"Display™"
Combining local action with community legislation implementation

Peter Schilken
Energie-Cités
2, chemin de Palente
FR-25000 Besançon
pschilken@energie-cites.org

Gérard Magnin
Energie-Cités
2, chemin de Palente
FR-25000 Besançon
gmagnin@energie-cites.org

Keywords

municipal buildings, buildings Directive, improving energy and CO_2 performance, networking, European campaign, benchmarking, awareness raising

Abstract

Display™ is a European Campaign aimed at encouraging European municipalities to publicly display the energy, water and green house gas emission performances of their municipal buildings. The Campaign is the first of its kind in Europe and is supported by the European Commission – DG ENV and DG TREN. It will run from 2003 till the end of 2007.

Display™ is within the scope of the Directive on the Energy Performance of Buildings. The objective of Display is to anticipate the implementation and to provide European municipalities with an opportunity to be one step ahead of this Directive. Display does not intend to be only a certification scheme, it is an information tool to raise the public awareness of energy consumption too.

At present, 60 municipalities from 19 European countries are partaking in the Campaign, though efforts are currently being made to extend the number of participants to at least a hundred cities by the end of June 2005.

The most visible part of Display is a poster, based on the now well-known principle of energy labels for household electrical appliances and which has been adapted for use on public buildings. This is one reason for the poster being easily understood and accessible by citizens. In the foreground of the poster there are pictures showing the classification of the building. It features a range of classes from A to G for the

overall primary energy consumption, the resulting CO_2 equivalent emissions, and water consumption.

Display, definitely an invitation to take action!

Introduction

Display is a European Campaign aimed at encouraging European towns and cities to publicly display the energy, water and carbon performance of their buildings. The campaign is the first of its kind in Europe and is co-ordinated by Energie-Cités and supported by the European Commission – DG Environment and DG TREN. It receives funding for the period from January 2003 till the end of 2007.

Display is within the scope of the Directive on the Energy Performance of Buildings (adopted in December 2002), which is to be integrated into the national legislation of all member states by January 2006. This directive requires all member states to take measures to encourage, through a consistent system of certification, the public display of information on the energy performance of their buildings. The objective of Display is to anticipate the implementation and to provide European municipalities with an opportunity to be one step ahead of this directive. Display does not intend to be a certification scheme only; it is an information tool to raise the public awareness of energy consumption too.

Display™ – a political instrument

DISPLAY™ EUROPEAN WORKING GROUP

Display is the result of networking activities between twenty municipalities from eighteen countries as represented by

their Energy Managers. Collectively, they have created the product and all its various components, under the co-ordination of Energie-Cités: poster, calculation parameters, tests, promotion, communication handbook, etc. Of the municipalities involved, some were more experienced than others, some were from the North, whereas others were from the South, the East or the West of Europe. Five experts from five countries contributed their skills and experience to the network of municipal specialists.

ACCELERATING AND IMPROVING THE DIRECTIVE'S IMPLEMENTATION PROCESS

The time required for a Directive to reach the implementation phase, from the conception of the initiative to its coming into effect is naturally quite long: preliminary consultation, proposal from the Commission, discussions in Parliament and Council in order to achieve a joint position, transposition time, transposition acts, implementation time after transposition… plus any possible delays. The entire process may take up to ten years, or even more in some cases.

Unlike many others, the legislative process for the "Buildings Directive" has been relatively swift: the Commission made a proposal in April 2001 and the Directive was published at the OJEC on 4th January 2003. The Directive provides a three-year timeframe (up to January 2006) for achieving transposition, but Member States will allow additional time for the implementation of the measures in their respective countries. The whole process may take three years, if not more, before all the provisions come into effect. In a meeting with OFEN, the Swiss energy agency, in November 04 we learnt that they expect this stage in 2010.

This extended "top down" process can be accelerated by means of parallel and complementary actions, which are closely linked to the legislation itself and which get the end participants involved by offering them the option of implementing the provisions of the Directive on a voluntary basis, well before it is transposed into national law, and using a "bottom up" approach.

This is precisely the objective of "Display", since the idea is to encourage municipalities to display their consumption and emission performance on a voluntary basis, for its own sake and because they are an example to the general public and to local players. In this way, they facilitate the implementation of national transposition acts in all EU countries, once these have been adopted. That's why Energie-Cités is also proposing a partnership to all institutions that are involved in the national implementation process. So far OFEN and Ademe have become a partner of Display.

Because Display aims to implement one of the provisions of the Directive in a scientific yet pragmatic way and because it encourages further improvements through appropriate communication, Display improves the quality of the Directive implementation process. Display may also be used by law-makers as a source of inspiration, since details of the implementation will have been tested even before any regulations have been passed.

INVOLVING ALL PLAYERS

Energy and climate jargon is often considered to be incomprehensible by non specialists: MWh, Gigajoules, tonne-CO$_2$ equivalent and other units mean nothing to most people. However, improving energy efficiency involves taking decisions that must be understandable to people who are not energy specialists and this accounts for 99% of the population – the general public, elected representatives, building companies, SME managers, housing estate managers, etc.

Following the example of the energy labelling system for household appliances, Display is an attempt to get out of this dead end by initiating a dialogue with the general public and by encouraging them to take action.

Energy is a "positive" term that is synonymous with movement and pleasure. Attempts at saving energy may be perceived as a deprivation of pleasure, a frustration or even a retreat. Being able to associate energy saving measures with some form of pleasure by taking action has become a priority if we want to get the whole population involved, rather than only the most highly motivated. Although frequently mentioned, the changes in behaviour that are required are based on this pre-requisite: a future with less energy and fewer emissions must not be associated with a gloomy future. To communicate this "positive" image in it's campaign the Display Implementation group has chosen among more than 50 proposals as it's slogan: "Get power – save energy".

Display promotes the idea of an energy certification system in the housing sector. It also encourages and facilitates the effective implementation of this, and not only in public buildings.

Display™ Activities and Actions Undertaken

THE DISPLAY™ POSTER

In the past 2 years, a wide-ranging communication tool has been developed by Energie-Cités. The essential objective, i.e. the design of the Display™ poster, has been achieved in February 04 after more than one year lasting intensive discussion process. In the foreground of the poster there are pictures showing the classification of the building in the three categories. It features a range of classes from A to G for the overall primary energy consumption, the resulting emissions of greenhouse gases expressed in CO$_2$ equivalents, and water consumption. Its design is recognisable as comparable to the existing energy label for household appliances. This is one reason for the poster being easily understood and accessible by citizens. The local authority will also record where improvements have been made to the building or are planned within the next three years and this information is included within the certificate making it a very powerful tool.

In addition, by pointing out simple actions, the Display poster enables users of the building to contribute to reducing the energy consumption and therefore improving the classification of the building. For the municipalities, the poster presents their contributions in terms of planned or already realised technical solutions. Finally, the details of a contact person are indicated in order to make it possible for users of the building to contact the responsible department of the city in case of questions and suggestions.
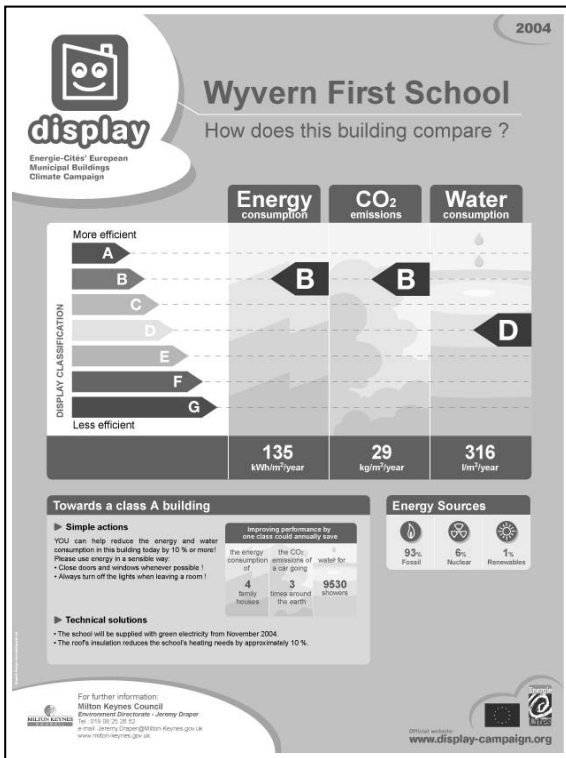
Figure 1. *Display™ Poster.*

Figure 2. *First Display™ poster hanged up in Milton Keynes.*

A very successful test phase was organised by the City of Leicester at the beginning of this year. The first version of the poster was hung up in five different buildings during one week and participants were interviewed after having seen the poster. Leicester experience has included testing customer's reaction to the poster and obtaining feed back. 56% of people interviewed said that they were interested in the poster and 27% very interested. Nearly 60% of people interviewed confirmed that they would change the behaviour to reduce energy and water use in the future [*Lack, 2004*].

In September/October 04 the first cities, Almada (PT), Graz (AT), Milton Keynes (GB) and Saarbrücken (DE), have started hanging up the first posters. Since then many more cities put up posters in their buildings.

THE DISPLAY™ POSTER GENERATION TOOL

Features and Structure of the Display™ Poster Generation Tool

The European Campaign Display was launched in order to anticipate – by a voluntary initiative – the entry into force of the "Energy Performance of Buildings" Directive (EPBD) [*Europe, 2002*]. The Display project focuses on part of the EPBD, which will oblige the Member-States to stimulate public display of information about energy performance in public buildings. Nevertheless, a methodology how to calculate the performance has not been defined in the Directive itself. The European Commission has committed the CEN (Comité Européen de Normalisation) to define methods for expressing the energy performance and for energy certification of buildings. Following the draft prEN [*CEN, 2004*] the energy performance indicator of the certification

scheme can represent an asset rating according to the building's architectural design and technological equipment, an operational rating based of the monitored consumption, or both. While many scientific experts (and several national ministries) prefer the asset rating certification scheme the Display pilot and partner cities opted for the label classifying buildings on the operational rating because:

- Final energy consumption data can be easily obtained, asses rating includes collecting of data on the building (insulation, heating system, etc)

- Operational rating certificate can be updated yearly and can be therefore be a measure of quality of the management and be used to motivate the building caretakers and users

- Public buildings are not foreseen for renting or selling so the impact of the building management and the development of the energy costs/consumption of the building are expressed in the operational rating system but not in the asset rating

The poster generation tool helps to create the individual Display poster. Having entered all demanded information it works autonomously and makes a printable poster available in pdf format immediately. It uses a calculation instrument that determines in a first step the buildings primary energy consumption. Afterwards the instrument generates the primary energy ratio, the consumption of primary energy per square metre of the gross internal floor area of the building. According its type, be it educational, administrative or another kind, the building is graded into a classification scheme of six classes: A to G similar to the well known certification scheme of household appliances. Concerning the CO_2 emissions, the instruments follow a nearly identical procedure. The production, transport, and consumption of every unit of whatever fossil energy source entails a certain
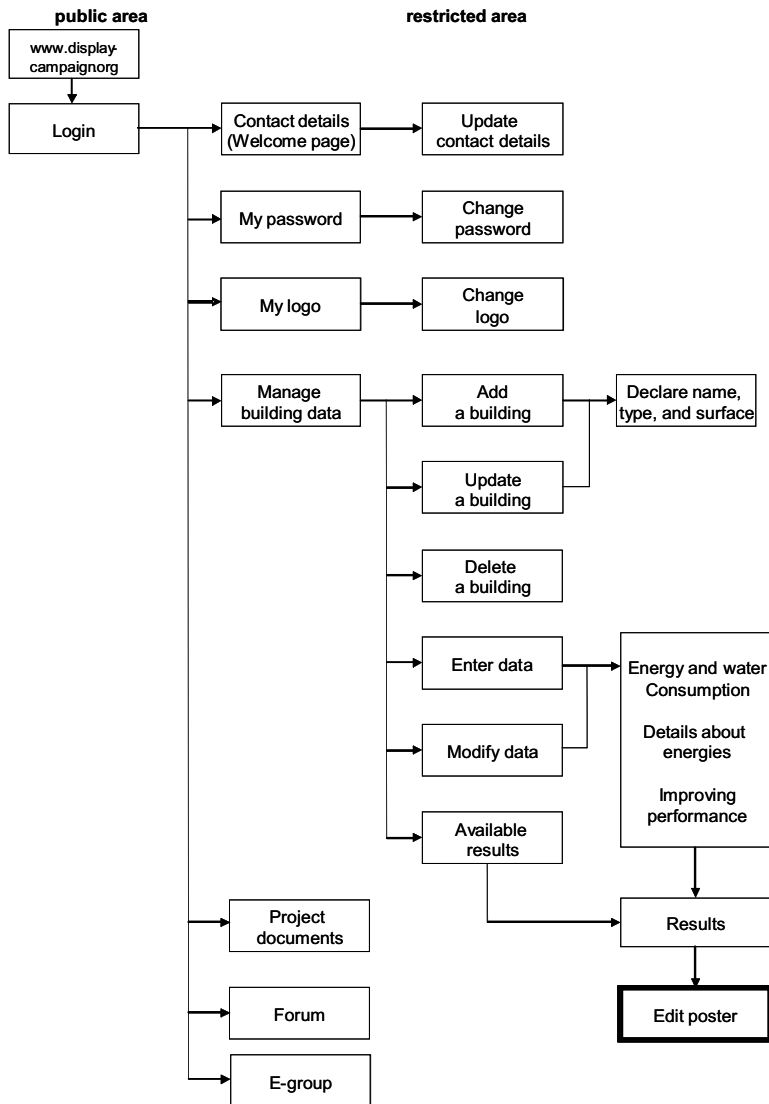
Figure 3. *Structure of the Display™ poster generation tool and further parts of the Display™ website.*

amount of greenhouse gas emissions, measured in kg of CO_2 equivalents. This unit is utilised so as not to neglect the emission of other greenhouse gases. Similar to the primary energy consumption, the tool calculates the CO_2 ratio, the CO_2 emissions in kg of CO_2 equivalents per square metre. Again, this ratio serves as criterion for the grading of the building into a scheme of six classes. The water consumption can be treated in an easier way. The water ratio, the consumption of the building in litres per square metre, is used as performance indicator.

Finally, the tool can fulfil other tasks but this sole calculation. Since the system offers the option of entering several years of data for the same building, Display can be used as a *monitoring tool* (although nothing can replace a proper energy management system when it comes to monitoring a stock of municipal buildings).

Display can also be used to compare the energy performance of a building with the performance it would have if improvement works were carried out. This *simulation* tool is of

interest because it provides a graphical demonstration of the impact of investment on the energy class (from A to G) the building finds itself in. For instance, the tool can show the impact – in terms of greenhouse gas emissions and primary energy consumption - of the installation of a wood fuelled boiler or a changeover to 100% "green" electricity.

It is also possible to *compare* the energy performance of some buildings with the performance of other buildings within the municipal stock or with those in other towns and cities. It is therefore an *incentive to achieve progress at one's own pace*, since the improvement margin is equal to the distance on the scale between the class the building is in and "Class A".

Information to be collected

The following list does not include every possibility but should be sufficient for most buildings. Disposing of the data listed in the following will normally enable you to fill in the forms:

- The surface of the building (gross internal floor area)

- The local weather correction factor

- The water consumption

- The energy consumption data of the building:

  - Separate for every energy source that was used in the building

- More detailed information about the used energy sources:

  - Natural gas or liquefied gas

  - Wood: chips, logs or pellets

  - Purchase of electricity: conventional or certified "green" electricity

- In case of use of district heating the following information:

  - A conversion factor (primary energy factor) informing about how much primary energy is needed for the production of 1 kWh of district heat

  - the CO_2 emission factor (Unit: t of CO_2 equivalents / MWh of district heat)

DESCRIPTION OF THE CALCULATION AND CLASSIFICATION PROCESS

The General Approach

Starting from the input data concerning the final energy consumption of the building the Display calculation instrument uses conversion factors to calculate the primary energy consumption. For this conversion it applies the cumulative energy demand (CED) factors that were developed by the German Association of Engineers (VDI) in co-operation with the German Federal Environmental Agency (Umweltbundesamt) [*UBA, 2004*]. According to the guideline VDI 4600 the CED is the sum of all the primary energy inputs of a service or a product. This contains its production, usage, and disposal. Contrary to other factors, the CED contains not only the energy demand of the process necessary to

provide a service or to produce a product but also the energy that remains in a product, e. g. the calorific value of mineral oil in plastic products.

The German Institute for Applied Ecology (Öko-Institut) has developed the life-cycle analysis program and database GEMIS [*Öko-Institut, 2004*]. This program is capable of calculating the CED factors for a variety of different energy sources and processes. On the basis of the processes linked to a service or a product the program also generates the greenhouse gas emissions related to the production or consumption of a product, given in kg of CO_2 equivalents per kWh of energy. Since the respective conversion factor takes into account the sum of all greenhouse gas emissions on the chain of energy transformation it is cumulative, too.

The Display calculation instrument uses conversion factors based on the GEMIS program, but produced by different sources. The factors concerning the national electricity mixes were calculated directly by the Öko-Institut using version 4.14 of the GEMIS program. The conversion factors for the energy sources gas, fuel, coal, and wood result from a GEMIS version 4.13 calculation made by the Institute for Housing and Environment (IWU) Darmstadt, Germany [*Öko-Institut, 2004*]. They are also used for the certificate of residential buildings developed by the German Energy Agency (dena). The factors for the production of hot water by a solar thermal collector and for the production of photovoltaic electricity in the building were delivered by the GEMIS-based database ProBas which is run by the Umweltbundesamt [*UBA, 2004*].

Furthermore, experts have verified the mode of calculation. In case of difficulties in the course of the data input, an on-line help and comprehensive user's guide is available to support the user. Additionally, the Display team is contactable via email for questions and suggestions. Finally, a forum, accessible in the restricted part of the website allows members to get into contact with other participating cities and to exchange experiences.

The building categories

In parallel to the design of the poster the technical and scientific issues have been tackled. In a first step a typology of public buildings has been established comprising 5 buildings categories with a 6 sub-categories:

1. Educational buildings (subcategories: day nursery/ kindergarten, general school and professional school)

2. Administrative buildings

3. Sport facilities (subcategories: Swimming pool, gymnasium and ice center)

4. Cultural buildings

5. Health Centres

In a first step the classification scheme for educational buildings has been fixed, in November 04 three more classification schemes have been set up (administrative, cultural buildings and health centres). Till June 05 classification scheme for all building types will be completed.

Name of the building: **Myatt Garden School**
Type of the building: Educational
Gross internal floor area: **4500 m2**

Reference year: **2003**
Weather correction factor: **1.1**
Water consumption: **903 m3**

Energies and energy sources	Unit	Space heating	Cooling	Water heating	Lighting	Equipment (other)	Total
Gas	kWh	200000	0	10000	-	0	0
Fuel oil	kWh	0	-	0	-	-	0
Coal	kWh	0	-	-	-	-	0
District heating	MWh	0	0	0	-	-	0
Wood	kWh	0	-	0	-	-	0
Solar (thermal)	kWh	0	0	0	-	-	0
Electricity (conventional)	kWh	0	0	0	0	0	150000
Electricity (green)	kWh	0	0	0	0	0	0
Electricity (PV)	kWh	0	0	0	0	0	0
Other renewables	kWh	0	0	0	0	0	0

Figure 4. *Extract of the website: "Energy and water consumption".*
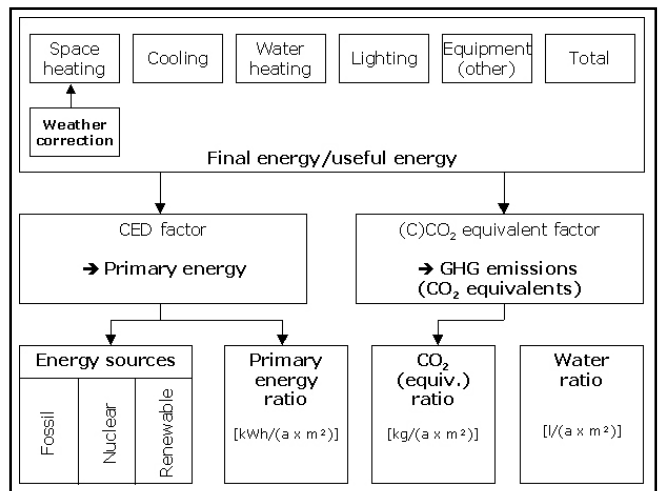

Figure 5. *Structure of the mode of calculation.*

The classification scheme

We only use one single classification scheme per building type for the whole Europe, and this for two reasons:

• First, varying the classification from member state to member state would be a significant limitation of the label. Using common A to G level, of course, it is easier to reach the A level in warmer climate, but on the same side the energy saving potential is lower. This means for example that in Portugal a lower insulation level is sufficient to reach "class A" which is very well in line with the economic optimisation: as a higher insulation thickness would not be economic if the heating load is low. The

Table 1. Display™ classification scheme for educational buildings.

Display™ classification School buildings	Primary Energy	CO₂	Water
Unit	kWh / m²	kg of CO₂ equivalents / m²	litres / m²
A	less than 75	less than 12	less than 100
B	75 - 125	12 - 24	100 - 200
C	125 - 175	24 - 36	200 - 300
D	175 - 225	36 - 48	300 - 400
E	225 - 275	48 - 60	400 - 500
F	275 - 325	60 - 72	500 - 600
G	325 and more	72 and more	600 and more

Display classification is very close to the Danish classification scheme, the only one existing in Europe so far.

- Second, member states to develop their own implementation scheme for the EBPD by the end of 2005, so probably they will introduce different classification schemes. In this case it is easier to replace the Display classification on the Display poster by the national classification scheme than to replace in two years time a national classification scheme developed under Display by the one prepared by the member state itself.

Visualising energy sources

Display poster is also taking partly into consideration the Directive 2003/54/EC [*Europe, 2003*] which introduces to electricity supply companies to specify the fuel mix and its related environmental impact of the electricity they sell to final customers. Each member state should develop a standard list of fuel categories (10-12; including RES) reflecting the order of importance within the country. The Display poster provides information on the three main types of fuels: the contribution of fossil, nuclear, and renewable energy sources to the overall primary energy consumption used for the production of electricity, heat and hot water that is consumed in a building. Data of the national electricity mix are taken from the Monthly Electricity Survey that is published by the International Energy Agency (IEA, data of 2002) [*IEA, 2002*].

DISPLAY™ PROMOTION TOOLS

Information material, website

A leaflet has been produced, principally addressed to representatives of municipalities, aimed at promoting the Display campaign and enlarging it to other willing municipalities. It details the main objectives of the campaign, explains its political background and lists the planned activities as well as the cities involved. At present it is available in sixteen languages [*Energie-Cités, 2004*].

An in April 2004 inaugurated website forms the general communication framework for the campaign. The site, available under www.display-campaign.org, is divided into two sections. The public part can be accessed by everybody, but is mainly targeted at municipalities. Everybody interested can test the Display certification tool, read up on the Display campaign itself, the participating cities and those who play a role model within the project. In order to encourage municipalities to improve the energy performance of their buildings the web site presents examples for other cities to follow. At present, the website's public part provides information in English and French. Most of this information is also available for download in printable pdf format. Municipalities who have signed the Display charter will benefit from the advantages of the restricted part of the Display website. The essential component is the Display poster generation tool.

Display™ Communication handbook

What we have learnt form the first experiences with the putting up of the posters is, that the poster is indeed a good eye-catcher, but to stimulate actions of the building users, additional communication and awareness raising activities are requested. So we decided to develop a special communication tool kit.

The Display Communication Handbook consists of a communications guide which shall help the municipalities to carry out information campaigns in their public schools (later also in other types of buildings). In order to strengthen the campaigns success the guide is completed by:

- General guidelines "Launching Display – from data collection to the Display Poster"

- Press kit, supporting the municipalities' information activities in line with campaigns,

- Display Items: Informational stickers as well as some promotional products will be put at their disposal,

- Good practice case studies.

A CD ROM with an electronic version of all relevant material is added to the handbook. Today, the handbook is published in English. French, German, Italian and Polish editions are programmed in late spring 2005.

Figure 6. *Display™ Communication Handbook.*

Display™ Campaign at events

The Display campaign was launched on 22 April in Martigny 04 as part of Energie-Cités' annual conference. The launching session took place at the second conference day, presentations were given by energy managers from the Display pilot cities. The European Commission was represented by representatives from DG ENV and DG TREN. The event was live webstreamed at the Internet via managenergy and the recordings can still be downloaded from the managenergy website (www.managenergy.tv/me_portal/portal.do?bc=153). More than 200 participants from 22 European countries attended the Conference.

To reach the objective of 100 municipalities participating in the Display Campaign a stronger promotion than expected is required. That's why many conference presentations and even individual presentations have been given to interested municipalities. At least 20 presentations will be given at important national and European conferences in more than 10 countries till end of June 2005 as well as about 20 individual presentations in local or project meetings.

HOW TO JOIN THE DISPLAY™

All European countries, whether they be Members of the European Union, candidate countries or otherwise, are eligible to join the Campaign. Today, the Display poster can be printed in all European languages whereas the Internet interface, is currently (January 2005) available in three languages (de, en, fr) and should be available in at least twelve languages by the end of June 2005. It is indeed essential to work and communicate in the languages of the countries involved. Display is an ideal tool for those local and regional energy management agencies who wish to develop initiatives in municipalities or at a regional scale. To join the Display campaign, the municipality signs a Members' Charter. In order to ensure the success and common European nature of the Display Campaign, the local authority commits itself to comply with the following conditions:

- to display to citizens the performance – in terms of energy consumption, CO_2 emissions and water consumption – and therefore to display the Display posters in each municipal building concerned at locations well used by the public,

- to launch an information and awareness campaign addressing the users of the buildings concerned,

In return, Energie-Cités commits itself:

- to provide the municipality with a web-based calculation tool allowing the production of the Display poster, as well as a handbook for this calculation tool,

- to prepare an information/communication dossier for each municipality by the end of 2004.

PROBLEMS AND DIFFICULTIES FOUND

Acceptance of Display as a label in line with the requests of EPBD

Display is a certification scheme completely in line with the standards set up by CEN in accordance with the terms set forth in the directive, but:

- It might not comply with the national certification schemes, because it is up to each member state to define the national implementation scheme of the directive

- It is more communication oriented than a single certificate, which may be perceived as being just another administrative requirement to provide information to the public.

These features mean that the introduction of Display can be achieved independently from the schedule set for enforcement of the legal requirements linked to the directive. In practice we learnt during the last six months that Display is not a self-running Campaign. Some cities are hesitating as they think that Display is first in competition with the national EPBD implementation scheme and second cities are not realising how long it will take to a wide scale application of the national schemes. They do not always see that "both" labels are complementary. In fact Display is really preparing the ground for the implementation and in consequence we changed our Display promotion strategy in focusing more on the complementarity of Display and a future national label(s), and in pointing out the fact that Display is a tool of communication towards citizens rather than an administrative obligation.

Definition of the classification schemes for the different building categories

When the Display campaign was launched only the classification scheme for educational buildings has been fixed in order to gain first experiences on how a single classification scheme for the whole Europe is working and to set up the classification schemes for other building types one year later. In the meantime nearly all pilot cities expressed their wish to set up quickly a classification for more building types. But this was not such an easy task as the support from the scientific experts on this topic was very poor. Finally, in the last Steering Committee meeting we agreed to set up a provisional classification scheme for administrative buildings, cultural buildings and health centres (not hospitals, but retirement homes, etc). This was done in November 04.

Conversion Factors for primary energy and CO_2 equivalents in Eastern European countries

The calculation tool makes use of conversion factors for the calculation of primary energy consumption and CO_2 emissions. We have tried to obtain these factors from various respected institutions and have found that the data obtained are not always identical but that there are significant differences.

So far the Member States haven't agreed on a common methodology how to calculate the conversion factors for primary energy and CO_2 emissions (nor the energy savings). Methods are different from one Member State to another and we are far away from a harmonisation, several proposals have been submitted to DG TREN in the past, today, we have a slight hope that the Concerted Action EPBD Working Group will work on this methodology.

At the moment we keep the Display data base factors (generated by the GEMIS software), but this problem could force us to change the utilised conversion factors during the Campaign's life time, if the participating cities insist on co-

herence between their national calculation and the Display calculation method/factors. In this case it is sure that some buildings' classifications will change and we will have to ask the participating cities to exchange their posters. Else, the calculation system will not be common for every participating municipality.

Outlook

After having set up and launched the Display campaign successfully we will in the next two years focus on large extension of the Campaign in 500 to 1 000 municipalities all over Europe. We expect to enter between 5 000 and 10 000 municipal buildings to the data base and to put the Display Poster in these buildings. As accompanying measures to the campaign we intent to:

- Set up the Towards Class A Help Centre which shall help the bad classified municipalities to jump rapidly from Class E-G to Class B-C

- Describe 100 Shining examples from all Europe and make them accessible to all European municipalities via the Display Database

- Disseminate the information about the Display Campaign in 25 national conferences and 5 EU conferences

- Organise the Towards Class A Award which shall be focused on the communication and awareness raising campaign launched by municipalities towards the general public.

Conclusions

At a time when the debate on the relationship between "Europe" and its citizens has very much become a topical issue in all European countries, it is vital to develop a series of initiatives that bring players from different levels together around common objectives that are shared by all. What is at stake is the future of Europe.

Display demonstrates that this is possible, and will provide further evidence of this when more than a thousand municipalities have joined the Campaign. How might this be achieved? It is thanks, essentially, to the networking approach, which provides a new way of thinking, producing, proposing, building and implementing ideas which is at the same time both political and practical, European and local.

The experience acquired by Energie-Cités over the last fifteen years has been used to serve this ambition through a practical project. Compared with what remains to be done in building a sustainable energy society, it is nothing, or almost nothing. One tentative attempt among many others.

But let's just imagine what would be possible – in all areas – if European and national institutions made better use of the strength of networks of players and gave them more encouragement to play their part.

References

CEN/TC 89/WG4 N251, Energy performance of buildings - Methods for expressing the energy performance and

for energy certification of buildings, work paper, Paris October 2004

Energie-Cités', Display Campaign's website: www.display-campaign.org

Europe, European Parliament and the Council of the European Union "Directive 2002/91/EC on the energy performance of buildings", Brussels 2002

Europe, European Parliament and the Council of the European Union "*Directive 2003/54/EC* " Brussels 2003

IEA-International Energy Agency"*Monthly Electricity Survey*" www.iea.org

Lack, Don, "*A public record of performance*", Energy Efficient Solutions, London 2004 p. 8

Öko-Institut (Institute for applied ecology) "*Global Emission Model for Integrated Systems (GEMIS), version 4.1.3 and 4.1.4*" www.oeko.de/service/gemis/

UBA–Umweltbundesamt (German Federal Environmental Agency) "*database ProBas*" (available only in German): www.probas.umweltbundesamt.de