Be-energi

Energia sostenible per als municipis gironins

Bundling sustainable energy investments for Girona's municipalities

Covenant of Mayors for Climate & Energy CoM East

Programa marc de recerca i innovació de la UE «Horitzó 2020».
Acord de subvenció núm. 649789.

Diputació de Girona

Authors:
Remei Aldrich Tomàs, Energy efficiency engineer
Eduard Batllori Alvarez, Energy efficiency engineer
Anna Camp Casanovas, Beenergi coordinator
Raquel Coll Serarols, Legal expert
Ariadna Vilà Quintana, Legal expert
Anna Sanitjas Olea, Forest engineer

Photos:
Roger Rovira Rius
Diputació de Girona

Design and layout:
Artic Studio / pereserrat.cat

Girona, March 2019

beenergi.ddgi.cat

Bundling sustainable energy investments for Girona's municipalities

Index

1 Executive Summary

The Girona Provincial Council's Beenergi program assists municipalities in Girona that have signed the Covenant of Mayors so they can mobilise investments to sustainable energy action plans (PAES) or sustainable energy and climate action plans (PAESC).

The main objective of the Beenergi program is focused on:

- **Contributing to meeting the European 2020 targets**
  Provide support to the 208 municipalities in the province of Girona (99.22% of the population) that have signed the Covenant of Mayors and whose goal is to reduce, by at least 20%, the CO_2 emissions in the European Union by 2020.

- **Improve municipal finances through energy savings**
  Energy savings will help reduce current expenses.

- **Establish a new model of multilevel governance among local authorities**
  Pooling investments in sustainable energy promotes economies of scale and simplifies administrative procedures. These new governance models can be replicated by other local authorities and can be exported to other sectors.

- **Create green jobs**
  The goal is to improve the competitiveness of the businesses and the talent of current and potential workers in the renewable energies and energy efficiency sector in Girona, by providing specific training programs on creating local small energy companies (MESCO).

- **Reduce the risk of forest fires**
  67.50% of Girona's surface area (317,771 hectares) is covered by forests. The biomass boilers installed in municipal buildings use local biomass fuel from municipal or private forests thanks to sustainable forest management.

Since April 2015, the Beenergi program has provided technical, legal and financial assistance to more than 110 of Girona's municipalities with the aim of carrying out actions that promote energy efficiency in public lighting and in municipal buildings, as well as creating heating networks using biomass fuels and locally producing sustainable biomass.

Thanks to the Beenergi program, in Girona 100 municipalities have improved their energy efficiency in public lighting and public buildings, generating a savings of 6.037,32 tons of CO_2, the mobilisation of 20.30 million euros in investments and 311 job creation[1]. Moreover, the contracts have produced an average energy savings of 32.22 %. It should be noted that more than34 municipalities are anticipating new contracts with micro energy service companies in the upcoming years that would generate a new investment of 16.1 million euros.

As far as improving energy efficiency in buildings, the Beenergi program has pushed for eliminating the use of fossil fuels in favour of using local sustainable forest biomass in 110 buildings in 45 municipalities. The consumption of this forest biomass has helped in reducing the risk of fires in 6,431 hectares of forest, thanks to sustainable forest management. At the same time, it has generated a savings of 2.612 tons of CO_2 and created 282 jobs. It should be noted that 15 more municipalities are planning to install biomass boilers in their buildings.

Additionally, the Beenergi program provides access to local energy consumption data and encourages sharing the results of the program throughout Europe so that these new schemes may be replicated in other regions.

[1] The number of jobs created was calculated using the ratio published in the document: Catalonia Energy and Climate Change Plan 2012-2020.

110 municipalities assisted.
6.037,32 tn CO_2 saved.
20,30 M eur in sustainable energy investments.
311 green jobs created.

2

Legal and technical assistance for the municipalities from the Service Plan for the Promotion of Energy Efficiency and Renewable Energies, and for the Promotion of Forest Biomass in Girona's municipalities

The Beenergi program´s technical team, together with the other members of Environmental Services, offers the municipalities that have signed the Covenant of Mayors free assistance from the Service Plan for the Promotion of Energy Efficiency and Renewable Energies, and for the Promotion of Forest Biomass in Girona´s municipalities. The Plan includes the following assistance:

1) Technical assistance needed to improve energy efficiency in outdoor public lighting, by signing contracts with energy service companies (ESCO) or using other types of financing.

2) Technical assistance needed to improve energy efficiency in public buildings, by signing contracts with ESCO or using other types of financing.

3) Technical assistance needed to install boilers or heating networks that operate on forest biomass or in combination with other sources of sustainable energy, and to carry out other installations to obtain greater energy efficiency in buildings, by signing contracts with ESCO or other types of financing.

4) Legal and technical assistance in the process of improving energy efficiency in public lighting and public buildings by signing contracts with ESCO or other types of financing.

5) Technical assistance for the production and consumption of forest biomass originating from sustainable and local sources.

6) Open data publication of municipal energy consumption data.

7) Financial assistance for investing in energy efficiency and renewable energies projects.

8) Contract monitoring with energy service companies (ESCO) or micro energy service companies (MESCO).

If a municipality requests assistance in carrying out energy efficiency investments in public lighting or for municipal buildings, the Beenergi program technical team will study the viability. If necessary, it will perform an energy audit public lighting, and in the case of buildings, the executive plan for installing biomass boilers or creating heating networks. Once the investment amount is calculated, the technical team analyses the different financing and contract options that best suit each municipality.

In total, 110 municipalities have requested the Service Plan for the Promotion of Energy Efficiency and Renewable Energies and the Promotion of Forest Biomass in Girona's municipalities.

*NUMBER OF MUNICIPALITIES THAT HAVE REQUESTED **ASSISTANCE***

1. Technical assistance necessary to improve energy efficiency in public lighting	44
2. Technical assistance necessary to improve energy efficiency in public buildings	51
3. Technical assistance necessary to install boilers or heating networks	57
4. Legal assistance	74
5. Technical assistance for the production and consumption of biomass	18
6. Open data publication of municipal energy-consumption data	28
7. Financial assistance for investing in energy efficiency and renewable energies projects	11
8. Contract monitoring with energy service companies (ESCO) or micro energy service companies (MESCO)	9

3

Innovative concepts for mobilising sustainable energy investments in Girona's municipalities

3.1. Contracts with micro energy service companies (MESCO)

3.1.1. Previous actions: contract format prior to implementing the complete energy management contracts with a MESCO

Girona's municipalities, in order to carry out energy efficiency improvement projects in public buildings or facilities, used to contract different services and public works with different parties:

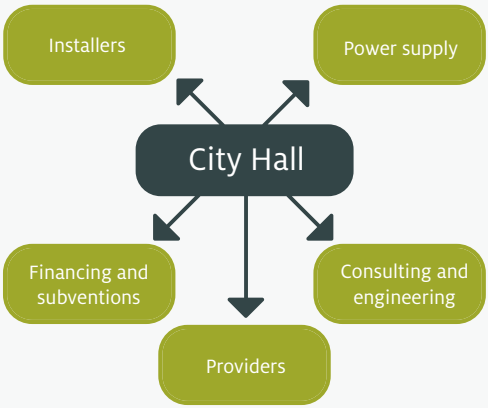
- **The consultant or engineer,** who designs the project or proposes an improvement through a basic and/or executive project and in some cases, calculates the anticipated energy savings on an informational basis.

- **The electric and/or thermal power company** (for example, wood chips), that provides their service to the municipality independently from the improvement being made.

- **The provider or technology installer,** who carries out the improvement work according to the technical specifications of the engineering project.

- **Financial entities** or other public organisations for financing the investment.

Parties involved in the municipal energy management without a MESCO contract:



In these types of contracts each party acts individually, without directly assuming or guaranteeing the energy savings in the proposal. Using this type of model has positive and negative aspects that will be considered:

Positive aspects

- Easy to handle the contract management, because it's the traditional type of public contract.

- The city council can choose each contractor separately.

- Lower interest rates on the credit. The city council can obtain a bank credit with interest rates near 1.5% (2016 data), less when the credit is obtained by a business.

Negative aspects

- No parties are contractually responsible for the projected energy savings.

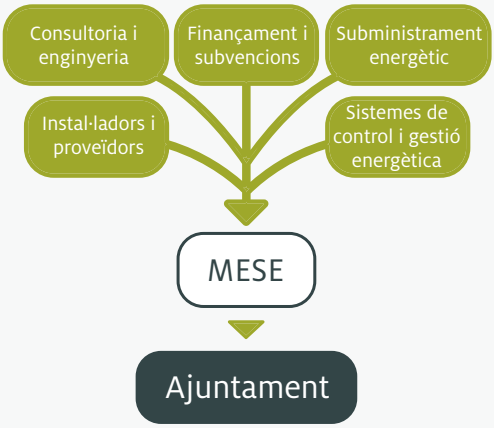
- No parties monitor the efficiency measures implemented or the project's quality and execution. Overall, the city councils do not have technicians specialised in energy efficiency and if they do, they do not have enough time to revise the projected savings and adequately monitor them.

- This does not consider the preventative and corrective maintenance of the facilities once the work is complete.

3.1.2. The MESCO. Concept and definition

A micro energy service company (MESCO) is a small or medium-sized company (SME) or a temporary joint venture (UTE of SME) specialised in maintaining public lighting, public buildings, or providing renewable energy, offering all the services necessary to implement a complete energy efficiency or sustainable energy project on municipal property, from the planning stage to the project's savings measurement and verification stage.

Parties involved in the municipal energy management with a MESCO contract:



The MESCO offer the following services:

- Improvements in efficiency and energy sustainability with the goal of increasing energy efficiency and reducing emissions from municipal buildings and facilities.

- Offer an implementation service for the sustainable measures and their management, to ensure the quality for at least 3 years.

- Guarantee proposed energy savings and reduction of emissions.

- Finance the operation and recover the investment thanks to the energy savings and economical savings obtained.

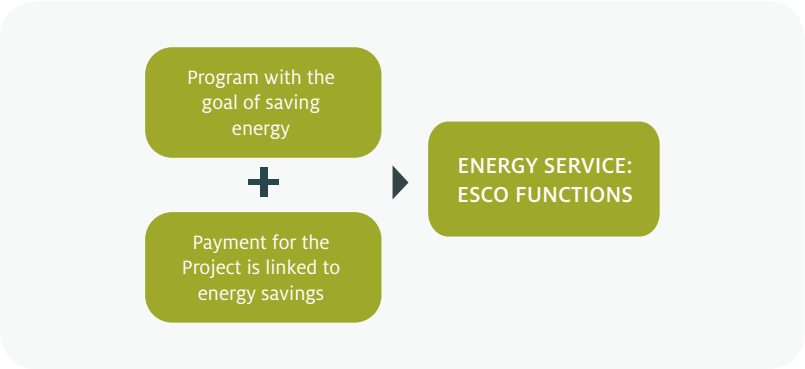
- Ability to formalize long-term contracts.

- Seek partnerships with other professionals to offer complete energy management services.

The types of contracts with MESCO have the following attributes:

- They provide an improvement in energy efficiency and/or primary energy savings.

- The ESCO assume a certain level of financial risk in the contract by linking the compensation with the energy savings resulting from the project.



There are different contracts available in function with the type of municipal buildings.

3.2. Types of contracts with MESCO

3.2.1. EPC: Energy Performance Contracting

The purpose of the EPC contracts is to reduce operational costs of the installations to guarantee the amount of savings and be able to recover the initial investment costs.

In this kind of contract there are different types with:

Guaranteed savings

- The MESCO guarantees the savings to the client, which will be obtained after applying the measures.

- If there is less savings than what was projected: the MESCO pays the difference equal to the cost of the savings not achieved.

- If there is more savings than what was projected: the MESCO and the city council will share the difference as stipulated in the contract.

Shared savings

- The MESCO and the city council share the savings achieved by the project from the start.

- The MESCO is not committed to any one specific type of savings.

Mixed option

Other contracts with a mixed option between guaranteed and shared savings can be negotiated in function of percentages, for example.

3.2.2. ESC: Energy Supply Contract

This contract is based on the supply of usable energy (MWh). In this case the ESCO may:

- Contract the energy supply with the corresponding provider.

- Directly provide the power.

The added value the ESCO provides the city council is the technical management of the facilities and providing the final energy.

- It does not include investment in new facilities.

- The ESCO assumes the risk of energy price and the performance of the facility.

3.2.3. Services concessions

The services concessions contract is one of the new changes made in the Law 9/2017, from November 8, regarding public sector contracts, substituting the former public services management contract.

The forest biomass heating networks that supply hot water used for heating both municipal and private buildings can be contracted as a concession of services because in these situations there is a transfer of the operational risk to the concessionary business, since the only commitment is to connect the municipal buildings to the network and the viability of the investment depends on the number of private users.

3.3. Types of financing in the form of contracts

Next, the different types of financing used to invest in sustainable energy will be described.

3.3.1. Financing via existing funds

The city council has 100% of the capital necessary to make the investments indicated in the energy efficiency improvement project, which lowers the cost of the project since there are no interests associated with financing. The city council pays for the energy efficiency improvements according to certificates of completed jobs, and there is no interest added from a third-party lender.

3.3.2. Financing via bank loan or by the IDAE (Institute for Diversification and Energy Saving)

The investments are made by bank loans or by credit offered by the IDAE (a loan for up to 100% of the eligible project investment, at a 0.0% interest rate).

In the case of funding by bank loan, the city council would have to apply for the loan from the lending institution, which would issue the loan as they see fit, according to their policies and applicable credit checks. In this case, the interest rates are set by law and tend to vary between 1% and 1.5%.

The IDAE allows municipalities to invest in sustainable energy by providing a refundable loan for up to 100% of the eligible project investment, at a 0.0% interest rate. The financing options, therefore, are quite favourable. The city council must provide the necessary documentation to justify the investments sought and wait for the IDAE to approve their application. Next they will have to prove that the investments made correspond to the investments applied for, respect the conditions set by the IDAE regarding the completion of the project and ensure the city council complies with all necessary requirements.

3.3.3. Financing via a MESCO (or ESCO for large investments)

In this case the city council may contribute a part of the capital needed for the energy efficiency improvement project and the rest of the capital can be obtained from the MESCO contract recipient.

The best part of this financing model is that the city council does not need to have 100% of the capital necessary to make the investments, but forecast that the annual cost of the MESCO corresponds to the cost savings generated by the MESCO, so that the investments in energy efficiency never become an extra cost to the taxpayer.

On the other hand, given that most of this financing comes from a private business, keep in mind they will charge interests on the amount of the loan that vary from 4% to 6%, depending on the solvency of the MESCO, the economic viability of the project and the amount of investment in energy efficiency proposed.

3.3.4. Financing via ERDF (European Regional Development Fund)

One of the strategic objectives of the Girona Provincial Council is to make a greater impact in terms of competitiveness, job creation and EU growth combining the ERDF and funding from the European program Horizon 2020, as stated by the European Commission: *Enabling synergies between European Structural and Investment Funds, Horizon 2020 and other research, innovation and competitiveness-related Union programmes* (European Union, 2014).

In this context, the combination of structural funds with innovative financial and organisational models is an opportunity to establish, promote and consolidate a new system of financing. It allows implementing new financing systems in Girona by using contracts with energy service companies (ESCO), micro, or small and medium-sized energy service companies (MESCO), pooling small and medium investments in different municipalities of Girona where the beneficiary (Girona Provincial Council) is in charge of the investment, as defined by the *Technical Guidance: Financing the energy renovation of buildings with Cohesion Policy funding*.

If the investment is paid by ERDF, the MESCO only assumes the technical risk of guaranteeing savings but it does not assume the financial risk of the operation, as that is the responsibility of the beneficiary.

3.4. Innovative organisational model: Girona Provincial Council's pooled requests for bids process

Most of Girona's municipalities have a population of less than 5,000 residents. This means that, overall, the technical services in this type of municipality lack the ability to conduct a bidding process for a contract with an ESCO (complex on its own, taking longer than a year and which must be classified as a mixed building, provisions and services contract).

For this reason, and given the specific objective of the Beenergi program, the Girona Provincial Council gives the city councils the ability to delegate their competency to make requests for bids on energy efficiency improvement contracts, by means of a pooled public bidding process with other municipalities, creating a collaboration pact. The delegation of the various municipalities to the Girona Provincial Council allows them to standardize the technical characteristics and optimize the execution conditions of the actions.

In the case of pooling requests for bids, the following contractual advantages apply to the municipality:

- Release from the legal, technical and administrative burden on the municipality regarding public contracting mechanisms.

- Standardization of bidding criteria, which allows more participation from small businesses that may apply (it's important to mention the direct relationship with the specific training for small companies).

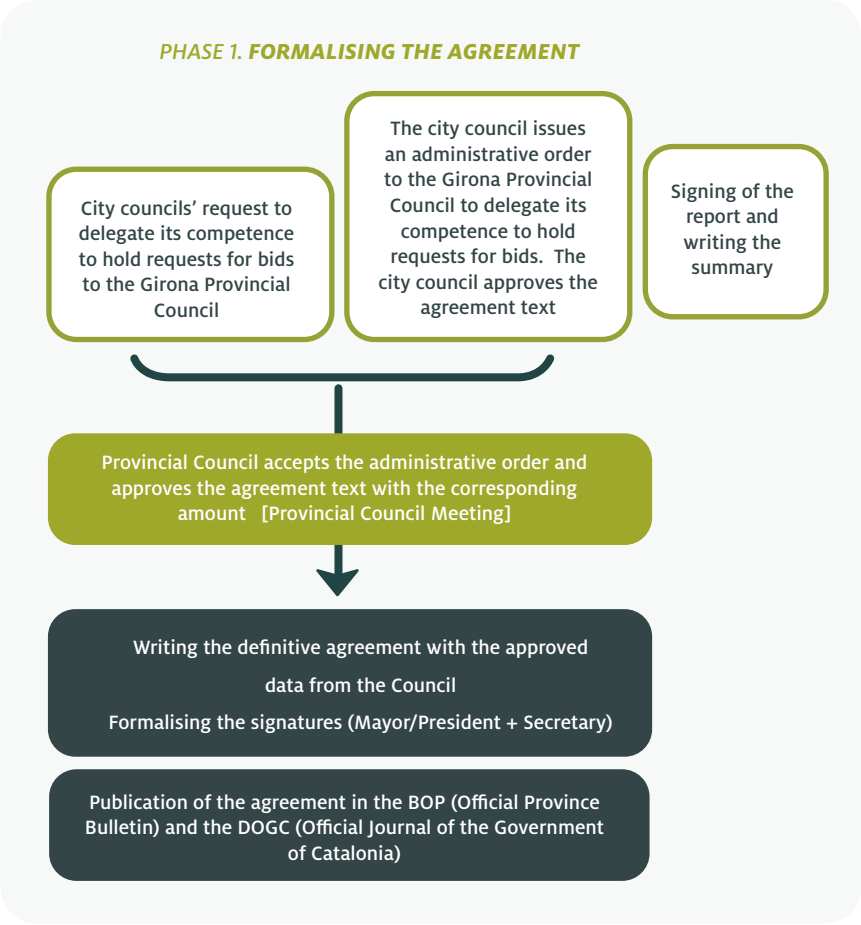
- More competitiveness in offers and the pooling of investments if it's needed to make the offer more competitive.

- Options to divide the contract, which together with the new law on contracts, favors more small businesses to be beneficiaries of the contracts.

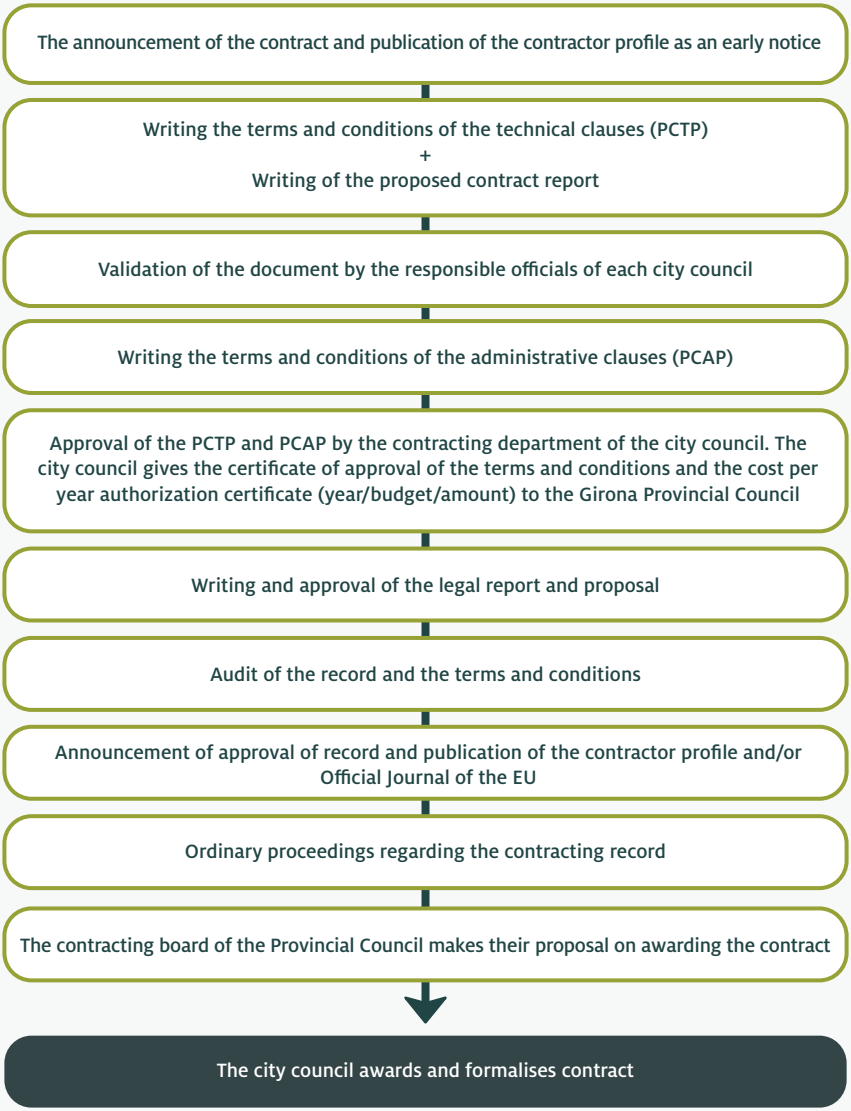
The appropriate legal formula for delegating this competence is by an administrative order, pursuant to article 11 of Law 40/2015, of October 1, on the legal framework for the public sector, and article 10 of the Law 26/2010, of August 3, on the legal and procedural framework for the public administrations of Catalonia, which requires signing an agreement to formalise the order.

By virtue of article 22.2 g of Law 7/1985, of April 2, regulating the basis of the local government, it is established that the municipal government is the competent party for transferring functions or activities to other public administrations.

Next is an outline of the administrative process required in pooling requests for bids.



PHASE 2. ***PROCESS FOR BIDDING***



The pooled bidding process ends the moment that the contract recipient defines their proposal. It's important to remember the city council is the owner of the contract and not the Provincial Council.

4 *Results achieved in improving energy efficiency in public lighting*

4.1. Calculations of the investments and contracts made

As a result of the Beenergi program, Girona Provincial Council has assisted 53 municipalities in improving their public lighting energy efficiency by making contracts with micro energy service companies.

34 municipalities have contracted energy efficiency improvements in the public lighting of their municipalities. A total of 12.17 million euros in investment was mobilized and the contract cost (or proposed budget in some cases) was 16.96 million euros.

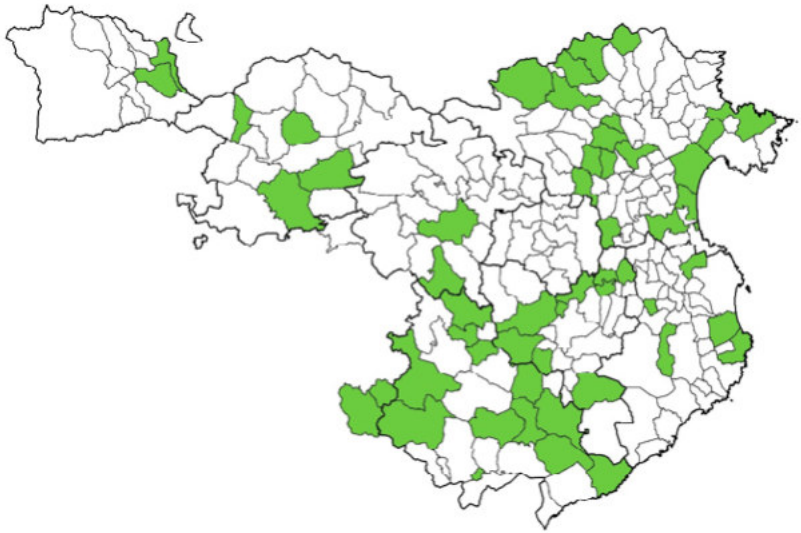
The tonnes per year in overall emissions reduction have been 3,424.40 tCO2/year and the energy savings have been 7,162.90 MWh/year.
The companies that were selected have mainly been SMEs (PIME), whether by group or individual contracts, with direct technical assistance provided to the council.

The investment of 12.17 million euros in renewable energy means the creation of 29 jobs [2].

Street lighting energy efficiency investments in 34 municipalities. 7.162,90 Mwh/year and 3.424,40 tn CO_2 /year saved. 12,17 Meur of investments and 29 Green Jobs created.

[2] The number of jobs created was calculated using the ratio published in the document: Catalonia Energy and Climate Change Plan 2012-2020.

*MUNICIPALITIES THAT HAVE APPLIED FOR BEENERGI ASSISTANCE FOR **STREET LIGHTING** ENERGY EFFICIENCY*



Agullana
Aiguaviva
Amer
Anglès
Arbúcies
Avinyonet de Puigventós
Bàscara
Begur
Bellcaire d'Empordà
Bescanó
Bordils
Caldes de Malavella
Cassà de la Selva
Castelló d'Empúries
Cellera de Ter
Cervià de Ter
Darnius
El Port de la Selva
Espinelves
Figueres
Fontanals de Cerdanya
Hostalric
la Bisbal d'Empordà
La Jonquera
Les Planes d'Hostoles
Les Planes d'Hostoles
Llers
Maçanet de Cabrenys
Navata
Palau-Saverdera
Pals
Pardines
Planoles
Pont de Molins
Puigcerdà
Ripoll
Riudarenes
Rupià
Sant Gregori
Sant Hilari Sacalm
Sant Joan de les Abadesses
Sant Jordi Desvalls
Sant Julià de Ramis
Sant Pere Pescador
Santa Pau
Sarrià de Ter
Sils
Tossa de Mar
Ventalló
Vidreres
Viladrau
Vilanant
Vilobí d'Onyar






Municipality	Investment (eur)	CO_2 savings ($tnCO_2$)	Energy savings (MWh)	Energy savings (%)
Agullana	8.687,98	0,80	3,21	10,00
Amer	6.989,36	5,54	11,51	72,11
Amer	268.635,51	107,58	223,66	73,00
Argelaguer	5.384,50	2,18	4,54	71,99
Avinyonet de Puigventós	118.110,80	33,04	68,69	43,00
Bàscara	195.128,67	58,32	121,26	67,00
Begur	1.475.060,85	313.043,94	650,82	61,00
Besalú	355.768,92	134,41	279,44	54,00
Bescanó	334.021,81	11,11	23,0	56,00
Boadella i les Escaules	9.459,18	3,94	8,19	47,85
Breda	699.807,60	218,77	454,82	81,70
Caldes de Malavella	555.939,66	98,67	205,13	72,00
Cassà de la Selva	17.363,50	44,05	91,59	66,30
Darnius	139.454,60	40,25	83,68	73,00
Figueres	10.859,75	4,24	15,88	60,00
Fontanals de Cerdanya	11.957,20	4,24	8,82	70,00
Fornells de la Selva	14.314,97	2,64	5,49	42,40
Fornells de la Selva	14.059,40	3,71	7,71	53,81
la Bisbal d'Empordà	26.972,81	21,80	25,93	70,00

Municipality	Investment (eur)	CO_2 savings ($tnCO_2$)	Energy savings (MWh)	Energy savings (%)
La Cellera de Ter	9.449,22	11,79	24,52	75,82
Les Planes d'Hostoles	95.000,00	33,03	122,97	68,70
Navata	211.224,01	83,63	173,88	62,00
Palamós	19.699,20	19,46	40,47	82,00
Pals	475.057,23	104,67	217,61	70,00
Pals	30.429,65	17,84	37,10	61,00
Riells i Viabrea (fase 2)	435.r8,38	52,60	109,36	80,00
Riells i Viabrea (fase 1)	20.737,80	36,82	76,59	44,00
Ripoll	1.574.357,96	497,02	1.033,31	66,93
Sant Gregori	209.000,00	151,50	314,97	87,30
Sant Hilari Sacalm	1.527.540,30	374,41	778,40	70,00
Sant Julià de Ramis	374.281,66	170,65	354,78	55,50
Sarrià de Ter	589.876,42	80,84	168,06	74,00
Sils	648.988,82	126,10	262,17	66,00
Ventalló	214.472,80	33,03	68,67	74,97
Vidreres	424.338,89	332,22	690,69	71,30
Vilablareix	600.715,50	83,13	172,83	69,00
Viladrau	38.720,00	8,73	18,14	27,00
Vilobí d'Onyar	407.062,57	98,57	204,92	72,00

4.2. Key aspects of the public lighting management contract with guaranteed savings

The contracts for the exterior public lighting service include energy management, control of lighting levels, regular and corrective maintenance and the complete guarantee of energy efficiency improvement in exterior lighting.

The main reason for contracting an integrated service is to improve efficiency and energetic savings, ensuring the correct operation of the municipality's public lighting, maintaining the level of service for which the installations were projected, preventing possible malfunctions, locating issues in the state of the equipment and performing, when required, the repairs, corrections, replacements and supplies that may be necessary during the contractual term.

Overall, the contracted services are designed to perform the required actions that are briefly explained below:

- **Service P1:** Energy management and control of lighting levels
- **Service S2:** Maintenance
  - Service S2A: Regular maintenance
  - Service P2B: Maintenance service
- **Service P3:** Corrective maintenance / total warranty
- **Service P4:** Service for improving energy efficiency in the district's public lighting
- **Service P5:** Works for adapting the exterior public lighting installations in the district

Depending on the financial outline for the investment, the bidding characteristics are different. The financial outlines used for the investments are the following:

- Investment made by micro energy service companies

- Investment made by the council's resources or bank credit (banks or IDAE credit)

- Investment made by the ERDF

In any case, the most relevant aspects of the contract are:

1) **Include the service P1- Energy management - Energy management service and control of lighting levels**

2) **Quality control of services provided in P1, P2 and P3Control de qualitat del servei de les prestacions P4 i P5**

3) **Quality control of services provided in P4 and P5**

1) Include the service P1- Energy management - Energy management service and control of lighting levels

This service begins once the substitution of inefficient lights for efficient lights is made (services P4 and P5).

In this case, the MESCO needs to provide the city council with the readings from all the public lighting meters.

The MESCO must keep the potency factors of the installations within the correct parameters in order to receive the funding and/or avoid charges.
The MESCO must keep a monthly register of actual consumption by each

block of lighting. A monthly report must be prepared that contains an analysis of the consumption by every block, organised by type of energy plan and block number, the optimal energy plan (in function with the wattage installed), number of blocks, nominal power, installed wattage, consumption in each of the periods in function with the type of plan, total consumption, total theoretical output, as well as the current price at the supplied wattage rate and the rates of each period in function with the optimal plan and finally the calculation of energy costs according to the payment terms in the administrative terms and conditions and the planned energy costs. This file must be kept during the entire duration of the contract and the city council must be able to consult it on the internet at any time. The city council can ask the ESCO to export the monthly data into another format that it finds easier to work with.

Additionally, the MESCO will give the city council an annual summary which gathers the annual energy consumption data for that year, in comparison with the target year and a study of the improvements and changes that contributed to the energy savings.

The company receiving the contract must agree to measure objective consumption in kWh, to ensure the correct functioning and normal use of the installation, to manage all the necessary rental policies and to correct any possible problems with the controls or other systems. If the consumption is higher than the amount agreed upon with the city council, the penalty steps from the PCAP will be applied.

If there is a consumption inferior to the guaranteed amount in kWh, the city council must pay the MESCO the share of additional savings generated each year the contract was in place, with the corresponding percentages established by the city councils and the following formula:

The calculation of this bonus amount should be done as follows:

% of the MESCO bonus **x** *additional kWh*
x *current price €/kWh*

This bonus is limited to an increase in price of 80% of the service provided in P1.

If a control panel supplies electricity to services other than public lighting, the MESCO, at the start of the project, must install a network analysis device to be able to differentiate the amount of electricity consumed by public lighting from other types of usage and request reports identifying and quantifying this other consumption data.

2) Quality control of services provided in P1, P2 and P3

In order to oversee the contract, the Girona Provincial Council will conduct quality control revisions of the services offered by the MESCO in providing P1, P2 and P3 services that consist of:

- Revising the reports created by the ESCO regarding the services provided in P1, P2 and P3, especially those that relate to energy savings, each trimester.

- Writing a final report regarding the level of success achieved in providing P1, P2 and P3 services throughout the year.

3) Quality control of services provided in P4 and P5

A company or external auditor will conduct a quality assessment of the service offered by the MESCO in providing P4 and P5 services, while they are being provided, that consist of:

- Checking the equipment installed, verifying they are the correct models.

- Verifying all the equipment and remote management systems are correctly installed and functioning.

- Validate any modifications made while providing services P4 and P5.

5 *Results achieved in improving energy efficiency in public buildings*

5.1. Calculations of the investments and contracts made

Throughout the duration of the Beenergi program 63 municipalities have received assistance in implementing energy efficiency measures or building renewable energy installations using biomass for different municipal buildings. In the case of biomass installations, there was the option of using wood burning or pellet burning boilers or centralised heating networks that use wood boilers.

There was an increased use in biomass as a thermal energy because the Environmental Services Department of the Girona Provincial Council has been working on ways of promoting local, certified, quality biomass.

In the scope of climate change and energy dependence on fossil fuels, taking advantage of forest biomass to produce energy is seen as an opportunity to encourage the multi-uses of forests, to accelerate the primary sector, promote forest management, create new businesses, create new jobs and to do it conserving the natural value of the forest.

Next, we will describe the different contracts made with MESCO involving the integrated thermal renewable energy supply management model.
The cost of the investment is 8.13 million euro and the budget for bidding on the contract was 9.50 million euro.

Overall there was a carbon emissions reduction of 2,612 tCO2/year, reaching 5,145 tons of wood, which means there were 6,431 hectares of sustainable-managed forest, reducing fire risks and creating forestry related jobs.
The companies that were awarded contracts were for the most part, (99% of the cases), small and medium-sized companies—either by group or individual purchases, with the direct technical assistance from the city council.

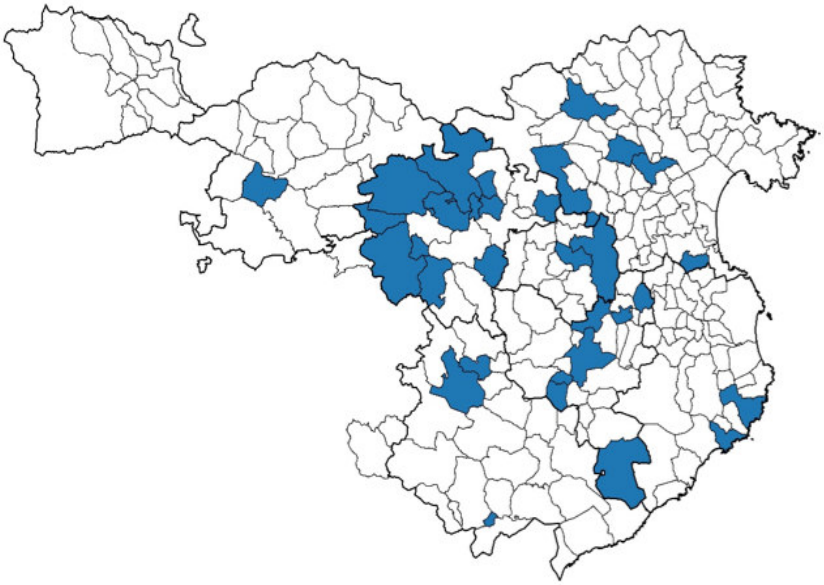
The investment of 9.5 € in renewable energy means the creation of jobs for 282 workers in the sustainable energy field.

63 municipalities assessed.
2,612 tnW2 / year saved.
5,145 tn of wood dynamized.
6,431 ha of sustainable forest management.
282 jobs created.
1,063 Mwh / year of energy saving.


JENZ

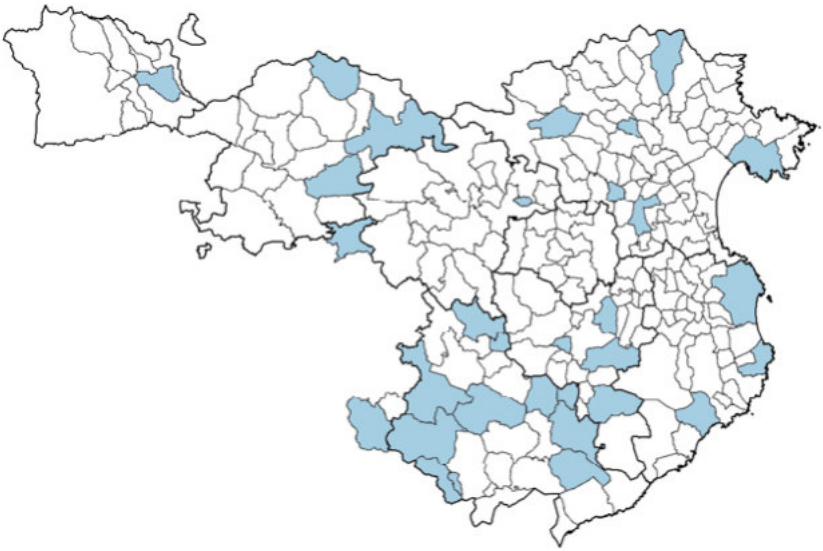

renovable
calderes de
biomassa

MUNICIPALITIES THAT HAVE APPLIED FOR BEENERGI TO INSTALL ***BIOMASS BOILERS***



Aiguaviva
Argelaguer
Bordils
Cabanelles
Campdevànol
Castellfollit de la Roca
Cellera de Ter
Darnius
Figueres
Fontcoberta
Girona
Hostalric
Les Preses
Llagostera
Llers
Maià de Montcal
Mieres
Montagut i Oix
Osor
Palafrugell
Palamós
Riudaura
Sant Feliu de Pallerols
Sant Jaume de Llierca
Sant Joan les Fonts
Sant Jordi Desvalls
Sant Julià de Ramis
Tortellà
Vall d'en Bas
Vall de Bianya
Vilablareix
Viladamat
Vilademuls

MUNICIPALITIES THAT HAVE APPLIED FOR BEENERGI TO CREATE ***DISTRICT HEATINGS***



Amer
Arbúcies
Begur
Besalú
Breda
Caldes de Malavella
Calonge
Camprodon
Cassà de la Selva
Celrà
Espolla
Fontanals de Cerdanya
Garrigàs
Ordis
Pont de Molins
Quart
Riells i Viabrea
Riudellots de la Selva
Roses
Salt
Sant Hilari Sacalm
Sant Joan de les Abadesses
Sant Julià del Llor i Bonmatí
Sant Llorenç de la Muga
Santa Coloma de Farners
Setcases
Torroella de Montgrí
Vidrà
Vidreres
Viladrau
Vilobí d'Onyar

Municipality	Description	Investment (eur)	CO_2 savings ($tnCO_2$)	Energy savings (MWh)	Energy savings (%)	Renewable energy production (MW)	Renewable energy production (MWh)
Aiguaviva	Biomass boiler - school	45.719,84	21,10	5,57	8,00	0,060	44,45
Amer	District heating – school, sports center and nursery	171.329,59	39,00	7,41	5,00	0,250	126,00
Arbúcies	Disctrict heating – several buildings	504.172,39	121,86	21,49	5,00	0,85	408,00
Begur	District heating –sports center and school	188.362,22	42,60	9,39	5,00	0,150	159,60
Besalú	District heating –sports center and school	245.146,00	59,10	8,56	5,00	0,20	171,12
Bordils	Biomass boiler - school	105.278,70	17,78	6,57	6,30	0,100	60,90
Breda	District heating – school and nursery	178.683,14	54,60	21,00	5,00	0,15	189,00
Caldes de Malavella	District heating – sports area	164.190,38	38,31	26,38	15,20	0,200	89,60
Calonge	District heating – school and sports center	171.221,17	99,15	22,90	5,00	n.d.	383,80
Campdevànol	Biomass boiler – sports center	164.421,82	24,86	10,06	6,60	0,200	83,46
Cassà de la Selva	District heating – sports center and swimming pool	190.384,62	151,38	58,02	6,43	0,250	546,70
Celrà	District heating – different buildings (La Fàbrica)	153.180,52	69,90	16,10	5,00	0,25	307,00
Darnius	Biomass boiler – school	74.606,46	9,20	2,70	6,29	0,070	27,55
Espolla	District heating – school, swimming pool, social center and cooperative	123.086,65	32,10	5,06	5,00	0,15	80,90
Figueres	Biomass boiler - School Pous i Pagès	151.708,11	94,57	18,41	5,00	0,30	297,90
Figueres	Biomass boiler - School Joaquim Cusi	136.488,00	72,31	12,79	5,00	0,30	225,76
Figueres	Biomass boiler - School Salvador Dalí	178.117,89	65,99	22,70	7,60	0,32	192,63

Municipality	Description	Investment (eur)	CO_2 savings ($tnCO_2$)	Energy savings (MWh)	Energy savings (%)	Renewable energy production (MW)	Renewable energy production (MWh)
Figueres	Biomass boiler - School Els Pins	47.080,59	21,50	4,00	5,00	0,07	76,80
Fontanals de Cerdanya	District heating – Town hall, library, social housing	101.071,39	15,80	3,50	5,43	0,050	50,87
Fontcoberta	District heating – school and sports center	132.080,65	40,35	7,8	5	0,1	161,5
Garrigàs	District heating – health center, social center and school	75.927,50	19,34	2,4	5	0,06	72,6
Girona	Biomass boiler - School	78.986,57	33,7	6,3	5	0,15	101
Hostalric	Biomass boiler – sports center	125.431,77	59,00	13,60	5,00	0,200	232,00
La Jonquera	Biomass boiler – sports center	222.329,22	45,17	151,00	14,30	0,200	109,60
La Vall d'en Bas	Biomass boiler – old people's home	195.436,17	53,65	11,82	5,00	0,200	236,36
Les Preses	Biomass boiler – Town hall	87.187,98	22,00	2,25	5,00	0,07	45,00
Mieres	Biomass boiler - school	51.477,47	9,63	3,20	6,60	0,060	28,20
Osor	Biomass boiler - school	53.064,45	5,8,	1,1,	5,00	0,07	22,00
Palafrugell	Biomass boiler - school Torres I Jonama	156.695,00	74,45	12,11	5,00	0,25	205,90
Palafrugell	Biomass boiler – Swimming pool	417.024,37	237,00	44,72	8,30	0,500	799,00
Pont de Molins	District heating – Town council and school	62.020,43	14,33	2,15	5,00	0,060	42,95
Riells i Viabrea	District heating – Town council, school and social center	127.688,35	52,47	7,15	5,00	0,20	142,95
Riudellots de la Selva	District heating – Several municipal buildings	322.006,13	80,94	10,50	6,69	0,200	277,00
Roses	District heating – Swimming pool, sports centers	529.610,57	219,00	118,00	8,60	0,600	675,00

Municipality	Description	Investment (eur)	CO_2 savings ($tnCO_2$)	Energy savings (MWh)	Energy savings (%)	Renewable energy production (MW)	Renewable energy production (MWh)
Sant Hilari Sacalm	District heating – Several municipal buildings	180.228,14	61,80	18,40	6,29	0,100	185,00
Sant Joan de les Abadesses	District heating – School and High school	120.075,16	39,75	5,96	5,00	0,10	119,11
Sant Julià del Llor i Bonmatí	District heating – school, social center and football field	137.118,01	26,72	12,40	11,70	0,150	102,00
Sant Llorenç de la Muga	Biomass boiler in Town council and social building	45.367,87	5,30	0,93	5,00	0,06	18,67
Santa Coloma de Farners	District heating in school Slavador Espriu and sports centers	214.961,91	109,70	42,20	7,80	0,400	294,00
Setcases	District heating - municipal buildings	178.869,69	16,18	1,91	5,00	0,150	74,89
Setcases	District heating – private buildings (hotels, houses, etc)	608.029,21	198,00	37,00	5,00	0,500	742,00
Torroella de Montgrí	District heating in l'Estartit – Municipal buildings	230.391,96	32,20	6,20	5,00	0,300	119,00
Vidreres	District heating – Several municipal buildings	195.052,00	55,00	206,00	5,00	0,25	175,00
Vilablareix	Biomass boiler – sports center	100.526,01	31,00	41,90	30,00	0,15	101,00
Vilademuls	Biomass boiler - school	68.496,06	7,90	2,50	6,50	0,07	23,20
Vilallonga de Ter	Biomass boiler – social building	28.550,07	6,10	0,60	5,00	0,05	12,60
Vilobí d'Onyar	District heating – school, nursery and sport center	187.472,68	26,60	14,20	7,70	0,188	74,20
Viladrau	District heating – school, nursery and Montseny Natural Park Museum	102.830,58	19,00	4,40	5,00	0,20	194,00

5.2. Key aspects in the biomass and public buildings contracts

5.2.1. Description of the contracts with MESCO

Following are the services provided by contracts with networks or biomass boilers.

Service P1: Supplying thermal energy
This service is described in two parts:

- **P1a. Supplying thermal energy from the corresponding fuels** (wood from local sustainable forest management and/or other biomass fuels like pellets) and the management of fuels supplied to the thermal installations in the buildings included in the contract, quality control, quantity, use and supply guarantees for the biomass boiler.

- **P1b. Fee for thermal energy management.** This service includes the use and payment of the heat generation equipment. It corresponds to providing heat generation equipment (or biomass boiler) on an operational rental basis, with the option to purchase it. This fee allows it to run with partial project funding from the city council. In this case, the city council pays for the entire installation and leaves the boiler part as an operational rental.

Service 2: Preventative maintenance
Preventative maintenance to ensure perfect cleanliness and functioning of all the installations and their components, as well as maintaining the installations and their components at the same performance levels as they initially had.

Preventative maintenance will also be carried out on the non-renewable energy boilers installed at all the sites where renewable thermal energy is supplied, ensuring that they will automatically turn on (according to the project) in case of a malfunction with the biomass boiler.

Service P3: Corrective maintenance and total warranty

Repairing and replacement of all damaged components as specified in the technical terms and conditions under the total warranty section.

Service P4: Works to adapt and renovate installations and to incorporate renewable energies technology (biomass installation)

The contracted business will provide updates to the renewable energy generation equipment, it's installation and the installation of the heat network, as detailed in the technical terms and conditions and in the executive plan.

If there is partial financing, the heat generation equipment is not included in this service, since it is included in the P1b (as explained in the P1 services).

5.2.2. A5.2.2. Key aspects of the MESCO model applied to contracting biomass boilers or heat networks

1) Type of contract

The mixed contract should be utilised in adapting this model to the legal framework for contracts. This means:

- A mixed building, provisions and services contract.
- This contract is designed with the following differences or characteristics:
  - The main service of this contract is classified as a provisions contract.
  - If the project and installation needs financing, it should be made in one payment that is considered a part of P4 services in the contract.

- If the project needs financing, it should be done by assessing an energy management fee or renewable fee, which is usually associated with the generation equipment (boiler), in which the equipment rental is considered. In this context, upon finalising the contract, the value of the equipment associated with the fee should be fully depreciated. In most contracts this fee was associated with providing thermal energy (see the following section).

2) Wood originating from sustainable local forest management

If wood is being provided, as an incentive to use wood sourced from sustainable local forests, the carbon footprint in transporting the wood from its origin will be taken into consideration. Because of this, there was a request to have the smallest carbon footprint listed in the technical terms and conditions of the contract, and the companies receiving the most points had a pre-contracted supply of wood that guaranteed: the wood's traceability, origins in sustainable forest management and the least amount of carbon footprint made by transporting the wood, whether from the forest where it originates or the storage area where it is kept. In this case a pre-contract model was created where the distance from the original forest or storage area to the installation was listed.

3) Proximity of pellets

In the case of supplying pellets, there were incentives to use quality forest pellets in a similar way that was done with the wood.

4) Carbon footprint in providing maintenance services

In the case of technical services, given this type of environmental contract, in the awarding of points for the contract, the businesses that had the lowest carbon footprint in transporting their technical services (annex), as similar to public lighting, received the highest scores.

5) Complete energy management of the building

The improvements suggested in each of these contracts were proposed to improve the thermal efficiency within the system or the electrical efficiency of the building where they were being applied. For example, installing remotely managed control systems, creating meeting reports and thermal monitoring of the installations, substituting more efficient pumps or taking actions to improve lighting efficiency in the building.

5.2.3. Energy Performance Contracting (EPC) via ERDF

Creation of a new financing method where the MESCO only assumes the technical risk of guaranteeing savings but does not assume the financial risk of the operation, as that is the responsibility of the beneficiary.

The contract calls for energy management services (thermal and electric) in buildings that receive power from this renewable thermal energy. These buildings must certify a 5% thermal energy reduction and a minimum 10% of electric energy reduction compared to base consumption rates for the buildings included in the contract.

During the execution of the contract different energy reduction measures must be put in place by the MESCO, for example:

- Actions to reduce electrical consumption in public lighting or heating and cooling

- Actions to manage and control parasite-consumption and the efficient use of electrical energy

- Actions in thermal management and control, maintaining levels of comfort for each type of use and building

Any proposed actions must be made in accordance with current laws and the technical solutions offered must be evaluated and validated by the technical services responsible for the contract.

The technical justification of the proposed guaranteed savings and the verification methods for each of the areas proposed in order to prove the feasibility of energy efficiency needs to be demonstrated in the planning and execution stage of the installation of the biomass boilers, by providing a summary certifying the energy savings and making a suggestion of mechanisms to verify the proposed measures.

Each year the measurement and verification mechanisms must be checked. Each year the verification of the savings accomplishments will be checked using the proposed mechanisms. If there is a discrepancy between the contract recipient and the contract provider, a certified external certification company will be used to manage the verification methods as set out by the EVO protocol.

If the percentage of guaranteed savings is not met, the contract provider will penalise the contract recipient by decreasing the amount of payment for the energy supply services, as stipulated in the contract.

Given the nature of small and medium business and the buildings associated with boilers or heat networks, the contract includes a simplified guarantee of savings in order to reduce technical and bureaucratic hurdles and to easily achieve the energy reduction goals.

In this sense, a simplified option is proposed where one or several specific measures must be acted upon in order to reduce overall consumption by 10% in electrical installations subject to the contract. In this case, the measure included in the contract is considered verified and the reductions achieved, with prior technical justification included in the contract.

Regarding thermal energy savings, in order to achieve the reduction desired (understanding thermal energy to be primary or final) of 5%, two elements are considered:

- Changing the fossil fuel boiler with a performance efficiency of 80-85% to a biomass boiler with a performance efficiency of more than 90% will carry an additional regulation, increasing efficiency compared to the existing fossil fuel system.

- The oversight and management of the thermal installation, which includes providing the annual monitoring service of the control system, involves the following tasks:

    - Remote-supervision of energy with an accurate monitoring of the facility and system adjustment settings to optimize it.

    - Creation and analysis of function and performance reports in thermal installations. Monthly task.

    - Trimester meetings with the entity responsible for the equipment assigned by the city council to observe and adjust the parameters for energy efficiency in the supply's control system.

Regarding the 5% reduction in thermal energy, it is enough to install new thermal equipment that is at least 5% more efficient (reduction in primary) and provide overall management of this thermal system (reducing the final thermal energy output).

If the contract recipient chooses this option of simplified energy savings, where the measures for A and B are carried out, along with the provision and technical guarantee during the 5 years of the contract, in order to check the feasibility of energy efficiency, it is not necessary to justify the savings in the phase of planning and execution of the projects to update the boilers or to implement mechanisms to measure and verify the efficiency.

5.3. Creation of heating networks via concessions

Through the course of legal-technical assistance, other types of financing models have come up in order to promote the use of centralised heating networks in the municipality.

These types of contracts are referred to as concessions. In a concession the risk, the management responsibility and the economic costs fall on the ESCO. On one hand the concession lets private entities, individuals or business get involved in the contract without needing to adhere to public contracts and agreements made after with the private entity.

There are two types of concessions according to the diverse technical-economical situations and criteria in the Beenergi program. Public concessions and service concessions.

5.3.1. Public concessions. The case of Setcases municipality

In 2016 the city council of Setcases promoted the installation of biomass that operated with forest biomass (boiler room and heating distribution with biomass), which provides warm water for heating to two municipal buildings (the city hall and the social building). This initial phase has already been received. It is currently operational and function and has is self-sustainable.

A potential executive development project has been created to expand the overall network in which the consumption potential is visualised and estimated as an investment in phases.

The contract suggested is designed to grant public use for the development of a heating network that operates on biomass (specifically on wood coming from sustainable forest management).

The goal is to make it possible to supply and distribute hot water for thermal uses (ex. Heating and providing sanitary hot water) for homes, businesses and public buildings and service sector buildings in the community of Setcases.

In this case, the concessionary will have to expand the network and boiler rooms in function with the additional clients participating in the program. The city council lends its facilities and gives the right to pass onto the streets so that the network can connect with future clients.

Providing hot water (thermal sale, management and maintenance) for heating existing municipal buildings belonging to the city council and social center, must be maintained and guaranteed during the duration of the contract.

The public concession is the private use of public property that incurs a transformation or modification to the property (legal nature). The concession is granted by approval from Decree 336/1988, of October 17, for which the legal framework is established for public use property, in accordance with the measures established in Legislative Decree 2/2003, of April 28, by which the text in the municipal Law and framework within Catalonia is approved.

5.3.2. Concessions of services. The case of Figueres municipality

In this case there was a concession of services promoted by the Figueres city council, without having an initial biomass installation already built.

The main purpose of this concession was to install a biomass boiler and centralised heating network for different public buildings, whether they were owned by the municipality, general public or private sector.

In this case the city council proposed and approved the creation of a project, provided the land for setting up the biomass boiler rooms and allowed connection to the centralised heating network. The municipality and the Beenergi program are working on designing a contract for the concession of thermal energy services in which the project is financed by the sale of the thermal energy, which would pay off the investment in the long term.

Diputació de Girona
T. +34 972 185 091
Pujada Sant Martí, 5
17004 Girona

beenergi.ddgi.cat