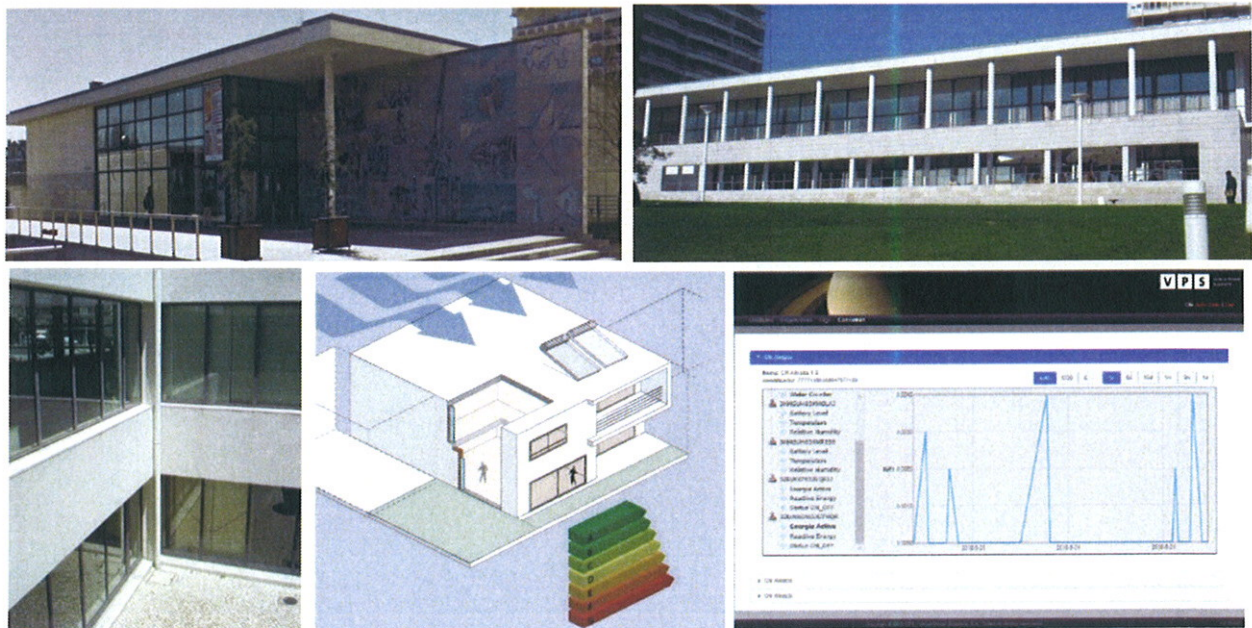


AGENEAL, Local Energy Management Agency of Almada

Regional Action Plan



EMPOWER - More Carbon Reduction by Dynamically Monitoring Energy Efficiency



Message from the Director of AGENEAL

Climate change and its consequences are one of the most serious problems facing us today. The changing climate, we are already experiencing, will manifest itself in the form of more extreme conditions to which we must adapt, by taking measures to mitigate their impacts.

At the same time, it is essential to continue the decarbonization effort of our society by mitigating CO₂ emissions, through reducing energy consumption and replacing fossil energy sources with cleaner renewable energy sources.

The relevance of local intervention in this area is widely recognized, namely by the United Nations, which places great emphasis on the “Sustainable Development Goals” for 2030.

In this field, municipalities, as the closest level of governance to citizens and as managers of a territory that supports the most varied activities, can play a decisive role in the collective effort for energy transition and decarbonization, as they provide a wide range of public service that consume energy and emit greenhouse gases.

At the international level, the Paris Climate Agreement, which resulted from COP 21, enshrines the commitment of all nations to try to stem the rise in the planet's average temperature by significantly reducing the use of fossil fuels and focusing on renewable energy, reducing greenhouse gas emissions.

The Municipality of Almada has taken a proactive stance, recognizing its eco-responsibility in the fight against climate change and pursuing a local development model based on a low carbon economy, with the valorisation of endogenous and renewable energy resources.

In particular, the planned intervention for the FRC building responds to the strategy and objectives set for Almada, as it contributes to improving energy efficiency, promoting the use of renewable energy and reducing energy bill and CO₂ emissions in public infrastructures, namely public buildings.

Director, Local Energy Management Agency of Almada - AGENEAL



Part I – General Information

Project: EMPOWER, More carbon reduction by dynamically monitoring energy efficiency

Partner organisation(s) concerned: Local Energy Management Agency of Almada, AGENEAL

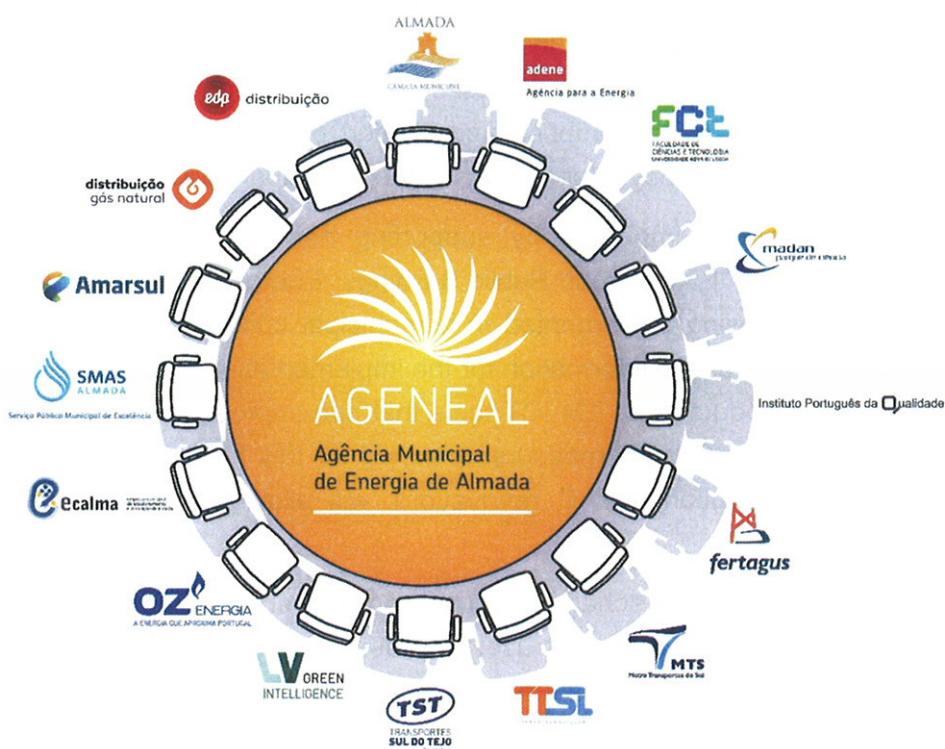
Country: Portugal

NUTS2 region: Lisbon Metropolitan Area

Contact person: Sílvia Remédios

Email address: silvia.remedios@ageneal.pt

Phone number: +351 925486832





Part II – Policy Context

- The Action Plan aims to impact:
- Investment for Growth and Jobs programme
 - European Territorial Cooperation programme
 - Other regional development policy instrument

Name of the Policy Instrument Addressed

ROP Lisboa 2020 (Lisbon Regional Operational Program), Thematic Objective 4: Supporting the transition to a low-carbon economy in all sectors”.

The specific Investment Priority (IP) identified by the policy instrument is the 4c: Support for energy efficiency, intelligent energy management and the use of renewable energy in public infrastructures, including in public buildings and in the housing sector.

Further details on the Policy Context and the way the Action Plan should contribute to improve the Policy Instrument

As was defined in the Application Form, IP4c aims to address energy efficiency and subsequent reduction of carbon emissions from public infrastructures. However, there is no specific mention to innovative actions like the use of ICT tools for energy management and monitoring, which could be of great interest to public authorities. For instance, Almada City Council manages a total of 260 residential buildings (2250 dwellings of social houses), roughly 50 services buildings and 40 primary schools. Monitoring real energy consumption and comfort parameters is crucial to evaluate the effectiveness of the energy efficiency interventions in the municipal building stock.

The policy instrument will be improved by supporting new projects. The outcomes of the implementation of the action “Low-Carbon Public Buildings: Energy Efficiency in Forum Municipal Romeu Correia (FMRC)”, being implemented in a municipal building (Forum Municipal Romeu Correia, FMRC), will provide useful information for the implementation of energy efficiency projects in other buildings. The introduction of EM-ICT tools that can improve the level of monitoring and effectiveness of the energy efficiency measures planned for this building (e.g. building envelope refurbishment; energy production; HVAC renovation), will allow to replicate it in other public buildings.

Intelligent and dynamic monitoring schemes focused on relevant parameters is a way to ensure information production and its subsequent use, because conventional approaches do not allow effective and fast monitoring of the measures implemented. These require human intervention, which in a context of shortage of staff, can be a problem. The adoption of innovative solutions with support from ICT systems will improve the strategy followed by POR Lisboa and can be a catalyser to expand these actions to other buildings, both in Almada and neighbouring territories. Also, collaboration between local public authorities and private companies is necessary to bring added



value to POR Lisboa by influencing the eligibility criteria of the projects to be financed under this policy instrument (e.g. innovative partnerships for ICT use and dissemination).

Comment on the Relevance of the Policy Instrument

POR LISBOA 2014-2020 and its investment priorities are “closed”, and no actions directly linked to the introduction of innovative solutions like the use of ICT tools for energy management and monitoring, which could be of great interest to public authorities, were prioritized. In the past, the typology of actions was targeted at performing energy audits and elaboration of Rationalization Plans for Energy Consumption; integration of solar hot water and PV generation and implementation of passive measures focused on the building envelope.

However, there is a consensus that the next Operational Programme, POR Lisboa 2020-2030, will have a special focus on the concept of smart regions (cities), promoting an efficient use of energy in public infrastructures; use of innovative technologies and contributing to the development of auto sufficient (nearly zero energy) buildings in the public sector.

Overall, it will give special emphasis on the automation of public infrastructures, creation of buildings networks, with intelligent control systems, producing/recoiling data for the region’s (city's) intelligent management system.

So, the improvement is still relevant and realistic since the implementation of successful actions related to innovative solutions, in the field of energy monitoring and management in public buildings, but also innovative partnerships for ICT use and dissemination will surely influence the design and implementation of the future POR Lisboa 2020-2030, whose strategic lines and measures are currently under consultation.

Background

AGENEAL is one of the nine partners in the consortium of the EMPOWER Project, More Carbon Reduction by Dynamically Monitoring Energy Efficiency.

EMPOWER started in January 2017, has a five-year duration and the Energy Agency of Podravje (Slovenia) is the lead partner.

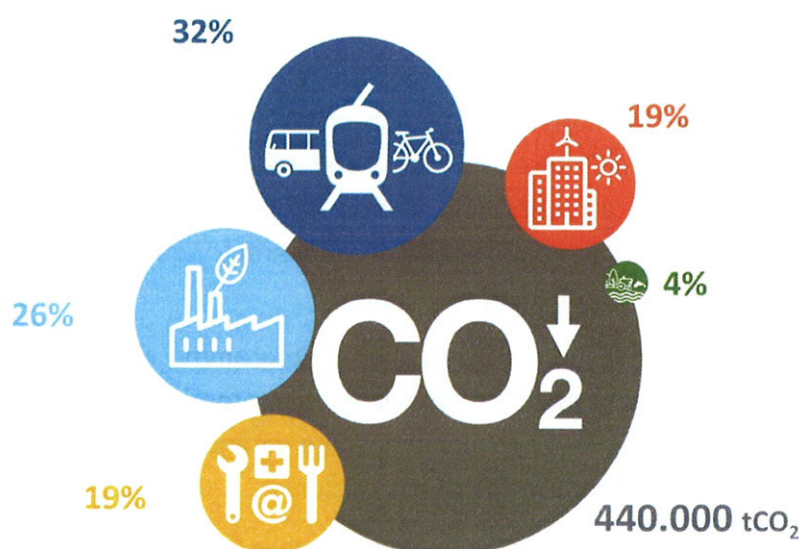
EMPOWER aims to reduce the carbon output by dynamically monitoring energy efficiency in buildings, with special focus on the use of innovative financial instruments.

The two overarching challenges addressed for the nine European cities and regions in the consortium are as follows:

- Reduce CO₂ emissions from buildings using new technology and better management;
- Increase investment in energy efficiency to meet the EU's CO₂ reduction targets.



In Almada, the residential subsector and the services subsector, which together constitute the large sector of buildings, represent almost half of the total energy consumption. As presented in the following picture.



The commerce and services sector includes the energy consumption of the Municipality of Almada, which provides a wide range of public services to residents and visitors at the territories under their management.

Among others, the municipal activity includes environmental, social, educational, cultural, economic, mobility, urban development and land management services, whose energy consumption must be permanently monitored and optimized.

The rational use of energy in municipal buildings, associated with the introduction of renewable energy production systems, are two fundamental aspects for the development of a low carbon strategy by the Municipality of Almada.

This approach is already embodied in the Portuguese regulations, which sets the energy performance levels of buildings. The regulation stipulates that new buildings licensed after 31st December 2018, owned by a public entity and occupied by a public entity, must have nearly zero energy consumption.

This requirement implies that the energy performance of buildings reaches a more efficient level in terms of the building envelop, energy consuming systems and, above all, energy production systems, the installation of which is essential to achieve the highest energy efficiency class.

Thus, the paradigm observed in most new building projects, but also in rehabilitation interventions, will have to be profoundly changed to accommodate and respond to the challenges ahead.

The building should become an energy producer rather than a passive consumer and be able to generate much or ideally all of the thermal and electrical energy that the uses it supports require.



Any excess production will be injected into the public distribution network, contributing to the logic of decentralized production and energy autonomy of cities, which is one of the pillars supporting the evolution towards a low carbon community.

The implementation of the EMPOWER Project, in Almada, is in line with the challenges identified within the consortium that foreseen the achievement of energy savings (up to 5% per year) in public infrastructures, developing energy efficiency measures based on the use of ICT (i.e. introduction of intelligent energy monitoring systems in public buildings), contribute to the development of the smart city model and also specific indicators for monitoring energy, costs and CO₂ emissions. And linked to this is the aim to contribute for the acceptance of energy efficiency projects by the financial institutions and private investors and increase the investment capacity of the public sector.

Part III – Details of the Actions Envisaged



ACTION 1:

Name of the Action: “Low-Carbon Public Buildings: Energy Efficiency in Forum Municipal Romeu Correia (FMRC)”.

The action it's targeted at increasing energy efficiency and promote the introduction of RES in the Forum Municipal Romeu Correia, FMRC, building, contributing to reduce its energy bill and CO₂ emissions.

1. Relevance to the Project

During the Exchange of Experience Activities of the EMPOWER project, AGENEAL had the opportunity to learn about and visit other partners Good Practices. Particularly interesting for Almada Regional Action Plan were the following Good Practices targeted at delivering efficient and innovative solutions for energy monitoring in public buildings and also new approaches in the field of financing energy efficiency and RES projects:



- GP 5-2: “Raspberry Pi electricity monitoring and free software data collection” - The city of Lorient wanted to set up a system for collecting and displaying the consumption and production of energy in its buildings. In order to reduce energy consumption. Rather than using commercially available, proprietary, closed and expensive systems, it has chosen to use the world of free software;
- GP 5-3: “Citizens, owners of solar panels” - The citizens from the city of Lorient have created “Oncimè”, which means “let’s do it” to finance 174 solar panels in 2016/2017 and 106 new solar panels in December 2017. Besides developing renewable energies, the 82 campaigners reclaimed the French energetic policy and steer it towards active democracy;
- GP 1-1: “Energy, CO₂ and financial monitoring system in 200 public buildings: software used by the energy agency as the energy manager and building’s managers” - Energy monitoring system implemented by the Municipality of Maribor. It is a web-based monitoring tool using special software programme for monitoring and analysing energy related data and preparing reports.

The first study visit in which AGENEAL has participated was held in Maribor, 12th and 13th of December 2018, hosted by the LP (ENERGAP). The delegation from Almada included only AGENEAL staff.

Among the GP’s presented by ENERGAP, GP 1-1 has influenced the drafting of the Regional Action Plan for the EMPOWER Project and is directly linked to one of the investment priorities identified for the action and described later in this section – the priority related to the Introduction of EM-ICT tools (energy monitoring and management) in the FMRC building. In this sense, AGENEAL had the opportunity to gain insight into the operation and management of the energy monitoring systems used for public buildings in Maribor.

Based on the lessons learned, AGENEAL gained a clearer vision about the possibility of introducing a similar energy monitoring and management system in public buildings at Almada. Also, the methodology used for energy data recoil and analysis has been discussed in detail with staff from ENERGAP directly involved in this task. This has been essential in order to help identify the technical specifications for the energy monitoring and management system to be implemented in the FMRC building.

The GP’s 5-2 and 5-3 were presented by the Municipality of Lorient during the Technical Workshop “Energy Monitoring, Regulation and Management”, held in Almada, 24th and 25th of October 2018 and the Technical Workshop “Innovative Financial Instruments”, held in Magdeburg, 4th and 5th of December 2018. Both GP’s informed the initial draft of the RAP for Almada, in the sense that they allowed the identification of innovative solutions for energy monitoring and management in public buildings, based in the use of low-cost technologies and freeware (GP 5-2: “Raspberry Pi electricity monitoring and free software data collection”). But also, innovative financial instruments for financing energy efficiency and RES projects (GP 5-3: “Citizens, owners of solar panels”).



The approach used by Lorient, for both GP's, worked as a boost to Almada's intention of implementing an intervention aimed at improving the energy and environmental performance of an iconic municipal building.

The general idea consisted of introducing, in a preselected building, energy efficient systems for indoor lighting, HVAC and energy production, using RES whenever possible. This intervention also foreseen the introduction of an energy monitoring and management system aimed at assessing in real time the improvements obtained as a result of the implementation of the energy efficiency measures identified for the building.

In conclusion, the study visit organized by the LP, in Maribor, has strongly contributed to gain insight into technical solutions already implemented in several public buildings, under supervision of the local energy agency.

Particularly, the GP 1-1: "Energy, CO₂ and financial monitoring system in 200 public buildings: software used by the energy agency as the energy manager and building's managers", which informed the development of the RAP for Almada by supporting the decision on the EM-ICT tools to be implemented in the action.

Also, the technical workshop held in Almada played an import role in the definition of the technical specifications for the energy and monitoring system selected for the FMRC building and the methodology to be used for data recoil and analysis.

In addition, the opportunity to have this intervention co-funded by POR Lisboa 2014 – 2020 made it possible to evaluate other options in terms of energy monitoring and management systems to be used in the action, that are cost effective and suitable based on the building typology.

Therefore, these GP's have influenced the Regional Action Plan of Almada. The opportunity to share experiences and learn about other cities good examples and success stories reinforced its sustainable energy actions within the scope of the EMPOWER Regional Action Plan.

Overall, the main outcome of this action is closely linked to the **adoption of innovative solutions, with support from ICT systems, in the FMRC building**. As it will contribute to an **effective and fast monitoring of the energy efficiency measures implemented**; allow for the **support of new projects related to energy efficiency in the remaining buildings run by the municipality** and **improve the strategy followed by POR Lisboa**, by focusing on major benefits such as increased comfort levels (Annex 1 - Ex-Ante/Ex-Post evaluation on the level of comfort experienced by the building users).

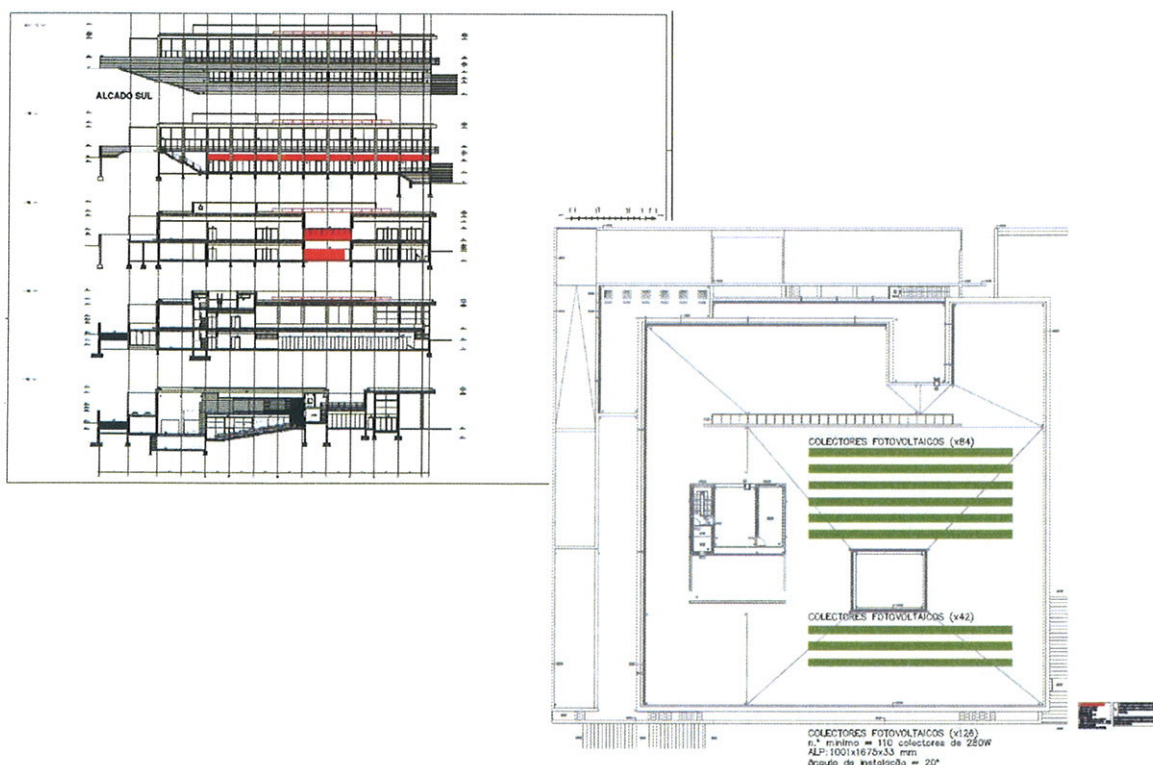
2. Nature of the action

The action "**Low-Carbon Public Buildings: Energy Efficiency in Forum Municipal Romeu Correia (FMRC)**" aims at increasing the energy efficiency of the FMRC building, **reduce the energy consumption and also improve thermal comfort among the users and visitors**.

Based on the energy audit of the building, the following measures will have a significant impact on its energy performance (the energy class will be improved up to four classes).

Therefore, they are the investment priority of this action:

1. **Improvement of the building envelope (new shading systems for the windows facing southeast, southwest and northeast);**
2. **Renovation of the HVAC system;**
3. **Renovation of the interior lighting system;**
4. **Introduction of a RES system (PV system for energy production);**
5. **Introduction of EM-ICT tools (energy monitoring and management).**



The **combined implementation of all five energy efficiency measures** will contribute to significantly **improve the energy performance of the FMRC building** (from class C to A+) and **decrease its energy consumption, in 68%**, as well as the associated CO₂ emissions.

The **introduction of EM-ICT tools** in this building will allow an **effective assessment of this intervention**. The **existing systems** (HVAC, PV and lighting) **will be linked to a general supervisor PC**, located in the ground level of the building, **which will be responsible for the energy monitoring and management of all the equipment linked to intranet controllers**.

All these controllers are programmable, connected between each other and to the supervisor PC, using the intranet. The communications will use intelligent protocols, responsible for assuring that all controllers have an equal access to the intranet.



This solution provides a set of relevant functions and procedures, linked to the supervision and management of the building systems, that will significantly contribute to improve its energy and environmental performance.

In addition, an **Ex-Ante/Ex-Post evaluation on the level of comfort experienced by the building users** will also be included in the RAP annexes. This technical study will consist of an evaluation based on ISO EN 7730, EN 15251 and/or ASHRAE-55: “Occupants Survey and Physical Measurements”, that takes into account six environmental and personal factors: temperature, thermal radiation, humidity, airspeed, activity level (metabolic rate) and occupant clothing (degree of insulation).

3. Stakeholders Involved

Almada City Council and AGENEAL, Local Energy management Agency of Almada are responsible for the overall coordination and implementation of the action “Energy Efficiency project for Forum Romeu Correia”.

The following stakeholders will provide valuable support and expertise in the implementation of the action:

- Blueorizon is responsible for the design of the new air conditioning, lighting and PV systems for the FMRC building;
- Sotecnisol will be responsible for the installation of the PV system for energy production;
- Instalclima will be responsible for the installation of the air conditioning system;
- Ubiwhere will provide insights and experience in the field of ICT tools for monitoring and management of energy consumptions and CO₂ emissions;
- ISA will provide insights and experience in the field of ICT tools for monitoring and management of energy consumptions and CO₂ emissions;
- IPS will be responsible for the elaboration of the Ex-Ante/Ex-Post evaluation on the level of comfort experienced by the building users.

After the technical and financial execution of the intervention, the following stakeholders will also provide valuable support to the action:

- ADENE, National Energy Agency provides technical support to the Managing Authority in funding of energy efficiency projects and therefore is a relevant decision maker. Since ADENE is also one of the 17 Associates of AGENEAL the collaboration, validation and dissemination of the action will be assured;
- AML, Lisbon Metropolitan Area has responsibilities in the management of structural funds programmes in the Lisbon Region and an history of partnership with AGENEAL and Almada City Council in the development of EU funded projects and local initiatives in the field of energy efficiency. Its direct involvement will be fundamental for the success of the action and surely influence the design and implementation of the future POR Lisboa 2020-2030 whose strategic lines and measures are currently under consultation;



- CCDRLVT, Coordination Commission and Regional Development of Lisbon and Tagus Valley is the Portuguese entity responsible for Structural Funds programmes in the Lisbon Region and also the Managing Authority (MA). As stated in “Part II – Policy context” of the RAP, “Comment on the relevance of the policy instrument “, POR LISBOA 2014-2020 and its investment priorities are “closed”. Therefore, it has not been possible to have the direct involvement from CCDR-LVT in the action.

AGENEAL kept the MA informed about the project development and promoted their involvement in the action, namely by inviting them to share their experience/expertise during the interregional learning events held in the framework of the project.

Overall, these stakeholders were actively involved in the exchange of experience activities carried out in the framework of the EMPOWER project. Mainly, in the preparation and dissemination of the interregional cooperation activities held in Almada, which included the Technical Workshop “Energy Monitoring, Regulation and Management”, in October 2018 and the Import Workshop “Innovation in the Financing of Low Carbon Technologies for Smart and Circular Cities “, in May 2019.

During the interregional cooperation phase, AGENEAL has also promoted individual meetings with these stakeholders, that have been essential to keep them informed about the project developments, gather their contributions on the planned activities and mostly to strengthen their engagement in the action.



4. Timeframe

Six months counting from the signature of the Subsidy Contract of the action, is the timing envisaged for the technical execution (which is expected to be complete in the last trimester of 2020). As for the financial execution of the action is expected to be finalized in the first trimester of 2021.

5. Costs

The **estimated costs for the implementation of the action** “Low-Carbon Public Buildings: Energy Efficiency in Forum Municipal Romeu Correia is of **€ 403 877,00**.

The action will consist of several interventions. Namely, it will focus in the following five typologies:

- i. Improvement of the building envelope (new shading systems for the windows facing southeast, southwest and northeast) | € 14.344,67
- ii. Renovation of the HVAC system | € 274.483,00
- iii. Renovation of the interior lighting system | € 14.110,29
- iv. Introduction of a RES system (PV system for energy production) | € 70.939,04
- v. Introduction of EM-ICT tools (energy monitoring and management) | € 30.000,00

6. Funding sources

This Action will be **co-funded by POR Lisboa 2014 – 2020**, up to € 200 000,00, **and City Council own resources**.



7. Regional Action Plan Endorsements

The Local Energy Agency of Almada – AGENEAL and Almada City Council acknowledge the added value of the EMPOWER project and its contribution to the ROP Lisboa 2020 and/or other national mainstream programmes, provided through the identification of Good Practice (s) and Interregional learning and the development of this Regional Action Plan.

The Local Energy Agency of Almada – AGENEAL and Almada City Council consider the potential import of the Good Practices (s) and Interregional learning mentioned in this Regional Action Plan, with necessary adaption according to local context, to represent a valuable input for further development of energy efficiency measures and reduction of CO₂ emissions in Almada.

We hereby confirm our support for the import and implementation of the Good Practice (s) as described in this Regional Action Plan as well as for the action reported in Part III of this document.

Name & Function:

Ms. Catarina Freitas

**Head of Department, Department of Innovation, Environment,
Climate and Sustainability, Almada City Council**

Date: 09/03/2020

Signature: _____

Name & Function:

Mr. Carlos Sousa

Director, Local Energy Agency of Almada

Date: 09/03/2020

Signature: _____