



## **Deliverable D2.2**

### **Local heating and cooling demand, setting the baseline**



### **Supporting South Europe municipalities in the definition of Sustainable Local Heating and Cooling Plans**

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**AMBIT:** AMBIENTE ITALIA SRL

**FEDARENE:** FEDERATION EUROPEENNE DES AGENCES ET DES REGIONS POUR L'ENERGIE ET L'ENVIRONNEMENT

**R2M:** R2M SOLUTION SRL

**INOVA+:** INNOVATION SERVICES, SA

**APE FVG:** AGENZIA PER L ENERGIA DEL FRIULI VENEZIA GIULIA

**AREAM:** AGENCIA REGIONAL DA ENERGIA E AMBIENTE DA REGIAO AUTONOMA DA MADEIRA

**PTA CM:** REGIONAL DEVELOPMENT FUND OF CENTRAL MACEDONIA

**CRES:** CENTRE FOR RENEWABLE ENERGY SOURCES AND SAVING FONDATION

**SVI.MED.:** CENTRO EUROMEDITERRANEO PER LO SVILUPPO SOSTENIBILE - ETS

**FAEN:** FUNDACION ASTURIANA DE LA ENERGIA

**CA:** CLIMATE ALLIANCE - KLIMA-BUENDNIS -ALIANZA DEL CLIMA e.V.

**REA KVARNER:** REGIONALNA ENERGETSKA AGENCIJA KVARNER

**ENA:** AGENCIA DE ENERGIA E AMBIENTE DA ARRABIDA

**TUC:** POLYTECHNEIO KRITIS



## ABBREVIATION AND ACRONYMS

**Plan4COLD** - Supporting South Europe municipalities in the definition of Sustainable Local Heating and Cooling Plans

**RED:** Renewable Energy Directive

**RES:** Renewable Energy Sources

**DHC:** District Heating and Cooling

**DHW:** Domestic Hot Water

**H&C:** Heating and Cooling

**RH&C:** Renewable Heating and Cooling

**SE&R:** Sustainability, Exploitation and Replication

**MS:** Member State

**COP:** Community of Practice

**EAB:** European Advisory Board

**EE:** Energy Efficiency

**GHG:** Greenhouse Gases

**KPI:** Key Performance Indicator

**RESHC:** Renewable Energy Sources for Heating and Cooling

**NGO:** Non-Governmental Organizations



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# 1. INTRODUCTION

In task 2.2 the framework of existing and reachable available data and information regarding H&C energy needs and energy demand, in each beneficiary municipality, has been defined and evaluated, so that suitable methodologies and tools for H&C plans development can be prepared and customized in T2.3 and T3.2

More in detail, the following activities have been implemented following 3 main steps:

## Step 1

The main categories and types of data concerning H&C energy needs and energy demand in each beneficiary municipality has been investigated, among which at least the following:

- Weather (Temperatures, rain, Heat waves, Tropical nights, Urban heat islands effects, etc.)
- Final consumptions of fuels and energy sources for H&C
  - Fossil fuels (*natural gas, LPG, heating oil, etc.*)
  - Renewables (*solar thermal, geothermal, biomasses, waste heat, etc.*)
  - Electricity
  - Heat/cool from district networks
- H&C final uses and market
  - H&C plants, devices, equipment features (*type, age, capacity, efficiency class, level of diffusion, etc.*)
  - Building stock features (*use, age, structures, energy class, etc.*)
  - Building energy certificates
  - Energy upgrading interventions (*type, trends, etc.*)

## Step 2

For each data category and type of data investigated, at least the following items have been detected and verified

- Source/s
- Type (census, cadastre, database, statistical release, market analysis, etc.)
- Responsible body
- Availability and accessibility
  - Who can access (*everybody, only Public Body/LAs, only technicians/researchers, etc.*)
  - Way of access (*through portal/website, upon written/email request, etc.*)
  - Type of access (*for free, upon entrance fee, upon registration, etc.*)
- Data format (xls, doc. html. dbf, etc.)
- Geographical scale
  - National
  - Regional
  - Intermunicipal/county
  - Municipal
  - Sub-municipal (*e.g. district or other spatial zoning*)



- Aggregation level
  - Sector (e.g. residential, tertiary, industry, etc.)
  - Sub-sector (e.g. public buildings, social housing, hotels, trade centres, etc.)
  - Final use (e.g. heating, cooling, hot water, freezing, industrial processes, etc.)
- Frequency
  - Yearly
  - Monthly
  - Daily
  - Hourly

### Step 3

The quality of data and information investigated in steps 1 and 2 have then be assessed, identifying main gaps and unevenness, if any, along with obstacles to their collection and organisation.

For each category and type of data a specific factsheet has been filled in, including all the necessary information. Factsheets have been then collected in for each project country (Portugal, Italy and Greece), according to the data sources level (national and/or regional and/or municipal) and compiled in Part A of this deliverable D2.2.

As such, this work is a work in progress, because factsheets will be updated, integrated and complemented throughout the project, so as to finally define a comprehensive framework of available data and information sources regarding H&C energy needs and energy demand in the project countries.

Furthermore, in Task 2.2 actors and key stakeholders from the local H&C chain in each project pilot municipality have been reached, scouted and consulted with the aim to:

- Complement the context analysis and the H&C data assessment
- Detect the level of awareness and know-how with respect to climate change, energy transitions and H&C decarbonization issues
- Detect the potential interest, role and contribution in a H&C planning process
- Select future members of the Community of Practice, to be set up in T4.2.

Intensive consultation activities have been carried out in the 17 project pilot municipalities, in various ways (i.e. by phone interview, in-person meeting, online forms, working tables, etc.) based on the items and issues proposed below, revising, integrating or adapting them according to specific local peculiarities and needs and to the type of actors to be involved.

- *Level of awareness and know-how on climate change, energy transitions and H&C decarbonization issues*
- *Awareness on the effect of climate change at the local level*
- *Sectors/fields with main critical energy issues and/or energy emergencies at the local level*
- *More urgent interventions to overcome energy emergencies and criticisms at the local level*



- *Relevance of H&C for the belonging sector, association, company, etc. and more urgent interventions needed in the field.*
- *Main obstacles for promoting and implementing energy measures and interventions at the local level*
  - *lack of financial resources*
  - *unsuitable regulations/permitting procedures*
  - *unsuitable incentive schemes/supporting mechanisms*
  - *lack of know-how and technical expertise*
  - *lack of data and information*
  - *lack of cooperation and coordination*
- *Main obstacles for implementing energy measures/interventions in the belonging sector, company, association, etc.*
- *Main barriers and challenges for developing energy transition strategies and H&C plans*
- *Main actors/stakeholders to involve and coordinate with for the development and implementation of energy transition strategies and H&C plans*
- *Possible contribution/role of the belonging sector, company, associations in the development of energy transition strategies and H&C plans*
- *Relevant experiences, best practices and projects related to energy transition and the H&C sector*

Most of the activities with stakeholders have been planned and implemented according to a “joint approach” based on cooperation between municipalities from a same area or region. The conclusions of these activities are described in detail in Part B of this document.



# PART A

## H&C DATA ASSESSMENT





# D2.2

## H&C DATA ASSESSMENT

### GREECE





**NGO:** Non-Governmental Organizations

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## 1. INTRODUCTION

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For each category and type of data a specific factsheet has been filled in, including all the necessary information.

In the following, factsheets have been then collected for Greece, according to the data sources level (national and/or regional and/or municipal).





## 2. MUNICIPALITY OF THERMI

### 2.1 Weather

<b>Municipality:</b>	Thermi
<b>Category of data:</b>	Climatic
<b>Type of data</b>	Tmin, Tmax, Tave, HDD, CDH
<b>Source</b>	Hellenic National Meteorological Service, Technical Directives of Technical Chamber of Greece
<b>Type of source</b>	Statistical release
<b>Source responsible body</b>	HNMS, TCoG
<b>Source contact person</b>	None
<b>Availability and accessibility</b>	<b>Who can access:</b> everybody
	<b>Way of access:</b> through portal/website
	<b>Type of access:</b> for free
	Data format: xls, pdf
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• National</li> <li>• Regional</li> <li>• Intermunicipal/county</li> <li>• Municipal</li> </ul>
<b>Aggregation level</b>	Other (territorial unit)
<b>Frequency</b>	Yearly

#### Quality of data

The data are entirely reliable as they are provided for free by the HNMS on their official website. Technical Chamber of Greece has also included meteorological data into its Technical Directive "T.O.T.E.E. 20701-3/2010" established in 2014.

In addition, HNMS also provides climate data in standardised tables, at the request of citizens, businesses or institutions.

Technical Chamber of Greece, is planning to re-publish the current directive for the climate data, updating the climate data including the HDD & CDH.



<b>Municipality:</b>	Thermi
<b>Category of data:</b>	Climate & Climate Forecasts
<b>Type of data</b>	Heat Waves, Cold Invasions – Frost, Drought – Rainfalls, Intent Rainfall, HDD, CDH, Resilience to Climate Change
<b>Source</b>	Regional Climate Change Adaptation Plan
<b>Type of source</b>	<ul style="list-style-type: none"> <li>• Database</li> <li>• Statistical release</li> </ul>
<b>Source responsible body</b>	Region of Central Macedonia
<b>Source contact person</b>	Dimitrios Vlachos
<b>Availability and accessibility</b>	Who can access: only Public Body/Las, only technicians/researchers
	Way of access: upon written/email request
	Type of access: free
	Data format: pdf
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Regional</li> <li>• Intermunicipal/county</li> <li>• Municipal</li> </ul>
<b>Aggregation level</b>	Other (territorial unit)
<b>Frequency</b>	Yearly
<b>Quality of data</b>	
In the Regional Climate Change Adaptation Plan, published in November 2021, the municipalities of the Region of Central Macedonia are assessed based on their vulnerability to climate change. More specifically, the plan includes forecasts; predicting an increase in the frequency of these conditions.	

## 2.2 Final energy consumption and sources for H&C

### 2.2.1 Heating oil consumption (for H&C)

Analysis of heating oil consumption is limited for the public sector until now. Invoices as described below, may provide a clearer and latest picture in comparison with SEAP.



<b>Municipality:</b>	Thermi
<b>Category of data:</b>	Energy consumption
<b>Type of data</b>	pdf
<b>Source</b>	Municipal financial services
<b>Type of source</b>	Invoices
<b>Source responsible body</b>	Municipality of Thermi
<b>Source contact person</b>	Polyzos Christos
<b>Availability and accessibility</b>	Who can access: only Public Body/LAs
	Way of access: upon written/email request
	Type of access: free
	Data format: pdf
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> <li>• Sub-municipal (e.g. district or other spatial zoning)</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sub-sector (public buildings.)</li> <li>• By final use (heating, cooling, hot water, freezing, industrial processes, etc.)</li> </ul>
<b>Frequency</b>	Yearly

<b>Quality of data</b>
Through the invoices of the municipal financial services and through Municipal Committee for Primary and Secondary Education the data for all the school buildings in details, the energy data can be collected.

### 2.2.2 Natural Gas consumption (for H&C)

On a next step these data can be provided with a letter to Gas Distribution Company of Thessaloniki (EDA THESS) but until now all the available data is from SEAP for public buildings.

<b>Municipality:</b>	Thermi
<b>Category of data:</b>	Energy consumption
<b>Type of data</b>	.xls
<b>Source</b>	Sustainable Energy Action Plan (SEAP)
<b>Type of source</b>	Database



<b>Source responsible body</b>	Municipality of Thermi
<b>Source contact person</b>	Polyzos Christos
<b>Availability and accessibility</b>	Who can access by everybody
	Way of access: through portal/website
	Type of access: free
	Data format: pdf
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sub-sector (public buildings)</li> </ul>
<b>Frequency</b>	Yearly

<b>Quality of data</b>
The SEAP of the Municipality of Thermi has not been updated to a SECAP. It is based on the year 2019, which we have designated as the reference year. The SEAP presents both energy consumption and carbon dioxide emissions. However, data is limited only to municipal buildings.

### 2.2.3 Electricity consumption (for H&C)

Analysis of electricity consumption for all the sectors, subsectors and final use. Baseline the year 2019 until now.

<b>Municipality:</b>	Thermi
<b>Category of data:</b>	Energy consumption
<b>Type of data</b>	.xls,
<b>Source</b>	Hellenic Electricity Distribution Network Operator (HEDNO)
<b>Type of source</b>	Database-Excel
<b>Source responsible body</b>	Municipality of Thermi
<b>Source contact person</b>	Polyzos Christos
<b>Availability and accessibility</b>	Who can access: only Public Body/LAs
	Way of access: upon written/email request
	Type of access: upon entrance fee
	Data format: xls
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> </ul>



<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector (residential and service buildings, tertiary)</li> <li>• By sub-sector (public buildings, commercial, hotels, trade centres, entertainment centers)</li> <li>• By final use (heating, cooling and hot water)</li> </ul>
<b>Frequency</b>	Yearly

<b>Quality of data</b>
The electricity data refers to the period starting from 2019 and beyond. There will be a breakdown of the data (number of buildings, building area, electricity consumption) by aggregation level.

## 2.2.4 Photovoltaics

<b>Municipality:</b>	Thermi
<b>Category of data:</b>	Energy production
<b>Type of data</b>	.pdf
<b>Source</b>	Independent Power Transmission Operator (IPTO)
<b>Type of source</b>	Database
<b>Source responsible body</b>	Municipality of Thermi
<b>Source contact person</b>	Polyzos Christos
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• only Public Body/LAs</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• upon written/email request</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• for free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• pbf</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> <li>• Sub-municipal (e.g. district or other spatial zoning)</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector (residential and service buildings, tertiary)</li> <li>• By sub-sector (public buildings, commercial, hotels, trade centres, entertainment centers)</li> <li>• By final use (heating, cooling and hot water)</li> </ul>
<b>Frequency</b>	Yearly



Quality of data
IPTO can provide information on the total installed capacity (kWp), total energy produced (kWh), type of connection (e.g. rooftop PV systems, standalone solar parks), municipal community, ownership status (public or private), and a breakdown by building category, specifically for rooftop PV systems.

### 2.2.5 Heat pumps

Statistical analysis - 2021 Population and Housing Census of ELSTAT for normal, occupied and vacant dwellings.

<b>Municipality:</b>	Thermi
<b>Category of data:</b>	Energy production
<b>Type of data</b>	.pdf
<b>Source</b>	Hellenic Statistical Authority
<b>Type of source</b>	Database-excel
<b>Source responsible body</b>	ELSTAT
<b>Source contact person</b>	none
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• everybody</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• website</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• for free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• pbf</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> <li>• Sub-municipal (e.g. district or other spatial zoning)</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector (residential and service buildings, tertiary)</li> <li>• By sub-sector (public buildings, commercial, hotels, trade centres, entertainment centers)</li> <li>• By final use (cooling)</li> </ul>
<b>Frequency</b>	Yearly

Quality of data
-----------------



Excel data are separate for cooling but no data for heating.

### 2.2.6 Bioenergy / Biogas

Waiting for detailed data collection from IPTO.

<b>Municipality:</b>	Thermi
<b>Category of data:</b>	Energy production
<b>Type of data</b>	.pdf
<b>Source</b>	Independent Power Transmission Operator (IPTO)
<b>Type of source</b>	Database
<b>Source responsible body</b>	Municipality of Thermi
<b>Source contact person</b>	Polyzos Christos
<b>Availability and accessibility</b>	Who can access: only Public Body/LAs
	Way of access: upon written/email request
	Type of access <ul style="list-style-type: none"> <li>• for free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• pbf</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> <li>• Sub-municipal (e.g. district or other spatial zoning)</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector (residential and service buildings, tertiary)</li> <li>• By sub-sector (public buildings, commercial, hotels, trade centres, entertainment centers)</li> <li>• By final use (heating, cooling and hot water)</li> </ul>
<b>Frequency</b>	Yearly
<b>Quality of data</b>	
IPTO can provide information on the total installed capacity (kWp), total energy produced (kWh), type of connection (e.g. rooftop PV systems, standalone solar parks), municipal community, ownership status (public or private), and a breakdown by building category.	



## 2.2.7 Wind

Waiting for detailed data collection from IPTO.

<b>Municipality:</b>	Thermi
<b>Category of data:</b>	Energy production
<b>Type of data</b>	.pdf
<b>Source</b>	Independent Power Transmission Operator (IPTO)
<b>Type of source</b>	Database
<b>Source responsible body</b>	Municipality of Thermi
<b>Source contact person</b>	Polyzos Christos
<b>Availability and accessibility</b>	Who can access: only Public Body/LAs
	Way of access: upon written/email request
	Type of access: for free
	Data format: pdf
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> <li>• Sub-municipal (e.g. district or other spatial zoning)</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector (residential and service buildings, tertiary)</li> <li>• By sub-sector (public buildings, commercial, hotels, trade centres, entertainment centers)</li> <li>• By final use (heating, cooling and hot water)</li> </ul>
<b>Frequency</b>	Yearly
<b>Quality of data</b>	
IPTO can provide information on the total installed capacity (kWp), total energy produced (kWh), type of connection (e.g. rooftop PV systems, standalone solar parks), municipal community, ownership status (public or private), and a breakdown by building category.	



## 2.2.8 Geothermal energy

Waiting for detailed data collection from IPTO.

<b>Municipality:</b>	Thermi
<b>Category of data:</b>	Energy production
<b>Type of data</b>	.pdf
<b>Source</b>	Independent Power Transmission Operator (IPTO)
<b>Type of source</b>	Database
<b>Source responsible body</b>	Municipality of Thermi
<b>Source contact person</b>	Polyzos Christos
<b>Availability and accessibility</b>	Who can access: only Public Body/LAs
	Way of access: upon written/email request
	Type of access: free
	Data format: pdf
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> <li>• Sub-municipal (e.g. district or other spatial zoning)</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector (residential and service buildings, tertiary)</li> <li>• By sub-sector (public buildings, commercial, hotels, trade centres, entertainment centers)</li> <li>• By final use (heating, cooling and hot water)</li> </ul>
<b>Frequency</b>	Yearly
<b>Quality of data</b>	
IPTO can provide information on the total installed capacity (kWp), total energy produced (kWh), type of connection, municipal community, ownership status (public or private), and a breakdown by building category.	



## 2.3 H&C final uses and market

### 2.3.1 Building stock

<b>Municipality:</b>	Thermi
<b>Category of data:</b>	Buildings
<b>Type of data</b>	.pdf
<b>Source</b>	Sustainable Energy Action Plan (SEAP)
<b>Type of source</b>	SEAP
<b>Source responsible body</b>	Municipality of Thermi
<b>Source contact person</b>	Polyzos Christos
<b>Availability and accessibility</b>	Who can access Census: everybody
	Way of access: through portal/website
	Type of access: free
	Data format: excel, pdf
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• National</li> <li>• Regional</li> <li>• Municipal</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector (e.g. residential, tertiary, industry, etc.)</li> <li>• By sub-sector (e.g. public buildings, social housing, hotels, trade centres, etc.)</li> </ul>
<b>Frequency</b>	Yearly
<b>Quality of data</b>	
The data of SEAP is not up to date and the data for the buildings is limited because the source is SEAP and not SEAK (Building Energy Performance Plan).	



### 2.3.2 Heating and cooling equipment

Source of heating and cooling equipment for residential dwellings.

<b>Municipality:</b>	Thermi
<b>Category of data:</b>	Devices and equipment
<b>Type of data</b>	.pdf
<b>Source</b>	Hellenic Statistical Authority (ELSTAT)
<b>Type of source</b>	Excel
<b>Source responsible body</b>	Municipality of Thermi
<b>Source contact person</b>	Polyzos Christos
<b>Availability and accessibility</b>	Who can access Census: everybody
	Way of access: through portal/website
	Type of access: free
	Data format: pdf
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector (only residential)</li> </ul>
<b>Frequency</b>	Yearly
<b>Quality of data</b>	
Type of energy used in the 2019 Building Census.	



## 3. MUNICIPALITY OF AMPELOKIPI-MENEMENI

### 3.1 Weather

<b>Municipality:</b>	Ampelokipi-Menemeni
<b>Category of data:</b>	Climatic
<b>Type of data</b>	Tmin, Tmax, Tave, Heating Degree Days HDD, Cooling Degree Hours CDH
<b>Source</b>	Hellenic National Meteorological Service, Technical Directives of Technical Chamber of Greece
<b>Type of source</b>	Statistical release
<b>Source responsible body</b>	HNMS, TCoG
<b>Source contact person</b>	None
<b>Availability and accessibility</b>	Who can access everybody
	Way of access: through portal/website
	Type of access: free
	Data format: xls, pdf
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• National</li> <li>• Regional</li> <li>• Intermunicipal/county</li> <li>• Municipal</li> </ul>
<b>Aggregation level</b>	Other (territorial unit)
<b>Frequency</b>	Yearly
<b>Quality of data</b>	
<p>The data are entirely reliable as they are provided for free by the HNMS on their official website. Technical Chamber of Greece has also included meteorological data into its Technical Directive “T.O.T.E.E. 20701-3/2010” established in 2014.</p> <p>In addition, HNMS also provides climate data in standardised tables, at the request of citizens, businesses or institutions.</p> <p>Technical Chamber of Greece, is planning to re-publish the current directive for the climate data, updating the climate data including the HDD &amp; CDH.</p>	



<b>Municipality:</b>	Ampelokipi-Menemeni
<b>Category of data:</b>	Climate & Climate Forecasts
<b>Type of data</b>	Heat Waves, Cold Invasions – Frost, Drought – Rainfalls, Intent Rainfall, HDD, CDH, Resilience to Climate Change
<b>Source</b>	Regional Climate Change Adaptation Plan
<b>Type of source</b>	<ul style="list-style-type: none"> <li>• Database</li> <li>• • Statistical release</li> </ul>
<b>Source responsible body</b>	Region of Central Macedonia
<b>Source contact person</b>	Dimitrios Vlachos
<b>Availability and accessibility</b>	Who can access only Public Body/Las, only technicians/researchers
	Way of access: upon written/email request
	Type of access: for free
	Data format: pdf
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Regional</li> <li>• Intermunicipal/county</li> <li>• Municipal</li> </ul>
<b>Aggregation level</b>	Other (territorial unit)
<b>Frequency</b>	Yearly

<b>Quality of data</b>
In the Regional Climate Change Adaptation Plan, published in November 2021, the municipalities of the Region of Central Macedonia are assessed based on their vulnerability to climate change. More specifically, the plan includes forecasts; predicting an increase in the frequency of these conditions.

## 3.2 Final energy consumption and sources for H&C

### 3.2.1 Heating oil consumption (for H&C)

Analysis of heating oil consumption is limited for the public sector until now. Invoices as described below, may provide a clearer and latest picture in comparison with SEAP.

<b>Municipality:</b>	Ampelokipi-Menemeni
<b>Category of data:</b>	Energy consumption
<b>Type of data</b>	.pdf



<b>Source</b>	Municipal financial services
<b>Type of source</b>	Invoices
<b>Source responsible body</b>	Municipality of Thermi
<b>Source contact person</b>	Athanasios Papageorgiou
<b>Availability and accessibility</b>	Who can access: only Public Body/LAs
	Way of access: upon written/email request
	Type of access: free
	Data format: pdf
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> <li>• Sub-municipal (e.g. district or other spatial zoning)</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sub-sector (public buildings.)</li> <li>• By final use (heating, cooling, hot water, freezing, industrial processes, etc.)</li> </ul>
<b>Frequency</b>	Yearly
<b>Quality of data</b>	
Through the invoices of the municipal financial services and through Municipal Committee for Primary and Secondary Education data for all the school buildings in detail, the energy data can be collected.	



### 3.2.2 Natural Gas consumption (for H&C)

On a next step these data can be provided with a letter to Gas Distribution Company of Thessaloniki (EDA THESS) but until now all the available data is from SEAP for public buildings.

<b>Municipality:</b>	Ampelokipi-Menemeni
<b>Category of data:</b>	Energy consumption
<b>Type of data</b>	.xls
<b>Source</b>	Sustainable Energy and Climate Action Plan (SECAP)
<b>Type of source</b>	Database
<b>Source responsible body</b>	Municipality of Ampelokipi-Menemeni
<b>Source contact person</b>	Papageorgiou Athanasios
<b>Availability and accessibility</b>	Who can access: by everybody
	Way of access: through portal/website
	Type of access: free
	Data format .pdf
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sub-sector (public buildings)</li> </ul>
<b>Frequency</b>	Yearly
<b>Quality of data</b>	
The SECAP of the Municipality of Ampelokipi-Menemeni is updated. It is based on the latest year 2024. Data is limited only to municipal buildings.	

### 3.2.3 Electricity consumption (for H&C)

Analysis of electricity consumption for all the sectors, subsectors and final use. Baseline the year 2019 until now.

<b>Municipality:</b>	Ampelokipi-Menemeni
<b>Category of data:</b>	Energy consumption
<b>Type of data</b>	.xls,
<b>Source</b>	Hellenic Electricity Distribution Network Operator (HEDNO)
<b>Type of source</b>	Database-Excel



<b>Source responsible body</b>	Municipality of Ampelokipi-Menemeni
<b>Source contact person</b>	Papageorgiou Athanasios
<b>Availability and accessibility</b>	Who can access: only Public Body/LAs
	Way of access: upon written/email request
	Type of access: upon entrance fee
	Data format: xls
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector (residential and service buildings, tertiary)</li> <li>• By sub-sector (public buildings, commercial, hotels, trade centres, entertainment centers)</li> <li>• By final use (heating, cooling and hot water)</li> </ul>
<b>Frequency</b>	Yearly

<b>Quality of data</b>
The electricity data refers to the period starting from 2019 and beyond. There will be a breakdown of the data (number of buildings, building area, electricity consumption) by aggregation level.

### 3.2.4 Photovoltaics

<b>Municipality:</b>	Ampelokipi-Menemeni
<b>Category of data:</b>	Energy production
<b>Type of data</b>	.pdf
<b>Source</b>	Independent Power Transmission Operator (IPTO)
<b>Type of source</b>	Database
<b>Source responsible body</b>	Municipality of Ampelokipi-Menemeni
<b>Source contact person</b>	Papageorgiou Athanasios
<b>Availability and accessibility</b>	<ul style="list-style-type: none"> <li>• Who can access: only Public Body/LAs</li> </ul>
	<ul style="list-style-type: none"> <li>• Way of access: upon written/email request</li> </ul>
	<ul style="list-style-type: none"> <li>• Type of access: for free</li> </ul>
	<ul style="list-style-type: none"> <li>• Data format: pdf</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> <li>• Sub-municipal (e.g. district or other spatial zoning)</li> </ul>



<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector (residential and service buildings, tertiary)</li> <li>• By sub-sector (public buildings, commercial, hotels, trade centres, entertainment centers)</li> <li>• By final use (heating, cooling and hot water)</li> </ul>
<b>Frequency</b>	Yearly

<b>Quality of data</b>
IPTO can provide information on the total installed capacity (kWp), total energy produced (kWh), type of connection (e.g. rooftop PV systems, standalone solar parks), municipal community, ownership status (public or private), and a breakdown by building category, specifically for rooftop PV systems.

### 3.2.5 Heat pumps

Statistical analysis - 2021 Population and Housing Census of ELSTAT for normal, occupied and vacant dwellings.

<b>Municipality:</b>	Ampelokipi-Menemeni
<b>Category of data:</b>	Energy production

<b>Type of data</b>	.pdf
<b>Source</b>	Hellenic Statistical Authority
<b>Type of source</b>	Database-excel
<b>Source responsible body</b>	ELSTAT
<b>Source contact person</b>	none
<b>Availability and accessibility</b>	Who can access: everybody
	<ul style="list-style-type: none"> <li>• Way of access: website</li> <li>• Type of access: for free</li> </ul>
	<ul style="list-style-type: none"> <li>• Data format: pdf</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> <li>• Sub-municipal (e.g. district or other spatial zoning)</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector (residential and service buildings, tertiary)</li> <li>• By sub-sector (public buildings, commercial, hotels, trade centres, entertainment centers)</li> <li>• By final use (cooling)</li> </ul>
<b>Frequency</b>	Yearly

<b>Quality of data</b>
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Excel data are separate for cooling but no data available for heating.

### 3.2.6 Bioenergy / Biogas

<b>Municipality:</b>	Ampelokipi-Menemeni
<b>Category of data:</b>	Energy production
<b>Type of data</b>	.pdf
<b>Source</b>	Independent Power Transmission Operator (IPTO)
<b>Type of source</b>	Database
<b>Source responsible body</b>	Municipality of Ampelokipi-Menemeni
<b>Source contact person</b>	Papageorgiou Athanasios
<b>Availability and accessibility</b>	Who can access: only Public Body/LAs
	Way of access: upon written/email request
	<ul style="list-style-type: none"> <li>• Type of access: free</li> <li>• Data format: pdf</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> <li>• Sub-municipal (e.g. district or other spatial zoning)</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector (residential and service buildings, tertiary)</li> <li>• By sub-sector (public buildings, commercial, hotels, trade centres, entertainment centers)</li> </ul> By final use (heating, cooling and hot water)
<b>Frequency</b>	Yearly

#### Quality of data

IPTO can provide information on the total installed capacity (kWp), total energy produced (kWh), type of connection (e.g. rooftop PV systems, standalone solar parks), municipal community, ownership status (public or private), and a breakdown by building category.

### 3.2.7 Wind

Waiting for detailed data collection from IPTO.

<b>Municipality:</b>	Ampelokipi-Menemeni
<b>Category of data:</b>	Energy production



<b>Type of data</b>	.pdf
<b>Source</b>	Independent Power Transmission Operator (IPTO)
<b>Type of source</b>	Database
<b>Source responsible body</b>	Municipality of Ampelokipi-Menemeni
<b>Source contact person</b>	Papageorgiou Athanasios
<b>Availability and accessibility</b>	Who can access: only Public Body/LAs
	Way of access: upon written/email request
	Type of access: for free
	Data format: pdf
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> <li>• Sub-municipal (e.g. district or other spatial zoning)</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector (residential and service buildings, tertiary)</li> <li>• By sub-sector (public buildings, commercial, hotels, trade centres, entertainment centers)</li> </ul> By final use (heating, cooling and hot water)
<b>Frequency</b>	Yearly

<b>Quality of data</b>
IPTO can provide information on the total installed capacity (kWp), total energy produced (kWh), type of connection (e.g. rooftop PV systems, standalone solar parks), municipal community, ownership status (public or private), and a breakdown by building category.

### 3.2.8 Geothermal energy

Waiting for detailed data collection from IPTO.

<b>Municipality:</b>	Ampelokipi-Menemeni
<b>Category of data:</b>	Energy production
<b>Type of data</b>	.pdf
<b>Source</b>	Independent Power Transmission Operator (IPTO)
<b>Type of source</b>	Database
<b>Source responsible body</b>	Municipality of Ampelokipi-Menemeni
<b>Source contact person</b>	Papageorgiou Athanasios
	Who can access: only Public Body/LAs



<b>Availability and accessibility</b>	Way of access: upon written/email request
	Type of access: for free
	Data format: pdf
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> <li>• Sub-municipal (e.g. district or other spatial zoning)</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector (residential and service buildings, tertiary)</li> <li>• By sub-sector (public buildings, commercial, hotels, trade centres, entertainment centers)</li> <li>• By final use (heating, cooling and hot water)</li> </ul>
<b>Frequency</b>	Yearly

<b>Quality of data</b>
IPTO can provide information on the total installed capacity (kWp), total energy produced (kWh), type of connection, municipal community, ownership status (public or private), and a breakdown by building category.

## 3.3 H&C final uses and market

### 3.3.1 Building stock

<b>Municipality:</b>	Ampelokipi-Menemeni
<b>Category of data:</b>	Buildings
<b>Type of data</b>	.pdf,
<b>Source</b>	Sustainable Energy and Climate Action Plan (SECAP)
<b>Type of source</b>	SECAP
<b>Source responsible body</b>	Municipality of Ampelokipi-Menemeni
<b>Source contact person</b>	Papageorgiou Athanasios
<b>Availability and accessibility</b>	Who can access Census: everybody
	Way of access: through portal/website
	Type of access: for free
	Data format: pdf
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector (e.g. residential, tertiary, industry, etc.)</li> </ul>



	<ul style="list-style-type: none"> <li>By sub-sector (e.g. public buildings, social housing, hotels, trade centres, etc.)</li> </ul>
<b>Frequency</b>	Yearly

<b>Quality of data</b>
The data of SEAP is not up to date and the data for the buildings is limited because the source is SEAP and not SEAK (Building Energy Performance Plan).

### 3.3.2 Heating and cooling equipment

Source of heating and cooling equipment for residential dwellings.

<b>Municipality:</b>	Ampelokipi-Menemeni
<b>Category of data:</b>	Devices and equipment

<b>Type of data</b>	.pdf
<b>Source</b>	Hellenic Statistical Authority (ELSTAT)
<b>Type of source</b>	Database-excel
<b>Source responsible body</b>	Municipality of Ampelokipi-Menemeni
<b>Source contact person</b>	Papageorgiou Athanasios
<b>Availability and accessibility</b>	Who can access Census: everybody
	Way of access: through portal/website
	Type of access: free
	Data format: pdf
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>Municipal</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>By sector (only residential)</li> </ul>
<b>Frequency</b>	Yearly

<b>Quality of data</b>
Type of energy per building included in the 2019 Building Census.



## 4. MUNICIPALITY OF HERAKLION

### 4.1 Weather

The above mentioned key climate indicators of the Municipality of Heraklion can be found in the SECAP of Heraklion municipality which mainly refers to regional climate data based on the specialized methodology provided by the [Urban Adaptation Support Tool of the Climate-ADAPT platform](#); and the data provided for the region of Crete within a previous study elaborated for the Bank of Greece, (2011) "[The Environmental, Economic and Social Impacts of Climate Change](#)".

The [Regional Plan for Climate Change Adaptation](#) (RPCCA 2021) created GIS maps for all the different climate change scenarios and concluded to a set of measures based on data which supported the development of key climate (weather) indicators (Temperatures, Heat waves, Tropical nights, Urban heat islands effects). The datasets used for this elaboration are not available online but may be available upon request.

Weather data is available on a daily basis with the 5 different meteorological stations based on the island of Crete under the supervision of the RoC in collaboration with the UoC and TUC. One is sited at the Centre of Heraklion city, another one at the suburban area of Voutes (at the premises of the University of Crete) which is based at the borders of Heraklion city, another two at Chania, with one of them also based at the city center and the other one at the suburban area of Akrotiri where the Technical University of Crete is based. The last one is based at Finokalia, at the municipality of Agios Nikolaos on the eastern part of the island.

The Region of Crete recently developed a website: <https://airquality.crete.gov.gr/> providing free access to weather data and data related to air pollution for the 4 out of the 5 meteorological stations. The project was funded by the Green Fund and was developed in collaboration with the University and the Technical University of Crete which have direct access to weather data and are responsible for their regular maintenance. The above mentioned website provides access to free access to air pollution data for a selected period of time and is available for a time series of 19-20 years for the meteorological station based at Chania – Akrotiri where the Technical University of Crete is based. This is not the case for the weather data which is not publicly available on that specific website.

Additional climate data can be found from the datasets of Decentralized Government of Crete from the Meteorological Stations, Hydrological Stations and Bathing Water Quality have been included in [data.gov.gr](http://data.gov.gr). The DGC operates twelve (12) stations:

1. "Tympaki A3" Weather Station Data
2. "Doxaro" Weather Station Data
3. "Ziros" Weather Station Data
4. "Potamies" Weather Station Data
5. "Agios Stefanos" Weather Station Data
6. "Kato Kefala - Tavronitis Chania" Weather Station Data
7. "Pyrgos" Weather Station Data
8. "Anogia" Weather Station Data
9. "Viannos" Weather Station Data
10. "Rousochoria" Weather Station Data



## 11. "Vassilika Anogia" Weather Station Data

The data of the meteorological stations of the Decentralized Administration of Crete (temperature, precipitation, wind speed, etc.) are primary and have not undergone any processing. For this reason, in the recording of the measurements one may find "errors" that could come from, for example, problems in the transmission of the signal. However, these "errors" are expected in automatic transmission systems, they are temporary without affecting the entire information. For information on the data, one should contact the Water Directorate. Data measurement units :

- Temperature °C
- Precipitation mm
- Solar radiation power W/m<sup>2</sup>
- Wind speed m/sec
- Wind direction 0

Weather datasets on this platform are only historical ([from 1975 to 1995](#)), providing average temperature, humidity, rain in Crete on a monthly basis. A map of meteorological data was created within the framework of the Emeric subproject of the CRINNO project which was completed in 2006, and there is no reference online for any recent weather data available on this open-access web-platform.

- Meteorological Data of Maximum Temperature of Crete
- Meteorological Rainfall Data for Crete
- Evaporimetric Meteorological Data of Crete
- Meteorological Data for Average Humidity in Crete
- Meteorological Data for Average Temperatures in Crete

In 2016, in the context of the implementation of the open data legislation, the [following datasets](#) were created in the open data catalogue of the Decentralized Administration of Crete:

- Rain data from 56 stations on the island of Crete
- Evaporation data from 18 stations on the island of Crete
- Temperature data from 16 stations on the island of Crete
- Sunshine data from 4 stations on the island of Crete
- Hydrometric data from 48 spring complexes on the island of Crete
- Hydrometric data from torrents in 26 stations on the island of Crete

As for the rainfall in particular, the Ministry of Environment has installed conventional rain gauge stations with observers throughout Greece. In Crete, the supervision of 19 such conventional rain gauge stations is carried out by the Water Directorate of the Decentralized Administration of Crete. The data is accessible via the DAC Datastore Web API with the ability to return results in XML or JSON to the Open Data Repository of the Decentralized Administration of Crete. The use of the data is free as long as the "Water Directorate - Decentralized Administration of Crete" is mentioned with a License: Creative Commons Attribution.



The Technical University of Crete has a database on weather data which may also be used for the purposes of the Plan4Cold project. The situation regarding the main weather data sources for the municipality of Heraklion is summarized in the table below.

<b>Municipality:</b>	Heraklion
<b>Category of data:</b>	Climatic
<b>Type of data</b>	.xml, .html, .pdf
<b>Source</b>	SECAP of Heraklion Municipality (2020), DEAC, RCCAP (2021)
<b>Type of source</b>	Meteorological and Hydrological Stations
<b>Source responsible body</b>	Decentralized Administration of Crete, Region of Crete, Municipality
<b>Source contact person</b>	<a href="https://data.apdkritis.gov.gr/istoria-hrisis-dedomenon/istorika-meteorologika-stoiheia-tis-nisoy-kritis">https://data.apdkritis.gov.gr/istoria-hrisis-dedomenon/istorika-meteorologika-stoiheia-tis-nisoy-kritis</a>
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• pdf files: everybody</li> <li>• html: everybody (hydrological)</li> <li>• xls files: upon request</li> </ul>
	Way of access depends on the type of data (historical or contemporary) <ul style="list-style-type: none"> <li>• through portal/website</li> <li>• upon written/email request</li> </ul>
	Type of access: for free
	Data format: xls, html, pdf
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Regional</li> <li>• Intermunicipal/county</li> <li>• Municipal</li> <li>• Sub-municipal</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By water reservoir</li> </ul>
<b>Frequency</b>	Daily, Monthly, Yearly depending on the data source
<b>Quality of data</b>	
Access upon request. Different types of data from different sources, and different meteorological stations.	



## 4.2 Final energy consumption and sources for H&C

### 4.2.1 Heating oil consumption (for H&C)

There are six different types of consumption to consider when it comes to Heating oil:

- Municipal and other public buildings
- Households,
- Manufacturing,
- Industry,
- Businesses active in tertiary sector and
- Agriculture.

Regarding the municipal consumption of heating oil, the majority of data available refer to School Buildings. For the historical data before 2024 it can be available upon request from the School Committees, legal bodies established in each municipality according to article 103 of the Law 3852/201, whose board actually collect the invoices for Heating oil and distributes them for reimbursement to the financial department of the Municipality. However, according to law 5056/2023 (A' 163), the institutional appointment of School Committees by the Mayor is abolished since June 2024 and their responsibilities is transferred directly under the municipalities. Hence, it is expected that any data should be recovered by the financial records of each municipality. In any case, the Municipality of Heraklion, has already collected this data for most of its school buildings within their MPEEB where the annual consumption of heating oil is provided for the baseline year 2022.

As for the heating oil for Households, Manufacturing, Industry, Business and Agriculture, the overall consumption of petroleum products per regional unit can be used to calculate proxies for the rest of the sector (households, manufacturing, industry, business, agriculture) is provided by ELSTAT as the result of an annual survey based on administrative sources and archives. It includes the total petroleum consumption by Region and Regional Area and is provided to the Hellenic Statistical Authority by the General Directorate of Energy of the Ministry of Environment, Energy and Climate Change . The data of the Petroleum Consumption Survey are classified as follows:

1. Geographic classification by Region and Regional Unit of the country.
2. Classification by category of petroleum products for the following categories:
  - Gasoline (super, unleaded and super unleaded 98/100),
  - heating oil,
  - diesel,
  - fuel oil (low and high sulfur),
  - LPG.



Since 2019, in the data of the gasoline categories: super, unleaded and super unleaded 98/100, consumption in a mixture with biofuel is recorded. The data collection is carried out by the General Directorate of Energy of the Ministry of Environment and Energy from all companies trading and refining petroleum products. The above General Directorate transmits to ELSTAT aggregated data on the consumption of petroleum products by product category, distributed to the Regional Units of the country. From these data tables with total data on the consumption of petroleum products by product category, in the whole country, as well as by Region and Regional Unit are generated. The consumption does not include the own consumption of Public Power Corporation (DEI) in fuel oil and oil for the production of electricity.

To calculate the heating oil used by households in each municipality, data on the number of households that use heating oil for heating is available online from the website of the Hellenic Statistical Authority (ELSTAT - Census 2011 and Census 2021 where the disaggregated data for each municipality is free and available on the relevant website for each municipal community. To gain a broad spectrum on the overall energy consumption in households one may use the results of a survey implemented by ELSTAT for the years 2011-2012.

Regarding the heating oil in agriculture, one option would be to use the above-mentioned aggregated data and calculate proxies by taking into account other indicators (ie. the value of the indicator “Energy and lubricants” is provided by the Hellenic Statistical Authority (ELSTAT) at national level as a share (%) of the total cost of the production with values available for the period 2000 – 2024. The data concern the relative change in prices: 1) that producers in the agriculture-livestock sector enjoy when selling the agricultural products they produce (outputs), and 2) that producers pay for the purchase of goods and services required in the production process (inputs) by considering as baseline year the value of 2000 = 100. However, it is estimated that the consumption of heating oil in agriculture on the island Crete is relatively insignificant and compared to the level of uncertainty when considering that the indicator also includes lubricants, as well as motor oil and gas, this option is not considered optimal.

Regarding the heating oil in industry and business, proxies may be calculated based on the Statistical Business Registry where the number of enterprises and their employees is recorded. Accurate data regarding the energy consumption in business may also be available upon request from the Hellenic Statistical Authority (ELSTAT) when considering the questionnaire for the survey of 2013. In addition to the above, perhaps we should also consider the fact that among the 277 enterprises obliged to submit their carbon footprint to NECCA's Platform for Climate Change and Sustainability as by the article 20 of the National Climate law (Law 4936/2022), there are 7 big Cretan enterprises (Minoan lines, ANEK, Plastika Kritis, Domiki Kritis, Pancretan Bank, Pancretan Bank of Chania, Port of Heraklion, Cosmos Sport).



According to relevant press release by the Ministry of Environment & Energy, the total emissions of companies that submitted a Carbon Footprint Report for the reference year 2023 to the Climate Change and Sustainability Platform by December 5, 2024, amount to 20.62 Mtn CO<sub>2</sub>eq, marking a 26% decrease compared to the base year 2022.

<b>Municipality:</b>	Heraklion
<b>Category of data:</b>	Energy consumption
<b>Type of data</b>	.xls,
<b>Source</b>	Hellenic Statistical Authority, Municipality of Heraklion
<b>Type of source</b>	Census, SECAP
<b>Source responsible body</b>	<ul style="list-style-type: none"> <li>National Statistical Authority, Municipality of Heraklion</li> </ul>
<b>Source contact person</b>	Mr Fotakis
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>Census: by everybody</li> </ul> MPEEB: restricted access
	Way of access <ul style="list-style-type: none"> <li>through portal/website upon written/email request</li> </ul>
	Type of access for free
	Data format <ul style="list-style-type: none"> <li>xls</li> </ul> pdf
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>Municipal (School buildings)- through MPEEB</li> <li>National (all other sectors)</li> <li>Regional (all other sectors)- regional unit</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>By sector (e.g. residential, tertiary, industry, etc.)</li> </ul>
<b>Frequency</b>	Yearly
<b>Quality of data</b>	
More information on Petroleum Consumption can be found on the ELSTAT website <a href="http://www.statistics.gr">www.statistics.gr</a> , under the link "Environment and Energy > Energy > Petroleum (consumption)".	



### 4.2.2 Natural Gas consumption (for H&C)

At national level, the Natural Gas Pipeline Transport Survey is being conducted annually since 2015. Its purpose is to monitor the transport work carried out in the country's national gas pipeline network.

The data are made available by the National Natural Gas System Operator (DESFA SA) and the operators of the TAP and IGB pipelines and are checked by the Department of Transport Statistics for their completeness and accuracy, and then tables are compiled.

Natural Gas is not used in Crete. According to the study of the NTU (2016), the case of importing liquefied natural gas (LNG) into the energy balance of Crete has been of concern to the competent bodies many times. In the period 1996-97 by DEPA, in 2004 by RAE (Advantica study) and in 2009 by PPC (McKinsey study). At the same time, the feasibility of importing LNG into Crete was also examined by the TEE CRETE with a study in 2010. All studies conclude that the use of LNG is economically unprofitable due to the high initial cost. Even if it is used for other sectors, the economic data does not improve. The two scenarios – projects that have been identified so far include a) the underwater interconnection of the electrical systems of Israel – Cyprus – Greece and b) the interconnection with the East-med. So far only data on liquefied petroleum gas (LPG) exist and are available online at the Hellenic Statistical Authority survey on oil products (under the link "Environment and Energy > Energy > Petroleum (consumption)").

### 4.3.3 Electricity consumption (for H&C)

The Hellenic Electricity Distribution Network Operator (HEDNO) provides upon request annual electricity consumption per type of use: public, residential, commercial, industrial, agricultural, and lighting. Given the distribution of the various types of buildings by age category (Before 1980, 1980-2000, 2001 and after) and by utilizing bibliographic data on the specific energy consumption per year (kWh/m<sup>2</sup>) per representative type of building, the distribution of electricity consumption was estimated by applying the building distribution rates to the available electricity consumption for Public and Commercial Use (SECAP2020 - section "6.3 Total electricity consumption in the Municipality of Heraklion"). The results of electricity consumption by Public and Private Sectors by use and age category, for the reference year (2011) and for the year 2019, are presented in Table 15 of the Municipal SECAP of Heraklion. Significant sectors consuming electricity such as Hotels are also estimated in the report. The municipal Plan for Energy Efficiency of Buildings refers mainly to the electricity consumed in School Buildings and some important buildings of the municipality, ie. Town Hall.



<b>Municipality:</b>	Heraklion
<b>Category of data:</b>	Energy Consumption
<b>Type of data</b>	.xls,
<b>Source</b>	Hellenic Electricity Distribution Network Operator (HEDNO)
<b>Type of source</b>	Database-Excel
<b>Source responsible body</b>	Municipality of Heraklion
<b>Source contact person</b>	Mr Fotakis
<b>Availability and accessibility</b>	Who can access: only Public Body/LAs
	Way of access: upon written/email request
	Type of access: upon entrance fee
	Data format: xls
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector (residential and service buildings, tertiary)</li> </ul>
<b>Frequency</b>	By sub-sector (public buildings, commercial, hotels, trade centres, entertainment centers)
<b>Quality of data</b>	
The electricity data refers to the period starting from 2019 and beyond. There will be a breakdown of the data (number of buildings, building area, electricity consumption) by aggregation level.	

#### 4.2.4 Photovoltaics

IPTO can provide information on the total installed capacity (kWp), total energy produced (kWh), type of connection (e.g. rooftop PV systems, standalone solar parks), municipal community, ownership status (public or private), and a breakdown by building category, specifically for rooftop PV systems. The recent SECAP (2020) of the municipality of Heraklion includes this type of data, according to which in 2019, the total annual electricity produced by Rooftop PVs Program was 4.369.965 kWh, by Net-metering PVs was 331.839 kWh and by independent autonomous PVs was 5.465.022 kWh.

The Regulatory Authority of Waste, Energy and Water publishes monthly data on the permissions for the production of Energy from Renewable Resources. Data is available online and downloadable from the site of RAWEW. The tables available (national RES Registry) present the data (permissions for: Wind, solar-PVs, Hybrid, Storage units) per regional unit, municipality and site name, as well as the Guaranteed Power (MW) per station. Data is available since 2002. In Crete there are very few RES installations with energy storage units, and only one of them is permitted in Chania while there is



none in the municipality of Heraklion. Data from REWEW is expected to be uploaded on the GIS platform of the Region of Crete and be downloaded in .shp files upon request.

<b>Municipality:</b>	Heraklion
<b>Category of data:</b>	Energy production
<b>Type of data</b>	.xls, as well as .shp files on the site
<b>Source</b>	Independent Power Transmission System Operator ( <a href="#">IPTO - ADMIE</a> )
<b>Type of source</b>	SECAP (2020) and Updates from ( <a href="#">IPTO - ADMIE</a> )
<b>Source responsible body</b>	Municipality of Heraklion
<b>Source contact person</b>	Mr Fotakis
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• everybody</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• SECAP (2020), <a href="#">through portal/website</a> from RAWEW</li> <li>• Upon written request from IPTO</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• for free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls, .pdf</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• sector relevant- Public or Private installations</li> </ul>
<b>Frequency</b>	Yearly

<b>Quality of data</b>	
IPTO can provide information on the total installed capacity (kWp), total energy produced (kWh), type of connection (e.g. rooftop PV systems, standalone solar parks), municipal community, ownership status (public or private), and a breakdown by building category, specifically for rooftop PV systems. The remaining database (ie.RAWEW) refers to permissions, not the installations currently operating, or the overall production so far.	

#### 4.2.5 Solar thermal

A recent study from (November 2024) provides details on the [potential for the development of Solar-Thermal systems in Greece](#). However, the analysis is at national and not regional or lower geographical level.

At regional level, some indicative data is provided by the study “Energy Planning of Crete” implemented by the National Technical University in 2016, available online in pdf. The study refers



to solar systems which cover approximately 400,000m<sup>2</sup> and 2 solar air conditioning installations on the island of Crete. There are currently 265MW of solar thermal production licenses (215MW in the Lassithi Regional Unit and 50MW in the regional unit of Chania)<sup>1</sup>.

<b>Municipality:</b>	Heraklion
<b>Category of data:</b>	Energy production
<b>Type of data</b>	.pdf
<b>Source</b>	Regional of Crete
<b>Type of source</b>	Regional Study
<b>Source responsible body</b>	Region of Crete
<b>Source contact person</b>	Contact person Responsible for PESPKA
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• Energy Planning of Crete: everybody, available online</li> <li>PESPKA: everybody, available online</li> </ul>
	• Way of access: through portal/website
	• Type of access: for free
	• Data format: pdf
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• National</li> <li>• Regional</li> <li>• Intermunicipal/county</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By industry</li> </ul>
<b>Frequency</b>	Yearly
<b>Quality of data</b>	
Single numbers per regional unit. Some additional details may be found from the Decentralised Government of Crete (Department of Natural Resources).	

#### 4.2.6 Heat pumps

Data on the heating and cooling pumps is available from the Hellenic Statistical Authority per municipality and municipal community (Building Census 2021). In particular data refer to both heating and cooling pumps and there is presented under the headline/Table 10: “Population-Housing

<sup>1</sup> [https://www.crete.gov.gr/wp-content/uploads/2023/11/%CE%91-%CE%92-%CE%A0%CE%B1%CF%81%CE%B1%CE%B4%CE%BF%CF%84%CE%AD%CE%B1-17-2-2016\\_%CE%A4%CE%B5%CE%BB%CE%B9%CE%BA%CF%8C.pdf#page=119.73](https://www.crete.gov.gr/wp-content/uploads/2023/11/%CE%91-%CE%92-%CE%A0%CE%B1%CF%81%CE%B1%CE%B4%CE%BF%CF%84%CE%AD%CE%B1-17-2-2016_%CE%A4%CE%B5%CE%BB%CE%B9%CE%BA%CF%8C.pdf#page=119.73)



Census 2021. Regular dwellings by housing status (occupied, vacant) and cooling availability”, providing the number of houses using central cooling or cooling pumps.

<b>Municipality:</b>	Ampelokipi-Menemeni
<b>Category of data:</b>	Energy production
<b>Type of data</b>	.pdf
<b>Source</b>	Hellenic Statistical Authority
<b>Type of source</b>	Database-excel
<b>Source responsible body</b>	ELSTAT
<b>Source contact person</b>	none
<b>Availability and accessibility</b>	Who can access: everybody
	• Way of access: website
	• Type of access: for free
<b>Geographical scale</b>	• Data format: pdf
	• Municipal
	• Sub-municipal (e.g. district or other spatial zoning)
<b>Aggregation level</b>	• By sector (residential and service buildings, tertiary)
	• By sub-sector (public buildings, commercial, hotels, trade centres, entertainment centers)
	• By final use (cooling)
<b>Frequency</b>	Yearly
<b>Quality of data</b>	
Excel data are separate for cooling but no data for heating.	

#### 4.2.7 Bioenergy / Biogas

The Operating Stations Information Registry developed and maintained by the Investor Service for Renewable Energy Projects in collaboration with the CRES provides information on the operating RES systems per region and regional unit. Data is available since 2012 and the platform was last updated in July 2021 and can be downloaded in xls format. Some indicative data is provided by the study “Energy Planning of Crete” implemented by the National Technical University in 2016, available online in pdf. The study refers to data on the total bioenergy at regional units but not municipal level. According to this study, in Crete, solid biomass covers approximately 7% of total final energy consumption. At the same time, there are two Municipal biogas installations, one in Heraklion Municipality (DEYAH) and another one in Chania Municipality (DEYAX) who are self-producers.



Besides these there are also two more mature biogas projects (ANION BIOGAS CRETE E.E.1MW and CRETA FARMS 400kW). Recently, nine (9) Environmental Impact Assessment approvals were issued by the Decentralized Administration. The recent SECAP (2020) of the municipality of Heraklion includes this type of data, according to which in 2019, the total annual electricity produced by bioenergy was 4.382.100 kWh. Any updates on regional data for Bioenergy could be requested from the Independent Power Transmission System Operator (IPTO - ADMIE) and in some cases may be available from the Department of Natural Resources of Decentralised Administration of Crete (DEAC).

<b>Municipality:</b>	Heraklion
<b>Category of data:</b>	Energy production
<b>Type of data</b>	.pdf, .xls
<b>Source</b>	DEAC, RESoffice,
<b>Type of source</b>	Decentralised Government of Crete
<b>Source responsible body</b>	National Statistical Authority, Municipality, Region, etc
<b>Source contact person</b>	<a href="#">Department of Natural Resources</a>
<b>Availability and accessibility</b>	Regional level – request for updated data from DEAC
	Way of access
	<ul style="list-style-type: none"> <li>• through portal/website upon written/email request</li> <li>• Type of access: for free</li> <li>• Data format: pdf</li> </ul>
	<ul style="list-style-type: none"> <li>• Regional</li> <li>• Intermunicipal/county</li> <li>• Municipal</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Regional</li> <li>• Intermunicipal/county</li> <li>• Municipal</li> </ul>
<b>Aggregation level</b>	Non sector relevant, only production.
<b>Frequency</b>	Yearly
<b>Quality of data</b>	
As described above, no adequate information at municipal level.	



#### 4.2.8 Wind

Data for the energy production from Wind is collected by the Independent Power Transmission Operator (IPTO). These data are only available upon written request to IPTO. The recent SECAP (202) of the municipality (in pdf) includes data on the number of installations but not data on the wind energy consumed. According to the SECAP there are two (2) privately owned wind parks operating in the Municipality of Heraklion with a total installed power 63MW.

Additional to this, the Regulatory Authority of Waste, Energy and Water publishes monthly data on the permissions for the production of Energy from Renewable Resources for the overall permissions per municipality data is available online and downloadable from the site of RAWEW in the following link: <https://www.raaey.gr/energeia/ape/adeiodotisi-2/adeies-ape/>

The tables available (national RES Registry) present the data (permissions for: Wind, solar-PVs, Hybrid, Storage units) per regional unit, municipality and site name, as well as the Guaranteed Power (MW) per station. Data is available since 2002. In Crete there are very few RES installations with energy storage units, and only one of them is permitted in Chania while in there is none in the municipality of Heraklion. Data from REWEW is expected to be uploaded on the GIS platform of the Region of Crete and be downloaded in .shp files upon request.

<b>Municipality:</b>	Heraklion
<b>Category of data:</b>	Energy production
<b>Type of data</b>	.pdf
<b>Source</b>	Independent Power Transmission Operator (IPTO)
<b>Type of source</b>	Database
<b>Source responsible body</b>	Municipality of Heraklion
<b>Source contact person</b>	Mr Fotakis Manolis
<b>Availability and accessibility</b>	Who can access: only Public Body/LAs
	Way of access: upon written/email request
	Type of access: for free
	Data format: pdf
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> <li>• Sub-municipal (e.g. district or other spatial zoning)</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector (residential and service buildings, tertiary)</li> <li>• By sub-sector (public buildings, commercial, hotels, trade centres, entertainment centers)</li> </ul> <p>By final use (heating, cooling and hot water)</p>



<b>Frequency</b>	Yearly
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<b>Quality of data</b>
IPTO provides information on the total installed capacity (kWp), total energy produced (kWh), type of connection (e.g. rooftop PV systems, standalone solar parks), municipal community, ownership status (public or private), and a breakdown by building category.

### 4.2.9 Geothermal energy

At regional level there are some geothermal installations for public buildings (Municipality of Hersonissos) but mostly from private sector (Hotels) and households.

No data on the number and type and power generation for each geothermal stations is uploaded on the RESOFFICE for the region of Crete.

Within the last decade there is a significant number of enterprises providing technical support and undertaking works for installations of geothermal systems in Crete.

There is also a low number of indoor space conditioning systems with geothermal heat pumps, established mainly in tourist accommodation facilities and in a few residential buildings (Katsambrakakis et al. 2022 ).

The Government has recently undertaken some initiatives for the utilisation of the geothermal potential of Greece with the support of the Hellenic Authority for Geological and Mining Research (EAGME) and its Department of Geothermal and Thermal Natural Resources (GEOTHE).

The Organisation (EAGME) also has a branch in Crete and we intend to draw relevant data (if any) upon request.

## 4.3 H&C final uses and market

### 4.3.1 Building stock

Relevant data on building stock features (age, thermal insulation, etc.) is available from the Population & Housing Census 2011 and Census 2021. These data have been incorporated into the SECAP of the municipality. Additional to this, the municipality of Heraklion implemented a thorough analysis on the municipal building stock through the project IMPULSE funded by INTERREG – MED program, identifying building typologies and supporting the hierarchy for retrofitting the municipal buildings. These data have also been incorporated in the municipal SECAP while several energy retrofitting of municipal buildings have been implemented according to that plan. The municipality of Heraklion also has a list of Energy Certificates with details on the Municipal Buildings. The Plan for the Energy Efficiency of Municipal Buildings which was recently elaborated was based on these previous works.

<b>Municipality:</b>	Heraklion
<b>Category of data:</b>	Buildings



<b>Type of data</b>	.xls, .pdf
<b>Source</b>	National Census 2021
<b>Type of source</b>	Census, SECAP, MPEEB
<b>Source responsible body</b>	National Statistical Authority, Municipality
<b>Source contact person</b>	Mr Fotakis
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• Census: by everybody</li> </ul> SECAP, MPEEB: restricted access,
	Way of access <ul style="list-style-type: none"> <li>• through portal/website upon written/email request</li> </ul>
	Type of access: for free
	Data format: xls, pdf
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• National, Regional, Municipal</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• Public Buildings through SECAP, MPEEB</li> <li>• Private buildings (Households) through Statistics.gr</li> </ul>
<b>Frequency</b>	Yearly

<b>Quality of data</b>
Good quality of data, recent studies, perhaps not covering the whole range but enough to draw safe references.

### 4.3.2 Heating and cooling equipment

Data on the heating availability and equipment is available from the Hellenic Statistical Authority per municipality and municipal community (Building Census 2021). In particular data refer to number of dwellings “With heating” or “without heating” and the Type of heating (Central heating, of which: “other type of heating”,

“Central autonomous heating”, “Central non-autonomous heating”) per municipality and municipal community.

<b>Municipality:</b>	Heraklion
<b>Category of data:</b>	Buildings
<b>Type of data</b>	.xls,
<b>Source</b>	National Building Census 2021
<b>Type of source</b>	Census 2021



<b>Source responsible body</b>	Hellenic Statistical Authority
<b>Source contact person</b>	Available <a href="#">online</a>
<b>Availability and accessibility</b>	Who can access Census: by everybody
	Way of access through portal/website
	Type of access for free
	Data format xls
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• National</li> <li>• Regional</li> <li>• Intermunicipal/county</li> <li>• Municipal</li> <li>• Municipal community</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector: residential</li> <li>• By final use: heating</li> </ul>
<b>Frequency</b>	Yearly
<b>Quality of data</b>	
Good quality, recent data referring to heating availability and basic equipment.	

## 5. MUNICIPALITY OF CHANIA

### 5.1 Weather

According to the 1ST SEAP of the Municipality of Chania (2018), there are several meteorological stations (National Meteorological Service – EMY, Technical University of Crete and ATEI of Crete – Chania Branch, Directorate of Land Improvements & Water Resources, etc.), from which valuable information can be obtained regarding the meteorological and climatic conditions prevailing in it. The significant geomorphological changes, within the Municipality cause equally significant changes in its local climatic conditions, making it difficult to estimate uniform average values (e.g. temperature) for the entire Municipality of Chania.



Withing the SECAP that was elaborated in 2020, there is no further analysis of the weather data in the municipality since SECAP provides mainly a list of KPIs and methods of monitoring the successful implementation of the 1st SEAP.

The Energy Efficiency Plan for the Municipal Buildings (MBEEP 2024) which was recently elaborated, provided a list of graphs for the baseline year 2023 depicting data from five (5) different meteorological stations:

1. Chania
2. Theriso
3. Kampos Keramion
4. Akrotiri (meteorological station of the Technical University of Crete)
5. Stalos

The situation regarding the main weather data sources for the municipality of Chania is summarized in the table below.

<b>Municipality:</b>	Chania
<b>Category of data:</b>	Climatic
<b>Type of data</b>	.xml, .html, .pdf
<b>Source</b>	SEAP, EEMBP of Chania Municipality (2024), Meteorological stations DEAC, RCCAP (2021)
<b>Type of source</b>	5 Meteorological and Hydrological Stations
<b>Source responsible body</b>	Decentralized Administration of Crete, Region of Crete, Municipality
<b>Source contact person</b>	Someone from the Municipality of the Region, contact details
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• Pdf files: free online</li> <li>• xls files: upon request</li> </ul>
	• Way of access: upon written/email request
	Type of access: for free
<b>Geographical scale</b>	Data format <ul style="list-style-type: none"> <li>• xls</li> <li>• html</li> <li>• pdf</li> </ul>
	<ul style="list-style-type: none"> <li>• Regional</li> <li>• Intermunicipal/county</li> <li>• Municipal</li> <li>• Sub-municipal (e.g. district or other spatial zoning)</li> </ul>



<b>Aggregation level</b>	• By water reservoir
<b>Frequency</b>	Daily, Monthly, yearly
Quality of data	
Good quality.	

## 5.2 Final energy consumption and sources for H&C

### 5.2.1 Heating oil consumption (for H&C)

There are six different types of consumption to consider when it comes to Heating oil:

- Municipal and other public buildings
- Households,
- Manufacturing,
- Industry,
- Businesses active in tertiary sector and
- Agriculture.

Regarding the municipal consumption of heating oil, the majority of data available refer to School Buildings. For the historical data before 2024 it can be available upon request from the School Committees, legal bodies established in each municipality according to article 103 of the Law 3852/201, whose board actually collect the invoices for Heating oil and distributes them for reimbursement to the financial department of the Municipality. However, according to law 5056/2023 (A' 163), the institutional appointment of School Committees by the Mayor is abolished since June 2024 and their responsibilities is transferred directly under the municipalities. Hence, it is expected that any data should be recovered by the financial records of each municipality.

In any case, the Municipality of Chania, has already collected this data for most of its school buildings within their MPEEB where the annual consumption of heating oil is provided for the baseline year 2022.

As for the heating oil for Households, Manufacturing, Industry, Business and Agriculture, the overall consumption of petroleum products per regional unit can be used to calculate proxies for the rest of the sector (households, manufacturing, industry, business, agriculture) is provided by ELSTAT as the result of an annual survey based on administrative sources and archives. It includes the total petroleum consumption by Region and Regional Area and is provided to the Hellenic Statistical Authority by the General Directorate of Energy of the



Ministry of Environment, Energy and Climate Change<sup>2</sup>. The data of the Petroleum Consumption Survey are classified as follows:

1. Geographic classification by Region and Regional Unit of the country.
2. Classification by category of petroleum products for the following categories:
  - Gasoline (super, unleaded and super unleaded 98/100),
  - heating oil,
  - diesel,
  - fuel oil (low and high sulfur),
  - LPG.

Since 2019, in the data of the gasoline categories: super, unleaded and super unleaded 98/100, consumption in a mixture with biofuel is recorded. The data collection is carried out by the General Directorate of Energy of the Ministry of Environment and Energy from all companies trading and refining petroleum products. The above General Directorate transmits to ELSTAT aggregated data on the consumption of petroleum products by product category, distributed to the Regional Units of the country. From these data tables with total data on the consumption of petroleum products by product category, in the whole country, as well as by Region and Regional Unit are generated. The consumption does not include the own consumption of Public Power Corporation (DEI) in fuel oil and oil for the production of electricity<sup>3</sup>.

To calculate the heating oil used by households in each municipality, data on the number of households that use heating oil for heating is available online from the website of the Hellenic Statistical Authority (ELSTAT - Census 2011 and Census 2021 where the disaggregated data for each municipality is free and available on the relevant website for each municipal community. To gain a broad spectrum on the overall energy consumption in households one may use the results of a survey implemented by ELSTAT for the years 2011-2012.

Regarding the heating oil in agriculture, one option would be to use the above mentioned aggregated data and calculate proxies by taking into account other indicators (ie. the value of the indicator “Energy and lubricants” is provided by the Hellenic Statistical Authority (ELSTAT) at national level as a share (%) of the total cost of the production with values available for the period 2000 – 2024. The data concern the relative change in prices: 1) that producers in the agriculture-livestock sector enjoy when selling the agricultural products they produce (outputs), and 2) that producers pay for the purchase of goods and services

<sup>2</sup>

[https://www.statistics.gr/el/statistics?p\\_p\\_id=documents\\_WAR\\_publicationsportlet\\_INSTANCE\\_0qObWqzRnXSG&p\\_p\\_lifecycle=2&p\\_p\\_state=normal&p\\_p\\_mode=view&p\\_p\\_cacheability=cacheLevelPage&p\\_p\\_col\\_id=column-1&p\\_p\\_col\\_count=4&p\\_p\\_col\\_pos=1&\\_documents\\_WAR\\_publicationsportlet\\_INSTANCE\\_0qObWqzRnXSG\\_javax.faces.resource=document&\\_documents\\_WAR\\_publicationsportlet\\_INSTANCE\\_0qObWqzRnXSG\\_in=downloadResources&\\_documents\\_WAR\\_publicationsportlet\\_INSTANCE\\_0qObWqzRnXSG\\_documentID=115030&\\_documents\\_WAR\\_publicationsportlet\\_INSTANCE\\_0qObWqzRnXSG\\_locale=el](https://www.statistics.gr/el/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_0qObWqzRnXSG&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-1&p_p_col_count=4&p_p_col_pos=1&_documents_WAR_publicationsportlet_INSTANCE_0qObWqzRnXSG_javax.faces.resource=document&_documents_WAR_publicationsportlet_INSTANCE_0qObWqzRnXSG_in=downloadResources&_documents_WAR_publicationsportlet_INSTANCE_0qObWqzRnXSG_documentID=115030&_documents_WAR_publicationsportlet_INSTANCE_0qObWqzRnXSG_locale=el)

<sup>3</sup> <https://www.statistics.gr/documents/20181/f0c530e7-7f5e-b57d-06f3-4071584b4f39>



required in the production process (inputs) by considering as baseline year the value of 2000 = 100. However, it is estimated that the consumption of heating oil in agriculture on the island Crete is relatively insignificant and compared to the level of uncertainty when considering that the indicator also includes lubricants, as well as motor oil and gas, this option is not considered optimal.

Regarding the heating oil in industry and business, proxies may be calculated based on the Statistical Business Registry where the number of enterprises and their employees is recorded. Accurate data regarding the energy consumption in business may also be available upon request from the Hellenic Statistical Authority (ELSTAT) when considering the questionnaire for the survey of 2013. In addition to the above, perhaps we should also consider the fact that among the 277 enterprises obliged to submit their carbon footprint to NECCA's Platform for Climate Change and Sustainability as by the article 20 of the National Climate law (Law 4936/2022), there are 7 big Cretan enterprises (Minoan lines, ANEK, Plastika Kritis, Domiki Kritis, Pancretan Bank, Pancretan Bank of Chania, Port of Heraklion, Cosmos Sport). According to relevant press release by the Ministry of Environment & Energy, the total emissions of companies that submitted a Carbon Footprint Report for the reference year 2023 to the Climate Change and Sustainability Platform by December 5, 2024, amount to 20.62 Mtn CO<sub>2</sub>eq, marking a 26% decrease compared to the base year 2022.

<b>Municipality:</b>	Chania
<b>Category of data:</b>	Energy consumption
<b>Type of data</b>	.xls,
<b>Source</b>	Hellenic Statistical Authority, Municipality of Chania
<b>Type of source</b>	ELSTAT (xls), MPEEB (pdf)
<b>Source responsible body</b>	<ul style="list-style-type: none"> <li>National Statistical Authority,</li> <li>Municipality of Chania</li> </ul>
<b>Source contact person</b>	Mr Efthymiou
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>Census: by everybody</li> </ul> SECAP: restricted access, MPEEB
	Way of access <ul style="list-style-type: none"> <li>through portal/website upon written/email request</li> </ul>
	Type of access: for free
	Data format <ul style="list-style-type: none"> <li>xls</li> </ul>



	pdf
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal (School buildings)- through MPPEEB</li> <li>• National (all other sectors)</li> <li>• Regional (all other sectors)- regional unit</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector (e.g. residential, tertiary, industry, etc.)</li> </ul>
<b>Frequency</b>	Yearly

<b>Quality of data</b>	
More information on Petroleum Consumption can be found on the ELSTAT website <a href="http://www.statistics.gr">www.statistics.gr</a> , under the link "Environment and Energy > Energy > Petroleum (consumption)".	

### 5.2.2 Natural Gas consumption (for H&C)

According to the study of the NTU (2016), the case of importing liquefied natural gas (LNG) into the energy balance of Crete has been of concern to the competent bodies many times. In the period 1996-97 by DEPA, in 2004 by RAE (Advantica study) and in 2009 by PPC (McKinsey study). At the same time, the feasibility of importing LNG into Crete was also examined by the TEE CRETE with a study in 2010. All studies conclude that the use of LNG is economically unprofitable due to the high initial cost. Even if it is used for other sectors, the economic data does not improve. The two scenarios – projects that have been identified so far include a) the underwater interconnection of the electrical systems of Israel – Cyprus – Greece and b) the interconnection with the East-med. So far only data on liquefied petroleum gas (LPG) exist and are available online at the Hellenic Statistical Authority survey on oil products (under the link "Environment and Energy > Energy > Petroleum (consumption)").

### 5.2.3 Electricity consumption (for H&C)

Since the SECAP 2018 of the municipality of Chania does not provide analytical data on the electricity consumption per type of use (ie. public, residential, commercial, industrial, agricultural). Given the distribution of the various types of buildings by age category (Before 1980, 1980-2000, 2001 and after) and by utilizing bibliographic data on the specific energy consumption per year (kWh/m<sup>2</sup>) per representative type of building, the distribution of electricity consumption will be estimated.

The municipal Plan for Energy Efficiency of Buildings refers mainly to the electricity consumed in School Buildings and some important buildings of the municipality, ie. Town Hall. Another important study to use for electricity consumption is the one elaborated from the Hoteliers Association of Chania whose representatives the team of TUC for PLAN4COLD project met in February

<b>Municipality:</b>	Chania
<b>Category of data:</b>	Energy Consumption



<b>Type of data</b>	.xls
<b>Source</b>	Hellenic Electricity Distribution Network Operator (HEDNO)
<b>Type of source</b>	Database-Excel
<b>Source responsible body</b>	Municipality of Chania
<b>Source contact person</b>	Efthymiou
<b>Availability and accessibility</b>	Who can access: Only Public Body/LAs
	Way of access: upon written/email request
	Type of access: upon entrance fee
	Data format: xls
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector (residential and service buildings, tertiary)</li> </ul>
<b>Frequency</b>	By sub-sector (public buildings, commercial, hotels, trade centres, entertainment centers)

<b>Quality of data</b>
The electricity data refers to the period starting from 2019 and beyond. There will be a breakdown of the data (number of buildings, building area, electricity consumption) by aggregation level.

## 5.2.4 Photovoltaics

IPTO can provide information on the total installed capacity (kWp), total energy produced (kWh), type of connection (e.g. rooftop PV systems, standalone solar parks), municipal community, ownership status (public or private), and a breakdown by building category, specifically for rooftop PV systems. The recent SECAP (2018) of the municipality of Chania does not include this type of data. The Regulatory Authority of Waste, Energy and Water publishes monthly data on the permissions for the production of Energy from Renewable Resources. This database refers to permissions, not the installations currently operating, or the overall production so far and data is available online and downloadable from the site of RAWEW. The tables available (national RES Registry) present the data (permissions for: Wind, solar-PVs, Hybrid, Storage units) per regional unit, municipality and site name, as well as the Guaranteed Power (MW) per station since 2002. In Crete there are very few RES installations with energy storage units, and only one of them is permitted in Chania. Data from REWEW is expected to be uploaded on the GIS platform of the Region of Crete and be downloaded in .shp files upon request.

<b>Municipality:</b>	Chania
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<b>Category of data:</b>	Energy production
<b>Type of data</b>	.xls, as well as .shp files on the site
<b>Source</b>	Independent Power Transmission System Operator (IPTO - ADMIE)
<b>Type of source</b>	Xls from IPTO - ADMIE
<b>Source responsible body</b>	Municipality of Chania
<b>Source contact person</b>	Mr Efthymiou
<b>Availability and accessibility</b>	• Who can access: Restricted to public bodies
	• Way of access: Upon written request from IPTO
	• Type of access: for free
	• Data format: xls, .pdf
<b>Geographical scale</b>	• Municipal
<b>Aggregation level</b>	• sector relevant- Public or Private installations
<b>Frequency</b>	Yearly

<b>Quality of data</b>
IPTO can provide information on the total installed capacity (kWp), total energy produced (kWh), type of connection (e.g. rooftop PV systems, standalone solar parks), municipal community, ownership status (public or private), and a breakdown by building category, specifically for rooftop PV systems.

### 5.2.5 Solar thermal

A recent study from (November 2024) provides details on the potential for the development of Solar-Thermal systems in Greece. However, the analysis is at national and not regional or lower geographical level.

At regional level, some indicative data is provided by the study “Energy Planning of Crete” implemented by the National Technical University in 2016, available online in pdf. The study refers to solar systems which cover approximately 400,000m<sup>2</sup> and 2 solar air conditioning installations in the island of Crete. There are currently 265MW of solar thermal production licenses (215MW in the Lassithi Regional Unit and 50MW in the regional unit of Chania) .

<b>Municipality:</b>	Heraklion
<b>Category of data:</b>	Energy production
<b>Type of data</b>	.pdf
<b>Source</b>	Regional of Crete



<b>Type of source</b>	Regional Study
<b>Source responsible body</b>	Region of Crete
<b>Source contact person</b>	Contact person Responsible for PESPKA
<b>Availability and accessibility</b>	Who can access: everybody, available online
	• Way of access: through portal/website
	• Type of access: for free
	• Data format: pdf
<b>Geographical scale</b>	• National
<b>Aggregation level</b>	• Regional
<b>Frequency</b>	Intermunicipal/county
<b>Quality of data</b>	
Single numbers per regional unit. Some additional details may be found from the Decentralised Government of Crete (Department of Natural Resources).	

### 5.2.6 Heat pumps

Data on the heating and cooling pumps is available from the Hellenic Statistical Authority per municipality and municipal community (Building Census 2021). In particular data refer to both heating and cooling pumps and there is presented under the headline/Table 30: “Population-Housing Census 2021. Regular dwellings by housing status (occupied, vacant) and cooling availability”, providing the number of houses using central cooling or cooling pumps.

<b>Municipality:</b>	Chania
<b>Category of data:</b>	Buildings
<b>Type of data</b>	.xls,
<b>Source</b>	National Census 2021
<b>Type of source</b>	Census 2021
<b>Source responsible body</b>	National Statistical Authority
<b>Source contact person</b>	Available online
<b>Availability and accessibility</b>	
	• Who can access: everybody



	<ul style="list-style-type: none"> <li>Way of access: through portal/website</li> <li>Type of access: for free</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>Data format: xls</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>National</li> </ul>
<b>Frequency</b>	Regional
<b>Quality of data</b>	
Good quality, recent data.	

### 5.2.7 Bioenergy / Biogas

The Operating Stations Information Registry developed and maintained by the Investor Service for Renewable Energy Projects in collaboration with the CRES provides information on the operating RES systems per region and regional unit. Data is available since 2012 and the platform was last updated in July 2021 and can be downloaded in xls format. Some other indicative data is provided by the study “Energy Planning of Crete” implemented by the National Technical University in 2016, available online in pdf. The study refers to data on the total bioenergy at regional units but not municipal level. According to this study, in Crete, solid biomass covers approximately 7% of total final energy consumption. In the Municipality of Chania there is one biogas installation, from DEYAX. Any updates on regional data for Bioenergy could be requested from the Independent Power Transmission System Operator (IPTO - ADMIE) and in some cases may be available from the Department of Natural Resources of Decentralised Administration of Crete (DEAC).

<b>Municipality:</b>	Chania
<b>Category of data:</b>	Energy production
<b>Type of data</b>	.pdf, .xls
<b>Source</b>	DEAC, RESoffice,
<b>Type of source</b>	Independent Power Transmission System Operator ( <a href="#">IPTO - ADMIE</a> )
<b>Source responsible body</b>	Municipality of Chania
<b>Source contact person</b>	Mr Efthymiou
<b>Availability and accessibility</b>	Municipal level request for updated data from IPTO
	Way of access: upon written/email request
	<ul style="list-style-type: none"> <li>Type of access: for free</li> </ul>



	<ul style="list-style-type: none"> <li>Data format: pdf</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>Regional/ Intermunicipal/Municipal</li> </ul>
<b>Aggregation level</b>	Only production available.
<b>Frequency</b>	Yearly
<b>Quality of data</b>	
IPTO can provide information on the total installed capacity (kWp), total energy produced (kWh), municipal community, ownership status (public or private).	

### 5.2.8 Wind

Data for the energy production from Wind is collected by the Independent Power Transmission Operator (IPTO). These data are only available upon written request to IPTO. The recent SECAP (2018) of the municipality (in pdf) does not include any data on the number of installations or on the wind energy consumed.

Additional to this, the Regulatory Authority of Waste, Energy and Water publishes monthly data on the permissions for the production of Energy from Renewable Resources for the overall permissions per municipality data is available online and downloadable from the site of RAWEW in the following link: <https://www.raaey.gr/energeia/ape/adeiodotisi-2/adeies-ape/>

The tables available (national RES Registry) present the data (permissions for: Wind, solar-PVs, Hybrid, Storage units) per regional unit, municipality and site name, as well as the Guaranteed Power (MW) per station. Data is available since 2002. In Crete there are very few RES installations with energy storage units, and only one of them is permitted in Chania. Data from REWEW is expected to be uploaded on the GIS platform of the Region of Crete and be downloaded in .shp files upon request.

<b>Municipality:</b>	Chania
<b>Category of data:</b>	Energy production
<b>Type of data</b>	.pdf
<b>Source</b>	Independent Power Transmission Operator (IPTO)
<b>Type of source</b>	Database
<b>Source responsible body</b>	Municipality of Chania
<b>Source contact person</b>	Mr Efthimiou
<b>Availability and accessibility</b>	Who can access: only Public Body/LAs
	Way of access: upon written/email request



	Type of access: for free
	Data format: pdf
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> <li>• Sub-municipal (e.g. district or other spatial zoning)</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector (residential and service buildings, tertiary)</li> <li>• By sub-sector (public buildings, commercial, hotels, trade centres, entertainment centers)</li> <li>• By final use ( heating, cooling and hot water)</li> </ul>
<b>Frequency</b>	Yearly

<b>Quality of data</b>
IPTO provides information on the total installed capacity (kWp), total energy produced (kWh), type of connection (e.g. rooftop PV systems, standalone solar parks), municipal community, ownership status (public or private), and a breakdown by building category.

### 5.2.9 Geothermal energy

At regional level there are some geothermal installations for public buildings (Municipality of Hersonissos) but mostly from private sector (Hotels) and households.

No data on the number and type and power generation for each geothermal stations is uploaded on the RESOFFICE for the region of Crete.

Within the last decade there is a significant number of enterprises providing technical support and undertaking works for installations of geothermal systems in Crete.

There is also a low number of indoor space conditioning systems with geothermal heat pumps, established mainly in tourist accommodation facilities and in a few residential buildings (Katsambrakakis et al. 2022).

The Government has recently undertaken some initiatives for the utilisation of the geothermal potential of Greece with the support of the Hellenic Authority for Geological and Mining Research (EAGME) and its Department of Geothermal and Thermal Natural Resources (GEOTHE).

The Organisation (EAGME) also has a branch in Crete and we intend to draw relevant data (if any) upon request.

## 5.3 H&C final uses and market

### 5.3.1 Building stock

Relevant data on building stock features (age, thermal insulation, etc.) is available from the Population & Housing Census 2011 and Census 2021. These data have been incorporated into the SECAP of the municipality.



The Plan for the Energy Efficiency of Municipal Buildings which was recently elaborated was based on these previous works. Some data regarding the results after the Energy upgrading interventions can only be drawn from the municipality after written request.

<b>Municipality:</b>	Chania
<b>Category of data:</b>	Buildings
<b>Type of data</b>	.xls, .pdf
<b>Source</b>	National Census 2021
<b>Type of source</b>	Census, SECAP, MPEEB
<b>Source responsible body</b>	National Statistical Authority, Municipality
<b>Source contact person</b>	Mr Fotakis
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• Census: by everybody</li> </ul> SECAP, MPEEB: restricted access,
	Way of access <ul style="list-style-type: none"> <li>• through portal/website upon written/email request</li> </ul>
	for free
	Data format <ul style="list-style-type: none"> <li>• xls</li> </ul> pdf
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• National, Regional, Municipal</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• Public Buildings through SECAP, MPEEB</li> <li>• Private buildings (Households) through Statistics.gr</li> </ul>
<b>Frequency</b>	Yearly
<b>Quality of data</b>	
Good quality of data, recent studies, perhaps not covering the whole range but enough to draw safe references.	

### 5.3.2 Heating and cooling equipment

Data on the heating availability and equipment is available from the Hellenic Statistical Authority per municipality and municipal community (Building Census 2021). In particular data refer to number of dwellings “With heating” or “without heating” and the Type of heating (Central heating, of which: “other type of heating”,



“Central autonomous heating”, “Central non-autonomous heating”) per municipality and municipal community.

<b>Municipality:</b>	Chania
<b>Category of data:</b>	Buildings
<b>Type of data</b>	.xls,
<b>Source</b>	National Building Census 2021
<b>Type of source</b>	Census 2021
<b>Source responsible body</b>	Hellenic Statistical Authority
<b>Source contact person</b>	Available <a href="#">online</a>
<b>Availability and accessibility</b>	Who can access Census: by everybody
	Way of access through portal/website
	Type of access for free
	Data format xls
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• National</li> <li>• Regional</li> <li>• Intermunicipal/county</li> <li>• Municipal</li> <li>• Municipal community</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector: residential</li> <li>• By final use: heating</li> </ul>
<b>Frequency</b>	Yearly
<b>Quality of data</b>	
Good quality, recent data referring to heating availability and basic equipment.	



# H&C DATA ASSESSMENT

# ITALY





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## 1. INTRODUCTION

In Task 2.2 the framework of existing and reachable available data and information regarding H&C energy needs and energy demand, in each beneficiary municipality, has been defined and evaluated, so that suitable methodologies and tools for H&C plans development can be prepared and customized in T2.3 and T3.2

For each category and type of data a specific factsheet has been filled in, including all the necessary information.

In the following, factsheets have been then collected for Italy, according to the data sources level (national and/or regional and/or municipal).





## 2. THE NATIONAL LEVEL

### 2.1 Weather

<b>Municipality:</b> National territory	
<b>Category of data:</b> Weather	
<b>Type of data:</b> Temperature, precipitation, climate trends and recent extreme events	
<b>Source:</b> SNPA – Sistema Nazionale per la Protezione dell’Ambiente	
<b>Type of source</b>	Annual report: SNPA, Il clima in Italia nel 2023, Report ambientali SNPA, n. 42/2024
<b>Source responsible body</b>	SNPA
<b>Source contact person</b>	Not applicable
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• everybody</li> </ul>
	Way of access: <ul style="list-style-type: none"> <li>• through portal/website</li> </ul>
	Type of access: <ul style="list-style-type: none"> <li>• free access</li> </ul>
	Data format: <ul style="list-style-type: none"> <li>• pdf</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• National</li> <li>• Regional</li> <li>• Intermunicipal/county (in a few cases)</li> </ul>
<b>Aggregation level</b>	Not applicable
<b>Frequency</b>	Yearly
<b>Quality of data</b>	
The SNPA Report “The climate in Italy in 2023” outlines the main features of climate during 2023 and updates the estimate of climate variations over the last decades in Italy. The first part illustrates climate trends at the national scale. The second one is composed of in-depth analyses on the climate at the national, regional, and local scales and on most relevant events of 2023.	



## 2.2 Final energy consumption and sources for H&C

### 2.2.1 Energy balance

<b>Municipality:</b> National territory
<b>Category of data:</b> Final consumptions of fuels and energy sources for H&C
<b>Type of data:</b> Electricity consumptions
<b>Source:</b> TERNA

<b>Type of source</b>	electricity system statistics
<b>Source responsible body</b>	TERNA – National electricity transmission network operator
<b>Source contact person</b>	No contact person
<b>Availability and accessibility</b>	Who can access: <ul style="list-style-type: none"> <li>everybody</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>through portal/website  <a href="https://dati.terna.it/fabbisogno/dati-statistici#consumi/energia-elettrica-settore">https://dati.terna.it/fabbisogno/dati-statistici#consumi/energia-elettrica-settore</a>  <a href="https://www.pniecmonitoraggio.it/Argomenti/Monitoraggio/Pagine/default.aspx">https://www.pniecmonitoraggio.it/Argomenti/Monitoraggio/Pagine/default.aspx</a> </li> </ul>
	Type of access: <ul style="list-style-type: none"> <li>for free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>html</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>National</li> <li>Regional</li> <li>By province</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>Sectors (residential, tertiary, industry, agriculture)</li> </ul>
<b>Frequency</b>	Yearly (from 2000 to 2023)

<b>Quality of data</b>

<b>Municipality:</b> National territory
<b>Category of data:</b> Final consumptions of fuels and energy sources for H&C
<b>Type of data:</b> Natural gas consumptions
<b>Source:</b> Ministero dell'ambiente e della sicurezza energetica



<b>Type of source</b>	Energy statistics
<b>Source responsible body</b>	Ministero dell'ambiente e della sicurezza energetica
<b>Source contact person</b>	No contact person
<b>Availability and accessibility</b>	Who can access: <ul style="list-style-type: none"> <li>everybody</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>through portal/website <a href="https://sisen.mase.gov.it/dgsaie/consumi-regionali-gas-naturale">https://sisen.mase.gov.it/dgsaie/consumi-regionali-gas-naturale</a></li> </ul>
	Type of access: <ul style="list-style-type: none"> <li>for free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>xls</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>National</li> <li>Regional</li> <li>By province</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>Macro-sectors (industry, electric energy production, industry, distribution networks)</li> </ul>
<b>Frequency</b>	Yearly (from 2002 to 2024)

<b>Quality of data</b>
The quality of data is good and a yearly update is ensured so that trends of consumptions can be recorded.

<b>Municipality:</b> National territory
<b>Category of data:</b> Final consumptions of fuels and energy sources for H&C
<b>Type of data:</b> Oil fuels (heating oil, diesel, gasoline, LPG)
<b>Source:</b> Ministero dell'ambiente e della sicurezza energetica

<b>Type of source</b>	Energy statistics
<b>Source responsible body</b>	Bollettino petrolifero
<b>Source contact person</b>	No contact person
<b>Availability and accessibility</b>	Who can access: <ul style="list-style-type: none"> <li>everybody</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>through portal/website <a href="https://sisen.mase.gov.it/dgsaie/bollettino-petrolifero">https://sisen.mase.gov.it/dgsaie/bollettino-petrolifero</a></li> </ul>



	Type of access: <ul style="list-style-type: none"> <li>• for free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls (from 2015)</li> <li>• html (before 2015)</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• National</li> <li>• Regional</li> <li>• By province</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• Macro-sectors (mobility, heating, agriculture)</li> </ul>
<b>Frequency</b>	Monthly and Yearly (from 2003 to 2025)

<b>Quality of data</b>
The data refer to fuels sale and not to real consumption (they include stocking).

## 2.2.2 Renewable energy and district heating

<b>Municipality:</b> All municipalities of the national territory
<b>Category of data:</b> Final consumptions of fuels and energy sources for H&C
<b>Type of data:</b> Renewables (solar photovoltaic, geothermal, hydroelectric, bioenergy, wind power)
<b>Source:</b> GSE: Atlaimpianti – PNIEC monitoring

<b>Type of source</b>	Cadaster
<b>Source responsible body</b>	GSE - Gestore Servizi Energetici
<b>Source contact person</b>	No contact person
<b>Availability and accessibility</b>	Who can access: <ul style="list-style-type: none"> <li>• everybody</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• through portal/website Atlaimpianti - <a href="https://www.gse.it/dati-e-scenari/atlaimpianti">https://www.gse.it/dati-e-scenari/atlaimpianti</a> PNIEC Monitoraggio <a href="https://www.pniecmonitoraggio.it/Argomenti/Monitoraggio/Pagine/default.aspx">https://www.pniecmonitoraggio.it/Argomenti/Monitoraggio/Pagine/default.aspx</a></li> </ul>
	Type of access: <ul style="list-style-type: none"> <li>• for free, but only through private browsing</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls (Atlaimpianti)</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• National</li> </ul>



	<ul style="list-style-type: none"> <li>• Regional</li> <li>• Municipal</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• Type of renewable energy</li> </ul>
<b>Frequency</b>	Yearly

<b>Quality of data</b>	
<p>The data can be consulted on the platforms and downloaded from Atlampianti in .xls format. The data of Atlampianti has not been updated from July 2021.</p>	

<b>Municipality:</b> All municipalities of the national territory
<b>Category of data:</b> Final consumptions of fuels and energy sources for H&C
<b>Type of data:</b> District heating and Cooling plants
<b>Source:</b> ENEA - National Agency for New Technologies, Energy and Sustainable Economic Development

<b>Type of source</b>	Cadaster
<b>Source responsible body</b>	ENEA - National Agency for New Technologies, Energy and Sustainable Economic Development
<b>Source contact person</b>	Antonio Disi
<b>Availability and accessibility</b>	Who can access: <ul style="list-style-type: none"> <li>• only Public Body/LAs</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• official request via certified email to the email address <a href="mailto:segreteria.duee@enea.it">segreteria.duee@enea.it</a></li> </ul>
	Type of access official request via certified email
	Data format <ul style="list-style-type: none"> <li>• pdf</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• National (free)</li> <li>• Regional (free)</li> <li>• Municipal (upon request)</li> </ul>
<b>Aggregation level</b>	By type of renewable energy
<b>Frequency</b>	Yearly

<b>Quality of data</b>	
<p>National and regional data available from ENEA publications. To obtain the municipal data is necessary a specific request by mail from the Municipality that must specify the reasons for the request.</p>	



<b>Municipality:</b> All municipalities of the national territory
<b>Category of data:</b> Final consumptions of fuels and energy sources for H&C
<b>Type of data:</b> District Heating and Cooling plants
<b>Source:</b> AIRU – National association of urban heating

<b>Type of source</b>	Statistical yearbook (publication)
<b>Source responsible body</b>	AIRU
<b>Source contact person</b>	No contact person
<b>Availability and accessibility</b>	Who can access: <ul style="list-style-type: none"> <li>• everybody</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• upon request through portal/website</li> </ul>
	Type of access: <ul style="list-style-type: none"> <li>• for free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• pdf</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• National</li> <li>• Regional</li> <li>• Municipal</li> </ul>
<b>Aggregation level</b>	Technical factsheets about each existing DHC network
<b>Frequency</b>	Yearly

<b>Quality of data</b>
The quality of data is very good. Detailed information are provided concerning: heated and cooled volume by sector (residential, tertiary, industry), type and age of plants, electric and thermal power installed, fuels consumption, energy produced and distributed by sector, network length.



## 2.3 H&C final uses and market

### 2.3.1 The residential building stock

<b>Municipality:</b> All municipalities of the national territory
<b>Category of data:</b> H&C final uses and market
<b>Type of data:</b> The residential building stock characteristics (image, n° of dwellings/buildings, n° of floors, etc.)
<b>Source:</b> ISTAT – Istituto nazionale di Statistica

<b>Type of source</b>	Census
<b>Source responsible body</b>	ISTAT – Censimento popolazione e abitazioni
<b>Source contact person</b>	Not available
<b>Availability and accessibility</b>	Who can access: <ul style="list-style-type: none"> <li>• everybody</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• through portal/website</li> </ul>
	Type of access: <ul style="list-style-type: none"> <li>• free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• National</li> <li>• Regional</li> <li>• Municipal</li> <li>• Sub-municipal</li> </ul>
<b>Aggregation level</b>	Data available: <ul style="list-style-type: none"> <li>• N° and age of buildings</li> <li>• n° of dwellings/building</li> <li>• total surface of dwellings</li> <li>• n° of floors/building</li> </ul>
<b>Frequency</b>	Every 10 years (2001,2011,2021)

#### Quality of data

The data of the 2021 census are not available for all municipalities yet.



### 2.3.2 Interventions to improve energy performance

<b>Municipality:</b> All municipalities of the national territory
<b>Category of data:</b> H&C final uses and market
<b>Type of data:</b> tax deductions for energy efficiency and the use of renewable energy sources in existing buildings
<b>Source:</b> ENEA

<b>Type of source</b>	Statistics
<b>Source responsible body</b>	ENEA – Energy efficiency department
<b>Source contact person</b>	Not available
<b>Availability and accessibility</b>	Who can access: <ul style="list-style-type: none"> <li>• everybody (regional data)</li> <li>• LSAs (data at municipal level)</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• through portal/website (regional data)</li> <li>• upon written request/email (data at municipal level)</li> </ul>
	Type of access: <ul style="list-style-type: none"> <li>• for free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• pdf, xls</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• National</li> <li>• Regional</li> <li>• Municipal</li> </ul>
<b>Aggregation level</b>	<p>Overview of investments activated in as a result of tax deduction mechanisms and of the energy savings achieved. Main data available:</p> <ul style="list-style-type: none"> <li>• Type and n° of interventions</li> <li>• Type and n° of building structures involved</li> <li>• Surface involved (total and per intervention)</li> <li>• Energy saving (total and per intervention)</li> <li>• Surface of solar thermal plants</li> <li>• kWp od PV plants</li> </ul>
<b>Frequency</b>	Yearly, from 2007

<b>Quality of data</b>
The quality of data at municipal level is very good and provide useful information concerning the trends of interventions.



## 3. THE REGIONAL LEVEL

### 3.1 Weather

#### 3.1.1 Climate data

<b>Municipality:</b> Friuli Venezia Giulia region	
<b>Category of data:</b> Climate	
<b>Type of data:</b> Temperature (historical data)	
<b>Source:</b> ARPA FVG – OSMER website	
<b>Type of source</b>	<ul style="list-style-type: none"> <li>• Database</li> <li>• Statistical release</li> </ul>
<b>Source responsible body</b>	OSMER FVG – ARPA FVG (Regional Meteorological Observatory and Natural Risk Management Dept. of the Regional Agency for Environmental Protection of Friuli Venezia Giulia)
<b>Source contact person</b>	Not applicable
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• everybody</li> </ul>
	Way of access: <ul style="list-style-type: none"> <li>• through portal/website</li> </ul>
	Type of access: <ul style="list-style-type: none"> <li>• free access</li> </ul>
	Data format: <ul style="list-style-type: none"> <li>• pdf</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal (not for all the municipalities)</li> <li>• 40 meteorological stations in total scattered on the regional territory (Udine and Pordenone included)</li> </ul>
<b>Aggregation level</b>	Station summary tables are available for this dataset: daily minimum, mean or maximum temperatures
<b>Frequency</b>	Summary elaborates are produced at decadal, monthly and annual levels



Quality of data
<p>Data are available for the beneficiary municipalities but not for all the municipalities of the region. The data format is not easy to use for further elaborations.</p> <p>The elaborations cover the following standard statistics:</p> <ul style="list-style-type: none"> <li>• daily minimum temperature: average and minimum data over the period (decade, month and year);</li> <li>• average daily temperature: average, minimum and maximum data over the period (decade, month and year);</li> <li>• daily maximum temperature: average, minimum and maximum data over the period (decade, month and year);</li> <li>• number of cold days (temp. min &lt; 0°C) in the period (decade, month and year);</li> <li>• number of warm days (temp. min &gt; 0°C or temp. max &gt; 25°C or temp. max &gt; 30°C) in the period (decade, month and year);</li> <li>• cumulative heating degree days over the period (month and year).</li> </ul> <p>No urban heat island effects data</p>

<b>Municipality:</b> Friuli Venezia Giulia region
<b>Category of data:</b> Climate
<b>Type of data:</b> Temperature (historical data)
<b>Source:</b> ARPA FVG, 2023. La temperatura in Friuli Venezia Giulia - Schede climatiche (OSMER website)

<b>Type of source</b>	Homogeneous climate zone report and climate sheets
<b>Source responsible body</b>	OSMER FVG – ARPA FVG (Regional Meteorological Observatory and Natural Risk Management Dept. of the Regional Agency for Environmental Protection of Friuli Venezia Giulia)
<b>Source contact person</b>	Not applicable
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• everybody</li> </ul>
	Way of access: <ul style="list-style-type: none"> <li>• through portal/website</li> <li>• download a report</li> </ul>
	Type of access: <ul style="list-style-type: none"> <li>• free access</li> </ul>
	Data format: pdf



<b>Geographical scale</b>	Clusters of municipalities
<b>Aggregation level</b>	By climate homogeneity
<b>Frequency</b>	Data processed for the 30-year period 1991-2020

<p><b>Quality of data</b></p> <p>The data can be viewed online via the provided link by selecting the municipality and its homogeneous climate zone by clicking on the area of interest on the map. It is not possible to search by municipality name. The user will then be redirected to a PDF file containing several climate sheets for the entire region. Section A of the document contains descriptive sheets with a brief description of the thermometric regime for each area with similar thermal characteristics:</p> <ul style="list-style-type: none"> <li>• Annual average temperature</li> <li>• Average monthly temperatures</li> <li>• Absolute minimum temperatures</li> <li>• Absolute maximum temperatures</li> </ul> <p>Also 3 graphs are included for each area depicting average monthly temperature trends (max, min and median) for a number of locations representative of these thermally homogeneous areas. Section B of the document provides useful references for statistical data processing. Section C finally provides reference to the registry of the stations used to record the data, including the characteristics and location of the meteorological stations.</p> <p>The same procedure can be followed to obtain information on rainfall, wind regime and solar radiation. For each of these, a file containing climate sheets divided into homogeneous zones according to the characteristic being investigated can be accessed.</p> <p>For more general information on temperatures, it is possible to refer to the document “Il Clima del Friuli Venezia Giulia”, which provides an overview of the climate in the region over the thirty-year period from 1991 to 2020. The document is available on the website <a href="http://www.meteo.fvg.it">www.meteo.fvg.it</a> in the Climate/Descriptive Documents, Reports and In-Depth Studies section (see next table).</p>
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<b>Municipality:</b> Friuli Venezia Giulia region
<b>Category of data:</b> Climate
<b>Type of data:</b> Temperature (historical data)
<b>Source:</b> ARPA FVG, 2023. La temperatura in Friuli Venezia Giulia - Schede climatiche (OSMER website)

<b>Type of source</b>	Homogeneous climate zone report and climate sheets
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<b>Source responsible body</b>	OSMER FVG – ARPA FVG (Regional Meteorological Observatory and Natural Risk Management Dept. of the Regional Agency for Environmental Protection of Friuli Venezia Giulia)
<b>Source contact person</b>	Not applicable
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• everybody</li> </ul>
	Way of access: <ul style="list-style-type: none"> <li>• through portal/website</li> <li>• download a report</li> </ul>
	Type of access: <ul style="list-style-type: none"> <li>• free access</li> </ul>
	Data format: pdf
<b>Geographical scale</b>	Regional
<b>Aggregation level</b>	By climate homogeneity
<b>Frequency</b>	Data processed for the 30-year period 1991-2020

<b>Quality of data</b>
<p>An informative document intended to furnish the reader with basic information regarding the climate of Friuli Venezia Giulia. The annexes to this document contain:</p> <ul style="list-style-type: none"> <li>• Annual maps of min, med and max temperatures; summer days; frost days; tropical nights; rainfall; rainy days</li> <li>• B. Monthly minimum temperature maps</li> <li>• C. Monthly medium temperature maps</li> <li>• D. Monthly maximum temperature maps</li> <li>• E. Monthly rainfall maps</li> <li>• F. Monthly rainfall day maps</li> <li>• G. Seasonal maps showing the number of consecutive days without rain</li> <li>• H. Notes on climate change in Friuli Venezia Giulia.</li> </ul> <p>The relevant raster can also be downloaded from the 'Climate/Climate Maps (Raster)' section of the <a href="http://www.meteo.fvg.it">www.meteo.fvg.it</a> website</p>

<b>Municipality:</b> Municipalities in the North-East of Italy
<b>Category of data:</b> Climate
<b>Type of data:</b> Climate future projections
<b>Source:</b> Piattaforma Clima Nord-Est



<b>Type of source</b>	Interactive web platform
<b>Source responsible body</b>	ARPAV-ARPA FVG (Regional Agencies for Environmental Protection of Veneto and Friuli Venezia Giulia)
<b>Source contact person</b>	Not applicable
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• everybody</li> </ul>
	Way of access: <ul style="list-style-type: none"> <li>• through portal/website</li> </ul>
	Type of access: <ul style="list-style-type: none"> <li>• free access</li> </ul>
	Data format: <ul style="list-style-type: none"> <li>• online consultation or data downloadable in NETCDF format</li> </ul>
<b>Geographical scale</b>	Municipal (Udine and Pordenone included)
<b>Aggregation level</b>	By climate homogeneity
<b>Frequency</b>	Not applicable
<b>Quality of data</b>	
<p>Available indicators (selected for H&amp;C purposes):</p> <ul style="list-style-type: none"> <li>• Mean temperature (TAS)</li> <li>• Minimum temperature (TASMIN)</li> <li>• Maximum temperature (TASMAX)</li> <li>• Tropical nights (TR)</li> <li>• Summer days (SU30)</li> <li>• Frost days (FD)</li> <li>• Duration of heatwaves (HWDI)</li> <li>• Heating degree days (HDDs)</li> <li>• Cooling degree days (CDDs)</li> <li>• Dry days (CDD)</li> </ul> <p>No urban heat island effects data</p>	



<b>Municipality:</b> Friuli Venezia Giulia region
<b>Category of data:</b> Climate
<b>Type of data:</b> Temperature (historical data and future projections)
<b>Source:</b> ARPA FVG, 2018. Studio conoscitivo dei cambiamenti climatici e di alcuni loro impatti in Friuli Venezia Giulia - Primo report

<b>Type of source</b>	Report
<b>Source responsible body</b>	ARPA FVG
<b>Source contact person</b>	Not applicable
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• everybody</li> </ul>
	Way of access: <ul style="list-style-type: none"> <li>• through portal/website</li> </ul>
	Type of access: <ul style="list-style-type: none"> <li>• free access</li> </ul>
	Data format: <ul style="list-style-type: none"> <li>• pdf</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Regional</li> <li>• Similar climatic zones</li> </ul>
<b>Aggregation level</b>	Not applicable
<b>Frequency</b>	Not applicable

<b>Quality of data</b>
<p>Historical data (average annual regional data based on reference period 1990-2018):</p> <ul style="list-style-type: none"> <li>• T mean</li> <li>• Heat waves (avg. duration)</li> <li>• Tropical nights</li> <li>• Summer days</li> <li>• Cold days</li> </ul> <p>Future projections (average annual regional projections):</p> <ul style="list-style-type: none"> <li>• Tmean</li> <li>• Heat waves (avg. duration)</li> <li>• Tropical nights (specific data available for Trieste, Udine, Pordenone, Gorizia and Tolmezzo)</li> <li>• Summer days (specific data available for Trieste, Udine, Pordenone, Gorizia and Tolmezzo)</li> </ul>



- Cooling Degree Days and Heating Degree Days
- Cold days (specific data available for Trieste, Udine, Pordenone, Gorizia and Tolmezzo)

<b>Municipality:</b> Sicilia region	
<b>Category of data:</b> Weather	
<b>Type of data:</b> Weather data (series of maximum temperature, minimum temperature and precipitation)	
<b>Source:</b> Sicily region – Assessorato Risorse Agricole e Alimentari, dipartimento Interventi Infrastrutturali	
<b>Type of source</b>	Statistical release
<b>Source responsible body</b>	SIAS – Servizio Informativo Agrometeorologico Siciliano
<b>Source contact person</b>	Not available
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• accessible to general public</li> </ul>
	Way of access: <ul style="list-style-type: none"> <li>• through portal/website upon registration</li> </ul>
	Type of access: free access
	Data format: xls, pdf, html, shp
<b>Geographical scale</b>	Regional Municipal Measurements at the weather stations
<b>Aggregation level</b>	Available data: <ul style="list-style-type: none"> <li>• Minimum temperature</li> <li>• Maximum temperature</li> <li>• Precipitation</li> </ul>
<b>Frequency</b>	Not available
<b>Quality of data</b>	
Data are available for the beneficiary municipalities but not for all the municipalities of the region. The data format is not easy to use for further elaborations.	



## 3.2 Final energy consumption and sources for H&C

### 3.2.1 Energy balance

<b>Municipality:</b> Pordenone - Udine
<b>Category of data:</b> Final consumptions of fuels and energy sources for H&C
<b>Type of data:</b> Natural gas-Diesel-GPL-Woody biomass
<b>Source:</b> ARPA FVG

<b>Type of source</b>	Database
<b>Source responsible body</b>	ARPA FVG
<b>Source contact person</b>	Alessandra Petrini
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• only Municipalities</li> <li>• only technicians/researchers</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• official request via platform</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• other: data provided in response to official request</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector (tertiary, residential, industry)</li> </ul>
<b>Frequency</b>	<ul style="list-style-type: none"> <li>• Yearly</li> </ul>

#### Quality of data

The data provided is of good quality, although it is still an estimate based on the processing of data from various sources (primarily data from the petroleum bulletin, which provides information at the provincial level).

<b>Municipality:</b> Pordenone - Udine
<b>Category of data:</b> Final consumptions of fuels and energy sources for H&C
<b>Type of data:</b> Diesel-heating oil
<b>Source:</b> Oil Bulletin

<b>Type of source</b>	Database
<b>Source responsible body</b>	ARPA FVG



<b>Source contact person</b>	No contact person
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• everybody</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• through portal/website <a href="https://sisen.mase.gov.it/dgsaie/bollettino-petrolifero">https://sisen.mase.gov.it/dgsaie/bollettino-petrolifero</a></li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• for free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Provincial</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By use (heating, engines, agricultural)</li> </ul>
<b>Frequency</b>	Monthly
<b>Quality of data</b>	
The data relate mainly to fuels (petrol, diesel), but there are also entries for heating oil and fuel oil	

### 3.3 H&C final uses and market

#### 3.3.1 Energy performance of buildings

<b>Municipality:</b> Friuli Venezia Giulia region	
<b>Category of data:</b> Energy performance certificate	
<b>Type of data:</b> Energy performance certificate (APE – Attestazione Prestazione Energetica)	
<b>Source:</b> Energy performance assessment database	
<b>Type of source</b>	Database
<b>Source responsible body</b>	FVG ENERGIA
<b>Source contact person</b>	None
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• everybody</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• through portal/website <a href="https://fvgenergia.it/extcenedfvg/html/public/visuraApe.jsf">https://fvgenergia.it/extcenedfvg/html/public/visuraApe.jsf</a></li> </ul>
	Type of access



	<ul style="list-style-type: none"> <li>• for free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• other (PDF)</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Other (single building)</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector (e.g. residential, tertiary, industry, etc.)</li> </ul>
<b>Frequency</b>	<ul style="list-style-type: none"> <li>• Other (one-time)</li> </ul>

<b>Quality of data</b>
The assessments are freely available to anyone upon registration. As each energy performance certificate is based on the total energy consumption of a single building, details about heating and cooling are not provided.

<b>Municipality:</b> Sicily region municipalities
<b>Category of data:</b> Energy performance certificate
<b>Type of data:</b> Energy performance certificate (APE – Attestazione Prestazione Energetica)
<b>Source:</b> Sicilia region

<b>Type of source</b>	Register
<b>Source responsible body</b>	APE-Sicilia System
<b>Source contact person</b>	Elena Gangi Tel. 091.7230.851 - Cell. 366.3302.447 Cinzia Catalano Tel. 091.7230.857 servizio1.energia@regione.sicilia.it
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• everybody</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• through portal/website upon registration</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• for free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• other (PDF)</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Other (single building)</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector (e.g. residential, tertiary, industry, etc.)</li> </ul>
<b>Frequency</b>	<ul style="list-style-type: none"> <li>• Other (one-time)</li> </ul>

<b>Quality of data</b>
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The assessments are freely available to anyone upon registration. As each energy performance certificate is based on the total energy consumption of a single building, details about heating and cooling are not provided.

### 3.3.2 Heating systems

<b>Municipality:</b> Udine and Pordenone
<b>Category of data:</b> H&C final uses and market
<b>Type of data:</b> Heating systems
<b>Source:</b> FVG Energia - Data thermal plants FVG

<b>Type of source</b>	Cadastre
<b>Source responsible body</b>	FVG ENERGIA
<b>Source contact person</b>	No contact person
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>Professionals after signup and verification, for thermal plants cadastre</li> <li>Common citizens, after SPID/CIE verification (only for own thermal plant)</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>through portal/website <a href="https://fvgenergia.it/impianti-termici/impianti-termici.html">https://fvgenergia.it/impianti-termici/impianti-termici.html</a></li> </ul>
	Type of access <ul style="list-style-type: none"> <li>for free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>To verify</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>Other (single user)</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>By sector (e.g. residential, tertiary, industry, etc.)</li> </ul>
<b>Frequency</b>	<ul style="list-style-type: none"> <li>To verify</li> </ul>

<b>Quality of data</b>
The publication of data has not yet been made by FVG Energia: on the web site it is written that it is being drafted.

<b>Municipality:</b> Sicily region municipalities
<b>Category of data:</b> H&C final uses and market
<b>Type of data:</b> Heating systems



<b>Source:</b> Sicily region	
<b>Type of source</b>	Cadastre
<b>Source responsible body</b>	CURI - Catasto Unico Regionale Impianti
<b>Source contact person</b>	catasto@curi.it
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• Professionals for thermal plants cadastre</li> <li>• LPAs</li> <li>• Common citizens</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• through portal/website upon registration</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• for free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> </ul>
<b>Aggregation level</b>	Data available for each plant: <ul style="list-style-type: none"> <li>• Type of plant</li> <li>• Power (kw)</li> <li>• N° of boilersSeveral</li> <li>• Type of fuel</li> <li>• Producer and model</li> <li>• Municipal plant</li> <li>• Name</li> <li>• Address</li> <li>• RCEE deadline</li> </ul>
<b>Frequency</b>	<ul style="list-style-type: none"> <li>• Periodic</li> </ul>
<b>Quality of data</b>	
Several important data are not provided, such as: type of users (residential, tertiary, etc.), heated volume, age of the plant, hot water/cooling.	



## 4. MUNICIPALITY OF UDINE AND PORDENONE

### 4.1 Weather

#### 4.1.1 Heat islands

<b>Municipality:</b> Udine
<b>Category of data:</b> Climate
<b>Type of data:</b> Urban heat islands effects
<b>Source:</b> Longato and Marango, 2024

<b>Type of source</b>	Scientific paper: Longato, D. and Maragno D. 2024. Mapping the vulnerability to urban heat island combining satellite and ecosystem service data: a case study in Udine (Italy). Firenze University Press. CONTESTI CITTÀ TERRITORI PROGETTI. DOI: 10.13128/contest-14816
<b>Source responsible body</b>	IUAV University of Venice – Dept. of Architecture and Arts
<b>Source contact person</b>	Davide Longato and Denis Maragno
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• everybody</li> </ul>
	Way of access: <ul style="list-style-type: none"> <li>• through portal/website</li> </ul>
	Type of access: <ul style="list-style-type: none"> <li>• free access</li> </ul>
	Data format: <ul style="list-style-type: none"> <li>• pdf</li> </ul>
<b>Geographical scale</b>	Municipal
<b>Aggregation level</b>	Not available
<b>Frequency</b>	Not available

<b>Quality of data</b>
The paper proposes a simple and replicable method for assessing the vulnerability of cities to the urban heat island effect (UHI). The method combines satellite data on land surface temperature (LST) with information on the ability of ecosystems to provide cooling benefits to the climate.



The approach is simplified and based on standardised data and maps that may not represent the smallest urban green. Future developments could include integration with socio-demographic data to combine physical and social vulnerability.

## 4.2 Final energy consumption and sources for H&C

### 4.2.1 Municipal buildings and facilities

<b>Municipality:</b> Udine	
<b>Category of data:</b> Final consumptions of fuels and energy sources for H&C	
<b>Type of data:</b> Municipality consumption: electricity, natural gas, diesel, LPG	
<b>Source:</b> Municipality of Udine	
<b>Type of source</b>	Database - Excel
<b>Source responsible body</b>	Municipality of Udine
<b>Source contact person</b>	Paola Rovella
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• only Public Body/LAs</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• official request via email</li> <li>• consulting SECAP</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• Data provided in response to email</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> </ul>
<b>Geographical scale</b>	Single municipal building
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sub-sector (Public buildings)</li> </ul>
<b>Frequency</b>	<ul style="list-style-type: none"> <li>• Monthly</li> </ul>
<b>Quality of data</b>	
<p>The data quality is excellent; consumption is accurately recorded in Excel files for all types of energy carriers (electricity, natural gas, diesel) for each municipal building, with monthly frequency.</p> <p>Regarding the percentage of consumption attributable to cooling, the Municipality has an estimate of electricity consumption for cooling, derived within the framework of ISO 50001 certification. It</p>	



is possible to estimate the percentage of natural gas, diesel and LPG consumption attributable to space heating.

<b>Municipality:</b> Pordenone
<b>Category of data:</b> Final consumptions of fuels and energy sources for H&C
<b>Type of data:</b> Municipality consumption: electricity, natural gas, LPG
<b>Source:</b> Municipality of Pordenone

<b>Type of source</b>	Database - Excel
<b>Source responsible body</b>	Municipality of Pordenone
<b>Source contact person</b>	Giorgio Boz
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• only Public Body/LAs</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• official request via email</li> <li>• consulting SECAP</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• other: data provided in response to email</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Single municipal building</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By final use (Seven different categories of use)</li> </ul>
<b>Frequency</b>	<ul style="list-style-type: none"> <li>• Yearly</li> </ul>

<b>Quality of data</b>
<p>The data quality is excellent; consumption is accurately recorded in Excel files for all types of energy carriers (electricity, natural gas, LPG) for each municipal building.</p> <p>The data frequency is annual (to be verified whether monthly data is also available for some cases).</p> <p>It is possible to estimate the proportion of natural gas, diesel and LPG consumption that is attributable to space heating. However, the Municipality currently does not have any data or estimates for the percentage of consumption attributable to cooling.</p>

## 4.2.2 Energy balance

<b>Municipality:</b> Udine
<b>Category of data:</b> Final consumptions of fuels and energy sources for H&C



<b>Type of data:</b> Territorial consumption: electricity, natural gas, diesel, LPG
<b>Source:</b> Municipality of Udine

<b>Type of source</b>	Database - Excel
<b>Source responsible body</b>	Municipality of Udine – SECAP Udine
<b>Source contact person</b>	Paola Rovella
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• everybody</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• through portal website Covenant of Mayors</li> <li>• consulting SECAP</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• for free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> <li>• pdf</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> <li>• Single municipal building</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector (residential, tertiary, industry, etc.)</li> </ul>
<b>Frequency</b>	<ul style="list-style-type: none"> <li>• Yearly (only 2017 and 2019)</li> </ul>

<b>Quality of data</b>
<p>The data quality is good; consumption figures are reported in the document (Udine SECAP), available in PDF format. Annual data is available for the years 2017 and 2019.</p> <p>The breakdown by sector is more accurate for electricity consumption, and less so for natural gas, diesel, and LPG. It is possible to estimate the percentage of natural gas, diesel and LPG consumption attributable to space heating. As for the percentage of consumption attributable to cooling, this data is currently not available.</p>

<b>Municipality:</b> Pordenone
<b>Category of data:</b> Final consumptions of fuels and energy sources for H&C
<b>Type of data:</b> Territorial consumption: electricity, natural gas, diesel, LPG
<b>Source:</b> Municipality of Pordenone

<b>Type of source</b>	<ul style="list-style-type: none"> <li>• Database - Excel</li> </ul>
<b>Source responsible body</b>	Municipality of Pordenone



<b>Source contact person</b>	Giorgio Boz
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• everybody</li> <li>• only Public Body/LAs</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• through portal/website Covenant of Mayors</li> <li>• consulting SECAP</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• for free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> <li>• pdf</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> <li>• Single municipal building</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector (residential, tertiary, industry, etc.)</li> </ul>
<b>Frequency</b>	<ul style="list-style-type: none"> <li>• Yearly (only 2017 and 2019)</li> </ul>

<b>Quality of data</b>
<p>The data quality is good; consumption figures are reported in the monitoring documents of the Pordenone SEAP, available in PDF format. Annual data is available for the years 2018, 2019, 2020, and 2021.</p> <p>The breakdown of consumption by sector is more accurate for electricity, and less precise for natural gas, diesel, and LPG. It is possible to estimate the percentage of natural gas, diesel and LPG consumption attributable to space heating. As for the percentage of consumption attributable to cooling, this data is currently not available.</p>

<b>Municipality:</b> Pordenone – Udine
<b>Category of data:</b> Final consumptions of fuels and energy sources for H&C
<b>Type of data:</b> Electricity
<b>Source:</b> E-Distribuzione

<b>Type of source</b>	Database
<b>Source responsible body</b>	E-Distribuzione
<b>Source contact person</b>	None
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• only Municipalities</li> </ul>



	Way of access <ul style="list-style-type: none"> <li>official request via certified email</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>other: data provided in response to email</li> </ul>
	Data format <ul style="list-style-type: none"> <li>other: table in pdf</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>Municipal</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>By sector (public buildings, public lighting, non-municipal tertiary, residential, industry, agriculture)</li> </ul>
<b>Frequency</b>	<ul style="list-style-type: none"> <li>Yearly</li> </ul>

<b>Quality of data</b>
<p>The data provided is reliable, and the breakdown of consumption across different sectors is accurate: for the request, E-Distribuzione provides a pre-filled form that already includes the classification by the above-mentioned sectors.</p> <p>However, it is not possible to obtain more detailed data, either by sub-sector (e.g., heating and cooling) or by time interval (e.g., monthly, daily).</p> <p>A Municipality can request data for a maximum of 4 years, which do not need to be consecutive, and may submit a new request only after 24 months from the previous one.</p>

<b>Municipality:</b> Udine and Pordenone
<b>Category of data:</b> Final consumptions of fuels and energy sources for H&C
<b>Type of data:</b> Electricity – single user
<b>Source:</b> E-distribuzione

<b>Type of source</b>	Database
<b>Source responsible body</b>	E-distribuzione
<b>Source contact person</b>	No contact person
<b>Availability and accessibility</b>	Who can access: other (anyone delegated by the final consumer)
	Way of access <ul style="list-style-type: none"> <li>through portal/website</li> </ul>
	Type of access upon registration
	Data format <ul style="list-style-type: none"> <li>other (csv)</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>Other (final consumer)</li> </ul>



<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>By sub-sector (e.g. public buildings, social housing, hotels, trade centres, etc.)</li> </ul>
<b>Frequency</b>	<ul style="list-style-type: none"> <li>Other (quarter-hourly)</li> </ul>

<b>Quality of data</b>
The data is available and freely downloadable by anyone delegated by the final consumer with a quick procedure. To be significant at a municipality level, it requires permission from several single consumers. It is extremely specific and very high-frequency (4 data points/h for every consumer)

<b>Municipality:</b> Udine
<b>Category of data:</b> Final consumptions of fuels and energy sources for H&C
<b>Type of data:</b> Natural gas
<b>Source:</b> AcegasApsAmga

<b>Type of source</b>	Database
<b>Source responsible body</b>	AcegasApsAmga
<b>Source contact person</b>	None
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>only Public Body/LAs</li> <li>only technicians/researchers</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>official request via certified email</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>other: data provided in response to email</li> </ul>
	Data format <ul style="list-style-type: none"> <li>xls</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>Municipal</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>By final use (Seven different categories of use)</li> </ul>
<b>Frequency</b>	<ul style="list-style-type: none"> <li>Yearly</li> </ul>

<b>Quality of data</b>
The data quality is excellent in terms of total energy consumption at the municipal level. The distinction between the tertiary and residential sectors must be estimated based on end uses, as this breakdown is not precisely provided by the local natural gas distributor; the data is more accurate for industrial consumption (classified under “Technological Use”).



Among the seven categories, two are relevant for cooling (“Air Conditioning Use” and “Combined Air Conditioning and Heating Use”); however, they represent a very small percentage (less than 0.1%).

The vast majority of natural gas consumption is attributable to space heating, with a non-negligible share for domestic hot water production, and only very small percentages for cooking and cooling. Data is only available on an annual basis, so it is not possible to estimate monthly consumption, which would be useful to distinguish between heating and cooling usage.

<b>Municipality:</b> Udine
<b>Category of data:</b> Final consumptions of fuels and energy sources for H&C
<b>Type of data:</b> Heat/cool from district networks
<b>Source:</b> Municipality of Udine – Siram Veolia

<b>Type of source</b>	Database
<b>Source responsible body</b>	Municipality of Udine – Siram Veolia
<b>Source contact person</b>	Paola Rovella – David Sajna
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• only Public Body/LAs</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• upon written/email request</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• other: official mail request</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> <li>• Single building for public buildings</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector (e.g. residential, tertiary, industry, etc.)</li> </ul>
<b>Frequency</b>	<ul style="list-style-type: none"> <li>• Yearly</li> </ul>

<b>Quality of data</b>
The quality of the data is good, providing detailed information on the energy consumption of each municipal building connected to the district heating network. For other types of buildings, consumption data is available by sector (residential, commercial and industrial). In addition to annual data, monthly data is eventually available upon specific request from the municipality’s technicians to the Siram Veolia operator. Since the district heating network only provides heat, data related to space heating can be estimated. While, as the DHN is not connected to the production of cold water, any cooling-related consumption cannot be traced.



<b>Municipality:</b> Udine
<b>Category of data:</b> Final consumptions of fuels and energy sources for H&C
<b>Type of data:</b> Electricity & natural gas
<b>Source:</b> University of Udine (UniUD) archives

<b>Type of source</b>	<ul style="list-style-type: none"> <li>• Other (specify)</li> </ul>
<b>Source responsible body</b>	Università degli Studi di Udine
<b>Source contact person</b>	Arch. Paolo Govetto
<b>Availability and accessibility</b>	Who can access: only technicians/researchers
	Way of access: upon written/email request
	Type of access upon request
	Data format <ul style="list-style-type: none"> <li>• xls</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Sub-municipal (UniUD buildings only)</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By building</li> </ul>
<b>Frequency</b>	<ul style="list-style-type: none"> <li>• Monthly</li> </ul>

<b>Quality of data</b>	
<p>The data is very specific to UniUD, and needs to be requested specifically to arch. Paolo Govetto. It is well-documented, though it needs some work to extract useful information, because the data is not consistently formatted.</p> <p>It contains methane gas and electricity usage and total expenses for 2024, as well as all the energy taken from the heating network.</p> <p>Arch. Paolo Govetto has kept a record for the past 15 years, so we could access data from earlier years upon request.</p>	

<b>Municipality:</b> Pordenone
<b>Category of data:</b> Final consumptions of fuels and energy sources for H&C
<b>Type of data:</b> Natural gas
<b>Source:</b> Italgas

<b>Type of source</b>	Database - Excel
<b>Source responsible body</b>	Italgas
<b>Source contact person</b>	No contact person
	Who can access



<b>Availability and accessibility</b>	<ul style="list-style-type: none"> <li>• only Public Body/LAs</li> <li>• only technicians/researchers</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• official request via certified email</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• other: data provided in response to email</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By final use (Seven different categories of use)</li> </ul>
<b>Frequency</b>	<ul style="list-style-type: none"> <li>• Yearly</li> </ul>

<b>Quality of data</b>	
<p>The data quality is excellent in terms of total energy consumption at the municipal level. The distinction between tertiary and residential sectors must be estimated based on end uses, as it is not a breakdown precisely provided by the local natural gas distributor; the data is more accurate for industrial consumption (which falls under the category “Technological Use”). Among the 7 categories, there are two relevant to cooling (“Air Conditioning Use” and “Air Conditioning + Heating Use”); however, they account for a very small percentage (less than 0.1%). The vast majority of natural gas consumption is attributable to space heating, with a significant share used for domestic hot water production, and only very small percentages for cooking and cooling.</p> <p>The data is provided only on an annual basis, so it is not possible to estimate monthly consumption (which could be useful to assess the breakdown between heating and cooling usage).</p>	

## 4.3 H&C final uses and market

### 4.3.1 Building efficiency measures

<b>Municipality:</b> Udine	
<b>Category of data:</b> H&C final uses and market	
<b>Type of data:</b> Building efficiency measures	
<b>Source:</b> Municipality of Udine	
<b>Type of source</b>	Cadaster
<b>Source responsible body</b>	Municipality of Udine
<b>Source contact person</b>	Paola Rovella



<b>Availability and accessibility</b>	Who can access: <ul style="list-style-type: none"> <li>• only Public Body/LAs</li> <li>• only technicians/researchers</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• email request</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• email request</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> <li>• Sub-municipal (Single building for municipal buildings)</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By type of intervention (insulation, replacement of windows, efficiency of heating and/or cooling systems)</li> </ul>
<b>Frequency</b>	N/A

<b>Quality of data</b>
<p>The data on building interventions are complete for municipal buildings.  For all other buildings, the municipality has data available only on the total number of buildings, and more specific data on those that have an energy performance certificate (APE).  All data for buildings with Casa Clima certification are available</p>

<b>Municipality:</b> Pordenone
<b>Category of data:</b> H&C final uses and market
<b>Type of data:</b> Building efficiency measures
<b>Source:</b> Municipality of Pordenone

<b>Type of source</b>	Cadaster
<b>Source responsible body</b>	Municipality of Pordenone
<b>Source contact person</b>	Giorgio Boz
<b>Availability and accessibility</b>	Who can access: <ul style="list-style-type: none"> <li>• only Public Body/LAs</li> <li>• only technicians/researchers</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• email request</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• email request</li> </ul>



	Data format <ul style="list-style-type: none"> <li>• xls</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> <li>• Sub-municipal (Single building for municipal buildings)</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By type of intervention (insulation, replacement of windows, efficiency of heating and/or cooling systems)</li> </ul>
<b>Frequency</b>	N/A

<b>Quality of data</b>
<p>The data on building interventions are complete for municipal buildings, partially for insulation and window replacement interventions.</p> <p>For buildings with energy certification (APE), the Municipality has complete data, for all other data is only partial. All data for buildings with Casa Clima certification are available.</p>

## 5. MUNICIPALITY OF SIRACUSA, MODICA AND VITTORIA

### 5.1 Final energy consumption and sources for H&C

#### 5.1.1 Municipal buildings and facilities

<b>Municipality:</b>	Siracusa, Modica, Vittoria
<b>Category of data:</b>	Final consumptions of fuels and energy sources for H&C
<b>Type of data:</b>	Municipality consumption: electricity, natural gas, diesel, LPG
<b>Source:</b>	Municipalities of Siracusa, Modica, Vittoria
<b>Type of source</b>	Database
<b>Source responsible body</b>	Public facilities departments
<b>Source contact person</b>	\
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• everybody</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• official request via email</li> <li>• consulting SECAPs</li> </ul>
	Type of access



	<ul style="list-style-type: none"> <li>• for free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls, pdf</li> </ul>
<b>Geographical scale</b>	Single municipal building
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sub-sector (Public buildings)</li> </ul>
<b>Frequency</b>	<ul style="list-style-type: none"> <li>• Yearly</li> </ul>

<b>Quality of data</b>	
<p>The data quality is good; consumption is provided for main energy sources (electricity, natural gas, LPG) for each municipal building. As for the municipalities of Ragusa, data and information concerning the buildings and the plants have also been collected (age, volume, type of heating plan, etc.).</p>	

### 5.1.2 Energy balance

<b>Municipality:</b> Ragusa
<b>Category of data:</b> Final consumptions of fuels and energy sources for H&C
<b>Type of data:</b> Territorial consumption: electricity, natural gas, diesel, LPG
<b>Source:</b> Municipality of Ragusa

<b>Type of source</b>	Inventory
<b>Source responsible body</b>	Municipality of Ragusa – SECAP Ragusa
<b>Source contact person</b>	\
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• everybody</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• through portal website Covenant of Mayors</li> <li>• consulting SECAP</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• for free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> <li>• pdf</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector (residential, tertiary, industry, etc.)</li> </ul>
<b>Frequency</b>	<ul style="list-style-type: none"> <li>• Yearly (only 2017 and 2019)</li> </ul>



Quality of data
The data quality is good; consumption figures are reported in the document (Udine SECAP), available in PDF format.

Municipality: Modica
Category of data: Final consumptions of fuels and energy sources for H&C
Type of data: Territorial consumption: electricity, natural gas, diesel, LPG
Source: Municipality of Pordenone

Type of source	<ul style="list-style-type: none"> <li>• Database - Excel</li> </ul>
Source responsible body	Municipality of Modica – SECAP Modica
Source contact person	\
Availability and accessibility	Who can access <ul style="list-style-type: none"> <li>• everybody</li> <li>• only Public Body/LAs</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• through portal/website Covenant of Mayors</li> <li>• consulting SECAP</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• for free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> <li>• pdf</li> </ul>
Geographical scale	<ul style="list-style-type: none"> <li>• Municipal</li> </ul>
Aggregation level	<ul style="list-style-type: none"> <li>• By sector (residential, tertiary, industry, etc.)</li> </ul>
Frequency	<ul style="list-style-type: none"> <li>• Yearly (only 2011)</li> </ul>

Quality of data
The data quality is good; consumption figures are reported in the documents of the SECAP, available in PDF format. The breakdown of consumption by sector is more accurate for electricity, and less precise for natural gas, diesel, and LPG.

Municipality: Vittoria
------------------------



<b>Category of data:</b> Final consumptions of fuels and energy sources for H&C
<b>Type of data:</b> Territorial consumption: electricity, natural gas, diesel, LPG
<b>Source:</b> Municipality of Vittoria

<b>Type of source</b>	Inventory
<b>Source responsible body</b>	Municipality of Vittoria – SECAP Vittoria
<b>Source contact person</b>	\
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• everybody</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• through portal website Covenant of Mayors</li> <li>• consulting SECAP</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• for free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> <li>• pdf</li> </ul>
<b>Geographical scale</b>	• Municipal
<b>Aggregation level</b>	• By sector (residential, tertiary, industry, etc.)
<b>Frequency</b>	• Yearly (only 2011)

<b>Quality of data</b>
The data quality is good; consumption figures are reported in the document (Udine SECAP), available in PDF format.

<b>Municipality:</b> Ragusa, Modica, Vittoria
<b>Category of data:</b> Final consumptions of fuels and energy sources for H&C
<b>Type of data:</b> Electricity
<b>Source:</b> E-Distribuzione

<b>Type of source</b>	Database
<b>Source responsible body</b>	E-Distribuzione
<b>Source contact person</b>	None
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• only Municipalities</li> </ul>



	Way of access <ul style="list-style-type: none"> <li>official request via certified email</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>data provided in response to email</li> </ul>
	Data format <ul style="list-style-type: none"> <li>table in pdf</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>Municipal</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>By sector (public buildings, public lighting, non-municipal tertiary, residential, industry, agriculture)</li> </ul>
<b>Frequency</b>	<ul style="list-style-type: none"> <li>Yearly</li> </ul>

<b>Quality of data</b>
<p>The data provided is reliable, and the breakdown of consumption across different sectors is accurate: for the request, E-Distribuzione provides a pre-filled form that already includes the classification by the above-mentioned sectors. However, it is not possible to obtain more detailed data, either by sub-sector (e.g., heating and cooling) or by time interval (e.g., monthly, daily). A Municipality can request data for a maximum of 4 years, which do not need to be consecutive, and may submit a new request only after 24 months from the previous one.</p>

<b>Municipality:</b> Ragusa, Vittoria
<b>Category of data:</b> Final consumptions of fuels and energy sources for H&C
<b>Type of data:</b> Natural gas
<b>Source:</b> Italgas Reti SpA

<b>Type of source</b>	Database
<b>Source responsible body</b>	Italgas Reti SpA
<b>Source contact person</b>	None
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>only Public Body/LAs</li> <li>only technicians/researchers</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>official request via certified email</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>data provided in response to email</li> </ul>
	Data format <ul style="list-style-type: none"> <li>xls</li> </ul>



<b>Geographical scale</b>	• Municipal
<b>Aggregation level</b>	• By final use (Seven different categories of use)
<b>Frequency</b>	• Yearly

<b>Quality of data</b>
The data quality is excellent in terms of total energy consumption at the municipal level. The distinction between the tertiary and residential sectors must be estimated based on end uses, as this breakdown is not precisely provided by the local natural gas distributor; the data is more accurate for industrial consumption (classified under “Technological Use”). Among the seven categories, two are relevant for cooling (“Air Conditioning Use” and “Combined Air Conditioning and Heating Use”).

<b>Municipality:</b> Modica
<b>Category of data:</b> Final consumptions of fuels and energy sources for H&C
<b>Type of data:</b> Natural gas
<b>Source:</b> Mediterranea Energia

<b>Type of source</b>	Database
<b>Source responsible body</b>	Mediterranea Energia
<b>Source contact person</b>	\
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• only Public Body/LAs</li> <li>• only technicians/researchers</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• official request via certified email</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• other: data provided in response to email</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> </ul>
<b>Geographical scale</b>	• Municipal
<b>Aggregation level</b>	• By final use (Seven different categories of use)
<b>Frequency</b>	• Yearly

<b>Quality of data</b>
The data quality is excellent in terms of total energy consumption at the municipal level.



The distinction between tertiary and residential sectors must be estimated based on end uses, as it is not a breakdown precisely provided by the local natural gas distributor; the data is more accurate for industrial consumption (which falls under the category “Technological Use”). Among the 7 categories, there are two relevant to cooling (“Air Conditioning Use” and “Air Conditioning + Heating Use”). The data is provided only on an annual basis.





# H&C DATA ASSESSMENT

# PORTUGAL





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## 1. INTRODUCTION

In Task 2.2 the framework of existing and reachable available data and information regarding H&C energy needs and energy demand, in each beneficiary municipality, has been defined and evaluated, so that suitable methodologies and tools for H&C plans development can be prepared and customized in T2.3 and T3.2

For each category and type of data a specific factsheet has been filled in, including all the necessary information.

In the following, factsheets have been then collected for Portugal, according to the data sources level (national and/or regional and/or municipal).



## 2. THE NATIONAL LEVEL

### 2.1 Weather

#### 2.1.1 Temperature and precipitation

<b>Municipality:</b>	Continental Portugal
<b>Category of data:</b>	Weather
<b>Type of data:</b>	Standardized Precipitation Index (SPI) with temporal integration of 3, 6, 9 and 12 months
<b>Source:</b>	<a href="https://www.ipma.pt/pt/oclima/observatorio.secas/spi/monitorizacao/servico.situacaoatual/">https://www.ipma.pt/pt/oclima/observatorio.secas/spi/monitorizacao/servico.situacaoatual/</a>
<b>Type of source</b>	Calculated parameter
<b>Source responsible body</b>	Portuguese Institute of the Sea and Atmosphere (IPMA)
<b>Source contact person</b>	IPMA Phone: +351 291 241 592
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• accessible to general public</li> </ul>
	Way of access: through portal/website
	Type of access: free access
	Data format: html (graphical representation)
<b>Geographical scale</b>	National
<b>Aggregation level</b>	Not applicable
<b>Frequency</b>	Other (period of one year that ends on the previous month)



### Quality of data

The SPI (Standardized Precipitation Index) was developed by McKee et al. (1993) and is based on standardized precipitation, which corresponds to the deviation of precipitation from the average for a specific period of time, divided by the standard deviation of the period to which this average refers. Mathematically, the SPI corresponds to the cumulative probability of a given precipitation event occurring in a season. The computational result of the standardized precipitation is linearly proportional to the precipitation deficit and allows specifying the probability, the percentage of the mean and the accumulated precipitation deficit. Based on the long series of precipitation, it is possible to say what the probability is of precipitation being less than or equal to a certain amount: low probability values indicate a drought situation; high probability values indicate a rain situation. The SPI can be calculated considering series of average periods, selected in order to determine series of time scales of  $i$  months, where  $i = 1, 2, 3, \dots, 12, \dots, 24, \dots, 48$  months. This number of months is arbitrary but typically represents time scales of important precipitation deficits that are reflected in the socioeconomic activities of modern societies. Thus, the index was developed to be a drought indicator that recognizes the importance of time scales that affect various types of water needs: soil water; groundwater; snow; flow; water reserves (dams).

### 2.1.2 Heat waves

<b>Municipality:</b>	All municipalities of Continental Portugal
<b>Category of data:</b>	Weather
<b>Type of data:</b>	Heat waves
<b>Source:</b>	<a href="https://rea.apambiente.pt/content/ondas-de-calor-e-de-frio">https://rea.apambiente.pt/content/ondas-de-calor-e-de-frio</a>
<b>Type of source</b>	Cadastre
<b>Source responsible body</b>	APA (Agência Portuguesa do Ambiente) – Portuguese Environmental Agency
<b>Source contact person</b>	APA Telephone: 214 728 262 Email: <a href="mailto:radao@apambiente.pt">radao@apambiente.pt</a>
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• accessible to general public</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• through portal/website</li> </ul>



	Type of access <ul style="list-style-type: none"> <li>• free access</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• html</li> </ul>
<b>Geographical scale</b>	National
<b>Aggregation level</b>	Number of days with heat waves
<b>Frequency</b>	Daily

<b>Quality of data</b>	
This data only refers to 2023. It would be ideal to have data from previous years, to understand the annual trend in the municipalities under study. No information about the Autonomous Regions of Madeira and Azores.	

<b>Municipality:</b> Several weather stations throughout Continental Portugal. Only Vila Real and Setúbal (from the Plan4COLD municipalities) have weather stations with this data
<b>Category of data:</b> Weather
<b>Type of data:</b> Number of heat waves per year (summer period); number of days of heat waves per year (summer period);
<b>Source:</b> <a href="https://www.ipma.pt/pt/oclima/ondascolor/">https://www.ipma.pt/pt/oclima/ondascolor/</a>

<b>Type of source</b>	Statistical release
<b>Source responsible body</b>	Portuguese Institute of the Sea and Atmosphere (IPMA)
<b>Source contact person</b>	IPMA - Phone: +351 291 241 592
<b>Availability and accessibility</b>	<ul style="list-style-type: none"> <li>• accessible to general public</li> </ul>
	Way of access: through portal/website
	Type of access: free access
	Data format: csv, json and html (graphical representation)
<b>Geographical scale</b>	<p>Other (only available for a selection of weather station locations in Continental Portugal)</p> <p>Namely, for the partner municipalities of Plan4COLD in Continental Portugal, data for the following stations is available:</p> <ul style="list-style-type: none"> <li>- Vila Real Cidade</li> <li>- Vila Real CC</li> </ul>



	- Setúbal
<b>Aggregation level</b>	Other (selected weather stations, including Vila real-Cidade, Vila real-CC and Setúbal)
<b>Frequency</b>	Annual. Period: 1941-2024

<b>Quality of data</b>	
<p>In here it is considered the heat wave duration index definition, that states that a heat wave is considered to occur when, over a period of at least 6 consecutive days, the maximum daily temperature is 5°C higher than the average daily value in the reference period. Summer refers to the period from June until August. Note that this dataset includes weather stations throughout all Continental Portugal but that do not coincide with the partner municipalities of Plan4COLD. The locations of Faro and Elvas may be used as reference for Loulé and Évora, for example.</p>	

### 2.1.3 Drought

<b>Municipality:</b> Continental Portugal
<b>Category of data:</b> Weather
<b>Type of data:</b> Palmer Drought Severity Index (PDSI) for Continental Portugal (map) and Historical Evolution of Palmer Drought Severity Index (PDSI) per weather station (table)
<b>Source:</b> <a href="https://www.ipma.pt/pt/oclima/observatorio.secas/pdsi/monitorizacao/servico.situacaoatual/">https://www.ipma.pt/pt/oclima/observatorio.secas/pdsi/monitorizacao/servico.situacaoatual/</a> and <a href="https://www.ipma.pt/pt/oclima/observatorio.secas/pdsi/apresentacao/evolu.historica/">https://www.ipma.pt/pt/oclima/observatorio.secas/pdsi/apresentacao/evolu.historica/</a>

<b>Type of source</b>	Calculated parameter
<b>Source responsible body</b>	Portuguese Institute of the Sea and Atmosphere (IPMA)
<b>Source contact person</b>	IPMA Phone: +351 291 241 592
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• accessible to general public</li> </ul>
	Way of access: through portal/website
	Type of access: free access
	Data format: html



<b>Geographical scale</b>	National - in the case of the PDSI index for Continental Portugal Other (per location of the weather station. It includes the weather stations of Évora, Setúbal and Vila Real) – in the case of the historical evolution of the PDSI index
<b>Aggregation level</b>	\
<b>Frequency</b>	Monthly Period: January 1981 – last month

<b>Quality of data</b>	
The Palmer Drought Severity index is based on the concept of the water balance considering data on the amount of precipitation, air temperature and available water capacity in the soil and allows the detection of periods of drought by classifying them in terms of intensity (weak, moderate, severe and extreme).	

### 2.1.4 PMAC (Municipal Climate Action Plans) – Climate scenarios

<b>Municipality:</b> All Portuguese municipalities
<b>Category of data:</b> Final consumptions of fuels and energy sources for H&C
<b>Type of data:</b> Projections for temperature, precipitation and wind variables, as well as climatic anomalies for different future scenarios
<b>Source:</b> PMACs

<b>Type of source</b>	<ul style="list-style-type: none"> <li>• Projection</li> </ul>
<b>Source responsible body</b>	Municipalities
<b>Source contact person</b>	\
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• Free access</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• through portal/website (as all PMACs should be made publicly available by the municipalities)</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• for free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• pdf</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> </ul>



<b>Aggregation level</b>	-
<b>Frequency</b>	Current situation and projections for 2030, 2040 and 2050 for different scenarios

<b>Quality of data</b>	
Suggested year for municipalities to use as base year for the calculations: 2019. The guidelines for the calculations/projections of the PMACs are available at <a href="#">LBC Orientacoes Planos Municipais Accao Climatica.pdf</a> .	

## 2.2 Final energy consumption and sources for H&C

### 2.2.4 Energy balance

<b>Municipality:</b>	All municipalities of Continental Portugal and of the Autonomous Regions of Madeira and Azores
<b>Category of data:</b>	Final consumptions of fuels and energy sources for H&C
<b>Type of data:</b>	Energy balance - Electricity demand by type of consumer source and municipality / Installed power in renewable energy plants (PV, Thermal, Wind, etc.)
<b>Source:</b>	<a href="https://www.dgeg.gov.pt/pt/estatistica/energia/eletricidade/consumo-por-municipio-e-tipo-de-consumidor/">https://www.dgeg.gov.pt/pt/estatistica/energia/eletricidade/consumo-por-municipio-e-tipo-de-consumidor/</a>

<b>Type of source</b>	<ul style="list-style-type: none"> <li>Database</li> </ul>
<b>Source responsible body</b>	DGEG (Directorate-General for Energy and Geology)
<b>Source contact person</b>	DGEG Phone: +351217922700 Email: <a href="mailto:geral@dgeg.gov.pt">geral@dgeg.gov.pt</a>
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>accessible to general public</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>through portal/website</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>free access</li> </ul>
	Data format <ul style="list-style-type: none"> <li>xls</li> </ul>
<b>Geographical scale</b>	All municipalities of Continental Portugal and of the Autonomous Regions of Madeira and Azores



<b>Aggregation level</b>	By sector: <ul style="list-style-type: none"> <li>• Residential</li> <li>• Tertiary</li> <li>• Industry</li> </ul>
<b>Frequency</b>	Data available from 1994 until 2021 Annual

<b>Quality of data</b>
DGEG obtains electricity consumption data by collecting reports from electricity distribution and supply companies, mainly E-Redes (the national distribution network operator) and electricity retailers. These companies provide detailed consumption data based on electricity meters, broken down by municipality and by sector of activity (such as residential, industrial, services, agriculture).

## 2.2.5 PMAC (Municipal Climate Action Plans) - Energy Consumption

<b>Municipality:</b> All Portuguese municipalities
<b>Category of data:</b> Final consumptions of fuels and energy sources for H&C
<b>Type of data:</b> Energy Consumption in the Building Sector
<b>Source:</b> PMACs

<b>Type of source</b>	<ul style="list-style-type: none"> <li>• Statistical release</li> <li>• Market analysis</li> <li>• Projection</li> </ul>
<b>Source responsible body</b>	Municipalities
<b>Source contact person</b>	\
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• Free access</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• through portal/website (as all PMACs should be made publicly available by the municipalities)</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• for free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• pdf</li> </ul>
<b>Geographical scale</b>	Municipal
<b>Aggregation level</b>	By sector:



	<ul style="list-style-type: none"> <li>• Residential</li> <li>• Tertiary</li> <li>• Industry</li> </ul>
<b>Frequency</b>	Current situation and projections for 2030, 2040 and 2050 for different scenarios

<b>Quality of data</b>	
Suggested year for municipalities to use as baseline for the calculations: 2019.	
The guidelines for the calculations/projections of the PMACs are available at <a href="#">LBC Orientacoes Planos Municipais Accao Climatica.pdf</a> .	

## 2.2.6 Energy consumption & production in public buildings

<b>Municipality:</b>	All municipalities of Continental Portugal
<b>Category of data:</b>	Final consumptions of fuels and energy sources for H&C
<b>Type of data:</b>	Energy consumption & production - Electricity and Natural Gas consumption in public administration buildings / Number of photovoltaic and thermal installations, solar panels area and installed power
<b>Source:</b>	ECO.AP (Programme managed by ADENE)

<b>Type of source</b>	<ul style="list-style-type: none"> <li>• Database</li> </ul>
<b>Source responsible body</b>	ADENE
<b>Source contact person</b>	ECO.AP Phone: +351 214 722 800
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• only ADENE (access limit due to data protection)</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• through database</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• free access</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> </ul>
<b>Geographical scale</b>	All municipalities of Continental Portugal
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• Public administration buildings</li> </ul>
<b>Frequency</b>	<ul style="list-style-type: none"> <li>• Yearly</li> <li>• Monthly</li> </ul>



	<p>The data only exists from the moment each organisation registers and starts reporting. The timeframe of the data is not uniform - different entities started reporting in different years or months. For many buildings or entities, there may not be a complete and continuous set of data (for example, some only have data from 2019, others from 2021, etc.). The level of detail and coverage of the data improves over time, as more entities join and regularise reporting. In addition, the quality and frequency of reporting also varies - some organisations report monthly, others quarterly or annually, depending on the resources and maturity of the energy management system they have implemented.</p>
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Quality of data
Data only available for continental Portugal and for public bodies that have joined the ECO.AP programme.

### 2.2.7 Natural gas consumption

<b>Municipality:</b> All municipalities of Continental Portugal and of the Autonomous Regions of Madeira and Azores
<b>Category of data:</b> H&C final uses and market
<b>Type of data:</b> Final consumptions of gas - Natural gas consumption by economic activity and municipality
<b>Source:</b> <a href="https://www.dgeg.gov.pt/pt/estatistica/energia/gas-natural/consumos/">https://www.dgeg.gov.pt/pt/estatistica/energia/gas-natural/consumos/</a>

<b>Type of source</b>	<ul style="list-style-type: none"> <li>• Database</li> </ul>
<b>Source responsible body</b>	DGEG (Directorate-General for Energy and Geology)
<b>Source contact person</b>	DGEG Phone: +351217922700 Email: <a href="mailto:geral@dgeg.gov.pt">geral@dgeg.gov.pt</a>
<b>Availability and accessibility</b>	<b>Who can access</b> <ul style="list-style-type: none"> <li>• accessible to general public</li> </ul>
	<b>Way of access</b> <ul style="list-style-type: none"> <li>• through portal/website</li> </ul>
	<b>Type of access</b> <ul style="list-style-type: none"> <li>• free access</li> </ul>
	Data format



	<ul style="list-style-type: none"> <li>• xls</li> </ul>
<b>Geographical scale</b>	All municipalities of Continental Portugal and of the Autonomous Regions of Madeira and Azores
<b>Aggregation level</b>	By economic activity: <ul style="list-style-type: none"> <li>• Agriculture, animal husbandry, hunting and related service activities</li> <li>• Forestry and logging</li> <li>• Fishing and aquaculture</li> <li>• Other mining and quarrying</li> <li>• Mining and quarrying service activities</li> <li>• Food industries</li> <li>• Beverage industry</li> <li>• Tobacco industry</li> <li>• Manufacture of textiles</li> <li>• Clothing industry</li> </ul>
<b>Frequency</b>	Data available from 2008 until 2023 Annual

#### Quality of data

Last year available is 2023. DGEG obtains natural gas consumption data from gas network operators (such as the transmission system operator, REN Gasodutos, and distribution companies) and natural gas suppliers. These entities report detailed consumption figures based on metered deliveries to final consumers, disaggregated by sector of activity and geographic area. The data is collected under regulatory obligations, validated and aggregated by DGEG

## 2.2.8 Renewable energy

<b>Municipality:</b>	All municipalities of Continental Portugal
<b>Category of data:</b>	Final consumptions of fuels and energy sources for H&C
<b>Type of data:</b>	Renewable energy data - Electricity consumption by municipality / Characterization of consumers / Self-consumption (No. of installations and power)
<b>Source:</b>	E-REDES - <a href="https://e-redes.opendatasoft.com/pages/transicao_energetica_por_concelho/">https://e-redes.opendatasoft.com/pages/transicao_energetica_por_concelho/</a>

<b>Type of source</b>	<ul style="list-style-type: none"> <li>• Database</li> </ul>
<b>Source responsible body</b>	E-REDES
<b>Source contact person</b>	E-REDES Phone: +351 218 100 100



<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• accessible to general public</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• through portal/website</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• free access</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> <li>• html</li> </ul>
<b>Geographical scale</b>	All municipalities of Continental Portugal and of the Autonomous Regions of Madeira and Azores
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• Domestic and non-domestic consumers</li> </ul>
<b>Frequency</b>	<ul style="list-style-type: none"> <li>• Yearly</li> <li>• Monthly</li> <li>• Quarterly</li> </ul> Data available from 2022 until 2024

<b>Quality of data</b>	
Data is not available for Madeira and Azores Autonomous Regions. E-REDES collects data using a network of smart meters and digital monitoring systems installed throughout the electricity distribution grid, which automatically record and transmit information on energy consumption, production, and grid performance. This data is processed through advanced analytics and geographic information systems (GIS), allowing it to be aggregated, analysed, and made publicly available on their open data portal	

### 2.2.9 Energy consumption of energy-intensive consumers

<b>Municipality:</b> All municipalities of Continental Portugal
<b>Category of data:</b> Final consumptions of fuels and energy sources for H&C
<b>Type of data:</b> Energy consumption of energy-intensive consumers in each municipality
<b>Source:</b> SGCIE

<b>Type of source</b>	Database
<b>Source responsible body</b>	ADENE
<b>Source contact person</b>	ADENE + 351 214 722 800 geral@adene.pt



<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• Exclusively ADENE (access limit due to data protection)</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• through portal/website</li> <li>• upon written/email request</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• Internal database</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• Pdf</li> </ul>
<b>Geographical scale</b>	All municipalities of Continental Portugal
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By type of building</li> </ul>
<b>Frequency</b>	<ul style="list-style-type: none"> <li>• Yearly</li> <li>• Monthly</li> </ul>

<b>Quality of data</b>	
ADENE obtains data from the SGCIE the reports submitted by companies covered under the scheme, which are classified as intensive energy consumers. These companies are required to annually report detailed information on their energy consumption, implemented efficiency measures, and energy rationalization plans. The data is entered by the entities into the SGCIE online portal and is subsequently validated and processed by ADENE, which manages, analyses, and monitors the information to support compliance with national and European energy efficiency targets.	

### 2.2.10 PMAC (Municipal Climate Action Plans) - GHG emissions

<b>Municipality:</b> All Portuguese municipalities
<b>Category of data:</b> H&C demand
<b>Type of data:</b> GHG emissions
<b>Source:</b> PMACs

<b>Type of source</b>	<ul style="list-style-type: none"> <li>• Statistical release</li> <li>• Market analysis</li> <li>• Projection</li> </ul>
<b>Source responsible body</b>	Municipalities
<b>Source contact person</b>	\
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• Free access</li> </ul>



	Way of access <ul style="list-style-type: none"> <li>Through portal/website (as all PMACs should be made publicly available by the municipalities)</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>For free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>pdf</li> </ul>
<b>Geographical scale</b>	Municipal
<b>Aggregation level</b>	By sector: <ul style="list-style-type: none"> <li>Residential</li> <li>Tertiary</li> <li>Industry</li> </ul>
<b>Frequency</b>	Current situation and projections for 2030, 2040 and 2050 for different scenarios.

<b>Quality of data</b>
<p>Suggested year for municipalities to use as baseline for the calculations: 2019.</p> <p>The guidelines for the calculations/projections of the PMACs are available at LBC_Orientacoes_Planos_Municipais_Accao_Climatica.pdf.</p>

## 2.3 H&C final uses and market

### 2.3.1 Heating systems

<b>Municipality:</b> All municipalities of Continental Portugal and of the Autonomous Regions of Madeira and Azores	
<b>Category of data:</b> H&C final uses and market	
<b>Type of data:</b> Type of heating systems most frequently used in conventional housing	
<b>Source:</b> <a href="https://www.ine.pt/xportal/xmain?xpid=INE&amp;xpgid=ine_indicadores&amp;indOcorrCod=0012533&amp;contexto=bd&amp;selTab=tab2">https://www.ine.pt/xportal/xmain?xpid=INE&amp;xpgid=ine_indicadores&amp;indOcorrCod=0012533&amp;contexto=bd&amp;selTab=tab2</a>	
<b>Type of source</b>	Statistical release
<b>Source responsible body</b>	INE (Instituto Nacional de Estatística) – National Institute of Statistics
<b>Source contact person</b>	INE Tel.: + 351 218 426 100 <a href="mailto:ine@ine.pt">http://E-mail:ine@ine.pt/</a>



<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• accessible to general public</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• through portal/website</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• free access</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> </ul>
<b>Geographical scale</b>	All municipalities of Continental Portugal and of the Autonomous Regions of Madeira and Azores
<b>Aggregation level</b>	Sector: Residencial buildings Sub-sector: social housing and private housing
<b>Frequency</b>	2001, 2011 and 2021 Decennial

#### Quality of data

The main gap is the fact that 2021 is the last available year with data. It was found that in some available data the methodology used was not identical in the various census periods.

### 2.3.2 Air conditioning

<b>Municipality:</b>	All municipalities of Continental Portugal and of the Autonomous Regions of Madeira and Azores
<b>Category of data:</b>	H&C final uses and market
<b>Type of data:</b>	Existence of air conditioning in classic family housing
<b>Source:</b>	<a href="https://www.ine.pt/xportal/xmain?xpid=INE&amp;xpgid=ine_indicadores&amp;indOcorrCod=0012510&amp;contexto=bd&amp;selTab=tab2">https://www.ine.pt/xportal/xmain?xpid=INE&amp;xpgid=ine_indicadores&amp;indOcorrCod=0012510&amp;contexto=bd&amp;selTab=tab2</a>
<b>Type of source</b>	Statistical release
<b>Source responsible body</b>	INE ( <i>Instituto Nacional de Estatística</i> ) – National Institute of Statistics
<b>Source contact person</b>	INE Tel.: + 351 218 426 100 <a href="http://E-mail:ine@ine.pt/">http://E-mail:ine@ine.pt/</a>
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• accessible to general public</li> </ul>



	Way of access <ul style="list-style-type: none"> <li>• <i>through portal/website</i></li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• <i>free access</i></li> </ul>
	Data format <ul style="list-style-type: none"> <li>• <i>xls</i></li> </ul>
<b>Geographical scale</b>	All municipalities of Continental Portugal and of the Autonomous Regions of Madeira and Azores
<b>Aggregation level</b>	Sector: Residencial buildings Sub-sector: social housing and private housing
<b>Frequency</b>	2001, 2011 and 2021 Decennial

#### Quality of data

The main gap is the fact that 2021 is the last available year with data. INE (Statistics Portugal) collects data on the existence of air conditioning in classic family dwellings through national household surveys, primarily the Population and Housing Census and the Survey on Living Conditions and Income. These surveys gather self-reported information from households about the characteristics of their dwellings, including the presence of air conditioning systems. The data is processed, validated, and aggregated by INE following standardized statistical procedures to ensure representativeness and accuracy at national and regional levels.

### 2.3.3 Installed power

<b>Municipality:</b> All municipalities of Continental Portugal and of the Autonomous Regions of Madeira and Azores
<b>Category of data:</b> H&C final uses and market
<b>Type of data:</b> Installed power in electricity generating plants
<b>Source:</b> <a href="https://www.dgeg.gov.pt/pt/estatistica/energia/eletricidade/producao-anual-e-potencia-instalada/">https://www.dgeg.gov.pt/pt/estatistica/energia/eletricidade/producao-anual-e-potencia-instalada/</a>

<b>Type of source</b>	<ul style="list-style-type: none"> <li>• Database</li> </ul>
<b>Source responsible body</b>	DGEG (Directorate-General for Energy and Geology)
<b>Source contact person</b>	DGEG Phone: +351217922700 Email: <a href="mailto:geral@dgeg.gov.pt">geral@dgeg.gov.pt</a>
	Who can access



<b>Availability and accessibility</b>	<ul style="list-style-type: none"> <li>• accessible to general public</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• through portal/website</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• free access</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> </ul>
<b>Geographical scale</b>	All municipalities of Continental Portugal and of the Autonomous Regions of Madeira and Azores
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By source:</li> <li>• Thermal (of which renewable)</li> <li>• Photovoltaic</li> <li>• Hydropower</li> </ul>
<b>Frequency</b>	Data available from 2010 until 2021 Annual

<b>Quality of data</b>	
<p>Last year available is 2023. DGEg collects data on installed electricity generation capacity from both large-scale power plant operators and small-scale producers, including households and businesses with self-consumption installations (e.g., rooftop solar panels). All electricity producers — whether utility-scale or individual — are required to register their generation facilities with the national grid operator or relevant authorities, which includes technical details such as installed capacity, energy source, and location. This data is compiled from administrative records, validated, and aggregated by DGEg. The published statistics reflect the total officially registered installed capacity across all generation types (large plants and distributed self-consumption), disaggregated by municipality and technology.</p>	

## 2.4 H&C demand

### 2.4.1 Heating and cooling demand by sector

<b>Municipality:</b> Continental Portugal and of the Autonomous Regions of Madeira and Azores	
<b>Category of data:</b> H&C demand	
<b>Type of data:</b> Heating and cooling demand by sector	
<b>Source:</b> Plano Nacional de Energia e Clima 2023 – PNEC 2030 (National Energy and Climate Plan 2030)	
<b>Type of source</b>	<ul style="list-style-type: none"> <li>• Statistical release</li> </ul>



<b>Source responsible body</b>	DGEG
<b>Source contact person</b>	DGEG Phone: +351217922700 Email: <a href="mailto:geral@dgeg.gov.pt">geral@dgeg.gov.pt</a>
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• accessible to general public</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• through portal/website</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• free access</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• PDF</li> </ul>
<b>Geographical scale</b>	Continental Portugal and of the Autonomous Regions of Madeira and Azores
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By activity sector (e.g. residential, industry, agriculture etc.)</li> </ul>
<b>Frequency</b>	<ul style="list-style-type: none"> <li>• Yearly (2020 - 2040)</li> </ul>
<b>Quality of data</b>	
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## 2.4.2 Building Energy Certificates

<b>Municipality:</b> All municipalities of Continental Portugal
<b>Category of data:</b> H&C final uses and market
<b>Type of data:</b> Building Energy Certificates
<b>Source:</b> SCE

<b>Type of source</b>	Database
<b>Source responsible body</b>	ADENE
<b>Source contact person</b>	ADENE + 351 214 722 800 sce@adene.pt
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• Exclusively ADENE (access limit due to data protection)</li> </ul>



	Way of access <ul style="list-style-type: none"> <li>• Internal database</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• free access</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> </ul>
<b>Geographical scale</b>	Municipalities of Guimarães, Loulé, Évora, Vila Real, Palmela, Sesimbra and Setúbal
<b>Aggregation level</b>	<p>Sector: Residential buildings  Subsector: Single-family and multi-family buildings  Available data:</p> <ul style="list-style-type: none"> <li>• No. of Certificates per class, type of building and construction period</li> <li>• Buildings with at least one isolated wall</li> <li>• Buildings with isolated roofs</li> <li>• Minimum, maximum and average values of Ntc, Nic, Nvc and QA</li> <li>• Certificates below B-</li> <li>• Types of windows</li> <li>• Types of glass</li> <li>• Types of window frames</li> <li>• Minimum, maximum and average values of UWdn (Coefficient of Thermal Transmission of the Glazed Gap average day-night)</li> <li>• Types of systems</li> <li>• Improvement measures</li> </ul> <p>Sector: Service buildings  Subsector:</p> <ul style="list-style-type: none"> <li>• Small service buildings without systems</li> <li>• Small service buildings with systems</li> <li>• Large service buildings</li> </ul> <p>Available data:</p> <ul style="list-style-type: none"> <li>• No. of Certificates per class and construction period</li> <li>• Types of windows</li> <li>• Types of glass</li> <li>• Types of window frames</li> <li>• Energy consumption for heating and cooling, by type of business</li> <li>• Improvement measures</li> </ul>



	<ul style="list-style-type: none"> <li>Data available per <i>freguesia</i> (parish)</li> </ul>
<b>Frequency</b>	Period: from 1918 until 2024

<b>Quality of data</b>
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### 2.4.3 PMAC (Municipal Climate Action Plans) - Energy Efficiency Potential

<b>Municipality:</b> All Portuguese municipalities
<b>Category of data:</b> Final consumptions of fuels and energy sources for H&C
<b>Type of data:</b> Energy Efficiency Potential
<b>Source:</b> PMACs

<b>Type of source</b>	<ul style="list-style-type: none"> <li>Statistical release</li> <li>Market analysis</li> <li>Projection</li> </ul>
<b>Source responsible body</b>	<ul style="list-style-type: none"> <li>Municipalities</li> </ul>
<b>Source contact person</b>	
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>Free access</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>through portal/website (as all PMACs should be made publicly available by the municipalities)</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>For free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>pdf</li> </ul>
<b>Geographical scale</b>	Municipal
<b>Aggregation level</b>	By sector: <ul style="list-style-type: none"> <li>Residential</li> <li>Tertiary</li> <li>Industry</li> </ul>
<b>Frequency</b>	Projections for 2030, 2040 and 2050.

<b>Quality of data</b>
Suggested year for municipalities to use as baseline for the calculations: 2019.



The guidelines for the calculations/projections of the PMACs are available at [LBC Orientacoes Planos Municipais Accao Climatica.pdf](#)

## 2.4.4 PMAC (Municipal Climate Action Plans) – Integration of Renewable Energy into H&C

<b>Municipality:</b> All Portuguese municipalities
<b>Category of data:</b> Final consumptions of fuels and energy sources for H&C
<b>Type of data:</b> Integration of Renewable Energy into H&C
<b>Source:</b> PMACs

<b>Type of source</b>	<ul style="list-style-type: none"> <li>• Statistical release</li> <li>• Market analysis</li> <li>• Projection</li> </ul>
<b>Source responsible body</b>	<ul style="list-style-type: none"> <li>• Municipalities</li> </ul>
<b>Source contact person</b>	\
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• Free access</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• through portal/website (as all PMACs should be made publicly available by the municipalities)</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• For free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• pdf</li> </ul>
<b>Geographical scale</b>	Municipal
<b>Aggregation level</b>	By sector: <ul style="list-style-type: none"> <li>• Residential</li> <li>• Tertiary</li> <li>• Industry</li> </ul>
<b>Frequency</b>	Projections for 2030, 2040 and 2050.

<b>Quality of data</b>
Suggested year for municipalities to use as baseline for the calculations: 2019. The guidelines for the calculations/projections of the PMACs are available at <a href="#">LBC Orientacoes Planos Municipais Accao Climatica.pdf</a>



## 3. MUNICIPALITY OF ÉVORA

### 3.1 Weather

#### 3.1.3 Temperature and precipitation

<b>Municipality:</b> Évora	
<b>Category of data:</b> Weather	
<b>Type of data:</b> Weather data (long series of maximum temperature, minimum temperature and precipitation)	
<b>Source:</b> <a href="https://www.ipma.pt/pt/oclima/series.longas/list.jsp">https://www.ipma.pt/pt/oclima/series.longas/list.jsp</a>	
<b>Type of source</b>	Statistical release
<b>Source responsible body</b>	Portuguese Institute of the Sea and Atmosphere (IPMA)
<b>Source contact person</b>	IPMA Phone: +351 291 241 592
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• accessible to general public</li> </ul>
	Way of access: through portal/website
	Type of access: free access
	Data format: xls
<b>Geographical scale</b>	Other (only refers to measurements at the weather station 557 Évora)
<b>Aggregation level</b>	Other (only refers to measurements at the weather station 557 Évora) Available data: <ul style="list-style-type: none"> <li>• Minimum temperature</li> <li>• Maximum temperature</li> <li>• Precipitation</li> </ul>
<b>Frequency</b>	Monthly Period: from 1871 until 2008
<b>Quality of data</b>	



The Évora station has been in operation since December 1869 in the Sertório Tower, with the instrument park on the tower platform and the barometer in the lower room. Observations were only carried out at 9 am and 3 pm, with observations also being carried out at 9 pm from February 1906 onwards. However, since 1947, observations have been carried out at 6 am, 12 pm and 6 pm. In 1925 there was a change in the location of the station as well as in the altitude location of the instrument park, although these changes were not very significant.

<b>Municipality:</b> Évora, Vila Real and Setúbal	
<b>Category of data:</b> Weather	
<b>Type of data:</b> Weather data (calculated climatological normal for 1971-2000 and 1981-2010, namely air temperature, precipitation, evaporation, wind, etc)	
<b>Source:</b> <a href="https://www.ipma.pt/pt/oclima/normais.clima/1971-2000/#535">https://www.ipma.pt/pt/oclima/normais.clima/1971-2000/#535</a>	
<b>Type of source</b>	Statistical release
<b>Source responsible body</b>	Portuguese Institute of the Sea and Atmosphere (IPMA)
<b>Source contact person</b>	IPMA Phone: +351 291 241 592
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• accessible to general public</li> </ul>
	Way of access: through portal/website
	Type of access: free access
	Data format: dashboard and pdf
<b>Geographical scale</b>	Other (only refers to values at the weather stations) Namely, for the period 1971-2000: <ul style="list-style-type: none"> <li>- 557 Évora</li> <li>- 566 Vila Real</li> <li>- 170 Setúbal – Estação Fruticultura</li> <li>- 171 Setúbal - Setenave</li> </ul> And for the series 1981-2010: <ul style="list-style-type: none"> <li>- 557 Évora</li> <li>- 567 Vila Real</li> <li>- 770 Setúbal – Estação Fruticultura</li> </ul>



<b>Aggregation level</b>	Other ( <i>only refers to values at the weather stations mentioned before</i> ) Available data: <ul style="list-style-type: none"> <li>• Climatological normal 1971-2000 (<a href="https://www.ipma.pt/pt/oclima/normais.clima/1971-2000/#557">https://www.ipma.pt/pt/oclima/normais.clima/1971-2000/#557</a>)</li> <li>• Climatological normal 1981-2010 (<a href="https://www.ipma.pt/pt/oclima/normais.clima/1981-2010/#557">https://www.ipma.pt/pt/oclima/normais.clima/1981-2010/#557</a>)</li> <li>• Climatological factsheets for the mentioned stations.</li> </ul>
<b>Frequency</b>	Monthly or annual calculated averages, depending on the climatic parameter

<b>Quality of data</b>	
Each climatological factsheet provides, for the selected climatological station, the monthly values and annual values of some of the main climatic parameters in the form of graphs and tables: average values of maximum and minimum air temperature; precipitation; heat waves; wind; extreme values of maximum and minimum air temperature.	

### 3.1.2 Heat waves

<b>Municipality:</b>	Évora
<b>Category of data:</b>	Meteorological data and spatial data/cartography
<b>Type of data</b>	Heat waves
<b>Source</b>	Climate Impacts Profile for the Municipality of Évora, which is an integral part of Évora's Municipal Climate Change Adaptation Plan (PMAAC)
<b>Type of source</b>	Database
<b>Source responsible body</b>	Environment and Mobility Division
<b>Source contact person</b>	Carla Azeda/Daniel Valente
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• Free access</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• through the municipality's website</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• free</li> </ul>



	Data format <ul style="list-style-type: none"> <li>• doc</li> </ul>
<b>Geographical scale</b>	Municipal
<b>Aggregation level</b>	
<b>Frequency</b>	The Climate Impacts Profile for the Municipality of Évora, presented in Évora's PMAAC, covers the period between 2000 and 2021.

Quality of data	
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### 3.1.3 Green Areas

<b>Municipality:</b>	Évora
<b>Category of data:</b>	Meteorological data and spatial data/cartography

<b>Type of data</b>	Green areas - Zoning plan of the Municipal Master Plan of Évora and the Urbanization Plan of Évora in force (which includes the constraints of the Plans, namely the Municipal Ecological Structure, the National Agricultural Reserve, the Municipal Ecological Reserve, the Hydrological Network, Natura Networks covered, Forest Fire Hazard, etc.)
<b>Source</b>	Évora City Council
<b>Type of source</b>	Spatial data/cartography
<b>Source responsible body</b>	DORU - Évora City Council's Urban Planning and Rehabilitation Division
<b>Source contact person</b>	Pedro Fogaça and Ana Rita Ferreira from DORU. Contact: <a href="mailto:cme.doru@cm-evora.pt">cme.doru@cm-evora.pt</a> and +351 266 777 027
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• Free access for viewing via the portal/website (information cannot be downloaded): <a href="https://geo.cimac.pt/portal/apps/sites/#/geoevora">https://geo.cimac.pt/portal/apps/sites/#/geoevora</a></li> <li>• Information provided via shapefile in the context of the municipality's formal opinion. More information in the Municipal Regulations for the Transfer and Use of Digital Cartography: <a href="https://www.cm-evora.pt/wp-content/uploads/2020/07/regulamento-municipal-de-ced%C3%Aancia-e-utiliza%C3%A7%C3%A3o-de-cartografia-digital.pdf">https://www.cm-evora.pt/wp-content/uploads/2020/07/regulamento-municipal-de-ced%C3%Aancia-e-utiliza%C3%A7%C3%A3o-de-cartografia-digital.pdf</a></li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• via the portal/website: if only for viewing</li> </ul>



	<ul style="list-style-type: none"> <li>• sending information via shapefile upon written/email request and limited to the desired area</li> </ul>
	<b>Type of access</b> <ul style="list-style-type: none"> <li>• free online viewing</li> <li>• receipt of information via shapefile for a fee</li> </ul>
	<b>Data format</b> <ul style="list-style-type: none"> <li>• html if viewed via the portal</li> <li>• shp if the information is sent by the applicant to the municipality</li> </ul>
<b>Geographical scale</b>	Intermunicipal
<b>Aggregation level</b>	Constraints of the Évora Municipal Master Plan and the Évora Urbanization Plan
<b>Frequency</b>	The zoning plan is up to date as of today

<b>Quality of data</b>	
<p>The lack of information from wms and wfs services, web map service and web feature service, respectively.</p> <p>With regard to all the cartography that is part of the Évora Urbanisation Plan (PU), in addition to that present in the PU currently in force, there are updated versions in the proposed revision of the PU already presented at the Public Town Hall Meeting, but not yet approved.</p> <p>The link for the two versions of the Plano Diretor Municipal de Évora (PDMÉ) is also provided: <a href="https://www.cm-evora.pt/municipe/areas-de-acao/ordenamento-territorio-e-urbanismo/planos-municipais/plano-diretor-municipal/">https://www.cm-evora.pt/municipe/areas-de-acao/ordenamento-territorio-e-urbanismo/planos-municipais/plano-diretor-municipal/</a></p>	

### 3.1.4 Land cover

<b>Municipality:</b>	Évora
<b>Category of data:</b>	Meteorological data and spatial data/cartography
<b>Type of data</b>	Land Cover - COS 2018
<b>Source</b>	DGT Portal
<b>Type of source</b>	Spatial data/cartography
<b>Source responsible body</b>	\
<b>Source contact person</b>	\
<b>Availability and accessibility</b>	<b>Who can access</b> <ul style="list-style-type: none"> <li>• Free access</li> </ul>
	<b>Way of access</b>



	<ul style="list-style-type: none"> <li>• via the portal/website</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• html</li> <li>• shp (the Évora City Council has this information in this format)</li> </ul>
<b>Geographical scale</b>	Central Alentejo Region
<b>Aggregation level</b>	Land Use and Occupation Map
<b>Frequency</b>	The data refers to 2018

<b>Quality of data</b>
Considering that the minimum cartographic unit is 1 hectare, this leads to generalizations.

### 3.1.5 Urban heat islands

<b>Municipality:</b>	Évora
<b>Category of data:</b>	Meteorological data and spatial data/cartography

<b>Type of data</b>	Urban heat islands (within the scope of the Évora Urbanisation Plan - operational analysis and diagnosis booklet Environment, Risks and Fundamental Structure of the Landscape)
<b>Source</b>	Évora City Council
<b>Type of source</b>	Spatial data/cartography
<b>Source responsible body</b>	Évora City Council
<b>Source contact person</b>	Pedro Fogaça and Ana Rita Ferreira from DORU - Urban Planning and Rehabilitation Division. Contact: cme.doru@cm-evora.pt and +351 266 777 027
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• Free access</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• via the portal/website: <a href="http://www.cm-evora.pt/wp-content/uploads/2025/02/Relatorio-3_Ambiente_Riscos_EstruturaFundamentalPaisagem.pdf">www.cm-evora.pt/wp-content/uploads/2025/02/Relatorio-3_Ambiente_Riscos_EstruturaFundamentalPaisagem.pdf</a></li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• free</li> </ul>



	Data format • doc
<b>Geographical scale</b>	Municipal
<b>Aggregation level</b>	Per areas
<b>Frequency</b>	Document date: November 2024
<b>Quality of data</b>	
\	

## 3.2 Final energy consumption and sources for H&C

### 3.2.1 City energy system

<b>Municipality:</b>	Évora
<b>Category of data</b>	Final consumptions of fuels and energy sources for H&C
<b>Type of data</b>	General data
<b>Source</b>	Project InSMART - FP7-ENERGY-SMARTCITIES-2012 - WP4
<b>Type of source</b>	Report within the framework of the INSMART project
<b>Source responsible body</b>	Évora City Council
<b>Source contact person</b>	Nuno Bilo
<b>Availability and accessibility</b>	Who can access • Free access
	Way of access • on written request/email
	Type of access • free
	Data format • db
<b>Geographical scale</b>	municipal
<b>Aggregation level</b>	\
<b>Frequency</b>	\
<b>Quality of data</b>	
This report refers to WP4 (Tasks 4.1. to 4.4.). It includes the analysis of the status of urban spaces, water/sewage systems, waste chain and decentralised energy supply at the cities level.	



### 3.2.1 Renewable energy

<b>Municipality:</b>	Évora
<b>Category of data</b>	Final consumptions of fuels and energy sources for H&C
<b>Type of data</b>	solar thermal
<b>Source</b>	Évora City Council
<b>Type of source</b>	Other
<b>Source responsible body</b>	Environment, Hygiene and Mobility Division
<b>Source contact person</b>	\
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• Public bodies/local authorities</li> <li>• The municipality</li> <li>• Technicians/researchers</li> <li>• Others</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• upon written request/email</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• PDF, which can be converted to XLS format</li> </ul>
<b>Geographical scale</b>	municipal
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• Sector: tertiary</li> <li>• Sub-sector: public education and teaching establishments</li> <li>• End use: heating, cooling, hot water, freezing and food refrigeration</li> </ul>
<b>Frequency</b>	Monthly
<b>Quality of data</b>	
\	



## 3.3 H&C final uses and market

### 3.3.1 The municipality's building stock

<b>Municipality:</b>	Évora
<b>Category of data</b>	H&C final uses and market
<b>Type of data</b>	Characteristics of the municipality's building stock (type of use, age, structures, energy class, etc.)
<b>Source</b>	Évora's Municipal Climate Change Adaptation Strategy
<b>Type of source</b>	Municipal strategy
<b>Source responsible body</b>	Environment and Mobility Division
<b>Source contact person</b>	Carla Azeda/Daniel Valente
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• Free</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• upon written request/email</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• PDF</li> </ul>
<b>Geographical scale</b>	municipal
<b>Aggregation level</b>	
<b>Frequency</b>	
<b>Quality of data</b>	
\	

### 3.3.2 H&C equipment

<b>Municipality:</b>	Évora
<b>Category of data</b>	H&C final uses and market
<b>Type of data</b>	Existing H&C equipment and its characteristics
<b>Source</b>	Évora's City Council
<b>Type of source</b>	database



<b>Source responsible body</b>	Education and Social Intervention Division / School Groups
<b>Source contact person</b>	Helena Ferro
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• Public Organisations/Local Authorities</li> <li>• The municipality</li> <li>• Technicians/researchers only</li> <li>• Others</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• upon written request/email</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> </ul>
<b>Geographical scale</b>	municipal
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• Sector: tertiary</li> <li>• Sub-sector: public education and teaching establishments</li> <li>• End use: heating, cooling, hot water, food freezing and refrigeration</li> </ul>
<b>Frequency</b>	
<b>Quality of data</b>	
\	

### 3.3.3 Interventions to improve energy performance

<b>Municipality:</b>	Évora
<b>Category of data</b>	H&C final uses and market
<b>Type of data</b>	Interventions to improve energy performance
<b>Source</b>	Licensing or prior communication processes for private works classified as minor renovations
<b>Type of source</b>	Database (non-existent at the time, to be organised based on architectural projects, including mandatory characterisation of opaque and glazed envelopes subject to thermal behaviour renovation)



<b>Source responsible body</b>	Urban Management Division
<b>Source contact person</b>	Architect Elsa Carvalho; Architect Nuno Pais
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• The municipality</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• upon written request/email</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• free of charge in response to a request under the Plan4COLD project</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> <li>• doc</li> <li>• accdb</li> </ul>
<b>Geographical scale</b>	regional
<b>Aggregation level</b>	
<b>Frequency</b>	Database to be fed according to the projects submitted

<b>Quality of data</b>
<p>A database still not available at the moment, which will potentially make it possible to establish rehabilitation trends in the field of improving the thermal comfort and systems of private buildings;</p> <p>The possible database to be implemented will be fed by the technicians responsible for assessing the architectural and/or specialty projects submitted, the quality of which will condition the data extracted (e.g. specialty projects that are normally typified);</p> <p>Data conditioned by the recurrent failure to submit projects in the context of licensing refurbishment works and/or the omission of interventions in infrastructure networks and air conditioning systems;</p> <p>Database applicable only to minor renovations requiring prior or subsequent control involving the renovation of components, insofar as the solutions adopted in major renovations are detailed in the required pre-certificates or energy certificates to be submitted under the Energy Certification System for Buildings (SCE);</p> <p>Possible complementary extraction of data from communications of exempt works submitted under the terms of article 80-A of the RJUE and no. 30 of section VI of annex I of Ministerial Order no. 71-A/2024 of 27 February.</p>



### 3.3.4 Intervention areas

<b>Municipality:</b>	Évora
<b>Category of data</b>	H&C final uses and market
<b>Type of data</b>	Priority and integrated intervention areas in the municipality of Évora 2011   2021
<b>Source</b>	INE, Census 2011, 2021
<b>Type of source</b>	Spatial data/cartography
<b>Source responsible body</b>	INE and data processing from the Housing and Urban Rehabilitation Unit (UHRU)
<b>Source contact person</b>	Telma Félix telma.felix@cm-evora.pt
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• free</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• via the portal/website</li> <li>• upon written request/e-mail</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• shp</li> <li>• pdf</li> </ul>
<b>Geographical scale</b>	municipal
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector (e.g. buildings)</li> <li>• By sub-sector (e.g. residential)</li> <li>• Multisector (buildings, dwellings, households and resident population).</li> </ul>
<b>Frequency</b>	2011-2021
<b>Quality of data</b>	
<ul style="list-style-type: none"> <li>• The priority areas and integrated intervention in the municipality of Évora are the result of analysing and connecting data to the statistical subsection of the INE 2011   2021 Census (quarters): buildings, dwellings, households and resident population;</li> <li>• Data in connection with the statistical subsection: quantitative housing shortages; qualitative housing shortages; vacant dwellings, population over 65; population that can neither read nor write; population looking for work.</li> </ul>	



### 3.3.5 Building stock

<b>Municipality:</b>	Évora
<b>Category of data</b>	H&C final uses and market
<b>Type of data</b>	Characteristics of the municipality's building stock
<b>Source</b>	Project InSMART - FP7-ENERGY-SMARTCITIES-2012 - WP2 – Analysis of the Buildings Stock. Document: D.2.3. Simulation Report of Building Typologies Évora
<b>Type of source</b>	Report under the INSMART project
<b>Source responsible body</b>	Évora City Council
<b>Source contact person</b>	Nuno Bilo
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• free</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• upon written request/e-mail</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• dbf</li> </ul>
<b>Geographical scale</b>	municipal
<b>Aggregation level</b>	\
<b>Frequency</b>	\
<b>Quality of data</b>	
<p>The report presents the methodology developed for modelling energy use of buildings to fulfil the requirements of work package 2 of InSMART for the city of Évora.</p> <p>Residential building typologies and the base case energy models associated with them are described in detail.</p>	



## 4. MUNICIPALITY OF GUIMARAES

### 4.1 Weather

<b>Municipality:</b>	Guimaraes
<b>Category of data:</b>	Meteorological data and spatial data/cartography
<b>Type of data</b>	Temperatures; Heat waves; Effects of urban heat islands; Land cover; Green areas; Protected sites (World Heritage); Statistical units (Census, etc.); Buildings in the municipality (1992 and 2002); ARU's; Plano Diretor Municipal; Plano Urbanistico; Plano de Pormenor; Urban facilities and infrastructures (Unidades de Saúde Familiares, public swimming pools, gardens, fountains, universities, natural gas network, etc.); Land occupation; Historic center; Forest areas; Heritage (Classified; State; Municipal).
<b>Source</b>	Interdepartmental data sharing at Guimarães City Council
<b>Type of source</b>	<ul style="list-style-type: none"> <li>• Census</li> <li>• Register</li> <li>• Database</li> <li>• Statistical publication</li> <li>• Market analysis</li> <li>• Spatial data/cartography</li> </ul>
<b>Source responsible body</b>	Guimarães Municipality
<b>Source contact person</b>	Paulo Machado
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• Municipality only</li> <li>• Other - Even if it is in the municipality's internal documentation, some data may come from organisations that make it available to the public;</li> <li>• Other - By asking other organisations involved (e.g. the Laboratório da Paisagem)</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• Via the portal/website</li> <li>• On request, directly with the PLAN4COLD contact point</li> </ul>



	Type of access <ul style="list-style-type: none"> <li>• free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> <li>• doc</li> <li>• shp</li> <li>• DWG</li> <li>• KML</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Regional</li> <li>• Intermunicipal</li> <li>• Municipal</li> <li>• Sub-municipal</li> </ul>
<b>Aggregation level</b>	Spatial resolution <ul style="list-style-type: none"> <li>• Statistical units</li> <li>• Land cover and land use</li> <li>• Meteorological</li> </ul>
<b>Frequency</b>	\

<b>Quality of data</b>	
<p>The meteorological data available in Guimarães (4 stations in the city) does not have the precision, frequency and time horizon for rigorous meteorological analysis. However, they should be useful for observing and certifying meteorological conditions within the municipality's boundaries. Previous work has used data from the IPMA and the National Information System (SNIRH) on a NUTS II and NUTS III geographical scale.</p> <p>Spatial data and cartography have a wide variety of sources and designs. From national sources of information (SNIG, DGEG, INE, etc.) to surveys and studies carried out by municipal services.</p>	

## 4.2 Final energy consumption and sources for H&C

<b>Municipality:</b>	Guimarães
<b>Category of data:</b>	Final energy consumption and sources for H&C
<b>Type of data</b>	Municipal Facilities and Equipment; DGEG (Directorate-General for Energy and Geology) Council; Open data E-grid Portal; Fossil fuels (natural gas, LPG, fuel oil, etc.): Municipality facilities; DGEG Council and ENSE (National Entity for the Energy Sector); Renewable energies (solar thermal, geothermal, biomass, waste heat, PV, etc.):



	Municipality installations (Biomass, PV, etc.); Municipality (PV, Hydro); Cogeneration data from DGEG.
<b>Source</b>	<a href="https://www.dgeg.gov.pt/">https://www.dgeg.gov.pt/</a> ; <a href="https://e-redes.opendatasoft.com/pages/homepage/">https://e-redes.opendatasoft.com/pages/homepage/</a> ; E-redes portal, municipal account Data provided by suppliers
<b>Type of source</b>	<ul style="list-style-type: none"> <li>• Record</li> <li>• Database</li> <li>• Statistical publication</li> <li>• Supplier and meter data</li> </ul>
<b>Source responsible body</b>	Guimarães Municipality
<b>Source contact person</b>	Paulo Machado
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• free access</li> <li>• only Public Organisations/Local Authorities</li> <li>• only the municipality</li> <li>• only technicians/researchers</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• through the portal / website</li> <li>• upon request, directly with the Plan4COLD contact point</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• Free access</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> <li>• Xml</li> <li>• htm</li> <li>• Jason</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> <li>• Submunicipal</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector (e.g. residential, tertiary, industry, etc.)</li> <li>• By sub-sector (e.g. public buildings)</li> </ul>
<b>Frequency</b>	<ul style="list-style-type: none"> <li>• Annual</li> <li>• Monthly</li> <li>• Daily</li> <li>• Hourly</li> </ul>



<b>Quality of data</b>
The data that comes from the municipality's energy supply contracts (electricity, natural gas, bulk gas and cylinders) is the result of consumption in other buildings and equipment and is attributed specifically to the point where it was consumed. However, a precise breakdown by type of consumption (lighting, heating, etc.) is not guaranteed, as the municipality has not yet been equipped with the necessary equipment and management for all its buildings.

### 4.3 H&C final uses and market

<b>Municipality:</b>	Guimarães
<b>Category of data:</b>	H&C final uses and market
<b>Type of data</b>	Existing H&C equipment and its characteristics (type, age, capacity, efficiency class, etc.) - Inventory Management and Conservation Division Characteristics of the municipality's building stock (type of use, age, structures, energy class, etc.) Energy certificates for buildings, if available Interventions carried out to improve energy performance (types, trends, etc.) Industry sector (identification of the main industries in the municipality, in particular those that are characterised as energy-intensive facilities and have A&E needs) Renovations to improve the envelope in social housing
<b>Source</b>	ADENE data within the scope of the project; Data and information from the Guimarães Climate Pact; Records and projects in the Contracts Division, Studies and Projects Department and Housing Division
<b>Type of source</b>	<ul style="list-style-type: none"> <li>• Registration</li> <li>• Database</li> <li>• Statistical publication</li> <li>• Market analysis</li> <li>• Municipal initiatives</li> </ul>
<b>Source responsible body</b>	Construction Division, Studies and Projects Department and Housing Division



<b>Source contact person</b>	Paulo Machado
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• Only the municipality</li> <li>• Even if it is in the municipality's internal documentation, some data may come from organisations that make it available to the public.</li> <li>• By asking other organisations involved (e.g. the Landscape Laboratory)</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• through the portal / website</li> <li>• upon request, directly with the Plan4COLD contact point</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• Free access</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> <li>• doc</li> <li>• shp</li> <li>• DWG</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> <li>• Submunicipal</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>• By sector (e.g. residential, tertiary, industry, etc.)</li> <li>• By sub-sector (e.g. public buildings)</li> </ul>
<b>Frequency</b>	\

<b>Quality of data</b>	
<p>The data and information from the Guimarães climate pact are communicated by the institutions that are signatories of the pact. The number of signatories is small in relation to the business activity of the entire municipality and may therefore be unrepresentative. Nevertheless, it is an important source of co-operation and involvement that will bring added value to the project.</p> <p>The data from the municipal divisions is limited to the management, operation and investment activities of the municipality, thus excluding the private sector. The level of detail and access to private sector data could pose challenges for data collection.</p>	



## 5. MUNICIPALITY OF LOULÉ

### 5.1 Weather

#### 5.1.1 Meteorological data

<b>Municipality:</b>	Loulé
<b>Category of data:</b>	Meteorological data and spatial data/cartography
<b>Type of data</b>	Temperature (°C); Precipitation (mm); Accumulated precipitation (mm); Barometer (MBar); Average solar radiation (Watts/m2); Outdoor humidity (%); Average wind speed (km/h); Maximum wind speed (km/h); Average wind direction; Wind direction (°); Maximum UV
<b>Source</b>	Loulé Municipality
<b>Type of source</b>	Spatial data/cartography
<b>Source responsible body</b>	Loulé Municipal Civil Protection, Security and Forestry Service (SMPCSF)
<b>Source contact person</b>	SMPCSF Director – João Matos Lima
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• general public</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• portal/website</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> <li>• txt</li> </ul>
<b>Geographical scale</b>	Data available for the following weather stations: <ul style="list-style-type: none"> <li>• Vale Maria Dias</li> <li>• Quarteira</li> <li>• Loulé Alte</li> </ul>
<b>Aggregation level</b>	
<b>Frequency</b>	30-minute breaks Vale Maria Dias (since 06/02/2023 until now) Quarteira (since 26/08/2022 until now) Loulé (since 14/12/2022 until now)



	Alte (since 15/12/2022 until now)
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Quality of data	
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### 5.1.2 Air temperature in Protected Areas

<b>Municipality:</b>	Loulé
<b>Category of data:</b>	Meteorological data and spatial data/cartography
<b>Type of data</b>	Air temperature in Protected Areas
<b>Source</b>	Loulé Municipality
<b>Type of source</b>	Spatial data/cartography
<b>Source responsible body</b>	Environment Division (DA)
<b>Source contact person</b>	Head of DA – Lina Madeira
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• only Public Organisations/Local Authorities</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• on written request/email</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> </ul>
<b>Geographical scale</b>	Temperature data available for the following locations: <ul style="list-style-type: none"> <li>• Paisagem Protegida Local da Rocha da Pena</li> <li>• Paisagem Protegida Local da Fonte Benémola</li> <li>• Reserva Natural Local da Foz do Almargem e do Trafal</li> <li>• Nave do Barão, área em processo de classificação como Reserva Natural Local</li> </ul>
<b>Aggregation level</b>	
<b>Frequency</b>	Hourly data between 3rd September 2023 and 5th May 2024

Quality of data	
\	



### 5.1.3 Green Spaces

<b>Municipality:</b>	Loulé
<b>Category of data:</b>	Meteorological data and spatial data/cartography
<b>Type of data</b>	Green spaces
<b>Source</b>	Loulé Municipality
<b>Type of source</b>	Spatial data/cartography
<b>Source responsible body</b>	Green Spaces, Street Furniture and Gardens Division (DEVMUJ) / Geographical Information Systems Division (DSIG)
<b>Source contact person</b>	Head of DEVMUJ – Luís Inácio Head of DSIG – Ana Matos Lima
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• only Public Organisations/Local Authorities</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• on written request/email</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• shp</li> </ul>
<b>Geographical scale</b>	Municipal
<b>Aggregation level</b>	
<b>Frequency</b>	Current data

#### Quality of data

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### 5.1.4 Conjunctural Land Use Map

<b>Municipality:</b>	Loulé
<b>Category of data:</b>	Meteorological data and spatial data/cartography
<b>Type of data</b>	Conjunctural Land Use Map
<b>Source</b>	
<b>Type of source</b>	Spatial data/cartography
<b>Source responsible body</b>	Directorate-General for Territory (DGT)



<b>Source contact person</b>	\
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• accessible to general public</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• through portal/website</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• wms</li> <li>• zip</li> </ul>
<b>Geographical scale</b>	Municipal
<b>Aggregation level</b>	\
<b>Frequency</b>	Data available for 2018, 2020, 2021, 2022, 2023 Pre-Summer, 2023, 2024 Pre-Summer and 2024.

<b>Quality of data</b>	

### 5.1.5 Protection zones

<b>Municipality:</b>	Loulé
<b>Category of data:</b>	Meteorological data and spatial data/cartography
<b>Type of data</b>	Protection zones
<b>Source</b>	Municipality of Loulé
<b>Type of source</b>	Spatial data/cartography
<b>Source responsible body</b>	Green Spaces, Street Furniture and Gardens Division (DEVMUJ) / Geographical Information Systems Division (DSIG)
<b>Source contact person</b>	Head of DEVMUJ – Luís Inácio Head of DSIG – Ana Matos Lima
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• Public Organisations/Local Authorities only</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• upon written request/email</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• free</li> </ul>



	Data format • shp
<b>Geographical scale</b>	Municipal
<b>Aggregation level</b>	\
<b>Frequency</b>	Current data
<b>Quality of data</b>	
\	

### 5.1.6 Urban grove

<b>Municipality:</b>	Loulé
<b>Category of data:</b>	Meteorological data and spatial data/cartography
<b>Type of data</b>	Urban grove
<b>Source</b>	Municipality of Loulé
<b>Type of source</b>	Spatial data/cartography
<b>Source responsible body</b>	Green Spaces, Street Furniture and Gardens Division (DEVMUJ) / Geographical Information Systems Division (DSIG)
<b>Source contact person</b>	Head of DEVMUJ – Luís Inácio Head of DSIG – Ana Matos Lima
<b>Availability and accessibility</b>	Who can access • Public Organisations/Local Authorities only
	Way of access • upon written request/email
	Type of access • free
	Data format • shp
<b>Geographical scale</b>	Municipal
<b>Aggregation level</b>	\
<b>Frequency</b>	Current data
<b>Quality of data</b>	
\	



## 5.2 Final energy consumption and sources for H&C

### 5.2.1 CO<sub>2</sub> emissions from electricity consumption

<b>Municipality:</b>	Loulé
<b>Category of data:</b>	Final energy uses for H&C
<b>Type of data</b>	CO <sub>2</sub> emissions from electricity consumption in the Municipality.
<b>Source</b>	Municipal Observatory for the Environment and Territory (OMAT) of the Municipality of Loulé
<b>Type of source</b>	Data calculated internally by the Sustainability and Natural Resources Division (DSRN) of Loulé City Council. For the purposes of accounting for carbon intensity by greenhouse gas emissions, the emission factor associated with electricity consumption is considered to be equal to 0.47 kgCO <sub>2</sub> (index 2) e/kWh, in accordance with Ordinance no. 63/2008 of 21 January, 1st series
<b>Source responsible body</b>	DSRN of Loulé Municipality
<b>Source contact person</b>	Head of DSRN – Paula Mendes
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• accessible to general public</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• through the portal / website</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• Free access</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> <li>• csv</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> </ul>
<b>Aggregation level</b>	By subsector <ul style="list-style-type: none"> <li>• Municipal administrative buildings</li> <li>• Local authority sports facilities</li> <li>• Local authority water supply infrastructure</li> <li>• Local authority schools</li> <li>• Other municipal buildings and equipment</li> </ul>
<b>Frequency</b>	<ul style="list-style-type: none"> <li>• Quarterly</li> </ul>



	<ul style="list-style-type: none"> <li>Data period - 2015 - 2024 Daily</li> </ul>
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<b>Quality of data</b>
Data processing and monitoring began in 2014. The year 2024 is not complete (failure to send data by the energy supplier).

## 5.2.2 Electricity consumption

<b>Municipality:</b>	Loulé
<b>Category of data:</b>	Final energy uses for H&C
<b>Type of data</b>	Total electricity consumption in the Municipality
<b>Source</b>	Municipal Observatory for the Environment and Territory (OMAT) of the Municipality of Loulé
<b>Type of source</b>	Database
<b>Source responsible body</b>	Sustainability and Natural Resources Division (DSRN) of Loulé City Council (The team responsible for OMAT is DACEC, but the data entered is sent by DSRN)
<b>Source contact person</b>	Head of DSRN – Paula Mendes
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>accessible to general public</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>through the portal / website</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>Free access</li> </ul>
	Data format <ul style="list-style-type: none"> <li>xls</li> <li>csv</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>Municipal</li> </ul>
<b>Aggregation level</b>	By subsector <ul style="list-style-type: none"> <li>Local authority administrative buildings</li> <li>Local authority sports facilities</li> <li>Local authority water supply infrastructure</li> <li>Local authority schools</li> <li>Other municipal buildings and equipment</li> </ul>
<b>Frequency</b>	<ul style="list-style-type: none"> <li>Quarterly</li> <li>Data period - 2015 – 2024 Daily</li> </ul>



Quality of data
Data processing and monitoring began in 2014. The year 2024 is not complete (failure to send data by the energy supplier).

### 5.2.3 Gas consumption in school and in sport facilities

<b>Municipality:</b>	Loulé
<b>Category of data:</b>	Final energy uses for H&C
<b>Type of data</b>	Total gas consumption (propane) in the municipality's school establishments and in the municipality's sports facilities
<b>Source</b>	Municipal Observatory for the Environment and Territory (OMAT) of the Municipality of Loulé
<b>Type of source</b>	Data calculated by the Sustainability and Natural Resources Division (DSRN) of Loulé City Council
<b>Source responsible body</b>	Sustainability and Natural Resources Division (DSRN) of Loulé Municipality (The team responsible for OMAT is DACEC, but the data entered is sent by DSRN)
<b>Source contact person</b>	Head of DSRN – Paula Mendes
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• Only the municipality</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• via the portal/website</li> <li>• on written request/email</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• Free access</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> <li>• csv</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> </ul>
<b>Aggregation level</b>	By subsector <ul style="list-style-type: none"> <li>• municipal schools</li> <li>• local authority sports facilities</li> </ul>
<b>Frequency</b>	<ul style="list-style-type: none"> <li>• Half-yearly (data available for consultation on OMAT is annual).</li> <li>• Data period: 2018 - 2024</li> </ul>



<b>Quality of data</b>
The schools data processing and monitoring began in 2018, while for sport facilities in 2014 (from 2014 to 2018 refers only the Municipal Covered Swimming Pools, the Quarteira Municipal Covered Swimming Pools and the Loulé Municipal Pavilion Professor Joaquim Vairinhos).

## 5.3 H&C final uses and market

### 5.3.1 Energy Performance Certificates

<b>Municipality:</b>	Loulé
<b>Category of data:</b>	H&C final uses and market
<b>Type of data</b>	Energy certificates for municipal buildings by classification (no.)
<b>Source</b>	Municipality of Loulé
<b>Type of source</b>	<ul style="list-style-type: none"> <li>Registration</li> </ul>
<b>Source responsible body</b>	Loulé City Council's Department of Works and Municipal Infrastructure Management (DOGIM)
<b>Source contact person</b>	Joaquim Farrajota - Director of DOGIM
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>Public Authorities/Local Authorities</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>By Written Request/E-mail</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>Free access</li> </ul>
	Data format <ul style="list-style-type: none"> <li>xls</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>Municipal</li> </ul>
<b>Aggregation level</b>	By sector <ul style="list-style-type: none"> <li>Municipal public buildings</li> </ul>
<b>Frequency</b>	Current data
<b>Quality of data</b>	
	\



### 5.3.2 Hotel units by capacity

<b>Municipality:</b>	Loulé
<b>Category of data:</b>	H&C final uses and market
<b>Type of data</b>	Hotel units occupancy (no.)
<b>Source</b>	Municipality of Loulé
<b>Type of source</b>	<ul style="list-style-type: none"> <li>• Registration</li> </ul>
<b>Source responsible body</b>	Division of Local Economy, Trade and Tourism (DELCT)
<b>Source contact person</b>	Marília Lúcio – Head of the DELCT
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• Public Authorities/Local Authorities</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• By Written Request/E-mail</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• Free access</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> </ul>
<b>Aggregation level</b>	By sector <ul style="list-style-type: none"> <li>• Hotels</li> </ul>
<b>Frequency</b>	Current data
<b>Quality of data</b>	
\	

### 5.3.3 Large energy consumers

<b>Municipality:</b>	Loulé
<b>Category of data:</b>	H&C final uses and market
<b>Type of data</b>	Large energy consumers per type (no.)
<b>Source</b>	Municipality of Loulé
<b>Type of source</b>	<ul style="list-style-type: none"> <li>• Registration</li> </ul>
<b>Source responsible body</b>	Division of Local Economy, Trade and Tourism (DELCT)



<b>Source contact person</b>	Marília Lúcio – Head of the DELCT
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• Public Authorities/Local Authorities</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• By Written Request/E-mail</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• Free access</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> </ul>
<b>Aggregation level</b>	By sector <ul style="list-style-type: none"> <li>• Large Energy Consumers</li> </ul>
<b>Frequency</b>	Current data
<b>Quality of data</b>	
\	

### 5.3.4 Municipal buildings and facilities

<b>Municipality:</b>	Loulé
<b>Category of data:</b>	H&C final uses and market
<b>Type of data</b>	Municipal buildings and facilities per type (no.)
<b>Source</b>	Municipality of Loulé
<b>Type of source</b>	<ul style="list-style-type: none"> <li>• Registration</li> </ul>
<b>Source responsible body</b>	Finance and Assets Division (DFP) of Loulé City Council
<b>Source contact person</b>	Clara Gonçalves – Head of DFP
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• Public Authorities/Local Authorities</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• By Written Request/E-mail</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• Free access</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> </ul>



<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>• Municipal</li> </ul>
<b>Aggregation level</b>	By subsector - Municipal public buildings: <ul style="list-style-type: none"> <li>• Residential buildings</li> <li>• Service buildings</li> <li>• Markets</li> <li>• Schools</li> <li>• Socio-cultural buildings</li> <li>• Sports complexes</li> </ul>
<b>Frequency</b>	Current data
<b>Quality of data</b>	
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## 6. MUNICIPALITY OF VILA REAL

### 6.1 Weather

#### 6.1.1 Heat waves

<b>Municipality:</b>	All municipalities of Continental Portugal
<b>Category of data:</b>	Weather
<b>Type of data:</b>	Heat waves
<b>Source:</b>	<a href="https://rea.apambiente.pt/content/ondas-de-calor-e-de-frio">https://rea.apambiente.pt/content/ondas-de-calor-e-de-frio</a>
<b>Type of source</b>	Cadastre
<b>Source responsible body</b>	APA (Agência Portuguesa do Ambiente) – Portuguese Environmental Agency
<b>Source contact person</b>	APA Telefone: 214 728 262 Email: radao@apambiente.pt
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• accessible to general public</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• through portal/website</li> </ul>



	Type of access <ul style="list-style-type: none"> <li>• free access</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• html</li> </ul>
<b>Geographical scale</b>	National
<b>Aggregation level</b>	Number of days with heat waves
<b>Frequency</b>	Daily

<b>Quality of data</b>	
This data only refers to 2023. It would be ideal to have data from previous years, to understand the annual trend in the municipalities under study. No information about the Autonomous Regions of Madeira and Azores.	

<b>Municipality:</b> Several weather stations throughout Continental Portugal. Only Vila Real and Setúbal (from the Plan4COLD municipalities) have weather stations with this data
<b>Category of data:</b> Weather
<b>Type of data:</b> Number of heat waves per year (summer period); number of days of heat waves per year (summer period);
<b>Source:</b> <a href="https://www.ipma.pt/pt/oclima/ondascolor/">https://www.ipma.pt/pt/oclima/ondascolor/</a>

<b>Type of source</b>	Statistical release
<b>Source responsible body</b>	Portuguese Institute of the Sea and Atmosphere (IPMA)
<b>Source contact person</b>	IPMA - Phone: +351 291 241 592
<b>Availability and accessibility</b>	<ul style="list-style-type: none"> <li>• accessible to general public</li> </ul>
	Way of access: through portal/website
	Type of access: free access
	Data format: csv, json and html (graphical representation)
<b>Geographical scale</b>	<p>Other (only available for a selection of weather station locations in Continental Portugal)</p> <p>Namely, for the partner municipalities of Plan4COLD in Continental Portugal, data for the following stations is available:</p> <ul style="list-style-type: none"> <li>- Vila Real Cidade</li> <li>- Vila Real CC</li> </ul>



	- Setúbal
<b>Aggregation level</b>	Other (selected weather stations, including Vila real-Cidade, Vila real-CC and Setúbal)
<b>Frequency</b>	Annual. Period: 1941-2024

<b>Quality of data</b>	
<p>In here it is considered the heat wave duration index definition, that states that a heat wave is considered to occur when, over a period of at least 6 consecutive days, the maximum daily temperature is 5°C higher than the average daily value in the reference period. Summer refers to the period from June until August. Note that this dataset includes weather stations throughout all Continental Portugal but that do not coincide with the partner municipalities of Plan4COLD. The locations of Faro and Elvas may be used as reference for Loulé and Évora, for example.</p>	

## 6.1.2 Green areas

<b>Municipality:</b>	Vila Real
<b>Category of data:</b>	Meteorological data and spatial data/cartography
<b>Type of data</b>	Green areas
<b>Source</b>	Municipality of Vila Real
<b>Type of source</b>	Database associated with the services carried out by the Environment Division of the Municipality of Vila Real
<b>Source responsible body</b>	Environment Division of the Municipality of Vila Real
<b>Source contact person</b>	Darinka Costa Gonzalez
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• only the municipality</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• upon written request/email</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• xls</li> </ul>
<b>Geographical scale</b>	Municipal
<b>Aggregation level</b>	Green spaces organised by areas of each parish council



<b>Frequency</b>	Updating data according to the need/opportunity of the service). Identify, if possible, the period to which the data refers: the database was made/updated in 2024.
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<b>Quality of data</b>
The database on green areas will be maintained, with no set periodicity. The database will also be updated as changes are made/ new spaces added

## 6.2 Final energy consumption and sources for H&C

Vila real municipality has access to the following data:

- Final consumptions of fuels and energy sources for H&C, namely:
  - Fossil fuels (natural gas, LPG, heating oil, etc.) - the processing of data by the Municipality regarding these aspects is processed through Excel spreadsheets
  - Renewables (solar thermal, geothermal, biomasses, waste heat, etc.) - The Municipality's data processing regarding biomass is carried out using Excel spreadsheets. The amount of biomass is quantified, in terms of "Briquettes" and "Pellets" used in Basic Schools and Kindergartens in the municipality
- H&C final uses and market:
  - Energy upgrading interventions (types, trends, etc.) - Applications submitted for NORTE2030 programme involving "Energy Efficiency".



## 7. MUNICIPALITIES OF SETÚBAL, PALMELA AND SESIMBRA

### 7.1 Weather

#### 7.1.1 Meteorological data

<b>Municipality:</b> Setúbal, Palmela and Sesimbra	
<b>Category of data:</b> Weather	
<b>Type of data:</b> Climatic characterisation: Temperature, solar radiation, evaporation, relative humidity and analysis of recent temperature trends   Municipal Climate Scenario Development for temperature (average, maximum, and minimum), number of very hot days, summer days, tropical nights and frost days. Assessment and scenario development of bioclimatic comfort (scenario analysis of heatwaves, cold waves, and overall bioclimatic comfort)   Effects of the urban heat island on human health.	
<b>Source:</b> PLAAC – Arrábida (Local Plan for Climate Change Adaptation) - Bioclimatic, Sociocultural, Economic and Ecological Characterisation and Scenario Development for Setúbal   Palmela   Sesimbra	
<b>Type of source</b>	Local Plan including data from Census, Databases, Statistical releases and scientific analysis
<b>Source responsible body</b>	ENA – Agência de Energia e Ambiente da Arrábida
<b>Source contact person</b>	Orlando Paraíba   +351 918 150 989   orlando.paraiba@ena.com.pt
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• accessible to general public</li> </ul>
	Way of access: <ul style="list-style-type: none"> <li>• Setúbal: <a href="http://www.plaac.ena.com.pt/db/documentos/848.1.2.63c19109b9ea6.pdf">http://www.plaac.ena.com.pt/db/documentos/848.1.2.63c19109b9ea6.pdf</a></li> <li>• Palmela: <a href="http://www.plaac.ena.com.pt/db/documentos/848.1.3.63c51a51446fa.pdf">http://www.plaac.ena.com.pt/db/documentos/848.1.3.63c51a51446fa.pdf</a></li> <li>• Sesimbra: <a href="http://www.plaac.ena.com.pt/db/documentos/848.1.4.63c1946263167.pdf">http://www.plaac.ena.com.pt/db/documentos/848.1.4.63c1946263167.pdf</a></li> </ul>
	Type of access: <ul style="list-style-type: none"> <li>• free access</li> </ul>
	Data format: pdf



<b>Geographical scale</b>	Municipal and Sub-municipal (Parish councils and territorial climate units)
<b>Aggregation level</b>	territorial unit
<b>Frequency</b>	Monthly Period: from 1871 until 2008

<b>Quality of data</b>	NO critical aspects. Data provided in the scope of the project PLAAC – Arrábida (Local Plan for Climate Change Adaptation), promoted by ENA and financed by the EEA Grants (Programme Operator: Secretaria-Geral do Ambiente do Ministério do Ambiente e Ação Climática). Data quality supported by the project consortium: municipalities of Palmela, Sesimbra and Setúbal, as well as two leading scientific institutions in Portugal: IGOT – Institute of Geography and Spatial Planning and NOVA School of Science and Technology   FCT NOVA.
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<b>Municipality:</b> Setúbal, Palmela and Sesimbra
<b>Category of data:</b> Weather
<b>Type of data:</b> Low temperature, hot and dry weather: characterisation of the impacts and sensitivity analysis   Adaptive capacity (institutional, instrumental, and sectoral adaptation)   Excessive heat as current and future climate hazards and analysis of risk perception by stakeholders.
<b>Source:</b> PLAAC – Arrábida (Local Plan for Climate Change Adaptation) - Assessment of Current and Future Climate Impacts and Vulnerabilities in Setúbal   Palmela   Sesimbra

<b>Type of source</b>	Local Plan including data from Census, Databases, Statistical releases and scientific analysis
<b>Source responsible body</b>	ENA – Agência de Energia e Ambiente da Arrábida
<b>Source contact person</b>	Orlando Paraíba   +351 918 150 989   orlando.paraiba@ena.com.pt
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• accessible to general public</li> </ul> Way of access: <ul style="list-style-type: none"> <li>• Setúbal: <a href="http://www.plaac.ena.com.pt/db/documentos/848.1.2.63c19167b1a70.pdf">http://www.plaac.ena.com.pt/db/documentos/848.1.2.63c19167b1a70.pdf</a></li> <li>• Palmela: <a href="http://www.plaac.ena.com.pt/db/documentos/848.1.3.63c51a5c04a0c.pdf">http://www.plaac.ena.com.pt/db/documentos/848.1.3.63c51a5c04a0c.pdf</a></li> </ul>



	<ul style="list-style-type: none"> <li>Sesimbra: <a href="http://www.plaac.ena.com.pt/db/documentos/848.1.4.63c1947e27e02.pdf">http://www.plaac.ena.com.pt/db/documentos/848.1.4.63c1947e27e02.pdf</a></li> </ul>
	Type of access: <ul style="list-style-type: none"> <li>free access</li> </ul>
	Data format: pdf
<b>Geographical scale</b>	Municipal and Sub-municipal (Parish councils and territorial climate units)
<b>Aggregation level</b>	territorial unit
<b>Frequency</b>	Monthly Period: from 1871 until 2008

<b>Quality of data</b>	
NO critical aspects. Data provided in the scope of the project PLAAC – Arrábida (Local Plan for Climate Change Adaptation), promoted by ENA and financed by the EEA Grants (Programme Operator: Secretaria-Geral do Ambiente do Ministério do Ambiente e Ação Climática). Data quality supported by the project consortium: municipalities of Palmela, Sesimbra and Setúbal, as well as two leading scientific institutions in Portugal: IGOT – Institute of Geography and Spatial Planning and NOVA School of Science and Technology   FCT NOVA.	

### 7.1.2 Heat waves

<b>Municipality:</b> Several weather stations throughout Continental Portugal. Only Vila Real and Setúbal (from the Plan4COLD municipalities) have weather stations with this data
<b>Category of data:</b> Weather
<b>Type of data:</b> Number of heat waves per year (summer period); number of days of heat waves per year (summer period);
<b>Source:</b> <a href="https://www.ipma.pt/pt/oclima/ondascalor/">https://www.ipma.pt/pt/oclima/ondascalor/</a>

<b>Type of source</b>	Statistical release
<b>Source responsible body</b>	Portuguese Institute of the Sea and Atmosphere (IPMA)
<b>Source contact person</b>	IPMA - Phone: +351 291 241 592
<b>Availability and accessibility</b>	<ul style="list-style-type: none"> <li>accessible to general public</li> </ul>
	Way of access: through portal/website
	Type of access: free access
	Data format: csv, json and html (graphical representation)



<b>Geographical scale</b>	Other (only available for a selection of weather station locations in Continental Portugal) Namely, for the partner municipalities of Plan4COLD in Continental Portugal, data for the following stations is available: <ul style="list-style-type: none"> <li>- Vila Real Cidade</li> <li>- Vila Real CC</li> <li>- Setúbal</li> </ul>
<b>Aggregation level</b>	Other (selected weather stations, including Vila real-Cidade, Vila real-CC and Setúbal)
<b>Frequency</b>	Annual. Period: 1941-2024

<b>Quality of data</b>	
In here it is considered the heat wave duration index definition, that states that a heat wave is considered to occur when, over a period of at least 6 consecutive days, the maximum daily temperature is 5°C higher than the average daily value in the reference period. Summer refers to the period from June until August. Note that this dataset includes weather stations throughout all Continental Portugal but that do not coincide with the partner municipalities of Plan4COLD. The locations of Faro and Elvas may be used as reference for Loulé and Évora, for example.	

<b>Municipality:</b>	Setúbal, Palmela and Sesimbra
<b>Category of data:</b>	Weather

<b>Type of data</b>	Excessive heat: identification of adaptation measures by sector and action sheets for each sectoral measure  Climate monitoring indicators  Surface area and proportion of the municipality's territory in the highest hazard class for excessive heat, by parish councils  Indicators for monitoring adaptive capacity (including proportion of households with Air Conditioning by Parish Councils).
<b>Source</b>	PLAAC – Arrábida (Local Plan for Climate Change Adaptation) – Setúbal Palmela   Sesimbra Climate Adaptation Strategy and Action Plan
<b>Type of source</b>	Local Plan including data from Census, Databases, Statistical releases and scientific analysis
<b>Source responsible body</b>	ENA – Agência de Energia e Ambiente da Arrábida
<b>Source contact person</b>	Orlando Paraíba   +351 918 150 989   orlando.paraiba@ena.com.pt
	Who can access



<b>Availability and accessibility</b>	<ul style="list-style-type: none"> <li>only the municipality</li> </ul>
	<b>Way of access</b> <ul style="list-style-type: none"> <li>Setúbal: <a href="http://www.plaac.ena.com.pt/db/documentos/848.1.2.63c1918de25ac.pdf">http://www.plaac.ena.com.pt/db/documentos/848.1.2.63c1918de25ac.pdf</a></li> <li>Palmela: <a href="http://www.plaac.ena.com.pt/db/documentos/848.1.3.63c51a6190523.pdf">http://www.plaac.ena.com.pt/db/documentos/848.1.3.63c51a6190523.pdf</a></li> <li>Sesimbra: <a href="http://www.plaac.ena.com.pt/db/documentos/848.1.4.63c19483a76df.pdf">http://www.plaac.ena.com.pt/db/documentos/848.1.4.63c19483a76df.pdf</a></li> </ul>
	<b>Type of access</b> <ul style="list-style-type: none"> <li>free</li> </ul>
	<b>Data format</b> <ul style="list-style-type: none"> <li>xls</li> </ul>
<b>Geographical scale</b>	<ul style="list-style-type: none"> <li>Municipal and sub-municipal (parish councils)</li> </ul>
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>By sector (Agriculture and forests   Economy (industry, tourism and services)   Energy and energy security   Nature and Biodiversity   Urban Planning   Fisheries and Aquaculture   Cultural Heritage   Water resources   Security of People and Goods   Human Health   Transport and Communications   Coastal areas and Sea</li> <li>Other: territorial unit</li> </ul>
<b>Frequency</b>	

<b>Quality of data</b>	
<p>No critical aspects. Data provided in the scope of the project PLAAC – Arrábida (Local Plan for Climate Change Adaptation), promoted by ENA and financed by the EEA Grants (Programme Operator: Secretaria-Geral do Ambiente do Ministério do Ambiente e Ação Climática). Data quality supported by the project consortium: municipalities of Palmela, Sesimbra and Setúbal, as well as two leading scientific institutions in Portugal: IGOT – Institute of Geography and Spatial Planning and NOVA School of Science and Technology   FCT NOVA.</p>	

## 7.2 Final energy consumptions and sources for H&C

### 7.2.1 Fossil fuels (natural gas, LPG, heating oil, etc.) and electricity

<b>Municipality:</b>	Setúbal, Palmela and Sesimbra
<b>Category of data</b>	Final consumptions of fuels and energy sources for H&C
<b>Type of data</b>	Fossil fuels (natural gas, LPG, heating oil, etc.) and electricity
<b>Source</b>	Setúbal   Palmela   Sesimbra CO2 emissions Monitoring Matrix



<b>Type of source</b>	<ul style="list-style-type: none"> <li>• Database</li> <li>• Statistical release</li> </ul>
<b>Source responsible body</b>	ENA - Agência de Energia e Ambiente da Arrábida
<b>Source contact person</b>	Orlando Paraíba   +351 918 150 989   orlando.paraiba@ena.com.pt
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• Free access</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>• through portal/website <a href="https://www.arrabidazeroemissoes.pt/monitorizacao">https://www.arrabidazeroemissoes.pt/monitorizacao</a></li> </ul>
	Type of access <ul style="list-style-type: none"> <li>• free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>• website graphic design</li> </ul>
<b>Geographical scale</b>	municipal
<b>Aggregation level</b>	By sector (e.g. residential, tertiary, industry, etc.)
<b>Frequency</b>	Yearly

<b>Quality of data</b>
Data provided in CO2 emissions Monitoring Matrices has a two-year delay, as the reference information is sourced from the Directorate-General for Energy and Geology (DGEG), which publishes data with this time lag.

### 7.2.1 Renewable energy

<b>Municipality:</b>	Setúbal, Palmela and Sesimbra
<b>Category of data</b>	Final consumptions of fuels and energy sources for H&C
<b>Type of data</b>	Renewable energy
<b>Source</b>	ENA's projections
<b>Type of source</b>	Statistical release
<b>Source responsible body</b>	ENA - Agência de Energia e Ambiente da Arrábida
<b>Source contact person</b>	Orlando Paraíba   +351 918 150 989   orlando.paraiba@ena.com.pt
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• Public bodies/local authorities</li> </ul>
	Way of access



	<ul style="list-style-type: none"> <li>upon written request/email</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>xls</li> </ul>
<b>Geographical scale</b>	municipal
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>By sector (e.g. residential, tertiary, industry, etc.)</li> </ul>
<b>Frequency</b>	Yearly

<b>Quality of data</b>
The fact that the data comes from an estimate implies uncertainties in the real implementation of these projections.

## 7.3 H&C final uses and market

### 7.3.1 H&C plants, devices, equipments

<b>Municipality:</b>	Setúbal, Palmela and Sesimbra
<b>Category of data</b>	H&C final uses and market

<b>Type of data</b>	H&C plants, devices, equipment features (type, age, capacity, efficiency class, level of diffusion, etc.)
<b>Source</b>	Municipalities' public housing strategies
<b>Type of source</b>	Cadastré
<b>Source responsible body</b>	Municipality of Setúbal, Municipality of Palmela, Municipality of Sesimbra.
<b>Source contact person</b>	Carla Potrica (Setúbal), Fernanda Pésinho (Palmela) José Polido (Sesimbra)
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>Public Body/Las</li> <li>technicians/researchers</li> </ul>
	Way of access <ul style="list-style-type: none"> <li>upon written request/email</li> </ul>
	Type of access <ul style="list-style-type: none"> <li>free</li> </ul>
	Data format <ul style="list-style-type: none"> <li>unknown</li> </ul>



<b>Geographical scale</b>	Municipal and sub-municipal
<b>Aggregation level</b>	By final use (e.g. heating, cooling, hot water, freezing, industrial processes, etc.)
<b>Frequency</b>	\

## 8. MADEIRA REGION

### 8.1 Weather

<b>Municipality:</b> Madeira Region
<b>Category of data:</b> Weather
<b>Type of data:</b> Weather data (air temperature, extreme events, insulation, etc)
<b>Source:</b> Climate statistics

<b>Type of source</b>	Statistical release
<b>Source responsible body</b>	Regional Government (Statists Regional Directorate (DREM). The Portuguese Institute of the Sea and Atmosphere (IPMA)- Madeira Delegation is responsible for providing weather data for Climate statistics of DREM. National Government (Portuguese Institute of the Sea and Atmosphere (IPMA)- Madeira Delegation)
<b>Source contact person</b>	DREM General contact: drem@ine.pt Statistical information requests: biblioteca.drem@ine.pt Phone: +351291145126 IPMA Phone: +351 291 241 592
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• accessible to general public</li> </ul>
	Way of access: <ul style="list-style-type: none"> <li>• through portal/website</li> </ul>
	Type of access: free access



	Data format: xls
<b>Geographical scale</b>	Regional In some cases municipal In some cases by weather stations
<b>Aggregation level</b>	DREM <ul style="list-style-type: none"> <li>• Available data by weather station</li> <li>• Temperatures and average temperatures</li> <li>• N<sup>o</sup> of heat waves</li> <li>• N<sup>o</sup> of tropical Night</li> <li>• Average annual temperature range</li> <li>• Monthly number of hours of sunshine</li> <li>• Extreme weather Events</li> </ul> IPMA <ul style="list-style-type: none"> <li>• Climate anomalies in Funchal (1971-2000)</li> </ul>
<b>Frequency</b>	Yearly Monthly Daily (Dashboard)

<b>Quality of data</b>
The information available is very complete, with a lot of information for RAM and Funchal. In the geographical area of Funchal there are seven online weather stations, which monitor temperatures hour by hour.

<b>Municipality:</b> Madeira Region
<b>Category of data:</b> Weather
<b>Type of data:</b> Weather data (Gradual climate change and extreme weather events Climate projection to Madeira Region)
<b>Source:</b> Climate study reports: “Gradual climate change and extreme weather events” and “Climate projection to Madeira Region”

<b>Type of source</b>	Reports from Activity 2.1.1 of Acliemac project available on AREAM website
<b>Source responsible body</b>	Regional Energy and Environment Agency of the ARM (AREAM)
<b>Source contact person</b>	Phone: +351 291723300 Email: aream@aream.pt



<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• accessible to general public</li> </ul>
	Way of access: through portal/website URL to download study reports: <ul style="list-style-type: none"> <li>• Gradual climate change and extreme weather events</li> <li>• Climate projection to Madeira Region</li> </ul> AREAM Website: Acliemac Project
	Type of access: free access
	Data format: pdf and html
<b>Geographical scale</b>	Regional Municipal
<b>Aggregation level</b>	Available weather data: <ul style="list-style-type: none"> <li>• Climate change and extreme events</li> <li>• Climate scenarios</li> </ul>
<b>Frequency</b>	Monthly or annual calculated averages, depending on the climatic parameter

#### Quality of data

These studies took into account climate data available from official sources and other projects, namely by DREM, IPMA, Madeira Climate Strategy, IPCC and Soclimpact project.

**Municipality:** Madeira Region

**Category of data:** Weather

**Type of data:** Climate data and scenarios

**Source:** Madeira Climate Strategy

<b>Type of source</b>	Madeira Climate Strategy Report available on DRAM website
<b>Source responsible body</b>	Regional Directorate of Environment and Sea (DRAM)
<b>Source contact person</b>	Email: dram@madeira.gov.pt Phone: +351291145610
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• accessible to general public</li> </ul>



	Way of access: through portal/website URL of website of strategy: <a href="#">Madeira Climate Observatory</a> URL to download climate strategy : <a href="#">Climate strategy</a> URL to download consult strategy revision: <a href="#">Climate regionalization report</a>
	Type of access: free access
	Data format: pdf and html
<b>Geographical scale</b>	Regional Municipal
<b>Aggregation level</b>	Available data: <ul style="list-style-type: none"> <li>• Observed climate (temperature, precipitation)</li> <li>• Reference climate situation</li> <li>• Climate scenarios 2015 (A2 B2)</li> <li>• Climate scenarios 2023 (SSP2 SSP5)</li> <li>• Sectoral vulnerabilities to climate change</li> <li>• Adaption needs of energy sector to climate change</li> </ul>
<b>Frequency</b>	Strategy review every 10 years

<b>Quality of data</b>
The Climate strategy of Madeira Region is from 2015 and is currently undergoing review, which is divided into two distinct stages. The first phase, called climate regionalization, has already been completed, resulting in the production of climate projections. The second phase of the review will consist of carrying out a sectoral analysis of risks and vulnerabilities, supported by the new climate projections developed.

## 8.2 Final energy consumptions and sources for H&C

### 8.2.1 Energy Performance Certificates (EPC)

<b>Municipality:</b> Municipalities of Madeira Region
<b>Category of data:</b> Energy needs per type of energy source for H&C
<b>Type of data:</b> Fossil Fuel, electricity and renewable needs
<b>Source:</b> Energy Certification System

<b>Type of source</b>	Database Statistical treatment and estimates from AREAM
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<b>Source responsible body</b>	AREAM
<b>Source contact person</b>	sce@aream.pt
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>Public Body/LAs and technicians/researchers</li> </ul>
	Way of access: <ul style="list-style-type: none"> <li>upon written/email request</li> </ul>
	Type of access: <ul style="list-style-type: none"> <li>sent of excel database for eligible interested entities and persons</li> </ul>
	Data format: xls
<b>Geographical scale</b>	Regional Municipal Parishes
<b>Aggregation level</b>	<ul style="list-style-type: none"> <li>Sector: Residential and service buildings</li> <li>Sub-sector: public buildings, social housing, hotels, trade centres.</li> <li>Final use: heating, cooling and hot water.</li> <li>Energy needs by energy source (LPG, electricity and renewable sources) for heating, cooling and DHW, in new, rehabilitated and existing residential and service buildings that have energy certificates issued between 2014 and present.</li> </ul>
<b>Frequency</b>	Yearly Monthly Daily

<b>Quality of data</b>	
<p>Energy needs – Energy to ensure comfortable conditions in residential and service buildings (DHW, space heating and cooling) in all seasons. AREAM, as the manager of the ECS in the Madeira Region, has access to limited data</p> <p>Evaluation of the energy certificates (EC) of large service buildings, about 351 EC Madeira, 210 EC Funchal. Through the services buildings EPC, it is possible to know the energy consumption by type of use, based on a dynamic simulation calibrated with the building's annual energy bill, as well as the technical systems (equipments) and forms of energy used to meet the needs for DHW, heating and ambient cooling.</p> <p>Residential buildings (Energy Performance Certificates between 2014 and 2024)</p>	



Madeira Region- A sample of 31 556 new, renovated and existing residential building with energy certificate (EC) was analyzed, representing around 24% of the universe of classic family dwellings.  
 Funchal- A sample of 15 453 new, renovated and existing residential building with energy certificate (EC) was analyzed, representing around 30% of the universe of classic family dwellings.  
 Service buildings (Energy Performance Certificates between 2014 and 2024)  
 Madeira Region- A sample of 17 191 small service buildings and 351 large service buildings, new, renovated and existing with an EC was analyzed.  
 Funchal- A sample of 2 928 small service buildings and 210 large service buildings, new, renovated and existing with an EC was analyzed.

## 8.2.2 Energy consumption in the domestic sector (ICESD)

<b>Municipality:</b> Madeira Region	
<b>Category of data:</b> Final energy consumption per type of energy source for H&C	
<b>Type of data:</b> Energy consumption in domestic sector dwellings (LPG, electricity and renewable needs) for H&C	
<b>Source:</b> Energy consumption survey in the domestic sector (ICESD)	
<b>Type of source</b>	Statistical release
<b>Source responsible body</b>	National Government (National institute of statistics-INE)
<b>Source contact person</b>	INE Email ine@ine.pt Phone: + 351218426100  DREM General contact: drem@ine.pt Statistical information requests: biblioteca.drem@ine.pt Phone: +351291145126
<b>Availability and accessibility</b>	Who can access • Everybody



	<p>Way of access: through portal/website</p> <ul style="list-style-type: none"> <li>DREM-Madeira Regional Energy consumption survey in the domestic - 2010 Energy consumption survey in the domestic - 2020</li> <li>INE-National Level-NUTS I Energy consumption survey in the domestic - 2010 Energy consumption survey in the domestic sector - 2020</li> </ul>
	<p>Type of access:</p> <ul style="list-style-type: none"> <li>For free</li> </ul>
	Data format: xls, csv and pdf
<b>Geographical scale</b>	National Regional
<b>Aggregation level</b>	<p>Sector: Residencial buildings Sub-sector: social housing and private housing Final use: heating, cooling and hot water. Available data:</p> <ul style="list-style-type: none"> <li>Energy consumption in domestic sector dwellings</li> <li>Energy consumption in dwellings, by type of use and by type of energy source.</li> <li>Number of dwellings with LPG, electricity, solar thermal and biomass for domestic hot water (DHW) and space heating and cooling</li> <li>Type of equipment used for DHW and space heating and cooling and share (dwelling used).</li> <li>Estimated annual expenditure for DHW and space heating and cooling.</li> <li>Indicators by type of use: <i>kWh/dwelling</i> <i>Nº equipment/dwelling</i></li> </ul>
<b>Frequency</b>	2010 and 2020 Decenal
<b>Quality of data</b>	
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### 8.2.3 Energy balance



<b>Municipality:</b> Madeira Region	
<b>Category of data:</b> Final energy consumption	
<b>Type of data:</b> Fossil Fuel, electricity, renewable and heat network per economic sector	
<b>Source:</b> Energy balances for the entire national territory and Madeira Region	
<b>Type of source</b>	Statistical release
<b>Source responsible body</b>	National Government (General Directorate of Energy and Geology DGEG) Region Government (Statists Regional Diretorate -DREM)
<b>Source contact person</b>	DGEG Phone: +351217922700 Email: geral@dgeg.gov.pt DREM General contact: drem@ine.pt Statistical information requests: biblioteca.drem@ine.pt Phone: +351291145126
<b>Availability and accessibility</b>	<b>Who can access</b> • Everybody
	<b>Way of access:</b> through portal/website • DGEG URL to download National energy balances (1990-2024) and Madeira Region energy balances: <a href="https://www.dgeg.gov.pt/pt/estatistica/energia/balancos-energeticos/">https://www.dgeg.gov.pt/pt/estatistica/energia/balancos-energeticos/</a> • DREM URL to download Madeira Region Energy balances: Time Series of Energy Balance of the Autonomous Region of Madeira (2007-2023)
	<b>Type of access:</b> • For free
	<b>Data format:</b> xls and pdf
<b>Geographical scale</b>	National Regional
<b>Aggregation level</b>	Sector: All sectors



	<p>Sub-sector: residencial, service and public buildings, social housing, hotels, trade centres.</p> <p>Final use of energy per sector and energy source, including energy demand to heating, cooling and hot water.</p> <p>Available data:</p> <ul style="list-style-type: none"> <li>• Final energy for all economic sectors per energy source.</li> <li>• Energy demand for heat pumps (DHW).</li> <li>• Solar thermal production (DHW).</li> <li>• Biomass (kitchens, DHW and space heating).</li> <li>• Electricity production for own use.</li> <li>• Recovery of heat steam from thermoelectric of Caniçal.</li> </ul>
<b>Frequency</b>	<p>Annual</p> <p>To Madeira Region the history is presented between 2007 e 2023.</p>

<b>Quality of data</b>
<p>To Madeira Region, energy balance data takes a while to be officially released and made available to the general population. Exemple: data for 2023 will only be available approximately 12-14 months later.</p>

## 8.2.4 Fuel consumption

<b>Municipality:</b> Madeira Region
<b>Category of data:</b> Final energy consumption of fuels and energy sources for H&C
<b>Type of data:</b> Annual quantity of fossil fuels sold in Madeira Region
<b>Source:</b> Data on quantities of fossil fuels sold by suppliers

<b>Type of source</b>	Database
<b>Source responsible body</b>	Regional Government (Regional Energy Directorate (DREN))
<b>Source contact person</b>	<p>Phone: +351291 145 230</p> <p>Email: dren@madeira.gov.pt</p>
<b>Availability and accessibility</b>	<p>Who can access</p> <ul style="list-style-type: none"> <li>• Restrict data. Upon request, the database information can be provided to Public Body/LAs and technicians/researchers</li> </ul>



	Way of access: through portal/website <ul style="list-style-type: none"> <li>upon written/email request</li> </ul>
	Type of access: <ul style="list-style-type: none"> <li>sent of excel database for eligible interested entities and persons</li> </ul>
	Data format: xls
<b>Geographical scale</b>	Regional Municipal
<b>Aggregation level</b>	Sector: all sectors Sub-sector: hotels and industry infrastructure Final use: Fuel consumption by type of fuel  Available data: <ul style="list-style-type: none"> <li>Fuel consumption of Butane, Propane, Natural Gas, Auto Gas, Diesel, Colored Diesel, Fuel oil, Gasoline per municipal code and nace economic activity code (refers to the Economic Activity Code and serves to classify the activities of each company).</li> </ul>
<b>Frequency</b>	Annual Quarterly

<b>Quality of data</b>
<p>This data is provided to DREN on a quarterly basis. They are supplied in raw form by fuel suppliers. AREAM, makes a request to DREN to send the raw database, and AREAM compiles this information into a single file and then processes this data according to its needs (Processing by municipality or Madeira Region). NACEs are organized into housing, primary, secondary, tertiary and transportation sectors. These data are faster to obtain compared to the statistical data of the energy balance, going to the Municipal level (four to six months after the completion of the data year)</p> <p>The statistical data on the energy balance are only available at the Madeira Region level..</p>

### 8.2.5 Energy needs per type of energy source for H&C

<b>Municipality:</b> Madeira Region	
<b>Category of data:</b> Final energy consumption of fuels and energy sources for H&C	
<b>Type of data:</b> Energy needs for service buildings and industry infrastructures	
<b>Source:</b> Microsoft forms survey sent to stakeholders -Public and local entities, hotels, others	
<b>Type of source</b>	Microsoft forms survey carried out in March 2024



<b>Source responsible body</b>	AREAM
<b>Source contact person</b>	Email: aream@aream.pt Phone: +351723300
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• everybody</li> </ul>
	Way of access: <ul style="list-style-type: none"> <li>• upon written/email request</li> </ul>
	Type of access: <ul style="list-style-type: none"> <li>• sent of excel database results for eligible interested entities and persons</li> </ul> <i>Link to survey: <a href="https://forms.office.com/e/8PuHErxAHH">https://forms.office.com/e/8PuHErxAHH</a></i> <i>Link to survey results: Survey Results.xlsx</i>
	Data format: xls
<b>Geographical scale</b>	Regional Municipal
<b>Aggregation level</b>	Sector: Services and industry Sub-sector: service and public buildings, hotels, trade centres. Final use: energy demand to heating, cooling and DHW. Information collected through the survey: <ul style="list-style-type: none"> <li>• Energy demand (share of energy demand for DHW, space heating and cooling and total energy demand)</li> </ul> <i>Heating needs.</i> <i>Cooling needs.</i> <i>DHW needs(kitchens, bathrooms).</i> <i>Swimming pool and SPA heating needs.</i> <i>Industrial processes needs.</i>
<b>Frequency</b>	Undefined frequency, whenever necessary

<b>Quality of data</b>
In the Madeira Region and Funchal, there was a lack of information for heating and cooling demand in service buildings (public and private) and industry. The information available before carrying out this research came mainly from the energy certification system. 37 answers: 21 hotels; 3 local public entities;



7 regional public entities;  
 4 energy efficiency, renewable energy and energy certification companies;  
 1 regional entity responsible for social housing;  
 1 construction company.

## 8.2.6 Electricity consumption (DGEG, DREM)

<b>Municipality:</b> Madeira Region	
<b>Category of data:</b> Final energy consumption of fuels and energy sources for H&C	
<b>Type of data:</b> Electricity consumption per sector and type of consumer, installed power, number of consumers	
<b>Source:</b> Electricity statistics	
<b>Type of source</b>	Statistical release
<b>Source responsible body</b>	National government (General Directorate of Energy and Geology - DGEG) Regional government (Statists Regional Directorate -DREM)
<b>Source contact person</b>	DGEG General contact: geral@dgeg.gov.pt Statistical information requests: estatistica@dgeg.gov.pt Phone: +351 217922700/800  DREM General contact: drem@ine.pt Statistical information requests: biblioteca.drem@ine.pt Phone: +351291145126
<b>Availability and accessibility</b>	<b>Who can access</b> <ul style="list-style-type: none"> <li>everybody</li> </ul>
	<b>Way of access:</b> <ul style="list-style-type: none"> <li>through portal/website            DGEG-URL to download All territory electricity statistics: Electricity statistics (Monthly electricity production; Annual production and installed capacity; Consumption by municipality and sector of activity; Consumption by municipality and type of consumer and Number of consumers)             DREM- URL to download Madeira Region electricity statistics: Electric Energy Retrospective Series - 1982-2023 (Regional and municipal data)</li> </ul>



	Type of access: • for free
	Data format: xls
<b>Geographical scale</b>	National Regional Municipal
<b>Aggregation level</b>	Sector: All Sub-sector: All Final use: Electricity data DGEG: Available data (National territory) <ul style="list-style-type: none"> <li>• Monthly electricity production (2012-2025)</li> <li>• Annual production and installed capacity <i>Annual production by NUTs I (2005-2023)</i> <i>Annual production by NUTs I (1994-2004)</i> <i>Availability of electrical energy for consumption (2000-2023)</i> <i>Installed capacity in electricity generating plants (2008-2023)</i> <i>Installed capacity in electricity generating plants, by municipality (2010-2023)</i></li> <li>• Consumption by municipality and sector of activity (1994-2023)</li> <li>• Consumption by municipality and type of consumer (1994-2023)</li> <li>• Number of electricity consumers (1994-2023)</li> </ul> DREM: Available data (Madeira Region) <ul style="list-style-type: none"> <li>• Gross Electricity Production - 1982 to 2023</li> <li>• Electricity Consumption, by type of customer - 1994 to 2023</li> <li>• Electricity Consumption, by Municipality - 1994 to 2023</li> <li>• Electricity Consumption, by sector of activity - 2008 to 2023</li> <li>• Electricity Consumers, by type of customer - 1994 to 2023</li> <li>• Electricity Consumers, by Municipality - 1994 to 2023</li> <li>• Electricity Emissions in Madeira Region, according to the production mix - 2009 to 2024</li> </ul>
<b>Frequency</b>	Annual Monthly
<b>Quality of data</b>	



The information available is very extensive. Two sources of information were identified that have very similar information. DGEG has information for the entire national territory, and this is the main source of information. It presents a history in which the frequency varies according to statistical data.

### 8.2.7 Electricity consumption (EEM)

<b>Municipality:</b> Madeira Region	
<b>Category of data:</b> Final energy consumption of fuels and energy sources for H&C	
<b>Type of data:</b> Electricity consumption per sector and type of consumer, installed power, number of consumers	
<b>Source:</b> Electricity data Madeira electricity company (EEM)	
<b>Type of source</b>	Reports available on the EEM website
<b>Source responsible body</b>	Regional Government (EEM)
<b>Source contact person</b>	Phone: 291 211 300; E-mail eem@eem.pt
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>everybody</li> </ul>
	Way of access: <ul style="list-style-type: none"> <li>through portal/website</li> </ul> <a href="#">Annual sustainability reports EEM</a> <a href="#">Annual Report and Accounts EEM</a> <a href="#">Electric grid characterization EEM</a> <a href="#">Electricity labeling EEM</a>
	Type of access: <ul style="list-style-type: none"> <li>for free</li> </ul>
	Data format: xls and pdf
<b>Geographical scale</b>	Regional Municipal
<b>Aggregation level</b>	Sector: All Sub-sector: All Final use: Electricity data Available data: <ul style="list-style-type: none"> <li>Electricity consumption per type of consumer and sector</li> </ul>



	<ul style="list-style-type: none"> <li>• Installed power</li> <li>• Number of consumers</li> </ul>
<b>Frequency</b>	Annual

<b>Quality of data</b>
The information available is very extensive. Some of the information is redundant with that available in DREM and DGEG.

## 8.3 H&C final uses and market

### 8.3.1 Energy Certification System-Public data

<b>Municipality:</b> Madeira Region
<b>Category of data:</b> H&C final uses and market
<b>Type of data:</b> Building stock features (use, age, structures, energy class, etc.); Building energy certificates
<b>Source:</b> Energy certification statistics for buildings within the scope of Energy Certification System (ECS)

<b>Type of source</b>	Online statistics available on ECS website
<b>Source responsible body</b>	ADENE
<b>Source contact person</b>	Phone: 214 722 800 Email: sce@adene.pt
<b>Availability and accessibility</b>	<b>Who can access</b> <ul style="list-style-type: none"> <li>• everybody</li> </ul>
	<b>Way of access:</b> <ul style="list-style-type: none"> <li>• through portal/website- Access of public data available on ECS website: ECS statistics (All territory)</li> </ul>
	<b>Type of access:</b> <ul style="list-style-type: none"> <li>• for free</li> </ul>
	Data format: html and is possible to export CSV database
<b>Geographical scale</b>	Regional Municipal
<b>Aggregation level</b>	Annual e Monthly data for residential and service buildings with EPC Available Data (2014- present)



	<ul style="list-style-type: none"> <li>• Number of energy performance certificates (EPC)</li> <li>• EPC of residential and service buildings by context (New, renewed and existing buildings with EPC)</li> <li>• Share of energy labels per type of buildings with EPC</li> <li>• Share of residential buildings with energy class C or lower</li> <li>• Share of residential buildings renovated per year (estimated based on the number of dwellings identified in the census and evolution)</li> <li>• Average useful area per type of buildings</li> <li>• Age of buildings with energy certificate (CSV file)</li> <li>• CO2 Emissions</li> </ul>
<b>Frequency</b>	Yearly Monthly

<b>Quality of data</b>
Platform that aggregates information on all energy certificates issued in the national territory.

### 8.3.2 Energy Certification System- Restrict data

<b>Municipality:</b> Madeira Region
<b>Category of data:</b> H&C final uses and market
<b>Type of data:</b> H&C plants, devices, equipment features (type, age, capacity, efficiency class, level of diffusion, etc.) Energy upgrading interventions (types, trends, etc.)
<b>Source:</b> Energy certification statistics for buildings within the scope of Energy Certification System (ECS)

<b>Type of source</b>	Database Statistical treatment and estimates from AREAM
<b>Source responsible body</b>	AREAM
<b>Source contact person</b>	Phone: 291 723300 Email: sce@aream.pt
<b>Availability and accessibility</b>	<b>Who can access</b> <ul style="list-style-type: none"> <li>• Upon request, the database information may be provided to Public Body/Laws and technicians/researchers</li> </ul>
	<b>Way of access:</b> <ul style="list-style-type: none"> <li>• upon written/email request</li> </ul>



	Type of access: <ul style="list-style-type: none"> <li>• sent of excel database for eligible interested entities and persons</li> </ul>
	Data format: xls
<b>Geographical scale</b>	Regional Municipal Parishes
<b>Aggregation level</b>	Sector: Residencial and service buildings Sub-sector: public buildings, social housing, hotels, trade centres. Final use: heating, cooling and hot water Available Data (2014- present) for residential and service buildings: <ul style="list-style-type: none"> <li>• Equipment used for space heating and cooling and DHW needs, type of energy source, age, capacity, efficiency class.</li> <li>• Improvement measures provided for in EPC and implementation costs.</li> </ul>
<b>Frequency</b>	Yearly Monthly Daily
<b>Quality of data</b>	
Very extensive information that requires a lot of information processing.	

### 8.3.3 Building census

<b>Municipality:</b> Madeira Region	
<b>Category of data:</b> H&C final uses and market	
<b>Type of data:</b> H&C plants, devices, equipment features (type, age, capacity, efficiency class, level of diffusion, etc.) Building stock features (use, age, structures, energy class, etc.)	
<b>Source</b> Census	
<b>Type of source</b>	Statistical release Online data on the INE and DREM websites
<b>Source responsible body</b>	National Government (National institute of statistics-INE) Region Government (Statists Regional Diretorate - DREM)
<b>Source contact person</b>	INE Email: ine@ine.pt Phone: + 351218426100 DREM



	<p>General contact: drem@ine.pt          Statistical information requests: biblioteca.drem@ine.pt          Phone: +351291145126</p>
<b>Availability and accessibility</b>	<p>Who can access</p> <ul style="list-style-type: none"> <li>• everybody</li> </ul>
	<p>Way of access:</p> <ul style="list-style-type: none"> <li>• through portal/website              DREM-URL to download census data: <a href="#">Statistical release</a>              INE-URL to download census data: Statistical release</li> </ul>
	<p>Type of access:</p> <ul style="list-style-type: none"> <li>• for free</li> </ul>
	<p>Data format: xls and html</p>
<b>Geographical scale</b>	<p>Regional          Municipal          Parish</p>
<b>Aggregation level</b>	<p>Sector: Residencial          Sub-sector: N.A          Final use: heating and cooling equipments use          Available data:</p> <ul style="list-style-type: none"> <li>• Buildings by construction period, by parish</li> <li>• Proportion of buildings in need of repair, according to the size of the repair, by parish</li> <li>• Buildings by size of repair need and construction period, by municipality</li> <li>• Building change rate (2011-2021), by parish</li> <li>• Classic family accommodations of habitual residence by place of residence and most frequently used type of heating, by parish</li> <li>• Classic family accommodations of habitual residence by Geographical location on the date of the census and existence of air conditioning;</li> <li>• Population living in traditional family homes by place of residence on the date of the Census and existence of air conditioning.</li> </ul>
<b>Frequency</b>	<p>2001, 2011 and 2021          Decennial</p>
<b>Quality of data</b>	



It was found that in some available data the methodology used was not identical in the various census periods.

### 8.3.4 Living Conditions and Income (ICOR)

<b>Municipality:</b> Madeira Region	
<b>Category of data:</b> H&C final uses and market	
<b>Type of data:</b> Population comfort conditions	
<b>Source</b> Survey on Living Conditions and Income (ICOR)	
<b>Type of source</b>	Statistical release
<b>Source responsible body</b>	National Government (National institute of statistics-INE)
<b>Source contact person</b>	INE Email: ine@ine.pt Phone: + 351218426100
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>everybody</li> </ul>
	Way of access: <ul style="list-style-type: none"> <li>through portal/website ICOR 2023 - <a href="#">Housing, housing difficulties and energy efficiency of accommodation</a></li> </ul>
	Type of access: <ul style="list-style-type: none"> <li>for free</li> </ul>
	Data format: xls and pdf
<b>Geographical scale</b>	Regional
<b>Aggregation level</b>	Sector: Residencial Sub-sector: N.A Final use: heating, cooling and DHW. Available data: <ul style="list-style-type: none"> <li>Population living in households without the financial capacity to keep their homes adequately heated.</li> <li>Population living in poverty and living in households without the financial capacity to keep their homes adequately heated.</li> <li>Population living in homes where the roof leaks water or there is dampness in the walls or rot on the windows or floor (in %).</li> </ul>



	<ul style="list-style-type: none"> <li>Population living in poverty and living in housing where the roof leaks water or there is dampness in the walls or rotting of the windows or floor (in %).</li> <li>Population living in uncomfortably cool housing during summer.</li> <li>Households whose energy expenditure represents more than 10% of total income.</li> </ul>
<b>Frequency</b>	Annual

<b>Quality of data</b>
The information available aggregated for the entire national territory is more extensive compared to that available for the Madeira Region.

### 8.3.5 Household Expenditure Survey (IDEF)

<b>Municipality:</b> Madeira Region
<b>Category of data:</b> H&C final uses and market
<b>Type of data:</b> Energy expenses in homes
<b>Source:</b> Household Expenditure Survey (IDEF)

<b>Type of source</b>	Statistical release
<b>Source responsible body</b>	National Government (National institute of statistics-INE)
<b>Source contact person</b>	INE Email: ine@ine.pt Phone: + 351218426100
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>everybody</li> </ul>
	Way of access: <ul style="list-style-type: none"> <li>through portal/website</li> </ul> <a href="#">Household Expenditure Survey (2005/2006)</a> <a href="#">Household Expenditure Survey (2010/2011)</a> <a href="#">Household Expenditure Survey (2015/2016)</a> <a href="#">Household Expenditure Survey (2022/2023)</a>
	Type of access: <ul style="list-style-type: none"> <li>for free</li> </ul>
	Data format: xls, csv and pdf
<b>Geographical scale</b>	National



<b>Aggregation level</b>	Sector: Residencial Sub-sector: N.A Final use: N.A Available data: <ul style="list-style-type: none"> <li>• Energy expenditure indicators, by household composition</li> <li>• Energy poverty indicators</li> <li>• Share of households whose energy expenditure as a percentage of income is higher (10%, 25%)</li> <li>• Share of households at risk of poverty whose energy expenditure as a percentage of income is higher (10%, 25%)</li> <li>• Coefficients of variation of energy poverty indicators (National and Regional data)</li> </ul> <i>Share of households whose energy expenditure as a percentage of income is higher (10%, 25%)</i> <i>Share of households at risk of poverty whose energy expenditure as a percentage of income is higher (10%, 25%)</i>
<b>Frequency</b>	IDF 2005-2006 IDF 2010-2011 IDF 2015-2016 IDF 2022-2023

<b>Quality of data</b>
The information available is aggregated for the entire national territory.

### 8.3.6 Climate and buildings data -Acliemac Project

<b>Municipality:</b> Madeira Region	
<b>Category of data:</b> H&C final uses and market	
<b>Type of data:</b>	
<ul style="list-style-type: none"> <li>• H&amp;C plants, devices, equipment features (type, age, capacity, efficiency class, level of diffusion, etc.)</li> <li>• Energy and Climate strategies</li> </ul>	
<b>Source:</b> Climate and buildings study reports	
<b>Type of source</b>	Study reports from Acliemac project. Activity 2.3.2 available on the AREAM website
<b>Source responsible body</b>	AREAM



<b>Source contact person</b>	Email: aream@aream.pt Phone: +351723300
<b>Availability and accessibility</b>	Who can access <ul style="list-style-type: none"> <li>• everybody</li> </ul>
	Way of access: <ul style="list-style-type: none"> <li>• through portal/website</li> </ul> <a href="#">Study 1 - Analysis of vulnerabilities and risks to the energy performance of buildings associated with climate changes</a> <a href="#">Study 2- Bioclimatic architecture strategies, dynamic simulation and diagnosis of residential buildings in RAM</a> <a href="#">Study 3-Adaptation measures in buildings</a> <a href="#">Study 4- ECS Benchmarking</a> <a href="#">Study 5-Building adaptation plan</a> <a href="#">Study 6- Implementation of NZEB in RAM</a>
	Type of access: <ul style="list-style-type: none"> <li>• for free</li> </ul>
	Data format: pdf
<b>Geographical scale</b>	Regional
<b>Aggregation level</b>	Sector: Residential Sub-sector: N.A Final use: N.A Available data: <ul style="list-style-type: none"> <li>• Factors affecting the energy vulnerability of buildings to climate change</li> <li>• Climate change with potential to affect the energy performance of buildings</li> <li>• Identification of risks to the energy performance of buildings</li> <li>• Characterization of residential buildings in the RAM (number, type of technical systems installed, repair needs)</li> <li>• Dynamic simulation of the current situation and with an increase of 1.5°C</li> <li>• Adaptation measures</li> <li>• Number of residential buildings and energy classes</li> </ul>
<b>Frequency</b>	\

<b>Quality of data</b>
------------------------



The studies used available data from official sources and ECS data.

### 8.3.7 Local and Regional Housing Strategies

<b>Municipality:</b> Madeira Region and Funchal municipality	
<b>Category of data:</b> H&C final uses and market	
<b>Type of data:</b> Energy and Climate strategies	
<b>Source:</b> Regional Housing Strategy Local Housing Strategy (Municipality of Funchal)	
<b>Type of source</b>	<ul style="list-style-type: none"> <li>Regional policy instruments <i>Regional Housing Strategy report available on IHM website (public business entity, wholly owned by the Autonomous Region of Madeira, responsible for implementing the Regional Government of Madeira's policy in the area of housing support for the most needy families)</i></li> <li>Municipal policy instruments <i>Local Housing Strategy report available on Sociohabita Funchal website (municipal public business entity responsible for social housing under the responsibility of the municipality of Funchal)</i></li> </ul>
<b>Source responsible body</b>	Regional Government (IHM) Municipality of Funchal (Sociohabita Funchal)
<b>Source contact person</b>	IHM Phone: +351291145240 Email: ihm@ihm.pt Sociohabita Funchal Phone: +351291002360 Email: sociohabitafunchal@funchal.pt
<b>Availability and accessibility</b>	<b>Who can access</b> <ul style="list-style-type: none"> <li>everybody</li> </ul>
	<b>Way of access:</b> <ul style="list-style-type: none"> <li>through portal/website <a href="#">Madeira Region housing strategy</a> <a href="#">Local Housing Strategy (Funchal)</a></li> </ul>
	<b>Type of access:</b> <ul style="list-style-type: none"> <li>for free</li> </ul>



	Data format: pdf
<b>Geographical scale</b>	Regional Municipal
<b>Aggregation level</b>	Funchal's Local Housing Strategy (2019-2024) includes the demographic and housing characterization of Funchal, a diagnosis of the municipality's housing shortages and an action plan.  The Regional Housing Strategy (2020-2030) includes a framework for the housing sector in the Autonomous Region of Madeira, a characterization of housing shortages, contributions to the definition of the strategy.
<b>Frequency</b>	\
<b>Quality of data</b>	
The characterization of the housing sector uses statistical data from the Census, National Statistics Institute, Regional Statistics Directorate, Energy Certification System.	



# PART B

# STAKEHOLDERS ENGAGEMENT



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## 1. INTRODUCTION

Part B of Deliverable 2.2 collects the results of the activities undertaken with the national stakeholders, relevant to the discussion on local heating and cooling planning, detailing the surveys conducted, types of organizations engaged and the main results of the discussions held.





## 2. Municipalities of Guimarães, Vila Real, Loulé and Évora (PT)

The first contact with the municipalities was through 4 online meetings (carried out in November and December of 2024), where the project has been presented, the municipality's commitment confirmed and the strategy to map and reach relevant local stakeholders defined.

Municipality	Date	No. of participants from the municipality
Guimarães	04/11/2024	1
Vila Real	04/11/2024	1
Loulé	14/11/2024	3
Évora	16/12/2024	2

Then in February, the first in-person meetings with the municipalities and local stakeholders took place, where stakeholders were informed about the project and invited to answer the project's survey (as described in detail in the following paragraphs). The survey was applied at the first in-person stakeholders' meetings in each of the municipalities. After these sessions the municipalities sent the questionnaire to their local group of stakeholders by e-mail.

As in most in-person meetings the participants were representatives of the municipality, one should analyse the results of the survey taking this fact into account. Therefore, stakeholders that did not answer the survey, such as industry representatives and universities, should be engaged by using a different approach in the future.

After the in-person meetings, regular contacts with each municipality to exchange information, as well as work meetings took place. The main topics were the identification of the local data sources and the update of the stakeholders' lists.

The survey gave insights, concerning participants to be included in the stakeholders lists and, on the projects, and initiatives to consider for the contextualization of the H&C sector in each municipality. The main topics covered in the multiple choice questions in the survey were: the relevance of H&C to the organization's activity, the main measures in course and obstacles expected concerning the decarbonization of H&C, the capacity building needs and the preferred financing solutions for the sector's transition.

The survey was applied both on printed and online format, to maximize stakeholder response.

ADENE was invited to present Plan4COLD at the 10th meeting of Loulé's Local Council for Climate Action that occurred on the 20th of May in Loulé, Portugal. This was an opportunity to present Plan4COLD and engage other local stakeholders that were not present at the first in-person stakeholders' meeting.



## 2.1 The stakeholders' survey

Concerning the survey, previous alignment was made with the other Portuguese technical partners – ENA and AREAM – in order to uniformize the survey and the way to apply it to the municipalities' stakeholders of the municipalities. This consisted of the uniformization of the survey's format, content, type and number of questions, as well as the decision on the most relevant questions to apply. Afterwards, each partner made small adaptations to the survey, regarding the scenario for the municipalities where they would apply it.

ADENE's survey had eleven questions, one of identification of the sector of the organization of the respondent, seven of multiple choice and three open-answer questions. The details of the applied survey are presented on the following table.

Questions		Answers options
1. Select the sector of the organisation to which you belong	Single choice Mandatory answer	<ul style="list-style-type: none"> <li>a) Municipal division, municipal company, parish council</li> <li>b) Business, service, trade or industry associations/representatives</li> <li>c) Intermunicipal community or equivalent</li> <li>d) Local/regional research institutions, R&amp;D centres</li> <li>e) Regional development institutions</li> <li>f) Financial/banking institutions</li> <li>g) Civil society organisations, including residents' associations</li> <li>h) Electricity companies and their associations</li> <li>i) Renewable energy and heating/cooling companies</li> <li>j) Other relevant public or private institutions</li> <li>k) Other. Please specify:</li> </ul>
2. What is the weight of heating and cooling in your organisation's energy consumption?	Rate each option from 0 to 5, 0 - not important, 5 - very important  Mandatory answer	<ul style="list-style-type: none"> <li>a) Space heating</li> <li>b) Space cooling</li> <li>c) Sanitary water heating</li> <li>d) Swimming pool and SPA heating</li> <li>e) Industrial processes</li> <li>f) H&amp;C integral to the organization's activity</li> <li>g) Other. Please specify</li> </ul>
3. What are the main measures you advocate for decarbonising heating and cooling, and which should be included in Local Heating and Cooling Plans?	Rate each option from 0 to 5 where: 0 - no interest, 5 - a lot of interest  Mandatory answer	<ul style="list-style-type: none"> <li>a) Efficient heating and/or cooling solutions</li> <li>b) Adoption of renewable energy sources for heating and/or cooling</li> <li>c) Construction solutions in the thermal envelope of buildings to reduce air conditioning needs</li> <li>d) Urban measures in public and private outdoor spaces based on nature to mitigate heat island effects and improve comfort during high temperature events</li> </ul>



		<ul style="list-style-type: none"> <li>e) Development of public policies to encourage the adoption of more sustainable solutions (regulation, incentives, etc.)</li> <li>f) Awareness and training for good practices in H&amp;C</li> <li>g) Other. Please specify:</li> </ul>
4. What are the main obstacles to the adoption of heating and cooling decarbonisation measures in the local/regional context, to be considered in the Local Heating and Cooling Plans?	<p>Rate each option from 0 to 5 where: 0 – not important, 5 – very important</p> <p>Mandatory answer</p>	<ul style="list-style-type: none"> <li>a) Lack of financial resources/ inadequacy of incentive systems</li> <li>b) Inadequate licensing regulations/processes</li> <li>c) Lack of know-how and technical knowledge for evaluating/ implementing measures</li> <li>d) Lack of data and/or information for the definition of appropriate measures and their monitoring</li> <li>e) Lack of co-operation and co-ordination between relevant entities</li> <li>f) Lack of specialised service companies and energy service companies with suitable financing solutions</li> <li>g) Other. Please specify:</li> </ul>
5. Which are, in your perspective, the main obstacles to the adoption of measures to decarbonize the H&C sector, concerning your organization and the local H&C plans framework?	<p>Rate each option from 0 to 5 where: 0 – not important, 5 – very important</p> <p>Mandatory answer</p>	<ul style="list-style-type: none"> <li>a) Lack of financial resources/ inadequacy of incentive systems</li> <li>b) Inadequate licensing regulations/processes</li> <li>c) Lack of know-how and technical knowledge for evaluating/ implementing measures</li> <li>d) Lack of data and/or information for the definition of appropriate measures and their monitoring</li> <li>e) Lack of co-operation and co-ordination between relevant entities</li> <li>f) Lack of specialised service companies and energy service companies with suitable financing solutions</li> <li>g) Other. Please specify:</li> </ul>
6. What opportunities and positive impacts do you foresee for your business with the implementation of the Local Heating and Cooling Plans?	<p>Rate each option from 0 to 5 where: 0 – not important, 5 – very important</p> <p>Mandatory answer</p>	<ul style="list-style-type: none"> <li>a) Reduction of energy costs for heating and cooling</li> <li>b) Increased thermal comfort</li> <li>c) Productivity increase (includes the adoption of best available techniques - BAT)</li> <li>d) Re-use of waste heat (industry).</li> <li>e) Business opportunity for energy service companies and creation of qualified jobs</li> <li>f) Training of the organisation's technical staff</li> <li>g) Lower carbon footprint</li> <li>h) Other. Please specify:</li> </ul>
7. Considering the importance of your area of activity and	<p>Rate each option from 0 to 5 where: 0 – not important,</p>	<ul style="list-style-type: none"> <li>a) Land use planning solutions to improve thermal comfort (e.g. creation of green spaces and</li> </ul>



your need to improve your knowledge, what topics do you consider to be the most relevant for training and capacity-building activities?	5 – very important Mandatory answer	<ul style="list-style-type: none"> <li>a) corridors, implementation of nature-based solutions)</li> <li>b) Thermal behaviour of buildings and bioclimatic architecture</li> <li>c) Energy efficiency and renewable energies in buildings for heating and cooling</li> <li>d) Good practice in the use of heating and cooling equipment</li> <li>e) Renewable Energy Communities</li> <li>f) Financing solutions</li> <li>g) Use of waste heat from production processes</li> <li>h) Other topics? Please specify:</li> </ul>
8. Considering the needs of your business, what financing solutions do you consider applicable for investments in sustainable heating and cooling solutions?	Rate each option from 0 to 5 where: 0 - no interest, 5 - a lot of interest Mandatory answer	<ul style="list-style-type: none"> <li>a) Financing from own funds</li> <li>b) Non-refundable financing with rates between 30% and 50%</li> <li>c) Reimbursable financing with support rates of up to 75%</li> <li>d) Energy performance contract with 100% financing from energy service companies, to be repaid with the energy savings resulting from the investment</li> <li>e) Crowdfunding for investment in public or social interest</li> <li>f) Reduction of municipal fees and tax benefits</li> <li>g) Bank financing with subsidised interest rates</li> <li>h) Other. Please specify:</li> </ul>
9. How can your organization contribute to the development of the Local Heating and Cooling Plan and the implementation of decarbonization measures in heating and cooling? <i>(Long text, Optional answer)</i>		
10. Identify other entities that you consider important to involve in the preparation of Local Heating and Cooling Plans? <i>(Long text, optional answer)</i>		
11. Please indicate other experiences, projects and initiatives, from your organization or someone else, in the area of energy transition and heating and cooling that you would like to share <i>(Long text, Optional answer)</i>		

### Survey's general results

The survey had a total of 71 answers. Only 7 were answered in paper's format, all in the municipality of Évora during the meeting on the 26<sup>th</sup> of February.

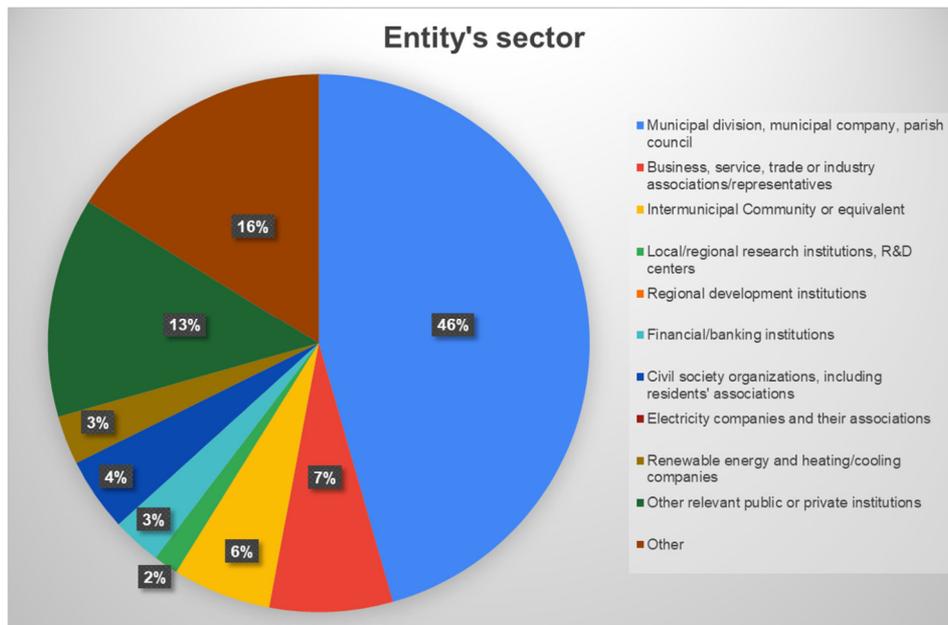
*Table 1 – Number of answers to the survey per municipality.*

	Number of answers
Évora	22
Guimarães	15

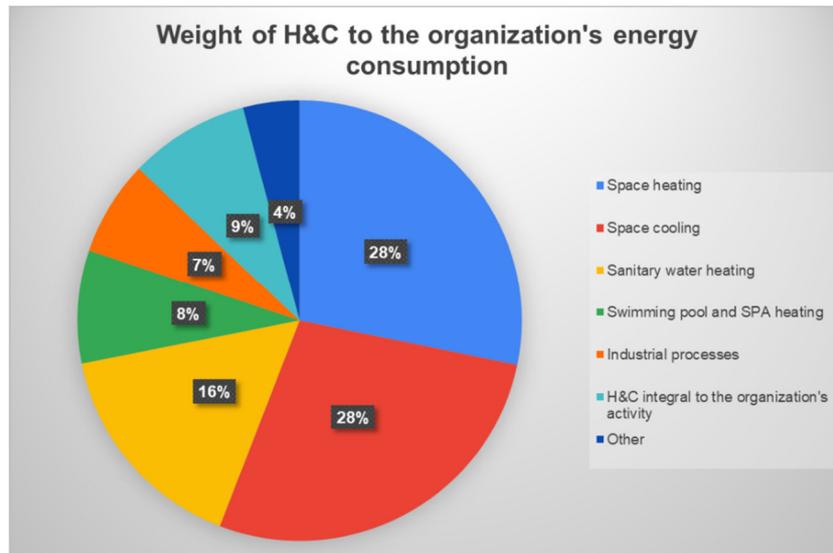


Loulé	24
Vila Real	10
<b>Total</b>	<b>71</b>

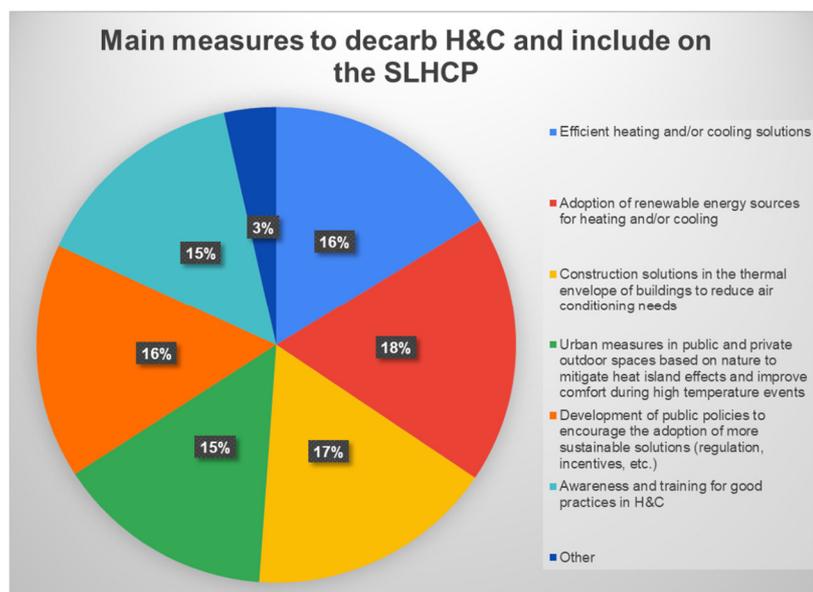
The results of the questions 1 to 8 of the survey, for the four municipalities, are shown below.



Most of the entities that answered the survey were municipal divisions, municipal companies and parish councils (46%), followed by other (16%) and renewable energy and H&C companies (13%).



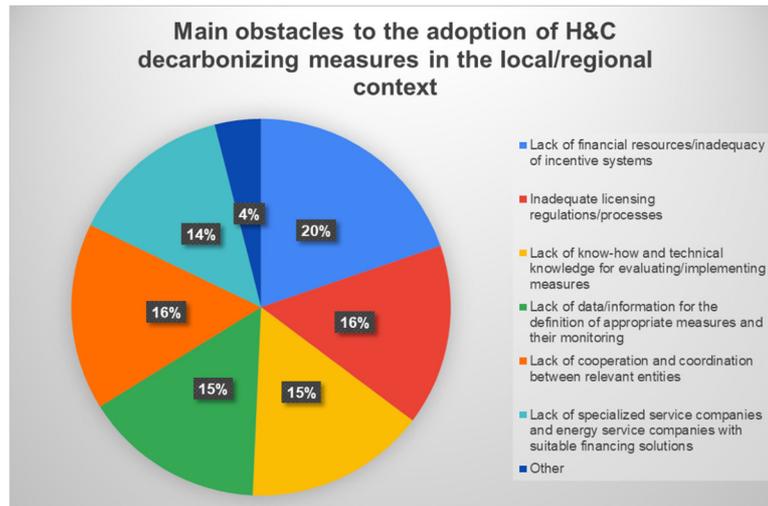
Concerning the weight of H&C in the energy consumptions of the organization, 28% referred the need for space cooling and the need for space heating, while 16% the need to sanitary water heating in kitchens and toilets.



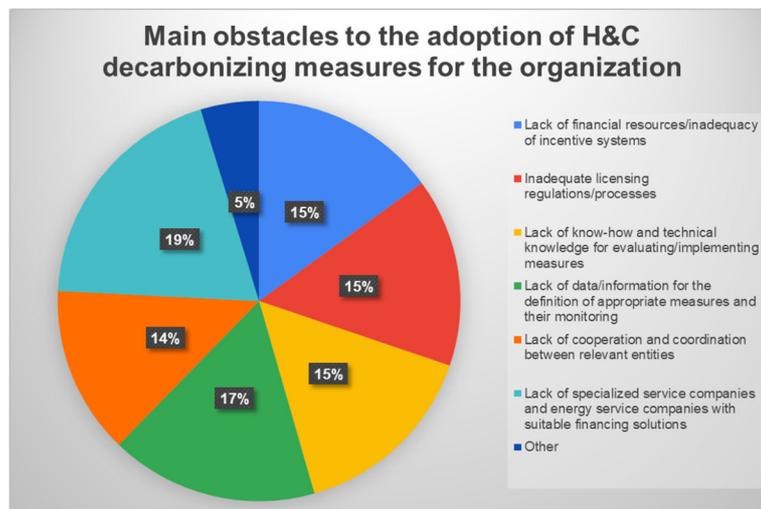
Regarding the main measures the organizations advocate for the decarbonization of H&C and that should be included in SLHCPs, all answering options had similar weight.



The most chosen ones were the adoption of renewable energy sources for heating and/or for cooling (18%), the construction solutions in the thermal envelopes of buildings to reduce air conditioning needs (17%) and the efficient heating and/or colling solutions (16%).

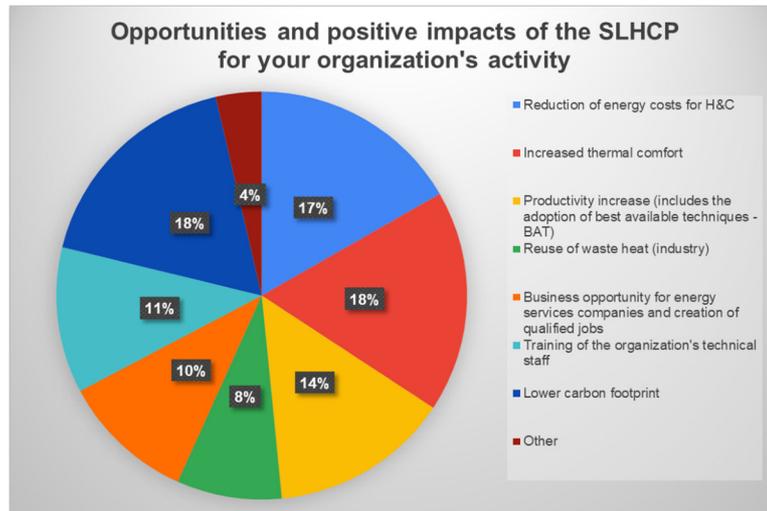


Regarding the main obstacles to the adoption of H&C decarbonization measures in the local/regional context that should be considered in the SLHCPs, the lack of financial resources/inadequacy of existent financing schemes (20%), the lack of cooperation and coordination between relevant entities (16%) and the inadequate licensing regulations/processes (16%) were pointed out, although all options had a similar percentage.

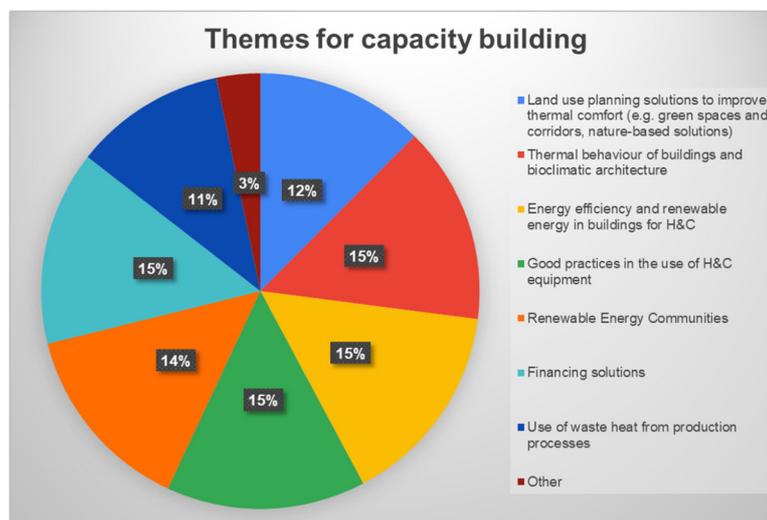




Now concerning the main obstacles for the organization, the survey highlighted the lack of specialized service companies and energy service companies with suitable financing solutions (19%) and the lack of data/information for the definition of appropriate measures and their monitoring (17%).

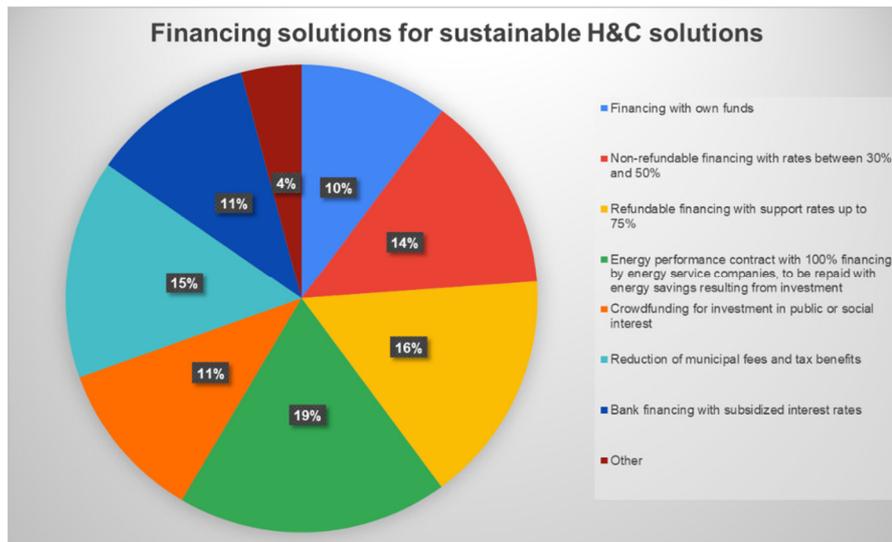


As opportunities and positive impacts foreseen to the organizations' activity due to the implementation of the SLHCPs, the respondents highlighted the increase in thermal comfort (18%), the lowering of the organization's carbon footprint (18%) and the reduction of energy costs for H&C (17%).





As for the needs for capacity building of the organization’s human resources, the most chosen options were energy efficiency and renewable energy for H&C in buildings (15%), the thermal behaviour of buildings and bioclimatic architecture (15%) and the good practices in the use of H&C equipment.



The preferred financing solutions for investment in sustainable H&C solutions were the energy performance contracts with 100% financing by energy service companies to be repaid with energy savings resulting from investment (19%), the refundable financing with support rates up to 75% (16%), tax benefits and reduction of municipal fees (15%) and non-refundable financing with rates between 30% and 50%.

Regarding open question 9 the most relevant answers are presented in the next table.

<b>9- How can your organization contribute to the development of the Local Heating and Cooling Plan and the implementation of decarbonization measures in heating and cooling?</b>
<ul style="list-style-type: none"> <li>- With technical knowledge</li> <li>- Good practice on the use of equipment</li> <li>- Developing studies and measurements</li> <li>- Promoting the dissemination of the environmental benefits of implementing building heating and cooling strategies that contribute to mitigating climate change</li> <li>- Participation in surveys and other public participation activities as stakeholders</li> <li>- Replacing current equipment with more technologically and environmentally efficient equipment</li> <li>- By providing data and supporting the implementation of measures</li> <li>- Identification of measures and their monitoring</li> </ul>



- With the knowledge acquired from the installed reality and the perspective of implementing measures to achieve the plan's objectives
- Synergy between stakeholders
- The Municipality will be responsible for the development and implementation of:
  - Increasing the use of renewable energy sources; Promoting the circular economy; Increasing energy efficiency and the use of material resources; Optimizing the processes of collection, recycling, production, and use of secondary raw materials
  - Through the provision of data; integrating and participating in working groups; implementing and testing new technologies (being a pilot project); coordinating with other entities and creating synergies
  - The municipality is the entity responsible for preparing the Local Heating and Cooling Plan, which should include a set of decarbonization measures for heating and cooling, also identifying the municipal services responsible for implementing each measure, the respective implementation schedule and sources of financing
- My organization should develop the plan!
- Within the scope of building rehabilitation, financing, awareness raising
- By sharing information that we have already collected and that is the result of our work and professional experience. Through educational activities, information and incentives for our target audience: the general population and technicians qualified to develop projects, in particular.
- We do not have the means to implement measures
- Raising awareness for the improvement of sustainable practices.
- The organization is willing to collaborate and make its contribution, especially in terms of housing and commercial spaces
- Providing space for solar panels
- Providing information that municipalities consider relevant
- Training students on the topic of decarbonization.
- Participating in the decision-making and implementation process as well as in the social field
- Assessment methodology, digital tools and carbon footprint certification
- Actively participate in its preparation
- Financing
- Through knowledge of the real needs of the interior of the country
- Financial support lines for interested entities
- Support in organizing data, tools (intermunicipal/municipal plans) and discussing methodological approaches that can best and most effectively (in a timely manner) respond to the intended challenges/objectives
- Information and training actions aimed at members and the community in general
- Create financing lines for individuals and legal entities
- "Help in organizing the Plan by contributing with necessary information
- , organizing periodic meetings with stakeholders and creating conditions that lead to its application at the municipal level"
- Ordem dos Arquitectos – Secção Regional Norte (OASRN) can collaborate in:
  1. *Development of Technical Guidelines and Standards: collaborate in the creation of specific technical standards and guidelines for the planning and implementation of sustainable heating*



and cooling solutions, which include the adoption of more efficient technologies that minimize carbon emissions;

2. *Professional Training and Qualification:*

3. *Consulting and Project Assessment:* provide ongoing training for architects and professionals in the field on best practices and technologies for the development of low-carbon heating and cooling solutions, namely workshops, seminars and courses on energy efficiency, use of renewable energy, and smart technologies for sustainable buildings;

4. *Development of Integrated Solutions for Local Communities:* architects, members of the Order, can be involved in technical consultancy and evaluation of heating and cooling projects in local communities, including the feasibility analysis of efficient systems, both at construction level and in building rehabilitation, ensuring that the plans meet decarbonization and energy efficiency goals;

5. *Promotion of Public-Private Partnership Initiatives and Projects:* OASRN can act as a mediator to foster public-private partnerships in local decarbonization projects. These partnerships could involve local authorities, energy companies and architects, aiming to develop public infrastructure and low-carbon solutions for heating and cooling in residential, commercial and industrial areas;

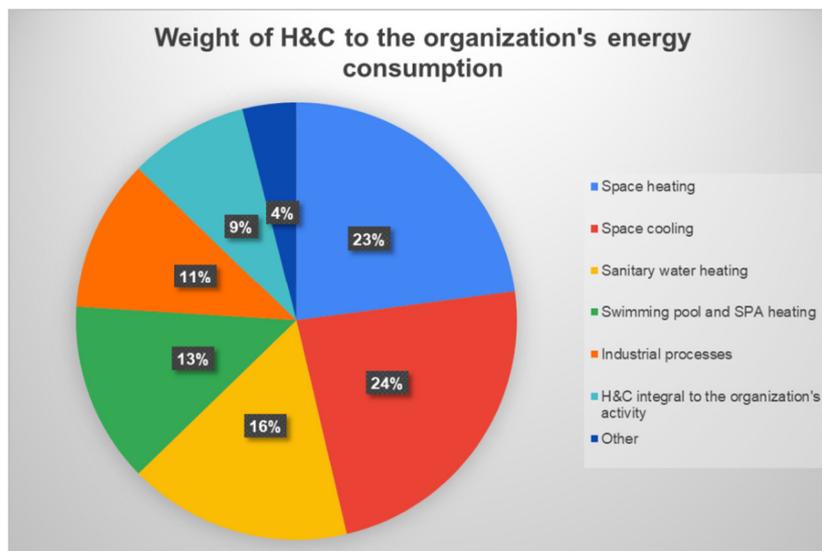
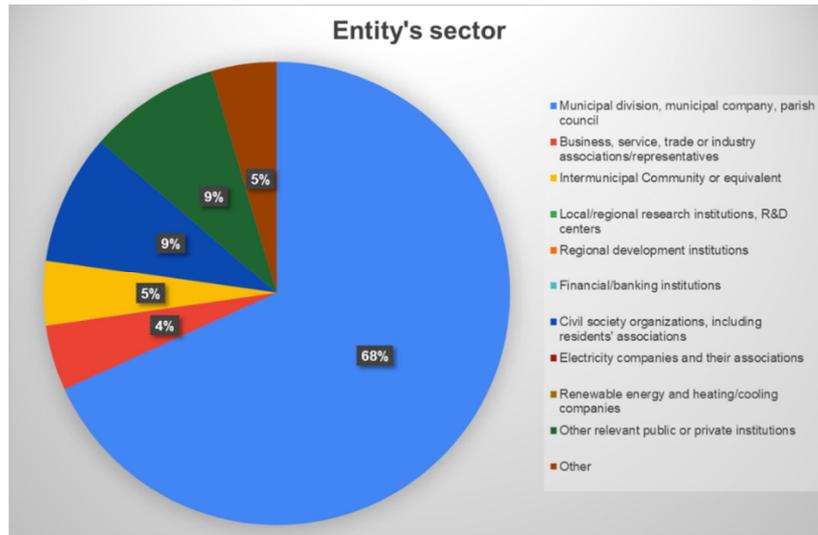
6. *Awareness and Social Mobilization:* OASRN plays an important role in raising awareness among the population and public authorities about the need to adopt sustainable practices, not only in the construction process, but also in the adaptation of existing buildings. Promoting environmental education campaigns and initiatives can be essential for acceptance and adherence to decarbonization solutions;

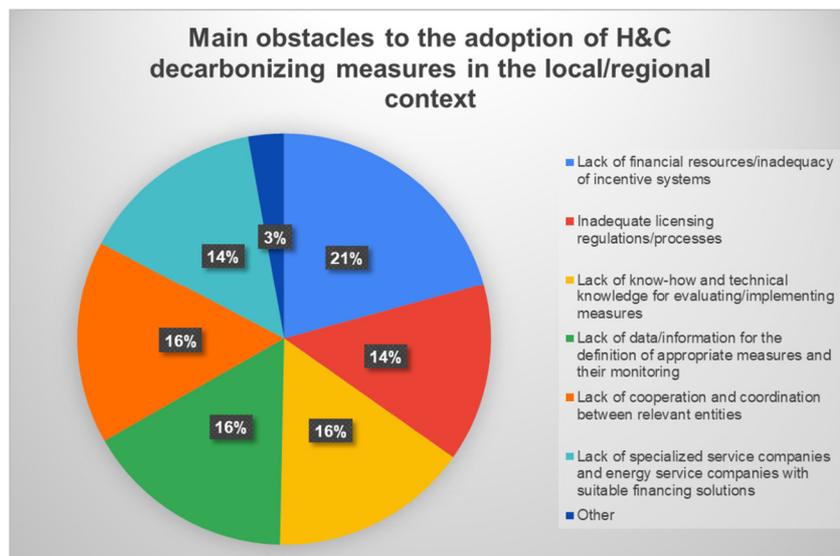
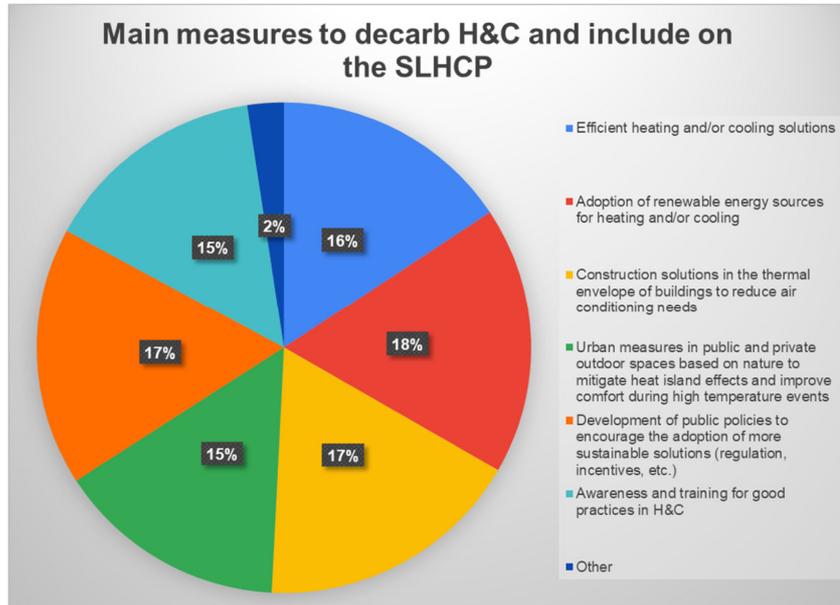
7. *Monitoring and Tracking of Results:* OASRN can contribute to the continuous monitoring of decarbonization and sustainable heating/cooling projects, evaluating their effectiveness and proposing adjustments. This monitoring can be carried out through energy audits and environmental impact assessment, contributing to the continuous improvement of public and private policies;

8. *Encourage Innovation and Research:* OASRN can encourage its members to develop and adopt new technologies and innovative solutions for heating and cooling, promoting passive design, bioclimatic architecture and the use of environmentally friendly materials and clean technologies. Through the Norte 41° project it is possible to associate research in the field of decarbonization and new materials, ensuring more effective and accessible solutions.

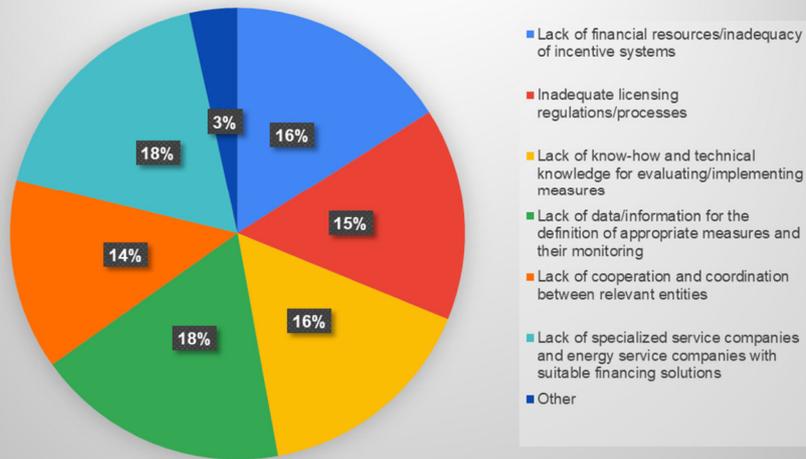


## Survey's Results - Évora

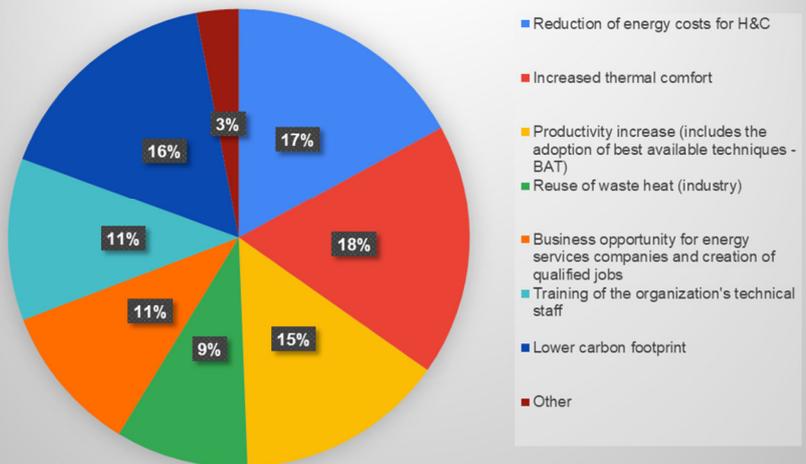


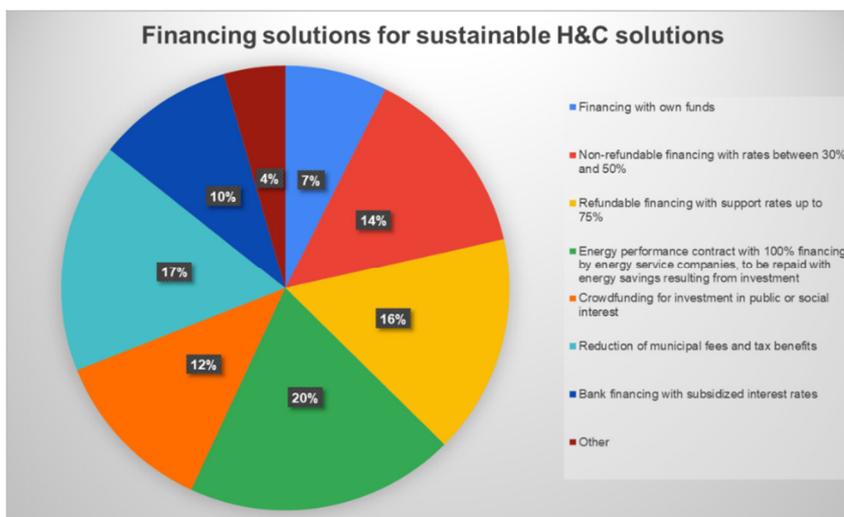
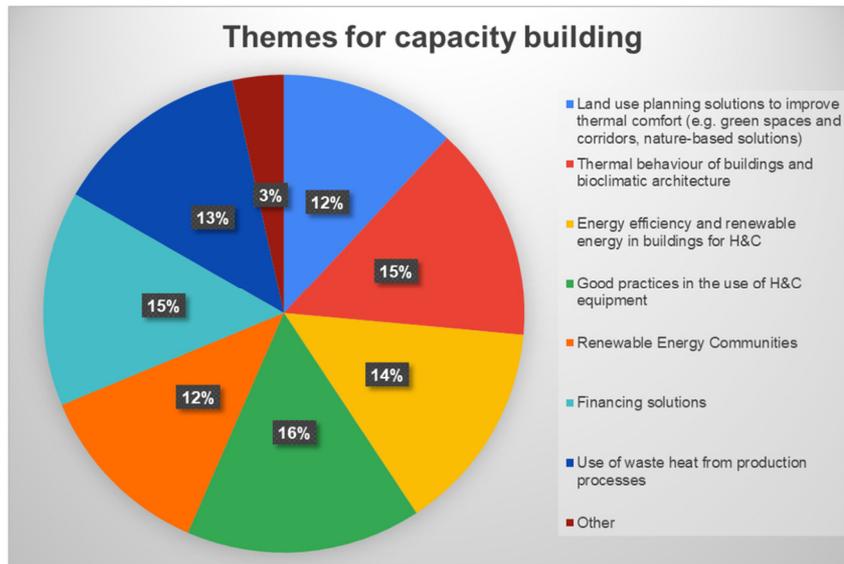


### Main obstacles to the adoption of H&C decarbonizing measures for the organization



### Opportunities and positive impacts of the SLHCP for your organization's activity







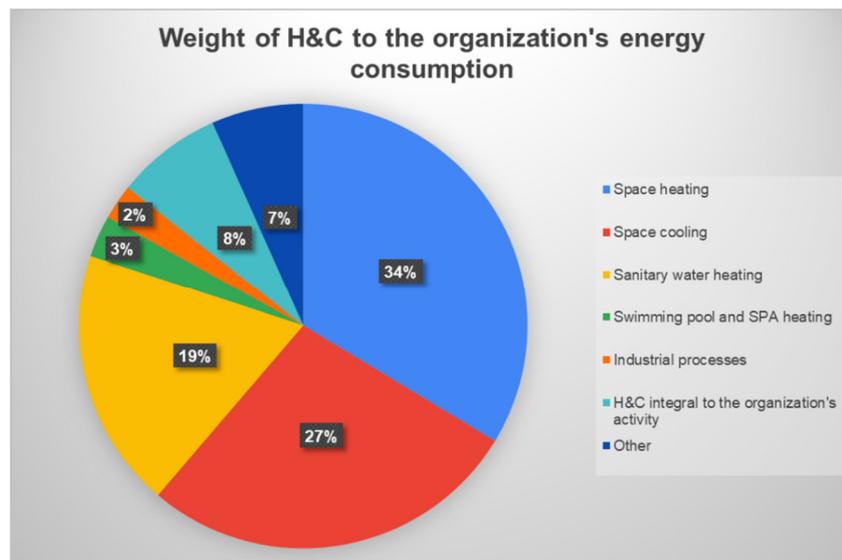
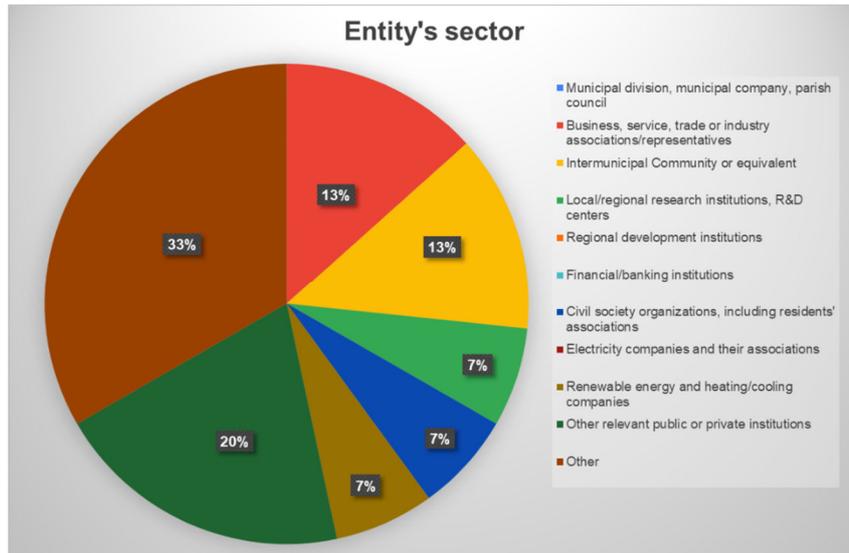
Regarding open questions 10 and 11 the most relevant answers for Évora are presented in the following tables.

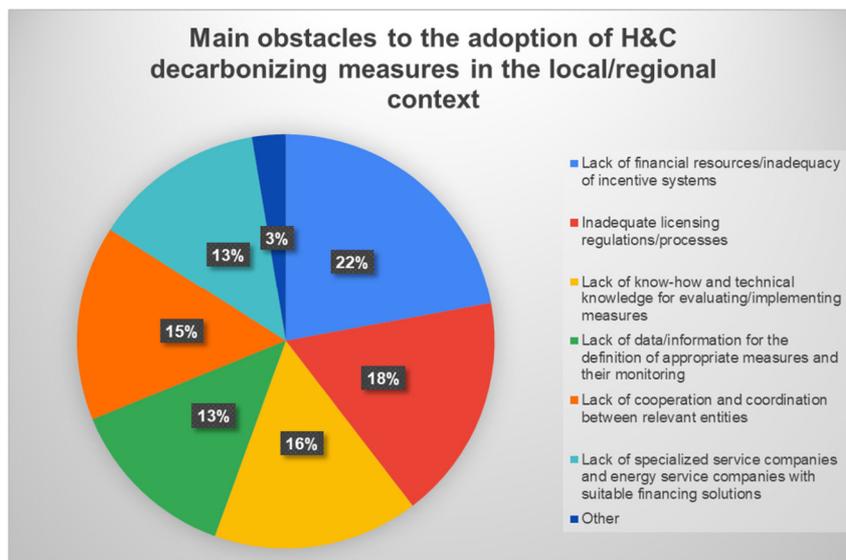
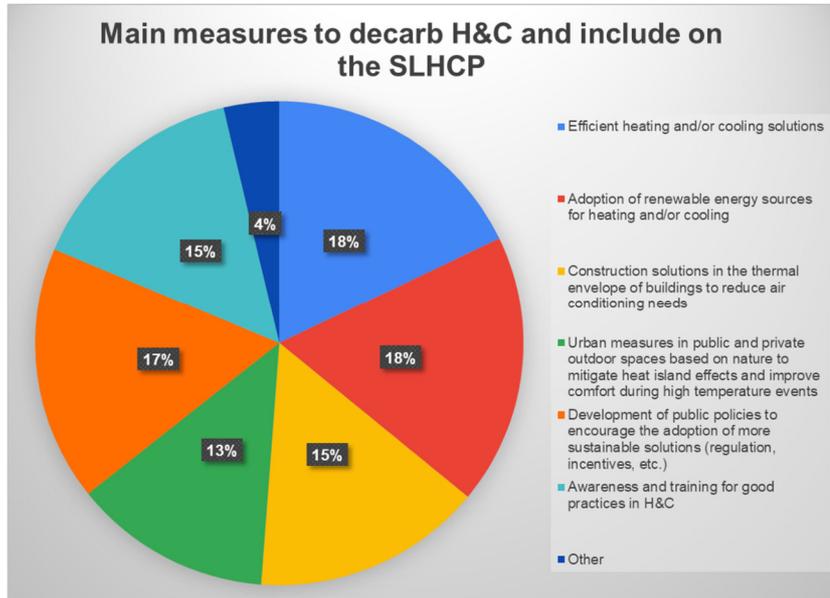
<b>10- Identify other entities that you consider important to involve in the preparation of Local Heating and Cooling Plans</b>
<ul style="list-style-type: none"> <li>- Chair of Renewable Energies at the University of Évora</li> <li>- CCDRA</li> <li>- Industry based in the Évora Industrial and Technological Park.</li> <li>- Companies present in the Industrial and Technological Park, residents' associations; public institutes; University of Évora</li> <li>- KEMET; YOU; AERNOVA</li> <li>- MARR; TYKO; AERNOVA</li> <li>- Condominiums, municipal housing companies - Habévora, large owners with more than 10 buildings</li> <li>- Municipality: planning division, works division, housing and rehabilitation unit,... Residents' associations; housing cooperatives; order of architects; order of engineers; University; School Groups (for the purpose of applying information from an early age)</li> <li>- All local entities</li> <li>- Companies in the energy sector, local authorities, public services and the general public</li> <li>- Universities and Research Centers, City Councils and Parish Councils, CCDRs, Companies in the area</li> <li>- Boilers</li> <li>- CCDR, CDAPEC, CAP, ANPEMA, AJASUL, ANCORME</li> <li>- CDAPEC, AJASUL, ANPEMA</li> <li>- Local Industry</li> <li>- Municipal Chambers, Ministry of Education</li> <li>- Municipalities and private companies</li> <li>- The Academy (UE), APA, Order of Engineers, Order of Architects</li> </ul>

<b>11- Indicate other experiences, projects and initiatives, from your organization or another, on the topic of energy transition and heating and cooling that you would like to share</b>
<ul style="list-style-type: none"> <li>- Évora urbanization plan currently under public discussion</li> <li>- European project POCITYF</li> <li>- Lighting in schools, São João fair and health centers is a constant concern, both in terms of energy consumption and lighting efficiency</li> <li>- PRR Housing. Local housing strategy. Municipal Housing Charter</li> <li>- Local housing plan; local housing strategy; 1<sup>st</sup> right program/PRR</li> <li>- Installation of solar panels for individuals</li> <li>- AURORA Project of the University of Évora</li> <li>- Eco-Schools Program</li> </ul>

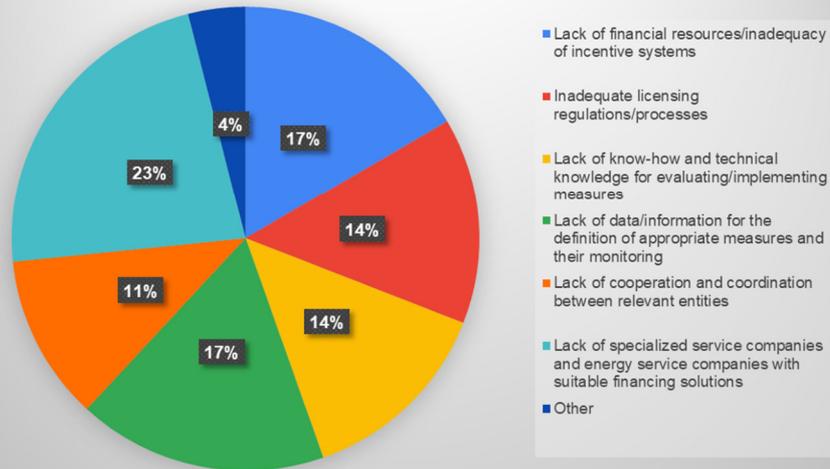


## Survey's Results - Loulé

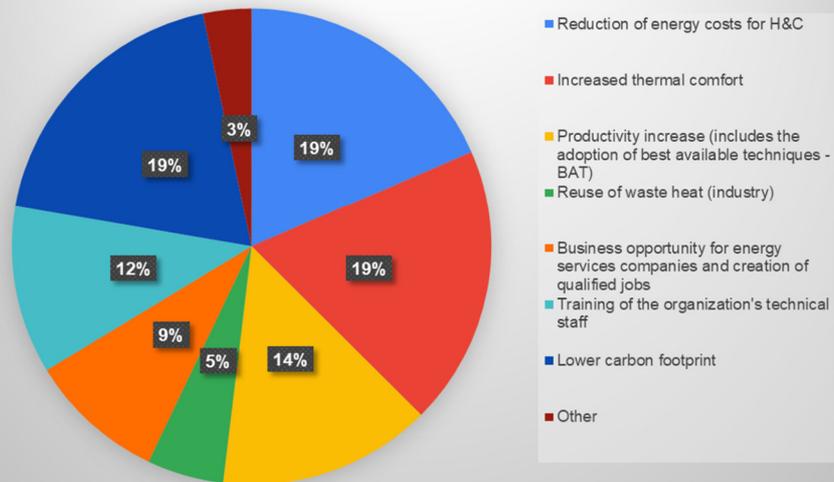


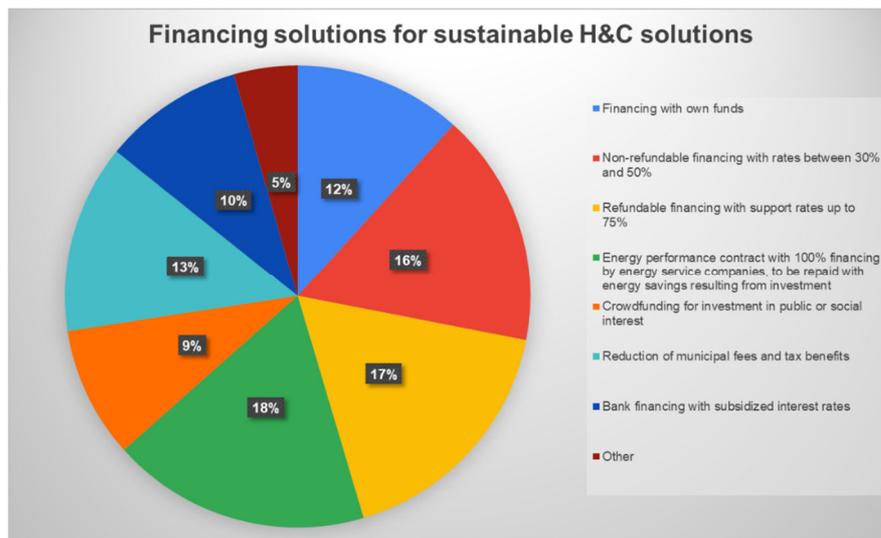
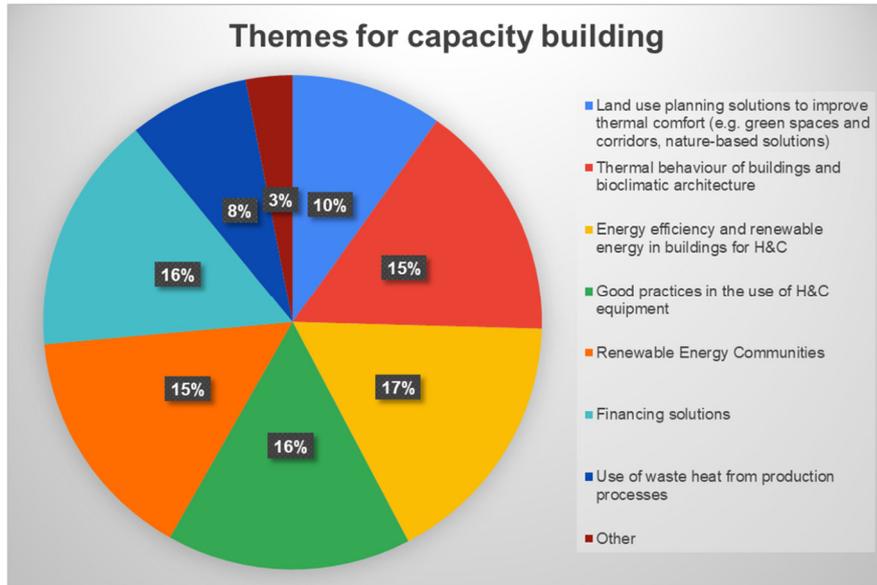


### Main obstacles to the adoption of H&C decarbonizing measures for the organization



### Opportunities and positive impacts of the SLHCP for your organization's activity





Regarding open questions 10 and 11 the most relevant answers for Guimarães are presented in the next tables.



**10- Identify other entities that you consider important to involve in the preparation of Local Heating and Cooling Plans**

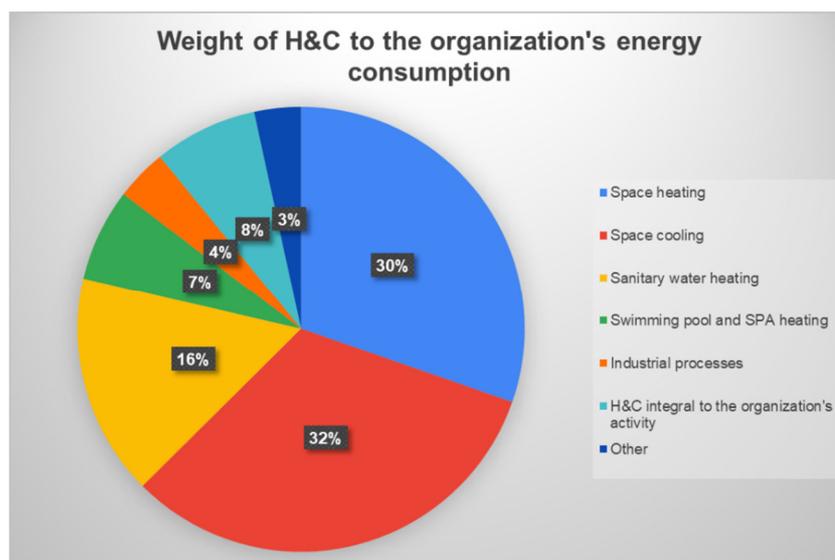
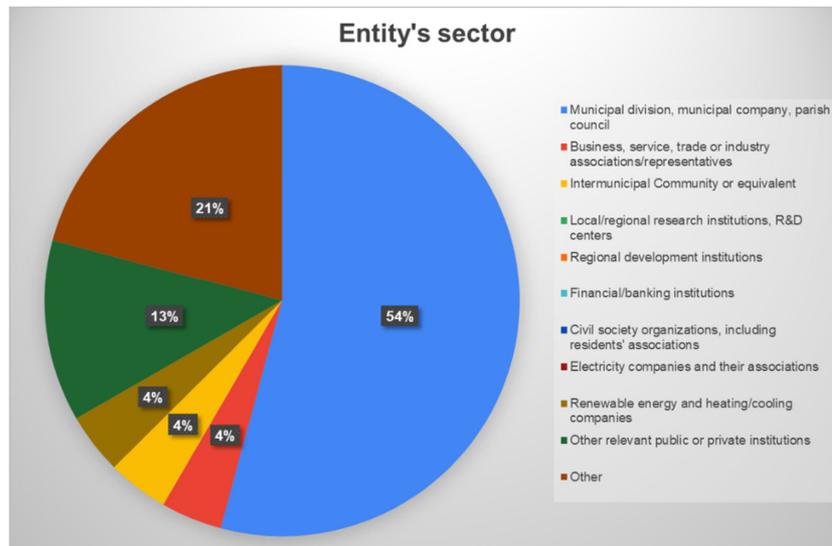
- University of Minho - Department of Mechanical Engineering - Energy and Environmental Technologies Group
- State entities
- City Council, ADENE, DGEG, Universities
- The creation of Local Heating and Cooling Plans requires the collaboration of several entities. Municipalities and towns implement energy efficiency measures, while energy agencies such as ADENE offer technical support and incentives. Energy service companies (ESCOs) help implement solutions and raise finance, and universities contribute innovation and knowledge. Construction and architecture companies apply solutions to reduce energy consumption, and energy suppliers must invest in renewable sources. Business and industry associations can make their processes more efficient, while civil society organizations promote good practices. For these measures to have an impact, it is essential to involve civil society. Knowledge sharing and raising public awareness are essential to changing behaviors and ensuring that everyone participates in the transition to a more sustainable energy system
- Renewable energy entities, EDP, perhaps Indaqua
- Parish Councils
- Financing entities; residents' associations; parish councils
- Taipas Turitermas, the entity that owns and manages the thermal spa in Caldas das Taipas

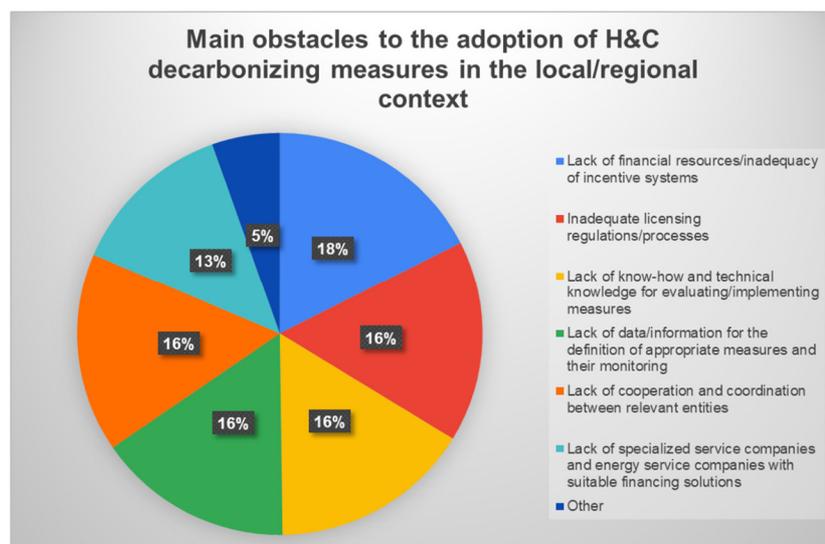
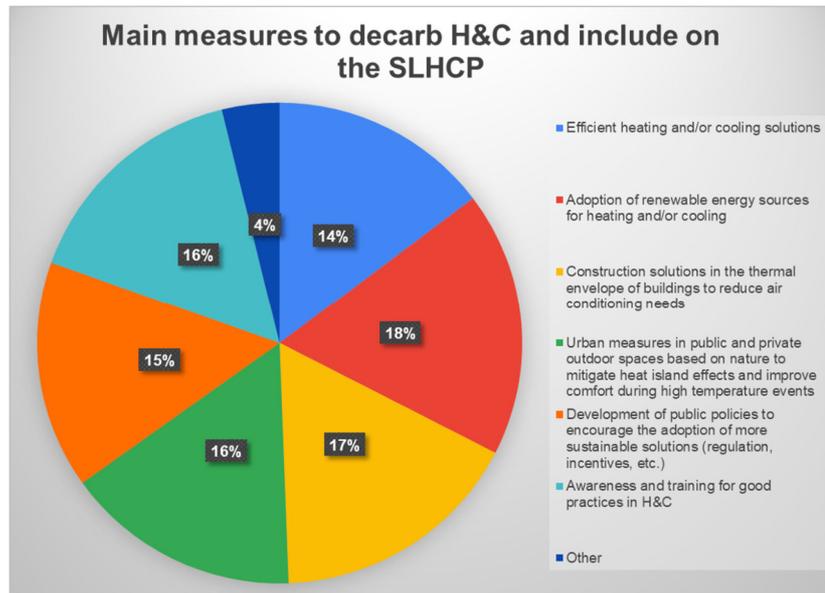
**11- Indicate other experiences, projects and initiatives, from your organization or another, on the topic of energy transition and heating and cooling that you would like to share**

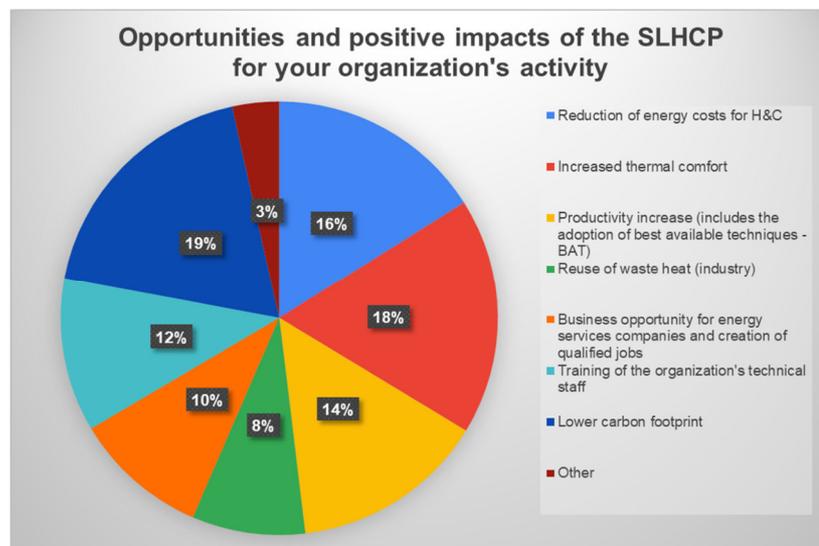
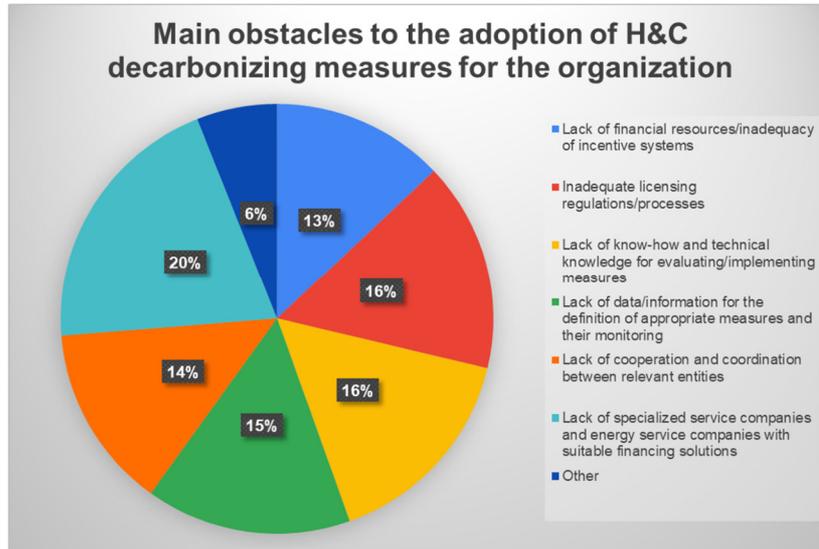
- LIFE Sparkle
- Neighbourhood C - Zero Carbon Commitment
- Cities Heat Detox
- E-Mission Zero
- CEBIO Project - promotion of the bioenergy cluster (solid biomass), with UMinho
- Energy Efficiency Operation under POSEUR and other investments with own funds
- The University of Minho has developed several initiatives to improve energy efficiency and reduce its carbon footprint. Among them, the monitoring of energy consumption in buildings stands out, allowing for more efficient management of air conditioning. In addition, it has invested in thermal rehabilitation, improving insulation and installing shading solutions to reduce the need for heating and cooling. It also participates in research projects and partnerships with municipalities and companies, promoting innovative solutions for sustainable air conditioning. Finally, it has invested in training and raising awareness among the academic community, encouraging good practices in the use of energy. These initiatives reinforce UMinho's commitment to energy transition and sustainability

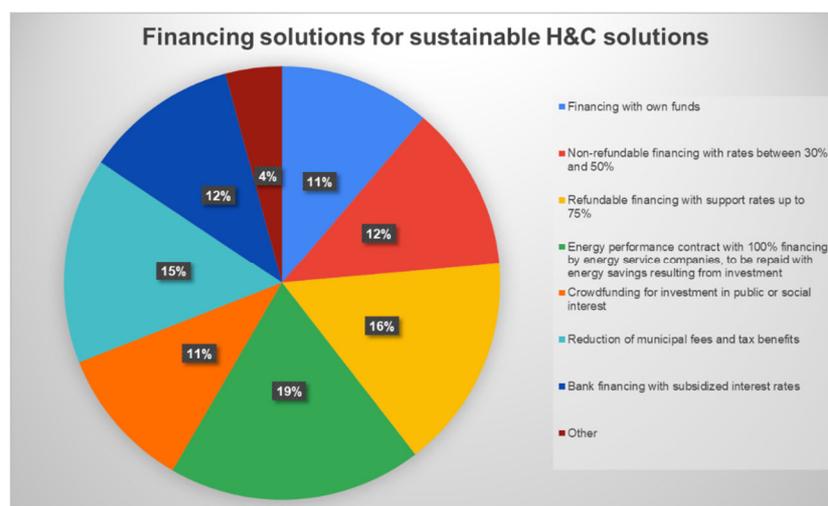
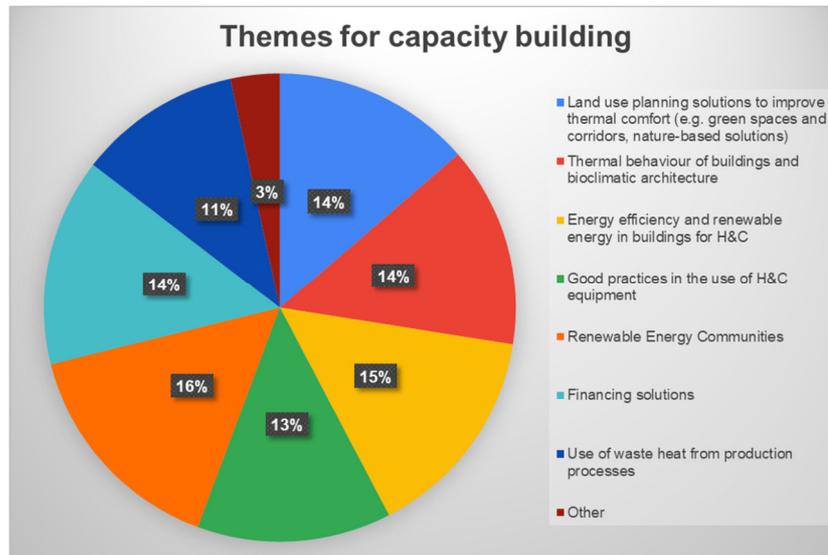


## Survey's Results – Guimarães











Regarding open questions 10 and 11 the most relevant answers for Loulé are presented in the following tables.

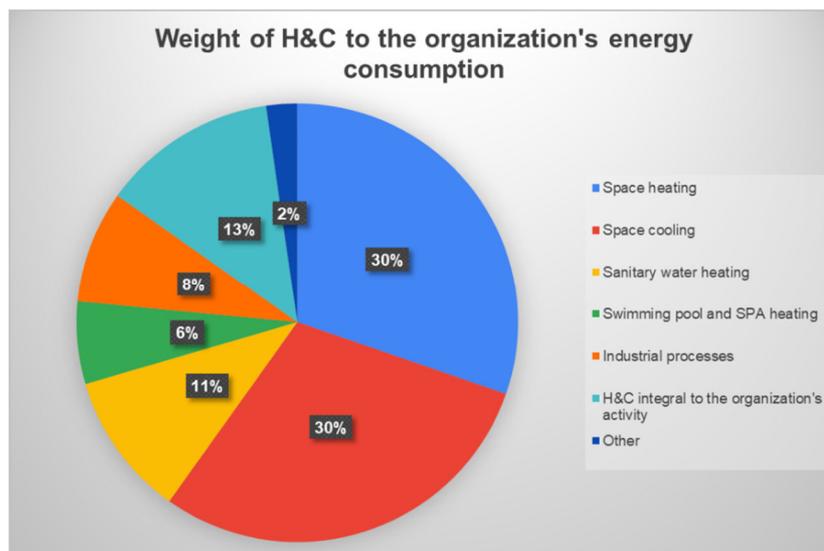
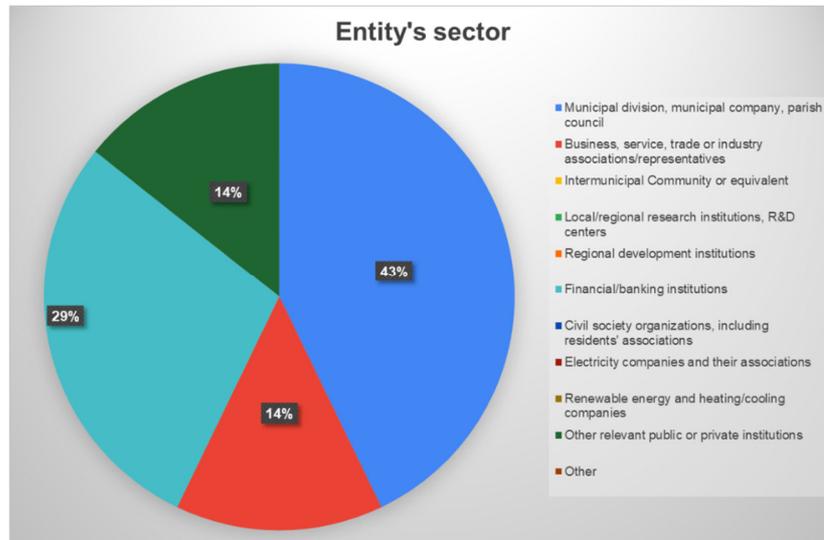
**10- Identify other entities that you consider important to involve in the preparation of Local Heating and Cooling Plans**

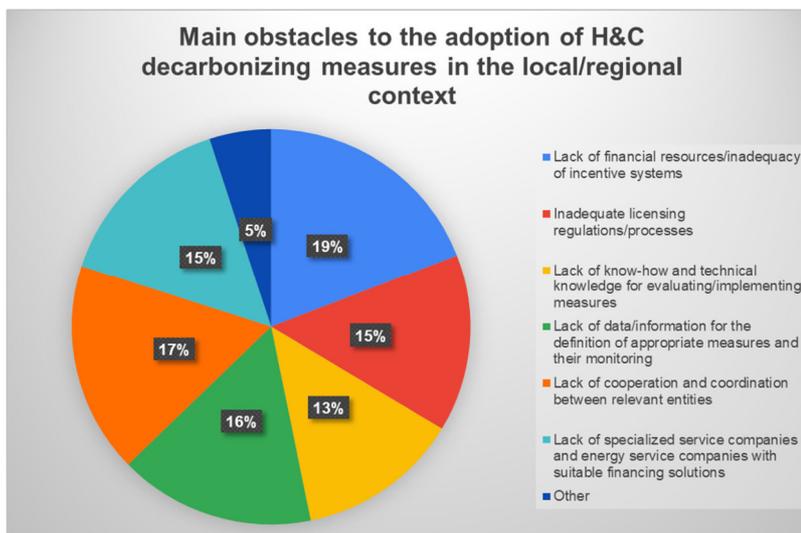
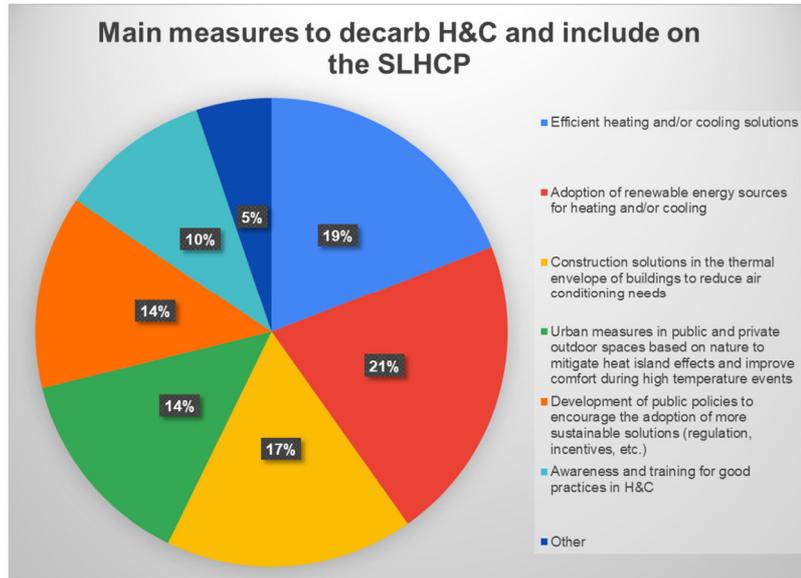
- SMEs in the sector (designers, installers and developers)
- AREAL; Climate Agency
- IPSS
- Local economy activities/companies, schools, health centres, sports equipment, social equipment
- Installation companies
- Involvement of entities linked to energy efficiency with good practices in this area
- School Groups, IPSS, Hotel Units of various areas, condominium management companies, University of Algarve, cooperatives
- Local associations
- Schools with influence on parents
- Municipality decision-making bodies
- Local authorities; AMAL; universities; LNEC; companies in the energy sector; energy and environmental agencies; General Secretariat for the Environment, construction and energy rehabilitation companies; environmental NGOs; banks and financing institutions; the community.
- Residents, companies and entities
- Energy agencies
- CIM-AMAL; Regional Services based at the council, University of Algarve/Research Centres; private entities that are large energy consumers: Industry, Hospitals, Hotels, Football stadiums, etc

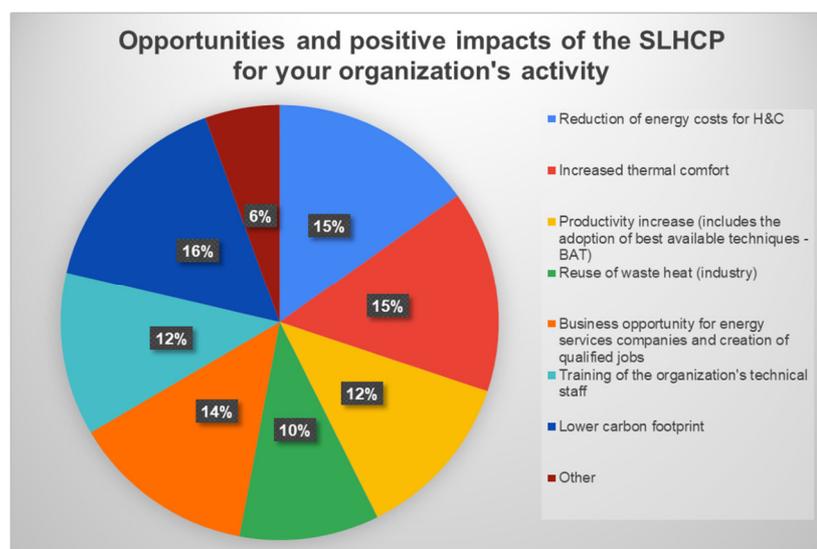
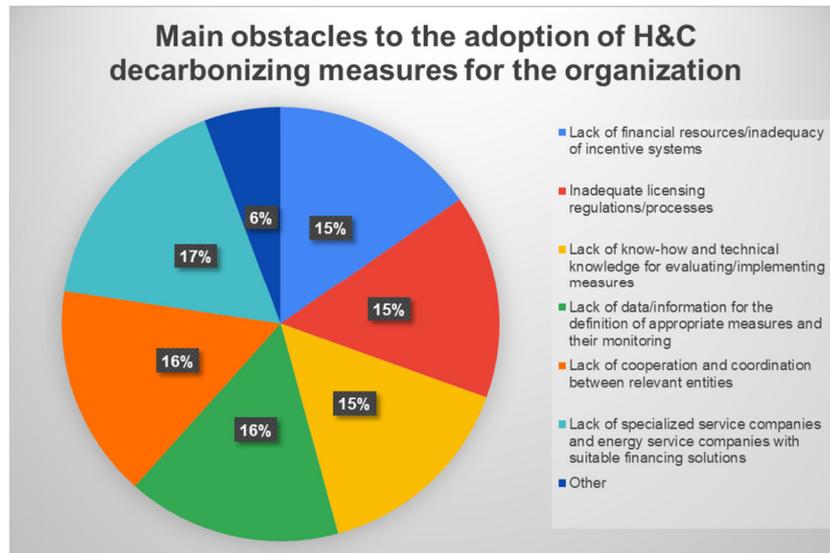
**11- Indicate other experiences, projects and initiatives, from your organization or another, on the topic of energy transition and heating and cooling that you would like to share**

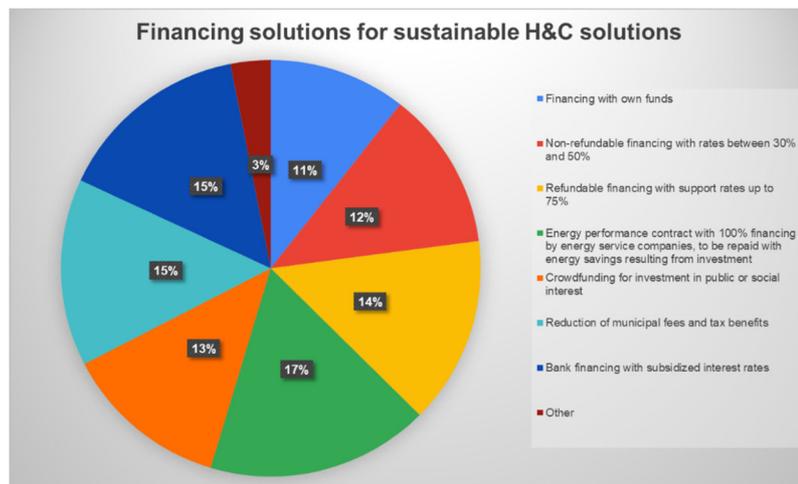
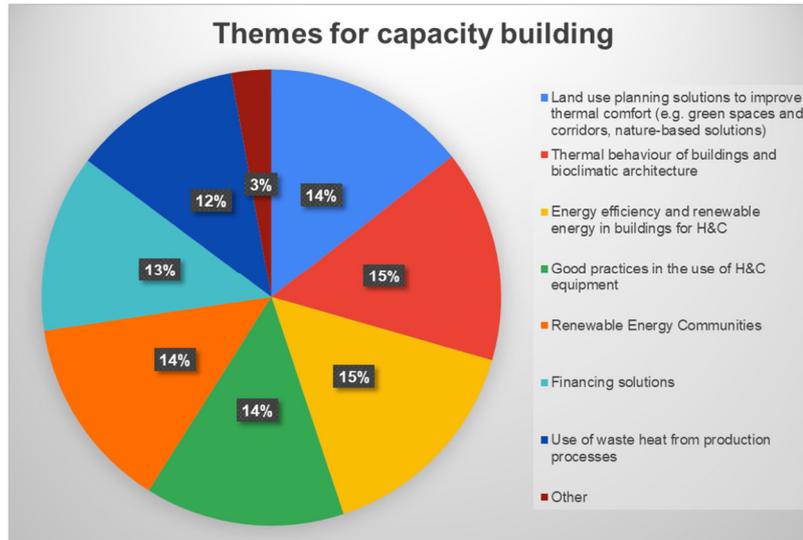
- Balcão de Energia; Comunidade Energética em Meio Escolar
- Installation of new energy sources in municipal buildings.
- Films in shop windows
- Heat island execution. Application of solar panels.
- Green Lab (Portugal) – Renewable Energy Communities
- Preparation of PIAAC-AMAL.
- Solar thermal, Photovoltaic production, Electric mobility, Heat pumps
- AdP Group Energy Neutrality Program
- Resource Efficiency Program in Public Administration “ECO.AP 2030”; design of heating and cooling networks in European cities; installation of heat pumps in critical infrastructures (emergency and relief forces, security forces and services, health units, airports, etc.)

## Survey's Results – Vila Real











Regarding open questions 10 and 11 the most relevant answers for Vila Real are presented on the next tables.

**10- Identify other entities that you consider important to involve in the preparation of Local Heating and Cooling Plans**

- Bio Region Pinhão and Corgo. D. Justes
- All industrial activity and retail trade in fossil energy
- Dourogas Group, Gold Energy
- Engineering offices
- Municipal Councils and Local Authorities
- Energy and Energy Services Companies
- Instituto da Energia e da Qualidade do Ar (IAQ)
- Agência Portuguesa do Ambiente (APA)
- Consumer and Environmental Defenders Associations
- Universities and Research Centres
- Construction and Architecture Companies
- Neighbourhood Associations and Local Communities
- Banks and Financial Institutions
- Non-Governmental Organizations (NGOs)
- Direção-Geral de Energia e Geologia (DGEG)
- Regional Development Agencies
- Energy and Architecture Professional Associations and Organizations
- Technology Companies and Sustainability Startups

**11- Indicate other experiences, projects and initiatives, from your organization or another, on the topic of energy transition and heating and cooling that you would like to share**

- Hydrogen, offshore wind, infrastructure assessment
- ESG
- Implementation of large-scale tree planting projects
- Applications to Norte 2030 program in the area of energy efficiency in buildings; EUCF project for the creation of green hydrogen in the Vila Real region
- Through the Norte 41<sup>o</sup> project - Centre for Architecture, Creativity and Sustainability, OASRN has a protocol with AdePorto for regular monitoring and evaluation of the architectural, construction and functional measures adopted, producing fundamental technical information to enhance the energy efficiency of our headquarters, a building with heritage value.



## 2.2 The meetings

### Vila Real

- **Type of activities developed:** Presentation of Plan4COLD and of the already collected information and data from Vila Real to local /regional stakeholders; presentation of the already collected information and data on Vila Real; what we expect from the municipality and from the local stakeholders; survey application; debate and next steps
- **Date:** 12/02/2025
- **Venue:** On the premises of the municipality of Vila Real
- **Actors reached and involved:** 23 participants from different municipal divisions, regional development organizations, environmental and enterprise associations, banking institutions, order of engineers and electricity and gas companies. Total of 15 local stakeholders' entities represented
- **Agenda:**
  - 14h30- Presentation of the Plan4COLD project;
  - 15h00- Next steps;
  - 15h30- Survey / debate on the Heating & Cooling sector;
  - 16h00- Closure;
- **Topics discussed and main outcomes:** Plan4COLD presentation to local/regional stakeholders; what Plan4COLD expects from the municipality/stakeholders, including application of the survey and a debate. Outcomes included stronger collaboration and exchange of information and next steps.



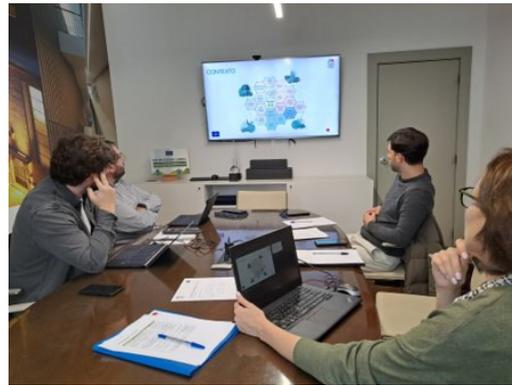
### Guimarães

- **Type of activities developed:** Presentation of Plan4COLD and of the already collected information and data from Guimarães; discussion on what to expect from the municipality/stakeholders; survey application
- **Date:** 13/02/2025
- **Venue:** On the premises of the municipality of Guimarães
- **Actors reached and involved:** Representatives of different municipal divisions and from a research and education association (Laboratório da Paisagem)
- **Agenda:**



- 10h30- Presentation of the Plan4COLD project
- 11h00- Next steps
- 11h30- Survey / debate on the Heating & Cooling sector
- 12h00- Close

**Topics discussed and main outcomes:** Presentation of the Plan4COLD project, highlighting local energy planning, stakeholders' involvement, and the role of the municipality. Tools/software used by the municipality were identified, and updating the stakeholder list was requested. Follow-up includes sharing questionnaires, validation of D2.1, and territorial analysis. Strong collaboration and data exchange were key synergies.



## Loulé

- **Type of activities developed:** Presentation of Plan4COLD and of the already collected information and data from Loulé to local /regional stakeholders; what we expect from the municipality and from the local stakeholders; survey application; debate and next steps
- **Date:** 17/02/2025
- **Venue:** On the premises of the municipality of Loulé
- **Actors reached and involved:** 16 participants from different municipal divisions (including the mayor), municipal enterprises, juntas de freguesia (parishes) and the regional energy company. Total of 7 different local stakeholders
- **Agenda:**
  - 14h30- Presentation of the Plan4COLD project
  - 15h00- Next steps
  - 15h30- Survey / debate on the Heating & Cooling sector
  - 16h00- Close
- **Topics discussed and main outcomes:** Plan4COLD presentation to local/regional stakeholders; what Plan4COLD expects from the municipality/stakeholders, including application of the survey.
- Outcomes included stronger collaboration, exchange of information and data, and definition of next steps.



### Évora

- **Type of activities developed:** Presentation of Plan4COLD and of the already collected information and data from Évora; discussion on what to expect from the municipality/stakeholders; survey application and definition of next steps
- **Date:** 26/02/2025
- **Venue:** On the premises of the municipality of Évora
- **Actors reached and involved:** 14 participants from the municipality (representatives of different municipal divisions)
- **Agenda:**
  - 10h30- Presentation of the Plan4COLD project
  - 11h00- Next steps
  - 11h30- Survey / debate on the Heating & Cooling sector
  - 12h00- Close
- **Topics discussed and main outcomes:** The meeting focused on explaining the Plan4COLD project and how to integrate SLHCPs into municipal planning, highlighting the municipality's key role.  
Follow-up included updating stakeholders' list, dissemination of the survey, territorial analysis, and sharing energy data from buildings/neighbourhoods/blocks. Definition of next steps.





### 3. Municipalities of Setúbal, Sesimbra and Palmela (PT)

The key stakeholders and relevant actors at the local level, already mapped by ENA in task T2.1, were contacted and consulted, through meetings and a survey, with the aim of complementing the context analysis (T2.1) and the H&C data assessment (T2.2), identifying the level of awareness and know-how regarding climate change, energy transitions, and H&C decarbonisation issues, detecting the potential interest, role, and contribution to the H&C planning process, and selecting future members of the Community of Practice to be established in task T4.2.

A total of 57 relevant stakeholders were identified, mapped and contacted via email and phone, and were invited to take part in the planning process by joining the H&C Working Group.

PLAN4COLD - ENA'S STAKEHOLDERS			
	NAME	SPECIFIC TARGET GROUP	Contact person(s)
PUBLIC AUTHORITIES	Municipality of Setúbal – Sustainable Development and Environmental Emergency Department	Local authority	Cristina Coelho / Gonçalo Rainha
	Municipality of Palmela – Departments of Works, Logistics and maintenance / Environment and Energy Efficiency	Local authority	Teresa Santos / Rui Farinha
	Municipality of Sesimbra - Sustainability and Climate Action Division	Local authority	Marta Franco
	AML – Metropolitan Area of Lisbon	Regional authority	Carlos Carvalho e Pedro Carneiro
	CCDR – LVT Lisbon and Tagus Valley Regional Coordination and Development Commission	Regional Public entity for development and territorial cohesion	Carlos Pina / Marta Alvarenga
	Junta de Freguesia de Azeitão	Parish Council	Sónia Cristina Pereira Paulo
	União Freguesias de Setúbal	Parish Council	Fátima de Jesus Carixas Silveirinha
	Junta de Freguesia de São Sebastião	Parish Council	Luís Miguel Pombo de Magalhães Matos
	Junta de Freguesia de Palmela	Parish Council	Jorge Manuel Cândido Mares
	Junta de Freguesia do Pinhal Novo	Parish Council	Carlos Jorge Antunes de Almeida
	Junta de Freguesia de Quinta do Anjo	Parish Council	António Manuel Caeiro Mestre
	União de Freguesias de Poceirão e Marateca	Parish Council	Cecília Maria Cordeiro de Sousa
	Junta de Freguesia do Castelo	Parish Council	Maria Manuel Gomes
	Junta de Freguesia da Quinta do Conde	Parish Council	Carlos Pólvora
	Junta de Freguesia de Santiago	Parish Council	Laura Pinto Correia
	Junta de Freguesia de Gâmbia-Pontes-Alto da Guerra	Parish Council	Luís Alberto Miranda Custódio
	Junta de Freguesia do Sado	Parish Council	Marlene Sofia Baião Caetano
	Direção-Geral de Energia e Geologia (DGEG)	National energy regulator	Paulo Carmona
	Agência Portuguesa do Ambiente (APA)	National Environment Agency	José Carlos Pimenta Machado
	AMRS - Associação de Municípios da Região de Setúbal	Association of Municipalities	Sofia Martins
Instituto da Habitação e Reabilitação Urbana (IHRU)	Housing and Urban Rehabilitation Institute	António Benjamim Costa Pereira	



<b>PORT AUTHORITY</b>	APSS – Setúbal and Sesimbra Port Authority	Port Authority	Nuno Almeida / Graça Viegas
<b>AGRICULTURE &amp; RURAL DEVELOPMENT</b>	ADREPES - Association for the Rural Development of the Setúbal Peninsula	Regional Public entity for development and territorial cohesion	Henrique Soares / Cristina Barbosa
	Oro Agri Europe, S.A.	Agricultural Solutions Company (Private company)	Alexandre Paulino
<b>INFRASTRUCTURE &amp; SERVICE PROVIDERS</b>	E-REDES (Electricity Distributor)	Infrastructure and (public) service provider	Victor Tavares Morais
	APESE – ESCO's Portuguese Association	ESCOs	Jorge Borges de Araújo
	Docapesca	Public company responsible for managing fishery-related port infrastructures	Sérgio Faias
	Arwatt	SME service provider	Tbc
	Simarsul Saneamento da Península de Setúbal, S.A.	Public service provider (waste water treatment entity)	Pedro Avelar
	AICCOPN Association of Civil Construction and Public Works Industrialists	Business support and trade association	Manuel Joaquim Reis Campos
	Auchan	Supermarket	Thais Pereira
	Mercadona	Supermarket	André Silva
	REN	Electricity and Gas Systems Management	Francisco Parada
	Associação Portuguesa de Empresas do Setor Energético (APESE)	ESCOs	Jorge Borges de Araújo
	Associação Portuguesa de Energias Renováveis (APREN)	Portuguese Association of Renewable Energy	Pedro Amaral Jorge / Diogo Carvalheda
	Ordem dos Arquitetos	Order of Architects	Avelino Oliveira
	Ordem dos Engenheiros	Order of Engineers	António José Carias de Sousa
	<b>HEALTH</b>	UDIPSS Setúbal - União Distrital das Instituições Particulares de Solidariedade Social de Setúbal	Health entity
Arrábida's Health Local Unit		Health entity	Célia Maia / João Diegues
<b>INDUSTRY</b>	AISSET - Setúbal Peninsula Industry Association	Business support and trade association	Nuno Maia
	Volkswagen Autoeuropa	Industry	Paulo Batista
	The Navigator Company	Industry	António Redondo
	Coca- Cola EuroPacific Partners	Industry	Carlos Branco
	ACISTDS Setúbal District Trade and Services Association	Business support and trade association	Isaú Alves Fialho da Maia
	SAPEC Industrial Park	Industrial Park	Vânia Marques
<b>EDUCATION/ACADEMIA</b>	Aicep Global Parques	Industrial and logistics parks' manager (public entity)	Manuel Gaeiras
	Setúbal Polytechnic Institute (IPS)	Academia	Prof. João Francisco Fernandes
	Escola Secundária du Bocage	Secondary School (Public educational institution)	Raquel Polainas e Carlos Bico
	Laboratório Nacional de Energia e Geologia (LNEG)	National Energy and Geological Laboratory	Ana Estanqueiro
	Centro de Investigação em Ambiente e Sustentabilidade (CENSE)	Center for Environmental and Sustainability Research	João Pedro Gouveia
<b>OTHERS</b>	INEGI - Instituto de Ciência e Inovação em Engenharia Mecânica e Engenharia Industrial	Institute of Science and Innovation in Mechanical Engineering and Industrial Engineering	Alcibiades Paulo Guedes
	ZERO	Environmental NGO	Francisco Ferreira
	Quercus NR Setúbal	Environmental NGO	Nuno Esteves
	Escola de Hotelaria e Turismo de Setúbal	Tourism public entity	Rui Silva
	Lisbon Tourism Regional Entity	Tourism public entity	Ricardo Mesquita / Jorge Humberto
	Coopérnico	CER cooperative	Rita Antunes
	DECO Proteste	Consumers association	Rita Rodrigues



### 3.1 The stakeholders' survey

A survey was developed to better understand the stakeholders' perspective on heating and cooling and the importance of this topic for their organisations. The survey was prepared in close collaboration with the Portuguese partners (ADENE and AREAM) to ensure relevance to the national context and was made available in an online format to facilitate wide participation.

The survey was structured around a framework that provided context on the project, highlighting the relevance of heating and cooling and the goal of developing three Local Sustainable H&C plans within the territory. This was followed by the questions below:

- *Relevance of H&C in their organisation 's energy consumption.*
- *Main measures proposed for the decarbonization of H&C that should be included in the plans.*
- *Main obstacles at local/regional level to the adoption of measures to decarbonise H&C to be considered in the plans.*
- *Main obstacles in their organizations/entities to the adoption of measures to decarbonise H&C to be considered in the plans.*
- *Opportunities and positive impacts foreseen for their activity and the local community with the implementation of the plans*
- *Topics considered most relevant for capacity-building and training activities*
- *Financing solutions perceived as applicable for investments in H&C solutions*
- *Contributions of their organizations to the development of the plans*
- *Identification of other relevant entities to be involved in the planning process*
- *Experiences, projects or initiatives in the H&C field for sharing*



SUPPORTING SOUTH EUROPE MUNICIPALITIES IN THE  
DEVELOPMENT OF SUSTAINABLE LOCAL  
HEATING AND COOLING PLANS

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**PLAN4COLD**

**B I U O X**

Cerca de metade da procura de energia da UE e das emissões de gases com efeito de estufa provém do aquecimento e arrefecimento. No Sul da Europa, o arrefecimento desempenha um papel mais importante do que noutros países europeus, e as necessidades aumentam significativamente devido às alterações climáticas.

O Plan4Cold é um projeto europeu financiado pelo Programa LIFE CEF que ajuda cidades do sul da Europa, com mais de 45.000 habitantes, a desenvolver Planos Locais Sustentáveis de Aquecimento e Arrefecimento (PLAA) em cumprimento da nova Diretiva de Eficiência Energética da UE. O objetivo é a **descarbonização** do setor de aquecimento e arrefecimento, reduzindo o consumo energético e promovendo o uso de energias renováveis e sistemas eficientes de climatização para melhorar o conforto térmico e a qualidade de vida dos cidadãos.

O projeto pretende criar uma metodologia para elaborar os PLAA, além de oferecer recursos, ferramentas e formação para os responsáveis locais.

O consórcio do projeto é liderado pela ADENE - Agência para a energia e composto por 15 parceiros, incluindo agências de energia como a ENA e organizações locais.

Através deste projeto irão ser criados os PLAA de Setúbal, Palmela e Sesimbra, pelo que o seu contributo e participação é fundamental para assegurar que estes planos respondam às suas necessidades reais.

Agradecemos desde já o seu contributo no preenchimento do presente questionário.

A equipa da ENA

Email \*

Email válido

Este formulário está a recolher emails. [Alterar definições](#)

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Entidade \*

Texto de resposta curta

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**1 - Nos seguintes âmbitos, qual o peso do aquecimento e arrefecimento no consumo de energia da sua organização?**

Descrição (opcional)

---

**Aquecimento para climatização de edifícios**

0%

Entre 1% e 10%

Entre 11% e 20%

Entre 21% e 30%

Entre 31% e 40%

Mais de 40%

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**Arrefecimento para climatização de edifícios**

0%

Entre 1% e 10%

Entre 11% e 20%

Entre 21% e 30%

Entre 31% e 40%

Mais de 40%

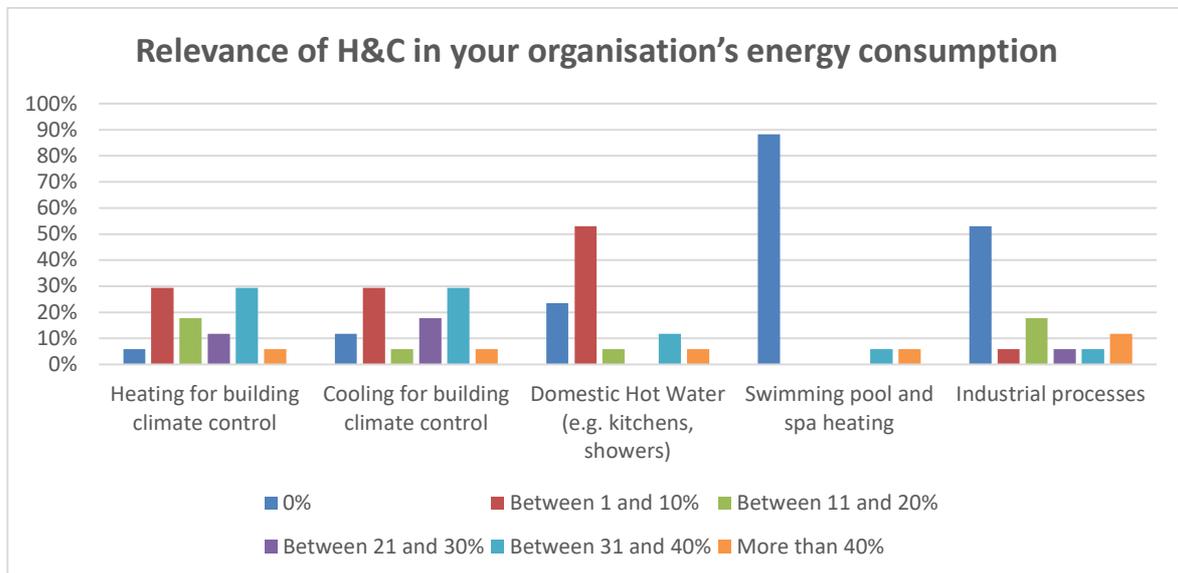
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**Águas Quentes Sanitárias (cozinha, banhos)**

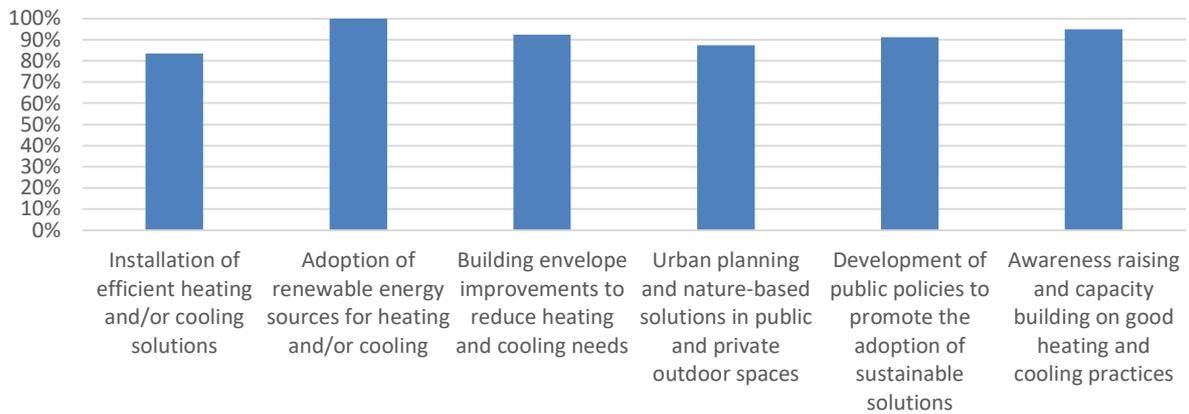
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Entre 1% e 10%

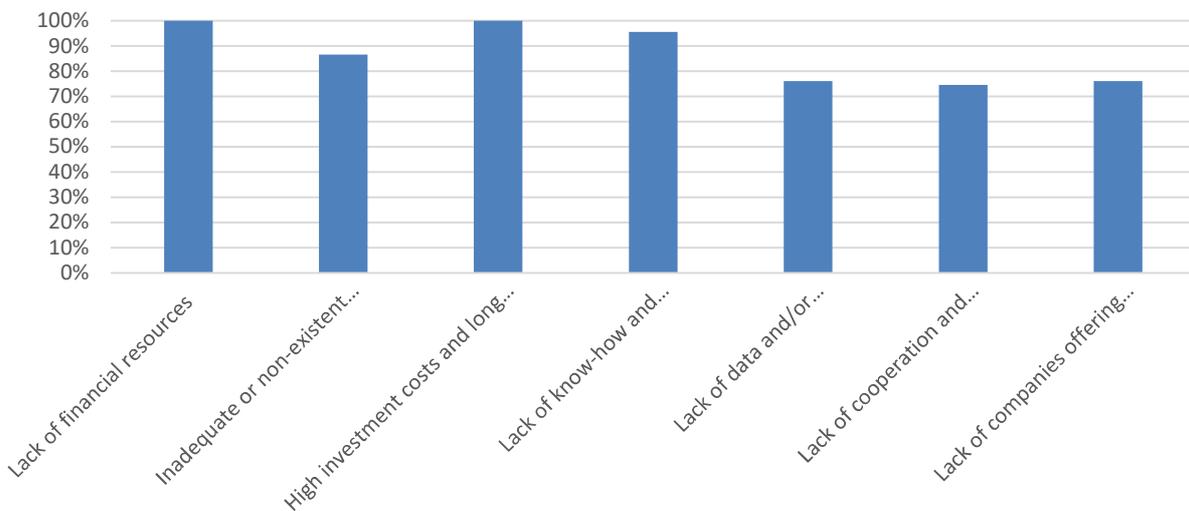
ENA received responses to the survey from 18 stakeholders. The key findings of the survey are presented below:

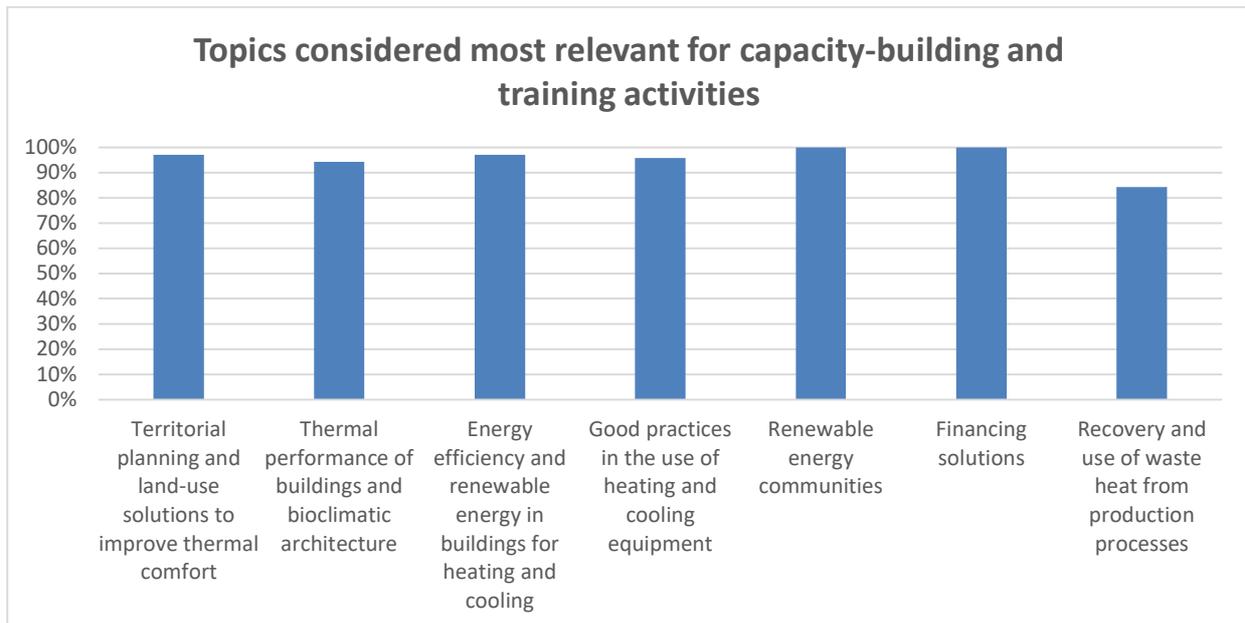
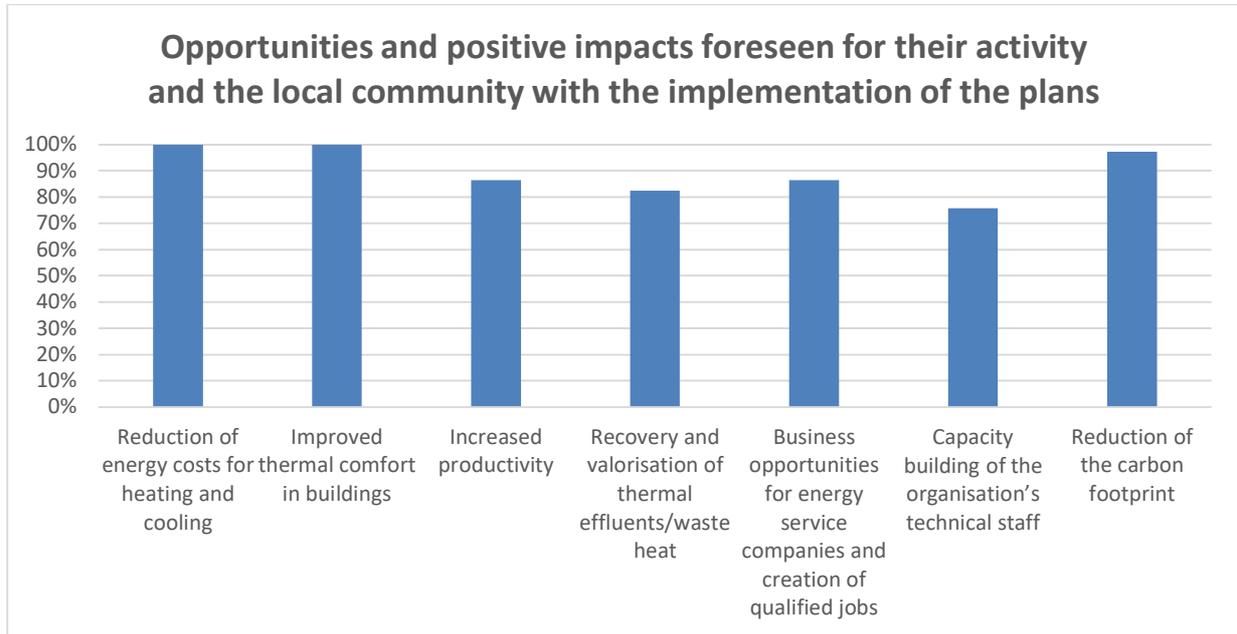


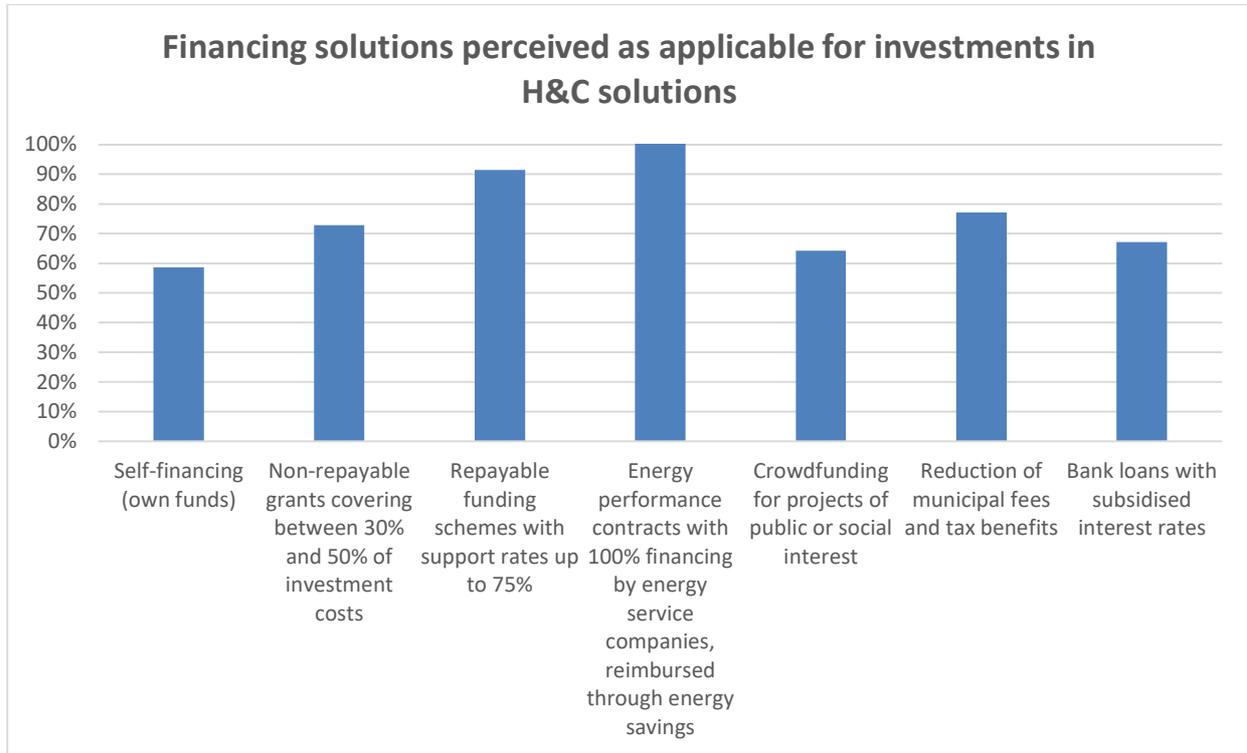
### Main measures proposed for the decarbonization of H&C that should be included in the plans



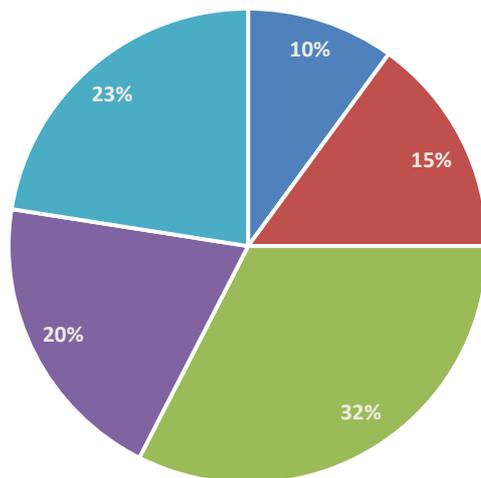
### Main obstacles in their organizations/entities to the adoption of measures to decarbonise H&C to be considered in the plans.







### Contributions of your organization to the development of the plans



- Capacity building and training of technicians and local decision-makers to enhance the implementation of the measures proposed in the plan
- Development and implementation of pilot projects to test innovative and sustainable solutions
- Participation in working groups and public consultations, contributing technical knowledge and sectoral experience
- Awareness raising and engagement with the community and stakeholders to promote the adoption of energy efficiency and decarbonisation measures
- Provision of relevant data and information on energy consumption, infrastructure, and renewable energy potential

Identification of other relevant entities to be involved in the planning process:

Large Retail Chains, Governmental and Regulatory Bodies, Academic Sector and Research Centres, Companies and Associations from the Energy Sector, Construction and Urban Planning Industry, Civil Society Organisations and Social Movements

Experiences, projects or initiatives in the H&C field for sharing:

Local experiences related to solar heating, replacement of windows with energy-efficient models, heat pumps, gas supply storage and fleet renewal with a greater number of electric vehicles.



## 3.2 The meetings

In addition to the survey, ENA carried out stakeholder consultation through 5 institutionalised dialogues and cooperation initiatives, both within and beyond public authorities. These included exchanges with peers, private stakeholders and civil society organisations.

A total of 37 stakeholders participated in these events. The results and main outcomes of the consultation are presented below.

**Date:** 12/12/2024

**Type of event:** Regional level bilateral meeting

**Location (physical/online):** ENA's premises (Setúbal)

**Entities involved:** Municipality of Setúbal and Municipality of Palmela

**Type of entities/stakeholders:** Local authorities

**Activity objectives:** Introductory meeting with technicians from the municipalities involved in the project.

### Key points discussed

- Presentation of the Plan4Cold project's objectives, work plan, methodology, and timeline.
- Discussion on mutual contributions between the project team and the municipalities.
- Validation of the stakeholder map.
- Synergies and relevant results for the project:
  - *Strengthened collaboration and alignment with municipal strategies and tools.*
  - *Improved stakeholder engagement through validation and extension of the mapping.*
  - *Enhanced data basis and policy framework understanding to support informed planning.*
  - *Identification of potential solutions through a participatory process that integrates local knowledge and expertise.*

### Outcomes and next steps

The Plan4Cold objectives, work plan, methodology and timeline were presented. Mutual contributions to and from the municipalities were discussed. Stakeholder map was validated.

Follow up actions:

- Data: Identification of relevant municipal data (ADENE will collect data on building energy certificates).
- Policies: Validation of the policy mapping presented; identification of any missing policy instruments.
- Stakeholders: Validation of the proposed list; identification of additional stakeholders; initial contact and request for feedback; organisation of the first meeting to discuss needs and identify potential solutions.
- Resources: Collection of tools used in urban planning by other municipalities; identification of tools known or of interest to explore in this context.





**Date:** 01/04/2025

**Type of event:** Regional level bilateral meeting

**Location (physical/online):** ENA's premises (Setúbal)

**Entities involved:** 24 participants from 21 local and regional entities

**Type of entities/stakeholders:**

Public authorities

*AML – Lisbon Metropolitan Area*

*APSS – Port Administration of Setúbal and Sesimbra, S.A. (public company)*

*Palmela Municipality*

*Setúbal Municipality*

*CCDR-LVT – Regional Coordination and Development Commission of Lisbon and Tagus Valley*

*IMT – Institute for Mobility and Transport, Setúbal District Office*

*Azeitão Parish Council*

Companies

*Albatroz Digital (Digital IT services)*

*ALSA TODI (Public transport operator)*

*Lisnave Shipyards, S.A. (Heavy Industry - Shipbuilding & Repair)*

*Mercearia Caramela (SME – Grocery / Local Products)*

*ORO AGRI – Rovensa Group (Agri-tech)*

*Volkswagen Autoeuropa (Automotive manufacturing, the largest private company in Portugal)*

*SIMARSUL, S.A. (State-owned enterprise - Environmental / Water & Sanitation Services in Setúbal Peninsula)*

NGOs / Associations / Civil Society Organisations:

*ADREPES – Association for the Rural Development of the Setúbal Peninsula*

*Quercus – Setúbal Delegation (Environment NGO)*

*ZERO – Sustainable Earth System Association (Environment NGO)*

*UDIPSS Setúbal – District Union of Private Social Solidarity Institutions of Setúbal*

*Fundação Oriente (Orient Foundation)*

Educational Institutions

*Du Bocage Secondary School*

*IPS – Polytechnic Institute of Setúbal*

**Activity objectives:** Stakeholder meeting to present the project, establish a working group and collect feedback from the survey.

**Key points discussed**

- Presentation of the Plan4Cold project (including objectives and expected outcomes) in the scope of the “Arrábida Zero Emissions”, ENA’s initiative aimed at driving decarbonisation efforts, attract funding, and monitor results, with active participation from organisations and citizens.
- Launch of the stakeholder survey to gather relevant inputs.
- Introduction and formation of a working group to support the project implementation and local engagement.
- Synergies and relevant results for the project:
  - *Integration of Plan4Cold within the broader framework of territorial decarbonisation monitoring under the Arrábida Zero Emissions initiative.*





- Mobilisation of local actors to contribute to the LSHCPs.
- Reinforcement of cross-sector collaboration and stakeholder alignment around climate and energy goals.

### Outcomes and next steps

Meeting held in the scope of "Arrábida Zero Emissions", ENA's initiative for monitoring the territory decarbonization progress.

Presentation of Plan4Cold project + survey collection + working group launch.

Follow up actions:

- Participants to complete and share the survey within the indicated timeframe.
- First working group meeting to be scheduled.
- Identification of key local data sources and policy instruments to be initiated.
- Continued engagement with municipalities and other stakeholders to build cooperation.

**Date: 23/04/2025**

**Type of event:** Focus group I - Local level bilateral meeting

**Location (physical/online):** ENA's premises (Setúbal)

**Entities involved:** UDIPSS Setúbal – District Union of Private Social Solidarity Institutions of Setúbal and Quercus

**Type of entities/stakeholders:** Civil Society Organisation / Environmental NGO

**Activity objectives:** Focus group meeting aimed at discussing the challenges and opportunities of the LSHCPs, assessing the specific needs of the sector/entity and sharing existing initiatives/future sustainability plans.

### Key points discussed

- Plan4Cold framework presentation
- Challenges and opportunities of LSHCPs and specific needs of the sector/entity
- LSHCPs should focus on improving energy efficiency and resilience, particularly for vulnerable groups, such as the elderly. QUERCUS suggested that LSHCPs should promote natural-based solutions, like green roofs and vegetation, in urban planning.
- UDIPSS shared concerns about the lack of skilled labour for construction and renovation, stressing the need for training in sustainability and green construction practices.
- There was a shared agreement that energy efficiency and passive heating/cooling systems should be integrated into new buildings and renovation projects from the outset.
- Sharing existing initiatives and future sustainability plans
- UDIPSS has installed solar panels in a nursery and a care home, selling excess energy to power public lighting in a social housing area. They expressed interest in collaborating with ENA on training programs and sustainability projects.
- Synergies and relevant results for the project:
  - UDIPSS expressed readiness for partnership with ENA on sustainability projects and for disseminating the LSHCPs among their associates.
  - Participation of UDIPSS can bring much-needed insight into the needs of the most vulnerable communities to the H&C planning process.



- *The integration of passive solutions for heating and cooling into building design, as advocated by all parties, will support sustainable urban development and improve the resilience of buildings to climate impacts.*
- *Ongoing partnerships and information sharing between ENA and local entities like UDIPSS will facilitate the implementation of energy-efficient solutions across the region.*

### **Outcomes and next steps**

- ENA highlighted the environmental, social, and health importance of local heating and cooling plans, particularly regarding climate refuges and vulnerable populations.
- QUERCUS stressed the need for LSHCPs to address the challenges of elderly people living alone, ensuring adequate support.
- UDIPSS presented the scale of their network, which includes 150 private social solidarity institutions (IPSS) in Setúbal District, noting the lack of funds for energy efficiency measures and the need for cost-effective, sustainable solutions. They suggested that the construction sector should evolve towards bioclimatic construction practices, particularly for care homes and schools.

#### Follow up action

- ENA will use UDIPSS as a key partner for disseminating information on sustainability practices to its network of private social solidarity institutions (IPSS).
- ENA will continue meetings with different focus groups and keep participants updated on the contributions and results of the process.
- Future follow-up will involve revisiting the stakeholders when it's time to translate plans into specific actions.

**Date:** 29/04/2025

**Type of event:** Focus Group II - Regional level bilateral meeting

**Location (physical/online):** ENA's premises (Setúbal)

**Entities involved:** 5 technical staff from Municipality of Setúbal (1), Municipality of Palmela (1), São Sebastião Parish Council (1), the Lisbon Metropolitan Area (1) and the CCDR-LVT - Lisbon and Tagus Valley Regional Coordination and Development Commission (1).

**Type of entities/stakeholders:** Public Authorities

**Activity objectives:** Focus group meeting aimed at discussing the challenges and opportunities of the LSHCPs, assessing the specific needs of the sector/entity and sharing existing initiatives/future sustainability plans.

### **Key points discussed**

- Plan4Cold framework presentation
- Challenges and opportunities of LSHCPs and specific needs of the sector/entity  
The need for clear involvement of urban planners and environmental experts in the LSHCPs development process was discussed.  
The importance of integrating passive cooling and heating solutions in both new construction and building renovations was highlighted.  
There was agreement on the necessity for LSHCPs to be action-oriented, focusing on practical measures rather than just normative guidelines.



The potential for local policies to address the reduction of car usage and to encourage more sustainable urban mobility options was explored.

Discussion also touched on the need to align LSHCPs with existing green space planning and policies.

- Sharing existing initiatives and future sustainability plans  
Municipality of Setúbal is currently consulting on its municipal Climate Action Plan, which includes identifying climate refuges. The Lisbon Metropolitan Area (AML) will launch the Metropolitan Climate Refuge Program and the Metropolitan Climate Action Plan very soon. CCDR is planning the Regional Climate Action Plan, aiming to avoid redundancy with existing plans and align with current strategic plans; they are also coordinating the PMMUS (Metropolitan Sustainable Urban Mobility Plan).
- Synergies and relevant results for the project
  - *The discussion emphasised the need to integrate LSHCPs with existing municipal and regional plans, ensuring that they are action-oriented and practical.*
  - *There is strong support for ENA's work in catalysing the development of climate resilience strategies and ensuring that local authorities align their efforts with broader sustainability objectives.*
  - *Partnerships with AML, CCDR, and local municipalities will create synergies in addressing climate challenges, including heat islands, climate refuges, and sustainable urban mobility.*

#### **Outcomes and next steps**

- Emphasis on the need for local mapping of heat islands, with a focus on aligning LSHCPs with municipal master plans (PDMs) and urban design to promote sustainability.
- Agreement on including heat and cold wave alert systems in LSHCPs, alongside climate refuge information, to protect vulnerable populations.
- Discussion on the role of LSHCPs in promoting passive cooling and heating solutions, as well as repurposing urban spaces for multifunctional uses.
- Recognition of the importance of aligning LSHCPs with existing climate action initiatives at local, regional, and metropolitan levels to ensure coordinated and effective implementation.

#### **Follow up action**

- ENA will send the Plan4Cold presentation to all meeting participants and continue engaging with various focus groups. A broader meeting may be scheduled for May with urban planning representatives from the municipalities.
- ENA will follow up on the Metropolitan Climate Refuge Program with AML to ensure coordination with LSHCPs.
- ENA will continue to inform participants about the contributions and results of the process, particularly when specific actions need to be implemented.



**Date:** 30/04/2025

**Type of event:** Focus Group III - Regional level bilateral meeting

**Location (physical/online):** Hybrid event: ENA's premises (Setúbal) + online (Teams)

**Entities involved:** 2 participants from the INEGI - Institute of Science and Innovation in Mechanical Engineering and Industrial Engineering (1) and from ZERO (1)

**Type of entities/stakeholders:** Public Research Institution / Environmental NGO

**Activity objectives:** Focus group meeting aimed at discussing the challenges and opportunities of the LSHCPs, assessing the specific needs of the sector/entity and sharing existing initiatives/future sustainability plans.

### Key points discussed

- Plan4Cold framework presentation
- Challenges and opportunities of LSHCPs and specific needs of the sector/entity  
Energy poverty should be addressed structurally within the LSHCPs, not only through social policy but also by leveraging industrial and building interventions.  
INEGI shared their use of the OSeMOSYS modelling system to industries analyse future energy scenarios, which could be adapted for municipal planning under the LSHCPs framework.  
ZERO stressed the importance of synchronising LSHCPs with EU-level mechanisms, particularly the revised Emissions Trading Scheme, and ensuring access to the Social Climate Fund.  
The concept of industrial symbiosis was discussed in depth, with examples where residual heat from industrial processes is reused for heating and cooling. Participants noted this should be part of LSHCPs.  
There is a need for coordinated efforts in raising awareness and building technical skills within the construction sector, particularly in energy-efficient renovation.  
Discussion emphasised community inclusion and behavioural change, with calls to involve residents, civil society organisations, and health stakeholders in both the design and implementation of LSHCPs.  
Participants raised the challenge of policy fragmentation, advocating for the integration of LSHCPs with other strategic plans (urban mobility, health, renovation). Emphasis was placed on public health as a driving force for action in the context of climate change.  
The group discussed the potential for collective financing mechanisms, community-level investment models, and better communication strategies to support long-term implementation.
- Sharing existing initiatives and future sustainability plans  
INEGI is participating in the HORIS (LIFE) project, aimed at developing an integrated service platform to support home renovation and reduce energy poverty, which aligns with PLAN4COLD's residential focus. INEGI also expressed ambition to create an “energy label” for municipalities, reflecting their energy performance—this concept could be piloted in connection with LSHCPs. ZERO continues its advocacy work with initiatives like the “Casa Quente para Toda a Gente” campaign and contributes to EU-level projects such as LIFE ETX (on strengthening EU ETS) and REDI4Heat (supporting renewable integration in heating/cooling).
- Synergies and relevant results for the project



- Both partners bring valuable technical expertise and networks that can directly support LSHCPs development. INEGIs could bring strategic insights on the industrial decarbonization and ZERO on the implementation of emissions' trade systems and the fight against energy poverty.
- Both organisations are involved in complementary efforts related to building renovation, industry decarb, energy justice, and climate-health integration, offering knowledge and technical inputs relevant for the development of LSHCPs content and methodologies.

### **Outcomes and next steps**

- Broad consensus on the need to integrate energy poverty, public health, and community participation as core dimensions of LSHCPs.
- Highlighted the importance of aligning LSHCPs with existing and upcoming EU funding instruments, new emissions trading schemes, and energy-related directives (e.g., EPBD).
- Emphasis on leveraging industrial symbiosis and residual heat use as strategic tools for circular economy, community benefit, and emissions reduction.
- Strong interest in incorporating capacity-building efforts within the construction sector and developing user-centred planning tools and support platforms for building renovation. .

#### Follow up action

- ENA will share the Plan4Cold presentation.
- Further meetings to be scheduled at key milestones, including the action implementation phase.
- Exploration of synergies with existing tools and platforms (e.g. OSeMOSYS) and potential funding opportunities.
- ENA will continue to inform participants about the contributions and results of the process, particularly when specific actions need to be implemented.



## 4. Municipality of Funchal and Autonomous Region of Madeira (PT)

A survey was carried out, aimed at stakeholders to identify training needs and opportunities in the heating and cooling, and another survey was carried out at hotel units with a view to identifying energy consumption for their heating and cooling needs.

After the survey, it was decided to hold face-to-face and online meetings in order to present useful information to local and regional stakeholders and have it available for discussion

### 4.1 The stakeholders' survey

This survey was conducted online, between March 12 and April 7, by sending the link to stakeholders' emails, and during this period, telephone contacts were received to clarify doubts.

The general survey allowed to assess the level of awareness and knowledge in the area of heating and cooling, to identify training needs of technicians, in order to enable the development of customized tools and materials, the active training of local and regional authorities and direct cooperation, and to identify problems, obstacles and needs in the area of heating and cooling.

The survey was launched on March 2025 and reached the following stakeholders:

- municipalities: Funchal, Machico and Porto Santo
- 7 regional entities: Energy, Health, environment and sea, education, professional qualification institute, machinery and vehicle service management and public administration in general;
- 1 social housing authority (regional entity);
- 21 hotels (Quintinha de São João Hotel & Spa, Dom Pedro Madeira e Garajau, Solar da Bica, Reid's Palace / Hotelaria, Residencial Encomeada, Vila Baleira Funchal e Porto Santo, Madeira Panorâmico Hotel and others who remained anonymous.

The general survey consisted of 10 questions, 10 of which were mandatory multiple-choice questions and 3 were optional questions. 37 responses were received. Emails were sent to 38 regional and local public entities, associations of municipalities, companies, professional associations and technicians responsible for the energy assessment of buildings and the issuing of the Energy Certificate (EC) and more than 50 hotels.



Questions	Answers options	
1. Identify the entity or sector/activity you represent		
2. How much does heating and cooling account for in your organization's energy consumption, or in the buildings you know or have worked in over the past 3 years?	<p>Rate each option from 0 to 5, where: (0) corresponds to 0%, (1) corresponds to the range of 1 to 10% (2) corresponds to the range of 11 to 20% (3) corresponds to the range of 21 to 30% (4) corresponds to the range of 31 to 40% (5) corresponds to more than 40%.</p> <p>Mandatory answer</p>	<p>a) Heating needs for air conditioning in buildings            b) Cooling needs for air conditioning in buildings            c) DHW needs (kitchen, bathrooms)            d) Needs within the scope of swimming pool and SPA heating processes            e) Needs within the scope of industrial processes</p> <p>3. If you wish, indicate other needs not mentioned in question 2.</p>
3. What are the main measures you advocate for the decarbonisation of heating and cooling that should be included in Local Heating and Cooling Plans?	<p>Rate each option from 0 to 5 where: 0 - not important, 5 - very important</p> <p>Mandatory answer</p>	<p>a) Installation of efficient heating and/or cooling solutions (e.g. condensing boilers, heat pumps, high-efficiency chillers, pipe insulation, intelligent control systems, etc.)            b) Installation of renewable energy technologies for heating and/or cooling (e.g. solar thermal, solar photovoltaic, biomass, waste heat recovery, etc.)            c) Construction solutions in the thermal envelope of buildings to reduce air conditioning needs (e.g. thermal insulation of facades and roofs, efficient glazing, shading solutions, use of solar orientation, installation of green roofs and facades)            d) Urban measures in public and private outdoor spaces based on nature to mitigate heat island effects and improve comfort during high temperature events (e.g. creation of green spaces and corridors)            e) Measures of a public policy nature to encourage the adoption of more sustainable solutions (regulation, incentives, etc.)</p>



		<p>f) Awareness and training for good practices in heating and cooling</p> <p>5. If you wish, indicate other measures that you recommend for the decarbonization of heating and cooling.</p>
<p>6. What are the main obstacles to adopting heating and cooling decarbonisation measures that you hope Local Heating and Cooling Plans will help overcome?</p>	<p>Rate each option from 0 to 5 where: 0 - not important, 5 - very important</p> <p>Mandatory answer</p>	<p>a) Lack of specialized service companies and energy service companies with suitable financing solutions</p> <p>b) Regulatory restrictions</p> <p>c) Lack of data or information that allows the definition of appropriate measures and the assessment of return on investment periods</p> <p>d) High investments and high return on investment period</p> <p>e) Lack of financial resources or inadequacy of incentive systems in relation to existing needs</p> <p>7. If you wish, please indicate other barriers to the adoption of heating and cooling decarbonisation measures that you hope Local Heating and Cooling Plans will help overcome.</p>
<p>8. What opportunities and positive impacts do you foresee for your activity and the local community with the implementation of the Local Heating and Cooling Plans?</p>	<p>Rate each option from 0 to 5 where: 0 - not important, 5 - very important</p> <p>Mandatory answer</p>	<p>a) Reduction in energy costs for heating and cooling</p> <p>b) Improving thermal comfort in buildings</p> <p>c) Business opportunity for energy services companies and creation of skilled jobs</p> <p>d) Training of the organization's technical staff</p> <p>e) Reduction of carbon footprint</p>
<p>9. Considering the importance of your area of activity and your need to improve your knowledge, which topics do you consider to be most</p>	<p>Rate each option from 0 to 5 where: 0 - not important, 5 - very important</p> <p>Mandatory answer</p>	<p>a) Solutions in terms of spatial planning/management to improve thermal comfort (e.g. creation of green spaces and corridors, implementation of nature-based solutions);</p> <p>b) Thermal behavior of buildings and bioclimatic architecture</p>

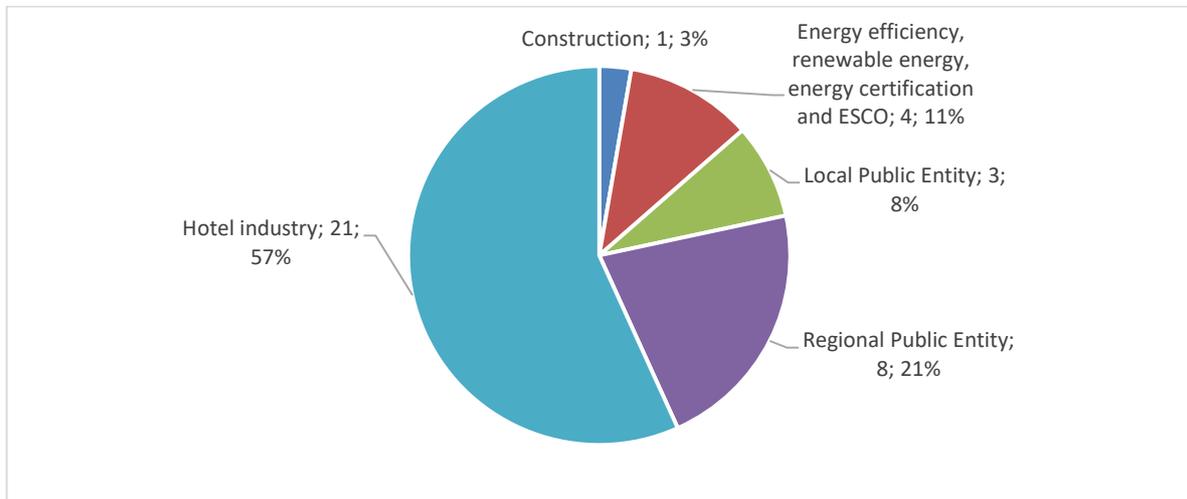


<p>relevant for training and qualification actions?</p>		<p>c) Energy efficiency and renewable energy in buildings for heating and cooling;  d) Good practices in the use of heating and cooling equipment  e) Renewable energy communities  f) Financing solutions  g) Use of residual heat from production processes  10. If you wish, suggest other topics that you consider relevant for training and development activities?</p>
<p>11. Taking into account the needs of your activity, what financing solutions do you consider applicable for investments in sustainable heating and cooling solutions?</p>	<p>Rate each option from 0 to 5 where: 0 - not important, 5 - very important   Mandatory answer</p>	<p>a) Financing with own funds for investments with return periods of less than 8 years  b) Non-refundable financing with rates between 30% and 50%  c) Refundable financing with support rates of up to 75%  d) Energy performance contract with 100% financing by energy service companies, to be repaid with energy savings resulting from the investment  e) Crowdfunding for investment in public or social interest  f) Reduction of municipal rates and tax benefits  g) Bank financing with subsidized interest rates  12. If you wish, suggest other financing solutions that you consider applicable for investments in sustainable heating and cooling solutions.</p>
<p>13. How can your organization contribute to the development of the Local Heating and Cooling Plan and the implementation of decarbonization measures in heating and cooling? (Long text, Optional answer)</p>		
<p>14. Identify other entities that you consider important to involve in the preparation of Local Heating and Cooling Plans?  Long text, Optional answer</p>		
<p>15. Please indicate other experiences, projects and initiatives, from your organization or someone else, in the area of energy transition and heating and cooling that you would like to share (Long text, Optional answer)</p>		

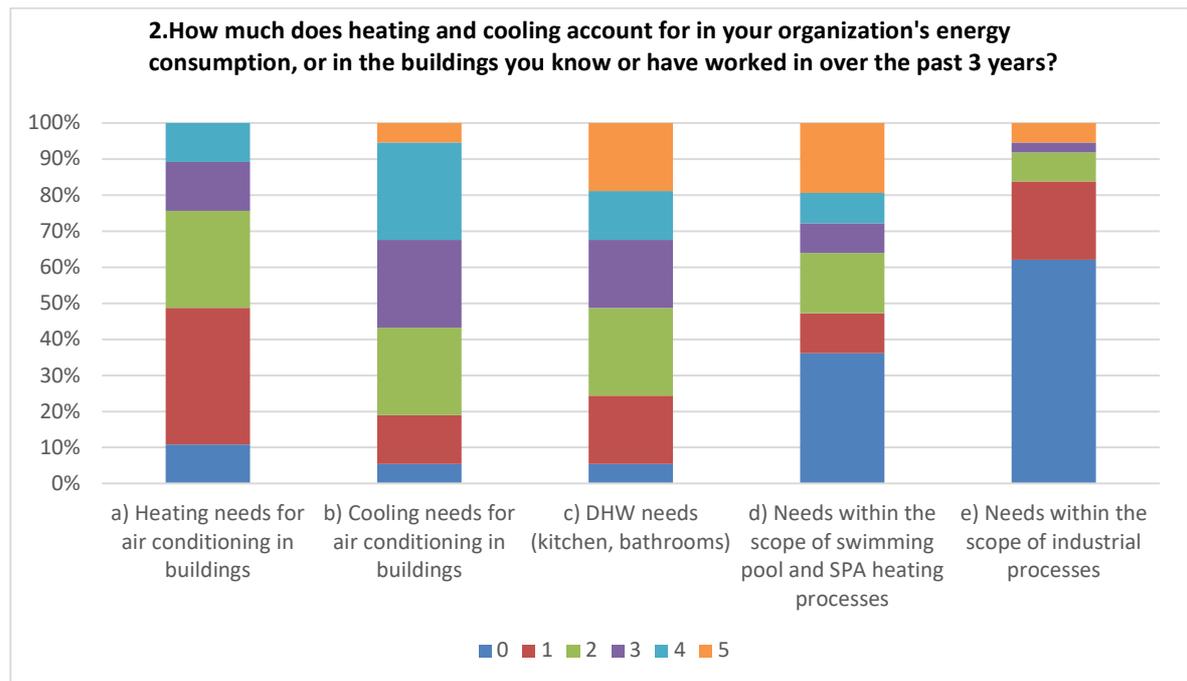
The survey answers are presented below



**Entity or sector/activity you represent**



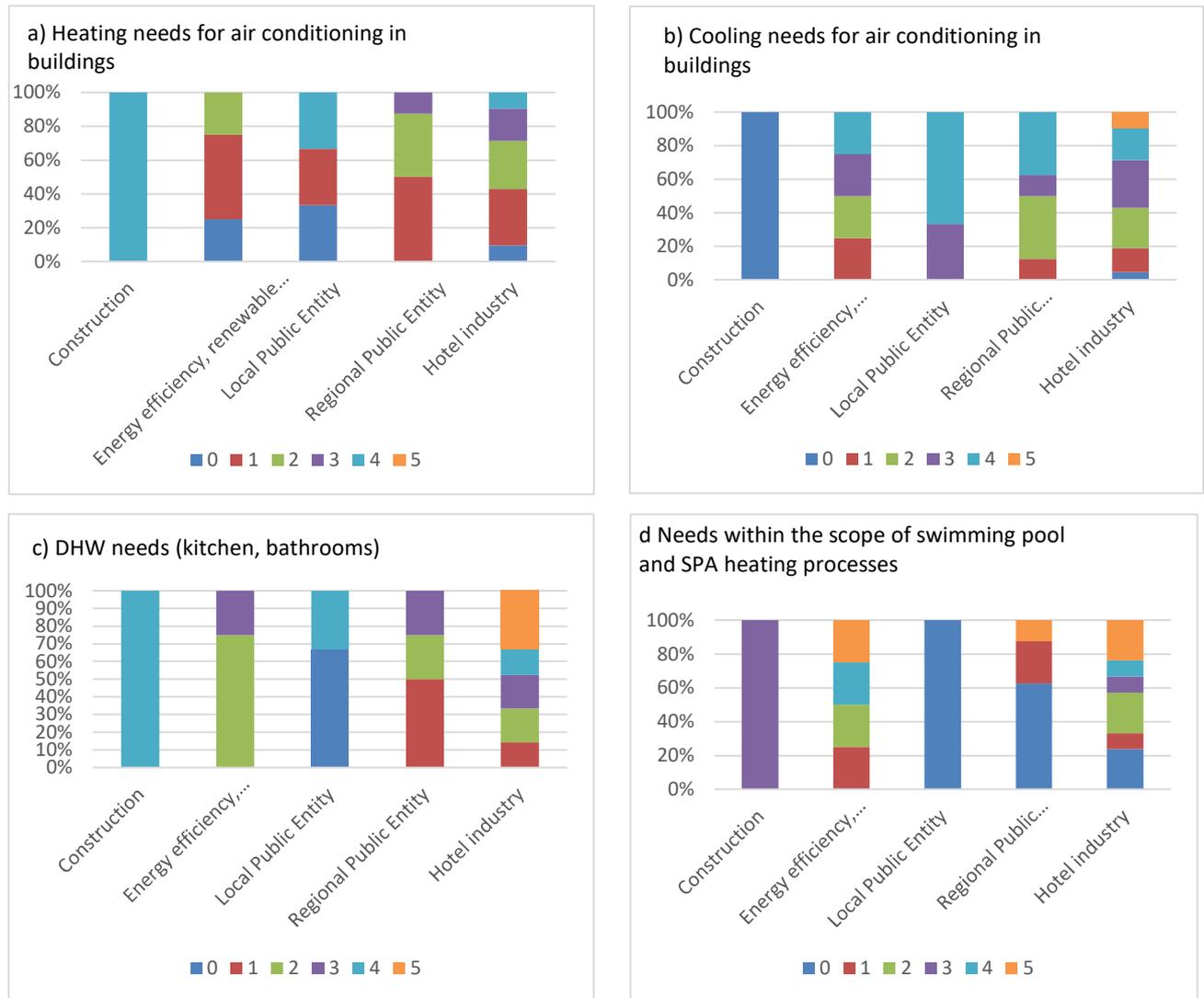
**2. How much does heating and cooling account for in your organization's energy consumption, or in the buildings you know or have worked in over the past 3 years?**

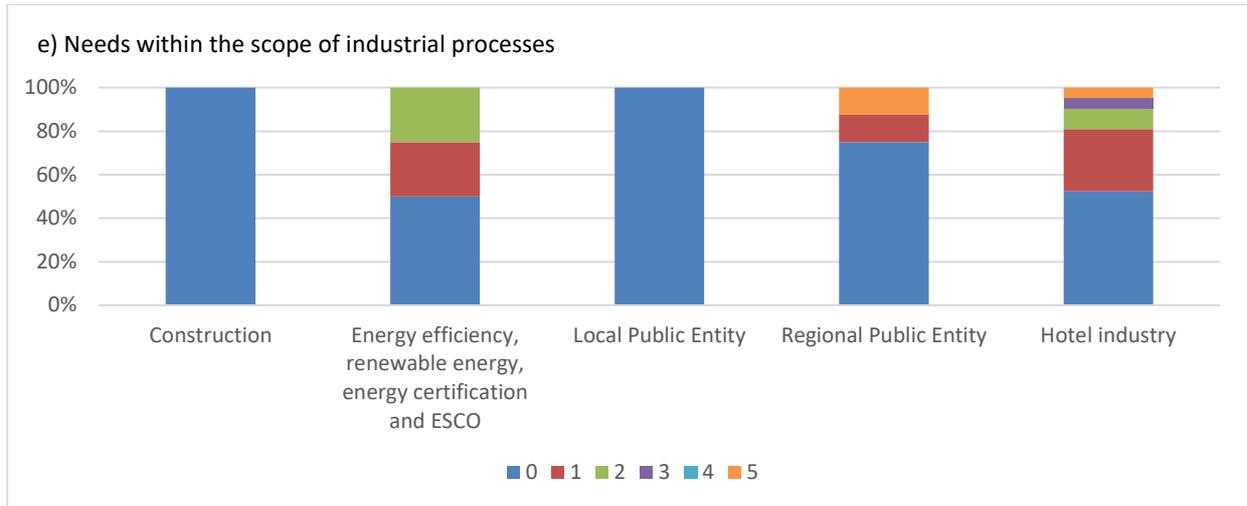


0) corresponds to 0%, (1) corresponds to the range of 1 to 10%, (2) corresponds to the range of 11 to 20% , (3) corresponds to the range of 21 to 30% , (4) corresponds to the range of 31 to 40% , (5) corresponds to more than 40%



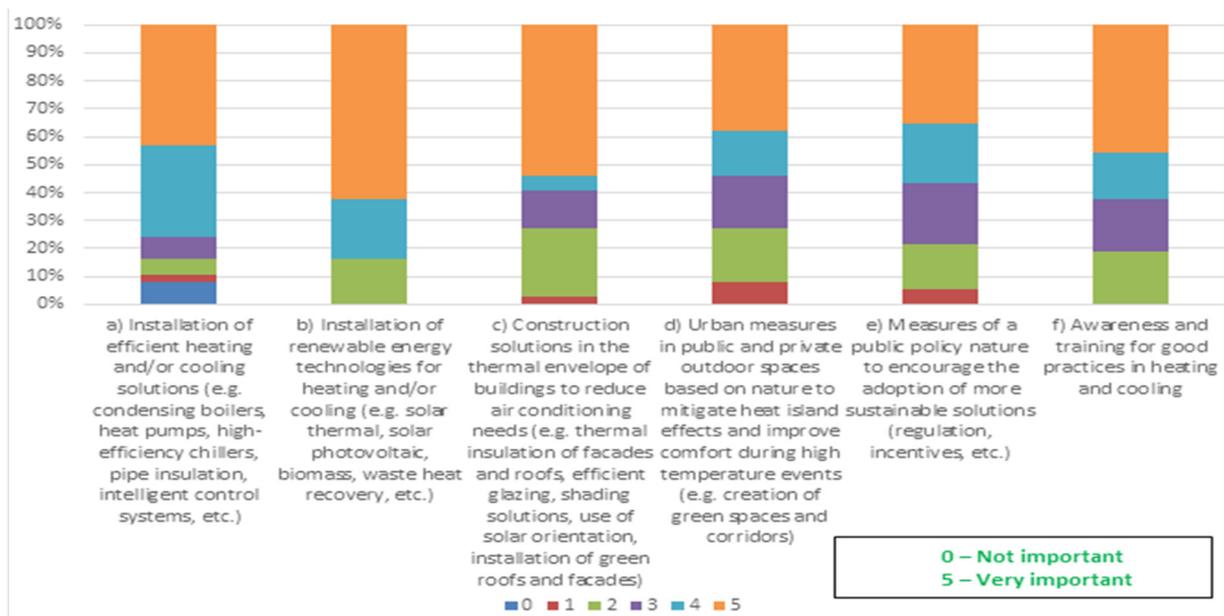
## Analysis of heating and cooling needs by entity typology





**If you wish, indicate other needs not mentioned in question 2.**

Photovoltaic panels; Heat pumps; LPG for heating production; Technical renovation of the public building because don't have equipment's and monitoring and/or measurement systems for of consumption of HVAC and water heating equipment; cold requirements for storage equipment: cold chamber, ice production; other equipment's





**5. If you wish, indicate other measures that you recommend for the decarbonization of heating and cooling.**

- Awareness campaigns about the consequences of energy consumption just for the maximum and exaggerated comfort of tourists, often without any real need
- Strengthen inspections of new residential building construction projects to ensure that materials have not been tampered with and that their quality is not compromised in their opaque and glazed surroundings.

**6. What are the main obstacles to adopting heating and cooling decarbonisation measures that you hope Local Heating and Cooling Plans will help overcome?**

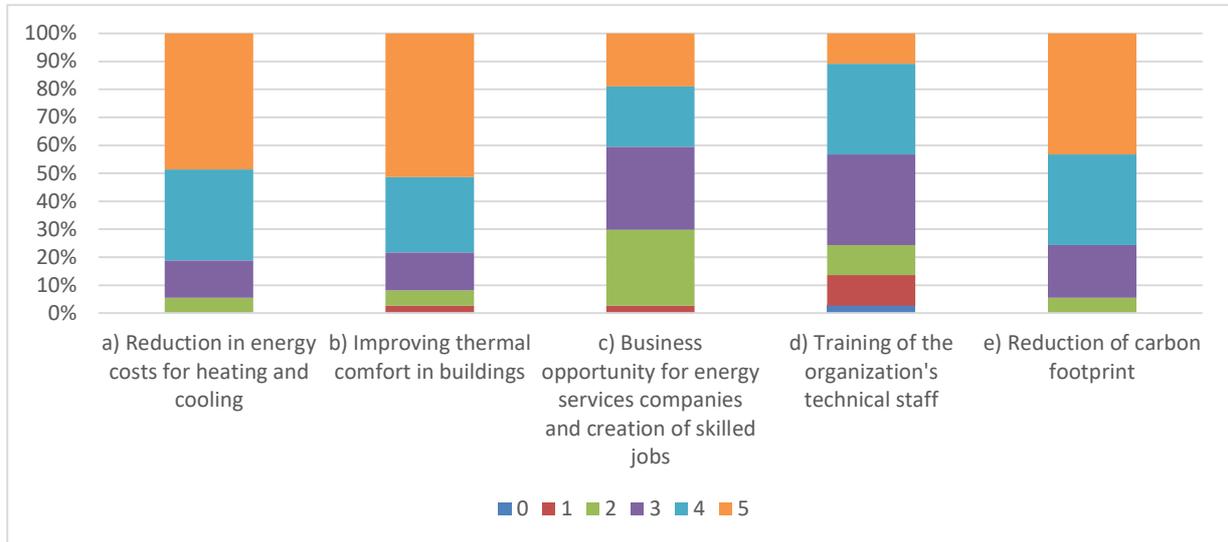


**7. If you wish, please indicate other barriers to the adoption of heating and cooling decarbonisation measures that you hope Local Heating and Cooling Plans will help overcome.**

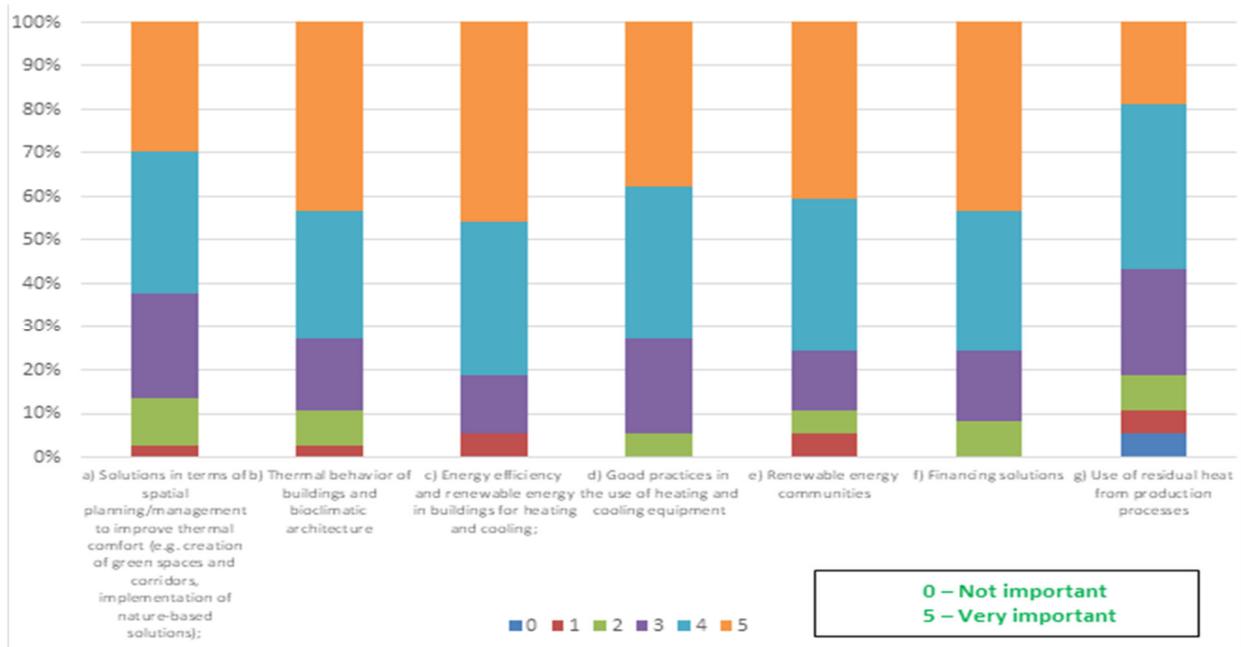
- Lack of definition of a long-term strategy on the energy performance of buildings in RAM - renovation and new.
- Lack of workforce
- Lack of awareness among building owners regarding the issue of decarbonization.



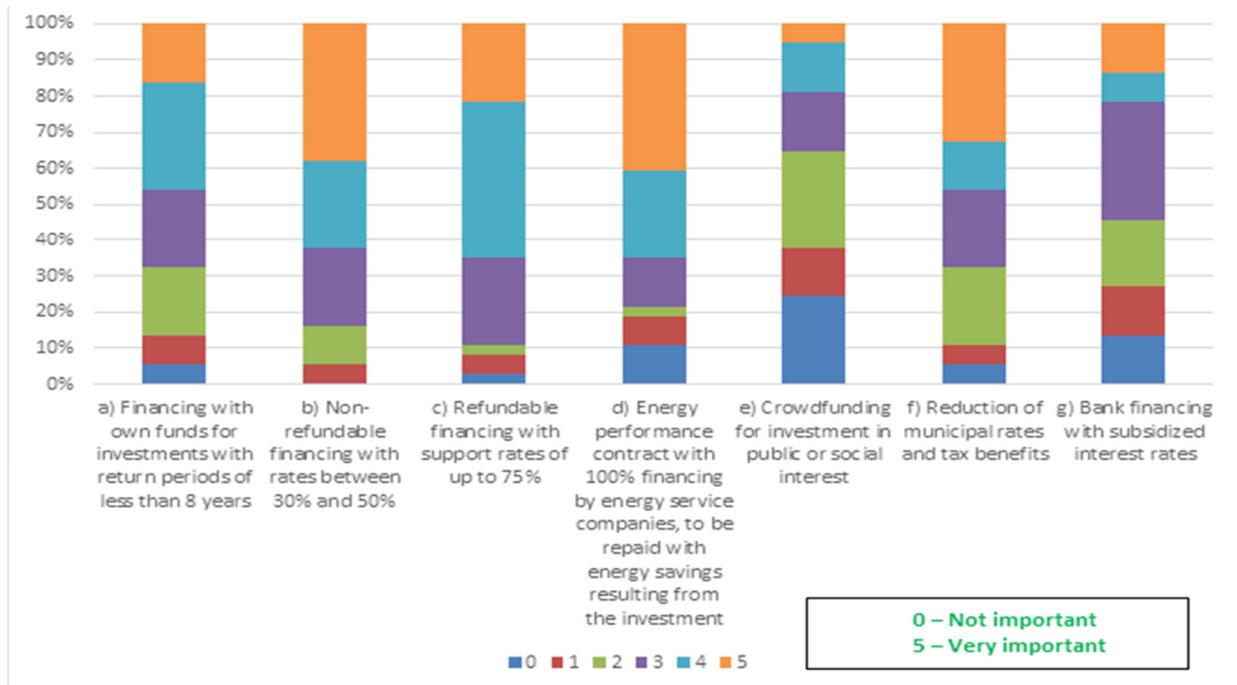
**8. What opportunities and positive impacts do you foresee for your activity and the local community with the implementation of the Local Heating and Cooling Plans?**



**9. Considering the importance of your area of activity and your need to improve your knowledge, which topics do you consider to be most relevant for training and qualification actions?**



### 11. Taking into account the needs of your activity, what financing solutions do you consider applicable for investments in sustainable heating and cooling solutions?



### 13. How can your organization contribute to the development of the Local Heating and Cooling Plan and the implementation of decarbonization measures in heating and cooling?

- Energy audits and surveys of performance improvement measures in terms of comfort, indoor air quality, system efficiency and renewable energy.
- Preparation of energy audits and maintenance plans
- Changing the gas boiler system to a heat pump system, to the DHW system
- Making themselves available to answer questionnaires, participate in meetings on the topic and share information about the activity history
- Using clean energy.
- It can contribute greatly to awareness, implementation and regulation of the Plan's measures.
- identify the needs
- Experience space
- The Regional Directorate for the Environment and the Sea can collaborate in the preparation of the document, helping to align it with other regional strategic references for climate action or to create synergies for its implementation and dissemination.



#### 14. Identify other entities that you consider important to involve in the preparation of Local Heating and Cooling Plans?

- All entities with responsibilities in approving building projects, entities responsible for defining urban renewal plans, public entities with responsibility in the construction of buildings.
- Transport sector, public entities and trade sector.
- ACIF
- The public decision maker. It is necessary to do (much) more than issuing legislation that is often disconnected from reality and coming up with financing plans that are completely unrealistic and hollow because they only aim to acquire funds, without the projects making sense or being effective.
- Local authorities
- Regional Directorate of Energy and Local Authorities
- Local authorities
- Parish Councils and People's Houses
- Municipalities, Parish Councils, Professional Associations with an interest in the subject (e.g. Engineers, Architects, Biologists, etc.), IHM.
- DRESC - Regional Directorate of Social Equipment and Conservation. It is an entity responsible for the study and characterization of EPFF facilities, within the scope of the Building Energy Certification System (SCE) - DL n° 101-D/2020 of December 7th.

#### 15. Please indicate other experiences, projects and initiatives, from your organization or someone else, in the area of energy transition and heating and cooling that you would like to share.

- Energy audit within the scope of the SCE and I will take the opportunity to improve the comfort conditions of the workshop areas (considered with ENU) with intervention measures in the surroundings, implementation of measures to improve the ventilation of the spaces, installation of LED lighting, heat pump and solar thermal system, photovoltaic system and energy management systems with records of the main energy consumers and implementing data analysis through Power BI through the Energy Management portal.
- HVAC designers with solid knowledge to develop projects with energy-efficient solutions.
- Working with a local company, DT Way, which has been helping us with studies and research into solutions.
- Working with Recovery and Resilience Plan
- Funchal currently have a Sustainable Energy and Climate Action Plan, a Municipal Strategies for Adapting to Climate Change EMAAC, a Public Lighting Master Plan, as well as Municipal Climate Action Plan.



## 4.2 The meetings

After the survey, two meetings were held, one with the Municipality of Funchal and another with the Regional Government of Madeira (Regional Energy Directorate of the Regional Government of Madeira)

### Municipality of Funchal

Date: May 26, 2025

Type: online meeting

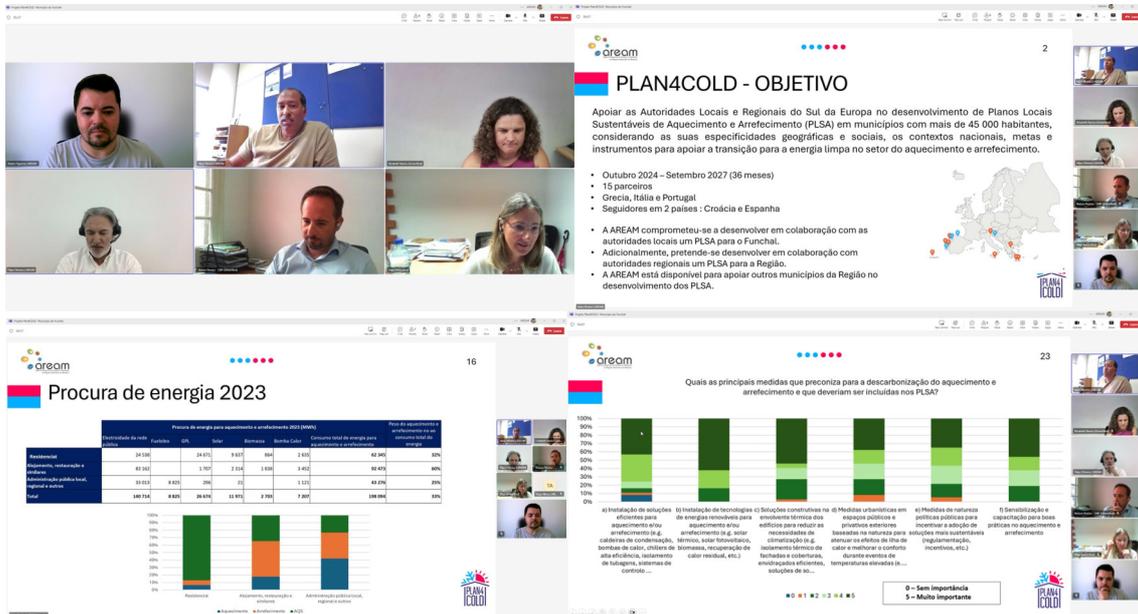
Participants: 3 technicians from the Department of Environment and Climate Action of Municipality of Funchal

Activity Objectives: Present the main objectives of the projects and raise awareness of the impacts of heating and cooling on the population, economy, environment and health and the importance of the municipality in the stakeholder's engagement of the population, public and private entities and technicians

Meeting has been organized and the following topics discussed:

- The Plan4Cold project and the survey main results
- Data management and preliminary baseline: Demand and need of energy for H&C; EPC and census data
- Municipality support in the development of the Plan
- Priority measures to be considered in the Plan: training actions and stakeholder engagement, impacts of the measures to be considered in the Plan, auscultation of the population, public and private entities and technicians during the preparation of the Plan

The poster features the 'aream' logo at the top left, the 'PLAN4COLD' logo in the center, and the 'Município do Funchal' logo at the top right. Below the main title, it lists the agenda items: '-Apresentação do projeto', '-Procura e necessidades de energia para aquecimento e arrefecimento', '-Medidas de melhoria', and '-Capacitação e formação'. The date and format '26/05/2025, Online' are also present. At the bottom, there are icons for energy (lightning bolt, water drop, wind turbine, solar panel, leaf) and logos for the European Union and PLAN4COLD.



**Main outcomes:** Raise awareness among municipal technicians in the Municipality of Funchal about the direct and indirect benefits of the Sustainable Local Plan for heating and cooling  
**Regional Government of Madeira** (Regional Energy Directorate of the Regional Government of Madeira)

**Date:** September 4, 2025

**Type:** physical meeting

**Participants:** Regional Director of the Regional Energy Directorate of the Regional Government of Madeira and Director of Energy Services

**Activity Objectives:** Present the main objectives of the projects and raise awareness of the impacts of heating and cooling on the population, economy, environment and health and the importance of the municipality in the stakeholder's engagement of the population, public and private entities and technicians

Meeting has been organized and the following topics discussed:

- Project Presentation
- Data management and preliminary baseline: Demand and need of energy for H&C; EPC and census data
- Present the main results of survey
- Regional Energy Directorate support in the development of the Plan
- Discuss priority measures to be considered in the Plan: training actions and stakeholder engagement, impacts of the measures to be considered in the Plan, auscultation of the population, public and private entities and technicians during the preparation of the Plan.



# PLAN4COLD

SUPPORTING SOUTH EUROPE MUNICIPALITIES IN THE DEFINITION OF SUSTAINABLE LOCAL HEATING AND COOLING PLANS



## Certificação Energética

### Edifícios de habitação

RAM – Foi analisada uma amostra de 31 556 edifícios residenciais novos, renovados e existentes, representando cerca de 24% do universo de habitações familiares clássicas.

3,2% de habitações com CE foram enquadradas numa grande reabilitação

### Edifícios de serviços

RAM – Foi analisada uma amostra de 4236 pequenos edifícios de serviços e 351 grandes edifícios de serviços, novos, renovados e existentes.

1,2% dos edifícios de serviços com CE foram enquadrados numa grande reabilitação

## Direção Regional de Energia (DREn)

- Apresentação do projeto
- Procura e necessidades de energia para aquecimento e arrefecimento
- Medidas de melhoria
- Capacitação e formação

04/09/2025

Co-funded by the European Union

Projecto financiado pelo Fundo Europeu de Desenvolvimento Regional através do Programa Operacional Regional do Alentejo e do Programa Operacional Regional do Algarve. Apoio financeiro do CINEA, dentro do âmbito do Projecto de Cooperação Interregional de Alto Impacto para o Desenvolvimento Regional.

14



Habituação	AQ	ARR	AQS	TOTAL
	kWh/m2_ano	kWh/m2_ano	kWh/m2_ano	kWh/m2_ano
2014-2021	53,61	1,02	24,26	78,89
2014-2022	52,87	1,13	24,05	77,85
2014-2023	51,00	1,23	23,54	75,87

Serviços	AQ	ARR	AQS	ELDI	TOTAL
	kWh/m2_ano	kWh/m2_ano	kWh/m2_ano	kWh/m2_ano	kWh/m2_ano
2014-2021	11,90	36,82	22,46	0,76	71,25
2014-2022	12,53	36,14	21,81	0,74	70,55
2014-2023	12,75	35,92	21,40	0,72	70,14

## CONTRIBUTOS PARA A REGIÃO

- Desenvolvimento do PLSA com o apoio técnico da AREAM.
- Garantir o envolvimento das partes interessadas, regionais e locais no processo de planeamento.
- Capacitar a equipa técnica para o desenvolvimento, implementação e monitorização do Plano.
- Contribuir para o processo de desenvolvimento dos recursos e materiais Plan4COLD.
- Ser uma região pioneira no cumprimento da nova obrigação de planeamento de A&A e exemplo para os demais Regiões.
- Contribuir com a identificação de boas práticas e definição de recomendações para novas políticas que acelerem a descarbonização do sector do A&A.

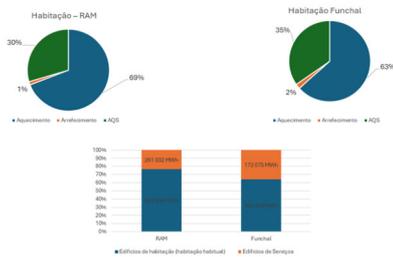


## Procura Vs Necessidades de energia

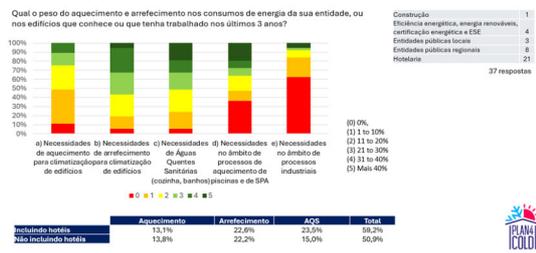
Habituação	RAM	Procura de energia (MWh)			Necessidades de energia (MWh)			Peso do consumo de energia em relação às necessidades		
		Aquecimento	Arrefecimento	AQS	Aquecimento	Arrefecimento	AQS	Aquecimento	Arrefecimento	AQS
Habituação	RAM	9320	8388	128319	189721	401157	208455	3,0%	1,6%	51,3%
Alajuntamento	RAM	4200	4206	50768	61696	135352	106564	6,3%	1,9%	51,6%
Alajuntamento	Funchal	22905	52079	53313	22903	52079	53313	100,0%	100,0%	100,0%
Administração	RAM	18307	44307	39895	63307	44307	39895	100,0%	100,0%	100,0%
Administração	Funchal	34127	21857	18367	48838	84254	28487	69,9%	25,7%	65,4%
Indústria	RAM	17758	34373	11327	22448	38723	27165	73,1%	56,9%	43,9%
Indústria	Funchal	10318			10318			100,0%		
Total	RAM	77473	80124	200398	272376	539490	332345	28,4%	14,9%	60,3%
Total	Funchal	18085	62783	102350	102446	218347	170221	37,2%	28,7%	60,1%



## Necessidades de energia para A&A-SCE



## Principais resultados do inquérito realizado junto dos stakeholders





## 5. Municipalities of Udine and Pordenone (IT)

An initial meeting was organised with the political representatives of each municipality (19 December 2024 in Udine and 15 January 2025 in Pordenone), followed by a meeting with the technical staff to present the project's objectives and establish working groups. The first task focused on organising stakeholders' meetings to present the project to local and regional actors, and to implement the initial consultation with stakeholders.

Then several exchanges and meetings have been held, some of them related to the H&C data assessment, in order to better understand the data availability on energy and gas consumption of municipal buildings.

### 5.1 The stakeholders' survey

During the initial meetings in Udine and in Pordenone, a questionnaire was administered to participants using the Mentimeter tool, and two additional questions were asked via a Google Form. These tools made it possible to gain an overview of the level of awareness and knowledge regarding climate change, the energy transition, and the issue of decarbonizing the heating and cooling sector (Mentimeter). Furthermore, it was possible to explore the interest and potential role of the invitees in contributing to the plan's development, and thus to assess which stakeholders might be part of the Local Community of Practice to be established during activity 4.2 (Google Form) in Udine and in Pordenone.

#### Municipality of Udine

Based on the questionnaires completed live by the participants, the most commonly perceived effects of climate change in their local area are: hotter summers and an increase in the number of days with very high temperatures (above 30°C).

The sector seen as most critical in the local energy context is the residential sector, while the main barriers to implementing energy-related actions and measures are identified as the lack of financial resources and inadequate incentive systems/support mechanisms.

According to those present, the key measures to decarbonize the heating and cooling sector to be included in local planning are: energy efficiency interventions, particularly improvements to the thermal envelope of buildings, along with training and awareness-raising on existing good practices. Regarding the topic of training, stakeholders in the room specifically identified the following areas for further exploration:

- energy efficiency and renewable energy in buildings for heating and cooling;
- good practices in the use of heating/cooling systems;
- renewable energy communities (RECs).





Based on the feedback received and the subsequent discussion, it was clear that stakeholders were eager to stay informed about the project and actively participate in upcoming activities, such as data sharing, focus groups, co-design initiatives, and training sessions. Stakeholders showed particular interest in identifying local challenges and developing solutions through the creation of synergies.

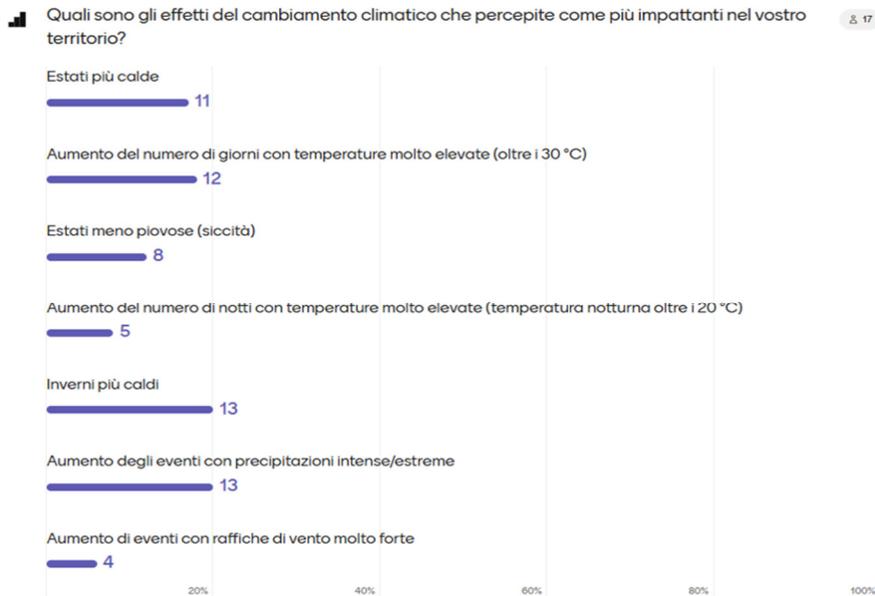
Notably, concerns were raised regarding indoor thermal comfort and energy poverty, especially in light of rising energy costs. Suggestions were also made regarding the next steps, including the need for greater involvement of local actors by leveraging existing networks. Additionally, there was interest in promoting the exchange of experiences and best practices among stakeholders from the different beneficiary municipalities, with the aim of broadening the project's perspective to an international level.

Unfortunately, representatives from certain stakeholder categories, such as shopping centres and large-scale retail chains, were not present at the meeting, despite having been invited. As a result, some perspectives may not have been fully captured. Nevertheless, the discussion yielded several valuable insights, and the possibility of involving these actors in future initiatives remains open.

### **Survey questions and results (Mentimeter, 21 attendees - 17 answers)**

**Question 1:** What are the effects of climate change that you perceive as the most impactful in your area? (Multiple choices possible)

- Hotter summers
- Increase in the number of days with very high temperatures (over 30 °C)
- Drier summers (drought)
- Increase in the number of nights with very high temperatures (nighttime temperatures over 20 °C)
- Hotter winters
- Increase in extreme/heavy precipitation events
- Increase in events with very strong wind gusts

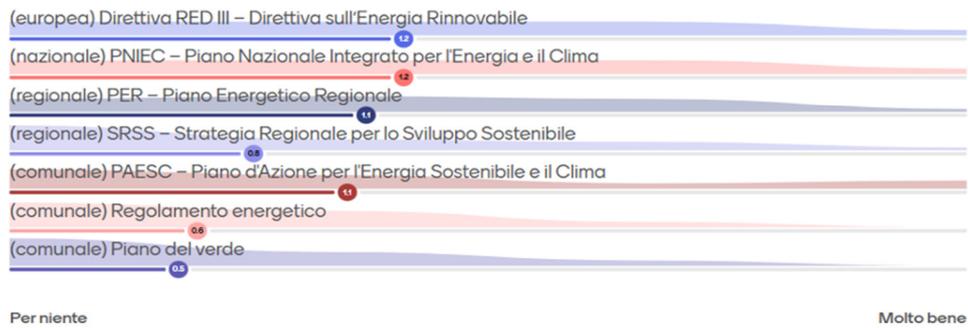


**Question 2:** How familiar are you with the following regulations, policies, and strategies related to energy transition and climate change? From “not at all” to “very well”.

	Not at all	A little	Quite well	Very well
(European) RED III	5	5	5	2
(National) NIECP	5	5	5	2
Regional Energy Plan	5	6	5	1
Regional Strategy for Sustainable Development	9	4	3	1
SECAP	7	5	2	3
(Municipal) Energy Regulation	9	6	2	0
(Municipal) Green Plan	10	5	2	0



Quanto conosce le seguenti normative, politiche e strategie in tema di transizione energetica e cambiamento climatico?



**Question 3:** According to you, at the local level, which sectors are most affected by energy-related issues?

- Residential sector
- Primary sector (agriculture)
- Secondary sector (industry)
- Tertiary sector (services)
- Buildings and public illumination
- Public transportation
- Private transportation
- Other

Quali sono, secondo lei, a livello locale i settori che più risentono di criticità nel campo energetico?



**Question 4:** According to you, what are the most urgent measures to address the energy emergencies and issues in your area?

- Installation of systems powered by renewable energy sources (photovoltaic, solar thermal, biomass district heating)



- Renovation of building envelopes (insulation, windows)
- Replacement of heating systems
- Energy audits
- Consumption monitoring
- Replacement of household appliances or electrical/electronic equipment
- Revision of land-use planning tools (increasing green spaces in urban areas)
- Enhancement of public and pedestrian/cycle mobility
- Energy certification systems
- Staff training and public information

Quali sono, secondo lei, gli interventi più urgenti per superare le emergenze e le criticità energetiche nel vostro territorio?



**Question 5:** According to you, what are the main obstacles to the implementation of energy interventions and measures at the local level?

- Lack of financial resources
- Inadequate regulations and permitting procedures
- Inadequate incentive systems and support mechanisms
- Lack of technical skills to assess/implement the measures
- Lack of data and information for defining appropriate measures and monitoring
- Lack of cooperation and coordination
- Lack of specialized service companies with suitable financing solutions
- Other



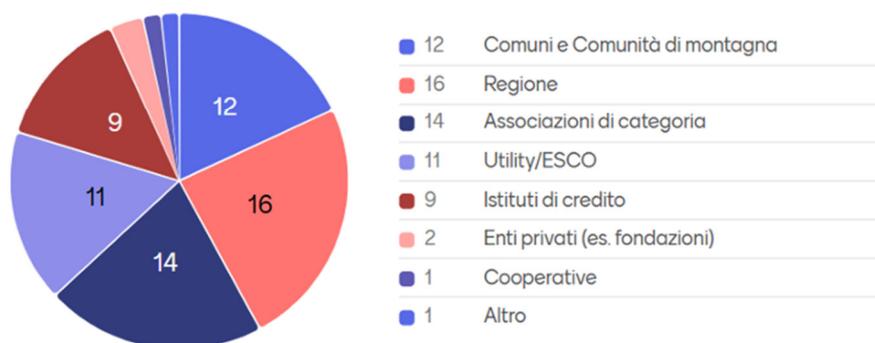
Quali sono, secondo lei, gli ostacoli principali all'implementazione di interventi e misure energetiche a livello locale?



**Question 6:** According to you, who are the main stakeholders to involve and coordinate with for the development of strategies and action plans?

- Municipalities and Mountain communities
- Region
- Trade associations
- Utility/ESCO
- Financial institutions
- Private entities (e.g., foundations)
- Cooperatives
- Other

Quali sono, secondo lei, i principali attori da coinvolgere e con cui coordinarsi per lo sviluppo di strategie e piani d'azione?

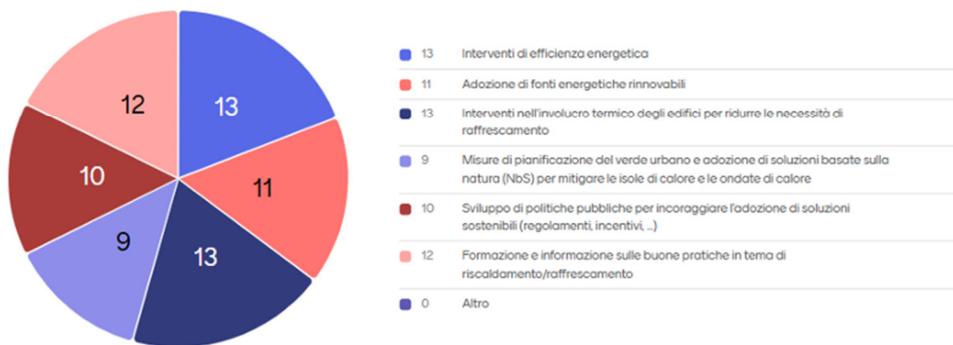




**Question 7:** According to you, what are the main measures to decarbonize the heating/cooling sector to be included in local planning?

- Energy efficiency measures
- Adoption of renewable energy sources
- Measures on the building thermal envelope to reduce cooling needs
- Urban green planning measures and adoption of nature-based solutions (NbS) to mitigate heat islands and heatwaves
- Development of public policies to encourage the adoption of sustainable solutions (regulations, incentives, ...)
- Training and information on best practices in heating/cooling
- Altro

Quali sono, secondo lei, le principali misure per decarbonizzare il settore del riscaldamento/raffrescamento, da inserire nella pianificazione locale?



**Question 8:** Which of these opportunities and positive impacts of local planning on heating/cooling would benefit your activity?

- Increase in thermal comfort
- Increase in productivity
- Reuse of waste heat
- Business opportunities for energy service companies and creation of qualified professionals
- Training of technical staff
- Reduction of carbon footprint
- Other



Quali di queste opportunità e impatti positivi della pianificazione locale su riscaldamento/raffrescamento sarebbe di beneficio alla vostra attività?



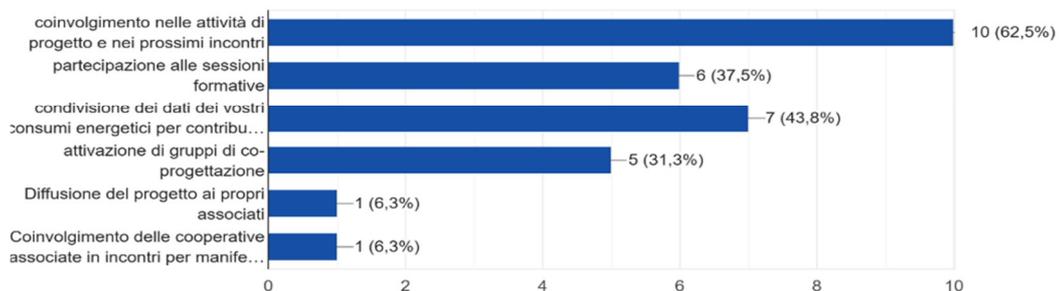
## Google Form

**Question 1:** What role do you think your organization/business/association could play in the local planning process for the heating and cooling sector in the Municipality of Udine?

- Engagement in the next project activities and in the next meetings
- Participation in the training sessions
- Sharing data about your energy consumption to contribute to the analysis that will be conducted for the SLHCP realization
- Activation of co-design groups
- Dissemination of the project to your members
- Involvement of associated cooperatives in meetings to express the needs of affiliated enterprises and organizations

Quale ruolo ritiene che potrebbe avere il suo ente/impresa/associazione all'interno del percorso di pianificazione locale nel settore riscaldamento e raffrescamento per il Comune di Udine?

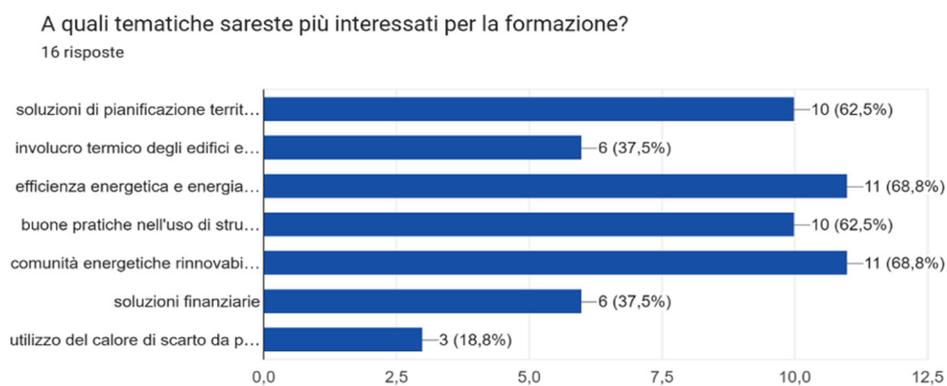
16 risposte





**Question 2:** Which topics would you be most interested in for training?

- Spatial planning solutions to improve thermal comfort (e.g., green spaces and corridors, nature-based solutions)
- Building thermal envelope and bioclimatic architecture
- Energy efficiency and renewable energy in buildings for heating and cooling
- Best practices in the use of heating and cooling systems
- Renewable Energy Communities (RECs)
- Financial solutions
- Use of waste heat from industrial processes



**Municipality of Pordenone**

The same methodology applied during the first stakeholder meeting in Udine was replicated in Pordenone on 22/09/2025.

The questionnaires revealed that the most frequently perceived impacts of climate change at the local level are: an increase in the number of hot days (above 30°C); a rise in the frequency of extreme/intense precipitation events; and hotter summers (consistent with the findings reported by stakeholders in Udine).

Within the local energy context, the industrial sector was identified as the most critical, followed by the residential sector and agriculture. The main barriers hindering the implementation of energy-related actions and measures were highlighted as: insufficient financial resources; inadequate incentive schemes/support mechanisms; and regulatory and authorization procedures deemed ineffective.

Stakeholders indicated that the priority measures for the decarbonization of the heating and cooling sector, to be integrated into local planning, include: energy efficiency interventions – particularly the improvement of building envelopes – alongside training activities and awareness-raising initiatives to promote the dissemination of existing best practices. With regard to training needs, stakeholders specifically identified the following areas for further development:



- energy efficiency interventions;
- building envelope improvements aimed at reducing cooling demand;
- the design of public policies that foster the adoption of sustainable practices (e.g., regulations, incentive schemes), coupled with training and dissemination of best practices in the use of heating and cooling systems.

The survey also elicited several additional remarks. On the one hand, participants suggested investigating existing local initiatives, in particular bottom-up actions, in the field of heating and cooling decarbonization. On the other hand, another participant stressed the importance of implementing awareness-raising activities to reduce energy consumption primarily through anti-waste measures (for example, addressing the widespread practice of shops leaving doors open while operating air conditioning or heating systems).

As in Udine, representatives of certain stakeholder categories – such as shopping centres and large-scale retail chains – were absent from the meeting despite being invited. Consequently, some viewpoints may not have been fully represented.

### Survey questions and results (Mentimeter, 14 attendees – 11 answers)

**Question 1:** What are the effects of climate change that you perceive as the most impactful in your area? (Multiple choices possible)

- Hotter summers
- Increase in the number of days with very high temperatures (over 30 °C)
- Drier summers (drought)
- Increase in the number of nights with very high temperatures (nighttime temperatures over 20 °C)
- Hotter winters
- Increase in extreme/heavy precipitation events
- Increase in events with very strong wind gusts

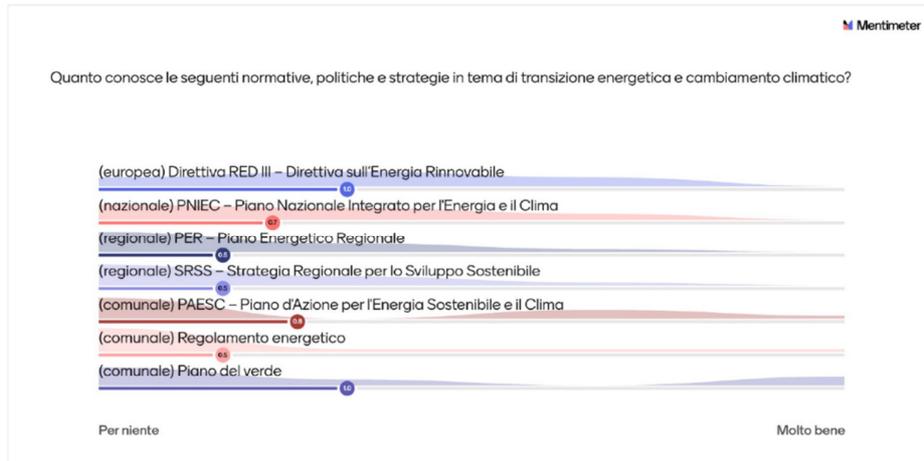
Mentimeter

Quali sono gli effetti del cambiamento climatico che percepite come più impattanti nel vostro territorio?





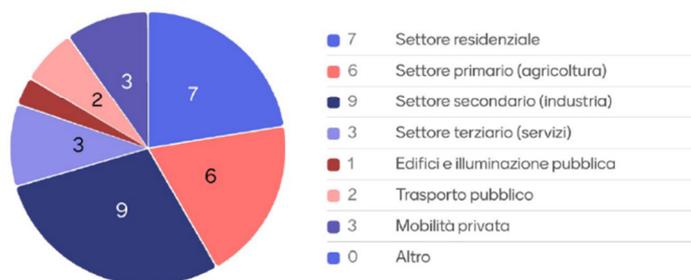
**Question 2:** How familiar are you with the following regulations, policies, and strategies related to energy transition and climate change? From “not at all” to “very well”.



**Question 3:** According to you, at the local level, which sectors are most affected by energy-related issues?

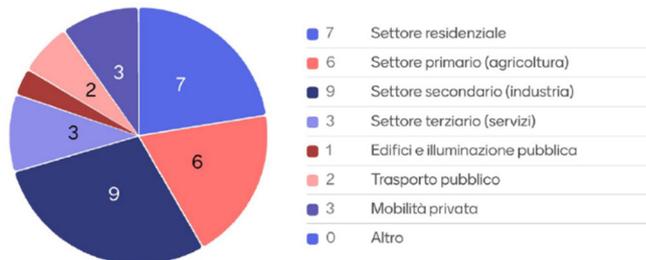
- Residential sector
- Primary sector (agriculture)
- Secondary sector (industry)
- Tertiary sector (services)
- Buildings and public illumination
- Public transportation
- Private transportation
- Other

Quali sono, secondo lei, a livello locale i settori che più risentono di criticità nel campo energetico?





Quali sono, secondo lei, a livello locale i settori che più risentono di criticità nel campo energetico?



**Question 4:** According to you, what are the most urgent measures to address the energy emergencies and issues in your area?

- Installation of systems powered by renewable energy sources (photovoltaic, solar thermal, biomass district heating)
- Renovation of building envelopes (insulation, windows)
- Replacement of heating systems
- Energy audits
- Consumption monitoring
- Replacement of household appliances or electrical/electronic equipment
- Revision of land-use planning tools (increasing green spaces in urban areas)
- Enhancement of public and pedestrian/cycle mobility
- Energy certification systems
- Staff training and public information

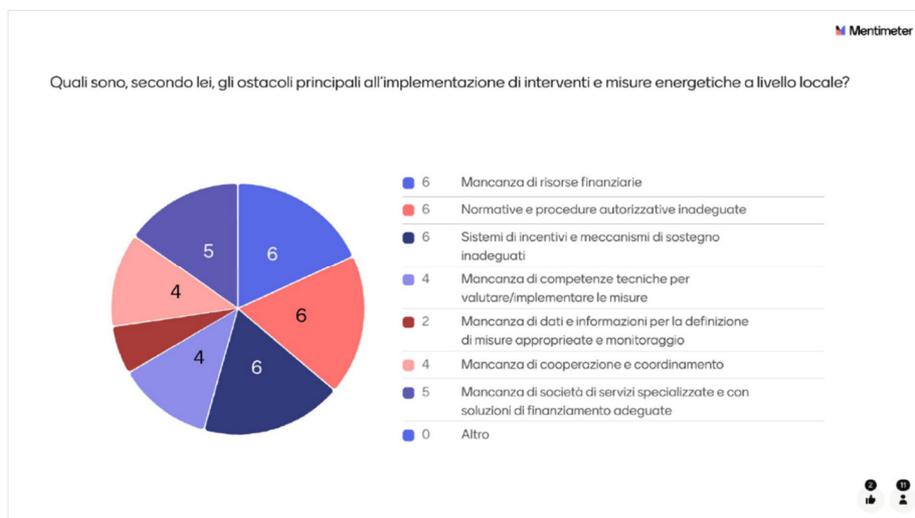
Quali sono, secondo lei, gli interventi più urgenti per superare le emergenze e le criticità energetiche nel vostro territorio?





**Question 5:** According to you, what are the main obstacles to the implementation of energy interventions and measures at the local level?

- Lack of financial resources
- Inadequate regulations and permitting procedures
- Inadequate incentive systems and support mechanisms
- Lack of technical skills to assess/implement the measures
- Lack of data and information for defining appropriate measures and monitoring
- Lack of cooperation and coordination
- Lack of specialized service companies with suitable financing solutions
- Other



**Question 6:** According to you, who are the main stakeholders to involve and coordinate with for the development of strategies and action plans?

- Municipalities and Mountain communities
- Region
- Trade associations
- Utility/ESCO
- Financial institutions
- Private entities (e.g., foundations)
- Cooperatives
- Other

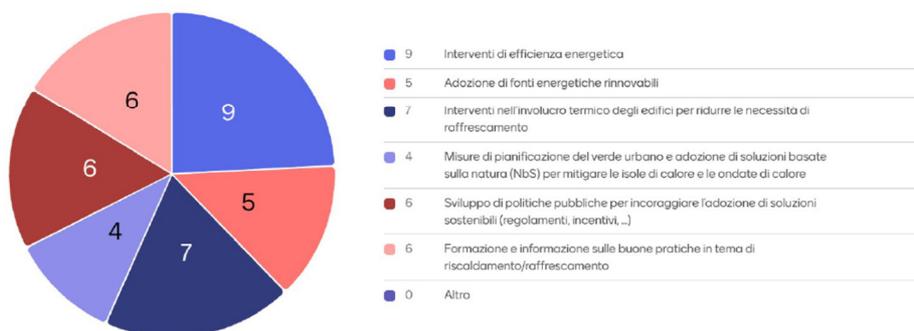
Quali sono, secondo lei, i principali attori da coinvolgere e con cui coordinarsi per lo sviluppo di strategie e piani d'azione?



**Question 7:** According to you, what are the main measures to decarbonize the heating/cooling sector to be included in local planning?

- Energy efficiency measures
- Adoption of renewable energy sources
- Measures on the building thermal envelope to reduce cooling needs
- Urban green planning measures and adoption of nature-based solutions (NbS) to mitigate heat islands and heatwaves
- Development of public policies to encourage the adoption of sustainable solutions (regulations, incentives, ...)
- Training and information on best practices in heating/cooling
- Other

Quali sono, secondo lei, le principali misure per decarbonizzare il settore del riscaldamento/raffrescamento, da inserire nella pianificazione locale?





**Question 8:** Which of these opportunities and positive impacts of local planning on heating/cooling would benefit your activity?

- Increase in thermal comfort
- Increase in productivity
- Reuse of waste heat
- Business opportunities for energy service companies and creation of qualified professionals
- Training of technical staff
- Reduction of carbon footprint
- Other

Mentimeter

Quali di queste opportunità e impatti positivi della pianificazione locale su riscaldamento/raffrescamento sarebbe di beneficio alla vostra attività?



### **Google Form (14 attendees – 13 answers)**

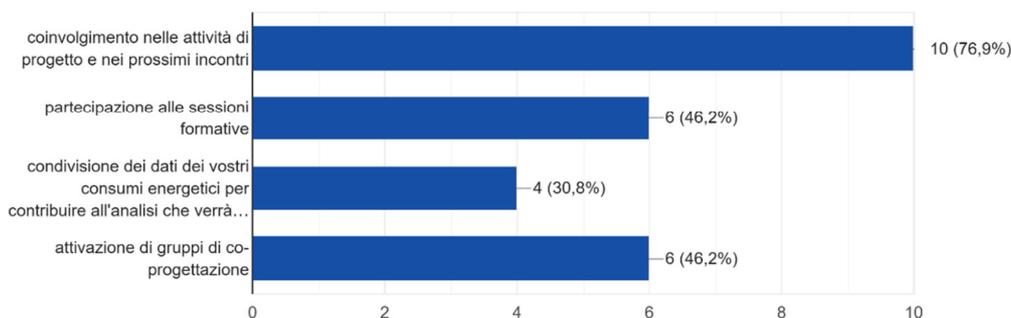
Question 1: What role do you think your organization/business/association could play in the local planning process for the heating and cooling sector in the Municipality of Pordenone?

- Engagement in the next project activities and in the next meetings (76,9%)
- Participation in the training sessions (46,2%)
- Sharing data about your energy consumption to contribute to the analysis that will be conducted for the SLHCP realization 30,8%)
- Activation of co-design groups (46,2%)



Quale ruolo ritiene che potrebbe avere il suo ente/impresa/associazione all'interno del percorso di pianificazione locale nel settore riscaldamento e raffrescamento per il Comune di Pordenone?

13 risposte

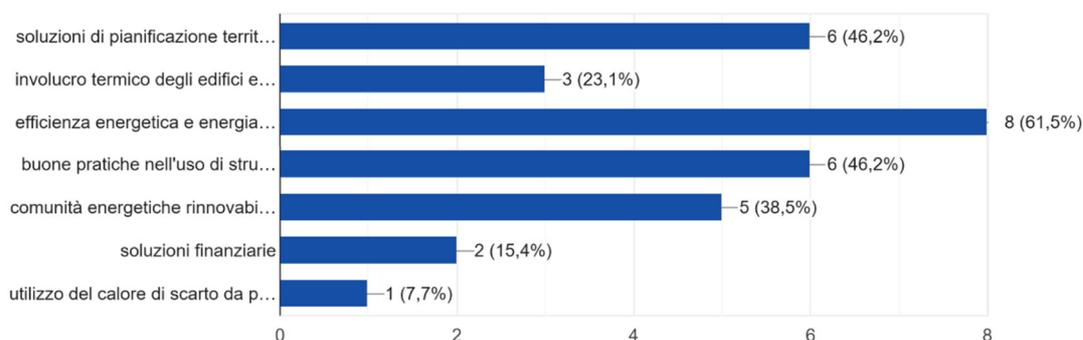


**Question 2:** Which topics would you be most interested in for training?

- Spatial planning solutions to improve thermal comfort (e.g., green spaces and corridors, nature-based solutions) (46,2%)
- Building thermal envelope and bioclimatic architecture (23,1%)
- Energy efficiency and renewable energy in buildings for heating and cooling (61,5%)
- Best practices in the use of heating and cooling systems (46,2%)
- Renewable Energy Communities (RECs) (38,5%)
- Financial solutions (15,4%)
- Use of waste heat from industrial processes (7,7%)

A quali tematiche sareste più interessati per la formazione?

13 risposte





## 5.2 The meetings

### Municipality of Udine

In agreement with the working group of the **Municipality of Udine** and the relevant Councillor, local and regional stakeholders to be involved in the Plan4COLD activities were mapped and identified. It was decided to invite these stakeholders to a first in-person meeting during which the project, its objectives, and the reasons for involving the participants were presented.

The meeting was held on April 11, 2025, in a room at the Municipality of Udine (Sala Valle – Palazzo Morpurgo, via Savorgnana 12).

Twenty-one stakeholders participated, including political and technical representatives of the Municipality of Udine, public and private entities, as well as representatives of professional associations and service confederations of Udine (for more information, see the table below).

#	Company/Association	Potential role	Stakeholders' meeting 11/04/25	Other meetings
1	Municipality of Udine	Data collection; beneficiary of the SLHCP	Yes	Introductory (19/12/2025) and working-group definition meeting (21/02/2025)
2	Banca 360FVG (financial institution)	Specific financial support instruments to facilitate citizens' access to more efficient H&C solutions	Yes	/
3	Net spa (public service company - waste)	Know-how in renewable energy production from organic waste (biodigester); H&C challenges and opportunities; data collection	Yes	/
4	ATER Udine (Provincial Agency for Public Housing of Udine)	Data collection; understanding of H&C challenges and opportunities	Yes	/
5	University of Udine	Data collection; understanding of H&C challenges and opportunities	Yes	Consumption data analysis meeting (28/03/2025)



6	Bluenergy Group (Utility provider)	Data collection; understanding of H&C challenges and opportunities	Yes	/
7	SIRAM VEOLIA (District heating plant operator)	Data collection; understanding of H&C challenges and opportunities	Yes	/
8	Consumatori Attivi FVG APS (consumers association)	Data collection; understanding of H&C challenges and opportunities	Yes	/
9	FEDERCONSUMATORI (consumers association)	Data collection; understanding of H&C challenges and opportunities	Yes	/
10	CONFCOOPERATIVE FVG (third sector association)	Data collection; understanding of H&C challenges and opportunities	Yes	/
11	Ordine Architetti pianificatori, paesaggisti e conservatori della provincia di Udine (Professional Association of Architects, Planners, Landscape Architects and Conservationists of the Province of Udine)	Data collection; understanding of H&C challenges and opportunities	Yes	/
12	Ordine dei Dottori Agronomi e dei Dottori Forestali del Friuli Venezia Giulia (Professional Association of Agronomists and Foresters of Friuli Venezia Giulia)	Data collection; understanding of H&C challenges and opportunities	Yes	/
13	CONFCOOPERATIVE ALPE ADRIA (third sector association)	Data collection; understanding of H&C challenges and opportunities	Yes	/



14	HSE HERA Servizi energia (energy services provider)	Data collection; understanding of H&C challenges and opportunities	No	/
15	ANCE Associazione nazionale costruttori edili Udine (National Association of Building Constructors – Udine)	Understanding of H&C challenges and opportunity (construction sector)	No	/
16	CODACONS (third sector association)	Understanding of H&C challenges and opportunity	No	/
17	Confindustria Udine (Industry confederation)	Data collection; understanding of H&C challenges and opportunities	No	/
18	Confcommercio Udine (commerce confederation)	Data collection; understanding of H&C challenges and opportunities	No	/
19	Confesercenti FVG (retailers confederation)	Data collection; understanding of H&C challenges and opportunities	No	/
20	Confartigianato Udine (craft sector confederation)	Data collection; understanding of H&C challenges and opportunities	No	/
21	Aspiag Service s.r.l. (Despar group) (supermarket chain)	Data collection; understanding of H&C challenges and opportunities	No	/
22	Coop Alleanza 3.0 – Udine (supermarket chain)	Data collection; understanding of H&C challenges and opportunities	No	/
23	Movimento difesa del Cittadino (Citizens defence movement)	Understanding of H&C challenges and opportunities	No	/
24	Legambiente Udine (Environmentalist association)	Data collection; understanding of H&C challenges and opportunities	No	/



25	Ordine Ingegneri della provincia di Udine (Professional Association of Engineers of the Province of Udine)	Data collection; understanding of H&C challenges and opportunities	No	/
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The participants showed interest in the project's topics and objectives, expressing their willingness to participate in the upcoming phases, to share further information and data related to heating and cooling systems and consumption in future meetings (to be scheduled in the coming months). After the meeting, participants received a recap and thank-you email containing the materials presented during the meeting, a summary of the discussion, and the anonymous results of the Mentimeter questionnaire. The same email was sent to stakeholders who had been invited but were unable to attend, to keep them updated and request that they complete the questionnaires, providing a broader overview of the local situation.

On March 28, 2025, a bilateral online meeting was also held between APE FVG and a technical staff member from the **University of Udine**, during which the types of data available on the energy and gas consumption of various university-owned buildings were clarified, and their interest in contributing to the analysis and energy planning activities was explored.

Finally, on June 10, 2025, a bilateral meeting with **Banca 360FVG** was organised, also involving Pordenone municipality, to discuss financing opportunities for light energy requalification and generic restructuring.

### Municipality of Pordenone

Although the organization of the stakeholders' consultation process in Pordenone also began in January, a significant delay in planning the first stakeholders' meeting occurred, partly due to the municipal elections held on 13–14 April 2025. In this period, several exchanges and meetings with the Municipality took place after January (on 25 March, 25 June, and 4 August 2025). Some of these meetings focused on the H&C data assessment, to gain a better understanding of the availability of energy and gas consumption data for municipal buildings. Furthermore, on 12 September a meeting was also held with the Municipality's external energy consultant (SOGESCA Srl) to clarify the relationship between the SECAP and the SLHCP. Finally, on 22 September 2025, the first stakeholders' meeting was successfully held in Pordenone.

As for Udine, in agreement with the working group of the Municipality of Pordenone and the relevant Councillor, local and regional stakeholders to be involved in the Plan4COLD activities were mapped and identified. It was decided to invite these stakeholders to a first in-person meeting during which the project, its objectives, and the reasons for involving the participants were presented.

The meeting took place in a room at the Municipality of Pordenone (Sala Missinato – Corso Vittorio Emanuele II, 64). Fourteen stakeholders participated, including political and technical representatives of the Municipality of Pordenone, public and private entities, as well as representatives of professional associations and service confederations of Pordenone (for more information, see the table below).

#	Company/Association	Potential role	Stakeholders' meeting 22/09/25	Other meetings
1	Municipality of Pordenone	Data collection; beneficiary of the SLHCP	Yes	Introductory meetings
2	GEA (Gestioni Ecologiche e Ambientali) S.p.A. (public service company - waste)	H&C issues and opportunities; data collection; heat recovery or energy production systems (TBD)	No	---
3	ATER Pordenone (Provincial Agency for Public Housing of Pordenone)	Data collection; understanding of H&C challenges and opportunities	Yes	---
4	Italgas Pordenone (energy services provider)	Data collection; understanding of H&C challenges and opportunities	Yes	---
5	E-Distribuzione (energy services provider)	Data collection; understanding of H&C challenges and opportunities	No	---
6	University of Udine	Data collection; understanding of H&C challenges and opportunities	No	First stakeholders' meeting in Udine
7	Efficienta srl (Energy management company - North Adriatic Technology Park)	Contact with local companies; H&C issues and opportunities; data collection	Yes	---
8	Legambiente Pordenone (Local environmental association)	Data collection; understanding of H&C challenges and opportunities	No	---
9	Terraè - officina della sostenibilità (Local environmental association)	H&C issues and opportunities; dissemination of project activities to citizens	Yes	---
10	Confindustria Alto Adriatico (Industry confederation)	Data collection; understanding of H&C challenges and opportunities	Yes	---
11	Confartigianato (craft sector confederation)	Data collection; understanding of H&C challenges and opportunities	No	---
12	FIPE Confcommercio ASCOM (commerce confederation)	Data collection; understanding of H&C challenges and opportunities	No	---
13	Pordenone fiere SpA (enterprise)	Understanding of H&C challenges and opportunities (TBD)	No	---
14	Electrolux Pordenone (enterprise)	Understanding of H&C challenges and opportunities	No	---



15	Interporto - Centro Ingrosso Pordenone S.p.A	Contact with local companies; H&C issues and opportunities; data collection	No	---
16	Azienda Sanitaria Friuli Occidentale (public health institution)	H&C issues and opportunities; data collection	Yes	---
17	Ordine Architetti pianificatori, paesaggisti e conservatori della provincia di Pordenone (Professional Association of Architects, Planners, Landscape Architects and Conservationists of the Province of Pordenone)	Data collection; understanding of H&C challenges and opportunities	No	---
18	Ordine Ingegneri della provincia di Pordenone (Professional Association of Engineers of the Province of Pordenone)	Data collection; understanding of H&C challenges and opportunities	No	---
19	Ordine dei Dottori Agronomi e dei Dottori Forestali del Friuli Venezia Giulia (Professional Association of Agronomists and Foresters of Friuli Venezia Giulia)	Data collection; understanding of H&C challenges and opportunities	No	First stakeholders' meeting in Udine
20	Federconsumatori Pordenone APS (consumers association)	Data collection; understanding of H&C challenges and opportunities	Yes	---
21	ANCE Alto Adriatico (Associazione nazionale costruttori edili Pordenone - National Association of Building Constructors Pordenone)	Understanding of H&C challenges and opportunity (construction sector)	Yes	---

Also in this case, the participants expressed their willingness to participate in the upcoming phases of the SLHCP process.

Although the organisation of the stakeholders' consultation process in Pordenone also started in January, it has not yet been possible to schedule the first meeting, partly due to the municipal elections held on 13–14 April 2025.



As stated above, several exchanges and meetings have been held with the Municipality after January (on 25 March, 25 June and 4 August 2025). Some of them were related to the H&C data assessment, in order to better understand the data availability on energy and gas consumption of municipal buildings.

However, the initial meeting with stakeholders has been scheduled on September 22, 2025. During this meeting a survey will be promoted, using the Mentimeter tool as for Udine.

## 6. Municipalities of Ragusa, Modica and Vittoria (IT)

During October and November 2024, the most relevant stakeholders for the project were identified, contacted, and involved, in collaboration with the municipalities. During the stakeholder engagement phase, approximately 70 key actors were mapped. They operate at various levels, from municipal to national, and represent one or more of the categories defined by the project.

- *Public administrations – Territorial entities and agencies*
- *Trade associations – Productive sector*
- *Trade associations – Tertiary/Commerce*
- *Trade associations – Construction*
- *Trade associations – Agriculture*
- *Trade associations – Consumers*
- *Professional orders*
- *Cooperatives/Third sector*
- *Energy and service companies*
- *Economy and finance*
- *Freelancers*

### 6.1 The stakeholders' survey

All the identified stakeholders were invited to take part in the launch event of PLAN4COLD, coordinated by SVI.MED and AMBIENTE ITALIA, with the participation of representatives from the municipalities involved in the project: Ragusa, Modica, and Vittoria.

**Date:** 15/01/2025

**Participants:** 38, including staff and online participants. Municipality of Ragusa, Municipality of Vittoria, Municipality of Modica, Ass. CO-GOVERNANCE Laboratorio civico di sussidiarietà, CCN “I tre ponti”, CERSU, Barocco garden club, Chimetec srl, Geometri Ragusa, Freelancers, Adoc RG, GAV Ragusa, Collettivo Ocra, Comitato Fare Verde Bruscé, Sicindustria, Fondazione Sorella Natura, Confcooperative Ragusa, Libero Consorzio Comunale di Ragusa, CNA, Plastic Free, SVI.MED., Ambiente Italia

**Where:** Comune di Ragusa – Sala Convegni Centro Direzionale Zona Artigianale



**Duration:** 2h

The launch event for the Plan4Cold project, aimed at officially presenting the initiative and initiating a first round of dialogue with local stakeholders, took place in person and lasted approximately two hours. After a brief introduction by Dr. Sarnari (SVIMED), the institutional greetings were delivered by the Deputy Mayor of the City of Ragusa, followed by the official project presentation by Dr. Lazzari (AI).

The event then moved to a lively open discussion involving institutional representatives, associations, and technical stakeholders.

Representatives from the municipalities of Modica and Vittoria voiced their support and alignment with the project's goals, as did delegates from the Free Municipal Consortium of Ragusa and Sicindustria. Numerous third-sector organizations also contributed, emphasizing the role of local communities in the energy transition.

Several participants expressed a desire to better understand the technical components of the plan and how proposed solutions could be applied in the local context.

The need for a deep preliminary understanding of the territory was widely stressed, to avoid overlaps with ongoing initiatives and to enhance synergies with existing efforts.

Many stakeholders showed genuine enthusiasm for the project's ambitions and saw it as an opportunity to strengthen cooperation among public institutions, businesses, professionals, and citizens.

There was a strong consensus on the importance of leveraging local resources and know-how, many participants offered to share data and experience that could support the development of the plan. At the same time, several attendees raised concerns about the persistent challenges the area faces—administrative, technical, and organizational—underscoring the need for a grounded but forward-looking and collaborative approach.



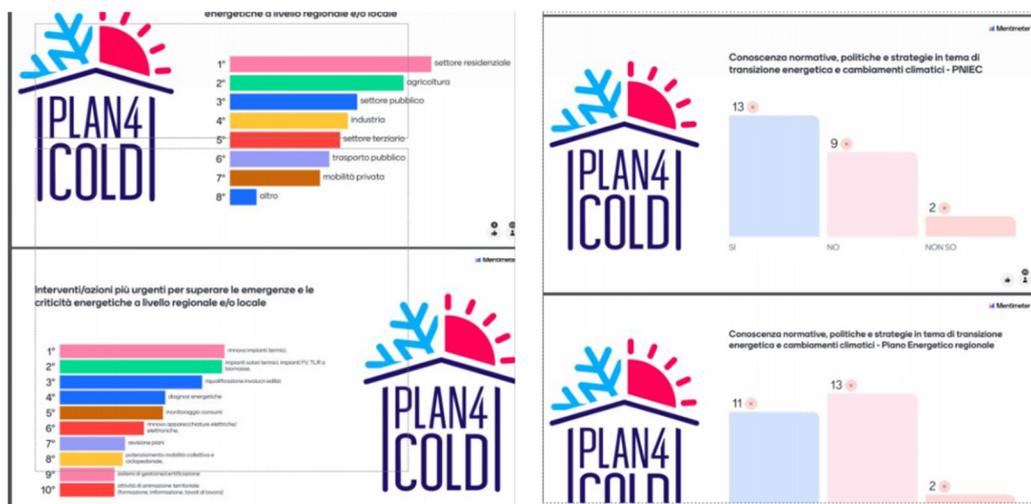


## Mentimeter questions

Following the initial presentation, an interactive session was held using the Mentimeter platform, with the aim of gathering initial perceptions, expectations, and suggestions.

The questions aim to explore the level of awareness and understanding among stakeholders regarding existing frameworks for energy transition and climate action. They investigate how climate change is perceived locally, which sectors are most affected, and what urgent actions are considered necessary. Furthermore, they seek to identify barriers to implementation, the key players to engage with, and the potential role of each stakeholder in supporting the creation and execution of strategic plans.

- Knowledge of regulations, policies, and strategies related to energy transition and climate change (e.g., RED III, NECP, Regional Energy Plan, Regional Climate Change Strategy, SEAP/SECAP).
- Perceived effects of climate change in the territory.
- Sectors/areas facing major energy-related challenges and/or emergencies at regional and/or local level.
- Most urgent interventions/actions needed to address energy emergencies and critical issues at regional and/or local level.
- Main obstacles to the development and implementation of strategies and action plans at regional and/or local level.
- Key actors to involve and coordinate with in the development of strategies and action plans.
- Possible contribution/role of your sector, company, or association in the development of strategies and action plans.





### **The questionnaire**

A few days after the launch event, **a detailed questionnaire was distributed to all stakeholders** (both participants and non-participants) to understand how they could contribute to the project.

- Select the sector in which you believe your contribution would be most significant during the Focus Group (Building, urban planning and residential – Governance and public administration – Energy operators, economy and finance – Environmental protection and sustainable development – Tourism and commerce – Industrial and artisanal – Agriculture and livestock farming)
- Possible contribution/role you can have in this initial preliminary phase before the development of strategies and action plans in the energy sector and in the field of heating and cooling
- Briefly tell us about relevant experiences/strategies and projects completed, ongoing, or planned related to the energy transition and specifically to the heating and cooling sector.
- If you have a question, suggestion, or any other comment about the Plan4Cold project or the organization of the January 15th meeting, please share it below.

**24 responses** from stakeholders, belonging to all the categories identified, were received.

In addition to the questionnaire, a telephone campaign was also conducted and emails sent to follow up with those who didn't answered and to gather valuable feedback.

## **6.2 The meetings**

The questionnaire was also useful for organizing thematic **focus groups**, which were essential for initiating active collaboration between the identified stakeholders in developing project activities in the area.

The structure of the focus groups was designed as an evolution of the initial guidelines for stakeholder engagement, adapting to the emerging needs and inputs. Each focus group followed a structured set of guiding questions and made use of shared digital whiteboards on Miro to facilitate participation and idea sharing.

The discussions focused on assessing the level of awareness and expertise on climate change, energy transition, and decarbonization, identifying skills and information gaps, and analysing the impacts of climate change and energy challenges at the local level. Participants were invited to propose urgent actions, reflect on the main barriers to implementing sustainable energy measures, and suggest tools or incentives to overcome them.

The relevance of the heating and cooling (H&C) sector, the identification of key stakeholders to involve, and the potential contribution of each organization were also addressed. Finally, participants shared relevant experiences, best practices, and innovative projects that could inspire the development of energy transition strategies and action plans.

In order to effectively manage the organisation of the focus groups, we used Miro boards, set up with a series of structured questions based on the suggestions provided, to explore the role of the stakeholders and to start collecting in a single board all the suggestions and comments (coming during the focus groups and further future meetings, email, etc.).



## **FIRST FOCUS GROUP – Industrial, artisanal, construction and urban planning sector**

**Number of invites to the meeting:** 14

**Date:** 25/03/2025

**Location:** Online

**Participants:** SVIMED – AI - CERSU - engineers, architects, urban planner, construction professionals (7 Participants)

**Duration:** 1:40h

The session opened with an introduction to the project by Dr. Lazzari, who outlined the objectives of the focus group, emphasizing the need to investigate local heat demand, energy needs, and the mapping of consumption patterns, in order to identify both challenges and opportunities.

The discussion began with questions regarding the constraints imposed by the Soprintendenza (the regional office of the Italian Ministry of Culture responsible for the protection, preservation, and supervision of cultural, architectural, archaeological, and landscape heritage. It ensures that all interventions on these assets comply with national conservation and landscape protection regulations), particularly in the areas of Modica and Ragusa. Participants stressed the need for an energy plan that is fully aligned with the local context, especially in light of bureaucratic obstacles faced by professionals in implementing interventions. Due to the region's climatic conditions, attention is primarily directed toward summer cooling needs. One participant referenced the use of hydronic systems.

The demand for efficient cooling systems has grown, partly driven by incentives such as the Superbonus (The "Superbonus 110%" is a tax incentive (Relaunch Decree – Law Decree 34/2020) aimed at promoting energy efficiency upgrades and seismic risk reduction in buildings. It allowed taxpayers to either deduct from their taxes or transfer a tax credit equal to 110% of the expenses incurred for specific works, such as thermal insulation, window replacement, HVAC system upgrades, and photovoltaic system installation. For projects started after February 2023, it was no longer possible to transfer the credit, and from 2023 onward, the deduction rate began to decrease annually, reaching 65% in 2025), although many participants noted it was often misused or inefficiently applied. About the topic of professional development and decarbonization awareness, a local independent commission was cited as an underused example, partly due to regulatory hurdles.

Participants highlighted that, beyond technical training, greater cooperation between professionals, public institutions, and authorities is crucial.

Concerns were also raised about misconceptions surrounding nano-insulation products, which have led to misinformation. Participants criticized the current system of incentives, deeming it unstable and unclear, and advocated for longer-term measures, such as tax deductions, to encourage responsible investments. A robust monitoring and verification system was suggested as a key feature of the forthcoming energy plan. A concrete proposal involved mapping the types of technologies that can be installed, accompanied by clear regulations approved by the Soprintendenza, to reduce uncertainty. Emphasis was placed on reducing thermal loads through passive techniques before adopting new technologies. Further issues discussed included misuse of incentives, lack of



collaboration between municipal technical departments and the Soprintendenza, and the need for public administrations to lead by example. They should ensure compliance of their own facilities and implement efficient monitoring and management systems.

There was a call for simplified and harmonized regulations, along with a prioritization of waste reduction and efficiency as prerequisites for renewable energy implementation. Public awareness of climate change was said to be generally high, though still lacking practical implementation. Participants noted the limited adoption of innovative technologies like solar cooling and nature-based solutions such as green roofs, which have been scarcely used in the past. They called for the inclusion of urban greenery in planning instruments, urging the Sicilian Region to provide stronger guidance rather than leaving such decisions entirely to local authorities.

### **SECOND FOCUS GROUP – Third Sector and associations**

**Number of invites to the meeting:** 10

**Date:** 25/03/2025

**Location:** Online

**Participants:** SVIMED – AI - Ass. Co-Governance Laboratorio Civico di sussidiarietà politica - Barocco Garden Club (7 Participants)

**Duration:** 1h

During the meeting, Dr. Lazzari presented the project, outlining its objectives and emphasizing the importance of the focus group as a tool to identify energy needs, challenges, and opportunities at the local level. Two civic associations from the Ragusa area took part in the discussion. While neither organization is technical in nature nor composed of youth groups, both expressed strong interest in the project, sharing a common commitment to environmental sustainability and fostering dialogue with local institutions. One of the associations emphasized its ongoing work in environmental education, particularly through initiatives aimed at younger generations.

A notable example is the donation and planting of trees in schools across Ragusa, Modica, and Vittoria. These actions align well with the dissemination goals of the Plan4COLD project, helping to raise awareness about the importance of green spaces and urban ecology. Both associations showed a solid understanding of the region's environmental issues. They noted that their activities are often carried out independently, without direct involvement from municipal administrations. For example, their tree-planting initiatives were organized directly with schools and included educational activities about the ecological role of trees in urban areas. In terms of energy, participants noted the expansion of energy communities and the sometimes poorly planned implementation of wind farms. Although they lack deep technical expertise, the associations support the development of energy communities, stressing the need to simplify their setup processes and foster a more participatory and informed citizen base. Currently, such projects are perceived more as financial opportunities than as genuine tools for ecological transition. For this reason, participants called for regulatory simplification and improved civic education on energy matters. The conversation also addressed the urban development patterns of Ragusa.

The associations painted a concerning picture: the city center is increasingly depopulated, while peripheral areas have grown in a disorganized way, often without incorporating green spaces.



The historic center contains many abandoned buildings—some unfit for renovation due to legal restrictions, others inhabited by economically disadvantaged families without the means or incentives to invest in energy efficiency. Meanwhile, new residential developments are energy-efficient but economically inaccessible to much of the population. Against this backdrop, the associations proposed reusing abandoned industrial or residential buildings to host photovoltaic systems or green areas, thus contributing to a regenerative approach to urban planning. Finally, both associations underscored the importance of continuing awareness-raising efforts in the region. Although Ragusa has taken some steps toward sustainability, there remains a clear need to strengthen environmental and energy literacy across the community.

### **THIRD FOCUS GROUP – Local action groups and financial institutions**

**Number of invites to the meeting:** 5

**Date:** 27/03/2025

**Location:** Online

**Participants:** SVIMED – AI - BAPS - Fondazione Zipelli - GAL Nati Iblei - GAL Terra Barocca

**Duration:** 1 h

After a brief introduction by Dr. Lazzari, who presented the project and the rationale behind organizing the focus group—specifically concerning heating demand, energy needs, and consumption mapping to identify challenges and opportunities—the meeting continued with contributions from several key local stakeholders. Among the participants were representatives from the Banca Agricola Popolare di Sicilia (also on behalf of the Fondazione Zipelli), the GAL Nati Iblei, and the GAL Terra Barocca. The representative of the bank, who oversees internal and external sustainability strategies, confirmed full alignment with the goals of the Plan4Cold project. He expressed a strong interest in the initiative, both as a stakeholder and as a potential key actor in supporting the planning process through financial tools and structured engagement. The GAL Terra Barocca emphasized the coherence between the Plan4Cold objectives and their own local action plan, which is centered on environmental protection and sustainable tourism. The representative shared that they are working on a territorial mapping project to match urban planning needs with environmental goals—mentioning tools such as digital twins and urban greening strategies.

They also highlighted specific initiatives related to agrivoltaics and solar installations for productive sites in the area of Vittoria, reaffirming their willingness to collaborate. The GAL Nati Iblei also thanked the organizers for the invitation and reiterated the importance of the long-standing collaboration with Svimed, fully endorsing the comments made by GAL Terra Barocca. Throughout the discussion, participants pointed out several structural barriers within the local entrepreneurial ecosystem, which is composed mostly of micro and small enterprises lacking adequate managerial and technical capacity to engage in the energy transition. Similarly, municipalities often struggle to set an example for citizens or to implement innovative policies—such as green roofs or smart cooling technologies—due to institutional constraints and lack of resources. As a concrete proposal, participants suggested the creation of three distinct channels for information dissemination and technical support tailored to citizens, businesses, and local governments. These would be valuable tools for future energy planning and implementation. The bank agreed with this approach and



stressed the need to introduce standardized instruments that combine technical solutions with financial mechanisms. They also raised the importance of mapping needs and offering practical tools specifically tailored to small-scale operators.

While most local businesses are not legally required to provide sustainability reporting due to their size, the bank expressed interest in exploring how ESG principles could be promoted among its clients. From their perspective, achieving environmental and economic sustainability must go hand in hand. A key concern raised during the meeting was the impact of inconsistent public policies—such as the Italian Superbonus—which have distorted public perception and created mistrust around energy efficiency initiatives. Despite this, there is growing awareness in sectors such as agriculture and agri-food.

Notable examples were discussed, such as Regran, a company that has long invested in renewable energy, launched successful crowdfunding campaigns, and is now developing a renewable energy technology hub. Participants also noted that the bank supported the establishment of the first agricultural energy community through its involvement in a Living Lab in collaboration with GAL Terra Barocca.

Additionally, the GAL has launched the **Osservatorio per lo Sviluppo Locale (Observatory for Local Development)**, which initially focused on tourism data and has since expanded to include information on the agri-food and agro-industrial sectors. The Observatory and its technical staff will be made available to support the project, and it was through this collaboration that contact was established with Professor Platania, who may serve as a valuable academic reference. Finally, the participants expressed their readiness to align their events with the project's outreach strategy to engage relevant stakeholders who have not yet responded. The agricultural sector in the region—mainly consisting of horticulture, dairy, and, in the case of Modica, poultry farming—is largely composed of small and medium enterprises, though several larger entities are also present. Energy demand is steadily increasing, especially for heating and cooling processes. Exploring these specific needs and identifying viable technical and financial solutions will be essential in the next stages of the project.

#### **FOURTH FOCUS GROUP – Sicindustria, ANCE, CNA e Confooperative (absent during the first meeting)**

**Number of invites to the meeting:** 4

**Date:** 09/04/2025

**Location:** Online

**Participants:** SVIMED – AI - Sicindustria – Confooperative

**Duration:** 1 h

The fourth meeting continued the collective reflection on local challenges and opportunities related to heat demand and energy needs, this time focusing on the role of the industrial sector in the Ragusa area. After brief introductions and a presentation of the project by Dr. Lazzari, the discussion shifted towards identifying criticalities and potentialities in the current energy framework, especially from a business and industrial perspective. Representatives from Confooperative and Sicindustria were present, offering a comprehensive view of the region's entrepreneurial fabric. One of the first points



raised concerns about the inadequacy of the Sicilian electrical grid, which is currently unable to meet the increasing connection demands posed by energy communities and large-scale renewable plants. This bottleneck is not so much technical but rather institutional and political. The trend toward full electrification has also been criticized, as it tends to monopolize the landscape, pushing aside alternative or mixed solutions that might be better suited to the territory. A recurring theme was the importance of reducing energy consumption at the source, starting with the buildings themselves. Enhancing thermal insulation and upgrading building envelopes were seen as fundamental steps toward reducing the need for air conditioning.

While mechanical cooling systems are increasingly being installed in response to high summer temperatures and consumer demand, this trend also reflects market pressures rather than long-term sustainability goals.

Regarding nature-based solutions such as urban forestry and green roofs, these are rarely implemented, especially in public sector projects, due to concerns over maintenance. However, it was noted that newly built public housing now tends to meet zero-impact standards. On the subject of data, Confcooperative reported a lack of accessible databases tracking trends in new constructions.

The only available reference mentioned was the APE (Energy Performance Certificate) data via ENEA, which is not user-friendly and only accessible to certified professionals or public bodies, with limited insight.

Some municipalities had attempted to create Energy Offices to facilitate the installation of PV systems, but bureaucratic barriers turned them into an additional layer of complexity rather than a support mechanism. Regarding the industrial sector, no structured efforts have been made to quantify waste heat or analyze climate control within industrial processes. Heat recovery or exchange strategies are entirely absent, although specific sectors, such as dairy production, might be well-positioned to benefit from such approaches. Sicindustria expressed openness to supporting the project by providing non-nominative data on company types and exploring opportunities for distributing a questionnaire to gather more targeted insights. Their associated companies span the fields of metalworking, plastic recycling, and services. The general size of the businesses is small to medium. A few potentially relevant actors, like frozen goods producers or cement factories, are currently not involved in thermal energy efficiency initiatives. Where energy efficiency measures are being adopted, they pertain mostly to electricity via photovoltaics or improved production systems. A useful recommendation from Sicindustria was to reach out to IRSAP Ragusa for a detailed overview of the industries present in the local industrial area. One past initiative was also recalled, whereby businesses in the industrial zone were incentivized to maintain green areas—some of which still exist today. Many companies now have access to clean energy for their basic operational needs, particularly in office spaces. The meeting concluded with a strong sense of openness and collaboration. Both Confcooperative and Sicindustria expressed their willingness to support the project moving forward and to collaborate more closely, including through the possible distribution of questionnaires focused on industrial energy processes and needs.



## **Bilateral meeting with IRSAP – REGIONAL INSTITUTE FOR THE DEVELOPMENT OF PRODUCTIVE ACTIVITIES**

**Date:** 16/04/2025

**Location:** IRSAP office - Ragusa

**Duration:** 1 h

**Participants:** SVIMED Staff and IRSAP (Regional Institute for the development of productive activities) office manager

Following a brief presentation of the Plan4Cold project and its core objectives, the meeting with the head of the IRSAP offices in Ragusa focused on exploring how the Agency could contribute to the project, particularly in terms of providing relevant data on the industrial settlements across the Ragusa area. From the outset, it was noted that, to the best of the respondent's knowledge, there are currently no active strategies within the industrial area aimed at managing heat or cold collectively—such as heating or cooling districts—or any significant investments by companies in recovering heat from their production processes.

While the topic is occasionally referenced within the regional industrial development plan, it has never been adequately promoted or implemented in practice.

A notable precedent dates back approximately twenty years, when a study was conducted on how to utilize waste heat from the disposal of whey produced by dairy factories. According to the IRSAP representative, the dairy sector remains the most promising for alignment with Plan4Cold's goals.

Three major players were highlighted: Parmalat, Ragusa Latte, and the Consorzio Latterie Ragusane. Additionally, within the livestock supply chain, the case of an incinerator for the disposal of cow carcasses was mentioned as potentially relevant.

Beyond the dairy sector, other industrial actors were identified as potentially suitable for analysis within the project, including the Fratelli Angione bitumen and asphalt plant and the Iblea Frigo company, which operates in the frozen food sector. To support the project, IRSAP kindly provided a detailed and up-to-date GIS map containing cadastral and administrative information for the entire regional industrial area, along with a list of the companies operating in the Ragusa zone. These resources are valuable for subsequent analytical phases and could support profiling and clustering of local industrial realities. The meeting also touched upon the green areas within the industrial zone. Years ago, a project had been implemented requiring companies to allocate a portion of their land to green spaces. While this initiative is no longer in effect, some of those areas still remain, albeit poorly maintained. The overall attitude toward such requirements has shifted, with businesses now tending to see them as burdensome costs without tangible returns. In closing, the IRSAP representative remarked on how the industrial landscape in Ragusa has undergone substantial change over the years. Once a competitive and vibrant industrial area, it has now significantly contracted. Most businesses today are small to medium-sized enterprises, increasingly service-oriented rather than focused on traditional industrial production



### **Bilateral meeting with GAL Terra Barocca Observatory**

**Date:** 23/04/2025

**Location:** Online

**Duration:** 1 h

**Participants:** SVIMED – AI – GAL TERRA BAROCCA OBSERVATORY

After a brief introduction to the Plan4Cold project and its objectives, participants moved on to presentations. The work of the **Observatory promoted by GAL Terra Barocca** was illustrated—an initiative that, while linked to GAL, operates independently with the goal of analyzing the tourism and agri-food sectors across the municipalities covered by the GAL. The project is carried out in collaboration with other institutions, such as the Banca Agricola Popolare di Sicilia. The Observatory uses advanced tools and software to analyze tourist searches and make forecasts. It is currently working on a detailed analysis of the agri-food sector in the five target municipalities.

Qualitative surveys are also planned, aligned with local needs and inputs from the territory. Additionally, a toolkit is being developed to facilitate access to and understanding of ISTAT data relevant to the involved municipalities. The Observatory's representatives immediately showed strong interest in the Plan4Cold project and offered their active support in data gathering and sharing. They mentioned a *living lab* project on the energy rebound effect in some tourist facilities, from which around 60 questionnaires were developed—these will be shared with our team.

They also expressed their willingness to enrich their existing research tools—especially the qualitative questionnaires—with energy-related themes relevant to Plan4Cold: energy sources, consumption, processes, and heating/cooling technologies. It was agreed that there will be a follow-up to align on methods for collecting, processing, and sharing data collaboratively. Lastly, the Observatory will share draft versions of their tourism and agri-food sector reports to further support the development of the project activities.



## 7. Municipalities of Thermi, Ampelokipi-Menemeni, Heraklion and Chania

Three main levels of stakeholders have been identified, mapped and reached.

### First level stakeholders

- Municipalities: Urban Planning Department, Energy/Environment Department, Public Works and Infrastructure Department
- Regions and Regional Development Funds

### Second level stakeholders

- Building Sector: Construction and retrofit companies, architects and engineers,
- Heating and cooling technology providers: Manufacturers of heating/cooling systems, Smart grid and energy efficiency technology companies, IT providers for energy monitoring and control
- Utility Companies and Energy Providers: District heating and cooling network operators, Electricity supplier, Natural gas supplier
- Financial Institutions and Investors: Banks and green investment funds, ESCOs (Energy Service Companies)
- Academia and Research Institutions: Universities and technical institutes, Energy research centers

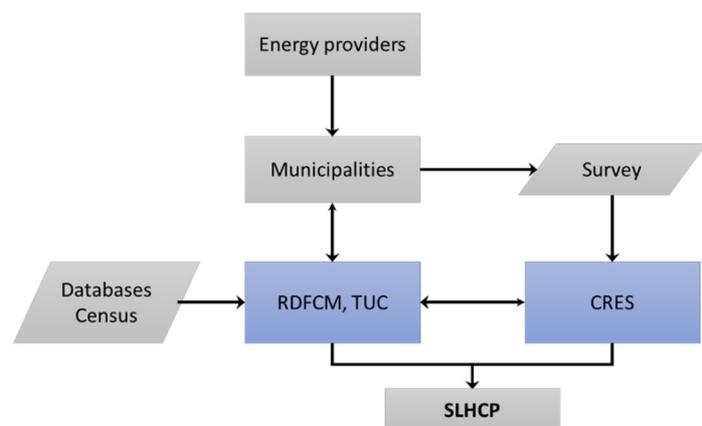


### Third level stakeholders

- Citizens and civil society: Property owners, Residents, Energy communities
- Large energy consumers (factories, industries, offices).

Available methods of interaction with the identified stakeholders are: Physical or online meetings, Survey, Emails, Conferences, Exhibitions, public speeches.

The interconnection between the different types of stakeholders with the view to develop the Sustainable Local Heating and Cooling Plans are shown in the figure.





## 6.1 The stakeholders' survey

At the first stage of the project, it was crucial to communicate and interact with the 1<sup>st</sup> level of the stakeholders, that is the stakeholders that are directly affected by the implementation of the EE Directive. Currently, the development of local heating and cooling plans in Greece remains limited. To monitor this progress and better understand the situation at the regional and municipal levels, a targeted survey was created. The aim was to gather input from Regions and Municipalities to assess the current status of plan preparation and identify the main obstacles causing delays.

The survey was developed by the Centre for Renewable Energy Sources and Savings (CRES). It was designed to be anonymous, encouraging honest responses and avoiding overly idealized or inaccurate feedback.

The survey link was initially sent to the Regional Development Fund of Central Macedonia (RDFCM), which then forwarded it to the Central Union of Municipalities of Greece (KEDE). KEDE distributed the survey to all 332 Municipalities and 13 Regions across Greece.

As of the time of writing this report, 14 responses have been received.

### Questions

	Question	Available answers
1	What is the name of your Region / Municipality?	100 characters max
2	How many inhabitants are there in your Region / Municipality?	<input type="radio"/> $\geq 45.000$ <input type="radio"/> $\geq 45.000$
3	How familiar are you with the requirements of the Greek legislation regarding heating and cooling plans of Regions and Municipalities?	<input type="radio"/> Very familiar <input type="radio"/> Somewhat familiar <input type="radio"/> Not familiar
4	In what stage is your Region/Municipality currently regarding the development of a local heating and cooling Plan?	<input type="radio"/> No plan yet <input type="radio"/> Initial discussions <input type="radio"/> Drafting phase <input type="radio"/> Implementation phase <input type="radio"/> Monitoring and evaluation
5	What are the primary challenges your Region/Municipality faces in developing or implementing local heating and cooling Plans?	between 1 and 3 choices <input type="radio"/> Lack of funding <input type="radio"/> Lack of technical knowledge <input type="radio"/> Lack of data / guidance / tools <input type="radio"/> Lack of personnel <input type="radio"/> Not obligatory so far <input type="radio"/> Low social acceptance <input type="radio"/> Other
6	Which renewable technologies are most feasible for heating and cooling in your Region/Municipality?	between 1 and 2 choices <input type="radio"/> Solar thermal systems <input type="radio"/> Geothermal heat pumps



7	Rank the following policy measures for decarbonizing the heating and cooling sector, in terms of effectiveness in your Region/Municipality, starting from the highest priority.	<ul style="list-style-type: none"> <li>○ Heat Pumps</li> <li>○ Biomass heating systems</li> <li>○ Other</li> <li>○ Support renewable energy generated on site or nearby</li> <li>○ Provide financial support to implement the local heating and cooling Plans</li> <li>○ Introduce green loans for the installation of renewable systems</li> <li>○ Set the minimum share of renewable energy sources in public buildings</li> <li>○ Create an online, public database for monitoring the energy efficiency in Regions/Municipalities</li> <li>○ Promote renewable energy communities and public energy communities for heating and cooling</li> <li>○ Organise workshops and training in Regions/Municipalities for the drafting and monitoring of the Plans</li> <li>○ Promote the exchange of best practices between the Regions/Municipalities</li> </ul>
8	What is the citizens' attitude towards energy efficiency measures and installation of renewable energy systems in your Region/Municipality?	<ul style="list-style-type: none"> <li>○ Very positive</li> <li>○ Positive</li> <li>○ Neutral</li> <li>○ Negative</li> <li>○ Very negative</li> <li>○ No answer</li> </ul>
9	What type of support would help your Region/Municipality advance its heating and cooling plans?	<ul style="list-style-type: none"> <li>○ Financial incentives or grants</li> <li>○ Access to data, guidance and tools</li> <li>○ Technical training and workshops</li> <li>○ Public awareness strategies</li> </ul>
10	Would you be interested in attending a training workshop for the	<ul style="list-style-type: none"> <li>○ Yes</li> <li>○ No</li> </ul>



- development of local heating and cooling plans in Regions/Municipalities? ○ Maybe
- 11 Please indicate any successful examples of local heating and cooling projects in your Municipality/Region. 1000 character(s) maximum
- 12 If you would like to be informed about the results please enter your email address below. Your email will not be linked to the questionnaire.

## Survey Results

### 1. What is the name of your Region / Municipality?

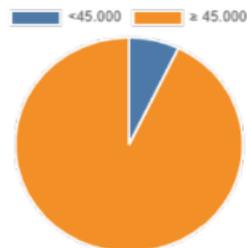
- 1 Municipality of Neo Heraklion Attikis
- 2 Municipality of Thermi
- 3 Municipality of Thermi
- 4 Municipality of Polygyros
- 5 Municipality of Kallithea
- 6 Municipality of Vari Voula Vouliagmeni
- 7 Region of Crete
- 8 Municipality of Thessaloniki
- 9 Region of Ionian Islands
- 10 Region of Nea Smyrni
- 11 Municipality of Athens
- 12 Municipality of Chios
- 13 Region of Central Macedonia
- 14 Region of Central Macedonia

### 2. How many inhabitants are there in your Region / Municipality?

The bulk of the respondents (92%) belong to a Municipality with over 45.000 inhabitants. Therefore, the responses are considered valid for the purpose of the Plan4Cold project.



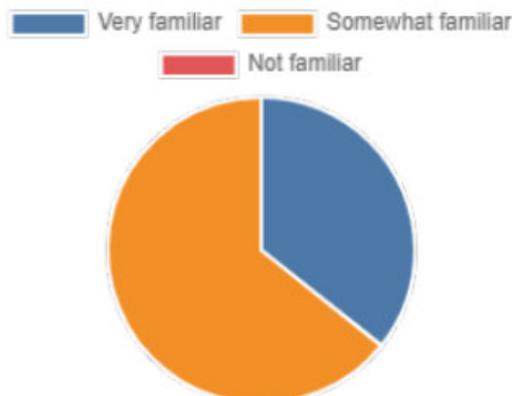
		Answers	Ratio
<45.000		1	7.14 %
≥ 45.000		13	92.86 %
No Answer		0	0 %



### 3. How familiar are you with the requirements of the Greek legislation regarding heating and cooling plans of Regions and Municipalities?

As it can be seen below, the 65% of respondents declared “somewhat familiar” to the requirements of the Greek legislation regarding heating and cooling plans and the rest 35% declared “very familiar”.

		Answers	Ratio
Very familiar		5	35.71 %
Somewhat familiar		9	64.29 %
Not familiar		0	0 %
No Answer		0	0 %

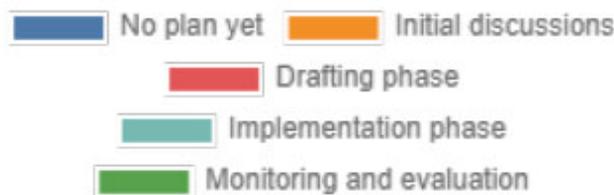




**4. In what stage is your Region/Municipality currently regarding the development of a local heating and cooling Plan?**

Half of the respondents (50%) stated that their Region/Municipality has not drafted any local heating and cooling plan yet. 21% of the respondents stated that the plans are under discussions. 14% of the respondents stated that the plans are under monitoring and evaluation.

		Answers	Ratio
No plan yet		7	50 %
Initial discussions		3	21.43 %
Drafting phase		1	7.14 %
Implementation phase		1	7.14 %
Monitoring and evaluation		2	14.29 %
No Answer		0	0 %



**5. What are the primary challenges your Region/Municipality faces in developing or implementing local heating and cooling Plans?**

The most important challenge for the development / implementation of the local heating and cooling plans is considered to be the lack of funding, receiving the 57% of the responses. The next most important challenge is the lack of data, guidance and tools (50%). Other challenges are the lack of personnel (42%), the lack of technical knowledge (28%) and the fact that so far they are not obligatory in Greece (28%).



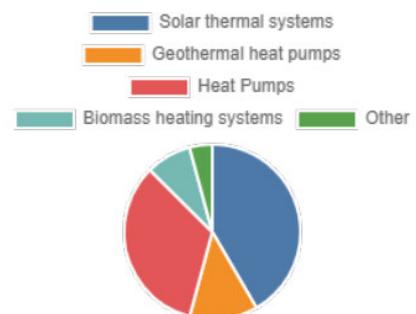
		Answers	Ratio
Lack of funding		8	57.14 %
Lack of technical knowledge		4	28.57 %
Lack of data / guidance / tools		7	50 %
Lack of personnel		6	42.86 %
Not obligatory so far		4	28.57 %
Low social acceptance		0	0 %
Other		2	14.29 %
No Answer		0	0 %



## 6. Which renewable technologies are most feasible for heating and cooling in your Region/Municipality?

Here, the respondents could choose 2 answers. Therefore, solar thermal systems and heat pumps gathered most of the responses, with 71% and 57% respectively.

		Answers	Ratio
Solar thermal systems		10	71.43 %
Geothermal heat pumps		3	21.43 %
Heat Pumps		8	57.14 %
Biomass heating systems		2	14.29 %
Other		1	7.14 %
No Answer		0	0 %





**7. Rank the following policy measures for decarbonizing the heating and cooling sector, in terms of effectiveness in your Region/Municipality, starting from the highest priority.**

The most effective measure for the decarbonisation of the heating and cooling sector is the financial support to implement the local heating and cooling plans. The second most effective measure is the promotion of renewable energy communities.

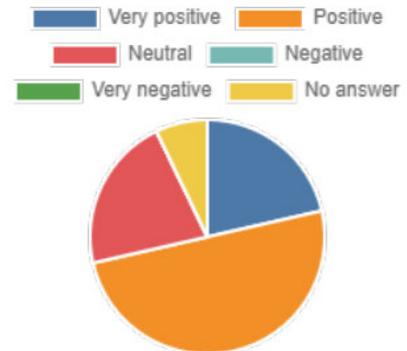
	1	2	3	4	5	6	7	8	Score
Set the minimum share of renewable energy sources in public buildings	21.42% 3	21.42% 3	14.28% 2	28.57% 4	7.14% 1	7.14% 1	0.0% 0	0.0% 0	6.0 14
Support renewable energy generated on site or nearby	14.28% 2	21.42% 3	14.28% 2	7.14% 1	21.42% 3	14.28% 2	7.14% 1	0.0% 0	5.28 14
Provide financial support to implement the local heating and cooling Plans	28.57% 4	28.57% 4	35.71% 5	0.0% 0	0.0% 0	0.0% 0	7.14% 1	0.0% 0	6.57 14
Introduce green loans for the installation of renewable systems	0.0% 0	0.0% 0	21.42% 3	35.71% 5	14.28% 2	0.0% 0	14.28% 2	14.28% 2	4.07 14
Promote renewable energy communities and public energy communities for heating and cooling	28.57% 4	7.14% 1	0.0% 0	14.28% 2	35.71% 5	14.28% 2	0.0% 0	0.0% 0	5.35 14
Create an online, public database for monitoring the energy efficiency in Regions /Municipalities	7.14% 1	14.28% 2	0.0% 0	0.0% 0	21.42% 3	28.57% 4	14.28% 2	14.28% 2	3.71 14
Organise workshops and training in Regions /Municipalities for the drafting and monitoring of the Plans	0.0% 0	0.0% 0	14.28% 2	0.0% 0	0.0% 0	14.28% 2	50.0% 7	21.42% 3	2.5 14
Promote the exchange of best practices between the Regions /Municipalities	0.0% 0	7.14% 1	0.0% 0	14.28% 2	0.0% 0	21.42% 3	7.14% 1	50.0% 7	2.5 14
No Answer	0 % 0								

**8. What is the citizens' attitude towards energy efficiency measures and installation of renewable energy systems in your Region/Municipality?**

For the 50% of the Regions and Municipalities, the citizens' attitude is positive and this is very encouraging. Very positive and neutral attitude has the same share of responses, with 21%.



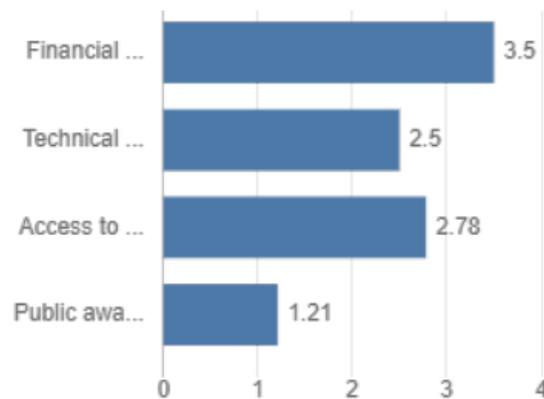
		Answers	Ratio
Very positive		3	21.43 %
Positive		7	50 %
Neutral		3	21.43 %
Negative		0	0 %
Very negative		0	0 %
No answer		1	7.14 %
No Answer		0	0 %



### 9. What type of support would help your Region/Municipality advance its heating and cooling plans?

Overall, the advancement of the heating and cooling plans would be through financial incentives or grants (first choice for the 57% of responses) and through better data and guidance. Technical training and workshops for the drawing of the plans was the second choice for the 35% of the responses.

	1	2	3	4	Score
Financial incentives or grants	57.14% 8	35.71% 5	7.14% 1	0.0% 0	3.5 14
Technical training and workshops	14.28% 2	35.71% 5	35.71% 5	14.28% 2	2.5 14
Access to data, guidance and tools	28.57% 4	28.57% 4	35.71% 5	7.14% 1	2.78 14
Public awareness strategies	0.0% 0	0.0% 0	21.42% 3	78.57% 11	1.21 14
No Answer	0 % 0				

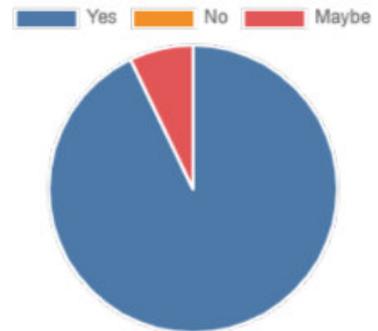




### 10. Would you be interested in attending a training workshop for the development of local heating and cooling plans in Regions/Municipalities?

The lack of data, guidance, technical expertise and skilled personnel is reflected here, with 92% of the respondents interested to attend a training workshop, dedicated to the development of local heating and cooling plans.

		Answers	Ratio
Yes		13	92.86 %
No		0	0 %
Maybe		1	7.14 %
No Answer		0	0 %



### 11. Please indicate any successful examples of local heating and cooling projects in your Municipality/Region.

Successful examples of local heating and cooling projects are described here from the respondents of the survey. The best practices, according to the respondents, are seen below.

- The project “Energy upgrades and RES installation at public buildings of Vari Voula Vouliagmeni Municipality in the frame of European Economic Area (EEA) Financial Mechanism”, beneficiary the Municipality of Vari-Voula-Vouliagmeni, is a **holistic energy upgrade project plan**, successfully improved the energy efficiency profile of the selected building stock along with the installation of **RES to 7 municipal buildings**.

A **retrofitting project** concerning the energy upgrade and integration of applications of RES in a **school complex** of the Municipality of Thessaloniki, **where five buildings (four high schools and one gym) are housed (approx. 6.500 m<sup>2</sup>)**. At the School complex a new heating system was installed in all buildings, comprising of a **ground source HP** inverter technology consisting of multiple (100) single-loop vertical boreholes drilled in all three schoolyards. The construction of the wells as well as the interconnection with the horizontal network required a reconstruction of the floors throughout the areas in which the boreholes were constructed. One gas boiler acts as a backup heating source unit. In all school buildings a new heat distribution system was installed using low-temperature radiators. Additionally, a **roof top PV system** was installed with a total power of 88.5 kW.

- Our municipality has already implemented a **master plan about reducing carbon emissions**. In this plan heating and cooling effectiveness is included. As a first step we have implemented soft **measures for monitoring our energy consumption** that will allow us to make concrete changes in heating and cooling systems where is needed.



- **Energy upgrades on municipal buildings and schools.** Funding the PV installation on **52 schools** for producing the energy that all 200 schools consume in a year. Published solar map for Athens in the website for the solar potential of the buildings in the city. Set up the **energy alleviation poverty office** and the Athenian **Energy alliance with many municipalities** in Attica. Energy community support. Finalized Climate City Contract as an **EU mission city**.
- Chios is not interconnected yet to the mainland and electricity is mainly produced by diesel generators while about 11% of electricity comes from renewable energy sources on the island. It is implementing projects for the **reduction of energy consumption** of individual municipal buildings, school complexes, the replacement of light bulbs of street lighting with photovoltaic lighting elements and recently, the transition of vehicles that perform public transport to electric vehicles. To this direction, Chios has recently developed its **Clean Energy Transition Agenda** as part of the technical assistance received from the program **Clean Energy for EU Islands**. In addition, the island already puts planning into action through a new project on **circular and sustainable desalination**, again by taking advantage of the technical assistance provided by the CE4EUI program.
- **District heating system** in the Municipality of Serres, Region of Central Macedonia. District heating has been operating in the city of Serres since 2007. More than 10,000 apartments and other buildings are connected to the network of the Serres district heating system, which corresponds to approximately 800,000 square meters of heated space. The management company of the system declares itself as unaffected by increases in energy prices, maintaining the cost per MWh and offering to Serres households and businesses a completely environmentally friendly and economical form of heating in the city of Serres.

**12.If you would like to be informed about the results please enter your email address below. Your email will not be linked to the questionnaire.**

Emails are available, but they are not provided here due to GDPR limitations.



## 6.2 The meetings

### **Municipalities of Thermi & Ampelokipi-Menemeni (Central Macedonia)**

The stakeholder consultation process was initiated in November 2024 for the Municipality of Ampelokipi-Thermi and in April 2025 for the Municipality of Thermi, following the appointment of their respective local representatives.

**Date: 3<sup>rd</sup> of December 2024**

**Type: Physical intranet meeting**

**Participants: RDFCM, CRES**

**Venue: Regional Development Fund of Central Macedonia**

#### **Key points discussed**

- In-Depth Analysis of Article 25 (Energy Efficiency Directive – EED)
- Project challenges at local and national level
- Local implementation of legislation
- What Will Be Expected from Municipalities, starting with SEAPs/SECAPs)
- Composition of the Local Community of Practice (LCoP)
- Roles and Responsibilities of RDFCM and CRES for the WP4

#### **Outcomes and next steps**

- Communications Letters to Municipalities
- Nomination of Municipal Representatives to the Local Project Team
- Completion of Deliverable D.2.1 – Identification and Engagement of Local Authorities





The International Exhibition Verde.tec took place in February 2025 in Athens with the presentation of stakeholders on the Workshop Topic "Heating and cooling: sustainability strategies". A number of presentations were delivered, after which an open discussion took place. The session concluded with the proposal of final results and key takeaways.

**Date: 22<sup>th</sup> February 2025**

**Type: Exhibition- Workshop**

**Participants: RDFCM, CRES, TUC & ELECTRA Energy**

**Venue: Exhibition Center M.E.C, Athens**

**Key points discussed**

- Heating and cooling - harmonisation with the new European Directives
- Local Heating and Cooling Plans in Local Authorities
- Low carbon footprint heating and cooling in industry

**Outcomes and next steps**

- Public information about the alignment with Greek legislation and regulatory requirements
- Greek path towards a gradual transition to climate neutrality
- by the year 2050



The Regional Development Fund of Central Macedonia, the Local Government Development Agency – ANATOLIKI S.A., and the Centre for Renewable Energy Sources and Saving (CRES) organized an event entitled "Energy Transition and the Role of Local Government" as part of the Plan4COLD project, and simultaneously within the framework of the LIFE Projects REDI4HEAT and LIFE SMART. Also, Municipality of Thermi, which is one of the greek municipalities on the framework of Plan4Cold Project, attended and participated in the event.



**Date:** 14<sup>th</sup> March 2025

**Type:** Exhibition-Workshop

**Participants:** RDFCM, CRES, Anatoliki S.A & Municipality of Thermi

**Venue:** HELEXPO Exhibition Center, Thessaloniki

**Key points discussed**

- European & National Legislation on the decarbonization of heating and cooling in local authorities
- Technical support for municipalities in their energy transition
- From energy poverty to energy efficiency - The role of local government

**Outcomes and next steps**

- Past experiences of the Municipalities on the energy challenges and how this can change
- Actions that Municipalities and Regions should take



The stakeholder consultation process was initiated in May 2025 for the Regional Development Fund of Central Macedonia, Municipality of Ampelokipi-Menemeni, Municipality of Thermi, CRES, TUC (online and the Centre for Renewable Energy Sources and Saving Fondation with physical and online presentation. A discussion on the project itself took place , including its challenges and potential difficulties, as well as the identification of key issues within the two Municipalities. A detailed presentation covering the project’s activities and outcomes was made to the Municipalities.

**Date:** 8<sup>th</sup> May 2025

**Type:** Hybrid meeting (physical and online)

**Participants:** RDFCM, Municipality of Ampelokipi-Menemeni, Municipality of Thermi, CRES (online), TUC (online).

**Venue:** City Hall of Ampelokipi-Menemeni



### Key points discussed

- Making it obvious that at the national level, a new compliance deadline will be set for the municipalities. One of the major challenges of the project is the absence of a standardized template or document upon which the development of the LHCPs can be based, as this is being implemented for the first time.
- Another identified challenge is the collection of energy consumption data at the municipal level, including all types of buildings—from residential and household units to businesses and public services. There was also reference to the mapping of the current situation, which was based on the updated SEAP and SECAP plans for the Municipality of Ampelokipoi–Menemeni and an older version of the SECAP for the Municipality of Thermi.
- Reference to the existing plans of the two Municipalities. Lack of Energy Performance Certificates (EPCs) and the inability to measure energy consumption. Reference was also made to the municipality's difficulty in utilizing financial instruments, emphasizing that the resolution and settlement of such issues is a time-consuming and complex process.
- Setting the year 2019 as a baseline year for energy data collection; collecting data from 2019 up to the present.

### Outcomes and next steps

It was recommended to both Municipalities to send us all the important information for the T.2.2, after providing them detailed instructions for energy data. In fact the instructions were:

- According to the attached draft letter "Transmittal to HEDNO", each Municipality may contact HEDNO and IPTO (Independent Power Transmission Operator) to request annual energy data, subject to a fee, using the year 2019 as the reference point onwards. It will be necessary to update the contact details of the respective recipients at each network operator, as the IPTO website does not provide contact information by region/sector.
- Heating consumption data for municipal buildings can be obtained from utility bills, through the Municipalities' Financial Services, or in the case of schools, through the Primary/Secondary School Committees. These data should cover at least the last decade.
- A list of energy upgrade projects in municipal buildings, if available and not already included in the SECAPs/SEAPs, from 2019 onwards.





## Municipality of Heraklion & Chania (Crete)

Date: February 13, 2025

**Type:** Physical meeting

**Participants:** TUC, Municipality of Heraklion (participants list is not provided here due to GDPR limitations)

**Venue:** Municipal Technical Services Department, Alikarnassos

### **Key points discussed**

- Presentation of PLAN4Cold project, its objectives and benefits for the municipality
- Investigation of climate change challenges at local level
- Scope of the meeting regarding the collection of energy data, the organization of a Community of Practice and the identification of appropriate measures for sustainable H&C.

### **Outcomes and next steps**

- The most critical challenges addressed: energy saving at municipal buildings, water scarcity, green urban areas (NBS for Climate adaptation)
- Municipalities' role is mostly relevant to municipal buildings, utilities, facilities and infrastructure
- Identified contact persons – members of the of the Community of Practice, to be set up in T4.2.
- Heraklion has already elaborated the following energy studies which may prove to be useful for the collection of H&C data:
  - ✓ *Sustainable Energy & Climate Action Plan (SECAPs 2012, 2020)*
  - ✓ *Energy Efficiency Plan for the Municipal Buildings (MEEP 2020), both of which have been officially approved by the municipal council.*
  - ✓ *Municipal Emissions Reduction Plan (MERP 2025): recently (Nov. 2024) delegated to an external consultant, expected to be delivered within the 2nd quarter of 2025 and approved by the end of the year.*
  - ✓ *Energy Efficiency Certificates of about 30 municipal buildings based on the Energy Efficiency Studies.*
  - ✓ *Energy Efficiency projects of historical buildings, sports and conference venues*



Deputy Mayor for Cleanliness, Environment & Energy (Mr N. Gialitakis), Energy Infrastructure & Facilities Manager (Mr V. Theodoropoulos), Head of the Directorate of Environment, Rural Development & Commerce (Mr M. Fotakis).



**Date: April and May 12, 2025**

**Type:** 2 Physical meetings

**Participants:** TUC, Municipality of Chania (participants list is not provided here due to GDPR limitations)

**Venue:** Municipal Technical Services Department, Grigoriou the 5<sup>th</sup>

**Key points discussed**

- Presentation of PLAN4Cold project, its objectives and benefits for the municipality
- Investigation of climate change challenges at local level
- Scope of the meeting regarding the collection of energy data, the organization of a Community of Practice and the identification of appropriate measures for sustainable H&C.

**Outcomes and next steps**

- The most critical challenges addressed as priority: energy saving at municipal buildings and bioclimatic design of urban open spaces for the improvement of urban microclimate
- Municipalities' role is mostly relevant to municipal buildings, utilities, facilities and infrastructure as well as awareness raising of citizens and local business.
- Contact persons – members of the of the Community of Practice, to be set up in T4.2 were identified.
- Chania has already elaborated the following energy studies which may prove to be useful for the collection of H&C data:
  - ✓ *Sustainable Energy & Climate Action Plan (SECAPs 2018)*
  - ✓ *Energy Efficiency Plan for the Municipal Buildings (MEEP 2020), both of which have been officially approved by the municipal council.*
  - ✓ *Municipal Emissions Reduction Plan (MERP 2025): recently (Nov. 2024) delegated to an external consultant, expected to be delivered within the 2nd quarter of 2025 and approved by the end of the year.*
  - ✓ *Innovative energy efficiency and renovation projects with the integration of transparent PVs on historical buildings*
  - ✓ *The municipality is member of the Citizen Energy Community of the Region of Crete («CEC Region of Crete») established recently (2024) for the production, self-consumption or sale of electricity from renewable sources, the storage, distribution and supply of electricity to its members.*



*Meeting with representatives of the Municipal Technical Services Directorate, the Association of Hoteliers of Chania and the Municipal Enterprise for Water and Sewage of Chania (DEYAX).*



*Meeting with the Deputy Mayor of Technical Services (Mr. M Kalogridakis), Head of Technical Services Directorate (Mr Efthimiou)*



**Date:** May, 2025

**Type:** Physical meeting

**Participants:** TUC, Representatives of the Cretan Energy Cluster

**Venue:** Eco-solutions store, Heraklion city

**Key points discussed**

- Challenges for the services sector of renewable energy systems and energy efficiency applications (commerce & installation) due to intensity of CC (heat waves) and energy crisis.
- Main barriers for the development of SHCPs associated to energy market
- Financial incentives and programs used by households “energy saving” (EXOIKONOMO) for public sector, households and enterprises, “Recycle -Change water heaters”, and “Recycle – change electric appliances”.
- Institutional problems and obstacles associated to electricity Grid

**Outcomes and next steps**

- Main barriers addressed: The latent integration of RES technologies in Crete was due to the fact that it was a non-Interconnected Island (NII) - islands of the Greek Territory whose Electricity Distribution Network is not connected to the Transmission System or the Distribution Network of the mainland.
- Recently and within a very short period of time the development of the sector was rapid and currently electricity production from RES exceeds local needs and there are no adequate technical solutions for energy storage.
- Small size of the local/island market (SMEs with low turnover), heavy workload, lack of technicians with a broad knowledge and expertise on integrated energy efficiency systems.
- Energy storage is the main obstacle for the sustainable development and utilization of RES technologies – The production of electricity from hydrogen could be the solution.
- Different needs for public and private sector. However both need to examine safe installation of local energy storage systems
- Bureaucracy and very late reimbursement of investments from national financial programs (ie.“Exoikonomo”).
- Energy efficiency in any energy “ecosystem” is more stable and secure when a combination of measures, applications and energy sources is used (ie. Geothermal energy and solar energy, underfloor heating, energy management systems, smart buildings, including automation and IoT to monitor and control energy consumption and generation in real time). The elaboration of energy efficiency studies (based on the national energy regulation, ie. KENAK) combined with updated and contemporary best practices on RES and automation technology could contribute to the development of sustainable energy ecosystems.



Meeting with the representatives of the Energy Cluster of Crete

