Energy saving in public buildings.

Guide to introduce the 50/50 methodology in municipal facilities.

Working document

Diputació Barcelona | Àrea de Territori i Sostenibilitat

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EURONET 50/50 max

We hope this document will be useful to involve everyone who is part of the public building community in achieving energy savings and so contributing to greenhouse gas emissions reduction and to a better management of public buildings.

This proposal is open to your suggestions and your experience so that we can make the Euronet 50/50 max project a real success.

Original idea: Environmental Services Management, Barcelona Provincial Council

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1. What is this guide for?

At the municipal level, public buildings are among the largest consumers of energy, up to 60% of the town council's total energy consumption. To have an impact on this consumption you must focus on the demand. Energy efficiency is one way to achieve energy consumption reduction. However, it always entails, with a grater or lesser degree, some investment, either to improve already existing equipments or to acquire more efficient ones. Another option is to act directly on demand through management and behavioural changes. This guide will develop how to manage and introduce behavioural changes in order to reduce energy consumption. Introducing energy management in public buildings implies a change in our habits, an optimisation of our consumption without reducing our comfort and, above all, common sense. *Energy management is the process of monitoring, controlling, and conserving energy in a building*.

Energy management and behavioural changes carry no associated economical costs. The cost involved is, above all, the cost of the time spent to implement different ways of acting. Introducing energy management in a public building means to work with its users and managers. Savings associated with behaviour are always more costly in terms of effort than investing in energy efficiency measures but also, and precisely for this reason, these savings may be more enduring and sustainable ones.

The 50/50 methodology introduces a financial incentive for good energy management and makes people the key to success in energy savings. This guide has been prepared in the framework of the European Euronet 50/50 max project and contains the methodology and some examples to apply 50/50 in municipal facilities.

1.1. The Euronet 50/50 max project

The Euronet 50/50 max starts from the experience gathered in many German schools and from the pilot test carried out in 50 schools in various European countries during 2009-2012 (Euronet 50/50 project) . Now, the new project transfers the 50/50 methodology, already used and proven, to 500 schools (both primary and secondary) and to 48 municipal facilities spread over the different countries of the project. This is a way of extending the European network of schools and other public buildings in favour of energy savings and the fight against climate change.

The main objective of the project is reducing energy consumption in public buildings and sharing its associated economic savings with the users of the buildings.

This project lasts three years (2013 – 2016) and during this period the aims are :

- Achieving an energy consumption reduction through behavioural changes of the users combined with small measures in maintenance.
- Giving the public building's managers and users an important role in proposing ideas and measures to save energy.
- Raising energy awareness among the employees and users of the public buildings and going beyond the Euronet 50/50 max project.
- Saving money that would have been spent on energy and using it to finance other projects, activities or improvements in the facility.

1.2. What do you find here and what is it for?

The purpose of this guide is to provide a simple way to apply the 50/50 methodology to public buildings in order to achieve energy savings without making large investments, basically through behavioural changes in the use of the facilities.
There are many types of public buildings and facilities: sports facilities, municipal offices, social-cultural spaces (libraries, civic centres, museums, etc.) and others such as public markets, health centres and so on.

Each has its own characteristics, so the actions proposed should be specific, but they all share the fact of being managed by a Public Authority and of having a significant capacity for energy savings.

Euronet 50/50 max proposes different approaches to suit the diversity of the municipal facilities, either working with the people running the facility or by creating energy teams comprising representatives of the managers and representatives of the entities using the building.

Euronet 50/50 max project gives much importance to the involvement of the facility's users throughout the whole process: from managers to employees, and including groups or individual users. These people are the true protagonists of the project and the leading actors to achieve the energy savings target through the improvement in the use of the facility.

We recommend that participation should be made visible in the facilities, so that both visitors and users can be aware of their work for energy savings and can know what is being done all the time and what results are being obtained.

There are 9 steps to apply 50/50 methodology. They can be implemented throughout a whole year. There are details on how to organise the project in the operation of the facility: with guidelines, ideas and resources which the energy team can use to apply the 50/50.

The guide is completed by a set of annexes with useful information and another document: *Guide to introducing the 50/50 into municipal facilities. The steps in practice*, which includes a set of actions to be applied at the different steps of the methodology.

2. What do we have to do before we start?

When the town council suggests to implement the 50/50 methodology in municipal buildings there are several tasks that have to be done in advance:

2.1 The monitoring committee of the project

It is recommended to create an internal committee in the town council to promote and track the project. If there is more than one area/department of the town council involved or if there are various types of facilities, each of them should have a representative in the committee.

The monitoring committee of the project can include technical and political staff:

- Representatives from the environmental department.
- Representatives from the..... department (as agreed for the facility).
- Representatives from intervention and/or secretariat.
- Others seemed appropriate.

The functions of this committee are:

- Selecting the buildings for action
- Agreeing and planning the general phases of the project. The work schedule of the project needs to be estimated. Perhaps the easiest way is to work with annual calendars.
- Preparing the agreement to be signed with the facility (in annex 2 you will find a model of the agreement)
- Providing the necessary information for the good development of the project (energy consumption details, number of users, hours of use, surface, etc.)
- Monitoring the project
- Proposing how to refund the savings achieved thanks to energy savings

2.2 How do you choose the buildings for the 50/50?

First of all, choosing the target building or group of buildings is essential to gather information on its energy consumption for the last three years. Afterwards we collect other information such as the building structure, users and workers, operational facts (operation hours, how the heating system works, habits…). The more information we have on the building the better we can plan the development of the project.

We should take into account the following criteria to select target buildings:

Criteria for the selection of the target buildings

1. *High motivation of the manager and the staff working there.*

A key factor in the success of the project is finding a person or group of people who are keen to take it on and keep it going. That there are such people is, without doubt, the main criterion to take into account when selecting it. On the other hand, if there are open conflicts in a building, it is better to leave it out for the moment (reserving it for a second phase).

The rest of the criteria, although important, are secondary. The best guarantee of success is that someone takes the project as their own. In short we need to find those people who will spread the new habits acquired among the rest of the users. And ensure that they are on the energy team of the centre.

2. *High support and involvement of the managers.*

It is important to have the implicit and declared support of the managers for the person or people leading the project in each building. If this support is openly clear to all the employees in the centre then the management tasks which are promoted by the energy team will have more legitimacy. A good moment to do this is when holding the first meeting for presentation of the project in the building.

3. *Having knowledge of the types of users of the building.*

It is very important to know the different kinds of users in the building, as the good development and success of the actions planned can depend on it. It is recommended to have information on the users (students on courses in the civic centre, schoolchildren doing sports, or just employees of the building, etc.), their numbers, timetables and the relationships established among them.

4. *A fluent and easy relationship between the managers and the users.*

If the managers of the building have a good relationship with the users and if there are clearly established communication channels, it will be easier to apply the 50/50 methodology. Moreover, the project can take advantage of those communication channels to broadcast the various messages on energy savings.

5. *Knowing in advance that there is a potential for savings.*

As a general rule there is always a potential for savings in any building, as things can always be improved. It is recommended to select buildings having significant energy consumption. Achieving energy savings will not only benefit the town council but will also become a motivational element for the energy team.

6. *Having information about the building: plans, a recent energy audit and, above all, energy data consumption.*

The more information we have on the building the easier it will be to apply the 50/50 methodology, as this information will be especially useful in the audit step. It can also be a good idea to choose buildings where there have been no extensions, structural renovations, etc., so as to simplify the calculation of the energy savings.

7. *Fulfilling the function of being an example to allow other public buildings to start on the 50/50 methodology.*

If there are more facilities of the same type in the municipality, then one of them can be used as an example to the rest. Given the choice, it should be a building well located in the municipality, with intensive use and well known to all the population. Actions taken in a significant building in the town will enhance its role as an example of the project for the citizenship.

2.3 Start on the right foot: present the project to the community of the building.

It is important to arrange a meeting where you can explain the project to all the people involved in the use and management of the target facility.

So, you should invite all the possible beneficiaries/people involved; facility managers, staff, presidents of the entities which use the building, individual users, representatives of the town council, maintenance service, cleaners, etc.

When possible it is recommended that the mayor or a councillor explain what it is all about, what reasons have persuaded the town council to back an initiative of this type and what are the benefits to be obtained by the public buildings, the town council, the municipality and the citizens.

3. Steps in applying the 50/50 methodology in a municipal facility

There are 9 steps in applying the 50/50 with success. These can generally be extended over a whole year. However, each energy team will decide the appropriate speed to develop them, and will arrange the working plan in accordance with its reality. We recommend preparing a working schedule.

The steps of the methodology can be made consecutive, but there are also some which can be taken out of order if the energy team thinks it right, depending on the type and operation of the facility.

Step 1. Setting up the energy team: the key to success.

This step is the most important one. The energy team of each facility will include:

- Representatives of the building: managers, technical staff, employees, etc.
- Representative/s of the town council department/s managing the facility.
- Others thought appropriate: caretakers, workers, clean service, etc.

It will have the following main functions:

1. Coordinating the project and taking the necessary decisions to guarantee its correct progress.
2. Detecting the strong and weak points in the energy management of the facility and proposing improvements.
3. Monitoring the energy consumption of the centre, both the control of invoices and the management of the monitoring devices in the building.
4. Disseminating the project among the rest of the users and transmitting messages to encourage savings.

The energy team will meet as often as is decided or required by the project, at least once every three months is recommended. In Annex 1 you will find a template for setting up the energy team.

Step 2. Signing a commitment agreement

It is very recommendable that a document of commitment should be signed, specifying among others:

- The building's responsibilities.
- The town council's responsibilities.
- The method of calculating the savings.
- How to refund the savings achieved thanks to energy savings

In annex 2 you can see an example of an agreement.

Step 3. Monitoring the energy consumption of the building

In the process of introducing the 50/50 methodology you need to know how much energy the building uses and when is it used. There are three broad ways of handling this:

1. Follow-up of the monthly bills. An Excel spreadsheet can be prepared to show the facility's monthly energy consumption, using the invoices sent to the town council by the utility companies.
2. Regular meter readings. Someone is appointed to be responsible for taking regular readings from the meters existing in the building and entering them on a grid/excel spreadsheet.
3. Installation of measuring devices (smart meters). There are now monitoring devices which are installed directly in the general connection of the building. It is better to begin to monitor the total consumption of the facility through the general supply connection. Since all people involved in the project will be able to see the energy consumption of the building at any time, which will help to reinforce the base of the project: everybody is involved in energy savings.

When monitoring the energy consumption we can follow-up changes in the behaviour of the users of the building and the impact of the actions taken.
Throughout the whole project the energy consumption of the building has to be monitored and therefore it is recommended to appoint someone in the centre to be responsible for this task.

Step 4. The energy audit.

In step 3 we know HOW MUCH energy is used and WHEN it is used, step 4 tells us HOW we consume.

Carrying out this initial energy audit in the facility will require special attention to the management and behavioural elements of the building.

Collecting the previous data

The first step is the **search for information**.

1. **Information on people**: we will seek information related with the organisation of the centre and identification of key people.
2. **Information on the activity of the centre**: which spaces are occupied and at what time. Having a calendar of the activities of the centre allows us to make comparisons between busy days and quiet days, and also between the same days in different weeks or months.
3. **Information on energy consumption: In addition to the monitoring of the consumption, it is important to know** if there is any recent study or audit of the building (we can use all the information that already exists!!).

Once this information is collected we can cross all data we have with this information, so that we can see which activities have a direct influence on consumption.

Audit

The energy audits carried out in the buildings of the EURONET 50/50 MAX project have a series of particular points which differentiate them from a standard energy audit. These are, among others:

1. It must be a technically rigorous document but easy to understand for any member of the energy team.
2. It must include a description of the building, designed to be understood by the 50/50 energy team, it will be the starting point to establish the energy tours will take place (step 5).
3. Special attention must be given to the management and running of the building, without forgetting the description of the building and its points of consumption.

4. It must allow a subsequent monitoring of energy in the building, showing the details of consumption in a comprehensible manner.
5. It must identify the principal problems presented by the buildings but must also concentrate on those actions which require low investment and, above all, actions related with the application of good practices (useful as a guide / inspiration to the energy team).

In annex 5 there is more information on how to do the audit.

Step 5. Energy tour

An accompanied visit to discover how energy is managed in the building. It has to be decided who will conduct the tour, whether it is first made by the energy team and then repeated with the entities or other users, etc.

Among others, the visit can include: the main electrical connection, the boiler room, a standard room, public areas, etc. This visit must allow the members of the energy team to get an idea of the principal strong and weak points of the building in order to start proposing actions for improvement.

If the energy tour is done after the audit you can use the results to organize the visit: principal spaces to be visited, heating system, boilers, main energy consumer devices, etc. But the tour can also be used for the energy audit, steps 4 and 5 being dealt with together.

At the end of the tour a set of conclusions should be made.

Step 6. Information to the users of the building.

The energy team, from conclusions arisen from the energy tour, may start planning communication actions to inform the rest of the users. Parallel to that, the energy team can collect ideas, comments, opinions, etc. from the rest of users, so they can be used when preparing the proposals for the action plan (step 7).

Step 7. Defining the action plan.

From previous steps the energy team can plan a set of actions, determines people responsible for carrying them out and establishes a work schedule.

The actions can be defined directly by the energy team or the process can be opened to participation by the users of the buildings.

After putting the actions in practise, the evolution in energy consumption has to be monitored with invoices and the monitoring devices installed. This is the way to assess the effectiveness of the various measures introduced.

Step 8. Calculation of the energy savings.

Every year the savings achieved have to be calculated and to do so the monitoring committee and the energy team will decide the method of calculation to be used.

However, from the project we suggest a methodology which is simple and easy to understand but at the same time is rigorous. With this calculation you get the value of the energy savings in kWh, tonnes and euro. Energy savings obtained are converted into money value by applying the current energy prices. That is, the number of kWh saved is calculated for each supply (electricity and natural gas) and is multiplied by the average price shown on the various invoices.

For this reason it is essential that the Town Council collects all the energy (electricity, fuel, gas…) invoices, those from the last three years (baseline consumption) and, of course, every year since 50/50 application.

Half of the savings achieved is for the town council (or whoever pays the energy bills of the building) and the other half is for the public facility.

If the facility is not able to make any savings then no money has to be given to the town council. In this situation it would be interesting to review the action plan and

the involvement of the different stakeholders, in order to improve the result in the next year.

You will find details on the method of calculating the savings in annex 4.

Step 9. Dissemination of the results.

Once the energy team has decided how to spend the money gained this should be communicated to the rest of the users and also to the citizens.

It is recommended to take advantage of the mechanisms and channels already in place in the public building and the town council in order to communicate to the maximum the actions taken and the results obtained. A public presentation of the project is also a possibility.

4. The steps on a calendar.

As an example the following table summarises the 9 steps and gives you an idea of how to spread them over a calendar year:

Phase	Month
1. Setting up the energy team.	January
2. Signature of the commitment agreement	January
3. Monitoring the energy consumption of the building	January/ early February
4. Carrying out the energy audit.	February / March
5. Energy tour by the energy team.	March
6. Information to the users of the building	March / April
7. Defining the action plan. Carrying out the actions and follow-up of results.	April March – December
8. Calculation of the energy savings.	January next year
9. Dissemination of the results.	February next year

5. Top ten for success in the 50/50

Before starting a 50/50 project do not forget these 10 good advices!

1. *Motivation, will, thrust and support*

Find people who want to lead the project, who have the will and the necessary support.
Ensuring the support, commitment and cooperation of the political members of the town council is the starting point for any energy management project.

2. *Know who's who.*

Find out which groups of people there are in the building, identify the managers and key users (people whose influence will have a knock-on effect on the rest of the users).
Make links or agreements with the people responsible for maintenance, sports coordinators, bar managers, cleaners and other services.

3. *Concentrate on people and good practices*

The objective of the project is to implement actions for energy savings and to influence on people, not trying to make large investments in savings and efficiency.
However, during the project, actions requiring some small investment may be identified and these can be put into effect in the second year with the savings achieved.
But, we repeat, the aim of the project is to involve people and concentrate on actions for management and behavioural changes.

4. *Monitor consumption*

It is recommended to install a monitoring device on the general energy connection point to check the total consumption of the centre. Monitoring allows us to quantify the savings achieved with the changes made and gives us graphic information, very valuable in showing the results obtained to the whole community.
If we do not have instant measuring devices we can use other more manual alternatives for monitoring the consumption.

5. *The connecting tour*

Do an energy tour with the energy team, which will allow the energy team to understand the building from the energy perspective. This tour will help to identify the main consumption points and, thus, to agree on the main actions to be taken, seeing the building that we know so well from another viewpoint.

6. *What do we do?*

Arrange easy, clear and intelligible instructions; these will be a key factor in the success of the project. You must ensure that instructions are generally agreed. Make a simple action plan, by consensus, in which it is clear what is to be done, who is responsible for it, and when and how it is to be done.

7. *Empower*

Without people there is no management. The potential of each person has to be assessed, giving them authority and the reward of success achieved. Getting the key people to take on the project and make it their own will bring success. Then arrange public recognition of their efforts.

8. *Share*

Explain the project, what instructions were given and what savings have been achieved is a way of encouraging everyone to contribute their grain of sand to the project. To do this you can use the already existing communication channels.

9. *Follow-up... without losing the thread*

A good energy management project does not end with the application of the instructions and the first monitoring. We recommend a regular follow-up about every 6 months to check that the good behaviour acquired continues and, even, to motivate the users for further actions.

10. *Reinvest*

Use the savings achieved through the reduction of energy consumption on some action for energy efficiency to take the results further than the savings made through simple management.

List of Annexes

Annex 1: Template on setting up the energy team.

Annex 2: Model agreement for signature between the building and the town council.

Annex 3: Description of the energy audit.

Annex 4: Guide to calculate the energy savings.

Annex 1: Form on setting up the energy team.

THE ENERGY TEAM OF (building name). EURONET 50/50 MAX PROJECT

The EURONET 50/50 max project is a European project in which 500 schools and 48 facilities are taking part in 13 different countries, with our building among them. Through this project we wish to save on energy consumed by improving management and our habits. From the savings we make half will be returned to the public facility and the other half is for the town council.

This project lasts for three years and the Energy Team is in charge of coordinating its implementation in our building.

The energy team members are .....(a photograph can be added)

	Name	Post
Staff of the centre		
Technical team of the centre		
Other members of the building		
Entities		
Town council		
Barcelona Provincial Council		

And its functions are.....

- Coordinating the project and taking the decisions necessary to guarantee its good working.
- Detecting strong and weak points in the energy management of the public building and making proposals for improvement.
- Monitoring the energy consumption of the centre, both through the billing and in managing the follow-up devices.
- Involving all the key actors and making alliances to push forward the energy saving actions.
- Broadcasting the project among the rest of the users and transmitting messages on savings to them.

In ....., on..... of ..... 2014.

Annex 2: Model of agreement for signature between the public building and the town council.

AGREEMENT BETWEEN THE TOWN COUNCIL OF (name) AND (name of public building) TO CARRY OUT THE EURONET 50/50 max PROJECT

1. Declaration of intentions

Both parties are aware of their responsibilities regarding the responsible use of public budgets and the use of natural resources with the purpose of preserving the environment. Therefore, they agree to adopt the measures necessary for savings in:

- energy for heating and hot water
- electricity

2. The commitments of (name of building)

1. **(name of building)** undertakes to stimulate the users of the building to make a responsible application of the energy used in the building.
2. To facilitate the achievement of this objective, an energy team is formed, comprising the following people: (list them, with name and post)
   - Name and post
   - Name and post
   - Name and post
   - Name and post

The principal functions of the energy team will be (among others, can be more detailed and personalised):

- Coordinating the project and taking the necessary decisions to guarantee its good functioning.
- Detecting strong and weak points in the energy management and making proposals for improvement.
- Monitoring the energy consumption of the centre, both at billing level and in managing the follow-up devices (if there are such).
- Involving all the key actors and seeking alliances to push forward the energy saving actions.
- Broadcasting the project among the rest of the users and transmitting messages on savings to them.

3. **(name of building)** will appoint at least two people who will be responsible for implementing the 50/50 process and will form part of the energy team.
   - *(Name and surnames:*
   - *Name and surnames:)*

4. The public facility undertakes to keep a record of the activities and measures adopted.

5. The public facility undertakes to participate in the 50/50 network, that will share experiences and information on the application of the 50/50 max project among other public amenities around Europe.

3. The commitments of the Town Council of (name)

1. Supplying all the documents and information necessary for the proper execution of the project. *(Possibility of specifying these: details of energy consumption for the last three years, plans of the building, etc,).*
2. Participating in the energy team. The town council will appoint at least one person, who will be responsible for the installation of the 50/50 process and form part of the energy team set up in the centre.
3. To return part of the savings achieved according to the results obtained.
4. Broadcasting the application of the 50/50 methodology to its municipality and encouraging other municipal amenities to take part in similar activities.

4. Values of reference

1. To fix the starting point in order to calculate the savings achieved during the project, the monthly consumption of the various resources during the last three years is used, as shown on the respective invoices, set out in the following tables for months and years.

2. Electricity

Periods	Electricity consumption (kWh)												
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1 (2011)													
2 (2012)													
3 (2013)													

3. Gas/combustible

Periods	Gas consumption (kWh)												
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1 (2011)													
2 (2012)													
3 (2013)													

N.B.: If the invoices only indicate consumption per two months or quarterly, it is only necessary to put in the figure for the last month of the period. The consumption of gas (or other fuels) has to be recorded in kWh.

5. Changes in use and times of functioning

The energy team will enter in the record any important change which takes place in the use of the building, such as alterations of the external structure, in the heating system or other technical amenities, and the opening hours of the centre, in order to evaluate the impact of these changes on the consumption of energy and resources during the project. The reference values will have to be adjusted for the changes.

6. Calculation of the savings in expenses

The savings achieved in energy supplies are converted into cash values by applying the current prices at any time.

To do this, the energy consumption for the current year is subtracted from the consumption calculated from the year of reference and then the kWh saved are multiplied by the average price for the energy supply of the current year.

Details of the method for this calculation are in the document: *calculation of savings.xls* provided by the Environmental Services Management Department of Barcelona Provincial Government.

Calculating the savings in electricity

The savings obtained will be the difference with the year of reference:

Savings (in kWh) = kWh year of reference – kWh current year

In this case the kWh of the year of reference will be the arithmetical average of the three years measured. Then the kWh are multiplied by the average annual price for electricity.

To calculate the savings in electricity, in principle there is no weighted value, this will only apply if there is a change in the hours of use of the centre or in other parameters which have an effect on consumption.

Calculating the savings in heating

To calculate the energy savings in heating the fuel consumption is weighted for the degree days (DD) in heating. A degree day is a unit which indicates the degree of cold in a year. In this way the effect of outside temperature on the fuel consumption can be drawn from the savings calculation.

To calculate the savings in heating we must first determine the consumption of reference standardised for the degree days in order to calculate the standard consumption for degree days of the year in progress. Then we subtract the real consumption for the year in progress from the calculated standard consumption. Finally the kWh are multiplied by the average annual price of the fuel.

The total savings achieved will be the sum of the savings on electricity and the savings on fuel.

7. Ratio of distribution of the savings (can be personalised if thought fit)

The amount of the savings is shared as follows:

- 50% for the use of the building
- 50% for the town council

8. Payment and use of the money (the town council and the building will have to personalise their agreements on this point)

The payment of the savings money will be made each year as soon as the essential calculations are ready, but no later than _____ (three months after the key date indicated in section 6).

The building will decide what to do with the money received. During this process the energy team should be consulted.

9. Start and duration of the agreement

This agreement will be in force from date..... to date ..... During this period the values of reference will not change. The agreement can be renewed if both parts so wish.

Signature for the building
(Name of representative)

Signature for the town council
(Name of representative)

Place, date

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Annex 3: Description of the energy audit.

The energy audits carried out in public buildings under the EURONET 50/50 max project have a series of special features which differentiate them from the normal energy audit. Among others:

- They are technically rigorous documents while easy to understand for the energy team.
- They include a description of the building intended to be understood and worked on by the 50/50 energy team. The energy reviews will be based on this description.
- They pay special attention to the management and functioning of the centre, not forgetting a description of the building and the points of consumption.
- They allow an energy follow-up of the building, showing the details of consumption in an understandable way and in consonance with the documents to be worked on with members of the energy team.
- They point out the main problems presented by the buildings, but concentrate on those actions which require little investment and especially actions related with the application of good practices (which are useful as a guide / inspiration to the energy team).

In short…

They are technical documents of support for the energy team.

General structure of the energy audit:

1. Introduction and methodology of the audit.

a. **Presentation** of the working framework, the objectives, the visits, the working methods, etc.
b. **General description of the building.** Brief introduction of the building with its main characteristics, location and type of building (detached, between party walls, corner building, number of floors, etc.), the activities taking place in it and the distribution per floor, working hours, number of lines, etc.

2. Description of the building and its energy consumption.

a. Study of the thermal enclosure of the building (walls, windows, closures, roofs, etc.)
b. Description of existing energy sources and the movements in consumption. Details of contracts (for both heating and electricity), graphics of movements in consumption, calculations of energy indicators.
c. **Description of installations in the building.** Air conditioning/central heating, domestic hot water, electricity installations (meters, control panels, connections), principal sources of consumption (electrical appliances, office computer systems, hand dryers, etc.), closures and type of roofing (tiles, flat

roof, with or without air cavity, fibrocement...), installations for renewable energy: description of those which may exist, others.

3. Description of energy management in the building. The people and the maintenance tasks that they perform, who turns off the lights, the timetable for cleaning tasks, if there is any kind of central control, if there is any time set for turning the heating or air conditioning on or off according to the time of year, any prior actions with a view to sensitising/changing the habits of the public facility's users, if any renovation has been done or any significant action in recent years, or if any is planned in the short term, among others.

4. Actions proposed: List of actions proposed, whether in the application of good practices in energy management or for investments in equipment (low).

5. Conclusions on the energy situation. Noting:

a. Principal weaknesses and strengths of energy use in the building (tendency in consumption, the main consumption points, which consume most and why...).
b. Energy consumption indicators (drawn from the European Check-it-out project)
    - Min/Med/Max kWh/m²a heating
    - Min/Med/Max kWh/m²a electricity.
c. Principal actions proposed.
d. Other observations made during the visit or which the technician thinks relevant.

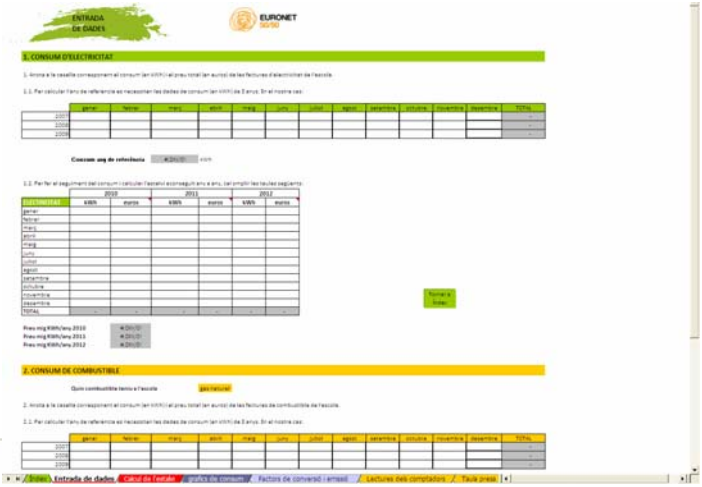
Annex 4: Guide to calculate the energy savings.

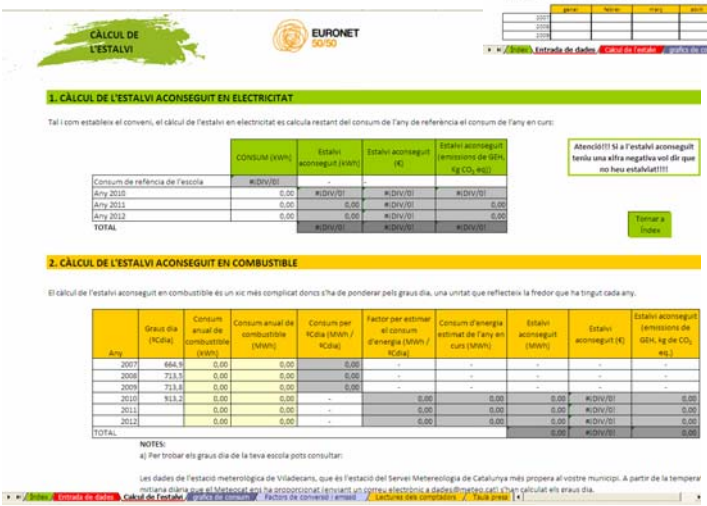
Every year the savings achieved have to be calculated and to do this all parties (building, town councils and partners in the project) have agreed on simple methodology, easy to understand and also rigorous. Through this calculation we obtain the value in kWh, tonnes and euro, of the energy savings. 50% of the savings in euro is the amount that the town council will have to give to the public building.

The Euronet 50/50 project has developed an Excel sheet to simplify and homogenise the calculation of energy savings. During the first application of the Euronet 50/50 each partner did the calculations for each of the schools. Now the Excel file has been converted into a tool for the energy teams of the schools and the amenities which will form part of the 50/50 Network, so that they can do the calculations for their savings.

The Excel tool is user-friendly and easy and has the following sections:

1. Home page of the programme.
2. Welcome to the programme and description of the content.
3. Explanation of the calculations.
4. Putting in the data. This is the part that each building/town council has to complete.
5. Calculation of savings. You only have to put in the degree days for the year.
6. Graphics of consumption.
7. The factors of emission used and other details of interest.





To calculate the energy saved, the details have to be put in as required by the "entry of details" tab and the degree-day column for the "calculation of savings" tab. The rest of the calculation is automatic.

Methodology of calculation

The principal objective is to calculate the amount of energy that has been saved in a year in:

- Consumption of electricity
- Consumption for heating (normally natural gas)

The savings obtained with the reduction of energy consumption is converted into monetary values by applying the current energy prices. That is, the number of kWh saved is calculated for each supply (electricity and natural gas) and is then multiplied by the average price for the current year, taken from the various invoices.

This is why it is essential for the Town Council to provide all the invoices for electricity and fuel for each year.

To calculate the kWh saved the annual consumption for the year in progress has to be subtracted from the consumption in the year of reference (the average of the preceding three years). After that, the kWh saved are multiplied by the average annual price of the energy.

How is the year of reference defined?

The Euronet 50/50 project uses as a value of reference the average consumption of the previous three years (2007 – 2009). These details are taken from the monthly invoices which must be provided by the town council (or whoever pays the energy bills).

During the development of the project the energy saving was calculated for 2010 and 2011 (the period when the schools of the 50/50 Network were applying the 50/50). At the ends of these years, the energy savings of all the schools were calculated by comparing the consumption for that year with the values of reference.

If there are changes in the use of the building or in the installations which could have an impact on energy consumption, these must be taken into account when making the calculation.

1. Calculation of the savings in electricity.

The saving achieved is the difference between consumption in the year of reference and consumption in the year in progress.

Savings in energy (in kWh) = kWh year of reference - kWh year in progress

The figure for kWh year of reference is, as has been said above, the average of the last three years (2007-2009, during the project). Later, the kWh saved are multiplied by the average annual price of electricity.

2. Calculation of the savings on heating.

The calculation of the savings on heating is more difficult as it has to take into account the degree days (DD). A degree day is a unit which indicates the level of cold of the year. The effect of outside temperature cannot be controlled by the building and has a direct effect

on fuel consumption. Including the degree days in the calculation process corrects this problem.

2.1 To obtain the degree day figures.

The Euronet 50/50 project has used, principally, the webpage www.degreedays.net to calculate the degree days. In the section "degree day type" you have to select "heating" and the base temperature 15ºC. It is important to select the meteorological station closest to the public building.

Now in the Euronet 50/50 max project, the Provincial Government can also provide the degree days for each municipality, taken from the details given by the Catalan Institute of Meteorology.

2.2. To calculate the value of reference.

To determine the year of reference the values have to be weighted by the degree days. This has to be calculated for each year:

$$\frac{\text{Gas consumption year 1 (MWh)}}{\text{Degree days year 1}} = \text{Consumption weighted by degree days (MWh/DD)}$$

Then an average of the three years is taken in order to obtain the standardised consumption of reference.

$$\frac{\text{Consumption (MWh)/degree days year 1} + \text{Consumption (MWh)/degree days year 2} + \text{Consumption (MWh)/degree days year 3}}{3}$$

2.3. To determine the savings in the year in progress

The next step is to multiply the degree days of the year in progress (year 1) by the consumption of reference calculated as above (point 2.2) in order to obtain the standardised consumption for the year in progress, which is the estimated consumption that the facility would have had, without applying any special measures in the use of energy as a result of developing a 50/50 process.

Degree days year 1 x standard factor (point 2.2) = Estimated consumption for year 1

Finally, it is possible to calculate the savings obtained by subtracting the standardised consumption for the year in progress from the average consumption for the same year (obtained directly from the invoices for energy).

Energy savings (MWh) = estimated consumption for year 1 - real consumption for year 1

Then the kWh obtained are multiplied by the average annual price of the fuel.

3. Total savings achieved

The total savings obtained will be the sum of the savings in electricity and the savings in fuel.

4. Financial income for the public building

50% of the savings achieved is for the town council (or whoever pays the energy bills for the amenity) and the other 50% is for the building. If the public building does not achieve any kind of savings there is no sum given to the town council. But if the are savings in any consumption (electricity or gas) the town council can reward the efforts made by returning half the savings achieved.