# ACTION PLAN

## Action plan to be implemented in the 2030 Climate and Energy Plan of the Barcelona Metropolitan Area

Verified 29.03.2021

# Part 0 – Introduction

SmartEdge address the potential for greenhouse gas emission reductions that lie in the development of smaller cities within metropolitan areas. Edge cities are an integral part of the existing metropolitan fabric and may be laboratories for smart, green, economic solutions and have the opportunity to play a crucial role in the low carbon economy.

The overall objective of the project is to improve low carbon economy policies in edge cities and their metropolitan regions. To achieve this, eight partners from the metropolitan areas of Akershus, Barcelona, Brandenburg, Ilfov, Krakow, Milano and Stockholm, and the Romanian Ministry of Environment will exchange experience, transfer good practices and facilitate learning between the partners on innovative tools for urban planning. This exchange of experiences has been carried out through 5 thematic workshops. The topics covered are:

- **Multi-level governance**
- **Participation in urban and climate and energy planning,**
- **Business development based on energy production,**
- **Energy efficiency and energy systems in the built environment**
- **Energy efficiency and energy systems in the transport sector**

Transport and buildings represent the lion's share of our emissions, and may be reduced through efficient policies on a local and regional level. Smart Edge will in particular explore the potential for local renewable energy production, reduction of emissions from transport through renewable energy and energy systems ad reduction of emissions from buildings through renewable energy and energy systems. SmartEdge is expected to result in improved low carbon economy policies in edge cities and their metropolitan regions.

In particular the metropolitan regions will prepare and implement action plans to improved selected seven policy instruments by sharing solutions for Integrated Strategic Planning for edge cities and their regions, providing tools and methods for multi-level governance and participatory planning, actively including the edge cities and other stakeholders in the metropolitan areas, and develop policy recommendations. 205 MEUR in Structural funds and 124,8 MEUR in other funds of other funds are estimated to be influenced by the project.

In this context, the action plan of the metropolitan region of Barcelona is presented.

# Part I – General information

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|---|---|
| *Project:* | **SmartEdge** |
| *Partner organization:* | **AMB. Àrea Metropolitana de Barcelona** |
| *Other partner organizations involved:* | - |
| *Country:* | Spain |
| *NUTS2 region:* | Barcelona metropolitan region |
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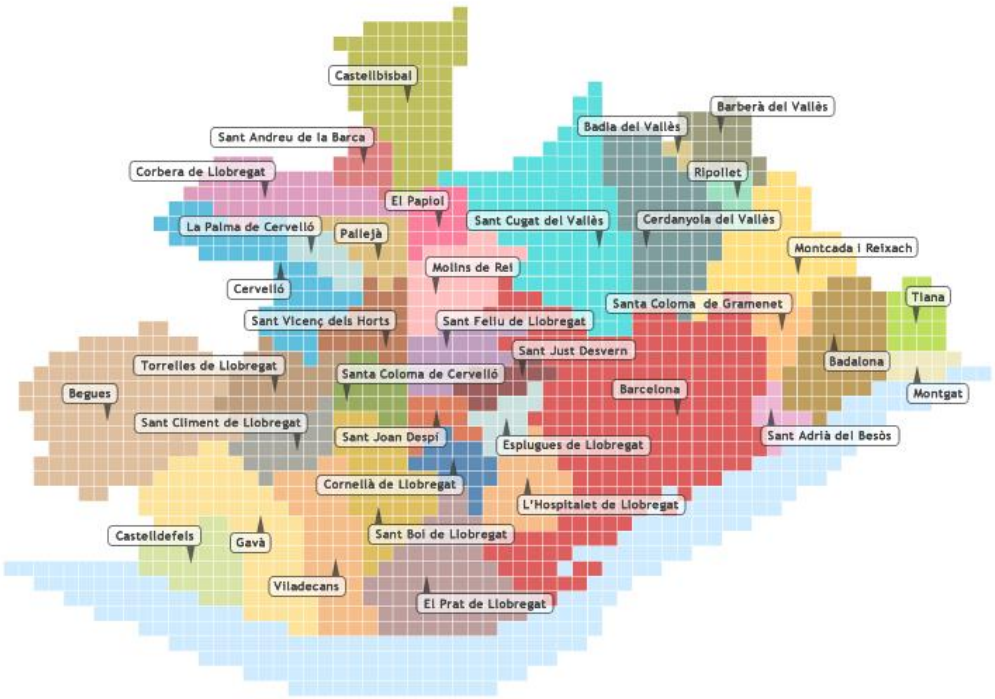
## The Barcelona Metropolitan Area

The Barcelona Metropolitan Area (AMB) is the public administration of the metropolitan area of Barcelona, which occupies 636 km² and encompasses 36 municipalities with more than 3.2 million inhabitants.

The metropolitan area is a territorial, social, demographic, economic and cultural entity formed during the last century as a product of the growth and connection of urban systems around the city of Barcelona. This is the largest metropolitan conurbation in the western Mediterranean, which generates half of the GDP in Catalonia.

AMB management areas are related to territory and urban planning, mobility, housing, environment economic development and social cohesion.



# Part II – Policy context

The Action Plan aims to impact:

X Investment for Growth and Jobs programme

☐ European Territorial Cooperation programme

X Other regional development policy instrument

Name of the policy instrument addressed: **Catalonia's ERDF Operational Programme 2014-2020 (Axis 4) / Climate and energy plan 2030**

## Catalonia's ERDF Operational Programme 2014-2020 and Climate and energy plan 2030

Catalonia's ERDF OP prioritizes knowledge and innovation, entrepreneurship and green economy. Axis 4 promotes the transition towards a low carbon economy, and one of its investment priorities is the promotion of carbon reduction strategies for all sectors. Axis 6 focuses on resource efficiency and the protection of the environment, and one of its priorities is improving the urban environment and revitalization of cities.

The Action Plan are in line with the Priority Axis 4 and Axis 6 of the OP FEDER Catalunya 2014-2020, with the aim of favoring the transition to a low-carbon economy in all sectors; due the deadlines of the Action Plan of the Smart edge project that will be implemented after 2020, the implementation phase is from 2021-2023, the project will not influence anymore this Policy instrument that finish in 2020.

AMB and SMART EDGE Action Plan achieve the goals set in this policy instrument and are in line with the new goals 2021-2027 a greener, low-carbon and resilient Europe through the development the Barcelona Metropolitan Area Climate and Energy Plan 2030. This plan is aimed to address the commitments of the climate change, with the aim of moving towards carbon neutrality in the metropolitan territory through a true energy transition and it can become one of the key measures for achieving the goals for sustainable urban mobility and climate adaptation in the Barcelona Metropolitan Area.

Moreover, SMART EDGE will contribute to the general objectives as well as the sustainability goals regarding sustainable development and environment, i.e. reducing energy consumption and emissions, local air pollution, noise pollution, promoting green infrastructure and fostering a sustainable mobility system. The Climate and Energy Plan 2020 constitutes the metropolitan strategy in terms of energetic transition and climatic change for the year 2030 in order to get closer to carbon neutrality of the metropolitan territory, and to integrate the energetic sovereignty, drive renewable energies, efficiency and energetic saving, reduction of the emissions of GEH and adaptation at the climate change objectives

The SMART edge project Action Plan is focus on the EU commitment to become climate-neutral by 2050, looking for the new program period 2021-2027, with a special focus on energy, increased efforts will be necessary to achieve the key element of the amended directive (EU 2018/2002), the European Green Deal provides a roadmap for making the EU's economy sustainable with action to boost the efficient use of resources by moving to a clean, circular economy, and to restore biodiversity and cut pollution.

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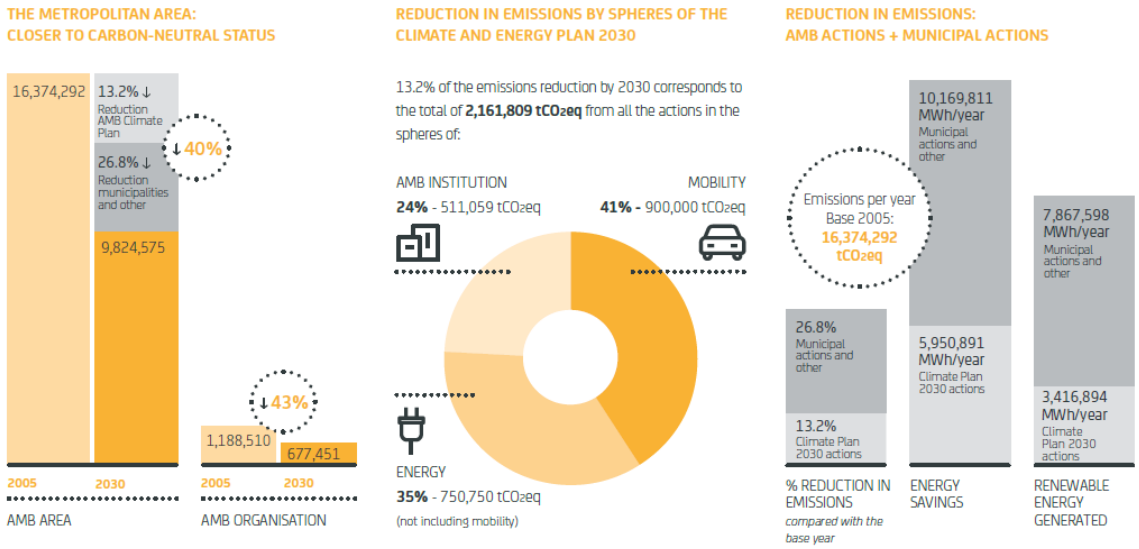
On the service field of the AMB (waste treatment, water cycle, mobility, etc.), the Climate and energy plan 2030 proposes the aim of reducing by 43 % the emissions in relation to the year 2005. However, taking into account all the foresee acts, with the of territorial and AMB, it's estimated that the Plan contributes with a reduction of 13,2 % of the emissions. To attain the European aim of cutting down 40 % it is necessary that everybody collaborates: city councils and other administrations, the principal logistic agents, the citizenry, etc.



# Part III – Details of the actions envisaged

## Action 1. Improvement of energy efficiency in schools through Energy Services Companies (ESCO)

### The background

In the presentation VIRTUOS TERRITORIES strategic action presented by the partners of Milan metropolitan City (CMM), it was found that the state of conservation and energy behavior of the schools in the regions of Milan and Barcelona is very similar. In both cases, these facilities are characterized by poor thermal insulation, very simple and inefficient energy systems and equipment, poor facility management, and a progressive increase in thermal discomfort inside the classrooms due to increased temperatures.

In both cases, traditional financing tools do not allow to intervene as quickly as the situation requires.

On the other hand, in the metropolitan region of Barcelona, schools are the public buildings with the highest energy consumption and, therefore, their performance has a great impact on energy consumption in the region.

In this context, the main learning from the action of the Metropolitan City of Milan (CMM) has been the implementation of improvements in the energy efficiency of schools thanks to the financing of interventions by a third party, through energy services companies (ESCO).

The energy performance contract is a contract through which a supplier (normally an energy saving company) is obliged to provide services and operations aimed at improving the energy efficiency of a plant or building owned by another subject (in this case, CMM ); The trade-off is related to the energy savings (previously identified during the feasibility analysis) that have been obtained at the end of the system's efficiency.

The opportunity to pair structural funds with energy performance contracts (with a guaranteed result) produces a virtuous effect in terms of expected energy returns.

The same synchronization of the two financing schemes allows mutual benefit for both projects, reducing implementation time and management costs. The joint resources will make it possible to achieve high and innovative standards, maximizing energy efficiency targets in terms of impact and reducing atmospheric emissions in buildings.

### Action

The proposed action consists of carrying out an energy improvement contract for 87 schools in the Barcelona metropolitan region through energy service companies (ESCO) through an energy performance contract with guaranteed savings (EPC).

At the same time, the action aims to know in detail the situation of thermal discomfort due to excess heat that is occurring with increasing frequency and evaluate the implementation of passive proposals that do not involve an increase in consumption to guarantee this thermal comfort.

Prior to the execution of the energy service contract, the energy audits of the 87 schools will be carried out with the following objective:

- Obtain a reliable knowledge of the energy behavior of schools.
- Identify and characterize the factors that influence energy consumption.
- Detect and evaluate proposals for improvement.
- Prepare the technical and administrative specifications for the ESCOs contract
- Define the technical scope of the service.

Although the energy audits will determine the technical scope of the contract, it is estimated that it will include energy efficiency measures mainly associated with improving the performance of heating equipment, replacing them with other more efficient ones and improving their management.

## Players involved

- Department of Education of the Generalitat de Catalunya
- 35 municipalities
- Energy Services Companies (ESCO)
- Energy consultants

## Timeframe

We are currently preparing the tender for the energy audits of the 87 schools is currently being prepared.

1. During 2021, we will carry out the energy audits, economic and technical evaluation of the energy efficiency measures to be implemented in the schools, and creation of the bidding documents for energy performance contract (EPC) with Energy Service Company (ESCO) of 87 schools in the Barcelona metropolitan region.

2. From May 2021 to December 2021, we will tender and award the Energy improvement contract for schools in the Barcelona metropolitan region through a energy performance contract (EPC) with Energy Service Company (ESCO).

3. January 2022 to December 2034 (12 years), commissioning of the contract.

## Costs

Costs of the actions are related in following up the measures proposed to improve the policy instrument. This includes involving staff, consultants and organizing conferences for proposing the measures and concepts for the municipalities and other actors.

- Contract for 87 energy audits of energy consultants and preparation of technical specifications (2021): 220,000€.
- Support for contract monitoring and verification of energy savings from 2022 to 2034: 522,000€. (43,500€/ year x 12 years)

## Funding sources

To fund the renovations: as in any ESCO contract, the savings will pay the investments needed

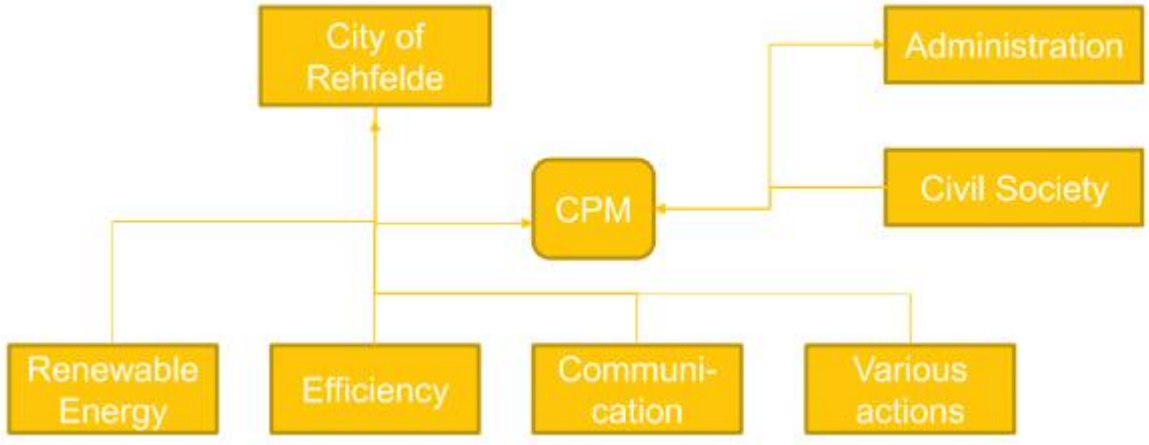
To implement the action: 20% working day of AMB senior engineer from 2020 to 2034.

## Action 2. Municipal Energy Management Service (POEEM)

### The background

On the second workshop in Ilfov the Brandenburg's partner presented the project Town of Rehfelde–Climate protection Management that resulted very inspiring.

It addresses a pilot trail carried out at the Rehfelde township, of 5000 inhabitants situated at 50km east of Berlin. In this project is defined the Climate protection manager figure that currently is based on the Energy Management concept.



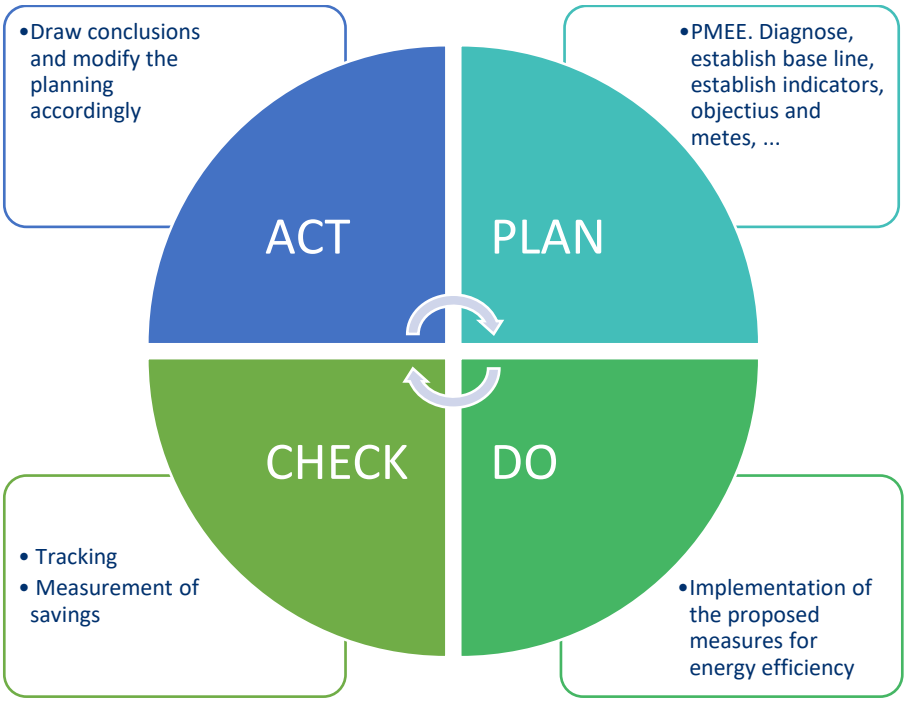

The Climate protection Management figure tries to give an answer to the same problematic that have a lot of city councils at Barcelona's metropolitan region. This problematic can predominately be condensed as a lack of human resources from the city councils that force them to earmark these resources to the most urgent actions, and consequently leave aside the less urgent but not less important, planning and energetic management.

### Action

Implementation of the joint energy management service for the 35 municipalities in the metropolitan area of Barcelona.

The aim is to integrate the projects that have been done over the last 4 years experimentally, into a global metropolitan building energy improvement strategy, which provides local energy agency services, together with support services between municipalities, weaving alliances with one another and emphasizing elementary and elementary schools, in order to continue the strategic NZEB schools project developed so far.

The idea is to implement a standardized municipal energy management system. It is for this reason that the methodology used in this energy management is based on ISO 50001 Energy Management Systems standard. This methodology is based on the cycle of continuous improvement or also called the Deming Cycle.




The energetic management concept is very wide, but in our project, it's defined as the organized procedure to forecast and control the energy consumption, with the purpose to obtain the most efficiency on the supply and usage of it, without diminishing the performance.

A systematized energetic management is the only way to guarantee savings sustained in time.

**The municipal plan of energetic balance** is the fundamental document of this action. It is the roadmap for the implementation of the energetic efficiency actions at a township to attain the aim of city councils 100% renewable at the 2030 on the metropolitan region (this document is what the UNE-AT 50.0001:2018 defines as energetic planning).

The municipal plan of energetic balance tries to be a changing tool to carry out the best energetic management.

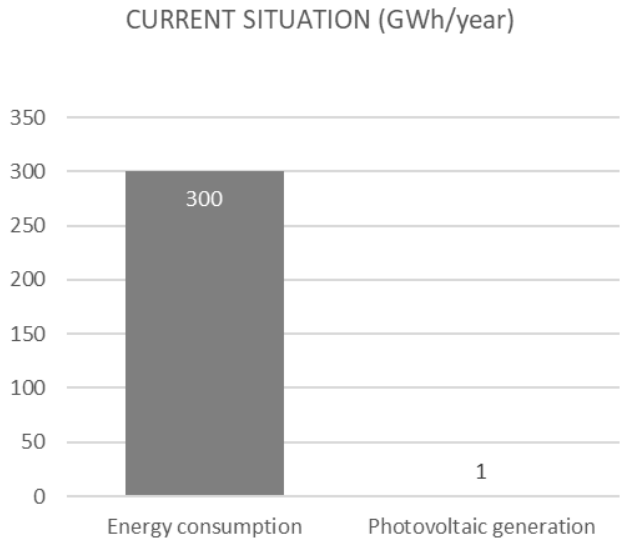
With this final goal, the PMEE:

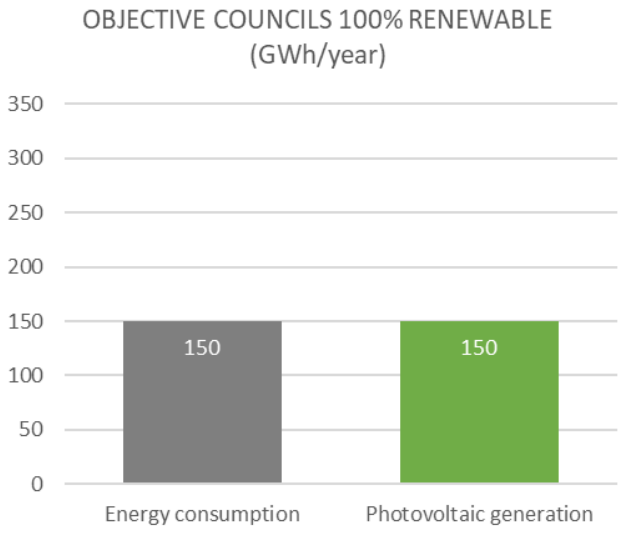
- It defines the line for energetic consumption (2019) to city council from which the specific aims and milestones will be defined in coherence with the PAES and the Climate and Energy 2030 Plan.
- It includes an analysis of the energy consumption at different scales with the aim to determine the main variants of the buildings and electrical panels energy consumption. As a result, identify and priorities the opportunities to improve the energetic achievement.
- It assesses the energetic efficiency improvement actions needed according to different typologies and equipment. They are organized hierarchically following an economic viability criterion, they are calendared and they are distributed to whom actor will carry it though.

The efficiency improvement actions that are collected in the municipal plans of energetic balance, are scheduled according to the bulk of the investment, period of amortization, accuracy on the savings calculus and necessity of prioritizing.

| Economic viability | Scale | | Investment | Amortization period | Accuracy calculation savings | Need for project to do it |
|---|---|---|---|---|---|---|
| High viability | 1 | Management and good energy practices with low investment | <2.000 € | < 2 years | Middle-High | no |
| | | | Priority | | | |
| | 2a | Actions with investments in energy efficiency | >2.000 € | < 5 years | Middle-High | no |
| | | | | < 7 years | High | |
| Low viability | 2b | | | > 5 years | medium-low | |
| | | | | > 7 years | Middle-High | |
| | 3 | Important energy renewal | >2000 € | - | - | yes |

The energetic management, along with the implementation of the photovoltaic will become the tool to achieve city councils 100% renewable by 2030.




## Players involved

- **Barcelona metropolitan area technical team.** The AMB technical team has the aim to carry out the Municipal Plan of energetic Balance, implement the actions for the management installation improvement, do the monitoring and verification of the savings achieved with the distinct actions and give advice and technical support at the city council.
- **35 townships.** The townships will have to engage into implementing the measures that will be assign to them, earmark part of the savings to other actions for energetic efficiency, ...

## Timeframe

1. Design of the joint energy management system and involvement of 3 municipalities in a pilot test. Currently as of May 2020.
2. Implementation of the energy management system in 3 municipalities. June 2020 to December 2020.

3. Implementation of the energy management system and energy monitoring of a total of 10 municipalities. 2021.
4. Implementation of the energy management system and energy monitoring of a total of 15 municipalities. 2022.
5. Implementation of the energy management system and energy monitoring of a total of 20 municipalities. 2023.
6. Implementation of the energy management system and energy monitoring of a total of 25 municipalities. 2024.
7. Implementation of the energy management system and energy monitoring of a total of 30 municipalities. 2025.
8. Implementation of the energy management system and energy monitoring of a total of 35 municipalities. 2026.

### Costs

Cost associated to human resources of the AMB:

- 2020. 1 working day of a specialist technician and 1,5 working day of a junior technician
- 2021. 1,5 working day of a specialist technician and 2,5 working day of a junior technician
- 2022. 2 working day of a specialist technician and 3,5 working day of a junior technician
- 2023. 2,25 working day of a specialist technician and 4 working day of a junior technician
- 2024. 2,5 working day of a specialist technician and 4,5 working day of a junior technician
- 2025. 2,75 working day of a specialist technician and 5 working day of a junior technician
- 2026. 3 working day of a specialist technician and 5,5 working day of a junior technician

Estimated cost associated at surveys of detail for experts: 315.000€

Estimated cost associated at performances of energetic efficiency: 17.346.117€

### Funding sources

Ways of paying the associated expenses with the savings achieved on the townships are being sought.

## Action 3. Photovoltaic ESCO

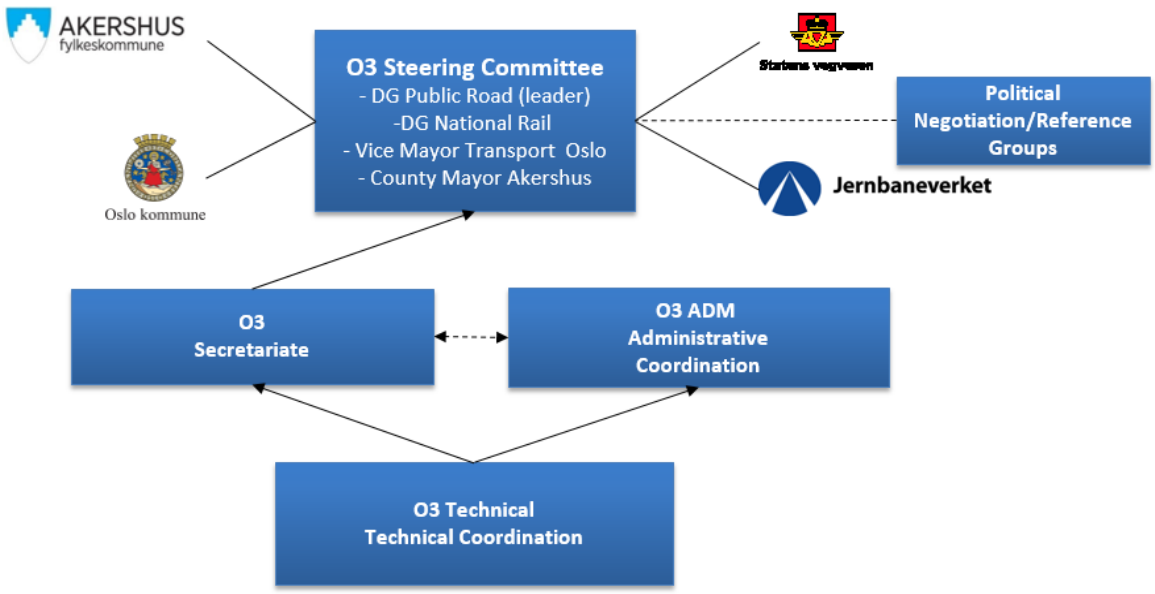
### The background

The strategies to fund the decarbonization actions has been a baseline during the Smart-Edge workshops. In particular, in the first WS in Oslo-Akerhsus, an interesting project of funding and multi-level governance has been presented: the Oslo Package-3.

The main lessons learnt were the supra-municipal structure that was set up to unblock sustainable investments on public transport. They created a multi-level governance mechanism that ensured an agreement on objectives between state and local level: zero growth goal from the state, 20% car traffic reduction from the municipality and climate strategy from the supra-municipal body.

Thanks to these learnings, AMB will apply a similar scheme focused on self-consumption rooftop PV on public buildings, with a guaranteed savings EPC-ESCO model. This will establish a commitment between municipalities and AMB for a long-term energy saving action. Through this, municipalities will have the obligation to transfer to AMB the savings gained thanks to the PV investment during 12 years, but at the same time they'll have a significant increase on renewable production, helping them to accomplish their climate goals.

It's also worthy to mention that the RenPLUS funding mechanism from Brandenburg has inspired this action in a particular way.




## Action

The action consists of the massive installation of photovoltaic plasterboard on the roofs of the AMB town hall facilities through private financing through an EPC (Energy performance contracting) contract with energy service companies (ESCO). The aim is to be able to install 10MWp of removable energy in the metropolitan region of Barcelona.

Financing through an ESCO makes it possible to speed up the process of implementing photovoltaics in the metropolitan area of Barcelona. The initial investment is made by the ESCO And from the savings achieved the investment is paid to the ESCO. On the other hand, the fact that the ESCO is the one that makes the initial investment at the time that the operation of the facility will guarantee the maximum production, since its income depends on the investment made.

The ESCO will make the initial investment and sell the energy produced in the equipment at a price slightly lower than the energy supply price.

Usually, this type of contract is formalized between two parties, the client and the ESCO. The critical point of this action is the contractual relationship that is established between 3 parties instead of 2:

- The ESCO that will make the investment and operation of the facility for the duration of the contract.
- The councils that are the owners of the equipment and energy supplies.

- The AMB, which on behalf of the 35 municipalities involved, signs the contract with the ESCO

## Players involved

- Barcelona metropolitan area technical an juridical team.
- 12 municipalities.
- Installing company or companies that will perform the installation and maintenance.
- Company or companies that will finance the operation

## Timeframe

1. 2020-2021. Financial and economic design and validation.
2. 2021. Juridical and legal design and validation.
3. 2021-2022. Public tender.
4. 2023- Initiation and execution of the contract.
5. 2023-2035. Execution, maintenance, management and exploitation of the installation.

## Costs

The investment doesn't represent an economic cost. The solar photovoltaic installation naturally produces economic savings which will be set aside for financing the investment cost.

Cost associated to human resources of the AMB:

- 2020-2021. 250 h of a specialist technician
- 2021. 100h of a specialist technician
- 2023-2025. 70h each year of a specialist technician

Estimated cost associated to previous studies: 7.000€

## Funding sources

Private financing. Private capital recovers investment through energy savings. Through an EPC (Energy performance contracting) contract with an ESCO. Where the ESCO will make the initial investment and operation of the facility. During the contract period the ESCO will be paid from the savings originating from the energy produced.