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STATUS-QUO ASSESSMENT REPORT





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Partner name and n.: PP07 - Sintra

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1. GENERAL DESCRIPTION OF YOUR REGION AND ITS DEMOGRAPHY

Lisbon Metropolitan Area (LMA) is Portugal's largest and most populated urban area. It includes Lisbon, and the localities that surround it, creating a cohesive and important geographic area. It is located on Portugal's Atlantic coast in the country's western region. It covers a region that encompasses the Tagus River estuary and the adjacent hills, stretching from the northern municipality of Vila Franca de Xira to the southern municipality of Sesimbra. The region has an estimated size of 2.8 million people. It has a mixed population, mostly ethnically Portuguese but becoming more cosmopolitan as a result of immigration.¹



The LMA is engaged to improving its **renewable energy efforts** as part of Portugal's broader commitment to a low-carbon future. Various initiatives have been implemented in this region, including the expansion of solar and wind energy projects to harness the region's natural resources, as well as a focus on improving energy efficiency in the residential, commercial, and industrial sectors. Priorities include modernising energy grid infrastructure and developing connections with neighbouring regions to facilitate the integration and exchange of renewable energy resources.

One of the main municipalities within the region is **Sintra**. It is well-known for its historical and natural beauty, attracting both inhabitants and tourists. It is a diversified community with a population of roughly 377,000 people. Sintra's economy is broad, comprising tourism, services, trade, and light manufacturing, with tourism playing an important part due to the city's compelling historic buildings.²

This municipality is committed to creating successful progress with a permanent and **sustainable quality of life**. The main resource used is Sintra's Sustainable Energy and Climate Action Plan, whose aim is to reduce greenhouse gas emissions and achieve cleaner, more efficient energy. To achieve these goals, the Municipality of Sintra has been promoting numerous initiatives to improve sustainability, developing, and monitoring the creation and implementation of energy efficiency and endogenous renewable production projects and measures, aligned with the national goals for carbon neutrality.

¹ https://www.researchgate.net/figure/Figura-5-Municipalidades-pertencentes-a-Area-Metropolitana-de-Lisboa_fig5_314556531

² <https://cm-sintra.pt/>

1.1 Land area by type

The Lisbon Metropolitan Area is primarily characterized by **urban areas**, including the city of Lisbon and its surrounding municipalities, occupying the largest share of territory. Suburban areas follow, serving as residential extensions of the city. Natural areas, such as parks and green spaces, also encompass a significant portion, preserving the region's natural beauty. Agricultural land, water bodies, historical and cultural sites, transportation infrastructure, and industrial zones characterize the remaining types of land, with varying but comparatively smaller quantities of territory dedicated to each.

The area in the region of Sintra is divided into different types. The largest type of land area is **forest**, which covers approximately 60% of the region. This includes both natural and planted forests, which are important for biodiversity and carbon sequestration. **Agricultural land** is the second largest type of land area, covering approximately 20% of the region. This includes both arable land and permanent crops, such as vineyards and orchards. **Urban areas**, which include residential, commercial, and industrial zones, cover approximately 10% of the region. The remaining 10% of the land area is classified as **other**, which includes water bodies, wetlands, and other natural areas. These areas are important for ecosystem services and biodiversity conservation. Overall, the different types of land area in the region of Sintra play important roles in the local economy, environment, and society.

1.2 Population density (including population in urban areas/total)

The municipality of Sintra is located in Lisbon Metropolitan area region (NUTS II) and Greater Lisbon sub-region (NUTS III). The county covers an area of 319 Km². The Lisbon Metropolitan area is estimated to have around 65% of people living in the urban areas from the total population of the region. As it was mentioned, the region has **2.8 million inhabitants** distributed by several municipalities being the bigger ones Lisboa, Sintra, Cascais, Amadora and Oeiras. The municipality of Sintra has **385.606 inhabitants**³ (2021), distributed by eleven parishes: União das freguesias de Agualva e Mira.-Sintra, Algueirão - Mem Martins, União das freguesias de Almargem do Bispo, Pêro Pinheiro e Montelavar, União das freguesias de Cacém e São Marcos, Casal de Cambra, Colares, União das freguesias de Massamá e Monte Abraão, Rio de Mouro, União das freguesias de Queluz e Belas, São João das Lampas e Terrugem e Sintra.

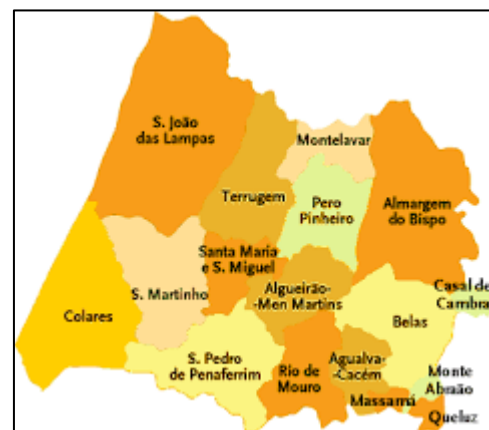
The urban population of Sintra is estimated to be around **80%** of the total population, with the remaining 20% living in rural areas. The high population density in urban areas can pose challenges for sustainable development, such as increased energy consumption and emissions, as well as

³ <https://www.tmlmobilidade.pt/>

pressure on natural resources and infrastructure. However, the municipality of Sintra is committed to promoting sustainable urban development through measures such as improving public transportation, promoting energy efficiency in buildings, and encouraging the use of renewable energy sources. These efforts aim to reduce the environmental impact of urbanization and improve the quality of life for citizens.

1.3 Municipality

Sintra, charming and historically rich municipality in Portugal, is divided into parishes, each with its unique character and appeal. Here is an overview of Sintra's parishes and their diverse attributes.⁴**Sintra:** Population of around *380,000 inhabitants*, population density of approximately *1,190 inhabitants per km²*.



- **Agualva-Cacém:** Population of about *160,000 inhabitants*, population density of about *6,154 inhabitants per km²*.
- **Mira-Sintra:** Population of about *28,000 inhabitants*, population density of about *3,600 inhabitants per km²*.
- **Rio de Mouro:** Population of about *54,000 inhabitants*, population density of about *6,000 inhabitants per km²*.
- **Algueirão-Mem Martins:** Population of about *66,000 inhabitants*, population density of about *3,700 inhabitants per km²*.
- **Cacém e São Marcos:** Population of about *95,000 inhabitants*, population density of about *6,000 inhabitants per km²*.
- **Massamá e Monte Abraão:** Population of about *76,000 inhabitants*, population density of about *5,500 inhabitants per km²*.
- **Queluz e Belas:** Population of about *78,000 inhabitants*, population density of about *6,000 inhabitants per km²*.
- **Agualva:** Population of about *48,000 inhabitants*, population density of about *11,000 inhabitants per km²*.
- **Belas:** Population of about *19,000 inhabitants*, population density of about *400 inhabitants per km²*.

⁴ <https://geneall.net/pt/mapa/178/sintra/>

- **Pêro Pinheiro:** Population of about 6,000 inhabitants, population density of about 200 inhabitants per km².

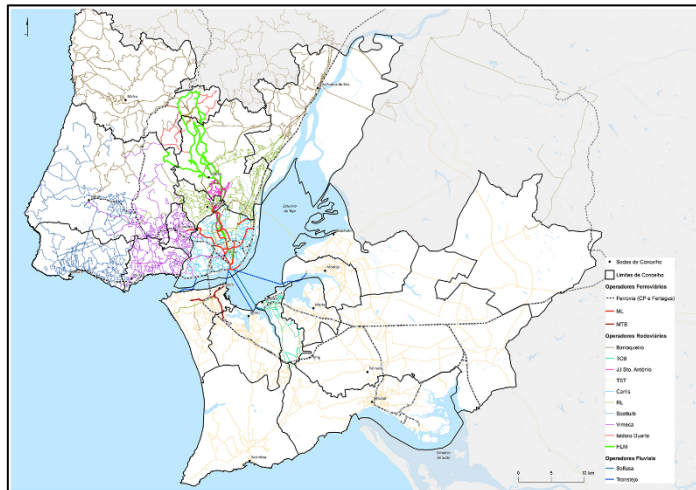
In conclusion, Sintra region exhibits a distinctive demographic diversity in its different parishes. Sintra stands out as one of the largest and most diverse municipalities in Portugal, with a relatively young population.

2. Regional Factors concerning the theme

2.1 Mobility

2.1.1 Public network of transport system available in the region





⁵The public network of transport system available in the region is the **Road Passenger Transport Network** in the Lisbon Metropolitan Area (AML), developed by the transport authority and the 18 municipalities that integrate it. The network, that was recently launched consists of approximately 820 bus routes serving around 2.8 million potential users, with an expected increase in road transport services of about 35%. The development of the network includes the design of the road transport system for passengers, including routes, stops, schedules, fares, and vehicles. The contracts for the acquisition of the public road passenger transport service for various lots in the Lisbon Metropolitan Area were signed in 2021. The increase in road transport services will result in an improvement of routes, paths, and circulations, which will benefit the mobility of the population in the region. Here there is a description of the complete AML Transport Network:



- **Lisbon Metro (Metropolitano de Lisboa):** The Lisbon Metro is an efficient and extensive subway system that covers most parts of the city. It has four lines (blue, yellow, green, and red).

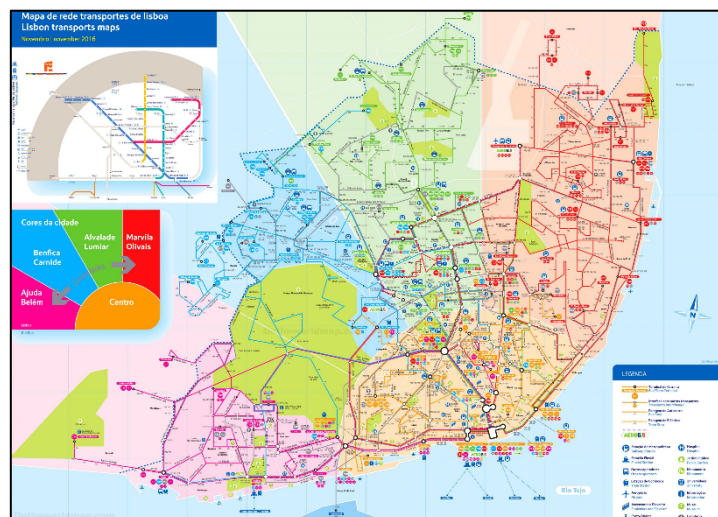


⁵ <https://www.aml.pt/index.php>

- **Trams (Elétricos):** Lisbon is famous for its historic tram system, including the iconic yellow tram 28, which winds its way through the narrow streets of the city's historic neighborhoods. 
- **Buses (Autocarros):** Lisbon has an extensive bus network operated by Carris, connecting virtually every part of the city. 
- **Suburban Trains (Comboios Urbanos):** They operates suburban train services connecting Lisbon with nearby municipalities and towns. 
- **Ferries and Riverboats (Barcos e Ferries):** Lisbon's proximity to the Tagus River allows for ferry services that connect the city center with the southern bank. 
- **Trains (Comboios):** Lisbon is well-connected to other cities and regions in Portugal through the main train station, Santa Apolónia, and other train stations like Oriente and Rossio.
- **Electric Scooters and Bikes:** Lisbon has seen the introduction of electric scooters and bike-sharing services, allowing residents and visitors to explore the city using these convenient and eco-friendly options.

2.1.2 Description and data on current bus fleet (non e-buses) in city/area

⁶The road passenger transport network in the Lisbon Metropolitan Area (AML), which includes the acquisition of a new fleet of buses. The new fleet will be completely renovated and will include more than **1400 new** or less than one-year-old buses, equipped with *Wi-Fi and USB*, and designed to be environmentally friendly. The new buses will provide greater comfort and safety to passengers, and the service will be improved with additional lines and new routes. The new bus fleet will be part of the public road passenger transport service for various lots in the Lisbon Metropolitan Area. The new buses will be part of the efforts to improve mobility.



⁶ <https://www.laguiadelisboa.com/guia-viaje-a-lisboa/transporte/autobuses-de-lisboa/mapa-autobuses-lisboa-diurno/>

Although the picture shown only the municipality of Lisbon, the Buses Network of the Lisbon Metropolitan Area also covers Sintra Municipality.

Carris is the main bus owner, it has a system that divided the bus fleet between **colors and numbers**. With respect to the colors, it is used to identify the different neighborhoods of the city of Lisbon. The numbering system is quite more complex. Carris buses have route numbers composed of either three or four digits. Three-digit numbers are typically used for regular urban routes within the city of Lisbon. These are the ones represented in the picture. Four-digit numbers are often used for suburban and regional routes that extend beyond the city limits and into the broader Lisbon Metropolitan Area, that is why buses arriving to Sintra use to have four digits. In addition, the first digit of the bus number generally indicates the area or type of service.

2.1.3 Description and data on current private vehicles (non & electric ones) in the city/area

The municipality of Sintra has been making efforts to reduce the consumption of traditional fuels in its fleet of private vehicles. Although the total number of operational vehicles has remained stable in the last three years, measures have been implemented to decrease fuel consumption.

Prioritizing the acquisition of vehicles with lower fuel consumption and emissions, the municipality has been **gradually replacing older**, more polluting vehicles with newer ones that meet stricter international emission standards and have more fuel-efficient engines. Additionally, the municipality has started to gradually acquire **electric vehicles**, considering their positive impact on climate change. In terms of managing the vehicle fleet, a Fleet Management system has been applied to approximately **120 vehicles**, and it is planned to expand its coverage to the entire fleet over time. This system, through vehicle geolocation and user identification, acts as a deterrent to unnecessary or inappropriate vehicle circulation, reducing fleet consumption.

Nevertheless, the study done in 2022 "**Electric Mobility in Portugal**", carried out by the Automóvel Clube de Portugal (ACP), which analyzed electric vehicles in Portugal, as well as the habits of those who already drive emission-free vehicles said that only **a 2%** of all the Portuguese people gave electric cars.⁷ Other non ecofriendly options developed by private companies in the LMA are:

- **Traditional Taxis:** Traditional taxi services are readily available, but the majority of these vehicles are powered by gasoline or diesel engines.

⁷<https://away.iol.pt/mobilidade/eletricos/so-2-dos-portugueses-tem-carros-eletricos-o-que-trava-a-compra/20230316/6412ef470cf2c84d7fccb68d>

- **Ride-Sharing Services:** It is available ride-sharing services like Uber and Bolt, which offer rides in a range of vehicles, including gasoline and diesel-powered cars.
- **Car Rental Companies:** Numerous car rental companies provide a wide selection of vehicles, including both eco-friendly and non-eco-friendly options.
- **Tuk-Tuk:** This is one of the main transports used by tourists.

2.1.4 Description and data on other modes of e-mobility in the region (e.g. e-bicycles, e-taxis etc.)

The municipality of Sintra is considering to promote other modes of e-mobility, including e-bicycles, e-taxis, or other electric-powered vehicles. As Sintra aims to achieve sustainability and reduce emissions from transportation, the municipality will encourage the adoption of e-mobility solutions. Within the whole Lisbon Metropolitan Area, there are different eco-friendly options:

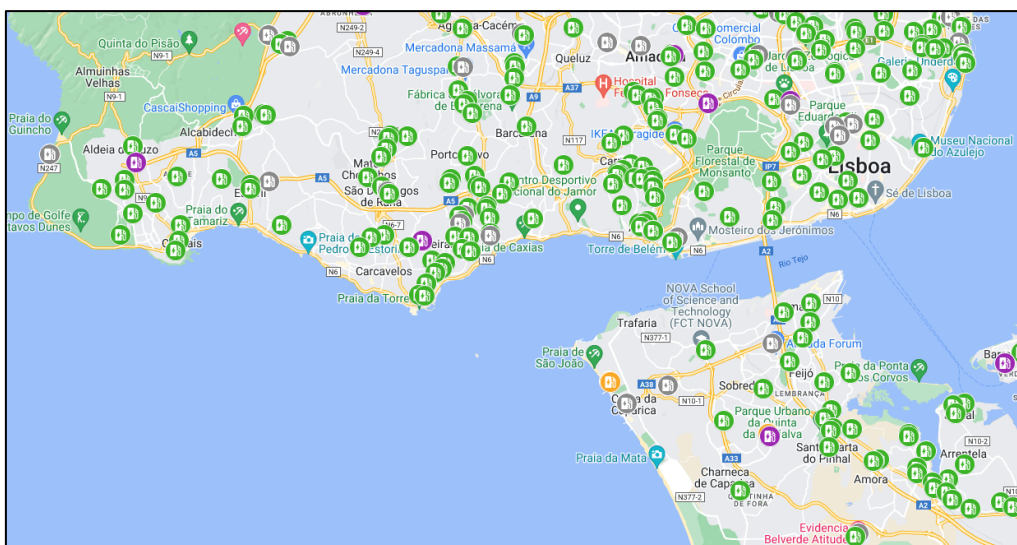
- **Electric Scooter:** Several electric scooter companies operate, offering a convenient and environmentally friendly way to explore the city. Users can rent electric scooters using smartphone apps and drop them off at designated locations. Some examples are Lime, Bird, Bolt, and others.
- **Bike Sharing:** Lisbon has bike-sharing services that provide bicycles for short trips around the city. These bikes are often equipped with electric assistance, making cycling easier and more eco-friendly. Given the emphasis on creating a network of cycle paths and promoting sustainable transportation modes, Sintra will soon have its own bike sharing network.
- **Electric Taxis:** Some taxi companies in Lisbon operate electric or hybrid taxis, which produce fewer emissions compared to traditional gasoline or diesel-powered vehicles. They offer an eco-friendly alternative for taxi services, providing residents and tourists with sustainable transportation options.

All these e-mobility alternatives are complemented with a proper charging infrastructure which will be developed in more detailed in the following section.

In 2017 a Strategic Vision for the Mobility was created to fulfill Agenda 2030 called MOVE 2030 to fulfill some targets. At that time the modal distribution of mobility was 46% of own car, 22% of sharing public transport, and a 32% for other modes. The targets were to reduce car ownership to 34% having a 66% as alternative options.

2.1.5 Description and data on charging infrastructures

When considering Lisbon, there is registration of **119 charging** points in the city, in addition, the municipality of Sintra has **58 charging** points.⁸ In this webpage it is able to find how many charging points are there per municipality. It is made by an association, UVE, which provides a list (which is constantly being updated) of the status of the installation process for fast charging stations (PCR/PCUR) in Portugal. Furthermore, there is another source⁹ who states more than **360 charging stations** in the whole Lisbon Metropolitan Area.



2.2 Energy

2.2.1 Availability of renewable energy in the region

The current shortage of fossil fuels and the volatility of fossil fuel markets underscore the urgency of transitioning to renewable energy sources. In Portugal, the utilization of hydropower, wind, and biomass for energy production has reached a level of maturity that enables these sources to be both competitive and prominent contributors to the annual energy output. Sintra, produced in 2021 **18,143 MWh of renewable energy**. Sintra hosts approximately **468 photovoltaic systems and 5 wind systems for micro and mini-generation, collectively offering a substantial 2.8 MW of installed capacity**. Furthermore, two key renewable energy facilities are operational within the region: the 2 MW Alfouvar photovoltaic plant, situated in the Almagem do Bispo parish since December 2013, and the

⁸ <https://www.uve.pt/page/postos-carregamento-rapido-portugal/>

⁹ <https://pt.charagemap.com/map>

Almargem wind park, located in the Serra de Sintra, which houses three 2 MW wind turbines and has been contributing to energy production since June 2007.

One of the main goals of Sintra's Sustainable Energy and Climate Action Plan is to increase the use of renewable energy in the region. There is an emphasis on the importance of promoting and encouraging investment in photovoltaic projects and other energy production projects for self-consumption or the sale of energy using renewable energy sources. In addition, increasing the use of energy from renewable sources is one of the main objectives of the European Union and national governments for the coming decades, in particular the targets for renewables in the energy mix set out in the National Energy and Climate Plan 2030 (PNEC 2030), corresponding to the incorporation of **47% of energy** from renewable sources in gross final energy consumption by 2030.

In addition, the municipality of Sintra has been promoting numerous initiatives to improve sustainability, developing and monitoring the creation and implementation of energy efficiency and endogenous renewable production projects and measures.

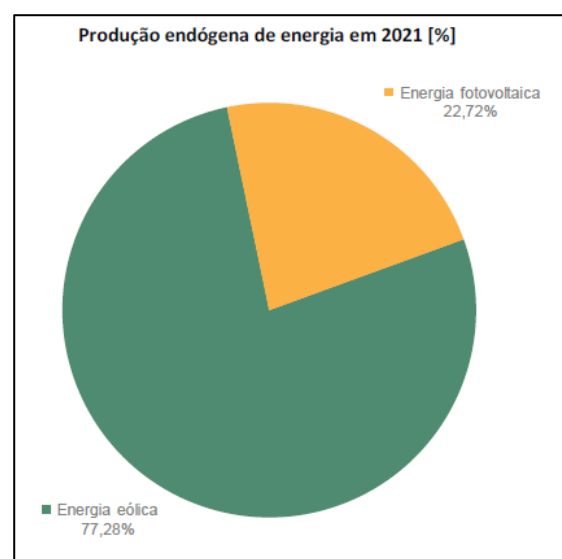
2.2.2 Share of renewable energy source in energy production

Vetor	Produção de eletricidade [MWh/ano]
Biomassa	0,00
Energia eólica	14.021
Energia hídrica	0,00
Energia fotovoltaica	4.122
Energia geotérmica	0,00
Total	18.143

The significance of integrating renewable energy sources into energy production in the Sintra area is underscored as a pivotal step towards a more sustainable and environmentally conscious future. A key aspect of this strategy involves **promoting the sharing of these renewable sources among various stakeholders.**

A notable focus lies on encouraging investments in photovoltaic projects and other innovative energy production initiatives. Whether for individual self-consumption or for feeding surplus energy back into the grid for wider distribution, the emphasis on these activities speaks to the local commitment to sustainable practices.

Furthermore, the strategy push to encourage the installation of these thermal solar collectors in buildings adds another layer to the region's renewable energy efforts. This pragmatic approach not only contributes to the local generation of clean



energy but also aligns with global trends in sustainable architecture and construction practices.

The endogenous renewable energy production in the municipality of Sintra was divided as follows: **77.28% wind energy** and **22.72% photovoltaic energy**.

The municipality is promoting the implementation of an **integrated renewable generation platform** which can function as an investment strategy by aggregating fragmented small-scale renewable projects, giving them a more substantial presence, and ultimately addressing the challenge of insufficient critical mass while attracting potential investors. The dissemination of investment prospects within the realms of renewable energy and energy efficiency for both public and private structures can serve as a powerful promotional instrument, acting to entice and retain further public and private investments in the sphere of energy sustainability.

2.2.3 Regional energy market structure (e.g. energy production, electricity grids, transport of energy, energy delivery to customers, ownership and operation)

Sintra's energy market structure is willing to be formed by an integrated renewable generation platform introduced in the last section. Nowadays structure is composed of different infrastructure facilities:

- **Energy Production:** Portugal has been making significant strides in renewable energy. The country, including the region of Sintra, has been investing in wind, solar, and hydroelectric power generation. The use of renewable sources aligns with the nation's commitment to sustainability and reducing carbon emissions.
- **Electricity Grids:** Portugal's electricity grid is interconnected and managed by the national transmission system operator, REN (Redes Energéticas Nacionais). The grid ensures the efficient distribution of electricity across the country, including the Sintra region.
- **Energy Delivery to Customers:** Energy delivery in Portugal, including Sintra, is typically managed by utilities. EDP (Energias de Portugal) is one of the main energy companies in the country, providing electricity and gas services to residential, commercial, and industrial customers.
- **Ownership and Operation:** Energy infrastructure in Portugal is a mix of public and private ownership. Additionally, there has been a push towards increasing community and decentralized energy projects, allowing local ownership and operation of certain renewable energy installation.

2.2.4 Description of current state of Energy Communities

According to portuguese *Decreto-Lei n.º 15/2022, de 14 de janeiro*¹⁰, as a transposition of Directive 2019/944¹¹ from the European Union, the “**Comunidades de Energia Renovável**” (CER) are part of the main actors of the “National Electricity System”. These are defined as legal entities established through open and voluntary participation of its



members, partners, or shareholders, who may be natural or legal persons, of public or private nature. Members must be engaged in activities related to the renewable energy projects of the respective energy community. Their main objective is to provide environmental, economic, and social benefits to its members or the communities where it operates, rather than financial profits.

The CERs can produce, consume, store, purchase, and sell renewable energy with their members or third parties, having access to all energy markets, including system services, both directly and through aggregation. The applicable regime to CERs are the rules of the ACC, with the necessary adaptations.

ACC means, “Autoconsumo coletivo”¹², in english, **Collective Self-Consumption (CSC)**. It happens when energy is used in two or more places, such as homes or businesses, and it's generated by a renewable energy source. If these places are not directly connected through the public power grid, they need to be linked to the renewable energy source without using the grid. This allows any extra electricity produced to be sold or shared among them.

In Sintra a pioneer initiative is being done under the living lab of SMILE project described below. SMILE project, which stands for **Sintra Motion & Innovation for Slow Emissions**, is a living laboratory initiative currently underway in the Municipality of Sintra. Led by the Aga Khan Foundation in partnership with the Municipality, DST Solar, Innovation Point, Watt-is, Card4b, IrRADIARE, Faculty of Sciences (Lisbon University) and ID Norway Association, SMILE aims to develop innovative technological solutions and create a test center for mitigating CO₂ emissions.

One of the key objectives of SMILE is to rethink sustainability for a specific neighborhood in Sintra called **Tabaqueira**. This will be achieved through the generation and use of renewable energy in

¹⁰ <https://diariodarepublica.pt/dr/detalhe/decreto-lei/15-2022-177634016>

¹¹ <https://eur-lex.europa.eu/legal-content/PT/TXT/?uri=CELEX:32019L0944>

¹² <https://www.adene.pt/wp-content/uploads/2022/11/Manual-Digital-Autoconsumo-e-Comunidade-de-Energia-Renovavel-Guia-Legislativo.pdf>

buildings, sustainable urban mobility, and circular economy practices. The project will focus on developing and implementing solutions that can help reduce carbon emissions and improve energy efficiency in the Tabaqueira neighborhood.

The Energy Community is an important part of the SMILE project. These communities are groups of people who come together to generate, store, and share renewable energy. The SMILE project aims to support the development of an energy community in the Tabaqueira neighborhood.

This energy community is being linked between a school and social housing buildings nearby. This is the first energy community being built in Sintra and is currently in a process of having the administrative/juridic procedures approved in order to be formally registered as a Community. The protocol for sharing energy and who owns the management of the community is being established.

2.3 Infrastructures as potential hubs

2.3.1 Buildings and other premises (public)

Within a previously approved project, under EU City Facility, Sintra has developed a mapping of all municipal buildings and the methodology to reach the buildings' decarbonization. We will refer to those buildings as the ones potentially relevant as hubs due to the previous analysis already made. Indicators and consumptions analysis have been done which facilitate the work as potential hubs for Energy Communities.

The **City Facility** project in the region of Sintra aimed at promoting the decarbonization of public buildings and other public premises in the municipality. The project recognizes that public buildings and other public premises are important infrastructure assets that can serve as potential hubs for sustainable energy solutions.

The project identified measures to be implemented to reduce energy consumption and carbon emissions in public buildings and other public premises. This includes measures such as *energy-efficient lighting, heating, and cooling systems*, as well as the installation of renewable energy systems such as *solar panels and wind turbines*. The project also considered the promotion of the use of electric vehicles and other sustainable modes of transportation in the municipality.

One of the key objectives of the City Facility project is to map a potential **network of public buildings** and other **public premises** that can serve as hubs for sustainable energy solutions. These hubs will be equipped with the necessary infrastructure to support the generation, storage, and distribution of renewable energy. They will also serve as centers for education and outreach, helping to raise awareness about the benefits of sustainable energy and encouraging the adoption of sustainable practices in the community. The targeted public buildings are:

- **Municipal Markets:** The municipal markets are at the forefront of decarbonization efforts by implementing several sustainable initiatives. These include optimizing lighting systems to reduce energy consumption and environmental impact. Additionally, the installation of photovoltaic panels is enabling these markets to generate clean energy for self-consumption, which significantly decreases their reliance on fossil fuels.
- **Schools:** They play a pivotal role in decarbonization through a multifaceted approach. They are optimizing their lighting systems, which not only reduces energy costs but also aligns with sustainability goals by minimizing their environmental footprint. Moreover, the installation of photovoltaic systems allows schools to harness renewable energy from the sun, thereby lowering electricity expenses and diminishing their carbon emissions. To further enhance energy efficiency, schools are replacing outdated air conditioning units with energy-efficient alternatives. Additionally, the adoption of solar thermal systems is reducing their reliance on conventional heating methods, contributing significantly to decarbonization objectives.
- **Sports Facilities:** These are actively engaged in decarbonization by focusing on optimizing their illumination systems. By doing so, they not only reduce their energy consumption but also advance sustainability efforts by promoting environmentally friendly practices within the sports community.
- **Health Centers:** including hospitals and clinics, are dedicated to decarbonization through a twofold strategy. They are optimizing their lighting systems to reduce energy usage and promote a greener healthcare environment. Simultaneously, the installation of photovoltaic panels is enabling these health centers to generate clean energy for self-consumption, thus lowering their carbon footprint.

The project recognizes that public buildings and other public premises are important assets that can help to drive the transition to a more sustainable energy system.

2.3.2 Buildings and other premises (private)

The project above mentioned primarily focuses on the decarbonization of public buildings and premises in the region of Sintra. However it is worth mentioning the **potential role of private buildings** and premises in the broader context of sustainable energy initiatives.

Private buildings, including *residential, commercial, and industrial properties*, play a significant role in energy consumption and carbon emissions. Recognizing this, many sustainability initiatives and policies encourage private building owners to adopt energy-efficient practices and renewable energy solutions. Private buildings can serve as potential hubs for sustainable energy solutions by incorporating *solar panels, energy-efficient lighting systems, smart energy management systems, and other energy-saving technologies*.

Private premises, such as commercial buildings, shopping centers, and industrial facilities, can also play a role in promoting sustainable practices. They can implement energy management systems,

optimize energy consumption, and explore opportunities for on-site renewable energy generation. Additionally, private premises can serve as demonstration sites for sustainable technologies and practices, inspiring others to follow suit.

Regarding private buildings the municipality doesn't currently have identified mapping of potential locations. However, it is a goal when engaging with local stakeholders namely with the industry to involve them and consider as potential hubs. This is why the **Entrepreneurial association of Sintra**¹³ is being involved from the start in order to reach out to private entities and broaden the outreach of the project. It is a key partner for mapping and improving energy solutions in private buildings. Their legal expertise, local business knowledge, and strong connections with public entities make them a valuable resource. They ensure compliance with legal requirements and facilitate partnerships, making them a crucial ally for advancing energy efficiency in Sintra's private buildings.

2.3.3 Open areas

Open areas, such as *parks, squares, and other public spaces*, can serve as potential hubs for sustainable energy solutions by incorporating renewable energy technologies and promoting sustainable practices. For example, solar panels can be installed on park benches or other structures to generate renewable energy. Additionally, open areas can be used to host community events and **educational programs** that promote sustainable practices and raise awareness about the benefits of renewable energy.

Sintra recognizes the potential of open areas as infrastructure and potential hubs for sustainable energy solutions.

Open areas can play a role in supporting this **network of hubs** by providing additional space for renewable energy generation and community engagement. For example, community gardens can incorporate solar panels to generate renewable energy while also providing fresh produce for the community. Additionally, open areas can be used to host community events and educational programs that promote sustainable practices and raise awareness about the benefits of renewable energy.

Some projects on this field are being planned by the municipality and a mapping of potential areas is under development namely a **Greening Plan for the City of Sintra**¹⁴.

¹³ <https://aesintra.pt/>

¹⁴ <https://cm-sintra.pt/info-cms-arquivo/sintra-municipio-sustentavel>

3. Stakeholders

The stakeholders consulted and identified within PROMOTER project are:

1. **Strategic Environmental Council**¹⁵: This council aims to ensure the cooperation of several entities that have competence on environmental issues, from waste collection and treatment, coastline, spatial planning, and urban requalification. It is composed by the Ministério do Ambiente (ICNF, Agência Portuguesa do Ambiente, IHRU, Parque Natural Sintra-Cascais, CCDRLVT) e da Câmara Municipal de Sintra (Divisão de Ambiente, SMAS, HPEM, Recolha de lixo, Conselho Estratégico Empresarial, Departamento de Solidariedade e Inovação Social). Also the sociedade Parques de Sintra Monte da Lua (gere o património classificado de Sintra).
2. **LNEG “Laboratório Nacional de Energia e Geologia”**¹⁶: This is Portugal’s first institution dedicated to energy and geological research. Operating under the control of the Ministry of the Environment and Energy Transition, LNEG plays a pivotal role in advancing scientific knowledge, driving technological development, and fostering innovation within the realms of energy and geology. Its multifaceted mission encompasses a wide variety of activities, including the promotion of renewable energy sources, the enhancement of energy efficiency, and the conduct of comprehensive geological research. LNEG serves as an essential pillar of support for the Portuguese government, industries, and society as a whole. By providing critical scientific and technical expertise, it actively contributes to the formulation of sustainable energy policies, efficient resource management, and environmental preservation initiatives.
3. **Associação empresarial de Sintra**¹⁷: known as AESintra, is a non-profit organization representing and supporting businesses in the Sintra. It advocates for members' interests, offers support and services, promotes entrepreneurship and innovation, facilitates networking and events, and engages in community initiatives. AESintra plays a vital role in fostering economic growth and sustainability within Sintra's business community, acting as a voice for local businesses and promoting collaboration among its members.
4. **DGEG “Direção-Geral de Energia e Geologia”**: is the Directorate-General for Energy and Geology in Portugal, operating under the Ministry of Environment and Energy Transition. DGEG is a governmental agency tasked with regulating, supervising, and overseeing the

¹⁵ <https://cm-sintra.pt/institucional/servicos/conselho-estrategico-ambiental>

¹⁶ <https://www.lneg.pt/>

¹⁷ <https://aesintra.pt/>

energy and geological sectors within the country. Its responsibilities encompass energy regulation, licensing and permits for energy-related activities, geological and mining oversight, promotion of energy efficiency and renewables, data collection and dissemination, and participation in research and development initiatives.

5. **Associação zero - ZERO** - Associação Sistema Terrestre Sustentável (Sustainable Earth System Association) is a national non-profit association that operates with complete independence from political parties, companies and profit-making entities, religious associations and the government in promoting sustainability.
6. **AgaKhan Foundation** - AKDN has been active in Portugal for several decades, in particular through the Aga Khan Foundation (AKF), which began working in Portugal in 1983. The Foundation's activities in Portugal primarily focus on innovation in early childhood development and education, and strengthening civil society through the social, cultural and economic inclusion of people living in neglected or underserved communities, with a specific focus on migrant inclusion. Has recently expanded its focus for the areas of sustainability and green approaches.
7. **ADENE** - ADENE is a legal entity of the associative type with public utility status whose purpose is to promote and carry out activities of public interest in the area of energy and its interfaces with other sectoral policies, in conjunction with other entities with powers in these areas, and also to promote and carry out activities of public interest in the areas of efficient use of water and energy efficiency in mobility

Describe strategies for their mobilization and ongoing involvement in the project Phases 1 & 2

The engagement strategy entails promoting initiatives that aim to establish working groups focused on sustainable development topics, including meetings and the organization of events for dissemination and communication. The municipality will uphold or adopt **governance mechanisms** to ensure the project's effectiveness and efficiency. In addition to the Strategic Councils, there are plans to create a dedicated structure. This structure will facilitate the sharing of information, enable communication with citizens, and produce reports on the implementation progress.

It should encompass **two participant categories**: those *responsible for implementing the measures and citizens, communities, companies, and other interested parties* who are partners or beneficiaries of the project activities. Effective monitoring is also crucial to ensure the project's high-quality implementation, with active involvement from all concerned parties. The monitoring process will track various planned activities, with specific monitoring indicators established. To disseminate information and engage with stakeholders, the municipality will utilize its **available channels**, such as the website,

social media, newsletters, regional and national press, and ongoing project meetings. Three key stakeholders can be mentioned here in order to achieve a better engagement:

1. **Entities from the Ministry of the Environment** are actively engaged in the process through participation in the Strategic Environmental Council and is planned to be engaged with *working group meetings*. The municipality leverages its various communication channels, including the website, social media, newsletters, the Strategic Environmental Council's communication channels, and local, regional, and national press, to connect with them.
2. **Sintra City Council departments' staff** are also actively involved through their participation in the Strategic Environmental Council, planning also to create *working group meetings*. Communication and information dissemination occurring through the municipality's diverse channels, such as the website, social media, newsletters, and communication channels related to the Strategic Environmental Council, as well as local, regional, and national press.
3. **Parish councils, entrepreneurs, non-profit organizations, professionals, students, and the broader community** are engaged through both past and ongoing projects. This engagement will include in the future, *the sharing of technical information, provision of training, and the organization of workshops*. The municipality employs a wide variety of communication channels, including the website, social media, newsletters, regional and national press, and current project meetings, to effectively connect with these stakeholders.

4. Legislative and financial environment in support to renewable energy initiatives

4.1 Legislation, regulations etc.

The legislative context in place aligned with PROMOTER focus are the following:

- **Directive 28/2009/EC:** Promotes renewable energy use, leading to Portugal's National Action Plan for Renewable Energies (PNAER).
- **Directive 2012/27/EU:** Sets energy efficiency objectives, shaping Portugal's 20% reduction in primary energy consumption target by 2020.
- **National Integrated Energy and Climate Plan (PNEC):** Guides Portugal's energy and climate policies for 2021-2030, aligned with EU regulations.
- **Roadmap for Carbon Neutrality 2050:** Aims for carbon neutrality by 2050, exploring various pathways with stakeholder collaboration.
- **REPowerEU Plan:** Speeds up the energy transition, reduces fossil fuel dependence, and adapts infrastructure to alternative sources.

- **Council Regulation 2022/1369:** Encourages a voluntary 15% gas demand reduction, requiring energy savings and renewables.
- **Decree-Law 162/2019:** Enables electricity self-consumption with renewable energy, facilitating sharing and sales.
- **Decree-Law no. 15/2022:** Governs Portugal's National Electricity System, covering various aspects.
- **Law no. 58/2013:** Sets requirements for energy certification and building system maintenance professionals.
- **Decree-Law no. 101-D/2020:** Establishes building energy performance requirements and energy certification.
- **Ministerial Order no. 138-G/2021:** Defines indoor air quality standards for commercial and service buildings.
- **Ministerial Order no. 138-H/2021:** Regulates the Energy Certification System for Buildings.
- **Ministerial Order 138-I/2021:** Establishes minimum energy performance requirements.
- **Public Procurement Code:** Governs public procurement, ensuring compliance in infrastructure contracts.
- **EU Taxonomy Regulation:** Addresses the "Do No Significant Harm" principle for construction and demolition materials.

In addition, there are also some identified possible legal and regulatory obstacles related to the *time-consuming regulatory processes*, *economic approaches* that prioritize cost-effectiveness over ethical concerns, *market failures* and missing markets that make socially desirable actions unprofitable, and *externalities and information asymmetries* that create barriers to public investment. However, public norms and standards, procurement regulation, direct public investment, tax measures, and other measures can help overcome these obstacles.

4.2 Financial incentives etc.

In Portugal there are funding programmes that can be considered for renewable energy and mobility projects, these are:

1. **Programa de recuperação e resiliência**¹⁸: *The Recovery and Resilience Plan (PRR)* is a national program with execution until 2026, aimed at boosting sustained economic growth and convergence with Europe, aligned with the United Nations' Sustainable Development Goals. The RRP addresses **six European strategic pillars**: green transition, digital transformation, smart and sustainable growth, social and territorial cohesion, health and resilience, and

¹⁸ <https://recuperarportugal.gov.pt/plano-de-recuperacao-e-resiliencia/>

policies for the next generation. The governance of the RRP seeks effective coordination, simplicity, transparency, and accountability, with four levels of coordination: strategic, monitoring, technical, and audit and control.

Furthermore, the RRP complies with various legal and strategic obligations of the European Union, such as the *National Integrated Energy and Climate Plan*, the *Carbon Neutrality Strategy 2050*, and the *REPowerEU Plan*. Compliance with legislation is essential for the effectiveness and efficiency of plan implementation. Projects aligned with PRR can apply for a funding.

2. **Portugal 2030**¹⁹: The Portugal 2030 initiative is the practical embodiment of the Partnership Agreement between Portugal and the European Commission, aimed at the utilization of 23 billion euros in European funds. These funds are designated to support and foster projects that drive forward and enhance the Portuguese economy during the period spanning from 2021 to 2027.

It is composed by 6 strategic objectives being the most important one for this context **Portugal + verde**. This objective is centered on moving towards a more environmentally-friendly approach, addressing urgent climate issues, and actively working towards reducing carbon emissions, improving energy efficiency, and boosting the use of renewable energy sources. Additionally, this approach supports innovation, the circular economy, and sustainable transportation.

Portugal 2030 is divided into 12 programs by theme and regions. The program “**Sustentável 2030**” is relevant in this context. It is funded with 3.1 billion euros from the Cohesion Fund, and aims to address sustainability and climate challenges on a national level. It focuses on decarbonizing various sectors of the economy, contributing significantly to Portugal's goal of achieving carbon neutrality by 2050. The program also promotes urban mobility and investments in transportation, aligning with national objectives for a greener and more connected Portugal.

3. **Fundo Ambiental**²⁰: It is a consolidated financial instrument in Portugal, created to improve the efficiency of environmental policies. It combines resources from various existing funds to provide greater financial capacity and adaptability for addressing environmental challenges. Several other environmental funds were dissolved and merged into the Fundo Ambiental, including the Portuguese Carbon Fund, the Environmental Intervention Fund, and others. Further changes in 2021 integrated additional funds into the Fundo Ambiental to support sustainability and innovation in various sectors.

¹⁹ <https://portugal2030.pt/o-portugal-2030/o-que-e-o-portugal-2030/>

²⁰ <https://www.fundoambiental.pt/>

4. **Municipal financial incentives**²¹: One of the main municipal initiatives is REAVIVA SINTRA. This program offers non-repayable grants to support the renovation of urban buildings in designated Urban Rehabilitation Areas. The program aims to preserve architectural heritage, enhance urban environments, and encourage renovations that respect the original style and materials. Applicants must meet specific requirements and follow administrative procedures to qualify for these grants.

5. S.W.O.T Analysis

Strengths

The main strengths of the municipality of Sintra to develop the PROMOTER project are:

- **Sustainability Commitment:** There is a municipality's commitment to environmental sustainability and energy efficiency. It strives for carbon neutrality and energy autonomy in municipal buildings, aligned with the goal of *reducing emissions and promoting sustainability*. It has also demonstrated a strong commitment to reducing dependence on fossil fuels and transitioning to a low-carbon economy
- **Varied Funding Sources:** The goal is to encompass national and *European/national funds, private investments, public-private partnerships, crowdfunding, or green bonds*. This diverse funding approach enhances financial viability and minimizes municipal risk.
- **Engaged Stakeholders:** Active collaboration with stakeholders, including the Strategic Environmental Council, ensures the project's harmony with community needs and priorities. This engagement fosters essential backing from key stakeholders.
- **Experienced Team:** Sintra's skilled technical staff, supported by a *Local Energy Manager and an Office for Environmental Sustainability and Energy Transition*, ensures proficient execution. This expertise minimizes the likelihood of delays or cost overruns.
- **Environmental Upsides:** Previous work done on mapping of potential of *decarbonizing public buildings* promises energy savings and reduced emissions.
- **Availability of renewable energy sources:** Sintra benefits from the production of renewable energy through photovoltaic and wind systems, with an installed capacity of 2.8 MW. This provides a strong foundation for the project's focus on renewable energy.

²¹ <https://reaviva.sintra.pt/>

- **Sustainable mobility infrastructure:** The municipality has a well-developed public transport network from the Lisbon Metropolitan Area, including the Lisbon Metro, trams, buses, suburban trains, ferries, and riverboats.

In conclusion, Sintra municipality combines sustainability dedication, diverse funding, stakeholder involvement, expertise, economic-environmental advantages, and a potential infrastructure, both for energy and mobility initiatives.

Weaknesses

The main weaknesses are:

- **Uncertainty in Future:** Challenging to predict the evolution in areas like technology and economics, therefore estimating costs and benefits becomes complex. This uncertainty might lead to delays or cost overruns.
- **Stakeholder Resistance:** Despite engaging stakeholders, potential resistance could arise due to concerns. Such resistance might cause project delays or increased costs.
- **Limited charging infrastructure:** While Sintra has installed electric vehicle charging stations, there is not a clear infrastructure that ensures its availability and coverage. Insufficient charging infrastructure may hinder the adoption of electric vehicles

Opportunities

The main opportunities identified for sintra are:

- **Diverse Funding:** secure funding from various sources, including *national, European, private investment, and alternative options* like public-private partnerships, crowdfunding, and green bonds. This comprehensive approach ensures financial stability and minimizes risks.
- **Environmental Benefits:** The municipality is committed to making a change and consider environmental gains with new and innovative approaches
- **Replication & Scaling:** Sintra wants to serve as a reference for other municipalities, as the team plans to share insights and lessons learned. This knowledge exchange could *accelerate sustainable practices and facilitate the transition* to a low-carbon economy.
- **Innovation & Tech Advancement:** Technical aspects such as photovoltaic systems or charging units drive innovation and the adoption of advanced technologies within the energy sector, contributing to broader industry advancement.
- **Stakeholder Engagement:** Strong collaboration with stakeholders, including the *Strategic Environmental Council*, ensures the project aligns with community needs and garners essential

support. This engagement can foster effective solutions and facilitate collaborations for sustainable outcomes.

- **New fleet of buses and charging infrastructure:** The project includes the introduction of a new fleet of buses and the development of charging infrastructure for electric vehicles. This presents an opportunity to improve sustainable mobility and encourage the adoption of electric vehicles in the region.
- **Investment in Photovoltaic projects:** Sintra's Sustainable Energy and Climate Action Plan aims to increase the use of renewable energy through investment in these projects. This provides an opportunity to attract investment and promote local renewable energy production.

Threats

The main Threats are:

- **Political & Regulatory Risks:** Potential shifts in government policies or regulations that could impact funding, execution, or efficacy. *Changes in energy or climate policies* at national or EU levels might alter funding availability or terms.
- **Technical & Operational Risks:** Technical intricacies bring complexities requiring *specialized expertise*.
- **Market dynamics and policy changes:** There is volatility on fossil fuel markets and need for transitioning to renewable energy sources. Changes in energy prices or policies may impact the project's financial viability and the attractiveness of renewable energy investments.
- **Insufficient Critical Mass for Renewable Energy:** There is a challenge due to insufficient critical mass in the renewable energy sector, which hinders the attraction of potential investors. This suggests that the lack of a significant presence or scale in renewable energy projects may pose a threat to the development and expansion of sustainable energy sources in the region.

6. READINESS MODEL INDICATOR RESULTS

The readiness indicators model is attached to this report. With this analysis it was possible to concretely identify the needs of the territory in order to better address the best practices and policy changes to be influenced.

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