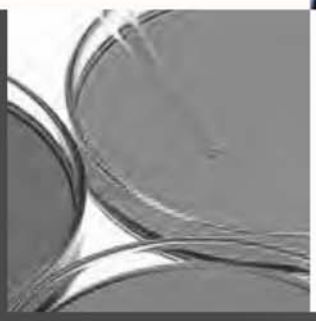
AVETE PROGETTI
PER IL FUTURO?

Bandi 2010

ALLEGATO 1 al bando

"Sostenibilità energetica dei comuni piccoli e medi"

Linee guida per la redazione dei Piani d'Azione per l'Energia Sostenibile



fondazione cariplo

DIAMO UN FUTURO ALLE IDEE

GUIDEBOOK

"HOW TO DEVELOP A SUSTAINABLE ENERGY ACTION PLAN (SEAP)"

JRC EUROPEAN COMMISSION
Institute for Energy
JRC EUROPEAN COMMISSION
Institute for Environment and Sustainability
Covenant of Mayors
Committed to local sustainable energy

INTRODUCTION - About these guidelines

The European Union is leading the global fight against climate change, and has made it its top priority. The EU committed itself to reducing its overall emissions to at least 20% below 1990 levels by 2020. Local authorities play a key role in the achievement of the EU's energy and climate objectives. The Covenant of Mayors is a European initiative by which towns, cities and regions voluntarily commit to reduce their CO_2 emissions beyond this 20% target. This formal commitment is to be achieved through the implementation of Sustainable Energy Action Plans (SEAPs). The purpose of the present guidebook is to help the Covenant of Mayors signatories to reach the commitments they have taken by signing the Covenant, and in particular to prepare within the year following their official adhesion:

- a Baseline Emission Inventory (BEI)
- a Sustainable Energy Action Plan (SEAP)

BEI is a prerequisite to SEAP elaboration, as it will provide knowledge of the nature of the entities emitting CO_2 on the municipality's territory, and will thus help select the appropriate actions. Inventories conducted in later years will allow determining if the actions provide sufficient CO_2 reductions and if further actions are necessary.

The current guidelines provide detailed step-by-step recommendations for the entire process of elaborating a local energy and climate strategy, from initial political commitment to implementation. It is divided in 3 parts:

- Part I relates to the description of the overall SEAP process and covers the strategic issues
- Part II gives guidance on how to elaborate the Baseline Emission Inventory.
- Part III is dedicated to the description of technical measures that can be implemented at local level by the local authority in the different sectors of activity

The guidebook provides a flexible but coherent set of principles and recommendations. The flexibility will allow local authorities to develop a SEAP in a way that suits their own circumstances, and will allow those already engaged in energy and climate action to come on board of the Covenant of Mayors while continuing to follow the approaches they have used before with as little adjustments as possible.

The number of topics covered by these guidelines is quite large. This is why we had to approach some of the topics in a rather general manner, providing links to further readings and information.

The Joint Research Centre[1] (JRC) - Institute for Energy (IE) and Institute for Environment and Sustainability (IES) - of the European Commission has been assigned the task of scientific and technical support to the Covenant. These guidelines have been elaborated by the JRC,,in collaboration with the Energy and Transport Directorate-General (DG TREN) of the European Commission, the Covenant of Mayors Office, and with the support and input of many experts, from municipalities, regional authorities, other agencies or private companies.

This document is intended to help beginner towns/cities/regions to initiate the process and guide them through it. It should also provide experienced local authorities with answers to specific questions they are faced in the context of Covenant of Mayors, and if possible, with some fresh and new ideas on how to proceed.

Further information and support:

If you do not find the desired information in the present guidebook, you can refer to the "Frequently Asked Question" section, available on the Covenant website:

http://www.eumayors.eu/faq/index_en.htm

In addition, a helpdesk has been set up to provide Covenant signatories with information and guidance on the preparation/implementation of both their BEI and their SEAP.

Inquiries can be sent by email**:** technical.info@eumayors.org or by phone: **+39 0332 78 9703**

[1] JRC's website: www.jrc.ec.europa.eu

ACKNOWLEDGEMENTS

These guidelines have been realised with the support and input of many experts, from municipalities, regional authorities, agencies, cities networks and private companies. We thank all those who have provided inputs and contributions and helped to shape the document in the right direction. The following organisations participated to the workshops dedicated to the preparation and elaboration of this guidebook: ADENE, AEAT, Agencia Provincial de Energía de Huelva, Agenzia per l´Energia e lo Sviluppo Sostenible, ARE Liguria, ARPA, ASPA - Surveillance et Etude de la Pollution Atmosphérique en Alsace, ATMO France - Fédération Nationale des Associations Agréées de Surveillance de la Qualité de l'Air, Brussels Capital Region, City of Almada, City of Budapest, City of Delft, City of Freiburg, City of Hamburg, City of Helsinki, City of Lausanne, City of Modena, City of München, City of Växjö, City of Zürich, Climate Alliance, CODEMA Energy Agency, Collège d'Europe, Covenant of Mayor Office, CRES, DAPHNE, ENEA, ENEFFECT, Energie-Cités, Ente Vasco de la Energia - EVE, European Energy Award, GRIP, ICLEI - Local Governments for Sustainability, IFEU - Institut für Energie- und Umweltforschung Heidelberg GmbH, Junta de Andalucía, KOBA SRL, MINUARTIA Consulting, North-West Croatia Regional Energy Agency, Province of Barcelona, Provincia de Bologna, Regione Siciliana, SENTERNOVEM Agency, SOFIA ENERGY AGENCY, Softech Team, SOGESCA SRL, SPES Consulting, UITP, Catalonia Polytechnic University, VEOLIA Environnement Europe Services.

GLOSSARY

Activity Data: Activity data quantifies the human activity occurring in the territory of the local authority

Covenant signatory: local authority that has signed the Covenant of Mayors

Baseline year: Baseline year is the year against which the achievements of the emission reductions in 2020 shall be compared.

Baseline Emission Inventory (BEI): quantifies the amount of CO_2 emitted due to energy consumption in the territory of the Covenant signatory in the baseline year

Emission factors: Emission factors are coefficients which quantify the emission per unit of activity.

Certified green electricity: electricity that meets the criteria for guarantee of origin of electricity produced from renewable energy sources set in the Directive 2001/77/EC and updated in the Directive 2009/28/EC.

Heating degree days (HDD): denote the heating demand in a specific year.

Life cycle assessment (LCA): Method that takes into account emissions over the entire life cycle of the commodity. For example, life cycle emissions of oil include emissions from oil extraction, refining, transportation, distribution and combustion.

Local heat production: production of heat in the territory of the local authority that is sold/distributed as a commodity to end users

Local electricity production: (small-scale) production of electricity in the territory of the local authority

Monitoring Emission Inventory (MEI): Emission inventory that the local authority carries out to measure the progress towards target.

Per capita target: the local authority may decide to set the target as “per capita”. In that case, the emissions in the baseline year are divided by the population in that year, and the target for year 2020 is calculated on that basis.

Territory of the local authority: geographical area within the administrative boundaries of the entity governed by the local authority

WORKING VERSION

GUIDEBOOK

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PART I

THE SEAP PROCESS, STEP-BY-STEP TOWARDS THE -20% TARGET BY 2020

TABLE OF CONTENTS

CHAPTER 1. THE SUSTAINABLE ENERGY ACTION PLAN, A WAY TO GO BEYOND THE EU TARGETS

1.1 What is a SEAP?

The Sustainable Energy Action Plan is a key document that shows how the Covenant signatory will reach its commitment by 2020. It uses the results of the Baseline Emission Inventory to identify the best fields of action and opportunities for reaching the local authority's CO_2 reduction target. It defines concrete reduction measures together with time frames and assigned responsibilities which translate the long-term strategy into action. Signatories commit themselves to submitting their SEAPs within the year following adhesion.

The SEAP should not be regarded as a rigid document. As circumstances change, and, as the ongoing actions provide results and experience, it may be useful/necessary to revise the plan on a regular basis.

Remember that opportunities to undertake emission reductions arise with every new development project to be approved by the local authority. The impacts of missing such an opportunity can be significant and will last for a long time. This means that energy efficiency and emission reduction considerations should be taken into considerations for all new developments, even if the SEAP has not yet been finalised or approved.

1.2 Scope of the SEAP

The Covenant of Mayors concerns action at local level within the competence of the local authority. The SEAP should concentrate on measures aimed at reducing the CO_2 emissions and final energy consumption by end users. Since the Covenant's commitments concern the whole geographical area of the local authority (town, city, region), the SEAP should include actions concerning both the public and private sectors. However, the local authority is expected to play an exemplary role and therefore to take outstanding measures related to the local authority's own buildings and facilities, vehicle fleet, etc. The local authority can decide to set the overall CO_2 emission reduction target either as 'absolute reduction' or 'per capita reduction' (see chapter 5.2 of part II of this guidebook).

The main target sectors are buildings, equipment/facilities and urban transport. The SEAP may also include actions related to local electricity production (development of PVs, wind power, CHP, improvement of local power generation), and local heating/cooling generation. In addition, the SEAP should cover areas where local authorities can influence energy consumption on the long term (as land use planning), encourage markets for energy efficient products and services (public procurement) as well as changes in consumption patterns (working with stakeholders and citizens)[1]. At the contrary, the industrial sector is not a key target of the Covenant of Mayors, so the local authority may choose to include actions in this sector or not. In any case, plants covered by the ETS (European CO_2 Emission Trading Scheme) should be excluded, unless they were included in previous plans of the local authority. A detailed description of the sectors to be covered in the Baseline Emission Inventory is provided in table 1 of Part II.

1.3 Time horizon

The time horizon of the Covenant of Mayors is 2020. The SEAP may cover a longer period but in this case it should contain intermediate values and objectives for the year 2020.

As it is not always possible to plan in detail concrete measures and budgets for such a long time span, the local authority may distinguish between:

- A vision, with long term strategy and goals until 2020, including firm commitments in areas like land use planning, transport and mobility, public procurement, standards for new/renovated buildings (at least for municipal buildings).
- Detailed measures for the next 3-5 years which translate the long term strategy and goals into action.

Both the long term vision and the detailed measures shall be an integral part of the SEAP.

[1] Note that the effect of such long term actions is not easy to evaluate or measure separately. Their effect will be reflected in the CO2 emission inventory of the sector(s) they relate to (buildings, transport …). In addition, note that 'green purchases' not related to energy consumption cannot be taken into consideration in the inventory.

For example, as a long term strategy, the local authority could decide that all cars purchased for the municipal fleet should be biogas operated. Of course, the municipality cannot vote the budget for all cars that will be purchased till 2020. But they can include this measure in the plan and evaluate its impact till 2020, as a result of the estimated future purchases of cars by the municipality. For the duration of the local authority's political mandate, this measure should be presented in very practical terms, with budgets, identification of financing sources etc.

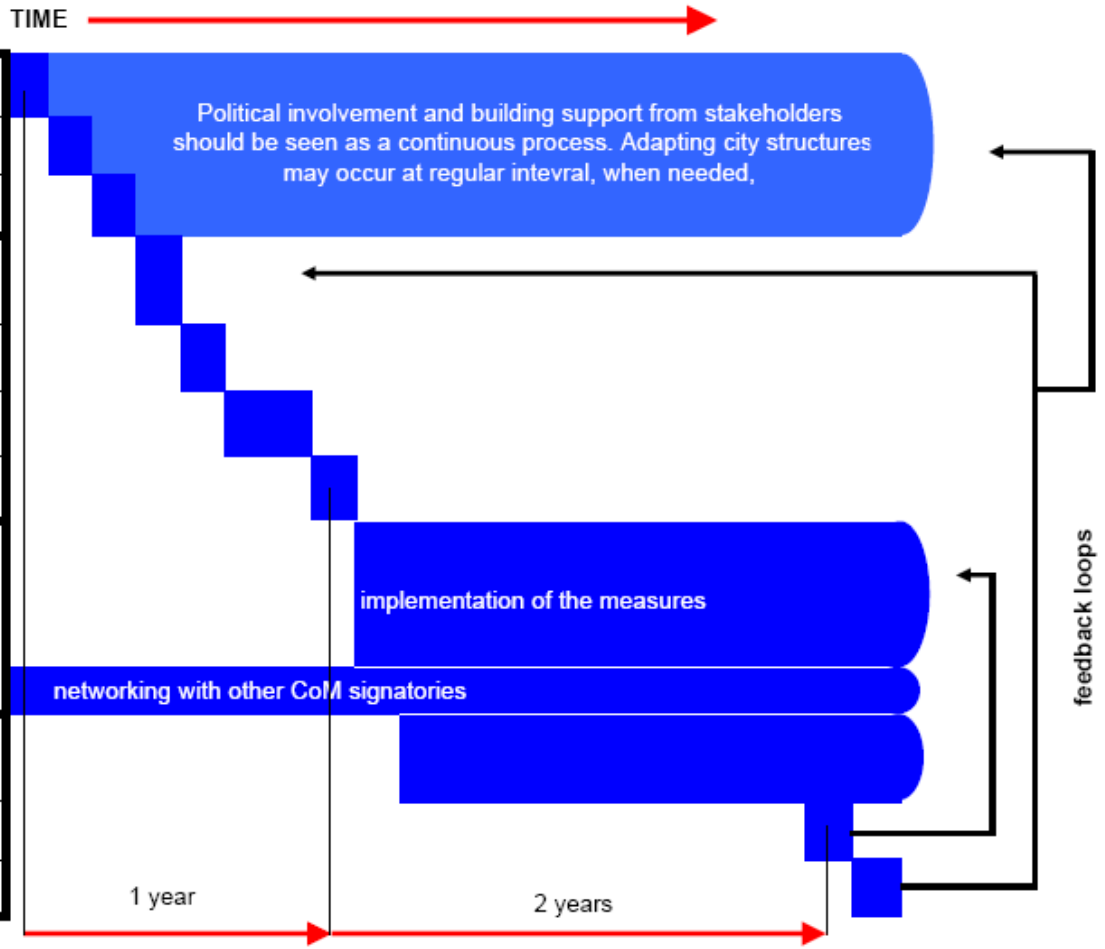
It is also strongly suggested that measures related to the local authority's own buildings and facilities are implemented first, in order to set an example and motivate the stakeholders.

1.4 The SEAP process

The following chart details the key steps for elaborating and implementing a successful SEAP. As shown on the graph, the SEAP process is not a linear one, and some steps may overlap with others. Besides, it is possible that some actions have begun before the adhesion to the Covenant (not shown on the graph).

The SEAP process : phasing of the different steps

PHASE	STEP	Corresponding guidebook chapter
Initiation	Political commitment and signing of the Covenant	Part I, chapter 2
	Adapt city administrativre structures	Part I, chapter 3
	Build support from stakeholders	Part I, chapter 4
Planning phase	Assessment of the current framework (*): Where are we ?	Part I, chapter 5 + Part III
	Establishment of the vision: Where do we want to go ?	Part I, chapter 6
	Elaboration of the plan: How do we get there ?	Part I, chapter 7, 8 and 9 + part II
	Plan approval and submission	-
Implementation phase	Implementation	Part I, chapter 10
Monitoring and reporting phase	Monitoring	Part I, chapter 11 + specific guidebook to be published later
	Reporting and submission of the implementaiton report	Part I, chapter 11 + part III, chapters 5 and 7
	Review	-



(*) Including the elaboration of the CO2 baseline emission inventory

1.5 Human and financial resources

SEAP elaboration and implementation requires human and financial resources. Local authorities may adopt different approaches:

- Using internal resources, for example by integrating the tasks to an existing department of the local authority involved in sustainable development (e.g. local Agenda 21 office, environmental and/or energy department).
- Setting up a new unit within the local administration (approx 1 person/100.000 inhabitants).
- Outsourcing (e.g., private consultants, universities …).
- Sharing one coordinator among several municipalities, in the case of smaller local authorities.
- Getting support from regional energy agencies or supporting structures (see chapter 3).

Note that the human resources allocated to the SEAP may be highly productive from a financial point of view, via savings on the energy bills, access to European funding for the development of projects in the field of EE and RES.

In addition, extracting as much as possible resources from inside offers the advantages of a higher ownership, saves costs and supports the very materialisation of a SEAP.

1.6 SEAP template and SEAP submission procedure

Covenant signatories commit to submitting their SEAPs within the year following adhesion and to provide periodic implementation reports outlining the progress of their action plan.

The SEAP must be approved by the municipal council (or equivalent decision-making body) and uploaded in national language via the Signatories' Corner (on-line password-restricted area). Covenant signatories will be required, at the same time, to fill in an online SEAP template in English. This will allow them to summarize the results of their Baseline Emission Inventory as well as the key elements of their SEAP.

Moreover the template is a valuable tool that provides visibility to the SEAP that facilitates its assessment as well as the exchange of experience between the Covenant signatories. Highlights of the collected information will be shown on-line at the Covenant of Mayors website (www.eumayors.eu).

The SEAP template is available on-line as internet based tool that the Covenant signatories are required to fill in by themselves. Detailed information on how to fill in the SEAP template are available by clicking on the 'Instructions' link directly accessible in the Signatories' Corner.

A public copy of the SEAP template & supporting instructions document is available in the Covenant of Mayors website library: http://www.eumayors.eu/library/documents_en.htm.

1.7 Recommended SEAP Structure

The Covenant signatories could follow the structure of the SEAP template when preparing their Sustainable Energy Action Plans. The suggested content is:

1) SEAP Executive Summary

2) Overall strategy

A. Objective (s) and Targets

B. Current framework and vision for the future

C. Organisational and financial aspects:

- Coordination and organisational structures created/assigned
- Staff capacity allocated
- Involvement of stakeholders and citizens
- Budget
- Foreseen financing sources for the investments within your action plan

- Planned measures for monitoring and follow up

3) Baseline Emission Inventory and related information, including data interpretation (see part II of this guidebook, chapter 5 Reporting and documentation)

4) Planned actions and measures for the full duration of the plan (2020)

- Long term strategy, goals and commitments till 2020
- Short/medium term actions

  For each measure/action, please specify (whenever possible):

  - Description
  - Responsible department, person or company
  - Timing (end-start, major milestones)
  - Cost estimation
  - Estimated energy saving/increased renewable energy production
  - Estimated CO_2 reduction

1.8 Level of detail

The level of detail in the description of each measure/action is to be decided by the local authority. However, remind that the SEAP is at the same time:

- A working instrument to be used during implementation (at least for the next few years)
- A communication tool towards the stakeholders
- A document that is agreed at the political level by the various parties in charge within the local authority: the level of detail should be sufficient to avoid further discussion at the political level over the meaning and scope of the various measures.

1.9 Key elements of a successful SEAP

- ü Build support from stakeholders: if they support your SEAP, nothing should stop it! Conflicting stakeholders interests deserve a special attention
- ü Secure a long term political commitment
- ü Ensure adequate financial resources
- ü Doing a proper CO2 emissions inventory is vital. What you do not measure you will not change
- ü Integrate the SEAP in the day to day life and management of the municipality: it should not be just another nice document, put part of the corporate culture!
- ü Ensure proper management during implementation
- ü Make sure that your staff has adequate skills, and if necessary offer training
- ü Learn to devise and implement projects over the long term
- ü Actively search and take advantage of experiences and lessons learned from other cities that have developed a SEAP.

CHAPTER 2: POLITICAL COMMITMENT

To ensure success of the process (from SEAP design to implementation and monitoring), it is essential that sufficient empowerment and support is provided at the highest political level. The signature of the Covenant of Mayors by the municipal council (or equivalent decision making body) is already a clear and visible sign of commitment. In order to reinforce the political support, it may be useful to remind the many benefits that SEAP implementation can bring to local authorities (see annex II).

Why do mayors join the Covenant?

"...To show that **local authorities already act and lead the fight against climate change.** The states need them to meet their Kyoto objectives and should therefore support them in their efforts..."

Denis Baupin, Deputy Mayor, Paris (FR)

"...To become **a strong partner of the European Commission** and influence adoption of policies and measures which help cities to achieve their Covenant objectives..."

Lian Merx, Deputy Mayor, Delft (NL)

"...To **meet people with the same ambitions**, get motivation, learn from each other..."

Manuela Rottmann, Deputy Mayor, Frankfurt am Main (DE)

"...To support the movement that obliges cities to meet their objectives, allows to monitor results and **involves EU citizens** – because it's their movement..."

Philippe Tostain, Councillor, Lille (FR)

The key decision makers of the local authority should further support the process by allocating adequate human resources with clear mandate and sufficient time and budget to prepare and implement the SEAP. It is essential that they are involved in the SEAP elaboration process so that it is accepted and backed up by them. Political commitment and leadership are driving forces that stimulate the management cycle. Therefore they should be sought from the very beginning. The formal approval of the SEAP by the municipal council (or equivalent decision making body), along with the necessary budgets for the first year(s) of implementation is another key step.

As the highest responsible entity and authority, the municipal council must be closely informed of the follow up of the implementation process. An implementation report should be produced and discussed periodically. In the context of the Covenant, an implementation report has to be submitted every second year for evaluation, monitoring and verification purposes. If necessary the SEAP should be updated accordingly.

Finally, the key decision makers of the local authority could also play a role in:

- Integrating the SEAP vision with the other actions and initiatives of the relevant municipality departments and making sure it becomes part of the overall planning
- Assuring the long term commitment to implementation and monitoring, along the full duration of the SEAP
- Providing support to citizens participation and stakeholders involvement
- Ensure that the SEAP process is 'owned' by the local authority and the residents
- Networking with other CoM signatories, exchanging experience and best practices, establishing synergies and encouraging their involvement in the Covenant of Mayors.

There is no single route leading to political commitment. Administrative structures, patterns of political approval and political cultures vary from country to country. For such reason, the local authority itself is best suited to know how to proceed to raise the political commitment needed for the SEAP process, i.e. who to contact and in which order (Mayor, municipal council, specialized committees…).

Suggestions on how to ensure the necessary local commitment:

- ü Provide Mayor and key political leaders with informative notes about the benefits and resources needed for SEAP. Make sure documents presented to political authorities are short, comprehensive and understandable.
- ü Brief major political groups
- ü Inform & involve general public/citizens and other stakeholders
- ü Make a strong reference to the other decisions taken by the municipal council in this field (related strategies and plans, Local Agenda 21 etc.)
- ü Take advantage of windows of opportunity, for example when the media is focusing on climate change issues
- ü Inform clearly about the causes and effects of climate change along with information about effective and practical responses
- ü Highlight the other benefits than contribution to climate change (social, economic, employment, air quality, …) Keep the message simple, clear and tailored to the audience
- ü Focus on measures on which the agreement of the key actors can be obtained

ADDITIONAL RESOURCES

i) **MUE-25 PROJECT**

The project “Managing Urban Europe-25 (MUE-25)” provides some suggestions on how to build political commitment.

http://www.mue25.net/Political_Commitment_200907_t1z4D.PDF.file

ii) The Policy Network, in its publication "Building a low carbon future: the politics of climate change", dedicates a chapter to political strategies for strengthening climate policies:

http://politicsofclimatechange.files.wordpress.com/2009/06/building-a-low-carbon-future-pamphlet-chapter-05.pdf

CHAPTER 3: ADAPTATION OF THE ADMINISTRATIVE STRUCTURES[2]

Devising and implementing a sustainable energy policy is a challenging and time-demanding process that has to be systematically planned and continuously managed. It requires collaboration and coordination between various departments in the local administration such as environmental protection, land use and spatial planning, economics and social affairs, buildings and infrastructure management, mobility and transport, budget and finance, procurement, etc. In addition, one of the challenges for success is that the SEAP process should not be conceived by the different departments of the local administration as an external issue, but that it has to be integrated in their everyday life: mobility and urban planning, management of the local authority's assets (buildings, municipal fleet, public lighting …), internal and external communication, public procurement …

A clear organisational structure and assignment of responsibilities are prerequisites for the successful and sustainable implantation of the SEAP. A lack of coordination between the various policies, local authority departments and external organisations has been a considerable shortcoming in the energy or transport planning of many local authorities.

This is why "*Adapting city structures, including allocation of sufficient human resources*" is a formal commitment of those signing the Covenant of Mayors.

Therefore, all Covenant signatories should adjust and optimise their internal administrative structures. They should assign specific departments with appropriate competencies as well as sufficient financial and human resources to implement the Covenant of Mayors commitments.

3.1 How to adjust the administrative structures?

If some organisational structures have already been created for other related policies (energy management unit, local Agenda 21 coordination etc.) such structures may be used in the context of the Covenant of Mayors.

In the beginning of the SEAP elaboration process, a 'Covenant coordinator' should be appointed. S/he must have full support of the local political authorities and from the hierarchy, as well as the necessary time availability, and the budgetary means to carry out his/her tasks. In large cities, s/he could even have a dedicated unit at his/her disposal, with several staff. Depending on the size of the local authority, one person dedicated to data collection and CO_2 inventory may also be necessary.

As an example of simple organisation structure, two groups may be constituted:

- A steering committee, constituted by politicians and senior managers. Its mission would be to provide strategic direction and the necessary political support to the process.
- One or several working group(s), constituted by the energy planning manager, key persons from various departments of the local authority, public agencies, etc. Their task would be to undertake the actual SEAP elaboration and follow up work, to ensure stakeholders participation, to organise monitoring, to produce reports etc. The working group(s) may be opened to the participation of non-municipal key actors directly involved in SEAP actions.

Both the steering committee and the working group need a distinct leader, although they should be able to work together. Moreover, the objectives and functions of each one of these groups must be clearly specified. A well-defined meeting agenda and a project reporting strategy are recommendable in order to have a good command over the SEAP process. The steering committee and the working group need each a leader, able to work together.

It is essential that sustainable energy management is integrated with the other actions and initiatives of the relevant municipality departments, and it must be ensured that it becomes part of the overall planning of the local authority. Multi-departmental and cross-sectoral involvement is required, and organisational targets need to be in line and integrated with the SEAP. The establishment of a flow chart indicating the various interactions between departments and actors would be useful to identify the adjustments that may be necessary to the local authority's organisation. As many key municipal players as possible should be assigned responsible roles to ensure strong ownership of the

[2] Parts of this chapter are adapted from http://www.movingsustainably.net/index.php/movsus:mshome developed by Union of the Baltic Cities Environment and Sustainable Development Secretariat and part-funded by the European Union. Further information about capacity building and previous experiences are available in the MODEL project webpage www.energymodel.eu

process in the organisation. A specific communication campaign may help to reach and convince the municipal workers in different departments.

Moreover, adequate training should not be neglected in different fields such as technical competencies (energy efficiency, renewable energies, efficient transport …), project management, data management (lack of skills in this field can be a real barrier!), financial management, development of investment projects, and communication (how to promote behavioural changes etc). Linking with local universities can be useful for this purpose.

3.2 EXAMPLES FROM COVENANT SIGNATORIES

Here are two examples of structures that the cities of Munich and Leicester respectively set up for developing and implementing their local energy strategies:

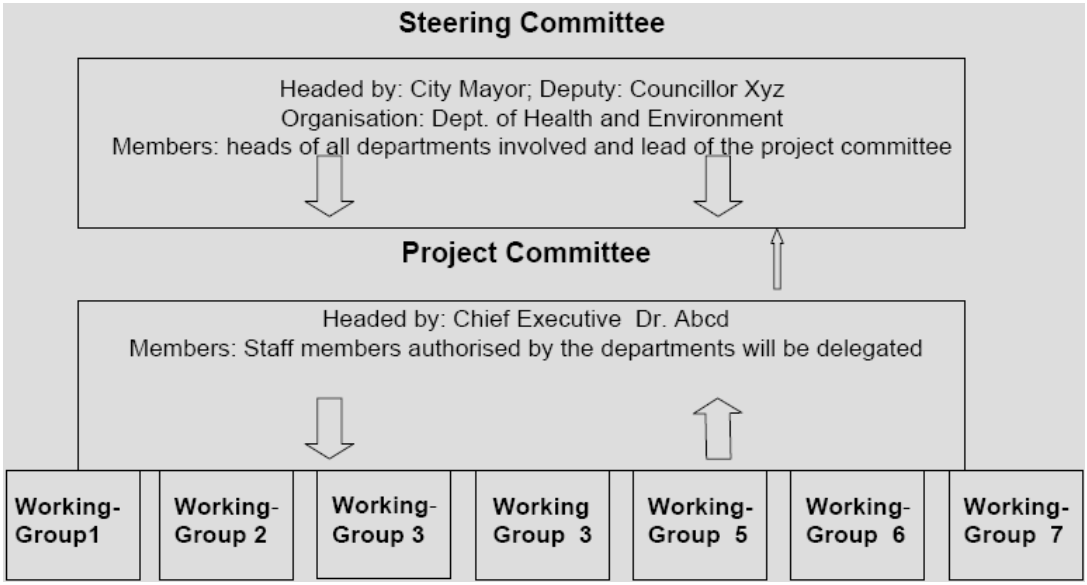


Figure 1: Administrative structure of the City of Munich

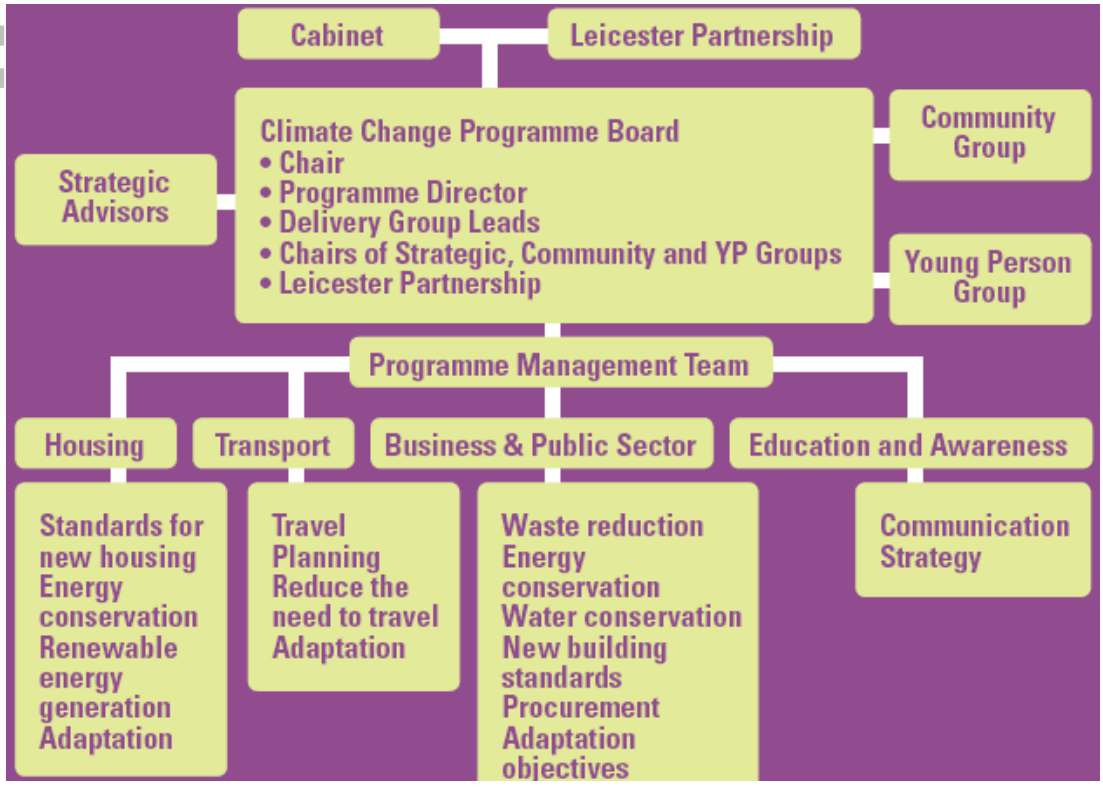


Figure 2: Administrative structure of the City of Leicester

3.3 External support

Depending on their size and human resources availability, local authorities may benefit from the support of supporting structures or energy agencies. It is even possible for them to subcontract some specific tasks (e.g. compilation of a Baseline Emission Inventory) or to use interns (Masters or PhD students can do much of the work associated with the collection of data and entry into a GHG calculation tool to produce the BEI).

à Supporting structures

Local authorities, which do not have sufficient skills or resources to draft and implement their own SEAP, should be supported by administrations or organisations with such capacities. Supporting Structures are in a position to provide strategic guidance and financial and technical support to local authorities with political will to sign up to the Covenant of Mayors, but lacking the skills and /or the resources to fulfil its requirements.

Supporting Structures also have a vocation to keep a close contact with the European Commission and the Covenant of Mayors' Office to ensure the best possible implementation of the Covenant. Thus, Supporting Structures are officially recognized by the Commission as key allies in conveying the message and increasing the impact of the Covenant.

There are 2 types of Supporting Structures:

1. National and regional public bodies, regions, counties, provinces, agglomerations
2. Networks or associations of regional or local authorities

Supporting structures can offer direct technical and financial assistance such as:

- Mobilising technical expertise in order to help Covenant signatories preparing their Baseline Emissions Inventory (BEI) or Sustainable Energy Action Plan (SEAP).
- Developing or adapting methodologies for preparing SEAP taking into account the national or regional context.
- Identifying financial opportunities for the SEAP implementation.
- Training local officials, who will be the final SEAP owners (type 1 supporting structures)

Some concrete examples**:**

- The Region of Andalucía has undertaken an Emission Inventory on its territory that will be used by Covenant Signatories of the region to prepare their SEAP.
- The Polish Network of Energie-Cités (PNEC) is providing direct technical support to four 4 Polish cities willing to join the Covenant of Mayors in 2009. This support is based on the methodology developed under the European-funded project MODEL (Management Of Domains related to Energy in Local authorities).
- The Province of Barcelona while directly financing the development of SEAPs of the Signatories it supports, is also preparing a programme under the European Local Energy Assistance facility to develop Photovoltaic systems which will benefit those municipalities.

à Energy agencies

Local and Regional Energy Agencies (LAREAs) have been active in local energy policy for decades and their knowledge and expertise could be very useful for the Covenant signatories, especially those lacking the technical capacities.

In fact, one of the first activities of each agency is to prepare an energy plan, or to up-date existing ones in the geographical area covered by the Agency. This strategic process usually comprises several steps including the collection of energy data, the establishment of an energy balance, as well as the development of short, medium and long-term energy policies and plans. Hence, Covenant signatories can expect their Local and Regional Energy Agencies (LAREAs) to give wide-ranging advice on all energy aspects, as well as useful technical assistance in the design of their BEI and SEAP.

ADDITIONAL RESOURCES

i) Ireland's national energy agency (SEI), provides a link with guidance to "Resourcing the Energy Management Programme"

http://www.sustainableenergyireland.ie/uploadedfiles/EnergyMAP/tools/01-10a%20Resourcing%20the%20Energy%20Management%20Programme%20v1.0.pdf

CHAPTER 4: BUILDING SUPPORT FROM STAKEHOLDERS[3]

All members of society have a key role in addressing the energy and climate challenge with their local authorities. Together, they have to establish a common vision for the future, define the paths that will make this vision come true, and invest the necessary human and financial resources.

Stakeholders' involvement is the starting point for stimulating the behavioural changes that are needed to complement the technical actions embodied in the SEAP. This is the key to a concerted and co-ordinated way to implement the SEAP.

The views of citizens and stakeholders should be known before detailed plans are developed. Therefore, citizens and other stakeholders should thus be involved and be offered the opportunity to take part in the key stages the SEAP elaboration process: building the vision, defining the objectives and targets, setting the priorities etc. There are various degrees of involvement: 'informing' is at one extreme whilst 'empowering' is at the other. To make a successful SEAP, it is highly recommended to seek the highest level of participation of from stakeholders and citizens in the process.

Stakeholders' participation is important for various reasons:

- Participatory policy making is more transparent and democratic
- A decision taken together with many stakeholders is based on a more extensive knowledge
- Broad consensus improves the quality, acceptance, effectiveness and legitimacy of the plan (at least is it necessary to make sure that stakeholders do not oppose some of the projects).
- Sense of participation in planning ensures the long-term acceptance, viability and support of strategies and measures
- SEAPs may sometimes get stronger support from external stakeholders than from the internal management or staff of the local authority

For these reasons, to "*Mobilise the civil society in our geographical areas to take part in developing the action Plan*" is a formal commitment of those signing the Covenant of Mayors.

4.1 Who are stakeholders?

The first step is to identify the main stakeholders. The stakeholders are those:

- whose interests are affected by the issue
- whose activities affect the issue
- who possess/controls information, resources and expertise needed for strategy formulation and implementation
- whose participation/involvement is needed for successful implementation

The following table shows the potential roles that the local authority and the stakeholders can play in the SEAP process outlined in chapter 1.

[3] Parts of this chapter are adapted from http://www.movingsustainably.net/index.php/movsus:mshome developed by Union of the Baltic Cities Environment and Sustainable Development Secretariat and part-funded by the European Union.

The SEAP process : the main steps - role of the key actors				
PHASE	**STEP**	**ROLE OF THE ACTORS**		
		Municipal council or equivalent body	**Local administration**	**Stakeholders**
Initiation	Political commitment and signing of the Covenant	Make the initial commitment. Sign the Covenant of Mayors. Provide the necessary impulse to the local administration to start the process.	Encourage the political authorities to take action. Inform them about the benefits (and about the necessary resources)	Make pressure on political authorities to take action (if necessary)
	Adapt city administrative structures	Allocate sufficient human resources and make sure adequate administrative structures are in place.		
	Build support from stakeholders	Provide the necessary impulse for stakeholders' participation. Show that you consider their participation and support as important.	Identify the main stakeholders, decide what channels of communication/participation you want to use. Inform them about the process that is going to start, and collect their views	Express their views, explain their potential role in SEAPs
Planning phase	Assessment of the current framework: Where are we?	Make sure the necessary resources are in place for the planning phase.	Conduct the initial assessment, collect the necessary data, and elaborate the CO_2 baseline emission inventory. Make sure the stakeholders are properly involved.	Provide valuable inputs and data, share the knowledge
	Establishment of the vision: Where do we want to go ?	Support the elaboration of the vision. Make sure it is enough ambitious. Approve the vision (if applicable).	Establish a vision and objectives that support the vision. Make sure it is shared by the main stakeholders and by the political authorities.	Participate in the definition of the vision, express their view on the city's future
	Elaboration of the plan: How do we get there ?	Support the elaboration of the plan. Define the priorities, in line with the vision previously defined.	Elaborate the plan: define policies and measures in line with the vision and the objectives, establish budget and financing, timing, indicators, responsibilities. Keep the political authorities informed, and involve stakeholders. Make partnerships with key stakeholders (if necessary).	Participate in the elaboration of the plan. Provide input, feedback.
	Plan approval and submission	Approve the plan and the necessary budgets	Submit the SEAP via the CoMO website. Communicate about the plan.	Make pressure on political authorities to approve the plan (if necessary)
Implementation phase	Implementation	Provide long-term political support to the SEAP process	Coordinate the implementation the plan. Make sure each stakeholder is aware of its role in the implementation.	Each stakeholder implements the measures that are under its responsibility
		Make sure that the energy and climate policy is integrated in the everyday life of the local administration	Implement the measures that are under responsibility of the local authority. Be exemplary. Communicate about your actions.	Make pressure / encourage the local administration to implement the measures under its responsibility (if necessary)
		Show interest in the plan implementation, encourage stakeholders to act, show the example	Motivate the stakeholders to act (information campaigns). Inform them properly about the available resources for EE and RES	Changes in behaviour, EE and RES action, general support to SEAP implementation
		Networking with other CoM signatories, exchanging experience and best practices, establishing synergies and encouraging their involvement in the Covenant of Mayors.		Encourage other stakeholders to act
Monitoring and reporting phase	Monitoring	Ask to be informed regularly about the advancement of the plan.	Proceed to a regular monitoring of the plan: advancement of the actions and evaluation of their impact	Provide the necessary inputs and data
	Reporting and submission of the implementation report	Approve the report (if applicable)	Report periodically to the political authorities and to the stakeholders about the advancement of the plan. Communicate about the results. Every second year, submit an implementation report via the CoMO website.	Provide comments on the report and report on the measures under their responsibility
	Review	Ensure that plan updates occur at regular intervals	Periodically update the plan according to the experience and the results obtained. Involve political authorities and stakeholders.	Participate in plan update

Here is a list of potentially important stakeholders in the context of a SEAP:

- Local administration: relevant municipal departments and companies (municipal energy utilities, transport companies etc)
- Local and regional energy agencies
- Financial partners such as banks, private funds, ESCOs[4],
- Institutional stakeholders like chambers of commerce, chambers of architects and engineers
- Energy suppliers, utilities
- Transport /mobility players: private/public transport companies, etc
- The building sector : building companies, developers
- Business and industries
- Supporting structures and energy agencies
- NGOs and other civil society representatives
- Representatives of the civil society, including students, workers etc
- Existing structures (Agenda 21 …)
- Universities
- Knowledgeable persons (consultants, …)
- Where relevant, representatives of national/regional administrations and/or neighbouring municipalities, to ensure coordination and consistency with plans and actions that take place at other levels of decision
- Tourists, where the tourist industry represents a large share of the emissions

4.2 How to engage in stakeholder participation?

Participation can be obtained through a variety of methods and techniques, and it may be useful to make recourse to a (professional) animator as a neutral moderator. Different levels of participation and tools may be considered[1]:

	Degree of involvement	Examples of tools
1	Information and education	brochures, newsletters, advertisement, exhibitions, site visits
2	Information and feedback	telephone hotline, website, public meetings, teleconferences, surveys and questionnaires, staffed exhibitions, deliberative polls
3	Involvement and consultation	workshops, focus groups, forums, open house
4	Extended involvement	community advisory committees, planning for real, citizen's juries

Example 1

A local energy forum is a local authority driven participatory process, which engages local stakeholders and citizens to work together in order to prepare and implement common actions that can be formalised into an Action Plan. Such forums are already used by some Covenant Signatories. For example Almada (Portugal) organised a local energy forum and invited all interested companies and organisations in order to gather ideas and project proposals that could contribute to their action plan. A partnership with a local energy agency and a university was established to develop their plan. Similarly the city of Frankfurt (Germany) asked the forum participants to make their own contributions to meet common energy targets and propose concrete actions to be carried out.

[1] Adapted from Judith Petts and Barbara Leach, Evaluating methods for public participation: literature review, Bristol Environment Agency, 2000.

[4] ESCO is the acronym of Energy Services Companies

Example 2

The municipality of Sabadell (Spain) raised the awareness of citizens by providing smart meters to 100 households. Such meters give an instant reading of energy consumption in euro, kWh and tonnes of CO_2, via a wireless device. Besides, workshops were organised to inform and educate households in relation with energy saving. The data related to energy consumption and CO_2 emissions were collected and the reduction achieved was calculated (expected around 10 % of reduction). Finally, the results were communicated to the families.

The roles and responsibilities of each player have to be specified. Partnerships with key actors are often necessary in developing and implementing a successful SEAP. Further communication about SEAP implementation results will be necessary to maintain motivation of stakeholders.

Some practical tips:

- ü Think big: Do not focus on the usual contacts.
- ü Get decision makers on board.
- ü Choose an appropriate facilitator / moderator.
- ü Some stakeholders can have conflicting interests. In this case it is advisable to organise workshops for each particular group separately to understand the conflicting interests before bringing them together.
- ü In order to raise the interest of the citizens, it is recommended to use visual tools (GIS tool showing the energy efficiency of the various districts of the local authority, aerial thermography showing thermal losses of individual buildings, or any simple model, which allows to show visually the data being presented).
- ü Attract media attention.

4.3 Communication

Communication is an essential mean to keep the stakeholders informed and motivated. Therefore, a clear communication strategy should be integrated in the SEAP. Before initiating a communication campaign, some information should be specified in order to maximise the impact of the action.

- Specify the message to be transmitted and the effect to be produced (desired outcome).
- Identify the key audience.
- Establish a set of indicators to evaluate the impact of the communication (head count at a seminar, surveys – quantitative/qualitative, hits on website, feedback e.g. e-mails, …)
- Specify the most appropriate communication channel(s) (face to face – most effective form of communication, advertising, mail, e-mail, internet, blogs, talks/meetings, brochures, posters, newsletters, printed publications, media releases, sponsorship ...).
- Specify planning and budget

Communication can also be internal to the local authority: setting up internal communication means may be necessary to improve collaboration between the involved departments of the local authority.

ADDITIONAL RESOURCES:

i) The Belief project produced a comprehensive guide on "Involve stakeholders and citizens in your local energy policy" through energy forums.

www.belief-europe.org

ii) The Environment Agency of Bristol published the following paper that contains a review of a variety of public participation techniques, with their main advantages and disadvantages (p. 28).

http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.129.8717&rep=rep1&type=pdf.

iii) The Employers' Organisation for local government (EO) produced a toolkit to assist local authorities and their partners to more effective collaborative working.

http://www.lgpartnerships.com/

iv) The Partner Foundation for Local Development has developed training for elected leaders. See Handbook 4, the councillor as communicator.

http://www.fpdl.ro/publications.php?do=training_manuals&id=1

v) Interesting information about communication strategy can be found in Energy Model project in step 9 named "Programme implementation".

www.energymodel.eu

CHAPTER 5: ASSESSMENT OF THE CURRENT FRAMEWORK: WHERE ARE WE?

5.1 Analysis of relevant regulations

Within a municipality, there are sometimes conflicting policies and procedures. A first step is to identify the existing municipal, regional and national policies, plans, procedures and regulations that affect energy and climate issues within the local authority.

The mapping and analysis of these existing plans and policies is a good starting point towards better policy integration. See Annex III for a list of the key European regulatory instruments relevant for local authorities.

The next step is to go through and check and compare the objectives and goals in the identified documents with the ones for a sustainable energy policy. The aim is to establish whether these objectives and goals are supporting or conflicting between each others.

Finally, the local authority should invite all the relevant actors and stakeholders to discuss the conflicts identified. They should try to reach an agreement on the changes that are necessary to update policies and plans, and clearly establish who and when should put them into practice. The relevant actions should be planned (when possible) and the list of actions to be taken should be included in the SEAP. Changes may take time to show their beneficial effects, but should nevertheless be endorsed by the political leadership.

5.2 Baseline review and Baseline Emission Inventory

Energy consumption and CO_2 emissions at the local level are dependent on many factors: economical structure (industry/service oriented and nature of the activities), level of economic activity, population, density, characteristics of the building stock, usage and level of development of the various transport modes, citizen's attitudes, climate, etc. Some factors can be influenced on the short term (like citizens attitudes) while others can only be influenced on the medium or long term (energy performance of the building stock). It is useful to understand the influence of these parameters, how they vary in time, identify on which the local authority can act upon (in the sort, medium and long term).

This is the purpose of baseline review: establish a clear picture of "where we are", a description of the city's current situation in terms of energy and climate change.

A baseline review is the starting point for the SEAP process from which it is possible to move to relevant objectives-setting, elaboration of adequate action plan and monitoring. The baseline review needs to be based on existing data. It should map relevant legislations, existing policies, plans, instruments and all departments / stakeholders involved.

Completing a baseline review requires adequate resources, in order to allow the data sets to be collated and reviewed. This assessment permits elaborating a SEAP that is suited to the emerging issues and specific needs of the local authority's current situation.

In annex II, you will find a list of suggested aspects to be covered in the baseline review.

The aspects to be covered can be either quantitative (evolution of energy consumption …) or qualitative (energy management, implementation of measures, awareness …).The baseline review allows to prioritise actions and then to monitor the effects based on relevant indicators. The most demanding element is to build a complete CO_2 emission inventory, based on actual energy consumption data (refer to Part II of this guidebook, which provides guidance on how to collect the energy data and how to elaborate the CO_2 emission inventory).

Detailed steps for conducting the baseline review:

1. Select the review team – preferably the inter-sectoral working group.

At this stage you should decide what degree of stakeholder's involvement you wish for this process. As stakeholders generally posses a lot of valuable information, their involvement is highly recommended (see chapter 3).

2. Assign tasks to team members.

Consider the competencies as well as the availability of each member of the group in order to assign them tasks that they will be able to perform.

3. Establish review schedule.

Indicate realistic start and end date of all data collection activities.

4. Identify the most important indicators to be included in the assessment. The following elements should be covered:

   - ü What is the energy consumption and CO_2 emissions of the different sectors and actors present in the territory of the local authority and what are the trends? (See Part II).
   - ü Who produces energy and how much? Which are the most important sources of energy? (See Part II).
   - ü What are the drivers that influence energy consumption?
   - ü What are the impacts associated with energy consumption in the city (air pollution, traffic congestion …)?
   - ü What efforts have already been done in terms of energy management and what results have they produced? Which barriers need to be removed?
   - ü What is the degree of awareness of officials, citizens and other stakeholders in terms of energy conservation and climate protection?

In annex, we provide a table with more detailed specifications of the aspects that could be covered in the assessment.

5. Collect the baseline data.

It requires the collection and processing of quantitative data, the establishment of indicators, and the gathering of qualitative information using document review and interviews/workshops with stakeholders. The selection of data sets needs to be based on criteria that are agreed on with stakeholders, who are then actively involved in contributing data. Part II of this guidebook provides guidance for the collection of data related to energy consumption.

6. Compile the CO_2 baseline emission inventory.

Based on energy data, the CO_2 baseline emission inventory can be compiled (see part II of this guidebook).

7. Analyse the data.

It is not enough just to collect data: data needs to be analysed and interpreted in order to inform policy. For example, if the baseline review shows that energy consumption is increasing in a specific sector, try to understand why it is so: population increase, increased activity, increased usage of some electrical devices, etc …

8. Write the self-assessment report – be honest and truthful, as an unfair report does not serve any purpose.

The baseline review can be carried out internally within the local authority as a self-assessment process, but combining the self-assessment with external peer review can add additional value to the process. Peer review offers an objective third-party review of achievements and future prospects. Peer reviews can be carried out by external experts who work in other cities or organisations in similar fields of expertise. It is a cost effective method and often a more politically acceptable alternative to consultants.

Based on the collected data and on the different sets of hypothesis, it may be relevant to establish scenarios: how would energy consumption and CO_2 emissions evolve under current policies, what would be the impact of the projected actions etc?

5.3 SWOT analysis

A SWOT analysis is a useful strategic planning tool that can be applied in the SEAP process. Based on the findings of the baseline review, it allows to determine the Strengths and Weaknesses of the local authority in terms of energy and climate management, as well as the Opportunities and Threats that could affect the SEAP. This analyse can help to define priorities when devising and selecting SEAP actions and measures.

ADDITIONAL RESOURCES

i) The Model project provides some guidance on how to build different scenarios:

http://www.energymodel.eu/IMG/pdf/IL_4_-_Baseline.pdf

ii) Managing Urban Europe 25 project gives detailed instructions on how to prepare a baseline review (based on sustainability management).

http://www.localmanagement.eu/index.php/mue25:mue_baseline

iii) The charity village website provides additional guidance on SWOT Analysis.

http://www.charityvillage.com/cv/research/rstrat19.html

iv) The businessballs website provides free resources on SWOT analysis, as well as examples.

http://www.businessballs.com/swotanalysisfreetemplate.htm

CHAPTER 6: ESTABLISHMENT OF A LONG-TERM VISION WITH CLEAR OBJECTIVES

6.1 The vision: towards a sustainable energy future

A further step to undertake to make your municipality in line with the Covenant of Mayor's energy efficiency objectives is to establish a vision. The vision for a sustainable energy future is the guiding principle of the local authority's SEAP work. It points out the direction in which the local authority wants to head. A comparison between the vision and the local authority's current situation is the basis for identifying what action and development is needed to reach the desired objectives. The SEAP work is a systematic approach to gradually get closer to the vision.

The vision serves as the uniting component that all stakeholders can refer to; meaning everyone from leading politicians to citizens and interest groups. It can also be used for marketing the local authority to the rest of the world.

The vision needs to be compatible with the Covenant of Mayor's commitments, i.e. it should imply that the 20% CO_2 emission reduction in 2020 target will be reached (at the minimum). But it could also be more ambitious than that. Some cities already plan to become carbon neutral in the long run.

The vision should be realistic but still provide something new, add real value and break some old boundaries that do not have real justification anymore. It should describe the desired future of the city and be expressed in visual terms to make it more understandable for citizens and stakeholders.

It is warmly recommended to involve stakeholders in the process to get more new and bold ideas and also to use stakeholder participation as the starting point of behavioural change in the city. Besides, stakeholders and citizens may provide a strong support to the process, as they sometimes want stronger action than what other levels of government would be prepared to support.

Examples of visions of some local authorities

Växjö (Sweden):

"*In Växjö, we have the vision that we will live and act so as to contribute to sustainable development where our consumption and production are resource-effective and pollution free*." And "*The vision is that Växjö shall become a city where it is easy and profitable to live a good life without fossil fuels.*"

Lausanne (Switzerland):

"*Our 2050 vision is a reduction by 50% of the CO_2 emissions on the city's territory*"

6.2 Setting objectives and targets

Once the vision is well established, it is necessary to translate it into more specific objectives and targets, for the different sectors in which the local authority intends to take action. These objectives and targets should be based on the indicators selected in the baseline review (see chapter 5.2).

Such targets and objectives should follow the principles of the SMART acronym: Specific, Measurable, Achievable, Realistic, and Time-bound. The concept of SMART objectives became popular in the 1980's as an efficient management concept.

To set SMART targets, ask yourself the following questions:

1. **Specific** (well-defined, focused, detailed and concrete) – ask yourself: What are we trying to do? Why is this important? Who is going to do what? When do we need it done? How are we going to do it?
2. **Measurable** (kWh, time, money, %, etc.) – ask yourself: How will we know when this objective has been achieved? How can we make the relevant measurements?
3. **Achievable** (feasible, actionable) – ask yourself: Is this possible? Can we get it done within the timeframe? Do we understand the constraints and risk factors? Has this been done (successfully) before?
4. **Realistic** (in the context of the resources that can be made available) – ask yourself: Do we currently have the resources required to achieve this objective? If not, can we secure extra

resources? Do we need to reprioritise the allocation of time, budget and human resources to make this happen?

5. **Time-Bound** (defined deadline or schedule) – ask yourself: When will this objective be accomplished? Is the deadline unambiguous? Is the deadline achievable and realistic?

6.3 Examples of SMART objectives[2]

Type of instrument	Examples of SMART targets
Energy performance standard	S: Focus on specific product or product group M: Performance characteristics aimed for / set baseline A: Performance standard links to best available product on the market and is regularly updated R: Best available product is accepted by the target group T: Set clear target period
Subsidy scheme	S: Focus on a specific target group and on specific technologies M: Quantified energy savings target / set baseline A: Minimize freeriders R: Link the savings target to the available budget T: Link the energy savings target to a target period
(Voluntary) Energy audit	S: Focus on a specific target group M: Quantify the targeted audit volume (m2, number of companies, % of energy use etc.) / set baseline A: Encourage to implement recommended measures, e.g. by offering financial incentives. R: Ensure that sufficient qualified auditors have been assigned and financial incentives are in place to carry out audits T: Link the quantified target to a target period

In practice, a potential SMART target could be: "15% of the dwellings will be audited between 1/1/2010 and 31/12/2012". Then, it is necessary to check every condition of being SMART. For example, the answer could be:

*"It is **Specific** because our action (energy audits) and target group (dwellings) is well defined. It is **Measurable** because it is a quantified target (15%) and because we have a system in place to know the number of audits actually carried out. It is **Achievable** because there is a financial incentive scheme that allows people to be reimbursed and because we will organise a communication campaigns about audits. It is **Realistic** because have trained 25 auditors that are now well-qualified, and we have verified that this number is sufficient. It is **Time-bound** because the time-frame is well defined (between 1/1/2010 and 31/12/2012)."*

Some Tips

- Avoid putting "raising awareness" as an objective. It's too big, too vague and very difficult to measure.
- Add the following requirements to the objectives:
  - understandable – so that everyone knows what they are trying to achieve.
  - challenging – so everyone has something to strive for.
- Define specific targets for 2020 for the different sectors considered and define intermediate targets (at least every 4 years for instance)

ADDITIONAL RESOURCES

i) The practice of leadership website provides additional guidance on setting SMART Objectives:

http://www.thepracticeofleadership.net/2006/03/11/setting-smart-objectives/

http://www.thepracticeofleadership.net/2006/10/15/10-steps-to-setting-smart-objectives/

ii) **The European Sustainable Development Network publishes** a study over (SMART) Objectives and Indicators of Sustainable Development in Europe:

www.sd-network.eu/?k=quarterly%20reports&report_id=7

[2] http://www.aid-ee.org/documents/SummaryreportFinal.PDF - April 2007

CHAPTER 7. SEAP ELABORATION

The core part of the SEAP relates to the policies and measures that will allow to reach the objectives that have been previously set (see chapter 6).

SEAP elaboration is only one step in the overall process and it should not be considered as an objective in itself, but rather as a tool that allows to:

- Outline how city will look like in the future, in terms of energy, climate policy and mobility (the vision)
- Communicate and share the plan with the stakeholders.
- Translate this vision into practical actions assigning deadlines and a budget for each of them.
- Serve as a reference during the implementation and monitoring process.

It is desirable to create a broad political consensus for the SEAP in order to ensure its long-term support and stability, regardless of changes in the political leadership. Discussions will be needed at the highest level to agree on the way in which stakeholders and political groups will be involved in the SEAP elaboration.

Also remind that the work does not finish after drafting the SEAP and its formal approval. On the contrary, this moment should be the start of the concrete work of putting the planned actions into reality. A clear and well-structured SEAP is be essential for this (i.e. all actions should carefully designed and described properly, with timing, budget, sources of financing and responsibilities etc).

Some chapters of this guidebook (Chapter 8 dealing with policies, as well as part III of the guidebook) will provide you with useful information in order to select and devise adequate policies and measures for your SEAP. Adequate policies and measures are dependent on the specific context of each local authority. Therefore, defining measures that are suited to each context is also highly dependent on the quality of the assessment of the current framework (see chapter 5).

Here is a list of recommended steps for drafting a successful SEAP:

Ø Make a prospective of best practices

In addition to the resources on policies and measures provided in this guidebook (see chapter 8), it may be useful to identify what best practices (successful examples) have delivered effective results in similar contexts in reaching similar targets and objectives than those set by the municipality, in order to define the most appropriate actions and measures. In this sense, joining a network of local authorities can be very helpful.

Ø Set priorities and select key actions and measures

Different kind of actions and measures may contribute to the achievement of the objectives. Undertaking the entire list of possible actions will often surpass the current capabilities of the local authority, in terms of costs, project management capacities etc. In addition, some of them may be mutually exclusive. This is why an adequate selection of actions in a given time horizon is necessary. At this stage a preliminary analysis of the possible actions is necessary: what are the costs and benefits of each of them (even in qualitative terms).

To facilitate the selection of measures, the local authority may rank the possible measures by importance in a table summarizing the main characteristics of each action: duration, level of required resources, expected results, associated risks etc. The actions may be broken down in short term actions (3-5 years) and long term actions (towards 2020).

Specific methods for priorities selection are available[3]. In simple terms, you should:

- define which criteria you want to consider for measures selection (investment required, energy savings, employment benefits, improved air quality, relevance to the overall objectives of the local authority, political and social acceptability …)
- decide which weight you give to each criterion
- evaluate each criterion, measure by measure, in order to obtain a "score" for each measure.
- If necessary, repeat the exercise in the context of various scenarios, in order to identify the measures whose success is not scenario-dependent (see chapter 5)

Such an evaluation is a technical exercise but it has definitely a political dimension, especially when selecting the criteria and their respective weighting. Therefore, it should be carried out in a careful manner, and be based on relevant expert and stakeholders' opinion. It may be useful to refer to various scenarios (see chapter 5)

Ø Carry out a risk analysis[4]

The selection of actions and measures should also be based on the careful estimation of risks associated with their implementation (especially when significant investments are planned): how likely is it that an action fails or does not bring the expected results? What will be the impact on the objectives? And what are the possible remedies?

Risks can be of different nature:

- Project-related risks: cost and time overruns, poor contract management, contractual disputes, delays in tendering and selection procedures, poor communication between project parties…
- Government-related risks: inadequate approved project budgets, delays in obtaining permissions, changes in Government regulations and laws, lack of project controls, administrative interference…
- Technical risks: inadequate design or technical specifications, technical failures, poorer than expected performance, higher than expected operation costs…
- Contractor-related risks: inadequate estimates, financial difficulties, delays, lack of experience, poor management, difficult in controlling nominated subcontractors, poor communication with other project parties etc
- Market-related risks: increase in wages, shortages of technical personnel, materials inflation, shortage of materials or equipments required, and variations in the price of the various energy carriers…

Risks may be assessed using conventional quality management techniques. Finally, remaining risks have to be evaluated and either accepted or rejected.

Ø Specify timing, clear responsibilities, budget and financing sources of each action

Once the actions have been selected, it is necessary to plan them carefully so that they can become a reality. For each action, specify:

- the timing (begin date –end date)
- the person/department responsible for implementation
- the modality of financing. As municipality resources are scarce, there will always be competition for available human and financial resources. Therefore, efforts should be continuously made to find alternative sources of human and financial resources (see chapter 9).
- the modality of monitoring: identify the kind of data need that to be collected in order to monitor the progress and results of each action. Specify how and by whom the data will be collected, and who will compile it. See chapter 11 for a list of possible indicators.

To facilitate implementation, complex actions could be broken down in simple steps, each of them having its own timing, budget, responsible person etc.

Ø Draft the action plan

At this stage, all the information should be available to complete the SEAP. A suggested table of content is presented in chapter 1.

Ø Approve the action plan and its associated budget

Formal approval of the SEAP by the municipal council is a mandatory requirement of the Covenant. In addition, the local authority should allocate the necessary resources in the annual budget and whenever possible make commitments for the forward (3-5 year) planning budget.

Ø Perform regular SEAP reviews

Continuous monitoring is needed to follow SEAP implementation and progresses towards the defined targets in terms of energy / CO_2 savings, and eventually to make corrections. Regular monitoring

followed by adequate adaptations of the plan allows initiating a continuous improvement cycle. This is the "loop" principle of the project management cycle: Plan, Do, Check, Act. It is extremely important that progress is reported to the political leadership. SEAP revision could for example occur every second year, after the implementation report has been submitted (mandatory as per the Covenant of Mayor's commitments).

ADDITIONAL RESOURCES

i) The JRC published a review of existing methodologies and tools for the development and implementation of SEAPs':

http://re.jrc.ec.europa.eu/energyefficiency/pdf/CoM/Methodologies_and_tools_for_the_development_of_SEAP.pdf

ii) Climate Alliance developed a "Compendium of Measures" helping to develop a climate change strategy at local level. Local authorities have the possibility to choose a set of measures in those fields they are more interested and decide the level of ambition (that will help to define the indicators of achievement) for each field.

http://www.climate-compass.net/fileadmin/cc/dokumente/Compendium/CC_compendium_of_measures_en.pdf

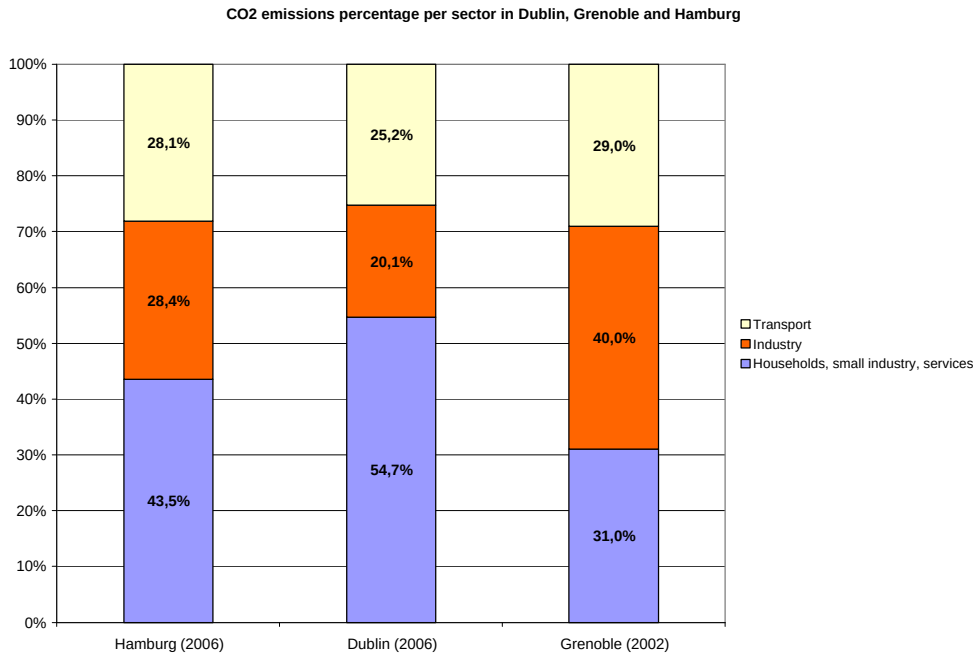
iii) There are also case studies based on the different areas of action relevant for the action plan:

http://www.climate-compass.net/_cases.html

CHAPTER 8. POLICIES AND MEASURES APPLICABLE TO YOUR SEAP

The Covenant of Mayors concerns action at local level within the competence of the local authority. This chapter provides suggestions and examples of policies and measures that can be adopted by the local authority in order to reach the SEAP objectives. It concentrates on "policy" actions that will generally deliver CO_2/energy saving over the longer term e.g. via subsidies, regulations, information campaigns.

The establishment of the baseline review (chapter 5) and in particular the knowledge of the share of the various economic sectors in the total CO_2 emissions will help the municipality to define priorities and select relevant measures in order to cut the CO_2 emissions. As this share of emissions per sector is specific for each city, three different examples are presented below.



Source: information extracted from values of the climate action plan of Hamburg, Dublin and Grenoble

Policies and measures aiming at reducing the CO_2 emissions at the local level can be categorised in different ways, for example:

- The sectors addressed (residential, industry, transport etc.)
- Whether they are addressed to the local administration itself or not
- The type of instrument used (financial support, regulation, communication and information, demonstration etc.)
- The type of impact on the energy consumption and production patterns: energy efficiency of equipments, buildings, cars etc., more rational behaviours (e.g. turning off lights, increased usage of public transport), cleaner energy (e.g. use of renewable energies, biofuels).

This chapter provides information on policies related to the key target sectors of the covenant: buildings and transport, usage of renewable energies and CHP, and covers the key fields of action: land use planning, public procurement, working with the citizens, and information and communication technologies (ICT).

ADDITIONAL RESOURCES

1. A study carried out for the European Commission (DG TREN) and coordinated by the Fraunhofer-Institute provides information on energy saving potentials in various sectors:

http://ec.europa.eu/energy/efficiency/studies/doc/2009_03_15_esd_efficiency_potentials_final_report.pdf

2. The AID-EE project provides guidelines for the monitoring, evaluation and design of energy efficiency policies:

   http://www.aid-ee.org/documents/000Guidelinesforthemonitoringevaluationanddesign.PDF

3. The AID-EE project also provides information over the overall impact assessment of current energy efficiency policies and potential 'good practice' policies':

   http://www.aid-ee.org/documents/WP5_AID-EE_Final_000.pdf

8.1 Buildings sector

Buildings are responsible of 40 % of total EU energy consumption and are often the largest energy consumer and CO_2 emitter in urban areas. Therefore, it is crucial to devise efficient polices to reduce energy consumption and CO_2 emissions in this sector.

The policies and measures allowing to promote energy efficiency and renewable energies in buildings depend on the type of buildings, their usage, age, location, ownership (private/public …), and if the building is in a project phase or is an existing one. For example historic buildings may be protected by law so that the number of options to reduce energy consumption is quite restricted.

The main energy usages in buildings are: maintaining an adequate indoor climate (heating, cooling, ventilation and humidity control), lighting, production of sanitary hot water, cooking, electrical appliances, elevators.

Key factors that affect energy consumption in buildings are the following:

- Performance of the building envelope (thermal insulation, building tightness, surface and orientation of the glazed surfaces…)
- Behaviour (how we use the buildings and its equipments in our day to day life).
- Efficiency of the technical installations
- Quality of the regulation and maintenance of the technical installations (are the technical installations managed and maintained in such a way as to maximise their efficiency and minimise their overall usage?).
- Ability to benefit from heat gains in the winter and limit them in the summer (appropriate summer comfort strategy)
- Ability to benefit from natural lighting
- Efficiency of electrical appliances and lighting

Recourse to renewable energy sources will not result in a reduction of energy consumption but will ensure that the energy used in the building has a lower impact on the environment.

In this section, we first provide policy suggestions applicable at the local level to the buildings sector as a whole. In part III of the guidelines, we provide specific considerations related to different situations: new buildings, existing buildings, public buildings, historical buildings …The technical measures that can be implemented to increase the efficiency of buildings are also described in the part III of this guidebook.

The Energy Performance of Buildings Directive (2002/91/EC) is a key regulatory instrument which is meant to boost the energy performance of the building sector. We suggest the local authorities to get informed about the specific rules that apply in their country, and to take maximum advantage of this regulation to improve the performance of their building stock (for example local authorities could make use the standards developed at national/regional level to impose more stringent energy performance requirements than those applicable at national/regional level – this will be developed below). See Annex III.

Here are some suggestions of policies that can be implemented at the local level in order to boost energy efficiency and renewables in buildings:

<u>Regulations for new/renovated buildings:</u>

- Adopt stricter global energy performance standards than those applicable at national/regional level, especially if such standards are not particularly demanding. Depending on the national/regional regulatory context, local authorities may be able to adopt such standard in their urban planning rules and regulations. Global energy performance standards leave many options open to building designers to choose how they will reach the objectives. In principle architects and building designers should be familiar with those norms, as they apply to the entire

national/regional territory. Generally fewer options exist to reduce energy consumption with refurbishments than for new buildings; therefore the requirements are generally less stringent. Eventually they may be adjusted according to the building's characteristics.

- Adopt specific standards for buildings components (thermal transmittance of the envelope, of windows, efficiency of the heating system, etc.). This option has the advantage to be simple to understand, and guarantees the minimal performance of the components even if the overall performance cannot be achieved.
- Impose the inclusion of some components that will help to improve the energy efficiency (shading devices, presence of meters that record the energy consumption, heat recovery devices for mechanical ventilation …). This can be done as a general rule that would apply to all new buildings, or could be imposed on a case by case basis, according to the building characteristics (e.g.: impose shading devices to buildings having a significant glazing surface oriented to the south).
- Impose a certain quantity of renewable energy production/usage, in particular in public buildings.
- Adopt energy performance standards for renovation works which are not considered as "major renovation" by national/regional law, and for which no energy performance standards apply.

Enforcement of regulations:

- Ensure that the energy performance standards are respected in practice and apply penalties if necessary. It is recommended to adopt both "on paper" and "on site "verifications. The presence of a representative of the authority at some point during construction/renovation works will clearly show that the authority is taking the regulations seriously and will help to improve the practices of the construction sector at the local level.

Financial incentives and loans

- The local authority could complement the financial support mechanisms existing at national or regional level with extra financial incentives for energy efficiency or renewable energy sources. Such scheme could focus on the global energy performance of building (e.g. the incentive could be proportional to the difference between a minimal threshold of energy performance, calculated according to the existing national/regional standards, and the level of performance actually achieved), or could be used to support specific techniques that the local authority would consider of particular relevance for new buildings, considering its own context and objectives (thermal insulation, RES, …). The latter option is particularly relevant for renovated building, for which the precise calculation of the overall energy performance is generally less easy than for new buildings. Ideally, the financial incentive would cover (part of) the difference between the cost of "standard construction work" and a construction/renovation that is considered as energy efficient.
- In addition, the local authority could provide financial support to for purchase of energy efficient equipments that allow to reduce energy consumption of buildings (efficient lamp bulbs, efficient appliances, …)
- Although financial incentives do reduce the cost of investment related to energy efficiency, investors (either citizens, private companies etc) still have to face up-front payments. To facilitate the access to capital, the local authority may liaise with local banks and financial institutions so that low-interest loans are available for energy efficiency or RES.

  Notes:

  Even if the budgets that the local authority can devote to such subsidies is not immense, they could still make a great difference in terms of citizen's motivation: with proper communication, such subsidies could be seen as a clear sign that the local authority is willing to achieve success in the field of energy and climate policy, and that it is willing to support its citizens in this direction.

  Note that the European Regulations on State Aid fix a framework for the financial support Member States are allowed to provide to commercial activities.

Information and training:

- Make the relevant stakeholders (architects, building developers, construction companies, citizens…) aware of the new energy performance requirements for buildings, and provide them

some motivating arguments (the savings on the energy bills can be highlighted, as well as the benefits in terms of comfort, environmental protection, etc…).

- Inform the general public and key stakeholders about the importance and benefits of behaviours allowing to reduce energy consumption and CO_2 emissions.
- Involve the local companies: they may have an economic interest in the energy efficiency and renewable energy business.
- Inform the stakeholders about the resources available: where can the information be found, what are priority measures, who can provide proper advise, how much does it cost, how can households do proper work by themselves, what are the tools available, who are the local competent architects and entrepreneurs, where can the necessary materials be purchased locally, what are the available subsidies,… This could be done via info days, brochures, information portal, information centre, helpdesk etc…
- Organise specific info and training sessions for the architects, workers and construction companies: they must become familiar with the new design and constructing practices and regulations. Specific training could be organised to cover basic issues (basic building thermal physics, how to install properly thick insulation layers) or more specific issues that are often neglected (thermal bridges, building air tightness, natural cooling techniques etc).
- Make sure the tenants, owners and managers of new and renovated buildings are informed about the building's features: what makes this building energy efficient and how to manage and operate the equipment and facilities offered, in order to obtain a good comfort and minimise the energy consumption. All the technical information needs to be passed to technicians and maintenance companies.

Promote successes

Encourage people to build efficient buildings by offering them recognition: buildings significantly above the legal standards of energy performance could be made visible by a label, open days visits, an exhibition in the town hall, an official ceremony, signposting on the local authority's website etc. The energy performance certificate, which is a requirement of the Energy Performance of Buildings Directive (see above), could be used for that purpose (e.g. the local authority could organise a contest for the first "Label A" buildings built in the municipality). Other standards can be used as well ("passive house" standard etc).

Demonstration buildings

Demonstrate that it is feasible to build energy efficient buildings or to make renovation with high energy performance standards. Show how it can be done. Some high performance buildings could be open to the public and stakeholders for this purpose. It does not necessarily need to be a high technology building – the most efficient ones are sometimes the simplest ones: the problem with energy efficiency is that it is not always quite visible (think about thick insulation for example). However, listening to the owner and the occupants talking about their experience, their reduced energy bills, their improved comfort etc should already be worthwhile. Visits during construction stage could be interesting for training and educational purpose for construction companies and architects.

Promote energy audits

Energy audits are an important component of energy efficiency policy, as they allow to identify, for each audited building, the best measures allowing to reduce energy consumptions. Therefore, the local authority could promote such audits via proper information, ensuring the availability of competent auditors (training …), financial support to audits … (see part III of the guidebook for more information on energy audits).

Urban planning

As explained in the dedicated section, urban planning is a key instrument to boost and plan refurbishments. In addition to setting energy performance standards as mentioned above under "regulation", urban regulations should be devised in such a way not to deter energy efficiency and RES projects. For instance, long and complex authorisation procedures to install solar panels on roofs of existing buildings will be a clear obstacle to RES promotion and should be avoided.

Increase the rate of refurbishment

By accelerating the rate of buildings undergoing energy efficient refurbishments, the impact of the above measures on the energy and CO_2 balance will increase. Some of the above measures, and in particular urban planning, financial incentives, loans or information campaigns about the benefits of energy efficient renovations are likely to have such an effect.

Energy taxes

Higher energy prices generally increase awareness and motivation towards energy savings. If the local authority has the legal power to do so, it may decide to levy taxes on energy. However, the social consequences of such a measure should be evaluated and debated thoroughly before such a decision is made. And an adequate communication plan should be devised to ensure citizens understand and adhere to such a policy. The question related to the usage of the tax's revenues should also be dealt in a very transparent manner (e.g. financing an energy efficiency support fund, financial compensation economically for vulnerable citizen groups etc).

Coordinate policies with other levels of authority

A number of policies, instruments, tools in the field of energy efficiency of buildings and RES exist at regional, national and European level. We recommend that the local authority has a good view of these, in order to avoid duplication, and to take the maximum advantage of what already exists.

Some recommendations for public buildings:

Management of public buildings: a local authority has often control over a large number of buildings. Therefore a systematic approach is recommended in order to ensure a coherent and efficient energy policy covering the entire building stock over which the local authority exercises control. Such an approach could be:

- Identify all buildings and facilities owned / managed / controlled by the local authority
- Collect energy data related to those buildings and set up a data management system (see section 4.1.2 a) of part II of these guidelines)
- Classify the buildings according to their energy consumption, both in absolute values and per square meter or other relevant parameter like: number of pupils for a school, number of workers, number of users for libraries and swimming pools, etc.
- Identify buildings which consume the most energy and select them for priority action
- Prepare an action plan (part of the SEAP) in order to progressively reduce the energy consumption of the building stock
- Nominate someone in charge of the implementation of the plan!
- Verify that the commitments and obligations of the contractors in terms of energy efficiency are met in practice and apply penalties if it is not the case. On-site verifications during construction are advisable (e.g. thick insulation which is not placed adequately will not be very efficient).
- Recycle the savings: if the local authority's financial rules allow to do so, savings obtained through simple and low-cost measures could be used to finance larger energy efficiency investments (e.g. revolving funds, for further details see chapter 9).

Policy instruments at disposal of the local authority	**Private buildings**			**Public buildings**		
	New	**Renovated**	**Existing**	**New**	**Renovated**	**Existing**
Energy performance regulations	X	X	-	+	+	-
Financial incentives and loans	X	X	+	+	+	-
Information and training:	X	X	X	X	X	X
Promote successes	X	X	+	X	X	+
Demonstration buildings	X	X	-	X	X	-
Promote energy audits	-	X	X	-	X	X
Urban planning and regulations	X	+	-	X	+	-
Increase the rate of refurbishment	-	X	-	-	X	-

Energy taxes	+	+	+	+	+	+
Coordinate policies with other level of authority	X	X	X	X	X	X

X = most relevant
+ = somehow relevant
- = low relevance

Table: Relevance of the policies exposed in this guidebook related to different buildings situations

[3] See for example http://www.energymodel.eu/IMG/pdf/IL_6_-_Priorities.pdf

[4] Further information on risks and project management can be found in scientific literature. This information on risk management is based on the paper "Role of public-private partnerships to manage risks in public sector project in Hong Kong" INTERNATIONAL JOURNAL OF PROJECT MANAGEMENT 24 (2006) 587-594.

8.2 TRANSPORT[5]

The transport sector represents approximately 30% of the final energy consumption in the European Union. Cars, trucks and light vehicles are responsible for 80% of the final energy consumed in the transport sector. The European Commission and the European Parliament have recently adopted the Communication COM (2009) 490[6] "Action Plan on Urban Mobility". The Action Plan proposes twenty measures to encourage and help local, regional and national authorities in achieving their goals for sustainable urban mobility.

Before the local authority proposes specific policies and measures concerning transport, an in depth analysis of the local current situation is highly recommended. The actual means of transport and the possible connections or synergies with different means of transport must be well-matched with the geographic and demographic features of the city and the possibilities to combine different types of transports.

Effective, Sustainable Urban Transport Planning (SUTP)[7] requires long-term vision to plan financial requirements for infrastructure and vehicles, to design incentive schemes to promote high quality public transport, safe cycling and walking and to coordinate with land-use planning at the appropriate administrative levels. Transport planning should take into account safety and security, access to goods and services, air pollution, noise, greenhouse gas emissions and energy consumption, land use, cover passenger and freight transportation and all modes of transport. Solutions need to be tailor-made, based on wide consultation of the public and other stakeholders, and targets must reflect the local situation. This chapter aims to offer different possibilities to municipalities to build their own SUTP.

1. Reducing the need for transport[8]

Local Authorities have the possibility to reduce the needs for transport. Here are some examples of policies to be implemented locally.

- Providing door-to-door access choices across the urban agglomeration. This objective may be reached through an appropriate combination of less flexible ways of transport for long and medium distances and other more flexible ways such as bike hiring for short distances.
- Making efficient use of space, promoting a “compact city” and targeting the urban development to public transport, walking and cycling.
- Strengthening the use of information and communication technologies (ICT). The local authorities have the opportunity to use ITC technologies to implement online administrative procedures and avoid citizens to travel to fulfil their duties with public administrations.
- Protecting existing short-routes in the network in order to diminish the energy consumption of those less efficient or more necessary transports (i.e. massive public transports)

2. Increasing the attractiveness of ‘alternative’ transport modes

Increasing the modal share for walking, cycling and public transport can be achieved through a wide variety of plans, policies and programmes.

As a general principle linked to transport policies, managing the overall offer and demand of transport is essential to optimise the use of infrastructures and transport systems. This allows making compatible the different ways of transport such as bus, train, tramway and underground to take advantage of each one and avoid unnecessary overlapping.

Public transport

Increasing the modal share for public transport requires a dense network of routes that meets the mobility needs of people. Before implementing any transport policy the local authority should determine the reasons/factors of why citizens/businesses are NOT using public transport. Therefore, it is essential to identify barriers for public transport use. Some examples[9] of such barriers for buses are:

- Inconvenient stops and inadequate shelters
- Difficulty in boarding buses
- Infrequent, indirect and unreliable services
- Lack of information on services and fares

- High cost of fares
- Long journey times
- Lack of practicability of connections between different modes of transport
- Fear of crime, particularly at night

To increase the share of public transport among the citizens, the local authority could implement the following measures:

- Develop a set of indicators measuring the access to public transport of citizens. Perform a comprehensive analysis of the current situation and adopt corrective actions to improve these indicators. The network should be attractive and accessible for all communities of interest and ensure that stops are sited within walking distance from key residential, commercial and tourist centres.
- A marketing strategy and service information availability should be integrated across public transport modes within 'travel to work' urban areas. The use of marketing enables a permanent improvement in all customer relations activities like sales, advertising, branding, network design, product (Public Transport) specifications, complaint management and customer service.
- Promote collective transport programmes for schools and businesses. This requires a forum with companies, unions and consumers associations in order to know the needs of each, share the costs of the service and maximize the number of citizens with access to the public transport.
- Provide an integrated public transport information service through a call centre, Information Centers, 24 hour information points and Internet.
- Services need to be reliable, frequent, cost and time-competitive, safe to use and perceived by the public as such. Therefore an important communication effort is necessary to inform users about the advantages of using public transport with respect to other means of transport.
- Information about services needs to be 'real-time', widely available and include predicted arrival times (For arriving passengers, it is also possible to give information about connections). For example displays may give passengers a countdown in minutes until the arrival of the next bus as well as showing the stop name and current time.
- "Public transport only" and priority routes will be essential policies. This will reduce travel time which is one of the most considered factors by users when choosing among the different means of transport. Spatial planning should deliver the required loading factors to allow public transport to compete with car transport.
- Work in partnership with the district councils and others to ensure a high standard of provision and maintenance of the public transport infrastructure, including bus shelters and improved facilities at bus and rail stations.
- Create a suggestion box to consider the ideas of users and non-users in order to improve your service. Consider the possibility to create "transport charter" according to the specific needs of a group of users.
- Create a Free Tourist Shuttle System with a fixed route and stops at a variety of popular tourist destinations. This would eliminate vehicle trips and parking spaces at popular destinations and provide an easy transportation alternative for tourists who are uncomfortable with a complex transit schedule.

It is important to keep in mind that choices are occasionally based on comparisons among public transport and car. For instance, some actions aimed at increasing the share of public transport are not only linked to the measures undertaken in this sector, but also in other areas such as reducing cars´ use (for example pricing public parking's policy). The monitoring results of public transport may be an effective indicator to know the effectiveness of some policies mentioned in this chapter.

Cycling[10]

Increasing the modal share for cycling also requires a dense network of well-maintained routes that are both safe to use and perceived by the public as such. Spatial and transport planning should treat cycling as an equal mode of transport along with cars and public transport. This means reserving the space that is necessary for the 'cycling infrastructure', direct connections and ensuring continuity with attractive and secure cycle parking facilities at transport hubs (train and bus station) and workplaces. Infrastructure design should ensure that there is a hierarchy of routes that are safe, attractive, well-lit,

signposted, maintained year around and integrated with green space, roads and the buildings of urban areas.

The international transport forum[11] (OECD) has identified seven key policies areas[12] in which authorities can act to promote cycling:

- Image of cycling: it is not only a leisure/sport activity but also a mean of transport.
- Infrastructure: an integrated network of cycling paths connecting origins and destinations and separate from motorised traffic is essential to promote cycling.
- Route guidance and Information: information such as number or colour of the cycling ways and distances in order to make easy to follow by cyclists.
- Safety: approve standards for safe driving and avoid the mixture of bicycles and other heavy ways of transport.
- Links with public transport: develop parking facilities at railway stations or tramway/bus stops. Rent bicycles at public transport and railway stations.
- Financial arrangements for cycling infrastructure should be considered.
- Bicycle theft: prevent thefts imposing electronic identification bicycles and/or the realisation of a national police registration for stolen bicycles[13].

It is also recommended to increase Workplace Shower Facilities for Bicyclists. Facilitate bicycle commuting by requiring new developments to provide shower and changing facilities, and/or offer grant programs for existing buildings to add shower facilities for bicyclists.

The City of San Sebastian (Spain) has started a large programme for developing the cycling culture in the city together with the creation of a new cycling network. The European Mobility Week represents the perfect opportunity to promote the benefits of bicycles, to organize bicycle trainings and free maintenance as well as to create new cycle lanes. This comprehensive programme to raise awareness on sustainable urban mobility and soft modes also includes road safety educational activities targeted to children. These actions lead to a clear modal shift in favor of bicycles. In 2007 the city enjoyed a 4% modal share for bicycles, which is a tremendous increase compared to previous years.[14]

Walking

As previously stated for "*Cycling*", increasing the modal share for walking requires a dense network of well-maintained routes that are both safe to use and perceived by the public as safe to use. Spatial planning should reserve the space that is necessary for the 'walking infrastructure' and ensure that local services are sited within walking distance from residential areas.

Many urban areas have produced design manuals that provide the detailed specifications for the practical tools and techniques that deliver high-quality, walking friendly urban environments. Examples of such environments are "Pedestrian only zones" and "low speed zones" with lower vehicle speed limits that allow pedestrians and cars safely share the same space. In these areas pedestrians always have priority over cars.

3. Making travel by car less attractive[15]

Walking, cycling and public transport can become more attractive alternatives if car travel becomes more difficult or expensive. Disincentives include:

Pricing

By making car drivers pay a fee for driving in the city (centre), drivers can be charged some of the social costs of urban driving, thus also making the car a less attractive option. Experience from local authorities that implemented congestion charges, shows that they can reduce car traffic considerably and boost the use of other transport modes. Pricing can be an effective instrument to reduce congestion and increase accessibility for public transports.

Parking management

Parking management is a powerful tool for local authorities to manage car use. They have several tools to manage parking, e.g., pricing, time restrictions and controlling the number of available parking

spaces. Parking time restrictions for non-residents, e.g., to two hours, are a proven tool to reduce commuting by car without affecting accessibility to urban shops.

The number of parking spaces is sometimes regulated by the local building act, demanding a certain number of parking spaces for new developments. Some local authorities have building regulations where location and accessibility by public transport influence the number of parking spaces allowed. Adequate pricing of urban parking lots is another important tool with similar potential to influence urban driving as congestion charging.

This type of actions shall be done with the support of technical and social studies aimed at ensuring equal opportunities among the citizens.

Graz (AT): Lower parking tariff for low emission vehicles

Low emission vehicles can get a 30 percent reduction of parking fees in Graz. This new differentiated parking system is expected to encourage more citizens to use low emission vehicles. Drivers of non low emission vehicles have to pay € 1.20 per hour, whereas low emission vehicles pay € 0.80 per hour. Hence, the scheme gives real benefits to low emission vehicles and provides a popular selling point of the new system.

In order to get the reduction, the car has to comply with EURO 4 emissions standards (all new cars sold after 1st January 2005 must comply with EURO 4 emissions standard) and be low CO_2 emission. Petrol cars have indeed to emit less than 140 gCO_2/km whereas diesel cars have to emit less than 130 gCO_2/km and be fitted with particles trap.

To get the special fee the drivers will have to register their vehicle at the city council. Then they will get a special parking coin ('Umweltjeton') and a special sticker. The sticker is an official document that is filled out by the city and includes the car number, type of car, colour of the car and the official seal of the city of Graz. The Umweltjeton and the special sticker are free, so no extra registration fee is applicable. The sticker is valid for two years; the user can apply for a time prolongation of the sticker. The Umweltjeton is to be inserted into parking machines to trigger the fee reduction. Once inserted, the parking ticket is marked in the upper corner with a U meaning 'Umweltticket' (environmental friendly ticket). The sticker has to be located on the dash board behind the windscreen to be clearly visible for the enforcement team.

Source: CIVITAS initiative www.civitas-initiative.org

4. Information & marketing

Local marketing campaigns that provide personally tailored information about public transport, walking and cycling alternatives have been successful in reducing car use and increasing levels of public transport use. These campaigns should also use arguments of health and environmental benefits provided by walking and cycling.

Information about how to start a campaign and where sources of information can be found are available in the report "Existing methodologies and tools for the development and implementation of SEAP" on methodologies collection (WP1). The full version of this document can be downloaded from the Institute for Energy[16] webpage. As an example of a successful awareness campaign, the European Commission DG TREN organizes every year the European Sustainable Energy Week - www.eusew.eu

5. Reduce municipal and private vehicle fleet emissions

Municipal and private vehicles emissions reductions may occur by using hybrid or other highly efficient technologies, the introduction of alternative fuels and promoting efficient driving behaviours.

- Use hybrid or totally electric vehicles in public fleets. These types of vehicles use a fuel motor (hybrid vehicles) and an electric engine whose aim is the generation of power for the motion. The electricity to be supplied to the vehicles is stored in batteries that can be recharged either by plugging on the car to the electrical grid or producing the electricity on board taking advantage of braking and the inertia of the vehicle when power is not demanded. Make use of fully electric vehicles in public transport and recharge them with renewable electricity.

According to the European Commission Directive 93/116/EC relating to the fuel consumption of motor vehicles, CO_2 emissions for two equivalent vehicles (combustion and hybrid) can be reduced by 50% (for instance from 200 g/Km to 100 g/Km)[17].

- Use biofuels in public fleets and make sure that vehicles acquired through public tenders accept the use of biofuels. The most common biofuels that can be supplied by the market are biodiesel, bioethanol and biogas. Biodiesel and bioethanol can be used in mixes in diesel and gasoline engines, respectively, whereas biogas can be used in natural gas vehicles (NGV).

The use of biofuels in vehicles accordingly to the 2009/28/EC Directive will reduce GHG emissions in the range 30%-80% in comparison with fossil fuels over the entire life cycle. These values collected from the Directive's annex V correspond to the case in which biofuels are produced with no net carbon emissions from land-use change.

- Promote low fuel consumption, hybrid and electric vehicles through a low taxation regime. This can be done dividing vehicles in different categories accordingly to the priorities of the local authority.

In its Vehicles´ Fiscal Ordinance, Madrid's City council applies reduction of 50%, 30%, 20% and 15% the first 4 years to small cars and a 6 years 75% tax discount to hybrid vehicles. When the vehicle is fully electric, this 75% discount is extended to its whole life.

These more energy-efficient vehicles can be promoted by local authorities through the application of local incentives:

- Free parking
- Test fleet (companies can borrow an alternative fuelled vehicle for a week to try out the new technology, the efficiency, the refuelling etc)
- Special lanes for alternative vehicles
- Access to city zones with restrictions for high GHG emitting cars, i.e. cultural city centres, environmental zones
- No congestion charges to clean vehicles
- Some examples of national incentives are tax reductions on fuel, on vehicles and regulations that favour the use of alternative vehicles in companies
- “Environmental Loading Points” adjacent to pedestrian areas only open for alternative vehicles

Efficient driving behaviours may reduce cars´ GHG emissions up to 15%. The European project ECODRIVEN - www.ecodrive.org - provide good practices to drivers. In the framework of the 2006/32/EC Directive some European Countries through their National Energy Action Plans have signed agreements with driving schools in order to spread efficient driving practices to citizens. Some of these training courses are not only addressed to car drivers but also to truck drivers.

6. Smart transport

Urban traffic control systems are a specialized form of traffic management which integrate and coordinate traffic signal control. The primary purpose of urban traffic control is to optimise overall traffic performance in accordance with the traffic management policies of the local authority. It uses the signal settings to optimise parameters such as travel time or stops.

Urban traffic control systems are either fixed time, using programs such as TRANSYT, or real time, such as SCOOT[18]. Widespread experiments have demonstrated the benefits of such systems, i.e. efficiency gains improve the environment, queues and safety, with typical reductions in accidents of the order of 10%. However it is important to bear in mind the potential for these benefits may be eroded by induced traffic.

In addition, the control systems may be used for the regulation of priorities of different "interest groups" such as pedestrians, cyclists, disabled persons or buses. For instance, these control systems can distinguish whether a bus is on time or late and its degree of lateness. Depending on this analysis, the priorities of traffic regulation will be readjusted in order to minimize delays and make public transport by bus more effective.

Another possibility offered by control systems in big cities is "Ramp Metering" which consists in a traffic management tool that regulates the flow of vehicles joining the motorway during busy periods. The aim is to prevent or delay the onset of flow breakdown. Benefits include ease of congestion and improvement in traffic flows, higher throughput during peak periods, smoother, more reliable journey times and improved energy consumption.

7. ADDITIONAL RESOURCES

i) European Commission Transport Webpage – Clean Urban Transport

This webpage covers a big range of information on policies, programmes and tools about Urban Mobility and Clean and Energy Efficient Vehicles.

http://ec.europa.eu/information_society/activities/ict_psp/cf/expert/login/index.cfm

ii) Eltis, Europe's web portal on transport

ELTIS supports the transfer of knowledge and exchange of experience in urban and regional transport. The database currently contains more than 1500 good practice case studies, including cases from other initiatives and databases like EPOMM, CIVITAS, SUGRE, LINK, ADD HOME, VIANOVA etc

http://www.eltis.org.

iii) The CIVITAS Initiative

The CIVITAS Initiative, launched in 2002, helps local authorities to achieve a more sustainable, clean and energy efficient urban transport system by implementing and evaluating an ambitious, integrated set of technology and policy based measures. On the website, examples of successful implementation of sustainable transport initiatives can be found.

http://www.civitas-initiative.org

The GUIDEMAPS handbook is designed to support transport decision-makers and designers in European cities and regions. A particular emphasis of the handbook is on using stakeholder engagement tools and techniques to overcome communication barriers in the transport decision-making process. It provides examples and Indications of the relative costs of different tools and techniques related to project management and stakeholders' engagement.

http://www.civitas-initiative.org/docs1/GUIDEMAPSHandbook_web.pdf

iv) BESTUFS project

This project aims to maintain and expand an open European network between urban freight transport experts, user groups/associations, ongoing projects, the relevant European Commission Directorates and representatives of national, regional and local transport administrations and transport operators in order to identify, describe and disseminate best practices, success criteria and bottlenecks with respect to City Logistics Solutions

http://www.bestufs.net/

v) COMPRO project

This project aims at contributing to the development of a common European market of clean vehicles, taking action on the demand side in order to homogenize the products technical requirements and creating a buyer consortium of local authorities to pool up together and reach the critical mass needed to ensure a swift market development.

http://www.compro-eu.org

vi) LUTR-PLUME

The LUTR website hosts the PLUME project (Planning and Urban Mobility in Europe), aiming at developing strategic approaches and methodologies in urban planning that all contribute to the promotion of sustainable urban development. The website contains state-of-the-art reports and synthesis report related to many transport and mobility issues.

http://www.lutr.net/index.asp

vii) HITRANS

HiTrans is a European project, which aim is to facilitate the development of high quality public transport in medium sized European cities (pop 100.000-500.000). The project has produced best practice guides and guidelines for use by local authorities.

http://www.hitrans.org

viii) PORTAL

PORTAL (Promotion Of Results in Transport Research and Learning) is an European project which aims to accelerate the take up of EU research results in the field of local and regional transport through the development of new education and training courses and teaching materials.

http://www.eu-portal.net/start.phtml?sprache=en

[5] Further information on transport sector in Transport Research Knowledge Centre (TRKC) www.transport-research.info Project funded by the European Commission's Directorate General for Energy and Transport under the Sixth Framework Programme for Research and Technological Development (FP6).

This chapter is based on the document "Expert Working Group on Sustainable Urban Transport Plans" provided by the International Association of Public Transport UITP. www.uitp.org

[6] Available on http://ec.europa.eu/transport/urban/urban_mobility/action_plan_en.htm. All European Union regulation may be found on http://eur-lex.europa.eu/

[7] Further information about SUTPs on http://ec.europa.eu/environment/urban/urban_transport.htm. In addition the webpage http://ec.europa.eu/environment/urban/pdf/transport/2007_sutp_annex.pdf provides an important amount of information concerning local transport policies and good practices in several European cities.

[8] This paragraph has been developed using information from Moving Sustainably project that contains an interesting methodology aimed at implementing Sustainable Urban Transport plans. Further information is available at www.movingsustainably.net in which it is possible to find a methodology to develop SUTPs.

[9] These reasons exposed as an example stem from the document "Lancashire Local Transport Plan 2008-2010" that can be downloaded from www.lancashire.gov.uk/environment/

[10] More information about cycling policies, increasing the bicycle use and safety, by implementing audits in European cities and regions can be found in the ByPad project webpage www.bypad.org and www.astute-eu.org . Information on mobility management can be found on www.add-home.eu . All these projects are supported by Intelligent Energy Europe. "National Policies to Promote Cycling" OECD – http://www.internationaltransportforum.org/europe/ecmt/pubpdf/04Cycling.pdf

[11] www.internationaltransportforum.org

[12] http://www.internationaltransportforum.org/europe/ecmt/pubpdf/04Cycling.pdf contains "National Policies to Promote Cycling" OECD – This document is addressed to national authorities but most of the policies proposed in this document may be used or adapted by local authorities.

[13] Policies implemented by the Dutch Ministry of Transport, Public Works and Water Management. "National Policies to Promote Cycling" document - OECD

[14] Example from the European Mobility Week Best Practice Guide 2007
http://www.mobilityweek.eu/IMG/pdf_best_practice_en.pdf

[15] Measure aimed at making travel by car less interesting should be developed at the same than those aimed at offering better alternatives to users. In order to avoid negative consequences, these types of measures should be debated and planned thoroughly

[16] http://re.jrc.ec.europa.eu/energyefficiency/

[17] Further information on cars´ emissions can be found in http://www.vcacarfueldata.org.uk/index.asp and http://www.idae.es/coches/

[18] TRL – Transport Research Foundation based in UK www.trl.co.uk

8.3 RENEWABLE ENERGY SOURCES (RES) AND DISTRIBUTED ENERGY GENERATION (DG)

This chapter is aimed at providing examples of municipal policies and strategies to promote local electricity production (renewable or not), the use of renewable energy resources to produce thermal energy and the promotion of district heating and cooling[19] (DHC).

Renewable Energy technologies offer the possibility to produce energy with a very low impact on the environment. DHC and cogeneration (or CHP – Combined Heat and Power) offer an energy efficient way of producing heat and electric power for urban areas. To be cost-effective and maximise impact, policies should focus on measures targeting areas with high heating and cooling loads. In addition, DHC provides a proven solution to make an efficient use of the many kinds of RES (biomass, geothermal, solar thermal) on a large scale and recycle surplus heat (from electricity production, fuel and biofuel-refining, waste incineration and from various industrial processes).

Regarding distributed electricity generation, it allows to reduce electricity transport and distribution losses and to use microcogeneration and low-scale renewable energies technologies. The increase of distributed energy generation with unpredictable (cogeneration, solar photovoltaic, wind, biomass…) renewable energy sources is more and more important in the European Union. The electricity grid must be able to distribute this energy to the final consumers when the resources are available and rapidly adapt the demand or cover the energy required using more adaptable (for example hydro or biomass) technologies when the former are not available.

Although there are a wide range of policies to promote RES and DG some of them are under national or regional competences. For this reason, all the policies proposed in this chapter should be complemented by a close cooperation with the different public administrations playing a role in this sector.

Local Energy Generation Policies

1. Give example and Support the development of local energy generation

- Perform an analysis of the legal, physical (resources), social and economical barriers hindering local energy generation, and provide corrective actions (subsidies, regulation, campaigns…).

Some examples:

Evaluation of geothermal energy potential considering legal and technical barriers of ground perforation and the environmental effect on the underground water layer.

With regard to the use of biomass, make a technical and economical evaluation of the potential of the biomass harvested in public spaces, companies and citizens´ properties.

Bring waste incineration closer (as close as permitted by the local regulation) to cities rather than establishing them on the green field, in order to make possible covering heat demands by recovering the heat from the incineration plant in a District Heating and Cooling plant.

- Identify public and private high thermal energy consuming buildings/facilities and design a high replication strategy to replace old heating plants by cogeneration or renewable energy installations (or a combined installation). Consider in the strategy not only technical aspects but also propose innovative financing schemes. Typical highly energy consuming public facilities are: Swimming pools, sport facilities, office buildings, hospitals or retirement homes. For instance, the following actions (high replication potential) are proposed:

Substitution of a swimming pool's old heating plant by an installation of a combined solar thermal and biomass boilers financed through an ESCO scheme.

Substitution of the old heating and cooling plants by trigeneration installations to provide the base demand of heat and cold along the year in municipal buildings.

These actions have a high replication potential in some private sectors such as food industry or hotels among others. For this reason a strong communication policy is essential to share the results with the private sector.

- Introduce renewable energy installations requirements (such as space for biomass supply and storage facilities of raw material to the biomass boiler or free space in flat roof to make easy

the use of solar systems) in the design of new public buildings. When it is possible implement DHC grids in public buildings areas.

- Show publicly the successes due to renewable energy measures implemented in public buildings.

Install visual consoles indicating the amount of CO_2 emissions avoided is a simple and graphic way to show the immediate effects of the action.

- Integrate the utilities companies in the new projects of distributed energy generation in order to take advantages of their experience, facilitate the access to the grid and to a large amount of individual consumers.
- Promote pilot projects to test and show technologies and attract the interest of stakeholders.

Test non-spread technologies such as low power absorption chillers or microcogeneration. Show the pilots installations and results (positive and negative) to the stakeholders.

- Implement or make compulsory district heating/cooling, integrated renewable energy sources (solar thermal, solar PV and biomass) or microcogeneration in social housing. This entails adapting the design of social buildings to the requirement of these technologies.

2. Provide information and support to the stakeholders:

- Organize informative meetings with stakeholders to demonstrate the economic, social and environmental advantages of energy efficiency and renewable energy sources. Provide financial resources to consumers associations and NGOs to disseminate these benefits to final consumers. Consider promoting distributed energy generation as a marketing project in which it is essential that final consumers trust this product.
- Reach agreements with other public entities or associations providing training courses focused on technical, environmental and financial issues to installers, consulting and engineering companies. As an example, training materials[20] may be found on European projects´ webpages funded under Intelligent Energy Europe.
- Create an info-portal on the renewable energies and energy efficiency sectors in your city with practical and timely information for citizens (where to buy biomass, which the best areas to install wind energy or solar thermal/photovoltaic collectors are, list of installer and equipment…). Such database may include information best practices in your city.
- Offer free advice and support to stakeholders. More than 350 local and regional Energy Agencies all over Europe are already offering many relevant services. Therefore, take advantage of their knowledge and get in touch with the closest one.
- Motivate citizens to put aside organic waste providing specific rubbish bin. Use it to produce biogas in the waste treatment plants. Do the same in the water treatment plants. Make use of the biogas produced in a cogeneration plant or in a biogas/natural gas public vehicles fleet[21].

3. Set up regulations and actions that promote local energy generation projects:

- Modify urban planning regulation to consider the necessary infrastructures required to conduct heat pipelines through public spaces in new urban development projects. In the case of DHC, apply the criteria used to install water, electricity, gas and communication pipelines.
- Adapt the administrative procedures to shorten the time required to obtain permits, and reduce local taxes when energy efficiency improvements or renewable energies sources are included in the proposals. Declare these projects as "Public Interest" and apply them advantageous administrative conditions with respect to non-energy efficient projects. The development of a DHC implies not only major investments but also compliance with authorization and licensing procedures. Long and uncertain negotiations with authorities can become a barrier. Administrative procedures for developing infrastructures should be clear, transparent and quick enough to facilitate the development of DHC projects.
- Contact other local authorities or European/national/regional local authorities networks and produce a common proposal of new regulation for the promotion of distributed energy generation addressed to the relevant public authorities.
- When needed, set up rules (regulate) to clarify roles and responsibilities of all parts involved in selling and buying energy (for example in those countries without experience and regulation

on district heating and cooling). Check that duty and responsibilities have been clearly identified and that each part is aware of them. In the energy selling sector, make sure the measurements of energy are in accordance with a recognized standard (For example IPMVP). Transparency is a key aspect from the point of view of consumers and investors. It is suggested that the "rules of the games" are in force as soon as possible. Convoke all stakeholders in order to obtain their views and have a good understanding of their interest and concerns.

4. Ensure the availability of space to achieve projects:

- If needed, provide public space to install local energy generation installations. Some European local authorities offer a piece of land to private company to rent with the aim to produce energy by means of photovoltaic collectors. The contract duration is established beforehand and the objective is to exploit large unused spaces to promote renewable energies.

Concrete example on promoting solar energy

The City of Munich (Germany) received in 2005 the “Capital of energy efficiency” award. As part of a comprehensive climate protection programme, the city offers the roof surfaces of its public buildings (mainly schools) for private photovoltaic investments. The city has developed a tendering scheme to select the investors.

Half of the scheme is reserved to citizens' groups. If there are several applicants for one roof, the winner is selected through a draw. The roofs are free of rent but users sign a contract allowing them to use the roof under certain conditions. The users are required to pay a deposit over the contract period, are responsible for checking the condition of the roof surface and required to display the system to the public.

The last two calls allowed generating more than 200.000 kWh/year of photovoltaic electricity. The challenge of the call is producing around 400.000 kWh/year of photovoltaic electricity using the schools buildings roofs (around 10.000 m^2 available for this call).

ADDITIONAL RESOURCES

i) International Energy Agency (IEA)

IEA's Programme of Research, Development, and Demonstration on District Heating and Cooling, including the integration of Combined Heat and Power.

http://www.iea-dhc.org/index.html

ii) ELEP Project

ELEP (European Local Electricity Production) is a European Project supported by Intelligent Energy Europe that offers technical and policies information, tools and best practices on local electricity generation.

www.elep.net

iii) ST-ESCOs Project

ST-ESCOs (Solar Thermal Energy Services Companies) offers technical and economical software tools aimed at studying the feasibility of ST-ESCO projects, guiding information and best practices examples. Supported by Intelligent Energy Europe.

www.stescos.org

iv) Intelligent Energy - Europe programme

The **Intelligent Energy - Europe programme** is the EU's tool for funding action to improve market conditions on terms of energy efficiency and usage of renewable energy sources. Local energy generation is part of the target areas.

http://ec.europa.eu/energy/intelligent/index_en.html

v) ECOHEATCOOL Project

The overall purpose with this project is to communicate the potential of district heating and cooling to offer higher energy efficiency and higher security of supply with the benefit of lower carbon dioxide emissions. Supported by Intelligent Energy Europe.

www.ecoheatcool.org

vi) Euroheat & Power

Euroheat & Power is an association uniting the combined heat and power, district heating and cooling sector throughout Europe and beyond, with members from over thirty countries.

www.euroheat.org

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[19] IEA, 2004, "Coming in from the Cold. Improving District Heating Policy in Transition Economies," http://www.iea.org/textbase/nppdf/free/2004/cold.pdf and IEA, 2009, "Cogeneration and District Energy – Sustainable energy technologies for today ... and tomorrow", http://www.iea.org/files/CHPbrochure09.pdf

[20] Training materials may be downloaded from: ACCESS project www.access-ret.net

[21] Further information in the NICHES + project webpage www.niches-transport.org . This project is funded by the European Commission DG Research through the 7th Framework Programme (FP7). The mission of NICHES+ is to promote innovative measures for making urban transport more efficient and sustainable and to move them from their current "niche" position into a mainstream urban transport application.

8.4 PUBLIC PROCUREMENT[22]

1. Green Public Procurement

Public procurement and the way procurement processes are shaped and priorities are set in the procurement decisions, offer a significant opportunity for local authorities to improve their overall energy consumption performance.

Green public procurement means that public contracting authorities take environmental considerations into account when procuring goods, services or works. **Sustainable public procurement** goes even further and means that the contracting authorities take into account the three pillars of sustainable development – the effects on environment, society and economy - when procuring goods, services or works.

Energy efficient public procurement allows improving energy efficiency by setting it as relevant criteria in the tendering and decision making processes related to goods, services or works. It applies to the design, construction and management of buildings, the procurement of energy consuming equipment, such as heating systems, vehicles and electrical equipments, and also to the direct purchase of energy, e.g. electricity. It includes practices such as life-cycle costing[23], the setting of minimum energy efficiency standards, the use of energy efficient criteria in the tendering process, and measures to promote energy efficiency across organisations.

Energy efficient procurement offers public authorities, and their communities, social, economic and environmental benefits:

- By using less energy, public authorities will reduce unnecessary costs, and save money.
- Some energy efficient goods, such as light bulbs, have a longer lifetime and are of higher quality than their cheaper alternatives. Purchasing them will reduce valuable time and effort involved in frequently replacing equipment.
- Reducing CO_2 emissions as a result of energy efficient procurement will help public authorities to decrease their carbon footprint**.**
- By leading by example**,** public authorities help to convince the general public and private businesses of the importance of energy efficiency.

The interest in developing Green Public Procurement is not only its impact in terms of CO_2 emissions reduction whose average (see study "Collection of statistical information on Green Public Procurement in the EU"[24] carried out for the European Commission-DG Environment) is 25% but also in terms of its financial impact whose average is 1,2% of savings. Here are some examples of energy efficient measures proposed in high-priority product groups:

Product group	Examples of Public procurement requirement
Public transports	Purchase low emissions buses and public fleets vehicles. The buses have to be equipped with driving-style meters to monitor fuel usage.
Electricity	Increase the share of electricity from renewable sources going beyond national support schemes. This measure can be completed by including the purchase of energy efficiency services. For example ESCOs.
IT products	Purchase of environmentally friendly IT goods that meet the highest EU energy standards for energy performance. Provide training to users on how to save energy using their IT devices.
Building construction/renovation	Use of localised renewable energy sources (RES) Impose high efficiency standards that reduce the building's energy consumption (see chapter on building policies)

Green, sustainable or energy efficient public procurement are highly recommended. However, in the context of the Covenant of Mayors, only measures related to energy efficient public procurement will be reflected in the CO_2 emission inventories. Indeed, the Covenant of Mayors is mainly focusing on energy consumption and on emissions that occur on the territory of the local authority.

2. Joint Public Procurement[25]

"**Joint procurement**" (JP) means combining the procurement actions of two or more contracting authorities. The key defining characteristic is that there should be only one tender published on behalf of all participating authorities. Such JP activities are not new – in countries such as the UK and Sweden public authorities have been buying together for a number of years - though in many European countries, especially in the South, there is often very little or no experience in this area.

There are several very clear benefits for contracting authorities engaging in JP arrangements:

- **Lower prices –** Combining purchasing activities leads to economies of scale. This is of particular importance in the case of renewable energy project whose costs may be higher that conventional projects.
- **Administrative cost savings –** The total administrative work for the group of authorities involved in preparing and carrying out one rather than several tenders can be substantially reduced.
- **Skills and expertise –** Joining the procurement actions of several authorities also enables the pooling of different skills and expertise between the authorities.

This model for Public Procurement requires agreement and collaboration among different contracting authorities. Therefore a clear agreement on needs, capacities, responsibilities and the common and individual legal framework of each part is a must.

Good practise example: Joint procurement of clean vehicles in Stockholm[26]

The city of Stockholm and other Public Administrations organised a joint procurement of clean cars. The city worked to introduce a large number of clean vehicles and mopeds to the fleet of vehicles used for City purposes. In 2000 there were around 600 clean vehicles operating in the city. There is a plan to increase the number of clean vehicles in the region to about 10,000 by around 2010. The most common fuels are ethanol and biogas and the clean vehicles are expected to use 60% environmental fuels and the remainder petrol or diesel and electricity. More filling stations for environmental fuel will be required to enable clean vehicles to use fuels other than petrol and diesel. By 2050, it is expected that all cars will be replaced by clean vehicles.

Carbon dioxide reduction: 2005 1,600 tons per year - 2030/2050 480,000 tons per year

Costs: SEK 6M per year (around 576,000€)

3. Green Electricity Purchasing[27]

The liberalisation of the European energy market offers local authorities the possibility of choosing freely their energy provider. According to the Directive 2001/77/EC electricity produced from renewable energy sources or Green Electricity can be defined as: "electricity produced by plants using only renewable energy sources, as well as the proportion of electricity produced from renewable energy sources in hybrid plants also using conventional energy sources and including renewable electricity used for filling storage systems, and excluding electricity produced as a result of storage systems"

In order to be sure that the electricity supplied comes from a renewable energy source, consumers have the possibility to request guarantees of origin certificates of the electricity. This mechanism has been foreseen in the Directive 2001/77/EC. The supplier has also the possibility to provide independent proof of the fact that a corresponding quantity of electricity has been generated from renewable sources or produced by means of high efficiency cogeneration.

Previous experiences of Green Electricity purchase performed by the German Public Administration included the following specifications in the call for tenders:

i) 100% of electricity to come from renewable energy sources as defined by European Directive 2001/77/EC.

ii) The RES-E supply to be combined with certified CO_2 reduction during the delivery period, meaning that:

a) CO_2 reduction achieved during the delivery period has to amount to at least 30% of the amount of average power supply during the same period; and

b) Proof of the levels of CO_2 reduction realised through new plants, i.e. plants coming into operation in the year of actual supply, must be provided. Proof must be given through the provision of specific data record sheets.

iii) Guarantee of Origin: The origin of the electricity must be clearly traceable and based on identifiable sources. In case there are various sources the split between the sources must be clearly explained. Special data record sheet serve to provide proof of the origin of the electricity and the expected CO_2 reduction achieved during the delivery period. The bidder may supply renewable electricity from plants that are not mentioned in the contract, however, must also meet the targeted levels of CO_2 reductions indicated in the bid.

iv) Exclusion of subsidised supply: The supplier is required to confirm in the form of a self declaration that the power supply has not been subsidised, either entirely or partly at the domestic or international level.

v) During the award phase, additional points were awarded to the supplier whose bid went beyond the minimum requirement of achieving CO_2 reductions of 30% compared to the existing energy mix in Germany at that time. The most economically advantageous bid was determined from the best price-performance ratio.

Price differences between conventional and green electricity depend on the status of liberalisation, the features of the national support schemes and the existence of green electricity suppliers. Green electricity is often more expensive, although price differences are narrowing substantially, and there are cases where green electricity is even available at a cheaper rate. Green electricity has proved to be a product group which is available for public procurement on a competitive basis.

4. ADDITIONAL RESOURCES

1. European Commission – DG Environment

The webpage of DG Environment of the European Commission offers guidelines, good practices, previous experiences, links and FAQs concerning Green Public Procurement.

http://ec.europa.eu/environment/gpp/index_en.htm

2. ICLEI – Procura+

Procura+ is an initiative of ICLEI that provides further information on Green Public Procurement.

www.procuraplus.org

3. SENTERNOVEM

SenterNovem has developed criteria and practical instruments to implement Sustainable Procurement to incorporate sustainability in procurement processes and tendering procedures.

http://www.senternovem.nl/sustainableprocurement/index.asp

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[22] Source: European Commission DG ENV http://ec.europa.eu/environment/gpp/index_en.htm www.iclei-europe.org/deep and www.smart-spp.eu.

Further information about the development of procurement models, fleet scan tools and manuals to facilitate the acquisition and maintenance of AFV vehicles for private and public fleets can be found in the PROCURA project webpage www.procura-fleets.eu these projects are supported by Intelligent Energy Europe. http://www.pro-ee.eu/materials-tools.html

[23] Life-cycle costing refers to the total cost of ownership over the life of an asset. This includes acquisition (delivery, installation, commissioning), operation (energy, spares), maintenance, conversion and decommissioning costs.

[24] This study can be downloaded from http://ec.europa.eu/environment/gpp/study_en.htm. The report present the statistical information and conclusions about the investigation done in the 7 most advanced European Countries in Green Public Procurement. It was found that the CO2 emissions savings was in the range -47%/-9% and the financial impact was in the range -5,7%/+0,31%.

[25] Guidelines for the implementation of Green Public Procurement and Joint Public Procurement can be found in the webpage of LEAP project www.iclei-europe.org/index.php?id=3113. This project is funded by the European Commission DG ENV through a project LIFE. http://ec.europa.eu/environment/life/index.htm

[26] From Stockholm's action programme against Greenhouse Gas Emissions (2003)

[27] Further information on www.procuraplus.org

8.5 URBAN PLANNING

Land use planning has a significant impact on the energy consumption in both the transport and building sectors. Strategic decisions concerning urban development such as avoiding urban sprawl influence the energy use within urban areas and reduce among others the energy intensity of transport. Compact urban settings may allow more cost effective and energy efficient public transport. Balancing housing, services and work opportunities (mixed use) in urban planning have a clear influence on the mobility patterns of citizens and their energy consumption. Local and regional governments can develop sustainable mobility plans and encourage a modal shift towards more sustainable transport modes.

Building shape and orientation play an important role from the point of view of heating, cooling and lighting. Adequate orientation and arrangement of buildings and built-over areas make it possible to reduce recourse to conventional air conditioning. Planting trees around buildings to shade urban surfaces, and green roofs to reduce their temperature, can lead to substantial reductions in energy consumption for air-conditioning. Proportion between width, length and height as well as its combination with the orientation[28] and proportion of glazed surfaces should be studied in detail when new urban developments are proposed. In addition, sufficient green areas and planting trees next to the building can lead to reduction in the energy needs and then reduce greenhouse gases.

There are also examples of local authorities that have started to develop CO_2 free settlements or even set up an overall objective to become “fossil fuel free”. CO_2 free settlements mean retrofitting districts in such a way that they do not consume fossil fuels.

Urban density is one of the key issues influencing energy consumption within urban areas. In the table below, the effects (both positive and negative) of density are considered. As it can be seen in the table, urban density may have conflicting effects.

Parameters	Positive effects	Negative effects
Transport	Promote public transport and reduce the need and length of trips by private cars	Congestion in urban areas reduces fuel efficiency of vehicles
Infrastructure	Shorten the length of infrastructure facilities such as water supply and sewage lines, reducing the energy needed for pumping	
Vertical transportation	-	High-rise buildings involve lifts, thus increasing the need for electricity for the vertical transportation
Ventilation	-	A concentration of high-rise and large buildings may impede the urban ventilation conditions
Thermal performance	Multiunit buildings could reduce the overall area of the building’s envelope and heat loss from the buildings Shading among buildings could reduce solar exposure of buildings during the summer period	-
Urban heat island	-	Heat released and trapped in urban areas may increase the need for air conditioning The potential for natural lighting is generally reduced in high-density areas, increasing the need for electric lighting and the load on air conditioning to remove the heat resulting from the electric lighting
Energy systems	District cooling and heating systems which are usually more energy efficient, are more feasible as density	-

	is higher	
Use of solar energy	-	Roof and exposed areas for collection of solar are limited
Ventilation energy	A desirable air flow pattern around buildings may be obtained by proper arrangement of high-rise building blocks	-

Table 1. Positive and negative effects of urban density on energy consumption[29]

Urban planning is a key instrument allowing to establish energy efficiency requirements for new and renovated buildings.

Urban regulations should be devised in such a way not to deter energy efficiency and RES. For instance, long and complex authorisation procedures will be a clear obstacle to RES and energy efficiency promotion and should be avoided. Such considerations should be integrated into the local authorities' urban planning schemes.

Quick tips:

- ü Introduce energy criteria in planning (land use, urban, mobility planning)
- ü Promote mixed use (housing, services and jobs)
- ü Plan to avoid urban sprawl:
  - Control the expansion of built areas
  - Develop and revitalize old (deprived) industrial areas
  - Position new development areas within the reach of existing public transport lines
  - Avoid «out-of-town» shopping centers
- ü Plan car free or low car use areas by closing areas to traffic or introducing congestion charge schemes, etc.
- ü Promote solar oriented urban planning, for example by planning new buildings with an optimum sun-facing position

ADDITIONAL RESOURCES

i) CONCERTO Plus project

CONCERTO supports local communities, in developing and demonstrating concrete strategies and actions that are both sustainable and highly energy efficient.

www.concertoplus.eu

ii) Document: "Community Energy; Urban Planning for a low carbon future"

http://www.chpa.co.uk/news/reports_pubs/Community%20Energy-%20Urban%20Planning%20For%20A%20Low%20Carbon%20Future.pdf

[28] A. Yezioro, Isaac G. Capeluto, E. Shaviv – Design guidelines for appropriate insolation of urban squares – Renewable Energy 31 (2006) 1011-1023.

[29] This table has been extracted from: Sam C.M. Hui – Low energy building design in high density urban cities – Renewable Energy 24 (2001) 627-640

8.6 INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT)

In developing your SEAP, it is essential to take advantage of the key role that can be played by ICT in the creation of a low carbon society.

ICTs play a key role in the dematerialisation of our daily way of life. The substitution of high carbon products and activities with low carbon alternatives e.g. replacing face-to-face meetings with videoconferencing, or paper with e-billing – could play a substantial role in reducing emissions. Like e-commerce, e-government could have a significant impact on reducing GHG emissions.

Currently the largest opportunity identified within dematerialisation is teleworking – where people work from home rather than commute into an office. Dematerialisation could also reduce emissions indirectly by influencing employees' behaviour, building greater awareness of climate change and creating a low carbon culture throughout businesses, though these impacts are less quantifiable. Dematerialisation at the very least provides alternatives, allowing individuals to control their carbon footprint in a very direct way.

Finally, ICT has also a key role in enabling efficiency: consumers and businesses can't manage what they can't measure. ICT provides solutions that enable us to 'see' our energy and emissions in real time and provide the means for optimising systems and processes to make them more efficient

Here are some examples of measures that could be implemented at local level:

- Stimulate an open debate with relevant stakeholders in relevant areas with a high potential impact like energy-smart homes and buildings, smart lighting, personalized public transport…
- Bring together stakeholders in the ICT and energy domains to create synergies and new forms of collaboration. For example, liaise with the utilities company in order to ensure adequate promotion and usage of smart-metering. Make sure the selected smart-meters provide a proper balance between additional cost to the customer and potential benefits in terms of energy savings or promote the delivery of broadband infrastructure and collaborative technologies enabling the widest and most efficient usage of the e-technologies
- Develop e-government, teleworking, teleconferencing, etc within the local administration and promote its usage.
- Integrate ICT to improve energy efficiency in public building, public lighting and transport control.
- Better management of the local authority's vehicle fleet: implement eco-driving, (real-time[30]) route optimization and fleet's management and supervision.
- Monitor and make more visible GHG emission and other environmental data to citizens. This real-time monitoring provides the means to study emissions patterns, track progress and interventions[31].
- Demonstrate that local authorities can lead by practical example by ensuring that a city's own ICT infrastructure and digital services have the smallest possible carbon footprint. Promote these practices towards the private sector and wider community.

It is important to appreciate that ICT itself has a carbon footprint, however, and therefore green ICT policies need to be in place to ensure that ICT remains a solution to, and not a part of, the climate change problem.

ADDITIONAL REFERENCES

i) The European Commission DG INFSO webpage contains a big amount of information about the possibilities of ICT in SMART Buildings.

http://ec.europa.eu/information_society/activities/sustainable_growth/index_en.htm

ii) The Climate Group and the Global eSustainability Initiative (2008) published a report promoting the advantages of ICT: "SMART 2020: Enabling the Low Carbon Economy in the Information Age".

http://www.theclimategroup.org/assets/resources/publications/Smart2020Report.pdf

[30] With information on traffic density, weather, alternative routes...

[31] Contact details and further information available on www.eurocities.eu and www.clicksandlinks.com

CHAPTER 9. FINANCING SUSTAINABLE ENERGY ACTION PLANS

1. INTRODUCTION

A SEAP´s successful implementation requires the sufficient financial resources. It is therefore necessary to identify available financial resources, as well as the schemes and mechanisms for getting hold of these resources in order to finance the SEAP actions.

Energy efficiency financing decisions must be compatible with public budgeting rules. For example, the cash generated by energy efficiency improvements and reductions in the energy bill may lead to a reduction of financial resources in the following budgeting period. This is due to the fact that most often EE projects are financed via capital expenditure budgets, where energy bills are paid from operational budgets.

The local authority should allocate the necessary resources in the annual budgets and make firm commitments for the years to come. As municipality resources are scarce, there will always be competition for available financial funding. Therefore, efforts should be continuously made to find alternative sources of resources. Regarding multi-annual commitments, it is convenient that different political parties approve it by consensus in order to avoid disruption in the development of the SEAP when a new administration is elected.

Successful SEAP actions will reduce the long-term energy costs of the local authority, the inhabitants, companies and in general all stakeholders. In considering the costs of SEAP actions, local authorities should also consider their co-benefits: benefits to health, quality of life, employment, attractiveness of the city, etc.

2. INITIAL CONSIDERATIONS

Local authorities may be tempted to opt for energy efficiency projects with short paybacks. However, this approach will not capture the majority of potential savings available through energy retrofits. Instead, it is recommended that all profitable options are included and in particular those that yield a rate of return higher than the interest rate of the investment capital. This approach will translate into greater savings over the long term.

Quick paybacks on investments mean too often organisations do not pay attention to "life-cycle costing". Payback time shall be compared with the lifespan of the good to be financed. For instance, a 15 years payback time cannot be considered long when it comes to building with a lifespan of 50-60 years.

3. CREATING BANKABLE PROJECTS[32]

A bankable project is a clearly documented economically viable project. Building a bankable project starts with sorting out the pieces that make a project economically attractive. Initially, it is required to examine the project's key components, make sure each aspect is properly assessed and that the plan to effectively manage that aspect is clearly presented. Each component carries a risk factor, and each risk factor carries a price tag. An effective ESCO or financial consulting experts know how to assess each part of a financial project.

When a financing project is studied by a bank, the objective is to know the level of risk through an assessment procedure. A technical energy audit is not enough for this purpose. Other aspects such as the engineering skills (of an ESCO or the municipal energy agency for instance) or the level of commitment of each part are crucial to make this project attractive for the bank. For instance some general requirements may be that the technology is well-proven, well adapted to the region and to produce an Internal Interest Rate greater than 10%[33].

4. MOST RELEVANT FINANCING SCHEMES

This point describes the most frequent and general financing mechanism used for renewable energy sources and energy efficiency. Other specific programmes such as European funding are also available. Wide and updated information about these programmes can be found in the webpage of the Covenant of Mayors Office www.eumayors.eu

4.1 REVOLVING FUNDS[34]

This is a financial scheme aimed at establishing sustainable financing for a set of investment projects. The fund may include loans or grants and aims at becoming self-sustainable after its first capitalization.

The objective is to invest in profitable projects with short payback time, be repaid, and use the same fund to finance new projects. It can be established as a bank account of the owner or as a separate legal entity. The interest rate generally applied in the capitalization of revolving funds is lower than the market one or even 0%. Grace periods are also frequent for revolving funds loans periodic payment.

There are several parties in a revolving fund: The owners can be either public or private companies, organizations, institutions or authorities. The operator of the fund can be either its owner or an appointed authority. External donors and financiers provide contributions to the fund in the form of grants, subsidies, loans or other types of repayable contributions. The borrowers can be either the project owners or contractors. According to the conditions of the revolving fund, savings or earnings gained from projects should be paid back to the fund within a fixed period of time, at certain time intervals.

4.2 THIRD PARTY FINANCING SCHEMES

Perhaps the easiest way for municipalities to undertake comprehensive building energy retrofits is to allow someone else to provide the capital and to take the financial risk. With these alternative methods of financing, high financing costs may be expected to reflect the fact that the debt is registered on someone else's balance sheet. However, the interest rate is only one factor among many that should be considered in determining the suitability of a project financing vehicle.

4.2.1 LEASING[35]

The client (lessee) makes payments of principal and interest to the financial institution (lessor). The frequency of payments depends on the contract. The stream of income from the cost savings covers the lease payment.

It can be an attractive alternative to borrowing because the lease payments tend to be lower than the loan payments; it is commonly used for industrial equipment. There are two major types of leases: capital and operating.

- **Capital leases** are instalment purchases of equipment. In a capital lease, the lessee owns and depreciates the equipment and may benefit from associated tax benefits. A capital asset and associated liability appears on the balance sheet.
- In **operating lease** the owner of the asset owns the equipment and essentially rents it to the lessee for a fixed monthly fee. This is off-balance sheet financing source. It shifts the risk from the lessee to the lessor, but tends to be more expensive for the lessee.

4.2.2 ENERGY SERVICES COMPANIES[36]

Energy Services Companies (ESCO) are described in "Technical measures" Part III of this guidebook. The ESCO usually finances the energy saving projects without any up-front investment costs for the local authority. The investment costs are recovered and a profit is made from the energy savings achieved during the contract period. The contract guarantees a certain amount of energy savings for the local authority, and provides the possibility for the city to avoid facing investments in an unknown field. Once the contract is expired, the city owns a more efficient building with less energy costs.

Often, the ESCO offers a performance "**guarantee**" which can take several forms. The guarantee can revolve around the actual flow of energy savings from a retrofit project. Alternatively, the guarantee can stipulate that the energy savings will be sufficient to repay monthly debt service costs. The key benefit to the building owner is the removal of **project non-performance risk** while keeping the operating costs on affordable level.

Financing is arranged so that the energy savings cover the cost of the contractor's services and the investment cost of the new and more energy efficient equipment. The repayment options are negotiable.

Measurements and verification of the energy and savings produced are critical for all the parts involved in the project. Therefore a protocol[37] aimed at working with common terms and methods to

evaluate performance of efficiency projects for buyers, sellers and financiers will be essential. As mentioned in a previous chapter, the International Performance Measurement and Verification Protocol (IPMVP) is an international set of standardized procedures for the measurement and verification (M&V) of savings in Energy Efficiency project (also in water efficiency). This protocol is widely accepted and adapted.

4.2.3 ESCO INTRACTING MODEL OR PUBLIC INTERNAL PERFORMANCE COMMITMENTS (PICO)[38]

Besides the large private ESCO sector, a public ESCO sector called "Intracting model" or Public Internal Performance Commitments (PICO) has mainly been used in Germany.

In the PICO model a department in the public administration acts as a unit similar to an ESCO in function for another department. The ESCO department organizes, finances and implements energy efficiency improvements mostly through a fund made up of municipal money, and using existing know-how. This allows larger cost savings and implementation of less profitable projects, which would be ignored by a private ESCO[39]. However, these projects lack the energy savings guarantee, because there are no sanction mechanisms within a single organization (even though PICO includes saving targets). This can result in lower effectiveness of the investments. Nevertheless, this scheme increases activity for energy savings.

Specific example in the City of Stuttgart:

The internal contracting was set up in 1995 under the direction of the Stuttgart environmental agency with the specific aim of establishing pre-financing for measures to conserve energy and water more rapidly, as well as implementing the measures themselves. The costs saved through these measures flow back to the environmental agency from the energy cost budgets of the individual departments and locally owned utilities until the investments have been paid off. After this, the funds then become available again.

Since the concept was launched, more than 220 measures have been implemented and 8.1 million Euros invested. Both small (improvements to control technology) and large-scale (building of wood pellet heating systems) projects have been implemented. The average period of return on invested capital is 7 years. Annual savings meanwhile amount to over 1.2 million Euros, which represents some 32,000 m^3 of water, 15,000 MWh of heat energy and 2,000 MWh of electricity. In addition to an increase in energy efficiency, city-internal contracting has also allowed the construction of systems for the use of renewable energy sources (27% of investments).[40]

4.3 PUBLIC-PRIVATE PARTNERSHIPS (PPP)[41]

In this case the local authority uses a concession scheme under certain obligations. For instance, public administration promotes the construction of a zero emissions swimming pool or a district heating and cooling installation by allowing a private company to run it revolving the profits on the initial investment. This kind of contracts should be flexible in order to allow the private company to extend the contract in case of unexpected payback delays. Moreover a frequent due diligence is also recommended in order to follow up the evolution of incomes.

An example of government-led third party financing is the Spanish IDAE model, which has been financing renewable projects in Spain since the late 1980s. IDAE identifies a project, provides the capital to a developer to construct it (or install the new energy efficient equipment), and recovers its investment plus the cost of its services out of the energy production or savings. In other words, IDAE finances all the costs and assumes the technical responsibility of the investment. At the end of the contract, the project developer and user of the installation owns all the capital assets. In most instances the government agency IDAE works as an ESCO and has invested 95 M€ in renewable energy projects and leveraged another 104 M€ for 144 projects under the third-party finance mechanism

[32] Further information on financing http://sefi.unep.org/fileadmin/media/sefi/docs/publications/pfm_EE.pdf

[33] Further information on how to produce bankable energy efficiency project may be found in the "Bankable Energy Efficiency Projects (BEEP) – Experiences in Central and Eastern Europe" brochure. Downloadable from:

http://www.dena.de/fileadmin/user_upload/Download/Dokumente/Publikationen/internationales/BEEP_Project_Brochure.pdf

[34] Further information on the EBRD-Dexia-Fondelec Revolving Fund can be found in www.ebrd.com/new/pressrel/2000/17feb15x.htm and in the document "Financing Energy Efficient Homes" of the International Energy Agency (IEA) http://www.iea.org/Papers/2008/cd_energy_efficiency_policy/2-Buildings/2-FinancialBarrierBuilding.pdf

[35] www.leaseurope.org/ is an association of car leasing European Companies

[36] Extended information available in the "publications" section of http://re.jrc.ec.europa.eu/energyefficiency/ and http://www.worldenergy.org/documents/esco_synthesis.pdf

In addition the International Energy Agency´s Task XVI offers a large range of information about competitive Energy Services in http://www.ieadsm.org/ViewTask.aspx?ID=16&Task=16&Sort=0#ancPublications3

[37] May be downloaded free from www.ipmvp.org

[38] www.eceee.org/EEES/public_sector/PROSTappendix8.pdf

[39] Irrek et al. 2005 – PICOlight project is a project supported by the European Commission through the programme SAVE. More information on http://www.iclei-europe.org/?picolight

[40] Example from a publication: Solutions for Change - How local governments are making a difference in climate protection (Climate Alliance 2008)

[41] Successful worldwide Public-Private Partnerships example can be found in the document "Public-Private Partnerships: Local Initiatives 2007" on www.theclimategroup.org/assets/resources/ppp_booklet.pdf

CHAPTER 10. SEAP IMPLEMENTATION

The implementation of the SEAP is the step that takes the longest time, efforts and financial means. This is the reason mobilization of stakeholders and citizens is critical. Whether the SEAP will be successfully implemented or will remain a pile of paperwork depends in a high extent on the human factor. The SEAP needs to be managed by an organisation that supports people in their work, where there is an attitude of ongoing learning, and where mistakes and failures are opportunities for the organisation and individuals to learn. If people are given responsibility, encouragement, resources and are motivated, things will happen.

During the implementation phase, it will be essential to ensure both good internal communication (between different departments of the local authority, the associated public authorities and all the persons involved (local building managers …) as well as external communication (citizens and stakeholders). This will contribute to awareness-raising, increase the knowledge about the issues, induce changes in behaviour, and ensure wide support the whole process of SEAP implementation (see chapter about the communication process).

Monitoring of progress and energy/CO_2 savings should be an integral part of SEAP implementation (see next chapter). Finally, networking with other local authorities developing or implementing a SEAP, will provide additional value towards meeting the 2020 targets by exchanging experience and best practices, and establishing synergies. Networking with potential CoM signatories, and encouraging their involvement in the Covenant of Mayors is also recommended.

Some tips to put a SEAP into practice;

- Adopt a Project Management approach: deadline control, financial control, planning, deviations analyze and risk management. Use a quality management procedure[42].
- Divide the project into different parts and select responsible persons.
- Prepare specific procedures and processes aimed at implementing each part of the project. A quality system is a useful tool to make sure that procedures are in accordance with the objectives.
- Establish a scorecard system for tracking and monitoring your plan. Indicators such as percentage of compliance with deadlines, percentage of budget deviations, percentage of emissions reduction with the measures already implemented and other indicators deemed convenient by the local authority may be proposed.
- Plan the follow-up with the stakeholders establishing a calendar of meetings in order to inform them. Interesting ideas could arise during these meeting or possible future social barriers could be detected.
- Anticipate future events and take into account negotiation and administrative steps to be followed by the Public Administration to start a project. Public projects usually require a long time to obtain authorization and approvals. In this case, a precise planning including security factors is convenient mainly at the beginning of the SEAP implementation.
- Propose, approve and put into operation a training programme at least for those persons directly involved in the implementation.
- Motivate your team. This point is highly connected to the "building support" chapter. Internal people are important stakeholders.
- Inform frequently the city council (or equivalent body) and politicians in order to make them an important part of successes and failures and get their commitment. This point has been considered as very important during experts consultations prior to developing this guidebook.
- Some measures proposed in the SEAP may need to be tested before a massive implementation. Tools such as pilot or demonstration projects can be used to test the suitability of these measures.

[42] The European Energy Award (EEA) www.european-energy-award.org

CHAPTER 11. MONITORING AND REPORTING PROGRESSES

Monitoring is a very important part of the SEAP process. Regular monitoring followed by adequate adaptations of the plan allows initiating a continuous improvement of the process. As mentioned before, CoM signatories are committed to submit an "Implementation Report" every second year following the submission of the SEAP "for evaluation, monitoring and verification purposes". **A specific monitoring and reporting guidebook will be published by the European Commission in 2010.**

Such implementation report should include an updated CO_2 emission inventory (MEI, monitoring emission inventory). Actually, local authorities are encouraged to compile CO_2 emission inventories on an annual basis (see part II, chapter 5: Reporting and documentation).

However if the local authority considers that such regular inventories put too much pressure on human or financial resources, it may decide to carry out the inventories at larger intervals. But local authorities are recommended to compile a MEI and report on it at least every fourth year, which means submitting alternatively every 2 years an "**Action Report**" – without MEI" - (years 2, 6, 10, 14…) and an "**Implementation Report**" – with MEI (years 4, 8, 12, 16…).The **Implementation Report** contains quantified information on measures implemented, their impacts on energy consumption and CO_2 emissions, and an analysis of the SEAP implementation process including corrective and preventive measures when this is required. The **Action Report** contains qualitative information about the implementation of the SEAP. It includes an analysis of the situation and qualitative corrective and preventive measures. **The European Commission will provide a specific template for each type of report.**

As previously mentioned, some indicators are needed in order to assess the progress and performance of the SEAP. Even if a specific monitoring and reporting guidebook will be published by the JRC, some indicators are suggested in this guidebook to give an orientation on the type of monitoring parameters that may be used.

SECTOR	INDICATORS	**DATA COLLECTION DIFFICULTY	DATA COLLECTION	POSITIVE TREND
Transport	Number of public transport passengers per year	1	Agreement with a public transport company. Select representative lines to monitor	•
	Kms of biking ways	1	City Council	•
	Kms of pedestrians streets / Kms of municipal roads and streets	1	City Council	•
	Number of vehicles passing fixed point per year/month (set a representative street/point)	2	Install a car counter in representative roads/streets	•
	Total energy consumption in public administration fleets	1	Extract data from fuel supplier's bills. Convert to energy.	•
	Total energy consumption of renewable fuels in public fleets	1	Extract data from biofuels suppliers' bills. Convert to energy. Sum this indicator with the previous one and compare values.	•
	% of population living within 400 m of a bus service	3	Carry out surveys in selected areas of the municipality.	•
	Average Kms of traffic jams	2	Performs an analysis of traffic fluidity in	•

			specific areas.	
	Tons of Fossil fuels and biofuels sold in representative selected gas stations	1	Sign an agreement with selected gas station located within the municipality	•
Buildings	% of households with energetic label A/B/C	2	City Council, national/regional energy agency etc	•
	Total energy consumption of public buildings	1	See part II, chapter 4, energy data collection City Council	•
	Total surface of solar collectors	3	See part II, chapter 4, energy data collection City Council, Regional/National Public Administrations (from grants) and selected areas door-to-door surveys	•
	*Total electricity consumption of households	2	See part II, chapter 4, energy data collection Selected areas door-to-door surveys	•
	*Total gas consumption of households	2	See part II, chapter 4, energy data collection Selected areas door-to-door surveys	•
Local Energy Production	*Electricity produced by local installations	2	See part II, chapter 4, energy data collection Regional/National Public Administrations (feed-in tariffs of certificates)	•
Involvement of the private sector	Number of companies involved in energy services, energy efficiency and renewable energies business Number of employees in these businesses, turnover	2	City Council and Regional/National Public Administrations	•
Citizens involvement	Number of citizens attending to energy efficiency/renewable energies events	1	City Council and Consumers Associations	•
Green Public Procurement (GPP)	Establish an indicator for each category and compare with the typical value before implementing GPP. For example compare kgCO2/kWh of	2	City Council	•

	green electricity with the previous value. Use the data collected from all purchases to produce a single indicator			

Table 2. Possible indicators to monitor the SEAP implementation

Data collection frequency may be every 12 months[43] by defaults

* This data can be collected from utilities, tax offices (calculation of electricity consumption patterns analysing taxes paid for electricity) of the Public Administration or performing surveys in selected areas. Data collection from taxes can be feasible or not depending on the taxing mechanisms of each country.

** 1-EASY, 2-MEDIUM, 3-DIFFICULT

Illnau-Effretikon (15'600 inhabitants, suburban municipality, European Energy Award® since 1998)

The city of Illnau-Effretikon in Switzerland set up a baseline emissions inventory in 2001 and approved an activity plan (similar to SEAP), based on the results of an initial energy review on the basis of the European Energy Award®. Within a project group with other eea® municipalities, an evaluation of 44 out of 87 measures of the eea assessment tool of potential CO_2 reductions and energy savings was carried out to monitor the GHG emissions,. The implementation of the activity plan/SEAP is monitored in real-time by recording the CO_2 reduction as soon as a measure has been implemented and inserted in the eea assessment tool. Therefore, the assessment of the quality is accompanied by a quantitative analysis.

[43] In some cases, more frequent data collection may be better. In this cases, seasonal effects must be considered in order to perform a real analyze of the situation. Once first year has been concluded, a monthly or quarterly inter-annual analyze may be carried out

ANNEX I: SUGGESTIONS OF ASPECTS TO BE COVERED IN THE BASELINE REVIEWS

SCOPE	KEY ASPECTS FOR ASSESSMENT
Energy structure and CO_2 emissions	• Level and evolution of energy consumption and CO_2 emissions by sector and by energy carrier (see part II). Global and per capita.
Renewable energies	• Typology of existing facilities of production of renewable energies • Renewable energy production and trends • Use of agricultural and forest biomass as renewable energy sources • Existence of bioenergetic crops • Degree of self-supplying with renewable energies • Potentialities for renewable energy production: solar thermal and photovoltaic, wind, mini-hydraulics, biomass, others
Energy consumption and energy management in the local administration	• Level and change in the energy consumption of the local administration by sector (buildings and equipments, public lighting, waste management, waste water treatment, etc.) and by energy carrier (see Part II) • Assessment of the energy efficiency of buildings and equipments using efficiency indexes of energy consumption (for example: kWh/m^2, kWh/m^2 • user, kWh/m^2 • hours of use). This allows identifying the buildings where there are more improvements potentialities. • Characterization of the largest energy consumers among municipal buildings and equipment/facilities. Analysis of key variables (for instance: type of construction, heating, cooling, ventilation, lighting, kitchen, maintenance, solar hot water, implementation of best practices …) • Assessing the types of lamps, lighting and energy related issues in public lighting. Assessment of energy efficiency using efficiency indexes of energy consumption. • Degree and adequacy of energy management in public buildings/equipments and public lighting (including energy accounting and audits) • Established initiatives for improving energy saving and efficiency and results obtained to date • Identification of potentialities for improvement in energy savings and efficiency in buildings, equipments/facilities and public lighting.
Energy consumption of the municipal fleet	• Evaluation of the composition of the municipal fleet (own vehicles and of externalized services), annual energy consumptions (see Part II) • Composition of the urban public transport fleet, annual energy consumptions • Degree of the energy management of the municipal fleet and public transport • Established initiatives for improving reducing energy consumption and results obtained to date • Identification of potentialities for improvement in energy efficiency
Energy infrastructures	• Existence of electricity production plants, as well as district heating/cooling plants • Characteristics of the electricity and gas distribution networks, as well as any district heat/cold distribution network • Established initiatives for improving energy efficiency of the pants and of the distribution network and results obtained to date • Identification of potentialities for improvement in energy efficiency
Buildings	• Typology of the existing building stock: usage (residential, commerce, services, social…), age, thermal insulation and other energy related characteristics, energy consumption and trends (if available, see Part II), protection status, rate of renovation, tenancy, … • Characteristics and energy performance of new constructions and major renovations • What are the minimal legal energy requirements for of new constructions and major renovations? Are they met in practice? • Existence of initiatives for the promotion of energy efficiency and renewables in the various categories of building • What results have been achieved? What are the opportunities?

SCOPE	KEY ASPECTS FOR ASSESSMENT
Industry	• Importance of industry sector in the energy balance and CO_2 emissions. Is it a target sector for our SEAP? • Existence of public and private initiatives address to promote energy saving and efficiency in industry. Key results achieved. • Degree of integration of energy/carbon management in industry businesses? • Opportunities and potentialities on energy saving and efficiency in industry
Transport and mobility	• Characteristics of the demand of mobility and modes of transport. Benchmarking and major trends. • What are the main characteristics of the public transportation network? Degree of development and adequacy? • How is the use of public transportation developing? • Are there problems with congestion and/or air quality? • Adequacy of public space for pedestrians and bicycles. • Management initiatives and mobility planning. Initiatives to promote public transport, bicycle and pedestrian.
Urban planning	• Characteristics of existing and projected "urban spaces", linked to mobility: urban density, diversity of uses (residential, economic activity, shopping, ...) and building profiles • Degree of dispersion and compactness of urban development • Availability and location of the main services and facilities (educational, health, cultural, commercial, green space, ...) and proximity to the population • Degree and adequacy of integration of energy efficiency criteria in urban development planning • Degree and adequacy of integration of sustainable mobility criteria in urban planning
Public procurement	• Existence of a specific policy commitment on green public procurement • Degree of implementation of energy and climate change criteria in public procurement. Existence of specific procedures, usage of specific tools (carbon footprint or others).
Awareness	• Development and adequacy of the activities of communication and awareness to the population and stakeholders with reference to energy efficiency • Level of awareness of the population and stakeholders with reference to energy efficiency and potential savings • Existence of initiatives and tools to facilitate the participation of citizen and stakeholders in the SEAP process and the energy and climate change policies of the local authority
Skills and expertise	• Existence of adequate skills and expertise among the municipal staff: technical expertise (energy efficiency, renewable energies, efficient transport …), project management, data management (lack of skills in this field can be a real barrier!), financial management and development of investment projects, communication skills (how to promote behavioral changes etc), green public procurement...? • Is there a plan for training staff in those fields?

Source: Methodology Guide for the revision of the Local Agenda 21 Action Plans in the Basque Country – UDALSAREA21 (Basque Network of Municipalities for Sustainability) www.udalsarea21.ent

ANNEX II

The local (political) authorities can obtain the following benefits in supporting SEAP implementation:

- Contribute to the global fight against climate change- the global decrease of greenhouse gases will also protect the city against climate change
- Demonstrate commitment to environmental protection and efficient management of resources
- Participation of civil society, improvement of local democracy
- Improve the city's image
- Political visibility during the process
- Revive the sense of community around a common project
- Economic and employment benefits (retrofitting of buildings…)
- Better energy efficiency and savings on the energy bill
- Obtain a clear, honest and comprehensive picture of budgetary outflows connected with energy use and an identification of weak points.
- Develop a clear, holistic and realistic strategy for improvement in the situation.
- Access to National/European funding
- Improve citizens wellbeing (reducing energy poverty)
- Local health and quality of life (reduced traffic congestion, improved air quality …)
- Secure future financial resources through energy savings and local energy production
- Improve long-term energetic independence of the city
- Eventual synergies with existing commitments and policies
- Preparedness for better use of available financial resources (local, EU grants and financial schemes)
- Better position for implementation of national and/or EU policies and legislation
- Benefits from networking with other Covenant of Mayors signatories

ANNEX III: KEY EUROPEAN REGULATIONS AFFECTING CLIMATE AND ENERGY POLICIES AT LOCAL LEVEL

1. The Energy Performance of Buildings Directive (2002/91/EC), which establishes the following obligations for Member States:

- Setting up a method to calculate/measure the energy performance of buildings
- Setting minimum energy performance standards for new/ renovated buildings
- Setting up a certification scheme that informs potential buyers/renters of buildings (residential, commercial, …) about the energy performance of the building in question
- Displaying an energy performance certificate in all "public" buildings
- Setting up an inspection scheme of the cooling and heating systems above a certain size

This regulation was supposed to be in force in all Member States as of January 2006 (with some possible delay till January 2009 for some of the chapters), but many Member States have been late in adopting the necessary measures and laws.

2. Communication COM (2009) 490 "Action Plan on Urban Mobility" aimed at establishing the actions to be implemented through programmes and instruments.

3. Directive 93/116/EC of 17 December 1993 adapting to technical progress Council Directive 80/1268/EEC relating to the fuel consumption of motor vehicles

4. Directive 2009/28/EC on the promotion of the use of energy from renewable sources.

5. Directive 2003/30/EC on the promotion of the use of biofuels for other renewable fuels for transport.

6. Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC

GUIDEBOOK

HOW TO DEVELOP A SUSTAINABLE ENERGY ACTION PLAN (SEAP)

PART II
BASELINE EMISSION INVENTORY

JRC
EUROPEAN COMMISSION

Covenant of Mayors
Committed to local sustainable energy

TABLE OF CONTENTS

ACRONYMS

BEI	Baseline Emission Inventory
CCS	carbon capture and storage
CH_4	methane
CHP	combined heat and power
CO	carbon monoxide
CO_2	carbon dioxide
CO2EH	CO_2 emissions related to heat that is exported outside of the territory of the local authority
CO_2-eq	CO_2-equivalents
CO2GEP	CO_2 emissions due to the production of certified green electricity purchased by the local authority
CO2IH	CO_2 emissions related to imported heat from outside the territory of the local authority
CO2LPE	CO_2 emissions due to the local production of electricity
CO2LPH	CO_2 emissions due to the local production of heat
CoM	Covenant of Mayors
$CO2_{CHPE}$	CO_2 emissions from electricity production in a CHP plant
$CO2_{CHPH}$	CO_2 emissions from heat production in a CHP plant
$CO2_{CHPT}$	total CO_2 emissions of the CHP plant
EFE	local emission factor for electricity
EFH	emission factor for heat
ELCD	European Reference Life Cycle Database
ETS	European Union Greenhouse Gas Emission Trading System
EU	European Union
GEP	green electricity purchases by the local authority
GHG	greenhouse gas
GWP	global warming potential
HDD	heating degree days
HDD_{AVG}	heating degree days in an average year
ICLEI	Local Governments for Sustainability
IEA	International Energy Agency
IEAP	International Local Government Greenhouse Gas Emissions Analysis Protocol
ILCD	International Reference Life Cycle Data System
IPCC	Intergovernmental Panel on Climate Change
JRC	Joint Research Centre of the European Commission
LCA	life cycle assessment
LHC	local heat consumption
LHC_TC	temperature corrected local heat consumption
LPE	local electricity production
MEI	Monitoring Emission Inventory
N2O	nitrous oxide
NCV	net calorific value
NEEFE	national or European emission factor for electricity
P_{CHPH}	amount of heat produced in a CHP plant
P_{CHPE}	amount of electricity produced in a CHP plant
PV	solar photovoltaic installation
SEAP	Sustainable Energy Action Plan

TCE	total electricity consumption in the territory of the local authority
UNFCCC	United Nations Framework Convention on Climate Change
WBCSD	World Business Council for Sustainable Development
WRI	World Resources Institute
η_e	typical efficiency of separate electricity production
η_h	typical efficiency of separate heat production

1 Introduction

The Baseline Emission Inventory (BEI) quantifies the amount of CO_2 emitted due to energy consumption in the territory of the local authority (i.e. Covenant Signatory)[1] in the baseline year. It allows to identify the principal anthropogenic sources of CO_2 emissions and to prioritise the reduction measures accordingly. The local authority may include also CH_4 and N_2O emissions in the BEI. Inclusion of CH_4 and N_2O depends on whether measures to reduce also these greenhouse gases (GHGs) are planned in the Sustainable Energy Action Plan (SEAP), and also on the emission factor approach chosen (standard or life cycle assessment (LCA)). For simplicity, we mainly refer to CO_2 in these guidelines, but it can be understood to mean also other GHGs like CH_4 and N_2O in the case that the local authority includes them in the BEI and SEAP in general.

Elaborating a BEI is of critical importance. This is because the inventory will be the instrument allowing the local authority to measure the impact of its actions related to climate change. The BEI will show where the local authority was at the beginning, and the successive monitoring emission inventories will show the progress towards the objective. Emission inventories are very important elements to maintain the motivation of all parties willing to contribute to the local authority's CO_2 reduction objective, allowing them to see the results of their efforts.

The overall CO_2 reduction target of the Covenant of Mayors Signatories is at least 20% reduction in 2020 achieved through the implementation of the SEAP for those areas of activity relevant to the local authority's mandate. The reduction target is defined in comparison to the baseline year which is set by the local authority. The local authority can decide to set the overall CO_2 emission reduction target either as ‘absolute reduction’ or ‘per capita reduction’, as is explained in Chapter 5.2.

According to the principles laid out in the Covenant of Mayors, each signatory is responsible for the emissions occurring due to energy consumption in its territory. Therefore, emission credits bought or sold on the carbon market do not intervene in the BEI/MEI. However this does not prevent signatories to use carbon markets and related instruments to finance their SEAP measures.

The BEI quantifies the emissions that occurred in the baseline year. In addition to the inventory of the baseline year, emission inventories will be compiled in the later years to monitor the progress towards target. Such an emission inventory is called Monitoring Emission Inventory (MEI). The MEI will follow the same methods and principles as the BEI. The acronym BEI/MEI is used when describing issues which are common for both BEI and MEI. Specific guidelines for monitoring SEAP implementation will be published in 2010.

In these guidelines, advice and recommendations for compiling a BEI/MEI under the Covenant of Mayors are presented. Some of the definitions and recommendations are unique to the inventories under the Covenant of Mayors, in order to enable the inventories to demonstrate the progress towards the target of the Covenant.

However, as far as possible, the concepts, methodologies and definitions in internationally agreed standards are followed in these guidelines. For example, the local authority is encouraged to use emission factors that are in line with those of the Intergovernmental Panel on Climate Change (IPCC) or European Reference Life Cycle Database (ELCD). However, the local authority is given the flexibility to use any approach or tool that it considers appropriate for the purpose.

The results of the BEI are reported by using the SEAP template which is published online at www.eumayors.eu. The SEAP template tables related to the Baseline Emission Inventory are shown in Annex II of these guidelines.

[1] “territory of the local authority” refers to the geographical area within the administrative boundaries of the entity governed by the local authority

2 Setting up an inventory

2.1 Key concepts

In the compilation of BEI/MEI, the following concepts are of utmost importance:

a) *Baseline year*. Baseline year is the year against which the achievements of the emission reductions in 2020 shall be compared. The EU has committed to reduce the emissions 20% by 2020 compared to 1990, and 1990 is also the base year of the Kyoto Protocol. To be able to compare the emission reduction of the EU and the Covenant signatories, a common base year is needed, and therefore 1990 is the recommended baseline year of the BEI. However, if the local authority does not have data to compile an inventory for 1990, then it should choose the closest subsequent year for which the most comprehensive and reliable data can be collected.

b) *Activity Data*. Activity data quantifies the human activity occurring in the territory of the local authority. Examples of activity data are:

- Oil used for space heating in residential buildings [MWh_{fuel}]
- Electricity consumed in municipal buildings [MWh_e]
- Heat consumed by residential buildings [MWh_{heat}]

c) *Emission factors*. Emission factors are coefficients which quantify the emission per unit of activity. The emissions are estimated by multiplying the emission factor with corresponding activity data. Examples of emission factors are:

- Amount of CO_2 emitted per MWh of oil consumed [t CO_2/MWh_{fuel}]
- Amount of CO_2 emitted per MWh electricity consumed [t CO_2/MWh_e]
- Amount of CO_2 emitted per MWh heat consumed [t CO_2/MWh_{heat}]

2.2 Boundaries, scope and sectors

The geographical boundaries of the BEI/MEI are the administrative boundaries of the local authority.

The baseline CO_2 inventory will essentially be based on final energy consumption, including both municipal and non-municipal energy consumption in the local authority's territory. However, also those other than energy-related sources may be included in the BEI.

The BEI quantifies the following emissions that occur due to energy consumption in the territory of the local authority:

a) Direct emissions due to fuel combustion in the territory in the buildings, equipment/facilities and transportation sectors

b) (Indirect) emissions related to production of electricity, heat, or cold that are consumed in the territory

c) Other direct emissions that occur in the territory, depending on the choice of BEI sectors (see Table 1)

The points a) and c) above quantify the emissions that physically occur in the territory. Inclusion of these emissions follows the principles of the IPCC used in the reporting of the countries to the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol[2].

[2] They are comparable with "scope 1 emissions", for example in the methodology of International Local Government Greenhouse Gas Emissions Analysis Protocol (IEAP) (ICLEI, 2009) and The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (WRI/WBCSD, 2004). However, a major difference is that not all emissions occurring in the territory are included, for example emissions of large power and industrial plants are excluded (see Sections 3.4 and 3.5).

As explained in point b) above, the emissions due to production of electricity, heat and cold consumed in the territory are included in the inventory regardless of the location of the production (inside or outside of the territory).[3]

The definition of the scope of the BEI/MEI ensures that all the relevant emissions due to energy consumption in the territory are included, but no double counting is taking place. As illustrated in Table 1, emissions other than the ones that are related to fuel combustion can be included in the BEI/MEI. However, their inclusion is voluntary because the main focus of the Covenant is the energy sector, and the importance of other than energy-related emissions may be small in the territories of many local authorities.

Table 1 illustrates the recommendation of sectors to be included in the BEI/MEI. The following labels are used in the table

- YES: inclusion of this sector in BEI/MEI is strongly recommended.
- YES if in SEAP: this sector may be included if the SEAP includes measures for it. Even if measures are planned for a sector in SEAP, its inclusion in the BEI/MEI is not mandatory. However, it is recommended because otherwise the local authority cannot quantitatively show the emission reduction which took place as a result of such a measure.
- NO: inclusion of this sector in BEI/MEI is not recommended.

Carbon Capture and Storage (CCS) and nuclear energy are outside the scope of the Covenant, and therefore any emission reduction related to such activities should be excluded from the BEI/MEI.

[3] Such emissions are often referred to as "scope 2" emissions, for example, in the methodology of ICLEI (2009) and WRI/WBCSD (2004).

Table 1. Sectors included in the BEI/MEI.

Sector	Included?	Note
Final energy consumption in buildings, equipment/facilities and industries		
-Municipal buildings, equipment/facilities	YES	These sectors cover all energy consuming buildings, equipment and facilities in the territory of the local authority which are not excluded below. For example, energy consumption in water and waste management facilities is included in this sector. Municipal waste incineration plants are also included here if they are not used to produce energy. For energy producing waste incineration plants, see Sections 3.4 and 3.5.
-Tertiary (non-municipal) buildings, equipment/facilities	YES	
-Residential buildings	YES	
-Municipal public lighting	YES	
-Industries involved in EU ETS	NO	
-Industries not involved in EU ETS	YES if in SEAP	
Final energy consumption in transportation		
-Urban road transportation: municipal fleet (e.g. municipal cars, waste transportation, police and emergency vehicles)	YES	These sectors cover all road transportation on the street network that is in the competence of the local authority.
-Urban road transportation: public transportation	YES	
-Urban road transportation: private and commercial transportation	YES	
-Other road transportation	YES if in SEAP	This sector covers the road transportation on roads in the territory of the local authority not under its competence, for example highways.
-Urban rail transportation	YES	This sector covers the urban rail transportation in the territory of the local authority, such as tram, metro and local trains.
-Other rail transportation	YES if in SEAP	This sector covers the long-distance, intercity, regional and cargo rail transportation that occurs in the territory of the local authority. Other rail transportation does not only serve the territory of the local authority, but a larger area.
-Aviation	NO	The energy consumption of airport and harbour buildings, equipment and facilities will be included as part of the buildings and facilities above, however excluding mobile combustion.
-Shipping/fluvial transport	NO	
-Local ferries	YES if in SEAP	Local ferries are the ferries that serve as urban public transportation in the territory of the local authority. These are not likely to be relevant for most of the Signatories.
-Off-road transport (e.g. agricultural and construction machinery)	YES if in SEAP	
Other emission sources (not related to energy consumption)		
Fugitive emissions from production, transformation and distribution of fuels	NO	
Process emissions of industrial plants involved in EU ETS	NO	
Process emissions of industrial plants not involved in EU ETS	NO	
Use of products and fluorinated gases (refrigeration, air conditioning etc)	NO	

Agriculture (e.g. enteric fermentation, manure management, rice cultivation, fertilizer application, open burning of agricultural waste)	NO	
Land use, land use change and forestry	NO	This refers to carbon stock changes in for example urban forests.
Wastewater treatment	YES if in SEAP	This refers to emissions not related to energy, such as to CH_4 and N_2O emissions from wastewater treatment. Energy consumption and related emissions from wastewater facilities is included in the category "buildings, equipment/facilities".
Solid waste treatment	YES if in SEAP	This refers to emissions not related to energy, such as CH_4 from landfills. Energy consumption and related emissions from waste treatment facilities are included in the category "buildings, equipment/facilities".
Energy production		
Fuel consumption for electricity production	YES if in SEAP	In general, only in the case of plants which are <20 MW_{fuel}, and are not part of EU ETS. See Section 3.4 for more details.
Fuel consumption for heat/cold production	YES	Only if heat/cold is supplied as a commodity to final end-users within the territory. See Section 3.5 for more details.

3 Emission factors

3.1 Choice of emission factors: standard (IPCC) or LCA

Two different approaches may be followed when selecting the emission factors:

a) *Using "Standard" emission factors* in line with the IPCC principles, which cover all the CO_2 emissions that occur due to energy consumption within the territory of the local authority, either directly due to fuel combustion within the local authority or indirectly via fuel combustion associated with electricity and heat/cold usage within their area. The standard emission factors are based on the carbon content of each fuel, like in national greenhouse gas inventories in the context of the UNFCCC and the Kyoto protocol. In this approach, CO_2 is the most important greenhouse gas, and the emissions of CH_4 and N_2O do not need to be calculated. Furthermore, the CO_2 emissions from the sustainable use of biomass/biofuels, as well as emissions of certified green electricity, are considered to be zero. The standard emission factors given in these guidelines are based on the IPCC 2006 Guidelines (IPCC, 2006). However, the local authority may decide to use also other emission factors that are in line with the IPCC definitions.

b) *Using LCA (Life Cycle Assessment) emission factors*, which take into consideration the overall life cycle of the energy carrier. This approach includes not only the emissions of the final combustion, but also all emissions of the supply chain. It includes emissions from exploitation, transport and processing (e.g. refinery) steps in addition to the final combustion. This hence includes also emissions that take place outside the location where the fuel is used. In this approach, the GHG emissions from the use of biomass/biofuels, as well as emissions of certified green electricity, are higher than zero. In the case of this approach, other greenhouse gases than CO_2 may play an important role. Therefore, the local authority that decides to use the LCA approach can report emissions as CO_2 equivalent. However, if the methodology/tool used only counts CO_2 emissions, then emissions can be reported as CO_2 (in t).

LCA is an internationally standardised method (ISO 14040 series) and used by a large number of companies and governments, including for Carbon footprinting. LCA is the scientific basis used typically behind e.g. the Thematic Strategies on Natural Resources and Waste, the Ecodesign Directive, and Ecolabel Regulation. On EU level a series of technical guidance documents building on the ISO 14040 series is currently being developed, coordinated by the European Commission's Joint Research Centre (JRC): International Reference Life Cycle Data System (ILCD) Handbook is consulted and coordinated within the EU and also with national LCA projects outside the EU (including China, Japan and Brazil), as well as a range of European business associations. A related ILCD Data Network (JRC et al., 2009) is currently being established (launch foreseen for end of 2009), that would be open for all data providers to give access to consistent and quality-assured LCA data. The network can host cost-free data, licensed data, members-only data, etc.

The LCA emission factors given in these guidelines are based on a European Reference Life Cycle Database (ELCD) (JRC, 2009). The ELCD provides LCA data for most of the fuels and also Member State specific electricity mix data. Both the ELCD and the ILCD data sets work with the IPCC global warming factors for the individual gases.

The advantages of both approaches are summarised in Table 2.

Table 2. Comparison of standard and LCA emission factors

Advantage	Standard	LCA
Is compatible with the national reporting to the UNFCCC	X	
Is compatible with the monitoring of progress towards EU's 20-20-20 target	X	
Is compatible with carbon footprint approaches		X
Is compatible with the Ecodesign Directive (2005/32/EC) and Ecolabel Regulation		X
All emission factors needed easily available	X	
Reflects the total environmental impact also outside the place of use		X
Tools available for local inventories	X	X

After selecting the emission factor approach, the local authority can either use the default emission factors provided in this guidebook or choose other emission factors that are considered more appropriate. The standard emission factors depend on the carbon content of the fuels and therefore do not vary significantly from case to case. In the case of LCA approach, obtaining information on the emissions upstream in the production process may be challenging and considerable differences may occur even for the same type of fuel. This is especially the case of biomass and biofuels. Local authorities using the LCA approach are recommended to consider the applicability of the emission factors presented in these guidelines before using them for BEI/MEI, and to try to obtain case-specific data where appropriate.

The choice of the emission factor is reported in the SEAP template by ticking the appropriate box.

3.2 Greenhouse gases included: CO_2 or CO_2 equivalent emissions

The greenhouse gases to be included in the BEI/MEI depend on the choice of sectors and also on the choice of emission factor approach (standard or LCA).

If the standard emission factors following the IPCC principles are chosen, it is sufficient to report only CO_2 emissions, because the importance of other greenhouse gases is small. In this case, the box "CO_2 emissions" is ticked in the SEAP template, in point "emission reporting unit". However, also other greenhouse gases can be included in the baseline inventory if the standard emission factors are chosen. For example, the local authority may decide to use emission factors that take into account also CH_4 and

N_2O emissions from combustion. Furthermore, if the local authority decides to include landfills and/or wastewater treatment in the inventory, then the CH_4 and N_2O emissions will also be included. In this case the emission reporting unit to be chosen is "CO_2 equivalent emissions".

In the case of the LCA approach, other greenhouse gases than CO_2 may play an important role. Therefore, a local authority that decides to use the LCA approach will likely include also other GHGs than CO_2 in the inventory, and select the emission reporting unit "CO_2 equivalent emissions". However, if the local authority uses a methodology/tool that does not include any other GHGs than CO_2, then the inventory will be based on CO_2 only, and the emission reporting unit "CO_2 emissions" is chosen.

The emissions of other greenhouse gases than CO_2 are converted to CO_2-equivalents by using the Global Warming Potential (GWP) values. For example, one kg of CH_4 has a similar impact on global warming than 21 kg of CO_2, when considered over a time interval of 100 years, and therefore the GWP value of CH_4 is 21.

In the context of the Covenant of Mayors, it is suggested to apply the GWP values that are used in the reporting to the UNFCCC and the Kyoto Protocol. These GWP values are based on the IPCC's Second Assessment report (IPCC, 1995), and are presented in Table 3.

However, the local authority may decide to use other GWP values of the IPCC, for example depending on the tool they use. The LCA emission factors presented in these guidelines are calculated using the GWP values of the 4th Assessment report of the IPCC (IPCC, 2007).

Table 3. Conversion of CH_4 and N_2O to CO_2-equivalent units

Mass of GHG as t compound	Mass of GHG as t CO_2-equivalent
1 t CO_2	1 t CO_2-eq
1 t CH_4	21 t CO_2-eq
1 t N_2O	310 t CO_2-eq

3.3 Fuels and renewable heat

As explained in Section 3.1, the local authority can choose between standard emission factors in line with IPCC principles, or LCA emission factors.

The Standard emission factors following IPCC principles are based on the carbon contents of the fuels. For simplicity, the emission factors presented here assume that all carbon in the fuel forms CO_2. However, in reality a small share of carbon (usually <1%) in the fuel forms also other compounds such as carbon monoxide (CO) and most of that carbon oxidises to CO_2 later on in the atmosphere.

The LCA emission factors include the actual emissions from all life cycle steps including final combustion, as mentioned earlier. This is of special relevance for biofuels: while the carbon stored in the biofuels themselves may be CO_2 neutral, the cropping and harvesting (fertilisers, tractors, pesticide production) and processing to the final fuel may consume a lot of energy and result in considerable CO_2 releases, as well as N_2O emissions from the field. The various biofuels differ considerably regarding the life cycle GHG emissions, and therefore the LCA approach supports the choice of the most climate-friendly biofuel and other biomass energy carriers.

Box 1 gives additional information on how to deal with biomass or biofuels[4] which are used in the territory of the local authority.

[4] In these guidelines, biofuel refers to all liquid biofuels, including transportation biofuels, vegetable oils and other fuels in liquid phase. Biomass, instead, refers to solid biomass such as wood, biowaste etc.

In the case of a biofuel blend, the CO_2 emission factor should reflect the non-renewable carbon content of the fuel. An example of calculation of an emission factor for a biofuel blend is presented in Box 2.

Box 1. Sustainability of biofuels/biomass

Sustainability of biofuels and biomass is an important consideration in the preparation of the Sustainable Energy Action Plan. In general, biomass/biofuels are a form of renewable energy, the use of which does not have an impact on the CO_2 concentration in the atmosphere. However, this is the case only if biomass/biofuels are produced in a sustainable manner. Two sustainability issues should be taken into consideration when deciding on SEAP measures related to biomass/biofuels, and when accounting for them in BEI/MEI.

1. Sustainability in relation to CO_2 concentration in the atmosphere

Combustion of carbon which is of biogenic origin, for example in wood, biowaste or transportation biofuels, forms CO_2. However, these emissions are not accounted for in the CO_2 emission inventories, if it can be assumed that the carbon released during combustion equals the carbon uptake of the biomass during re-growth within a year. In this case, the standard CO_2 emission factor for biomass/biofuel is equal to zero. This assumption is often valid in the case of crops which are used for biodiesel and bioethanol, and is valid in the case of wood if the forests are managed in a sustainable manner, meaning that on average forest growth is equal to or higher than harvesting. If wood is not harvested in a sustainable manner, then a CO_2 emission factor that is higher than zero has to be applied (see Table 4).

2. Life cycle emissions, biodiversity and other sustainability issues

Even though biofuel/biomass would represent a neutral CO_2 balance, its usage may not be considered as sustainable if its production causes high emissions of other greenhouse gases – such as N_2O from fertilizer use or CO_2 due to land use change – or has an adverse impact on biodiversity, for example. Therefore, the local authority is recommended to check that the biomass/biofuels used meet certain sustainability criteria. The criteria[a] set in directive 2009/28/EC on the promotion of the use of energy from renewable sources may be used for this purpose. After 5 December 2010 (date by which Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive), only biomass/biofuels that meet these criteria should be considered as renewable in the context of the Covenant of Mayors.

In the case the local authority uses *standard emission factors* and uses biofuel which does not meet sustainability criteria, it is recommended to use an emission factor that is equal to that of the corresponding fossil fuel. For example, if the local authority uses biodiesel which is not produced in a sustainable manner, the emission factor of fossil diesel is to be used. Even though this rule does not follow the conventional emission estimation standards, it is applied to prevent the use of unsustainable biofuels in Covenant cities.

If the local authority uses *LCA emission factors*, and uses biofuel which does not meet sustainability criteria, it is recommended to develop an emission factor, which takes into account all the emissions over the entire life cycle of the biofuel.

[a]See article 17 of the directive, paragraphs 1 to 6. In very short: "The greenhouse gas emission saving from the use of biofuels and bioliquids, [calculated in accordance with Article 19] […] shall be at least 35 % […] Biofuels and bioliquids […] shall not be made from raw material obtained from land with high biodiversity value […] from land with high carbon stock […] from land that was peatland in January 2008 […]". In addition, "Agricultural raw materials cultivated in the Community and used for the production of biofuels and bioliquids […] shall be obtained in accordance with the requirements and standards […]" of various environmental provisions of European agricultural regulations.

The emission factors for the fuels which are most commonly used in the territories of the local authorities are presented in the Table 4, based on 2006 IPCC Guidelines and European Reference Life Cycle

Database (ELCD)[5]. Annex I gives a more complete table of IPCC emission factors. However, the local authority can decide to use other emission factors which are considered appropriate.

Table 4. Standard CO_2 emission factors (from IPCC, 2006) and CO_2-equivalent LCA emission factors (from ELCD) for most common fuel types.

Type	Standard emission factor [t CO_2/MWh]	LCA emission factor [t CO_2-eq/MWh]
Motor Gasoline	0.249	0.299
Gas oil, diesel	0.267	0.305
Residual Fuel Oil	0.279	0.310
Anthracite	0.354	0.393
Other Bituminous Coal	0.341	0.380
Sub-Bituminous Coal	0.346	0.385
Lignite	0.364	0.375
Natural Gas	0.202	0.237
Municipal Wastes (non-biomass fraction)	0.330	0.330
Wood[a]	0 – 0.403	0.002[b] – 0.405
Plant oil	0[c]	0.182[d]
Biodiesel	0[c]	0.156[e]
Bioethanol	0[c]	0.206[f]
Solar thermal	0	-[h]
Geothermal	0	-[h]

[a]Lower value if wood is harvested in a sustainable manner, higher if harvesting is unsustainable.

[b]The figure reflects the production and local/regional transport of wood, representative for Germany, assuming: spruce log with bark; reforested managed forest; production mix entry to saw mill, at plant; and 44% water content. The local authority using this emission factor is recommended to check that it is representative for the local circumstances and to develop an own emission factor if the circumstances are different.

[c]Zero if the biofuels meet sustainability criteria; fossil fuel emission factors to be used if biofuels are unsustainable.

[d]Conservative figure regarding pure plant oil from palm oil. Note that this figure represents the worst ethanol plant oil pathway and does not necessarily represent a typical pathway. This figure does not include the impacts of direct and indirect land use change. Had these been considered, the default value could be as high as 9 t CO_2-eq/MWh, in the case of conversion of forest land in the tropics.

[e]Conservative figure regarding biodiesel from palm oil. Note that this figure represents the worst biodiesel pathway and does not necessarily represent a typical pathway. This figure does not include the impacts of direct and indirect land use change. Had these been considered, the default value could be as high as 9 t CO_2-eq/MWh, in the case of conversion of forest land in the tropics.

[f]Conservative figure regarding ethanol from wheat. Note that this figure represents the worst ethanol pathway and does not necessarily represent a typical pathway. This figure does not include the impacts of direct and indirect land use change. Had these been considered, the default value could be as high as 9 t CO_2-eq/MWh, in the case of conversion of forest land in the tropics.

[h]Data not available, but emissions are assumed to be low (however the emissions from electricity consumption of heat pumps is to be estimated using the emission factors for electricity). Local authorities using these technologies are encouraged to try to obtain such data.

If local authorities prefer to use or develop emission factors that better reflect the properties of the fuels used in the territory, they are welcomed to do so. The choice of emission factor used in the BEI has to be consistent with the choice of the emission factor in the MEI.

[5] The emission factors for fuel combustion are expressed as t/MWh_{fuel}. Therefore, the corresponding activity data to be used must also be expressed as MWh_{fuel}, which corresponds with the Net Calorific Value (NCV) of the fuel.

Box 2. How to calculate an emission factor of a biofuel blend?

A biodiesel blend is used in the city, including 5% of sustainable biodiesel, and the rest conventional diesel oil. Using the standard emission factors, the emission factor for this blend is calculated as

95%*0.267 t CO_2/MWh + 5%*0 t CO_2/MWh = <u>0.254 t CO_2/MWh</u>

3.4 Electricity

In order to calculate the CO_2 emissions to be attributed to electricity consumption, it is necessary to determine which emission factor is to be used. The same emission factor will be used for all electricity consumption in the territory, including that in rail transportation. The local emission factor for electricity may take the following components into consideration. The contribution of each of them in the estimation of the local emission factor is explained in more detail in the Sections below:

a) National/European emission factor
b) Local electricity production
c) Purchases of certified green electricity by the local authority.

Because the estimation of emissions from electricity is based on electricity consumption, the emission factors are expressed as t/MWh_e. Therefore, the corresponding activity data to be used has also to be in the form of MWh_e, i.e. in MWh of electricity consumed.

3.4.1 National or European emission factor

Electricity is consumed in the territory of each local authority, but the main units that produce it are only concentrated on the territory of a few of them. These major production units are often large CO_2 emitters (in the case of fossil fuel thermal plants), but their electricity production is not meant to cover only the electricity needs of the municipality on which they are built, but the needs of a larger area. In other words, the electricity that is consumed in a particular municipality generally comes from different plants either inside or outside the municipality. As a consequence, the CO_2 that is emitted due to this electricity consumption actually comes from those various plants. To quantify this for each individual municipality would be a challenging task, as the physical flows of electricity cross the borders and vary depending on several factors. In addition, the municipalities in question usually have no control on the emissions of such plants. For these reasons, and keeping in mind that the focus of the Covenant of Mayors is on the demand (consumption) side, it is recommended to use a national or European emission factor as a starting point to determine the local emission factor. This emission factor reflects the average CO_2 emissions related to the national or European electricity production.

The national and European emission factors fluctuate from year to year due to energy mix used in electricity generation. These fluctuations are caused by the heating/cooling demand, availability of renewable energies, energy market situation, import/export of energy and so on. These fluctuations occur independently of the actions taken by the local authority. Therefore, it is recommended to use the same emission factor in the BEI and in the MEI, because otherwise the result of the emission inventory could be very sensitive to factors on which the local authority has no influence.

The local authority may decide to use either a national or European emission factor. The emission factors for standard and LCA approaches are presented in Table 5 for all the Member States (except Malta and Luxembourg for which the data were not available) and the EU as a whole. The local authority is welcome to search for more up-to-date data. Note that LCA emission factors should in all the cases be higher than standard emission factors. However, due to different data sources used and different years

covered by the two sets of emission factors, the standard and LCA emission factors are not necessarily comparable, which is especially visible in the cases of Poland and the Czech Republic.

Table 5. National and European emission factors for consumed electricity. Note that the year which the data represents varies between countries and between standard and LCA approach[6].

Country	Standard emission factor (t CO_2/MWh_e)	LCA emission factor (t CO_2-eq/MWh_e)
Austria	0.209	0.310
Belgium	0.285	0.402
Germany	0.624	0.706
Denmark	0.461	0.760
Spain	0.440	0.639
Finland	0.216	0.418
France	0.056	0.146
United Kingdom	0.543	0.658
Greece	1.149	1.167
Ireland	0.732	0.870
Italy	0.483	0.708
Netherlands	0.435	0.716
Portugal	0.369	0.750
Sweden	0.023	0.079
Bulgaria	0.819	0.906
Cyprus	0.874	1.019
Czech Republic	0.950	0.802
Estonia	0.908	1.593
Hungary	0.566	0.678
Lithuania	0.153	0.174
Latvia	0.109	0.563
Poland	1.191	1.185
Romania	0.701	1.084
Slovenia	0.557	0.602
Slovakia	0.252	0.353
EU-27	0.460	0.578

The national or European emission factor for electricity has an acronym NEEFE in the equation in Section 3.4.4. The emission factor chosen is reported in the SEAP template as "CO_2 emission factor for electricity not produced locally" below Table B.

3.4.2 Local electricity production

Reducing CO_2 emissions through improvement of energy efficiency and local renewable energy projects is a priority of the Covenant. However, also other actions to reduce CO_2 emissions in the supply side can be accounted for. First, the local authority has to decide whether to include local electricity production in the BEI or not. In case all the SEAP measures are focused on the demand side, inclusion of local

[6] Sources for standard emission factors: Germany: http://www.umweltbundesamt.de/energie/archiv/co2-strommix.pdf (year 2007); Denmark : Average of emission factors for Eastern and Western Denmark including distribution loss of 5%. http://www.energinet.dk/en/menu/Climate+and+the+environment/Environmental+impact+statements+for+electricity/Environmental+impact+statements+for+electricity.htm (year 2008); Estonia: personal communication with Estonian Environment Information Centre (year 2007); Portugal: personal communication with Portuguese Agency for the Environment (year 2007); Slovenia: Personal communication with Environmental Agency of the Republic of Slovenia (year 2007); Slovakia: Personal communication with Slovak Hydrometeorological Institute (year 2007); Spain: personal communication with Ministry of Environment, Spain (year 2007); United Kindom: personal communication with Department of Energy and Climate Change (year 2007); other countries and European average: Eurelectric (2005), (available years 2000-2002). Source for LCA emission factors: European Reference Life Cycle Database (ELCD), http://lca.jrc.ec.europa.eu/lcainfohub/datasetArea.vm (year 2002).

electricity production is not needed, and the factors LPE and CO2LPE in the equation in Section 3.4.4 below are zero.

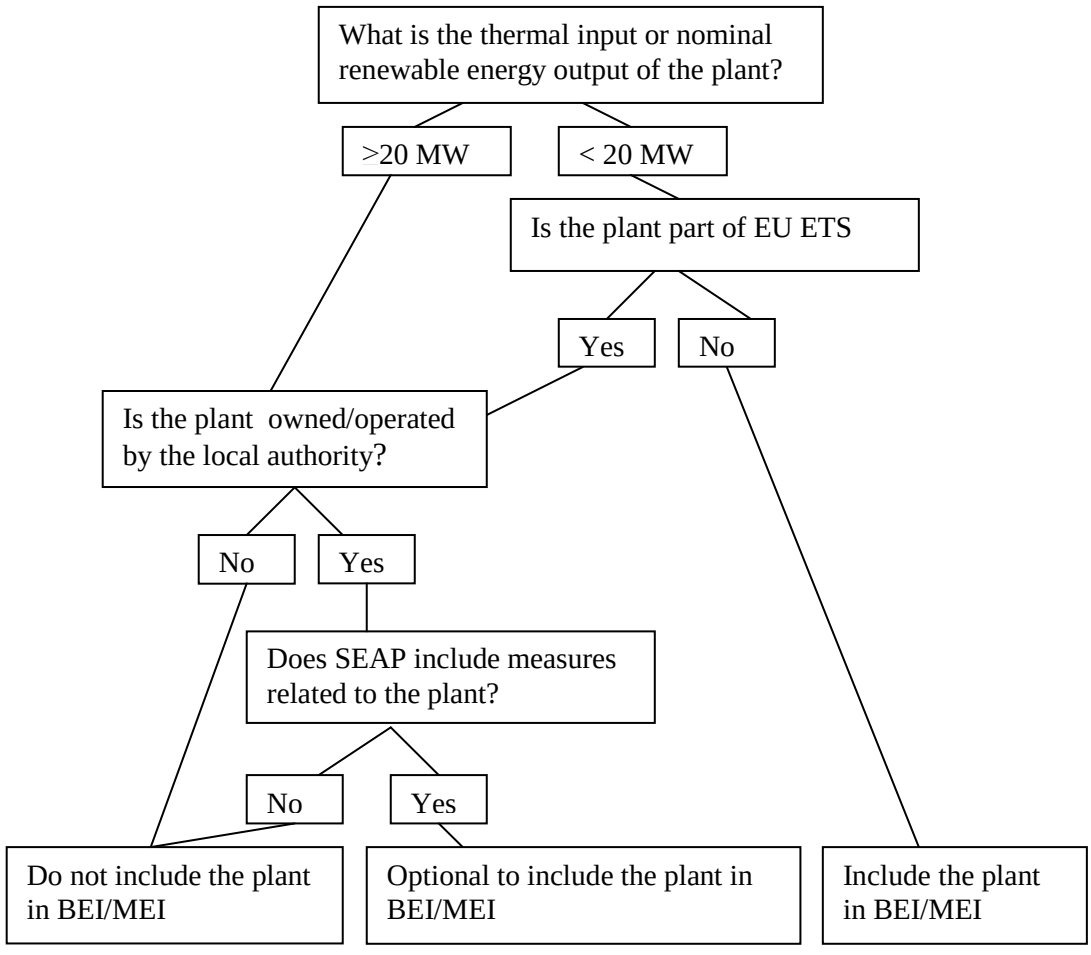
If the local authority decides to include local electricity production in BEI, all the plants/units that meet the following criteria have to be included:

- the plant/unit is not included in the European Emissions Trading Scheme (ETS);
- the plant/unit is below or equal to 20MW_{fuel} as thermal energy input in the case of fossil fuel and biomass combustion plants[7], or below or equal to 20MW_e as nominal output in the case of other renewable energy plants (e.g. wind or solar).

The criteria above are based on the assumption that smaller plants/units primarily serve the local electricity needs, whereas larger plants primarily produce electricity to the larger grid. Usually the local authority has more control or influence on smaller plants than larger ones whose emissions are controlled by the EU ETS. However, in some cases, also larger plants or units can be included in the BEI/MEI. For example, if a local authority owns utilities or plans to develop and finance large renewable installations like wind farms, such projects may be incorporated, as long as the priority remains on the demand side (final energy consumption reductions).

The local authority can use the decision tree of Box 3 to decide, for each of the plants/units located in the territory, whether to include them in BEI/MEI or not.

Box 3. Decision tree for inclusion of local electricity production.



[7] 20 MW_{fuel} refers to fuel input of the plant, and corresponds to the EU ETS threshold for combustion installations. The threshold 20 MW_e set for other renewables refers to nominal electricity generation capacity, and is thus higher than the threshold for combustion installations.

Based on the decision tree in Box 3, the local authority is recommended to fill in a table including all the electricity generation plants in the territory and determine whether they are to be included in BEI/MEI or not. An example of such a table is given in Box 4.

Box 4. An example of identification of local electricity generation facilities

The following electricity generation facilities are located in the territory of the local authority:

a) Wind power park owned by a private company
b) Solar panels on the roof of a building owned by the local authority
c) Solar panels on the roof of a building owned by a private company
d) CHP plant using natural gas
e) Gas turbine plant owned by a private company
f) A group of 3 wind turbines owned by a private company

In order to identify which plants and facilities belong to the scope of BEI/MEI, the local authority has filled in the table below.

Local electricity generation in [name of the Signatory] in [inventory year]

Plant/unit	**Size (thermal (fuel) input)**	**Size (nominal renewable electricity generation capacity)**	**Included in ETS?**	**Part of BEI?**
a)	-	25 MW_e	NO	NO
b)	-	250 kW_e	NO	YES
c)	-	500 kW_e	NO	YES
d)	200 MW_{fuel}	-	YES	NO
e)	15 MW_{fuel}	-	NO	YES
f)	-	3 MW_e	NO	YES

All plants that are to be included in BEI/MEI, as per above rule, should be listed in Table C of the SEAP template (see Annex II), with corresponding quantity of locally generated electricity, energy inputs, and corresponding CO_2 emissions. For convenience, similar production units may be grouped (for example solar photovoltaic installations (PVs) or combined heat and power plants (CHPs)).

Waste incineration plants that produce electricity are treated similarly to any other power plants. Waste incinerated in plants that do not produce electricity or heat is included in Table A of the SEAP template and the related emissions in Table B.

Further guidance on activity data collection regarding local electricity production is available in Section 4.3.

The emissions from local electricity production (CO2LPE) are estimated, in the case of plants combusting fuel, by using emission factors in Table 4. In the case of the local renewable electricity production (other than biomass/biofuels), the emissions can be estimated by using the emission factors in Table 6.

Table 6. Emission factors for local renewable electricity production.

Electricity source	Standard emission factor (t CO_2/MWh_e)	LCA emission factor (t CO_2-eq/MWh_e)
Solar PV	0	0.020-0.050[a]
Windpower	0	0.007[b]
Hydropower	0	0.024

[a]Source: Vasilis et al., 2008

[b]Based on results from one plant, operated in coastal areas with good wind conditions

3.4.3 Purchases of certified green electricity by the local authority

Instead of purchasing the "mixed" electricity from the grid, the local authority can decide to purchase certified green electricity. Only electricity that meets the criteria for *guarantee of origin of electricity produced from renewable energy sources* set in the Directive 2001/77/EC and updated in the Directive 2009/28/EC can be sold as green electricity. The local authority will report the amount of purchased green electricity (GEP) under Table A of the SEAP template.

In the case that the standard emission factors are used, the emission factor for certified green electricity is zero. If the LCA emission factors are used, the local authority has to estimate the LCA emissions of the green electricity purchases (CO2GEP) either by requesting required information from the power provider or by using the default factors provided for local renewable electricity generation in Table 6 if they are deemed suitable.

Also other actors in the territory of the local authority may purchase green electricity. However, it may be difficult to obtain data about such purchases. In addition, green electricity purchases reduce greenhouse gas emissions only in the case that electricity production by fossil fuels is actually replaced by production from new renewable electricity installations, due to such purchases, which is not necessarily the case. For these reasons, and also because the focus of the Covenant is on the demand side, the green electricity purchases of other actors (companies, consumers, institutions etc) in the territory are not accounted for in the local electricity emission factor.

3.4.4 Calculation of local emission factor for electricity

Based on the information presented in the Sections above, the local emission factor for electricity (EFE) can be calculated by using the equation below[8]

$$EFE = [(TCE - LPE - GEP) * NEEFE + CO2LPE + CO2GEP] / (TCE)$$

Where

EFE = local emission factor for electricity [t/MWh_e]

TCE = Total electricity consumption in the local authority (as per Table A of the SEAP template) [MWh_e]

LPE = Local electricity production (as per table C of the template) [MWh_e]

GEP = Green electricity purchases by the local authority (as per Table A) [MWh_e]

NEEFE = national or European emission factor for electricity [t/MWh_e]

CO2LPE = CO_2 emissions due to the local production of electricity (as per table C of the template) [t]

CO2GEP = CO_2 emissions due to the production of certified green electricity purchased by the local authority [t]

[8] This formula neglects transport and distribution losses in the local authority's territory, as well as auto-consumption of energy producers/transformers and tends to double count local renewable production. However, at the scale of the local authority, these approximations will have a minor effect on the local CO_2 balance and the formula may be considered as robust enough to be used in the context of the Covenant of Mayors.

In the exceptional case where the local authority would be a net exporter of electricity, then the calculation formula would be:

EFE = (CO2LPE + CO2GEP) / (LPE + GEP)

These principles and rules allow rewarding the increase in local renewable energy production, or improvements of efficiency in the local energy generation, whilst still keeping the main focus on final energy (demand side).

3.5 Heat/cold

If heat or cold is sold/distributed as a commodity to end users within the territory of the local authority (see table A of the SEAP template), then it is necessary to establish the corresponding emission factor.

First, the local authority has to identify all the plants and units which provide heat/cold as a commodity to end-users in the territory (for example from district heating, or a CHP plant). All such plants should be listed in table D of the SEAP template, with the corresponding quantity of locally generated heat, energy inputs, and corresponding CO_2 emissions. For convenience, similar production units may be grouped (e.g. CHPs).

Waste incineration plants that produce heat to be sold as commodity to the end-users are treated similarly to any other heating plants. Amount of waste incinerated, and the related CO_2 emissions from plants which do not produce electricity of heat, are included in Tables A and B, respectively.

Please note that energy consumption and CO_2 emissions related to heat and cold locally produced by end-users for their own usage are already covered by tables A and B (columns for fossil fuel and renewable energy consumption). In principle, the total amount of heat/cold produced referenced in table D should be equal (or very close) to the quantity of heat/cold consumed and reported in table A, column "Heat/cold". Differences may occur due to:

- auto-consumption of heat/cold by the utility producing it
- transport & distribution losses of heat/cold

Further guidance on activity data collection regarding heat production is available in Section 4.4.

If a part of the heat/cold that is produced in the territory of the local authority is exported, then the corresponding share of CO_2 emissions should be deducted when calculating the emission factor for heat/cold production (EFH), as indicated in the formula below. In a similar manner, if heat/cold is imported from a plant situated outside the local authority, then the share of CO_2 emissions of this plant that correspond to heat/cold consumed in the territory of the local authority should be accounted for when calculating the emission factor (see formula below).

The following formula may be applied to calculate the emission factor for heat, taking the above mentioned issues into consideration.

EFH = (CO2LPH + CO2IH – CO2EH) / LHC

Where

EFH = emission factor for heat [t/MWh_{heat}]

CO2LPH = CO_2 emissions due to the local production of heat (as per table D of the template) [t]

CO2IH = CO_2 emissions related to any imported heat from outside the territory of the local authority [t]

CO2EH = CO_2 emissions related to any heat that is exported outside of the territory of the local authority [t]

LHC = Local heat consumption (as per table A) [MWh_{heat}]

A similar formula may apply for cold.

District cooling, i.e. purchased chilled water, is in principle a similar product as purchased district heating. However, the process to produce district cooling is different from the process to produce district heating, and there is a larger variety of production methods.

If local production of district cooling occurs, or if district cooling is consumed as a commodity by end-users, the local authority is recommended to contact the district cooling provider for information on the use of fuels or electricity to provide cooling. Then the emission factors for fuels and electricity presented in the Sections above can be applied.

3.5.1 Combined heat and power production (CHP)

Part or all of the heat used in the territory of the local authority may be generated in a combined heat and power (CHP) plant. It is essential to divide the emissions of a CHP plant between heat and electricity when filling Tables C and D of the template. This is especially the case when the heat is used locally (input to the BEI), but the electricity is sold to the regional grid (no direct input to BEI).

The fuel use and emissions can be allocated between heat and electricity generation by using the following Equation:

$$CO2_{CHPH} = \frac{\frac{P_{CHPH}}{\eta_h}}{\frac{P_{CHPH}}{\eta_h} + \frac{P_{CHPE}}{\eta_e}} * CO2_{CHPT}$$

$CO2_{CHPE} = CO2_{CHPT} - CO2_{CHPH}$

Where
$CO2_{CHPH}$ denotes CO_2 emissions from heat production [t CO_2]
$CO2_{CHPE}$ denotes CO_2 emissions from electricity production [t CO_2]
$CO2_{CHPT}$ denotes total CO_2 emissions of the CHP plant calculated based on fuel consumption and fuel-specific emission factors [t CO_2]
P_{CHPH} denotes the amount of heat produced [MWh_{heat}]
P_{CHPE} denotes the amount of electricity produced [MWh_e]
η_h denotes the typical efficiency of separate heat production. The recommended value to be used is 90%.
η_e denotes the typical efficiency of separate electricity production. The recommended value to be used is 40%.

3.6 Other sectors

In the case of other sectors, the emissions of which are not related to fuel combustion, the local authority is recommended to use methodologies developed by specialised organisations.

If the local authority has chosen to use the standard emission factors in line with IPCC principles, it may consider using the methodologies of Local Governments for Sustainability (ICLEI) and Intergovernmental Panel on Climate Change (IPCC).

The ICLEI's International Local Government GHG Emissions Analysis Protocol (IEAP) also includes peer reviewed and approved Specific Country Supplements for certain countries, with country-specific

emission factors. Supplements for Italy, Spain and Poland are currently under development. The activity will be extended to other European countries as resources become available.

The IEAP and country supplements are available at
www.iclei.org/ghgprotocol

The 2006 IPCC Guidelines are available at
http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html

If the local authority has chosen to use the LCA emission factors, such emission factors for landfills are available from the ELCD database:

http://lca.jrc.ec.europa.eu/lcainfohub/datasetList.vm?topCategory=End-of-life+treatment&subCategory=Landfilling

4 Activity data collection

4.1 Introduction

The key issues in collecting activity data in the context of the CoM are:

- The data should be relevant to the particular situation of the local authority. For example, estimates based on national averages would not be appropriate, as in the future, they would only reflect trends occurring at national level, and they would not allow taking the specific efforts made by the local authority to reach its CO_2 targets into account.
- The data collection methodology should be consistent through the years: if the methodology changes, this may cause changes in the inventory which are not due to any action of the local authority to reduce its CO_2 emissions. For this reason, it is important to document very clearly the way data are collected and inventories are carried out, so that consistency can be kept in the future years. In the case of methodological changes, recalculation of the BEI may be necessary (see chapter 7)
- The data should cover at least all sectors in which the local authority intends to take action, so that the result of those actions can be reflected in the inventory.
- The sources of data used should be available in the future.
- Within the limits of possibility, the data should be accurate, or at least represent a vision of the reality.
- The collection process and data sources should be well documented and publicly available, so that the BEI elaboration process is made transparent and stakeholders can be confident with the inventory.

4.2 Final energy consumption

Reducing final energy consumption should be considered as a priority in the SEAP. The final energy consumption should be reported in Table A of the template (see annex II).

Final energy consumption is split into 2 main sectors, for both of which data are mandatory:

1. Buildings, equipment/facilities and industry
2. Transport

Those sectors are in turn divided into sub-sectors. See Table 1 for the details of the sectors to be covered.

Note: the term "equipment/facilities" covers all energy consuming entities that are not buildings (e.g. water treatment units). In the case there is a waste incineration plant that does not produce electricity or heat, the fuel (waste) incinerated is included in row “Municipal buildings, equipment/facilities” in Table A. The renewable fraction (i.e. biomass) is included in the column “other biomass” and the non-renewable part in the column “Other fossil fuels”.

Notes about the energy carriers referred to in Table A of the template:

- "Electricity" refers to the total electricity consumed by end-users, whatever the production source is. If the local authority is purchasing certified green electricity, please complete also the cell below the table. In the LCA approach, also the corresponding emission factor needs to be specified. "Certified green electricity" means electricity produced from renewable energy sources covered by Guarantee of origins as per Article 5 of Directive 2001/77/EC, Article 15 of Directive 2009/28/EC and Article 3 (6) of Directive 2003/54/EC. Electricity consumption is reported in the table as the amount of electricity consumed by end-user, MWh_e.
- "Heat/cold" refers to heat/cold that is supplied as a commodity to end-users within the territory (for example from district heating/cooling system, a CHP plant or waste heat recovery). Heating produced by end-users for their own use should not be included here, but under the columns of the energy carriers that produce the heat (fossil fuels or renewable energies). With the exception of CHP heat: as a CHP unit also generates electricity, it is preferable to include it under production (tables C and D), especially if it concerns large units. Heat/cold consumption is reported in the table as the amount of heat/cold consumed by end-user, MWh_{heat} / MWh_{cold}.
- "Fossil fuels" cover all fossil fuels consumed as a commodity by final end-users. It includes all fossil fuels bought by end-users for space heating, sanitary water heating, or cooking purposes. It also includes fuels consumed for transportation purposes, or as an input in industrial combustion processes[9]. Fossil fuel consumption is reported in the table as the amount of fuel consumed by end-user, MWh_{fuel}.
- “Renewable energies” covers all plant oil, biofuels, other biomass (e.g wood), solar thermal and geothermal energy consumed as a commodity by final end-users. Note: If peat is consumed within the local authority, it should be accounted for in the "other fossil fuel" column (even if it is not strictly speaking a fossil fuel). Renewable fuel consumption is reported in the table as the amount of fuel consumed by end-user, MWh_{fuel}. Renewable heat consumption is recorded as the amount of heat consumed by the end-user, MWh_{heat}.

4.2.1 Buildings, equipment/facilities and industries

a) Municipal buildings and equipment/facilities

In principle, the local authority should be able to collect accurate and comprehensive energy consumption data related to its own buildings and facilities. Well-advanced local authorities already have a full energy accounting system in place. For other local authorities who have not yet initiated such a process, the energy data collection could require the following steps:

- identify all buildings and facilities owned / managed by the local authority
- within those buildings and facilities, identify all energy delivery points (electricity, natural gas, heat from heating district network, fuel oil tanks, …)
- for all those energy delivery points, identify the person / department receiving the invoices and energy data.
- organise a centralised collection of these documents/data

[9] Only if the SEAP includes actions in this sector. However, energy use of industries involved in EU ETS is excluded.

- select an appropriate system to store and manage the data (could be a simple Excel sheet or a more elaborate software, available commercially).
- make sure the data are collected and introduced in the system at least every year. Tele measurement is possible and can ease the process of data collection.

Note that this process of data collection may be the opportunity to deal with other important energy related issues:

- rationalise the number of energy delivery and invoicing points
- renew/improve contractual arrangements with energy suppliers
- initiate a real energy management process within the territory of the local authority: identify buildings which consume most energy and select them for priority action, such as daily / weekly / monthly monitoring of energy consumption allowing to identify abnormalities and take immediate corrective action etc (see chapter 8.1 in Part I of this guidebook)

Regarding heating fuel oil or other energy carriers delivered periodically as bulk, it is often preferable to install a measurement device (gauge, metre …) to help determine exactly the quantity of energy consumed during a given period. An alternative is to assume that the fuel purchased each year is equal to fuel consumed. This is a good assumption if the fuel tanks are filled at the same period each year, or if many deliveries of fuel occur each year.

Renewable heat and cold produced and consumed locally by end-users should be measured and reported separately (columns related to "Renewable energies" in Table A of the template).

It is important that all fuel supplied for purposes of producing electricity or district heating or cooling are tracked and reported separately as fuel used for electricity or district heating/cooling generation (Tables C and D of the template).

If the local authority buys green electricity of guaranteed origin, this will not affect its energy consumption, but it may be counted as a bonus to improve the CO_2 emission factor (see Section 3.4.3). The quantity of such green electricity has to be derived from the supplier's invoices, which indicate the origin of the electricity. The amount of green electricity purchased has to be reported in Table A of the SEAP template.

b) Municipal public lighting

The local authority should be able to collect all data regarding Municipal public lighting. If it is not the case, an identification and data collection process similar to the one indicated in the previous paragraph may have to be initiated. In some cases, it may be necessary to place additional meters, for instance when an electricity supply point feeds both public lighting and building/facilities.

Note: any non-municipal public lighting should be referred in the category "Tertiary (non municipal) buildings, equipment/facilities".

c) Other buildings and facilities:

This section covers:

- Tertiary (non municipal) buildings, equipment/facilities
- Residential buildings
- Industries (optional, excluding industry part of EU Emission trading scheme)

Collecting information from every individual energy consumer within the territory of the local authority is not always possible or practical. Therefore, a variety of approaches are likely to be needed to develop an estimate of energy consumption. Several options are available, and often a combination of them is necessary to have an overall picture of the energy consumption within the territory of the local authority:

► Get data from the market operators

Since the liberalisation of gas and electricity market, the number of actors has increased, and the data related to energy consumption is becoming commercially sensitive and therefore more difficult to obtain from energy suppliers. Therefore, in order to get the data from them, you have to identify which suppliers are active on the territory of the local authority and prepare a table that they would have to fill.

As several energy suppliers may be active, it may be simpler to contact grid operators (for heat, gas and electricity) whenever possible (it is not very likely that more than one of them is active on the territory of a single municipality, for each energy carrier).

Note that such data are generally considered as commercially sensitive and that in the best case you will probably be able to get only aggregated data. Ideally, a disaggregation between the residential, services and industry sectors, for the different energy carriers (electricity, natural gas…) for all the postal code(s) that relate to your municipality should be obtained.

If a greater level of disaggregation is available, then do not hesitate to ask for it (e.g. you should distinguish between the various sub-sectors for services and industry, and ask whether for private or public, individual houses or apartments …). If the NACE code (statistical classification of economic activities in the European Community)[10] is available, this could help to classify the energy consumption in the appropriate sector. However, the NACE code may be misleading: offices of an industrial company will be classified as industrial, whereas they rather belong to the tertiary sector (they do not correspond to an actual industrial activity in the local authority's territory). Some fine-tuning or questionnaires may be necessary to solve this question.

Other interesting information relates to the names and addresses of the largest energy consumers within the territory of the local authority, and their overall energy consumption (individual energy consumption is not likely to be available as it would be commercially too sensitive). This may be useful for targeted actions and questionnaires (see further).

► Get data from other entities

Energy suppliers and grid operators may be reluctant to provide consumption data to the local authority (for reasons related to confidentiality, commercial secrecy, and administrative burden especially in the case where many local authorities would ask similar data from the same operators).

However, valuable data may be available at regional or national level (from statistical, energy, environmental, or economic ministries or agencies, supporting structures of the Covenant of Mayors, or from regulatory authorities for gas and electricity).

In addition, energy market operators have the obligation to "provide on request, but not more than once a year, aggregated statistical information on their final customers" to an agency assigned by the Government (Directive 2006/32/EC on energy end-use efficiency and energy services, article 6). Thus the data should be available somewhere and you should contact the energy ministry of your country to know what data are available from this channel and how to obtain it.

► Inquiries addressed to energy consumers

If all data cannot be obtained in the desired format from the market operators or from other entities, it may be necessary to make some inquiries directly to the energy consumers, in order to obtain the missing data.

This is especially the case for energy carriers which do not pass through a centralised grid (fuel oil, wood, natural gas supplied in bulk, etc). If it is not possible to identify all suppliers active in the territory of the local authority and to get data from them, it may be necessary to ask the consumers themselves.

[10] See REGULATION (EC) No 1893/2006 of 20 December 2006 establishing the statistical classification of economic activities NACE Revision 2 and amending Council Regulation (EEC) No 3037/90 as well as certain EC Regulations on specific statistical domains.

It is worth bearing in mind that energy or statistical agencies may already be collecting such data, so make sure that data are not available elsewhere before considering sending a questionnaire.

Several options are possible:

- For sectors where there is a large number of small consumers (like the residential sector), we recommend addressing a questionnaire to a representative sample of the population (for example 1000 households), spread over all districts of the local authority. The questionnaire may be on-line, but in this case make sure that this does not prevent some categories of customers from providing data, otherwise the results will be biased.
- For sectors where the number of players is limited, it may be worthwhile addressing the questionnaire to all energy consumers (this may be the case for example for the industrial sector).
- For sectors where there is a great number of players, but where there are some large ones (e.g. tertiary sector), it may be worthwhile making sure to address the questionnaire at least to all large players (e.g. all supermarkets, hospitals, universities, housing companies, large office buildings, etc). Their identification can be done through knowledge, statistical or commercial data (such as telephone directories) inquiry to the grid operator (ask who are the 1000 largest electricity/gas consumers in the territory of the local authority). Another option to identify large electricity consumers is to ask grid operators the identity of all consumers connected to the middle and high voltage distribution networks (or even to the transmission network in some extreme cases).

What to ask?: It may be tempting to ask a lot of questions in the questionnaire (e.g. is your building insulated, do you have solar panels, have you recently done energy efficiency improvements, do you have air conditioning, etc?). However, it should be kept in mind that it is very important to keep the questionnaire simple and short (ideally not more than 1 page), in order to obtain a satisfactory rate of answers. Besides the type and quantity of energy consumed and eventual local energy production (renewable, CHP …), we recommend to ask at least 1 or 2 questions related to variables that can explain the energy consumption (for comparison or extrapolation purposes), for example floor space (m^2) of a building, and/or number of inhabitants, or number of pupils in a school, etc. For industry or services, ask the branch they belong to (propose some categories, if possible). For the residential sector, it is useful to ask questions that would allow extrapolation of the collected data. This depends on what kind of statistical information is available at the municipal level. It could be for example: household size (number of occupants), class of revenue, location (postal code and/or rural/urban area), dwelling type (detached house, semi-detached house, apartment), size of the dwelling (m^2), etc.

Tips:

- Make sure the questions are clear and precise so that they will be understood by all in the same manner. Provide some short instructions if necessary.
- To increase the amount and quality of answers, inform clearly about the purpose of the questionnaire (energy statistics and not tax purpose for example). Motivate people to answer (for example, inform that the questionnaire allows to measure progress in reaching the CO_2 reduction objectives of the local authority, or provide any other incentive you find relevant).
- Make the inquiries anonymous (especially in the residential sector) and explain that the data will be kept confidential.
- Do not hesitate to send reminders to those who do not reply on time, in order to increase the rate of answers; and to call directly the largest energy consumers to make sure they reply.
- Make sure that the collected data sample is representative of the population. You should be aware that the response rate is generally low and those who respond are generally the most educated and climate-aware, and therefore there is the risk that the data collected is

strongly biased, even if the questionnaire was addressed to a representative sample of the population. To avoid this, it may be advisable to organise data collection via face-to-face or phone interviews, especially in the residential sector.

- Decide in advance what you want to do with the data collected, to make sure that you really ask the useful and necessary questions.
- Do not hesitate to get the help of specialists (statisticians) to design your inquiry.
- It is advisable to communicate in advance your aims (SEAP development) through the local media, explaining the context and expected benefits for your local community.

What to do with the data?

Generally speaking, data collected via inquiries should help you to construct the energy and CO_2 data related to the territory of the local authority. Here are a few examples of possible usages:

- aggregated data should be broken down into sectors and sub-sectors, in order to target your actions and measure the results achieved by different target groups.

- extrapolate some ratios obtained from the sample to the overall energy consumption. For example if you know the overall energy and gas consumption of a given sector, but you do not know its heating fuel oil consumption, you could extrapolate the electricity/fuel oil ratio or natural gas/fuel oil ratio of your sample to the whole population, provided your sample is representative.

► Making estimates

From data collected via a sample of the population (see above), you could estimate the overall consumption. For example, from the sample data you could calculate the energy consumption per square metre or per inhabitant in the household sector for different types of buildings and different classes of revenues, and extrapolate to the entire sector using statistical data related to the territory of the local authority.

Ideally, this kind of exercise should be done with the help of statisticians to make sure the data collected and method of extrapolation provide results that are statistically meaningful.

In addition, checks should be carried out to make sure that the overall results are compatible with the data available at a more aggregate level.

Notes:

- If energy consumption data cannot be disaggregated between individual sectors (i.e. residential, services and industry), then report the total consumption in the template and do not fill in the data at the sector level.
- If the data collected do not allow the possibility to distinguish the municipal consumption from other usages, then there is a risk of double counting. To avoid this, subtract the municipal usage (calculated separately, see above) from the overall energy consumption of each sector and report each of them in the relevant section of the template.

4.2.2 Road transportation

Road transportation in the territory of the local authority can be divided into two parts:

a) Urban road transportation, which includes road transportation on the local street network that is usually in the competence of the local authority. The inclusion of this sector in the BEI is strongly recommended.

b) Other road transportation, which includes road transportation in the territory of the local authority on the roads that are not in the competence of the local authority. An example of such road transportation is transportation on a highway that goes through the territory

of the local authority. These emissions can be included in the BEI if the local authority intends to include measures to reduce these emissions in the SEAP.

The same methods can be used to estimate emissions of both urban and other road transportation.

The activity data for the road transportation sector is the amount of fuel consumed in the territory. Usually the amount of fuel used is not equal to the amount of fuel sold (see Box 5). Therefore, the estimate of the fuel used has to be based on estimates of:

- Mileage driven in the territory of the local authority [km]
- Vehicle fleet in the territory of the local authority (cars, buses, two-wheelers, heavy and light-duty vehicles)
- Average fuel consumption of each vehicle type [l fuel/km]

The EMEP/EEA Guidebook (2009) and the 2006 IPCC Guidelines provide detailed guidance on the estimation of activity data for the road transportation sector. Even though the focus of these guidelines is on the national level, the information can be useful also to understand the principles for calculation of emissions at local level.

Box 5. Use of fuel sales data to estimate emissions from transportation

The local authority may consider that it is easier to collect data on local fuel sales than to estimate fuel use based on estimates of mileage driven. The study of Kennedy et al. (2009) concluded, that use of fuel sales data is appropriate for cities for which the number of vehicle trips over the border of the city is small relative to the number of trips within the city. They compared the results of using fuel sales data, scaling down from wider regions, and estimating emissions based on mileage for three megacities: Toronto, New York City and Bangkok, and concluded that the differences between the methods may be less than 5%.

However, fuel sold in the territory of the local authority may not in all the cases correctly reflect the fuel used in the territory. The amount of fuel sold and fuel consumed may be different for various reasons (comfort of fuelling, availability of filling stations, prices etc). This is the case especially for smaller cities in which the number of filling stations is small. In addition, the factors having an impact on fuel sales may change in time (for example opening/closing of filling stations) and therefore the changes in fuel sales data may not correctly reflect the changes in traffic (fuel use).

Mileage driven

The mileage driven on the street network of the local authority can be estimated based on information on traffic flows and length of the street network. As the first step, the local authority is recommended to search for information from one of the potential data sources listed below.

- The transport department of the local authority may have estimated vehicle flows and mileage driven for transport planning purposes.
- National or local street administration often carries out sample surveys, either automatic or manual. In these surveys, the numbers of vehicles passing fixed points are counted. Some surveys count vehicle numbers by type of vehicle, but information on the fuel (e.g. diesel or gasoline) is usually not available.
- Household transport surveys (origin and destination surveys)

- Mobility in cities database contains information on transportation in selected cities for the year 2001. The data are not available free of charge, but can be purchased at

  http://www.uitp.org/publications/index2.cfm?id=5#MCDBIS

In the case of the local authority's own fleet and public transportation fleet the mileage driven can be estimated using the information in the odometers of the vehicles. However, attention has to be paid to the fact that the BEI/MEI should consider only mileage driven in the territory of the local authority.

In the case of contracted services for public transport or other services, the information should be available from the operator.

The local authority may find it difficult to collect mileage data. However, data collection is of great importance, because without such information the actual impact of the measures taken cannot be estimated.

Vehicle fleet distribution

The vehicle fleet distribution indicates the share of each vehicle type of the mileage. At minimum, the fleet distribution should distinguish between

- passenger cars and taxis
- heavy and light-duty vehicles
- buses and other vehicles used for public transport services
- two-wheelers

The fleet distribution can be estimated based on one of the following sources:

- traffic counts as discussed above
- vehicles registered in the municipality
- national statistics
- Eurostat statistics at national or regional level

Use of any of the data sources above should be accompanied with a consideration on whether it represents an appropriate estimate of the distribution of mileage driven in the territory of the local authority. The data can be adjusted to better suit to the local authority's territory if needed. For instance, the share of mileage driven in a city by heavy-duty vehicles may be lower than the share of heavy duty vehicles registered at national level.

Some of the existing tools for local emission inventories may include default fleet distributions for different regions. These can be used if they are considered appropriate by the local authority.

Average fuel consumption per km

Average fuel consumption of each vehicle category depends on the types of vehicles in the category, their age and also on a number of other factors, such as the driving cycle. The local authority is recommended to estimate average fuel consumption of vehicles driving on the street network based on polls, information from inspection agencies or information on vehicles registered in the municipality or in the region. Auto clubs and national transport associations are also sources of useful information.

Use of national level average fuel consumption for each vehicle category may produce biased estimates, in particular for urban areas. This might occur especially in countries with a dense motorway network linking cities and where a high number of rural trips are made, as the figures for fuel consumption would not be representative for urban areas.

Especially if the local authority is planning measures to reduce the average fuel consumption of vehicles, for instance by promoting the use of electric or hybrid vehicles, it is recommended not to use national or

European average fuel consumption figures, but to make a more detailed estimate (as explained above) including hybrid and electric cars separately. This is because if averages are used, the reduction in fuel consumption due to measures will not be visible when comparing the BEI and MEI.

Calculation of activity data

The activity data for each fuel and vehicle type will be calculated by the following equation:

Fuel used in road transportation [kWh] = mileage [km] x average consumption [l/km] x conversion factor [kWh/l]

The most typical conversion factors are presented in Table 7. A full list of conversion factors (net calorific values) is presented in Annex I. An example of the use of the Equation is given in Box 6.

Table 7. Conversion factors for the most typical transportation fuels (EMEP/EEA 2009; IPCC, 2006).

Fuel	Conversion factor (kWh/l)
Gasoline	9.2
Diesel	10.0

Box 6. Example of calculation of activity data for road transportation.

	Passenger cars	Light duty vehicles	Heavy duty vehicles	Busses	Two wheelers	Total
Mileage (million km) from activity data collection						
Total						2100
Fleet distribution from activity data collection (as % of mileage)						
Total mileage	80%	10%	2%	4%	4%	100%
-Gasoline	50%	3%			4%	57%
-Diesel	30%	7%	2%	4%		43%
Average fuel consumption from activity data collection (l/km)						
Gasoline	0.096	0.130			0.040	
Diesel	0.069	0.098	0.298	0.292		
Calculated mileage (million km)						
Gasoline	1050	63			84	1197
Diesel	630	147	42	84		903
Calculated consumption (million l fuel)						
Gasoline	100.8	8.19	0	0	3.36	
Diesel	43.47	14.406	12.516	24.528	0	
Calculated consumption (GWh)						
Gasoline	927	75	0	0	31	1034
Diesel	435	144	125	245	0	949

Share of biofuels

If the local authority plans to promote the use of biofuels, produced in a sustainable manner, in the SEAP, it is important to estimate the share of biofuels in the fuel used in the territory of the local authority. This can be done, for instance, by making polls to the most important fuel distributors in the territory of the local authority and surrounding areas.

In the case of the use of biofuels in the municipal fleet (beyond the average use in the territory), the local authority is likely to have access to the amount of biofuel consumed, especially if special filling stations are used for municipal fleet.

If the local authority does not intend to promote biofuels in the SEAP, a national average share of biofuels can be used. This information can be found from the reports of the Member States on the promotion of the use of biofuels or other renewable fuels for transport. The reports are available at:
http://ec.europa.eu/energy/renewables/biofuels/ms_reports_dir_2003_30_en.htm

4.2.3 Rail transportation

Rail transportation in the territory of the local authority can be divided into two parts:

a) Urban rail transportation, for example tram, metro and local trains. The inclusion of this sector in the BEI is strongly recommended.
b) Other rail transportation, which covers the long-distance, intercity and regional rail transportation that occurs in the territory of the local authority. Other rail transportation does not only serve the territory of the local authority, but a larger area. Other rail transportation includes also freight transport. These emissions can be included in the BEI if the local authority has included measures to reduce these emissions in the SEAP.

The same methods can be used to estimate emissions of both urban and other rail transportation.

There are two types of activity data for rail transportation: consumption of electricity and consumption of fuel in diesel locomotives. Use of diesel locomotives in urban rail transportation is less common for local services.

Number of providers of rail transport in the territory of the local authority is usually low. The local authority is recommended to ask the annual electricity and fuel use data directly from the service providers. If such data are not available, the local authority can estimate the emissions based on mileage travelled and average electricity or fuel consumption.

4.3 Local electricity production (if applicable)

Identification of local electricity production plants that are included in the BEI is explained in Section 3.4.2.

For larger plants (such as CHPs), the data should be obtained via direct contact with the plant managers. For smaller units (domestic PV installations), the data can either be obtained through questionnaires or derived from statistics related to the amount of installations present in the territory of the local authority: number of permits delivered if such installations require a permit, number of subsidies granted or regional/national statistics with a sufficient level of disaggregation.

Market operators may also have data about entities that provide electricity to the grid and may help to identify them.

All plants that are to be included in BEI/MEI should be listed in Table C of the SEAP template (see Annex II), with corresponding quantity of locally generated electricity, energy inputs, and corresponding

CO_2 emissions. Make sure that all energy used as an input for plants listed here is excluded from fuel consumption in Table A, in order to avoid double counting.

4.4 Local heat/cold production

Identification of local heat/cold production plants that are included in the BEI is explained in Section 3.5.

The data should be obtained via direct contact (or questionnaires) with the plant managers, as mostly large units will be listed here. All plants that are to be included in BEI/MEI should be listed in Table D of the SEAP template (see Annex II), with the corresponding quantity of generated heat/cold, energy inputs, and corresponding CO_2 emissions. Make sure that all energy used as an input for plants listed here is excluded from fuel consumption in Table A.

Note: the case of micro cogeneration

Micro cogeneration units may be too small, too numerous and scattered to obtain individual data about them. In such a case, the energy input of those units should be reported in Table A as final energy consumption, and consequently the heat and electricity produced should not be reported in Tables C and D. In addition, the electricity produced should not be accounted for as electricity consumption in Table A.

On the contrary, if data are available (for example via support schemes, sales data from suppliers), then micro cogeneration units could be reported in Tables C and D, with the energy input and heat/electricity production data.

4.5 Other sectors

In the case of other sectors, the emissions of which are not related to fuel combustion, the local authority is recommended to use methodologies developed by specialised organisations. The local authority may consider using the methodologies of Local Governments for Sustainability (ICLEI) or Intergovernmental Panel on Climate Change (IPCC).

The ICLEI's International Local Government Greenhouse Gas Emissions Analysis Protocol (IEAP) is available at
www.iclei.org/ghgprotocol

The 2006 IPCC Guidelines are available at
http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html

5 Reporting and documentation

5.1 Reporting of BEI/MEI

The Covenant Signatories commit themselves to submitting their SEAP, including the BEI within the year following signing up to the Covenant of Mayors.

Furthermore, the Signatories are committed to submit an implementation report at least every second year after the submission of the SEAP for evaluation, monitoring and verification purposes. The monitoring emission inventory (MEI) is a recommended part of such an implementation report.

The local authority is encouraged to compile emission inventories on an annual basis. The advantages are:

- closer monitoring and better understanding of the various factors that influence the CO_2 emissions
- annual input to policy-making, allowing quicker reactions
- the specific expertise necessary for inventories can be maintained and consolidated

However, if the local authority considers that such regular inventories put too much pressure on human or financial resources, it may decide to carry out the inventories at larger intervals. The Signatories are committed to submit an implementation report at least every second year. Consequently, an MEI should be included in at least every second implementation report. This means that an MEI is carried out and reported at least every fourth year.

The Baseline Emission Inventory will be documented by using Tables A-D in the SEAP template. The SEAP template also includes instructions on how the BEI data should be filled in.

In addition to filling in the Tables A-D in SEAP template, the local authority is encouraged to make an inventory report for each inventory. It is recommended to include the following information in the inventory report:

- information about the geographical boundaries of the local authority
- choice of emission factor approach (standard or LCA)
- emission reporting unit (CO_2 or CO_2-equivalent)
- choices made regarding inclusion of voluntary sectors and sources
- identification of local electricity generation plants
- identification of local heat/cold plants
- information on data collection methods
- emission factors used and their sources
- assumptions made
- references used
- information on any changes related to approach/methodology/data sources etc since the previous inventory
- eventual comments that would help to understand and interpret the inventory. For example, it may be useful to provide exploitations on which factors have influenced CO_2 emissions since last inventories, such as economic conditions or demographic factors
- names and contact information of people who provided information for the inventory

It is in the interest of the local authority to document the inventory and to archive the files, for example spreadsheets used for the compilation of BEI. This will facilitate the compilation of the MEI in the following years.

5.2 *Per capita* target

The local authority can decide to set the overall CO_2 emission reduction target either as 'absolute reduction' or '*per capita* reduction'. The local authority is recommended to report on the choice in the inventory report.

Despite the choice, the emissions in BEI are first calculated as absolute emissions. In case the '*per capita* reduction' is chosen, the emissions of the baseline year are divided by the number of inhabitants in the same year, and these 'emissions *per capita* in the baseline year' are used as a basis for calculation of the target.

In case the '*per capita*' approach is chosen, the local authority is recommended to report the results of the BEI/MEI both as absolute emissions and *per capita*. In the SEAP template the emissions are reported as absolute emissions with no correction for population.

5.3 Temperature correction

The local authority may choose to use temperature correction for emissions from space heating when reporting the emissions and monitoring the progress towards target. Temperature corrected emissions can be calculated using the following equation:

$LHC\_TC = LHC * HDD_{AVG} / HDD$

LHC_TC = temperature corrected heat consumption in year x [MWh_{heat}]
LHC = actual heat consumption in the year x [MWh_{heat}]
HDD_{AVG} = heating degree days in an average year (defined over a certain time period) [K · d]
HDD = heating degree days in the year x [K · d]

Heating degree days (HDD) denote the heating demand in a specific year. HDD is derived from daily temperature observations, and defined relative to a base temperature - the outside temperature above which a building needs no heating. For each day, during which the temperature is below the base temperature, the HDD is the difference of the base temperature and actual temperature. See Box 7 for an example.

In some Member States, meteorological offices provide HDD data for different parts of the country. HDD_{AVG} denotes a long-term average of heating degree days, which may also be available from the meteorological office. If a long-term average is not available, the local authority may keep the BEI emissions uncorrected, and correct the emissions in MEI using the HDD of baseline year instead of average.

Similar approach can also be used to correct the emissions from cooling based on cooling demand.

Box 7. Calculation of heating degree days (HDD).

Heating of buildings in the territory of local authority usually begins when the outside temperature is less than 15 degrees Celsius. The local authority collects the data for each of the days of the year in the table below, and as a sum of the results, the local authority gets the annual HDD.

Day	temperature	Difference to base temperature (when smaller than base temperature)	HDD_day
Day 1	12	3	3
Day 2	9	6	6
Day 3	5	10	10
Day 4	-2	17	17
...	...	...	...
...	...	...	...
Day 365	17	0	0
HDD (total of the year)			700

6 Use of existing tools and more advanced methodologies

There are a number of tools available for compilation of local emission inventories. The tools are offered by, for instance, local authorities' networks, such as Climate Alliance and ICLEI. The report "Existing methodologies and tools for the development and implementation of SEAPs"[11] gives an overview of the most commonly used methodologies and their suitability for the compilation of BEI.

[11] Available at http://re.jrc.ec.europa.eu/energyefficiency/pdf/CoM/Methodologies_and_tools_for_the_development_of_SEAP.pdf

As explained in the report, none of the existing tools match completely the recommended criteria specified here for BEI/MEI. The largest differences occur in the selection of scope and sectors, especially in relation to inclusion of local energy production. In the case of transportation, many tools are in line with the specifications of BEI/MEI.

The local authority is free to choose any methodology or tool that it considers suitable for the compilation of BEI/MEI. However, the local authority is recommended to ensure that the results of the inventory are in line with the specifications given for BEI/MEI in these guidelines and in the SEAP template and accompanied instructions.

The local authority is welcome to use more advanced methods than those described in these guidelines, if the method is in line with the present specifications for BEI/MEI.

7 Recalculations

In general, once the BEI is completed, there is no need to change the numbers later on. By using similar methods also in the MEI, the local authority can ensure that the results are consistent, and thus the difference between MEI and BEI correctly reflects the changes of emissions between the baseline year and the monitoring year. However, there are a few occasions when recalculation of BEI is needed to ensure consistency between the emission estimates of BEI and MEI. Examples of such occasions are:

- industry delocalisation
- new information on emission factors
- methodological changes
- changes in the local authority's boundaries

Emission reductions due to industry delocalisation are explicitly excluded from the Covenant of Mayors. In these guidelines, industry delocalisation means a full and permanent closure of an industrial plant, the emissions of which represented more than 1% of the baseline emissions. An example of recalculation due to industry delocalisation is presented in Box 8.

Recalculation due to new information on emission factors or methodological changes has to be carried out only in the case that the new information reflects the situation in the baseline year more accurately than the information used in compilation of BEI (see Box 9). If real changes in emission factors have occurred between the baseline year and the monitoring year - for instance due to the use of different fuel types - then different emission factors will correctly reflect the changed circumstances, and recalculation is not needed[12].

[12] Extensive guidance for recalculation is given in the chapter "Time series consistency" of IPCC (2006), available at http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/1_Volume1/V1_5_Ch5_Timeseries.pdf

Box 8. Recalculation due to industry delocalization.

The local authority decided to include emissions from industrial plants not included in EU ETS in the BEI, because the SEAP included measures to improve energy efficiency in the plants. However, one of the plants (Plant A), the emissions of which were 45 kt CO_2 in the baseline year (1.4% of the baseline emissions), closed down before the monitoring year. Inclusion of this emission source in BEI but excluding it from MEI would mean that the local authority would gain benefit due to industry delocalisation. Therefore, the local authority has to recalculate the baseline year emissions so that the emissions of Plant A are excluded.

The BEI of the local authority, as reported in SEAP was as follows:

Category	**CO2 emissions (kt)**
Residential buildings	2000
…	…
Industries (excluding industry part of EU Emission trading scheme)	70
Subtotal buildings, facilities and industry	**2735**
…	
Subtotal transport	500
Total	**3235**

In the recalculated BEI inventory, the emissions of Plant A have been removed and the inventory is as follows:

Category	**CO2 emissions (kt)**
Residential buildings	2000
…	…
Industries (excluding industry part of EU Emission trading scheme)	25
Subtotal buildings, facilities and industry	**2690**
…	
Subtotal transport	500
Total	**3190**

Box 9. Recalculation due to new information on the emission factor

The local authority had used the standard emission factor provided in Table 4 to estimate the base year emissions from coal combustion in a local district heating plant. The emission factor was 0.341 t CO_2/MWh. In the monitoring year, the local authority asked the coal provider to give information on the carbon content and thus the emission factor, of the coal type provided. The coal provider informed the local authority that the emission factor of that coal type is 0.335 t CO_2/MWh, and that the same coal type has been provided to the city since many years.

If the local authority started to use the new emission factor only since the MEI, it would gain benefit, as estimated emissions would be lower than in BEI even if the same amount of fuel would be used. Therefore, the local authority has to recalculate the BEI using the same emission factor that will be used in the MEI.

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ANNEX I: CONVERSION FACTOR AND IPCC EMISSION FACTOR TABLES

Table A. Basic conversion factors

To	TJ	Mtoe	GWh	MWh
From	Multiply by:			
TJ	1	2.388×10^{-5}	0.2778	277.8
Mtoe	4.1868×10^{4}	1	11630	11630000
GWh	3.6	8.6×10^{-5}	1	1000
MWh	0.0036	8.6×10^{-8}	0.001	1

A unit converter is available at the website of the International Energy Agency (IEA): http://www.iea.org/stats/unit.asp

Table B. Conversion of fuels from mass to energy units (IPCC, 2006).

Fuel type	Net calorific value [TJ/Gg]	Net calorific value [MWh/t]
Crude Oil	42.3	11.8
Orimulsion	27.5	7.6
Natural Gas Liquids	44.2	12.3
Motor Gasoline	44.3	12.3
Aviation Gasoline	44.3	12.3
Jet Gasoline	44.3	12.3
Jet Kerosene	44.1	12.3
Other Kerosene	43.8	12.2
Shale Oil	38.1	10.6
Gas/Diesel Oil	43.0	11.9
Residual Fuel Oil	40.4	11.2
Liquefied Petroleum Gases	47.3	13.1
Ethane	46.4	12.9
Naphtha	44.5	12.4
Bitumen	40.2	11.2
Lubricants	40.2	11.2
Petroleum Coke	32.5	9.0
Refinery Feedstocks	43.0	11.9
Refinery Gas 2	49.5	13.8
Paraffin Waxes	40.2	11.2
White Spirit and SBP	40.2	11.2
Other Petroleum Products	40.2	11.2
Anthracite	26.7	7.4
Coking Coal	28.2	7.8
Other Bituminous Coal	25.8	7.2
Sub-Bituminous Coal	18.9	5.3
Lignite	11.9	3.3
Oil Shale and Tar Sands	8.9	2.5
Brown Coal Briquettes	20.7	5.8
Patent Fuel	20.7	5.8
Coke Oven Coke and Lignite Coke	28.2	7.8
Gas Coke	28.2	7.8
Coal Tar	28.0	7.8
Gas Works Gas	38.7	10.8
Coke Oven Gas	38.7	10.8
Blast Furnace Gas	2.47	0.7
Oxygen Steel Furnace Gas	7.06	2.0
Natural Gas	48.0	13.3
Municipal Wastes (non-biomass fraction)	10	2.8
Waste Oil	40.2	11.2
Peat	9.76	2.7

Table C. CO_2 emission factors for fuels (IPCC, 2006).

Fuel type	CO_2 emission factor [kg/TJ]	CO_2 emission factor [t/MWh]
Crude Oil	73300	0.264
Orimulsion	77000	0.277
Natural Gas Liquids	64200	0.231
Motor Gasoline	69300	0.249
Aviation Gasoline	70000	0.252
Jet Gasoline	70000	0.252
Jet Kerosene	71500	0.257
Other Kerosene	71900	0.259
Shale Oil	73300	0.264
Gas oil / diesel	74100	0.267
Residual Fuel Oil	77400	0.279
Liquefied Petroleum Gases	63100	0.227
Ethane	61600	0.222
Naphtha	73300	0.264
Bitumen	80700	0.291
Lubricants	73300	0.264
Petroleum Coke	97500	0.351
Refinery Feedstocks	73300	0.264
Refinery Gas	57600	0.207
Paraffin Waxes	73300	0.264
White Spirit & SBP	73300	0.264
Other Petroleum Products	73300	0.264
Anthracite	98300	0.354
Coking Coal	94600	0.341
Other Bituminous Coal	94600	0.341
Sub-Bituminous Coal	96100	0.346
Lignite	101000	0.364
Oil Shale and Tar Sands	107000	0.385
Brown Coal Briquettes	97500	0.351
Patent Fuel	97500	0.351
Coke oven coke and lignite Coke	107000	0.385
Gas Coke	107000	0.385
Coal Tar	80700	0.291
Gas Works Gas	44400	0.160
Coke Oven Gas	44400	0.160
Blast Furnace Gas	260000	0.936
Oxygen Steel Furnace Gas	182000	0.655
Natural Gas	56100	0.202
Municipal Wastes (non-biomass fraction)	91700	0.330
Industrial Wastes	143000	0.515
Waste Oil	73300	0.264
Peat	106000	0.382

ANNEX II: SEAP TEMPLATE TABLES FOR BASELINE EMISSION INVENTORY

BASELINE EMISSION INVENTORY

1) Baseline year

For Covenant signatories who calculate their CO2 emissions per capita, please precise here the number of inhabitants during the Baseline year:

2) Emission factors

Please tick the corresponding box:

- ○ Standard emission factors in line with the IPCC principles
- ○ LCA (Life Cycle Assessment) factors

Emission reporting unit

Please tick the corresponding box:

- ○ CO2 emissions
- ○ CO2 equivalent emissions

3) Key results of the Baseline Emission Inventory

Green cells are compulsory fields

A. Final energy consumption

Category	FINAL ENERGY CONSUMPTION [MWh]															
			Fossil fuels								Renewable energies					
	Electricity	Heat/cold	Natural gas	Liquid gas	Heating Oil	Diesel	Gasoline	Lignite	Coal	Other fossil fuels	Plant oil	Biofuel	Other biomass	Solar thermal	Geothermal	Total
BUILDINGS, EQUIPMENT/FACILITIES AND INDUSTRIES:																
Municipal buildings, equipment/facilities																
Tertiary (non municipal) buildings, equipment/facilities																
Residential buildings																
Municipal public lighting																
Industries (excluding industries involved in the EU Emission trading scheme - ETS)																
Subtotal buildings, equipments/facilities and industries																
TRANSPORT:																
Municipal fleet																
Public transport																
Private and commercial transport																
Subtotal transport																
Total																

Municipal purchases of certified green electricity (if any) **[MWh]:**	
CO2 emission factor for certified green electricity purchases (for LCA approach)**:**	

B. CO2 or CO2 equivalent emissions

Category	CO2 emissions [t]/ CO2 equivalent emissions [t]														
			Fossil fuels								Renewable energies				
	Electricity	Heat/cold	Natural gas	Liquid gas	Heating Oil	Diesel	Gasoline	Lignite	Coal	Other fossil fuels	Biofuel	Plant oil	Other biomass	Solar thermal	Geothermal
BUILDINGS, EQUIPMENT/FACILITIES AND INDUSTRIES:															
Municipal buildings, equipment/facilities															
Tertiary (non municipal) buildings, equipement/facilities															
Residential buildings															
Municipal public lighting															
Industries (excluding industries involved in the EU Emission trading scheme - ETS)															
Subtotal buildings, equipments/facilities and industries															
TRANSPORT:															
Municipal fleet															
Public transport															
Private and commercial transport															
Subtotal transport															
OTHER:															
Waste management															
Waste water management															
Please specify here your other emissions															
Total															

Corresponding CO2-emission factors in [t/MWh]	
CO2 emission factor for electricity not produced locally [t/MWh]	

C. Local electricity production and corresponding CO2 emissions

Locally generated electricity (excluding ETS plants , and all plants/units > 20 MW)	Locally generated electricity [MWh]	Energy carrier input [MWh]										CO2 / CO2-eq emissions [t]	Corresponding CO2-emission factors for electricity production in [t/MWh]
		Fossil fuels					Waste	Plant oil	Other biomass	Other renewable	other		
		Natural gas	Liquid gas	Heating oil	Lignite	Coal							
Wind power													
Hydroelectric power													
Photovoltaic													
Combined Heat and Power													
Other *Please specify: _____*													
Total													

D. Local heat/cold production (district heating/cooling, CHPs…) and corresponding CO2 emissions

Locally generated heat/cold	Locally generated heat/cold [MWh]	Energy carrier input [MWh]										CO2 / CO2-eq emissions [t]	Corresponding CO2-emission factors for heat/cold production in [t/MWh]
		Fossil fuels					Waste	Plant oil	Other biomass	Other renewable	other		
		Natural gas	Liquid gas	Heating oil	Lignite	Coal							
Combined Heat and Power													
District Heating plant(s)													
Other *Please specify: _____*													
Total													

SUSTAINABLE ENERGY ACTION PLAN

1) Title of your Sustainable Energy Action Plan

Date of formal approval | Authority approving the plan

2) Key elements of your Sustainable Energy Action Plan

Green cells are compulsory fields | Grey fields are non editable

SECTORS *& fields of action*	KEY actions/measures per field of action	Responsible department, person or company (in case of involvement of 3rd parties)	Implementation [start & end time]	Estimated costs per action/measure	Expected energy saving per measure [MWh/a]	Expected renewable energy production per measure [MWh/a]	Expected CO2 reduction per measure [t/a]	Energy saving target per sector [MWh] in 2020	Local renewable energy production target per sector [MWh]	CO2 reduction target per sector [t] in 2020
BUILDINGS, EQUIPMENT / FACILITIES & INDUSTRIES:										
Municipal buildings, equipment/facilities	Action 1: _____ Action 2: _____ ...	1: _____ 2: _____ ...	1: _____ 2: _____ ...	1: _____ 2: _____ ...	1: ___ 2: ___ ...	1: ___ 2: ___ ...	1: ___ 2: ___ ...			
Tertiary (non municipal) buildings, equipment/facilities										
Residential buildings										
Municipal public lighting										
Industries (excluding industries involved in the EU Emission trading scheme - ETS) & Small and Medium Sized Enterprises (SMEs)										
Other - please specify: _____										
TRANSPORT:										
Municipal fleet	Action 1: _____ Action 2: _____ ...	1: _____ 2: _____ ...	1: _____ 2: _____ ...	1: _____ 2: _____ ...	1: ___ 2: ___ ...	1: ___ 2: ___ ...	1: ___ 2: ___ ...			
Public transport										
Private and commercial transport										
Other - please specify: _____										
LOCAL ELECTRICITY PRODUCTION:										
Hydroelectric power	Action 1: _____ Action 2: _____ ...	1: _____ 2: _____ ...	1: _____ 2: _____ ...	1: _____ 2: _____ ...	1: ___ 2: ___ ...	1: ___ 2: ___ ...	1: ___ 2: ___ ...			
Wind power										
Photovoltaic										
Combined Heat and Power										
Other - please specify: _____										
LOCAL DISTRICT HEATING / COOLING, CHPs:										
Combined Heat and Power	Action 1: _____ Action 2: _____ ...	1: _____ 2: _____ ...	1: _____ 2: _____ ...	1: _____ 2: _____ ...	1: ___ 2: ___ ...	1: ___ 2: ___ ...	1: ___ 2: ___ ...			
District heating plant										
Other - please specify: _____										

LAND USE PLANNING:										
Strategic urban planning	Action 1: _____ Action 2: _____ ...	1: _____ 2: _____ ...	1: _____ 2: _____ ...	1: _____ 2: _____ ...	1: ___ 2: ___ ...	1: ___ 2: ___ ...	1: ___ 2: ___ ...			
Transport / mobility planning										
Standards for refurbishment and new development										
Other - please specify: _____										
PUBLIC PROCUREMENT OF PRODUCTS AND SERVICES:										
Energy efficiency requirements/standards	Action 1: _____ Action 2: _____ ...	1: _____ 2: _____ ...	1: _____ 2: _____ ...	1: _____ 2: _____ ...	1: ___ 2: ___ ...	1: ___ 2: ___ ...	1: ___ 2: ___ ...			
Renewable energy requirements/standards										
Other - please specify: _____										
WORKING WITH THE CITIZENS AND STAKEHOLDERS:										
Advisory services	Action 1: _____ Action 2: _____ ...	1: _____ 2: _____ ...	1: _____ 2: _____ ...	1: _____ 2: _____ ...	1: ___ 2: ___ ...	1: ___ 2: ___ ...	1: ___ 2: ___ ...			
Financial support and grants										
Awareness raising and local networking										
Training and education										
Other - please specify: _____										
OTHER SECTOR(S) - *Please specify: _____*										
Other - Please specify: _____	Action 1: _____ Action 2: _____ ...	1: _____ 2: _____ ...	1: _____ 2: _____ ...	1: _____ 2: _____ ...	1: ___ 2: ___ ...	1: ___ 2: ___ ...	1: ___ 2: ___ ...			
					TOTAL:					

3) Web address

Direct link to the webpage dedicated to your SEAP (if any)

More information: www.eumayors.eu.