

Local Study and Action Plan

Reshaping Almada's Climate fund



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1. Local Framework - Almada

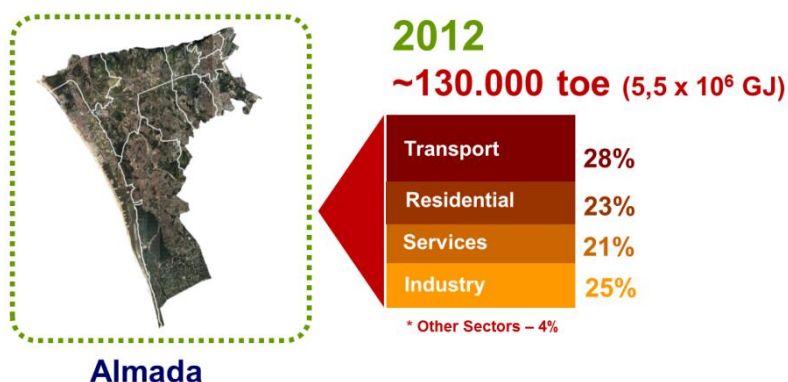
Almada's energy and environment framework

The local energy profile, the Sustainable Energy Action Plan and goals for 2020 – decarbonisation and energy transition

Located on the south bank of the Tagus River across from Lisbon, Almada is one of 18 municipalities within the Lisbon Metropolitan Area, with 180 000 full-time residents in an area of 72 km².

In spite of being mostly urban, Almada still manages to maintain and preserve 25% of its territory as a natural protected area of great natural richness and biodiversity. Almada confines with water to the East and North (Tagus River) and to the West (Atlantic Ocean), being its Atlantic beachfront a popular leisure destination within the Lisbon Metropolitan Area, attracting an estimated 8 000 000 visitors per year.

Due to its location in the Lisbon Metropolitan Area and its urban nature, transports and buildings (comprising services and residential) are the most important sectors in terms of energy consumption in Almada.



Almada has adopted a Local Development Strategy, which has been used as the framework for the local activity for the last 3 decades. Each of these decades has then been devoted to a particular topic related to the local needs and reality at each moment, which has allowed the City Council to follow a balanced, smooth and coherent development pattern, based in solid sustainability criteria.

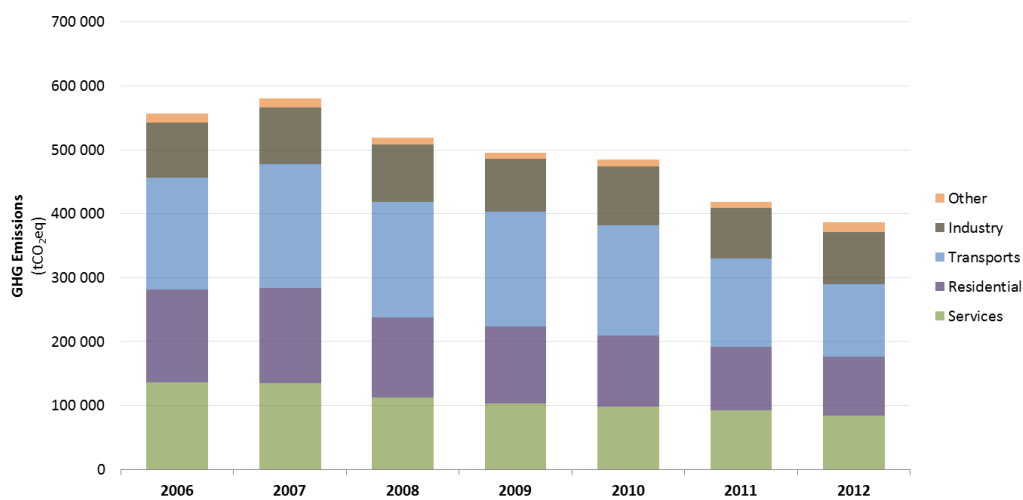
For the current decade, Almada City Council has adopted the motto “Almada+: Sustainability, Solidarity and Eco-Efficiency”. The objectives of this motto are to pursue a develop pattern in Almada along the following guiding principles:

- Establish Almada as a territory of high environmental quality, whose territorial identity lays on the Tagus estuary and its Atlantic dimension;
- Consolidate Almada's Green Infrastructure, which safeguards the biophysical functions of the territory;
- Achieve an efficient and smart use of natural resources;

- Reduce environmental impacts of the different activities developed in its territory and promote an efficient energy use, to foster a progressive energy transition leading to a low carbon city.

These guiding principles are expressed in the different development guidelines that pursue the objectives stated above. In the field of “Environment, Biodiversity and Energy”, Almada has been implementing its Local Strategy for Climate Change, which comprises the dimensions of mitigation and adaptation. The mitigation component addresses the reduction of energy related carbon emissions, by saving energy through its efficient use and the replacement of fossil energy sources with renewable endogenous sources, thus paving the way towards a low carbon city. On the other hand, the adaptation component identifies and implements planning and management solutions that guarantee the resilience of the natural, urban, social and economic systems in Almada.

Almada’s commitment to these principles meant that, in 2001 it was the first Portuguese Local Government to produce an action plan for the reduction of the energy consumption. This sustained work led to the subscription of the Covenant of Mayors in February 2009, which entailed the production of the Sustainable Energy Action Plan, which has a CO_{2eq} 22% reduction objective, relative to the base year (2006). The latest evaluation data shows that Almada has already achieved a 30% CO_{2eq} reduction in 2012, which is beyond the most optimistic reduction scenarios. Despite the coherent policies and measures brought up by the municipality, it should be mentioned that the evolution identified is also a consequence of the abrupt changes in the economical framework and the large increase in the share of renewable energies on the electricity production profile in Portugal.



The mitigation component of Almada’s Local Strategy for Climate Change contains a number of actions targeted at reducing the energy consumption of the different activity sectors, namely buildings transports, which are crucial to attain the reduction objectives defined for energy consumption and GHG emissions.

In general terms, the work developed in Almada in the transport sector, as stated in the Sustainable Urban Mobility Plan, seeks to promote the accessibility to the different functions of the territory, based on a diversification of the transport system and on the co-modality between

public transport and soft (or active) transport modes, to ensure more sustainable and efficient mobility patterns. Moreover, a serious complementary effort is being made to promote the reconversion and rehabilitation of abandoned and older urban areas and adequate them to new functions, as an alternative to the creation of new urbanized areas.

All these efforts are leading to a reduction in the energy consumption in Almada have been developed with the support and in close partnership with the Local Energy Management Agency of Almada, AGENEAL, which has been established in 1999. AGENEAL acts as a technical advisor to the Local Government, but also as a local energy efficiency forum, bringing together public and private stakeholders for a stronger concerted action around the common objective of increasing efficiency, through the reduction of energy consumption.

2. Financing for energy efficiency – national and EU framework

Structural funds + EU financing + Nation Funds + Local Financing = relevant measures boost

The development of energy efficiency projects is strongly hampered by investment constraints; hence, new strategies for financing have been a top priority in the recent years at local, national and EU level.

Under these three dimensions there are some opportunities and restraints to be addressed:

EU funding – There are three main layers for financing available for municipalities: 1) Structural and Cohesion Funds (ERDF) - applications submitted to and evaluated by national authorities – can pay for equipment, 2) EU grants (e.g Horizon 2020) - can pay feasibility studies, dissemination and, in some cases, equipment, 3) Financial instruments – e.g ELENA, JESSICA – The later one's are hampered by restrictions on debt from local authorities and the scalability of projects. They imply a financial cost for the future since they work as a loan and the more immediate benefits are for third parties other than municipalities. In the near future, it is expected that Portugal2020 (partnership agreement that manages structural and cohesion funds in Portugal) will provide some resources for specific projects that can be used by the municipalities.

National funding – The national funding for energy efficiency projects has been very scarce on the last years. Currently, two main financing sources are available although they depend on call for applications that are sometimes very specific and sparse in time: the FEE (Energy Efficiency Fund), PPEC (Promotion of Efficiency on Electrical Energy Consumption).

Local funding – There are two main instruments for local funding, as thoroughly described in previous Infinite Solutions outputs: the Almada's Less Carbon Climate Fund,

Integrated approach for financing

An integrated approach to financing has been a key issue in the success of Almada's strategy for developing actions and measures related to energy efficiency and renewable energy production. The planning phase and pilot projects can be financed by EU grants and equipment and infrastructure combining the use of structural and cohesion funds and local funding

Almada's **mixed approach** to use the European and Local funds in the **most efficient way**,

Σ EU funding Structural and Cohesion Funds

+

Σ EU funding EU grants

+

Σ Local Funding

Σ Relevant and comprehensive cost-effective measures

It is especially critical to ensure that solid planning framework for intervention is in place. This will allow to develop a coherent pool of projects and implement them on a step-by-step approach. Two examples from Almada show exactly the how this can be addressed:

FLEXIBUS, Inclusive Mobility System of Almada

Preparation phase: Feasibility Study for the creation of the service and dissemination materials

Co-financed by INTERREG IVC (85%): FLIPPER Project



European Union
European Regional Development Fund

Implementation phase: purchase of 2 electric mini-buses

Co-financed by Structural Funds (50%)



Almada "Less Carbon" Carbon Fund (50%)



EcoEnLight, Telemanagement system for the public lighting in Almada + 100% LED traffic lights

Base Study + Pilot phase: testing in the feasibility of the new system

Co-financed by ICT-PSP Information and Communication Technology, Policy Support Programme (50%): BEST Energy Project



Implementation phase: purchase materials/equipments to cover 5% of total light points

Co-financed by Structural Funds (50%)



Almada “Less Carbon” Carbon Fund (50%)



The new rise of Energy Performance Contracts and ESCO's in Portugal

In Portugal, the ESCO's market is still fairly inexistent although with a rapid growth in the last years. Some success cases were identified in the private sector namely in large commercial buildings, industry and tourism sector but the use of this tool on the public sector has remained at a very low level mainly due to strong constraints on legislative framework (public procurement rules were not flexible in order to allow such approaches), some scepticism and lack of knowledge to ensure fair share of energy efficiency benefits and small scale of most public infrastructures.

In order to boost the market for ESCO, since it was identified by the Portuguese government as a useful tool for ensuring energy efficiency in the public sector, a series of legislation was launched in 2010. This included a legislative framework for ESCO companies and certification procedures and the launch of the Eco.AP program. European funds were channelled for these initiatives and calls for actions deliberately focused on ESCO's as main beneficiaries were set up.

The structure for a new public contracting scheme was created alongside with the architecture of the process and the contract draft to be followed by all public institutions was define. This allows a coherent framework for action and a consistent set of rules to be observed bothby public and private partners in ESCO's contracts.

Recently, this program was financed by the ELENA “European Local ENergy Assistance” tool from the European Investment Bank. It is envisaged that local authorities from the Lisbon region could have access to the fund although possibly only for high return, large scale projects such as LED lighting or public lighting investments. Either way, the funds available under soft loan will be directed to the ESCO's. The projects set up can have the support from the national energy agency – ADENE.

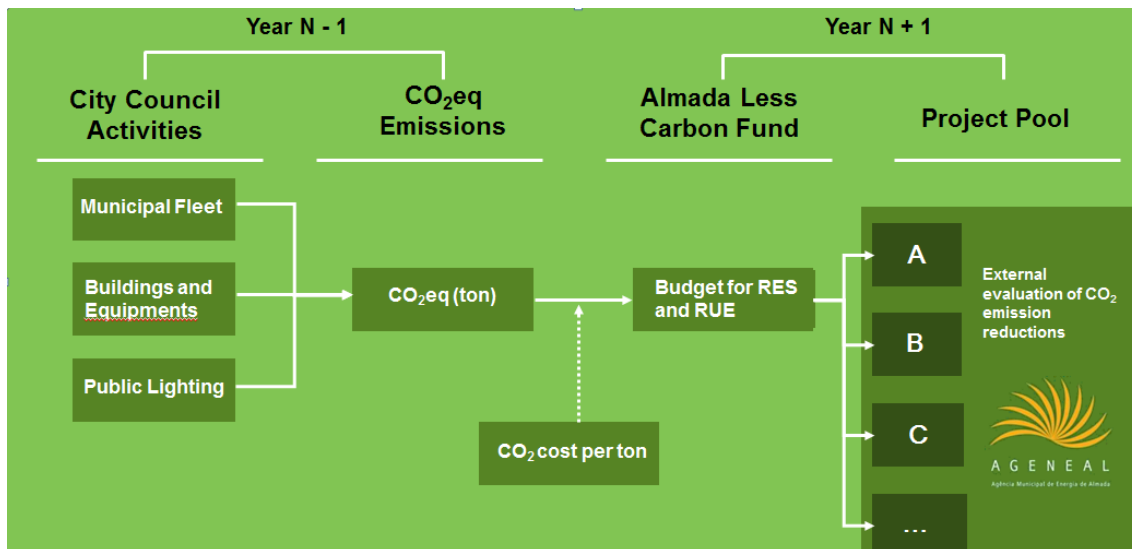
3. Local funding for energy efficiency and related schemes for revolving funds

The Almada's Climate Fund

Almada's Municipality large range of competences and responsibilities imply the development of several activities which are associated with energy consumption and greenhouse gas emissions (GHG).

In order to reduce its carbon footprint, Almada's City Council created the Almada Less Carbon Fund in 2009, a pioneer initiative amongst local authorities in Portugal and Europe.

The Fund is a voluntary scheme which fosters the City Council's investment in energy efficiency and renewable energy. It is supported by a simple economic valuation of the GHG generated by the City Council's regular activities. In the next picture a overall approach of the fund is explained.



Once the CO₂eq annual emissions attributed to the city council's activities are computed, a price per ton of CO₂eq is defined and applied to the global emissions. The total amount that results from the computation of annual emissions and carbon price is included in the next year budget for the municipality in a specific item dedicated exclusively to investments in energy efficiency and renewable energy. The fund is managed by the Almada Municipality, integrated in its yearly budget and the technical support is given by the Local Energy Management Agency of Almada.

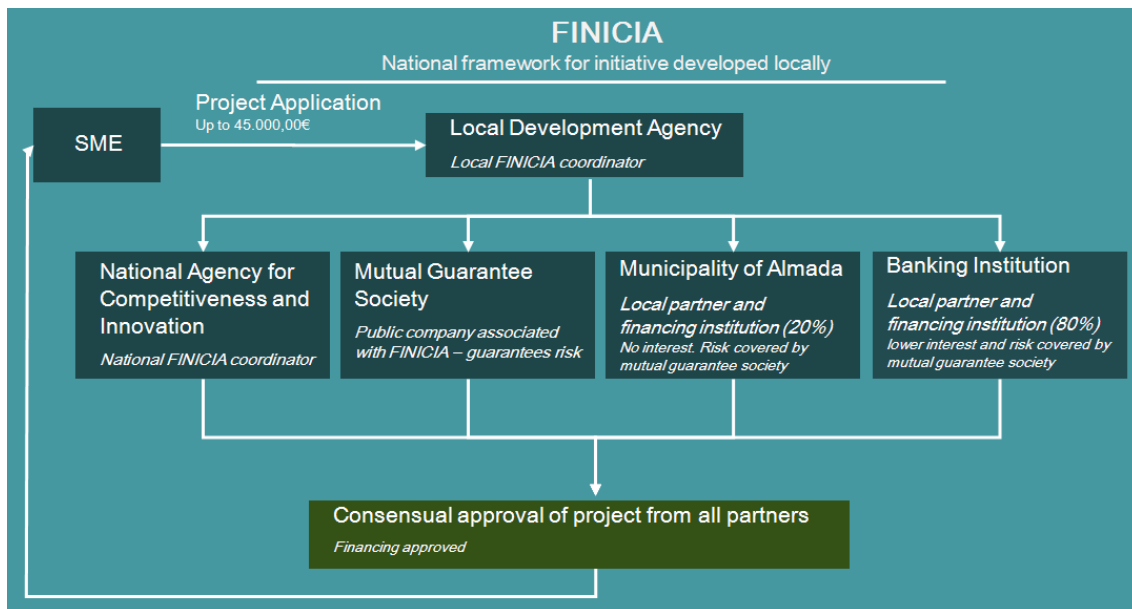
Based on the depicted methodology, the total amount available is applied for funding projects and measures identified in a pool of possible interventions. The selection criteria involve cost estimates, return on investment evaluation and GHG emissions reduction potential.

Projects are qualified for funding through the Almada Less Carbon Fund after an independent evaluation developed by the Local Energy Management Agency of Almada, AGENEAL, in order to guarantee that the principles of additionality and sustainability are followed. AGENEAL also

ensures the monitoring and evaluation of the projects in order to quantify the real CO₂e emission reductions achieved.

The Finicia Municipal Fund

The Finicia Local Fund is a financial support credit line created in the framework of the Support to Employment Creation and Investment Attraction Office and supported by the municipality and banking institutions. It is supported on a national framework, similar for several municipalities, but it is applied locally according to the will of the local partners and initiative of the municipality. It is aimed at SME's (small and medium-sized enterprises) located in Almada and for projects in the following sectors: industry, tourism, leisure and commercial including green business. The projects should also contribute for growth and development of the local economy and for job creation. In the next picture a overall approach of the fund is explained.



The fund is organized between the municipality, a local development agency, a banking institution, a mutual guarantee society and the National Agency for Competitiveness and Innovation (IAPMEI). The main contributors to the fund are the municipality and the banking institution. They provide soft loans to the applicant projects where 20% of the project is financed by the municipality with no interests and the remainder 80% are provided by the banking institution with an adjusted interest rate (with maximum fixed limit of Euribor 180 + 5,25%). The guarantee for the bank and for the municipality that the money comes back to the fund is provided by the mutual guarantee society in cooperation with IAPMEI.

4. Actions already developed (main results)

Under these financing schemes a series of projects have been developed such as:

- Tele-management system for the public lighting

- Solar hot water in 100% municipal sports facilities
- 100% LED traffic lights
- Energy efficient lighting and HVAC systems in municipal buildings
- Energy certification of municipal buildings
- Electric vehicles for the municipal fleet
- Efficient lighting in historical monuments
- Use of biomass waste from parks and gardens for heat production

Two of the most impressive achievements interventions are the tele-management system for the public lighting which includes dimming and the solar hot water in 100% municipal sports facilities. The tele-management project has been able to reduce the energy needs from public lighting in roughly 40% on almost 1200 light points, i.e, a reduction of nearly 0,6 GWh and 300 tons of CO₂eq. The savings estimated, which include maintenance and electricity cost savings, point to 80.000,00€ of yearly savings. The installation of solar water on all municipal sports infrastructures resulted on a consumption reduction of natural gas of about 0,5 GWh and a reduction of almost 40.000,00€ just on energy cost savings.

5. Reshaping the Almada's Climate fund

Legal and financial framework

Currently there are strong overall budget constraints and public accounting rules that make investments on energy efficiency not as fast as expected. Investments, especially large amounts of public money, are severely restricted which undermines the development of projects that are not strictly associated with fundamental attributions and competencies of local authorities. Still, rising costs for energy have been perceived as an opportunity for investment although a critical factor makes it difficult to couple energy consumption and energy billing. In fact, all bill payments are concentrated on the financial office since there is still no analytical accounting although it is a project being developed by the municipality. This can come as an opportunity and also a risk for the current reshaping of the Almada's climate fund since the current scheme will need to be updated if analytical accounting is to be set-up.

Opportunities for improving the current scheme

The current fund scheme has been detailed in the previous section and it has been widely successful since the money for investment on projects does not come directly from the beneficiary's department budget. This has created a demand for the fund as each department management realized there could be synergies from energy efficiency projects and their own goals without spending its budget (for example: a school needs a lighting refurbishment. If a project with efficient lighting is proposed, all the investment can be made exclusively through the fund).

This has led to successful cross sectoral/interdepartment alignment on RES/RUE investment overcoming one of the most constant barriers. Also, the fact that a third party ensured the technical screening of the projects, in this case the Energy Agency, made it possible to access more interventions (that would otherwise not be put through the screening from an energy perspective) and guarantee they are set maximizing energy efficiency.

Still, some opportunities for improvement have been defined namely the need to have a clear vision of the savings obtained and couple the fund to the savings in order to leverage it and make it more self sustained. These objectives can be perfectly obtained by transforming the fund with a revolving philosophy.

Recommendations on how to overcome the barriers

In order to take chance of the work already developed and also to minimize risks from projects from which energy savings do not generate large amounts of savings in monetary terms, a hybrid solution is to be placed for evaluation under the business plan to be developed. This solution uses the existing mechanism but mimicks the inflow to fund of energy savings and outflow to “client departments” based on the result of the projects.

Financial flows of the revolving fund – a first approach

Also, since the fund is already set up, it could be useful to maintain the current scheme of CO2 valuation to maintain a “base load” for investment. This means the fund will have a fixed budget determined yearly plus a variable portion to be fed by the savings of the projects.

The savings will then be shared between the client department and the fund with the largest benefits for the most interesting projects in terms of cost-benefit. If a project as a long payback time most savings should be directed to the fund. A detailed analysis and methodology of benefits sharing shall be defined within the business plan.

Stakeholder's engagement

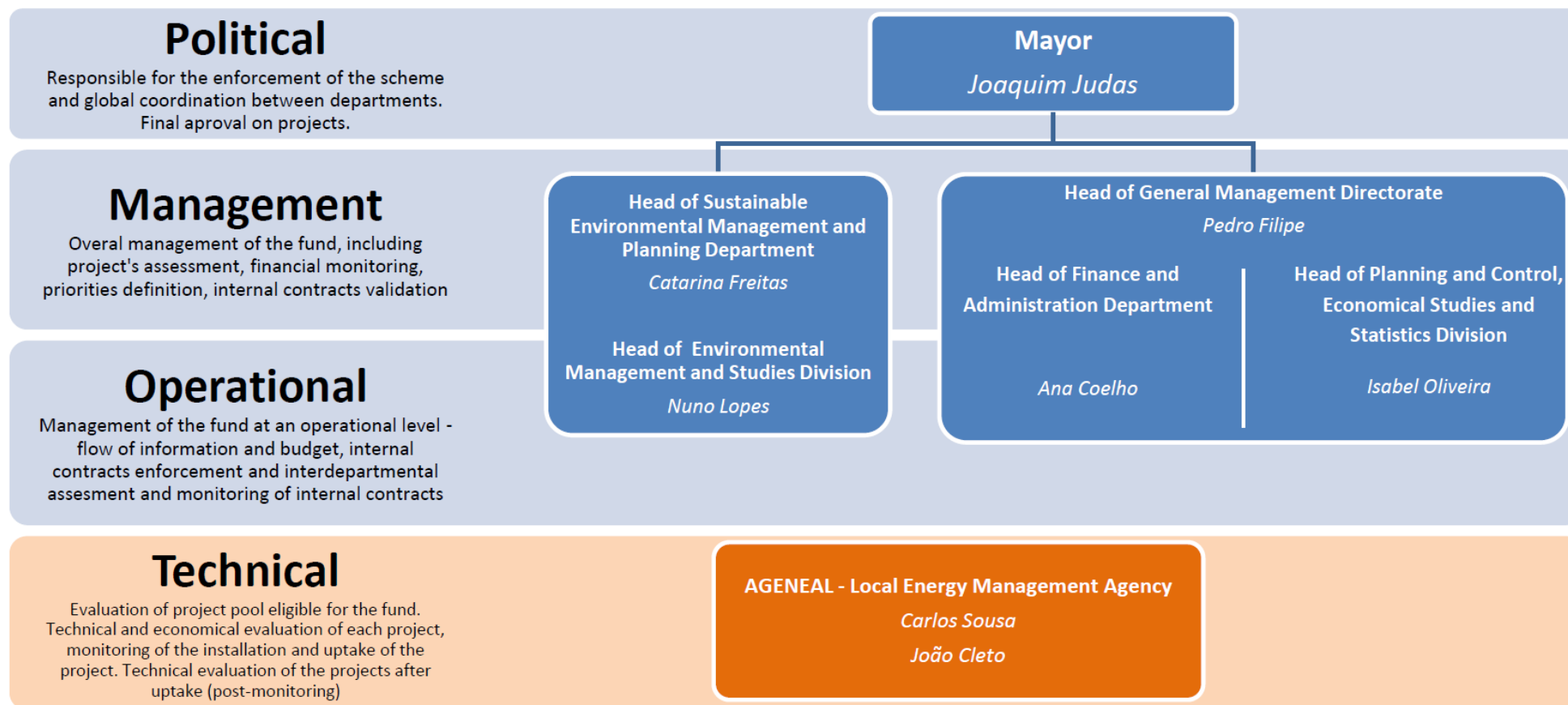
Stakeholder's involvement is a crucial part of the reshaping of the fund. The Infinite Solutions project is already being developed in close contact with the main departments directly involved, namely:

- economic planning department,
- financial department,
- environmental strategy department

These departments will work also as “leveraging” departments for the reshaping of the fund as crucial actors for the dissemination of the new tool and rules.

As for third parties involved the main stakeholder will be the Local Energy Agency in its role of local energy forum. It can relate directly with the main actors such as service providers; technology providers; consultancy firms; local and national stakeholders belonging to AGENEAL - national electricity distribution company, national energy agency, university, etc

Organizational chart and main competences of key staff



6. Local actions

Public lighting in Almada

| Public lighting | Action/description | Reduction potential | Economic evaluation |
|------------------------------|---|---|--|
| Telemanagement system | <p><u>Full potential: 29.700 light points in Almada</u> (562 PTs)</p> <p><u>Description:</u> expansion of telemanagement for public lighting with remote management and point to-point luminous flux definition.</p> <p>↳ ~15% of light points envisaged(4500 light points – roughly 1500 light points already in operation)</p> | <p><u>Energy consumption reduction:</u> 1749 MWh/ano</p> <p><u>Energy bill reduction:</u> 210.000 €/ano</p> <p><u>CO2 emissions reduction:</u> 0,6 kt CO2eq/ano</p> | <p><u>Total cost:</u> 540 000 €</p> <p><u>Payback period:</u> ~5 years</p> <p>The intervention can be phased in several stages</p> |

| Public lighting | Action/description | Reduction potential | Economic evaluation |
|--|--|--|--|
| Flow reduction with telemanagement on branch level (groups of light points instead of point to point) | <p><u>Full potential: 29.700 light points in Almada</u> (562 PTs)</p> <p><u>Description:</u> introduction of telemanagement on branch (groups of light points instead of point to point)</p> <p>↳ ~15% of light points envisaged(4850 light points)</p> | <p><u>Energy consumption reduction:</u> 1200 MWh/year</p> <p><u>Energy bill reduction:</u> 140.000 €/ year</p> <p><u>CO2 emissions reduction:</u> 0,4 kt CO2eq/ year</p> | <p><u>Total cost:</u> 575 000 €</p> <p><u>Payback period:</u> ~2 years</p> <p>The intervention can be phased in several stages</p> |

| Public lighting | Action/description | Reduction potential | Economic evaluation |
|---|---|--|--|
| Flow reduction with multilevel electronic ballasts | <p><u>Full potential: 29.700 light points in Almada</u> (562 PTs)</p> <p><u>Description:</u> introduction of multilevel electronic ballasts</p> <p>↳ ~16% of light points envisaged (5000 light points)</p> | <p><u>Energy consumption reduction:</u> 1300 MWh/ano</p> <p><u>Energy bill reduction:</u> 160.000 €/ano</p> <p><u>CO2 emissions reduction:</u> 0,45 kt CO2eq/ano</p> | <p><u>Total cost:</u> 250 000 €</p> <p><u>Payback period:</u> ~1 years</p> <p>The intervention can be phased in several stages</p> |

Energy efficient lighting and HVAC systems in municipal buildings

| Public buildings | Action/description | Reduction potential | Economic evaluation |
|---|---|---|---------------------|
| Innovation, energy efficiency and renewable energies in public buildings | <p><u>Description:</u> introduction of energy efficient technologies :lighting, insulation, natural ventilation, air conditioning capacitor banks monitoring / consumption management in real time Use of renewable energy.</p> <p>Interventions already made in various buildings and sports equipment. Extension to other buildings possible (headquarters building of the SMAS , workshops SMAS , Building Technical Services CMA)</p> | <p><u>Energy bill reduction already obtained :</u> 120.000 €/ year</p> <p>Further reductions to be evaluated on building by building approach</p> | N/A |

Efficient energy in schools

| Public buidings | Action/description | Reduction potential | Economic evaluation |
|--|---|---|---|
| Inovation, energy efficiency and renewable energies in public schools | <u>Description:</u> Replacement of conventional lighting for T5 and LED Installation of high efficiency fixtures / electronic ballast Motion detectors installation Strengthening building envelope(glazing and roofs) Introduction of solar thermal collectors | <u>Estimated savings :</u> 43.000 €/ year Further reductions to be evaluated on building by building approach | Intervention in all schools of the Municipal School Park (39) <u>Estimated Investment p / school :</u> 8000 € <u>Total cost:</u> ~315 000 € <u>Payback period of investment:</u> ~ 7 years The intervention can be phased in several stages |

Energy efficiency in social housing

| Public buildings | Action/description | Reduction potential | Economic evaluation |
|---|---|---|--|
| Innovation, energy efficiency and renewable energies in residential buildings – social housing | <p><u>Description:</u> Ongoing interventions in a residential building of social housing : project HERB Introduction of advanced energy efficiency and renewable energy technologies : lighting, insulation, natural ventilation, air conditioning monitoring / consumption management in real time renewable energy (solar hybrid system PVT with nano-coating for self-cleaning) . Possibility to extend the intervention to other buildings with standard technology Eco- district of creation .800.000 KWh / year Annual revenues : ~ € 190,000.00 / year</p> | <p>Comfort improvements with a strong impact on the well being of the inhabitants (increase of energy services provided by building).</p> <p>Energy bill reduction: fundamental to low-income households</p> <p>Saving potential in the pilot building - 90 % of consumption (nominal assumptions and considering the contribution PVT <u>solar system</u>)</p> | <p>From a strict cost effectiveness perspective the measure is not possible to be evaluated since the energy bill is not paid by the municipality but by the residents. Still the ancillary benefits created to the residents, the possibility of coupling with programmed interventions, the contribution for municipal targets on energy and climate and the possibility to capture some of the savings from the tenants makes it a fundamental measure.</p> |

Electric vehicles for the municipal fleet

| Public fleet | Action/description | Reduction potential | Economic evaluation |
|--|---|---------------------|---------------------|
| Electric vehicles for the municipal fleet | <p><u>Description:</u> Replacement of conventional vehicles with electrical ones.</p> <p>Several specific vehicles have already been introduced such as a minibus (flexibus) and urban cleaning and logistics</p> | To be defined | To be defined |

Efficient lighting in historical monuments

| Public equipments | Action/description | Reduction potential | Economic evaluation |
|---|--|---|---------------------|
| Efficient lighting in historical monuments | <p><u>Description:</u></p> <p>Replacement of conventional lighting by energy saving lamps and LED technology</p> <p>Reduction in the daily operating time of lighting systems</p> <p>Reducing energy consumption water pumps through electronic variable speed drives installation</p> | <p><u>Estimated savings :</u> 15.000 €/ year</p> <p><u>Energy consumption reduction:</u> ~ 30 %</p> | To be defined |

Solar PV on municipal buildings

| Renewable energy production | Action/description | Reduction potential | Economic evaluation |
|---|--|--|---|
| <p>Photovoltaic projects with significant scale - mini -production or photovoltaic energy production center</p> <p>Vale Figueira Park</p> | <p><u>Description:</u> Photovoltaic installation on the roof of the building Figueira Vale Park Available Area ~ 8000 m2 Excellent sun exposure - without any obstruction Use of available space in high consumption site) Possible effect of climate mitigation particularly in the summer - decreased cooling thermal load Joint intervention with the energy rehabilitation of viable building Great alternative location - does not imply occupation of natural , agricultural areas , etc.</p> | <p>Photovoltaic plant 7.000m2</p> <p><u>Energy Savings</u> ~ 1,800 MWh/year</p> <p><u>Annual revenues :</u> ~ € 190,000/year</p> <p><u>CO2 emissions reduction:</u> 0.58 kt CO₂eq/ year</p> | <p><u>Total cost:</u> 810 000 €</p> <p><u>Payback period:</u> ~5 years</p> <p>Financing for this project can be made thorough hybrid approach – local fund + ESCO + structural funds + private investment</p> |