your PED. If you do not select in this stage ALL applicable data for your district, data cannot be inserted in the later stage

Select the tab "Energy consumption and generation".



Please select the types of ENERGY SOURCES applicable in your district

IMPORTANT:

(1) if you have Electricity provided by a grid supplier please select "Electricity",

(2) if you have local generation of heat/cold, please select "Locally produced Heat/cold", (3) if you do not select in this stage ALL energy sources which are applicable to your district, data cannot be inserted in the later stage

Ener	gy Sources <sup>(1)</sup>		
	Anthracite		Biodiesel from non-sustainable sources
	Biodiesel from sustainable sources		Bio-gasoline from non-sustainable sources
	Bio-gasoline from sustainable sources		Biogas from non-sustainable sources
	Biogas from sustainable sources	~	Electricity
	Gas/diesel oil		Geothermal
	Lignite		Liquefied Petroleum Gases
	Locally produced Heat/cold		Motor gasoline
<b>~</b>	Municipal wastes (biomass fraction) from non-sustainable sources		Municipal wastes (biomass fraction) from sustainable sources
	Municipal Wastes (non-biomass fraction)	~	Natural gas
	Natural Gas Liquids		Other Bituminous Coal
	Other liquid biofuels from non-sustainable sources		Other liquid biofuels from sustainable sources
	Other primary solid biomass from non-sustainable sources		Other primary solid biomass from sustainable sources
	Peat		Solar thermal
	Sub-Bituminous Coal		Wood / wood waste from non-sustainable sources
<ul> <li></li> </ul>	Wood / wood waste from sustainable sources		



Please select the types of ENERGY SECTORS (sectors of energy consumptions / renewable energy production) you would like to monitor as part of your system boundaries; categories are defined according to Covenant of Mayors methodology.

#### IMPORTANT:

(1) select as many categories as possible in order to have an accurate PED progress,

(2) energy consumptions/generation must be monitored according to these categories,

(3) if you do not select in this stage ALL categories which are applicable to your district, data cannot be inserted in the later stage

Click on each of the following category tabs to reveal the sub-categories from which to choose:

- Buildings, equipment/facilities and industries
- Transport
- Other sectors
- Locally produced renewable energy

En	Energy Sectors <sup>(1)</sup>		
I	Buildings, equipment/facilities and industries		
	Fransport		
(	Other sectors		
l	ocally produced renewable energy		



N	Aunicipal buildings, equipment/facilities
C	Municipal buildings, equipment/facilities
	Public lighting
	Other
т	Tertiary (non municipal) buildings, equipment/facilities
C	Institutional buildings
	Other
R	tesidential buildings
C	Residential buildings
h	ndustry
	Non-ETS
	ETS
Trans	sport
Other	sectors
Local	ly produced renewable energy
	Local electricity production: Wind
	Local electricity production:Hydroelectric
<ul> <li></li> </ul>	Local electricity production:Photovoltaics
	Local electricity production: Geothermal
	Local electricity production:Other

To finish the PED set-up, please click "Create" at the bottom of the page.





# 2. Inputting monitoring data

For regular input of monitoring data, please access the "Open" under your PED.

👰 PED Monitor	<pre></pre>
PEDs	Test Test
Define PED	Test PED
	C D DELETE
	This project has received funding in the framework of the PED Program, which is implemented by the Joint Programming Initiative Urban Europe and SET Plan Action 3.2. The project is supported by the Austr (the Netherlands Enterprise Agency), reference number ERANETPED-02767306. This work was supported by a grant of the Ministry of Research, Innovation and Digitization ONGS/OCCOI – UEFISODI, project r the Ministry of Education and Meri - Department for Higher Education and Research, project number PED_00042, from the Fund for Investment in Scientific and Technological Research (FIRST/FAR) and/or S For more information please access: http://simplypositive.eu/

#### 2.1. Updating conversion and emission factors

The application will use as default values inputted in the previous step of creating a PED project. If energy factors (primary energy and emission) change during the monitoring period, you can update these values.

From the general dashboard, select the "Edit" from the top section to update your Primary energy factor and Emission factors for grid electricity and heat/cold in a certain year, if it is applicable.

frest			
est PED			
PED Basics Name	Test	Density of Focus District 0.25/ m <sup>2</sup>	Built-up der
Country Baseline Year Target Year Self Supply Renewable Energy In Baseline	Austria 2023 2030 30%	no. of ottizens / m² of total area m² of built-up area / m² o	f total area
Geospatial And Socioeconomics Size of focus district	2000 m²	Frequently Changed Factors Values for the year '2024'. They can be updated every year between baseline and target.	🖾 ALL VALUES
Build Up Area Size AVG Household Income Heating Degree Days	800 m² 3500 EUR -2 days/year	Primary Energy Factor GHG emission(s)	1.9
		Factor for electricity Factor for electricity - source Factor for heat/cold generated in the district Factor for heat/cold generated in the district - source	0.4 (t CO2-eq/MWh) IPCC 0 (t CO2-eq/MWh) n/a



In the pop-up window, select the year you want update the necessary factors, while mentioning the year.

Please note that in this window some other fields such as PED name, description and some non-mandatory profiling data can also be updated.

-	
Test PED	
People reached (no.) @	Total Money Spent (EUR) @
Return Of Investment (years) 🚳	Internal success rate (%) 🚳
Factors and energy-sources for the reference year	
Reference Year *	
2026	
Primary Energy Factor *	
2	
GHG emission(s)	
Electricity	Heat/cold generated in the district
Factor value (t CO2-eq/MWh) *	Factor value (t CO2-eq/MWh) *@
0.7	0
Energy-source *	Energy-source *
IPCC	n/a



An overview of all updated energy factors can be viewed in the dashboard section, by clicking the "All values" tab under the "Frequently changed factors" section.

m Test					🖍 EDIT
Test PED					
PED Basics			Density of Focus District		Built-up density
Name	Test	_	0.25/ m <sup>2</sup>	_	0.4
Baseline Year	2023	no. of citizens / m² of total area		m² of built-up area / m²	of total area
Target Year Salf Sungly Renewable Energy in Reselling	2030				
oen ouppy renewable citery in baseline	00/8				$\frown$
Geospatial And Socioeconomics		Frequently Changed Factors		-	ALL VALUES
Size of focus district	2000 m²	Values for the year '2024'. They car	n be updated every year betwe	en baseline and target.	
Population of focus district Build Up Area Size	500 people 800 m²				
AVG Household Income	3500 EUR	GHG emission(s)			1.9
Heating Degree Days	-2 days/year	Factor for electricity			0.4 (t CO2-eq/MWh)
		Factor for electricity - source			IPCC
		Factor for heat/cold generated in Factor for heat/cold generated in	the district the district - source		0 (t CO2-eq/MWh) n/a
2022					
			1.0		
Primary Energy Factor			1.9		
GHG emission(s) factors					
Electricity			0.4 (t	CO2-eq/MWh)	
Electricity - source			IPCC		
Heat/cold generated in the district			0 (t CC	02-eq/MWh)	
Heat/cold generated in the district - source			n/a		
2024					
Primary Energy Factor			1.9		
GHG emission(s) factors					
Electricity			0.4 (t	CO2-eq/MWh)	
Electricity - source			IPCC		
Heat/cold generated in the district			0 (t C0	02-eq/MWh)	
Heat/cold generated in the district - source			n/a		
2025					
Primary Energy Factor			1.9		
GHG emission(s) factors					
Electricity			0.4 (t	CO2-eq/MWh)	
Electricity - source			IPCC		
Heat/cold generated in the district			0 (t C0	02-eq/MWh)	
Heat/cold generated in the district - source			n/a		
2026					
Primary Energy Factor			2		
GHG emission(s) factors					
Electricity			0.7 (t	CO2-eq/MWh)	
Electricity - source			IPCC		
Heat/cold generated in the district			null (t	CO2-eq/MWh)	
Heat/cold generated in the district - source			n/a	. /	
. read one generated in the district - source			11/ a		



# 2.2. Inputting yearly data

Input the yearly energy consumption/generation for the sectors you have defined in the earlier stage of creating the PED project.

Click the Energy consumption and generation under the PED Indicators section to display the sectors under which you want to register information.

1 Test			n edit
Test PED			
PED Basics	Test	Density of Focus District 0.25/ m <sup>2</sup>	Built-up density 0.4
Country Baseline Year Target Year Self Supply Renewable Energy In Baseline	Austria 2023 2030 30%	no. of citizens / m² of total area	m² of built-up area / m² of total area
Geospatial And Socioeconomics Size of focus district Population of focus district	2000 m² 500 people	Frequently Changed Factors Values for the year '2024'. They can be updated every year between t	ALL VALUES
Build Up Area Size AVG Household Income Heating Degree Days	800 m² 3500 EUR -2 days/year	Primary Energy Factor GHG emission(s)	1.9
		Factor for electricity Factor for electricity - source Factor for heat/cold generated in the district Factor for heat/cold generated in the district - source	0.4 (t CO2-eq/MWh) IPCC 0 (t CO2-eq/MWh) n/a
PED Indicators			
Energy consumption and generation			~
Greenhouse Gas Emissions			~



#### 2.2.1 Inputting energy data

Select each sector that you want to introduce data for. Please note that renewable energy production will be entered under "Locally produced renewable energy".

After selecting each sector, sub-sector will be displayed. Click on the  $\bigcirc$  sign placed to thre right of each sub-sector to add yearly data.

F	PED Indicators
	Energy consumption and generation
+	Buildings, equipment/facilities and industries
+	Transport
+	Other sectors
┢	Locally produced renewable energy

Buildings, equipment/facilities and industries	
Municipal buildings, equipment/facilities	
Municipal buildings, equipment/facilities	No values recorded
Tertiary (non municipal) buildings, equipment/facilities	
Institutional buildings	No values recorded
Residential buildings	
Residential buildings	No values recorded

In the new window, click on "Add new values" button from the right corner of the "Values" section to insert yearly consumption / generation data for each sector.

fit Energy consumption: municipal buildings, equipment/facilities						
Values						+ ADD NEW VALUE
10 v entries per page						$\smile$
DATABOURCE	AMOUNT (KWH/A)		CREATED			ACTION
Showing 1 to 10 of 0 entries						
Tasks						+ ADD NEW TASK
10 v entries per page						
NAME	STATUS	CREATED	DEADLINE	PLANNED BUDGET (EUR)	COMPLETION RATE (%)	ACTION
Showing 1 to 10 of 0 entries						

In the pop-up window, insert:

- amount of energy in kWh for the specific subsector (either energy consumed or energy generated under the Locally produced renewable energy tab)
- year end date (in the format mm/dd/yyyy), afferent to the year you are inputting data for
- select the energy source

Please note that if there are multiple energy sources for the same year (e.g. municipal buildings have been supplied by both grid electricity and thermal energy sourced from natural gas), you need to separate entries.

After completing, click "Save changes" button from the bottom right corner.

A	dd data	×
	Amount (kWh/a) * 100000 Creation Date * 12/31/2023	DATA SOURCE A Electricity Municipal wastes (biomass fraction) from non-sustainable sources Natural gas Wood / wood waste from sustainable sources
	CLOSE	CHANGES

Repeat the process for all applicable sub-sectors.

#### 2.2.2 Viewing centralized energy data

Once the information has been introduced in the corresponding section, the application will display the centralized progress for energy consumption and renewable energy generation.

The application will display graphical charts and numeric tables for:

#### Total district final energy consumption and primary energy consumption:



#### Energy consumption for each sector and sub-sector

#### (respectively, energy generation for Locally produced renewable energy)

VALUE 2023 kWh/a 2024 kWh/a 25000 2025 kWh/a 15000 2026 kWh/a 22000 (FET1) al Energy ( 2023 kWh/a 38000 2024 47500 kWh/a 2025 kWh/a 28500 2026 kWh/a 44000 Total Primary Energy Consumption (PET1) Municipal buildings, equipment/facilities 2023 kWh/a

2024

2025

2026

kWh/a

kWh/a

kWh/a

135000

125000

Municipal Energy Consumption

#### 2.2.3 Viewing centralized emissions data

Once the energy data has been introduced in the corresponding section (step 2.2.1), the application will display the centralized progress for emissions quantities.

The application will display graphical charts and numeric tables for:

#### Total district emissions generation:



#### Emissions generation for each sector and sub-sector

Buildings, equipment/facilities and industries



Municipal buildings, equipment/facilities



YEAR	U.M.	VALUE	
2023	tC02eq/a	44040	
2024	tC02eq/a	51030	
2025	tCO2eq/a	47030	
2026	tCO2eq/a	68520	*

Residential buildings



#### 2.2.3 Inputting and monitoring actions progress

For each sub-sector, you can input actions planned for the operationalization of a PED.

From the dashboard menu, select the sub-sector and in the new window, click on "Add new task" button from the right corner of the "Tasks" section to insert actions for each sector.

Energy consumption: municipal buildings, equipment/facilities						
Values					I	+ ADD NEW VALUE
10 v entries per page						
DATASOURCE	AMOUNT (KWH/A)		CREATED		ACT	10N
Showing 1 to 10 of 0 entries						
Tasks					→ <b>(</b>	+ ADD NEW TASK
10 v entries per page						
NAME	STATUS	CREATED	DEADLINE	PLANNED BUDGET (EUR)	COMPLETION RATE (%)	ACTION
Showing 1 to 10 of 0 entries						

In the pop-up window, define your action by entering:

- name/description of action
- deadline for completion
- planned budget
- expected energy savings (optional)

Insulating 5 buildings on Test Street		
Deadline * 06/15/2025	Planned Budget (EUR) * 200000	
Expected Energy Saved 700	ENERGY SAVED UNIT A	
	MWh/EURO	

Click the "Save changes" button from the bottom right corner.

Once a task has been created, you can update its status by accessing the "Action" button ( :) from the right of the listing and selecting "Edit" from the drop-down list.

You cand also remove the action by selecting "Remove".

Tasks						+ ADD NEW TASK
10 v evolves per page						
NAME	STATUS	CREATED	DEADLINE	PLANNED BUDGET (EUR)	COMPLETION RATE (%)	ACTION
Insulating 5 buildings on Test Street	OPEN	2024-12-04	2025-06-15	200000	0%	→(`)
Showing 1 to 10 of 1 entries						

In the pop-up window, you can:

- close your task (by selecting "Done" from the top button)
- edit your task (update deadline, planned budget and expected energy savings if applicable)
- record its progress (by inputting recorded expenses and actual energy savings if applicable)

ulating 5 buildings on Test Street		
OPEN ¥		
Deadline * 06/15/2025	Planned Budget (EUR) * 200000	
Record expense (EUR)		
Expected Energy Saved 700	Actual Energy Saved 500	
MWH v		
CLOSE		SAVE CHAN

Click "Save changes" when update completed.

Repeat this process for all applicable sub-sectors where actions are being implemented for PED achievement.

# 3. Viewing the overall dashboard and PED progress

After filling in the required data and information according to steps 2.2.1-2.2.3, the application will update the dashboard section for the PED.

In this section, you can find:

- a. the overview for profiling indicators defined at the PED project creation phase (step 1)
- b. calculated district KPIs: population density and built area
- c. overview of frequently changed factors (primary energy factors and emission factors)
- d. gauge charts for:
  - i. Progress of degree of renewable energy self-supply for the last year
  - ii. Progress of Greenhouse Gas Emissions reduction rate for the last year
  - iii. Overall PED/PEN Achievement Rate

e.	overall	task	comp	oletion	rate
•••			••••P		

1 Test					
Test PED					
PED Basics			Density of Focus District		Built-up density
Name Country	Test Austria	-	0.25/ m <sup>2</sup>		0.4
Baseline Year	2023	no. of citizens / m <sup>2</sup> of total area	m <sup>2</sup> of bu	ill-up area / m² of total area	
Target Vear Self Supply Renewable Energy In Baseline	2030 30%				
Geospatial And Socioeconomics		Frequently Changed Factors			ALL VALUES
Size of focus district	2000 m²	Values for the unit '972.4' Theo are be undeted some unit be	uses have been and target		
Population of focus district	500 people	values for the year 2024. They can be updated every year be	ween baseline and target.		
Build Up Area Size	800 m²	Primary Energy Factor		1.9	
Heating Degree Davs	-2 dava/vear	GHG emission(s)			
		Factor for electricity		0.4 (t C02-eq/M	Vb)
		Factor for electricity - source		IPCC	
		Factor for heat/cold generated in the district		0 (t CO2-eq/MW)	1)
Progress of ungine to interview in terms of the subject of scale This progress directly supports SBD 7 Affects and search energy consumption. 54.55% Progress agenet the baseling year value of 50.0%. Highest value was 61.1% activened in 2026	Progress of untermode Gal Dimission of the Dimission of t	Localization and the 2028 Indicators 12.2.2.7.0.1 given houses gas emissions per year and the second sec		49.5%	
PED Indicators					
Overall progress of energy efficiency measures 74.33 to This a subalization of the overall progress for all measures defined. To view individual progress for each defined mea mease indication in the sector bears	sure, please access the "Tasks" section of each category of ener	37			
Energy consumption and generation					~

**Progress of degree of renewable energy self-supply for the last year** is displayed as the percent of final energy consumption provided by renewable energy generated on-site for the latest year for which data was filled in. The target value is at 100% degree of renewable energy self-supply. In the bottom of the gauge chart you can also see the progress against the baseline year value for degree of renewable energy self-supply and the highest yearly value for degree of renewable energy self-supply and the highest yearly value for degree of renewable energy self-supply and the years.

**Progress of Greenhouse Gas Emissions reduction rate for the last year** is displayed as the progress against the baseline year value of GHG emissions generated in that year. In the bottom of the gauge chart you can also see the best recorded value of GHG emissions throughout the years (the lowest amount of GHG emissions and the year it was achieved in).

**Overall PED/PEN Achievement Rate** is displayed for the last year and is considered to be 100% achieved when both of the following conditions are met: degree of renewable energy self-supply is at least 100% and GHG emissions are 0.

The overall task completion rate is the visualization of the overall progress for all measures defined. To view individual progress for each defined measure, you can access the "Tasks" section of each category of energy related sector.

# 4. Input parameters

# 4.1. System architecture

					Description of indicator	Formula
Code	Туре	CATEGORY	INDICATOR	U.M.	(Information to be uploaded by user / calculated by Demo)	(where information is calculated by Demo)
					baseline year for the calculation of progress in	
P0.1	Mandatory	Profiling indicators	Baseline year	year	energy consumption and emissions generation	-
					target year set up by the user to achieve PED	
P0.2	Mandatory	Profiling indicators	Target year	year	status	-
			Degree of energetic self-		percent of final energy consumption provided by	
			supply by RES in baseline		renewable energy generated on-site in baseline	
P0.3	Mandatory	Profiling indicators	year	%	year	-
			GHG emissions in baseline			
P0.4	Mandatory	Profiling indicators	year	tCO2eq/a	total quantity of GHG emissions in baseline year	-
P1	Mandatory	Profiling indicators	Size of Focus District	m²	m <sup>2</sup> of district	-
			Population of Focus			
P2	Mandatory	Profiling indicators	District	no.	no. of citizens	-
P3	Mandatory	Profiling indicators	Density of Focus District	/ m²	no. of citizens / m <sup>2</sup> of total area	P2/P1
P4	Mandatory	Profiling indicators	Size of built-up area	m²	m <sup>2</sup> of the focus district which has buildings	
Р5	Mandatory	Profiling indicators	Built-up density	no.	m <sup>2</sup> of built-up area / m <sup>2</sup> of total area	P5/P1
P6	Mandatory	Profiling indicators	Heating degree days	no.	no. of days	-
P7	Mandatory	Profiling indicators	Cooling degree days	no.	no. of days	-
			Average household			
P8	Mandatory	Profiling indicators	income	€	average household income EUR	-
					pre-selected primary energy factor of 2.5 OR	
PEF	Mandatory	Energy related	Primary Energy Factor	no.	insert manually	-
			GHG emission factor for	t CO2-	yearly emission factor defined by user	
EF1	Mandatory	Energy related	electricity - value	eq/MWh	(local/national/from IPCC database)	-

FET1.2	Mandatory	Energy related	consumption	kWh/a	district by the tertiary/service sector	SUM(FET1.2.1:FET1.2.2)
			Municipal) Final energy		actual quantity of energy consumed within the	
			Subtotal Tertiary (non-			
FET1.1.3	Mandatory	Energy related	other municipal category	kWh/a	of energy consumption	-
	,		Energy consumption		other categories of municipality-owned sources	
FET1.1.2	Mandatorv	Energy related	Energy consumption: public lighting	kWh/a	district by the public lighting, owned by the municipality	-
					actual quantity of energy consumed within the	
FFT1.1 1	Mandatory	Energy related	municipal buildings,	kWh/a	district by the municipal buildings, facilicities and	_
	mandatory	Lineigy related	Energy consumption:		actual quantity of energy consumed within the	() () () () () () () () () () () () () (
FFT1.1	Mandatory	Fnergy related	Subtotal Municipal Final	kWh/a	actual quantity of energy consumed within the district by the municipal sector	SUM(FFT1.1.1.FFT1.1.3)
FET3	Mandatory	Energy related	sectors	kWh/a	other sectors	FET3.1
			consumption: other		total actual quantity of energy consumed by	
_	· ·····	- 07	Total final energy		• • •	-,,
FET2	Mandatorv	Energy related	consumption: transport	kWh/a	transport	FET2.3, FET2.4)
1614	i vianuator y	LICISY ICIALCU	Total final energy	Nunia	total actual quantity of energy consumed by	SUM(FET2.1. FET2.2.
FFT1	Mandatory	Energy related	industries	kWh/a	huildings equipment/facilities and industries	501VI(ΓΕΙ 1.1, ΓΕΙ 1.2, FFT1 3 FFT 1 Δ)
			consumption: buildings,		total actual quantity of onorgy consumed by	SUNA/EET1 1 EET1 2
			Total final energy			
FET0	Mandatory	Energy related	consumption	kWh/a	the district	SUM(FET1:FET3)
	<b>.</b>	_ <u> </u>	Total district final energy		total actual quantity of energy consumed within	<b>-</b>
EF2.0	Mandatory	Energy related	the district - source	(free text)	biomass etc.)	
			heat/cold generated in		depending on input for the local heat/cold plants (r	natural gas, diesel,
			GHG emission factor for		source of yearly emission factor provided for locally	y produced heat/cold,
EF2	Mandatory	Energy related	the district - value	eq/MWh	biomass etc.)	
			heat/cold generated in	t CO2-	depending on input for the local heat/cold plants (r	natural gas, diesel,
-		- 07	GHG emission factor for	())	yearly emission factor defined by user (local/nation	nal/from IPCC database).
EF1.0	Mandatorv	Energy related	electricity - source	(free text)	electricity	
			GHG emission factor for		source of yearly emission factor provided for	

			Energy consumption:		actual quantity of energy consumed within the	
			institutional buildings,		district by the non-municipal buildings from the	
FET1.2.1	Mandatory	Energy related	non-municipal	kWh/a	service sector	-
			Energy consumption:			
			other non-municipal		actual quantity of energy consumed within the	
FET1.2.2	Mandatory	Energy related	category	kWh/a	district by other non-municipal categories	-
			Energy consumption:		actual quantity of energy consumed within the	
FET1.3.	Mandatory	Energy related	residential buildings	kWh/a	district by residential buildings	-
					actual quantity of energy consumed within the	
			Subtotal Industry Final		district by the industry sector (manufacturing	
FET1.4	Mandatory	Energy related	energy consumption	kWh/a	and construction)	SUM(FET1.4.1:FET1.4.2)
			Energy consumption: non-		actual quantity of energy consumed within the	
FET1.4.1	Mandatory	Energy related	ETS industry	kWh/a	district by industrial activities (non-ETS)	-
					actual quantity of energy consumed within the	
FET1.4.2	Mandatory	Energy related	Energy consumption: ETS	kWh/a	district by industrial activities (ETS)	-
			Subtotal Municipal Fleet		actual quantity of energy consumed by the fleet	
FET2.1	Mandatory	Energy related	Subtotal Municipal Fleet energy consumption	kWh/a	actual quantity of energy consumed by the fleet owned by the municipality	SUM(FET2.1.1:FET2.1.2)
FET2.1	Mandatory	Energy related	Subtotal Municipal Fleet energy consumption Energy consumption: road	kWh/a	actual quantity of energy consumed by the fleetowned by the municipalityactual quantity of energy consumed by the road	SUM(FET2.1.1:FET2.1.2)
<b>FET2.1</b> FET2.1.1	Mandatory Mandatory	Energy related	Subtotal Municipal Fleet energy consumption Energy consumption: road fleet	<b>kWh/a</b> kWh/a	actual quantity of energy consumed by the fleetowned by the municipalityactual quantity of energy consumed by the roadvehicles owned by the municipality	SUM(FET2.1.1:FET2.1.2)
FET2.1	Mandatory Mandatory	Energy related	Subtotal Municipal Fleetenergy consumptionEnergy consumption: roadfleetEnergy consumption:	<b>kWh/a</b> kWh/a	actual quantity of energy consumed by the fleetowned by the municipalityactual quantity of energy consumed by the roadvehicles owned by the municipalityactual quantity of energy consumed by other	SUM(FET2.1.1:FET2.1.2)
FET2.1.1 FET2.1.2	Mandatory Mandatory Mandatory	Energy related Energy related Energy related	Subtotal Municipal Fleetenergy consumptionEnergy consumption: roadfleetEnergy consumption:other fleet	<b>kWh/a</b> kWh/a kWh/a	actual quantity of energy consumed by the fleetowned by the municipalityactual quantity of energy consumed by the roadvehicles owned by the municipalityactual quantity of energy consumed by othertypes of vehicles owned by the municipality	SUM(FET2.1.1:FET2.1.2) -
FET2.1.1 FET2.1.1 FET2.1.2	Mandatory Mandatory Mandatory	Energy related Energy related Energy related	Subtotal Municipal Fleetenergy consumptionEnergy consumption: roadfleetEnergy consumption:other fleetSubtotal Public transport	<b>kWh/a</b> kWh/a kWh/a	<ul> <li>actual quantity of energy consumed by the fleet owned by the municipality</li> <li>actual quantity of energy consumed by the road vehicles owned by the municipality</li> <li>actual quantity of energy consumed by other types of vehicles owned by the municipality</li> <li>actual quantity of energy consumed by any type</li> </ul>	SUM(FET2.1.1:FET2.1.2) -
FET2.1.1 FET2.1.2 FET2.2	Mandatory Mandatory Mandatory Mandatory	Energy related Energy related Energy related Energy related	Subtotal Municipal Fleetenergy consumptionEnergy consumption: roadfleetEnergy consumption:other fleetSubtotal Public transportenergy consumption	kWh/a kWh/a kWh/a	actual quantity of energy consumed by the fleetowned by the municipalityactual quantity of energy consumed by the roadvehicles owned by the municipalityactual quantity of energy consumed by othertypes of vehicles owned by the municipalityactual quantity of energy consumed by othertypes of vehicles owned by the municipalityactual quantity of energy consumed by any typeof vehicles used for public passenger transport	SUM(FET2.1.1:FET2.1.2) SUM(FET2.2.1:FET2.2.4)
FET2.1 FET2.1.1 FET2.1.2 FET2.2	Mandatory Mandatory Mandatory Mandatory	Energy related Energy related Energy related Energy related	Subtotal Municipal Fleet energy consumptionEnergy consumption: road fleetEnergy consumption: other fleetSubtotal Public transport energy consumptionEnergy consumption	kWh/a kWh/a kWh/a	actual quantity of energy consumed by the fleetowned by the municipalityactual quantity of energy consumed by the roadvehicles owned by the municipalityactual quantity of energy consumed by othertypes of vehicles owned by the municipalityactual quantity of energy consumed by any typeof vehicles used for public passenger transportactual quantity of energy consumed by public	SUM(FET2.1.1:FET2.1.2) SUM(FET2.2.1:FET2.2.4)
FET2.1 FET2.1.1 FET2.1.2 FET2.2 FET2.2.1	Mandatory Mandatory Mandatory Mandatory	Energy related Energy related Energy related Energy related Energy related	Subtotal Municipal Fleetenergy consumptionEnergy consumption: roadfleetEnergy consumption:other fleetSubtotal Public transportenergy consumptionEnergy consumptionpublic road transport	kWh/a kWh/a kWh/a kWh/a	actual quantity of energy consumed by the fleetowned by the municipalityactual quantity of energy consumed by the roadvehicles owned by the municipalityactual quantity of energy consumed by othertypes of vehicles owned by the municipalityactual quantity of energy consumed by any typeof vehicles used for public passenger transportactual quantity of energy consumed by any typeof vehicles used for public passenger transportactual quantity of energy consumed by publicroad transport used for passengers	SUM(FET2.1.1:FET2.1.2) SUM(FET2.2.1:FET2.2.4) -
FET2.1.1 FET2.1.2 FET2.2 FET2.2.1	Mandatory Mandatory Mandatory Mandatory Mandatory	Energy related Energy related Energy related Energy related Energy related	Subtotal Municipal Fleet energy consumptionEnergy consumption: road fleetEnergy consumption: road fleetEnergy consumption: other fleetSubtotal Public transport energy consumptionEnergy consumption: public road transportEnergy consumption: public road transportEnergy consumption:	kWh/a kWh/a kWh/a kWh/a	actual quantity of energy consumed by the fleetowned by the municipalityactual quantity of energy consumed by the roadvehicles owned by the municipalityactual quantity of energy consumed by othertypes of vehicles owned by the municipalityactual quantity of energy consumed by any typeof vehicles used for public passenger transportactual quantity of energy consumed by publicroad transport used for passengersactual quantity of energy consumed by public rail	SUM(FET2.1.1:FET2.1.2) SUM(FET2.2.1:FET2.2.4) -
FET2.1 FET2.1.1 FET2.1.2 FET2.2 FET2.2.1 FET2.2.2	Mandatory Mandatory Mandatory Mandatory Mandatory	Energy related Energy related Energy related Energy related Energy related Energy related	Subtotal Municipal Fleetenergy consumptionEnergy consumption: roadfleetEnergy consumption:other fleetSubtotal Public transportenergy consumptionEnergy consumptionenergy consumption:public road transportEnergy consumption:public rail	kWh/a kWh/a kWh/a kWh/a kWh/a	actual quantity of energy consumed by the fleetowned by the municipalityactual quantity of energy consumed by the roadvehicles owned by the municipalityactual quantity of energy consumed by othertypes of vehicles owned by the municipalityactual quantity of energy consumed by any typeof vehicles used for public passenger transportactual quantity of energy consumed by publicroad transport used for passengersactual quantity of energy consumed by public road transport used for passengers	SUM(FET2.1.1:FET2.1.2) SUM(FET2.2.1:FET2.2.4)
FET2.1 FET2.1.1 FET2.1.2 FET2.2 FET2.2.1 FET2.2.2	Mandatory Mandatory Mandatory Mandatory Mandatory	Energy related Energy related Energy related Energy related Energy related Energy related	Subtotal Municipal Fleetenergy consumptionEnergy consumption: roadfleetEnergy consumption:other fleetSubtotal Public transportenergy consumptionEnergy consumption:public road transportEnergy consumption:public road transportEnergy consumption:public railEnergy consumption:	kWh/a kWh/a kWh/a kWh/a kWh/a	actual quantity of energy consumed by the fleet owned by the municipalityactual quantity of energy consumed by the road vehicles owned by the municipalityactual quantity of energy consumed by other types of vehicles owned by the municipalityactual quantity of energy consumed by other types of vehicles owned by the municipalityactual quantity of energy consumed by any type of vehicles used for public passenger transport actual quantity of energy consumed by public road transport used for passengersactual quantity of energy consumed by public road transport used for passengers	SUM(FET2.1.1:FET2.1.2) SUM(FET2.2.1:FET2.2.4)
FET2.1 FET2.1.1 FET2.1.2 FET2.2 FET2.2.1 FET2.2.2	Mandatory Mandatory Mandatory Mandatory Mandatory	Energy related Energy related Energy related Energy related Energy related Energy related	Subtotal Municipal Fleetenergy consumptionEnergy consumption: roadfleetEnergy consumption:other fleetSubtotal Public transportenergy consumptionEnergy consumptionEnergy consumption:public road transportEnergy consumption:public railEnergy consumption:public local and domestic	kWh/a kWh/a kWh/a kWh/a kWh/a	actual quantity of energy consumed by the fleetowned by the municipalityactual quantity of energy consumed by the roadvehicles owned by the municipalityactual quantity of energy consumed by othertypes of vehicles owned by the municipalityactual quantity of energy consumed by any typeof vehicles used for public passenger transportactual quantity of energy consumed by publicroad transport used for passengersactual quantity of energy consumed by public railtransport used for passengersactual quantity of energy consumed by public railtransport used for passengersactual quantity of energy consumed by public railtransport used for passengersactual quantity of energy consumed by public	SUM(FET2.1.1:FET2.1.2) SUM(FET2.2.1:FET2.2.4)

			Energy consumption:			
			other public transport		actual quantity of energy consumed by any other	
FET2.2.4	Mandatory	Energy related	categories	kWh/a	public transport used for passengers	-
			Subtotal Private and			
			commercial transport		actual quantity of energy consumed by private	
FET2.3	Mandatory	Energy related	energy consumption	kWh/a	vehicles used for transport of persons and goods	SUM(FET2.3.1:FET2.3.5)
			Energy consumption:		actual quantity of energy consumed by private	
FET2.3.1	Mandatory	Energy related	private road transport	kWh/a	road transport	-
			Energy consumption:		actual quantity of energy consumed by private	
FET2.3.2	Mandatory	Energy related	private rail	kWh/a	rail transport used	-
			Energy consumption:			
			private local and domestic		actual quantity of energy consumed by private	
FET2.3.3	Mandatory	Energy related	waterways	kWh/a	waterways transport	-
			Energy consumption:		actual quantity of energy consumed by private	
FET2.3.4	Mandatory	Energy related	private local aviation	kWh/a	aviation transport	-
			Energy consumption:			
			other private transport		actual quantity of energy consumed by any other	
FET2.3.5	Mandatory	Energy related	categories	kWh/a	private transport	-
			Energy consumption:		actual quantity of energy consumed by any	
FET2.4	Mandatory	Energy related	Other type of transport	kWh/a	other types of transport	-
			Subtotal other sectors		actual quantity of energy consumed by private	
FET3.1	Mandatory	Energy related	energy consumption	kWh/a	vehicles used for transport of persons and goods	SUM(FET3.1.1:FET3.1.2)
			Agriculture, Forestry,		actual quantity of energy consumed by	
FET3.1.1	Mandatory	Energy related	Fisheries	kWh/a	agricultural, forestry and fisheries sectors	-
					actual quantity of energy consumed by other	
FET3.1.2	Mandatory	Energy related	Other not allocated	kWh/a	sectors	-
			Total district primary		total actual quantity of energy consumed within	
PET0	Mandatory	Energy related	energy consumption	kWh/a	the district	FETO x PEF
			Total primary energy			
			consumption: buildings,			
			equipment/facilities and		total actual quantity of energy consumed by	
PET1	Mandatory	Energy related	industries	kWh/a	buildings, equipment/facilities and industries	FET1 x PEF

5.573		<b>-</b>	Total primary energy		total actual quantity of energy consumed by	5570 055
PET2	Mandatory	Energy related	consumption: transport	kWh/a	transport	FEI2 X PEF
			Total primary energy			
			consumption: other		total actual quantity of energy consumed by	
PET3	Mandatory	Energy related	sectors	kWh/a	other sectors	FET3 x PEF
					actual quantity of energy generated from	
RESO	Mandatory	Energy related	RES generation	kWh/a	renewables	SUM(RES1:RES5)
			Local electricity			
RES1	Mandatory	Energy related	production: wind	kWh/a	renewable wind energy generated in the district	-
			Local electricity		renewable hydroelectric energy generated in the	
RES2	Mandatory	Energy related	production: hydroelectric	kWh/a	district	-
			Local electricity		renewable photovoltaic energy generated in the	
RES3	Mandatory	Energy related	production: photovoltaics	kWh/a	district	-
			Local electricity		renewable geothermal energy generated in the	
RES4	Mandatory	Energy related	production: geothermal	kWh/a	district	-
			Local electricity		other types of renewable energy generated in	
RES5	Mandatory	Energy related	production: other	kWh/a	the district	-
			Degree of energetic self-		percent of final energy consumption provided	
SS	Mandatory	Energy related	supply by RES	%	by renewable energy generated on-site	RESO/FETO
						SUM( (depends on
						how we define sub-
			Total amount of			categories for FETs).
		Environment	Greenhouse Gas			This indicator is
GHG0	Mandatory	related	Emissions	tCO2eq/a	-	supposed to have
	· ·					consumption of energy
						(from FET indicators) x
						multiplied with the
						corresponding emission
						factor from the next
						sheet.
						Option 2: we can
						define separate NFW

						indicators for the 30 sub-categories in the
						next sheet, whithout
						their correspondence
						to FEIS, but this should
A1	Optional	Acceptance*	People reached	no.	percentage of people from P2 directly impacted by the initiatives to support PED (e.g.: triggered investments and created jobs, or reduction of energy bills per household)	
A2	Optional	Acceptance*	Rate of people reached	%	percentage of population of focus district directly impacted by the initiatives to support PED	A1/P2
A2	Optional	Acceptance*	Success rate	%	success rate of the project (according to internal KPIs set up by the user)	
E1	Mandatory	Economic	Money spent	€	total investment of initiatives to facilitate PED	-
E2	Optional	Economic	Return on investment	years	no. of years in which E2 is depreciated	-
		Overall Indicator (RES)	PED / PEN achievement rate for rewable energy	%	<b>Condition:</b> RES is achieved when SS is <b>Representation:</b> This should be represented as g progress against P0.3 (which is considered to be met, the gauge-diagram should b	at least 100 auge-diagram, showing 0%). When condition is 100%.
		Overall Indicator (GHG)	PED / PEN achievement rate for GHg emissions	%	<b>Condition:</b> GHG is achieved when GHG <b>Representation:</b> This should be represented as g progress against P0.4 (which is considered to be met, the gauge-diagram should b	60 is at least 0 auge-diagram, showing 0%). When condition is the 100%.
		Overall Indicator (OI)	PED / PEN achievement rate	%	Condition: OI is achieved when both condtions achieved Representation: This should be represented as ga condition for RES achievemnt and GHG	s for RES and GHG are auge-diagram, average of achievement

# 4.2. Emission factors used

Subcategories for FET indicators	Emission factors*
Electricity	EF1 - to be introduced by user
Locally produced Heat/cold	EF2 - to be introduced by user
Natural gas	0.202
Liquefied Petroleum Gases	0.227
Natural Gas Liquids	0.232
Gas/diesel oil	0.268
Gas/diesel oil	0.268
Motor gasoline	0.250
Lignite	0.365
Anthracite	0.355
Other Bituminous Coal	0.342
Sub-Bituminous Coal	0.348
Peat	0.383
Municipal Wastes	0.337
(non-biomass fraction)	0.337
Other liquid biofuels from sustainable sources	0.001
Other liquid biofuels from non-sustainable sources	0.287
Bio-gasoline from sustainable sources	0.001
Bio-gasoline from non-sustainable sources	0.256
Biodiesel from sustainable sources	0.001
Biodiesel from non-sustainable sources	0.256
Wood / wood waste from sustainable sources	0.007
Wood / wood waste from non-sustainable sources	0.410
Municipal wastes	0.007
(biomass fraction) from sustainable sources	0.007
Municipal wastes	0.367
(biomass fraction) from non-sustainable sources	
Other primary solid biomass from sustainable sources	0.007
Other primary solid biomass from non-sustainable sources	0.367
Biogas from sustainable sources	0.000
Biogas from non-sustainable sources	0.197
Solar thermal	0.000
Geothermal	0.000

# \* Covenant of Mayors approved emission factors from IPCC (update 2024) - measured in tons of CO2-eq/MWh

