Status of national contexts and state of the art about CREM processes (WP2)
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# Contents

## STATUS OF NATIONAL CONTEXTS AND STATE OF THE ART ABOUT CREM PROCESSES

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>3</td>
</tr>
<tr>
<td>2. National energy and CO2 emission saving policies</td>
<td>6</td>
</tr>
<tr>
<td>3. Overview of public building stock</td>
<td>14</td>
</tr>
<tr>
<td>4. National implementation of EPBD focus on public buildings</td>
<td>29</td>
</tr>
<tr>
<td>5. Energy end use and Energy efficiency for services directive [3]</td>
<td>50</td>
</tr>
</tbody>
</table>

## 2. National energy and CO2 emission saving policies

- Netherlands                                                          | 6    |
- France                                                               | 7    |
- Austria                                                              | 10   |

## 3. Overview of public building stock

- Netherlands                                                          | 14   |
- France                                                               | 18   |
- Austria                                                              | 24   |

## 4. National implementation of EPBD focus on public buildings

- Netherlands                                                          | 30   |
- France                                                               | 38   |
- Austria                                                              | 44   |

## 5. Energy end use and Energy efficiency for services directive [3]

### 5.1 Adoption of ee-esd by members states - the national energy efficiency action plans [neeaps]

- EPI-CREM Status of national contexts and state of the art about CREM processes, September 2008, WP2
5.2 National Energy Efficiency action plans - Focus on public sector................................. 52
  5.2.1 Netherlands ............................................................................................................ 52
  5.2.2 France .................................................................................................................. 54
  5.2.3 Austria .................................................................................................................. 56

6. Description of national CREM processes ................................................................. 59
  6.1 Four main functions in CREM .............................................................................. 59
  6.2 Overview of national CREM process for public buildings .................................... 61
    6.2.1 Netherlands ..................................................................................................... 61
    6.2.2 France .............................................................................................................. 64
    6.2.3 Austria .............................................................................................................. 67
      6.2.3.1 Real Estate Management at federal level ..................................................... 67
        6.2.3.1.1 Tasks of the Bundesimmobiliengesellschaft (BIG) ......................... 67
        6.2.3.1.2 Commission of the Burghauptmannschaft (BHÖ) ......................... 67
      6.2.3.2 Real estate management on local basis ....................................................... 68
        6.2.3.2.1 Tasks of the City Vienna concerning the construction and facility management ....................................................... 68
          6.2.3.2.2 The municipal program for energy-efficiency in Vienna (SEP) ...... 71
          6.2.3.2.3 Contracting Offensive .................................................................. 72
      6.2.3.3 Energy special representative of the federation and the provinces
        (Energiebeauftragte des Bundes und der Länder) ............................................. 74
    6.2.4 Short comparison between the three participating countries ......................... 75
      6.2.4.1 Public real estate management: task for government or privatised task? [6] ... 75
      6.2.4.2 Public real estate management as a public task: management of real estate
        management centralised or decentralised? [6] .............................................. 76
  6.3 Organisational structures ....................................................................................... 78
    6.3.1 Real estate management in large organizations ............................................... 78
    6.3.2 Real Estate management in medium sized organizations ............................... 79
    6.3.3 Real Estate management in small organizations ............................................. 79
    6.3.4 Structuring of decision making on energy-saving measures .......................... 79

7. Integration of energy saving in CREM process ...................................................... 81
  7.1 Description of “sheeq” aspects in CREM ............................................................... 81
    7.1.1 General description ....................................................................................... 81
    7.1.2 Inspections methods and experiences in Austria, Netherlands and France .... 82
  7.2 Decision making in CREM in relation with energy ............................................... 83
    7.2.1 Analysis of the four main functions in CREM and energy integration .......... 83
      7.2.1.1 Facility Management ........................................................................... 84
      7.2.1.2 Portfolio management ....................................................................... 85
      7.2.1.3 Asset management ............................................................................ 86
      7.2.1.4 Property & maintenance management .............................................. 87
        7.2.1.4.1 Inventory / inspection process ..................................................... 87
        7.2.1.4.2 Decision-making and implementation on annual plans ............... 88
    7.2.2 Synthesis – the place of energy in CREM process ........................................ 89
  7.3 Obstacles to energy-saving measures in existing non-residential building stock .... 90

8. Recommendations on energy integration in CREM process .................................. 91

9. Conclusion ............................................................................................................... 92

10. References ............................................................................................................. 93

PROJECT PARTNERS ................................................................................................. 95
1. Introduction

Energy efficiency is becoming a very important topic in Europe and around the world. Among the different sectors where energy savings can be realised, the European action plan for energy efficiency of the European Commission [1] has identified the building sector as a top priority.

Huge energy savings can be realised in existing buildings in general and in public buildings in particular.

In the public building sector, accompanying measures should be developed and implemented. For this kind of buildings, it is interesting that the state can give the example on energy-saving for its own buildings and the way an efficient management including energy issues are done.

Building related energy measures are rarely integrated within the management of public non residential stock but through the obligations now set by the Energy Performance Building Directive [EPBD] [2] and Energy Efficiency and Energy Services Directive (EE-ESD) [3], public organisations within the MS can make a quantum step.

One issue to embed energy efficiency for public real estate is to improve the way to take it into account through Real Estate Management by implementing energy efficiency measures, quality data and communication processes. This topic is one of the main objectives of EPI-CREM project.

To achieve this goal, the project starts with a work that consist on an overview of the state of the art about the real estate management in participating countries: An overview of the public building stock, an overview of REM schemes and the status of national contexts concerning public buildings and energy efficiency implementation.

To get better knowledge from participating countries to the project, a questionnaire was set up by CSTB and circulated around the project partners. The collected results were analysed and gathered in the present report. Additional information comes from desk research, interviews, existing data and previous studies.

This report gives the results of this research and point of recommendations for the terms of reference of generic strategies of the energy performance integration in corporate real estate management.
2. National energy and CO2 emission saving policies

2.1 Netherlands

The Dutch government has the ambition to make the Netherlands one of the cleanest and most energy-efficient countries in Europe. In the work program "Clean and economically: new energy for the climate" the ambitions for energy saving, sustainable energy and underground CO2-storage. The “VROM” ministry (Ministry of Housing, Spatial Development & Environment) coordinates the project "Clean and economically” that is carried out by seven ministries.

The objectives are:

- 30% reduction of CO2 emission in 2020, with regard to 1990;
- Doubling the energy saving tempo up to 2% per year, in the next few years;
- In 2020 20% of the total energy consumption is sustainable energy (situation in 2008: approx. 2%)

The work program "clean and economically" identif ies that huge reductions of CO2-emission are possible in existing building stock, but also in new buildings. Many new technologies are available and the challenge is to implement them on a large scale. Several learning processes have to be passed through and financial and institutional obstructions have to be removed. Close cooperation between government, the building construction sector, and building owners is very important thereby. For existing non-residential buildings the government will explore the possibilities for setting-up a similar normative guideline for the energy performance. By January 1st 2008 an energy label for buildings (residential and non-residential) has been introduced. This energy label is obliged for house - and building owners at times of mutations such as sale and rent and at serious renovations.

There are many opportunities in the non residential building sector, for example for techniques which can replace mechanical refrigeration, for warmth-cold storage and for energy-efficient lighting. The so called program "More with less" aims at offering energy services. The government widens the regulations on energy investment tax deduction in the non-residential sector. Also the cabinet explores whether the regulation for “green” investments can be made more accessible for energy saving in existing non residential building stock. In 2010 an exploration will have been carried out to a system by which CO2 emissions get a cost price.

Concerning the directly usable measures, appointments are made or will be made with the most important parties. In principle the current set of policy tools is adequate. If necessary the existing policy tools will be adapted or completed. It is possible that legislation from other fields than energy and climate policy will delay a swift implementation. This type of barriers will be tackled by the government.

For newer technologies well managed developing- and learning processes are important. This will be possible with existing instruments and sometimes with new instruments or adaptations on existing instruments. For this category it is in general possible to develop a regulation within the existing instruments such as the "stimulation regulation on sustainable energy production" (SDE) and "energy investment tax deduction" (EIA).
2.2 France

To fit the actions to be carried out into the context of the national energy strategy, the Programme Law of 13 July 2005\(^1\) sets ambitious performance targets and defines a certain number of incentive programmes for energy savings and development of renewable energies.

On the subject of energy efficiency, the law sets the following targets:

- Support for an international objective of halving the world’s greenhouse gas emissions by 2050, which means dividing the emissions of developed countries by 4 or 5; the fight against climate change is a priority of the energy policy, which aims to reduce France’s greenhouse gas emissions by 3% on average per annum. As a consequence, the State draws up a “climate plan”\(^2\) which is updated every two years, presenting all the national actions implemented to combat climate change.

- The reduction in final energy intensity by 2% per year by 2015 (relationship between energy consumption and economic growth) and by 2.5% by 2030.

In July 2007, the French government established six working groups to address ways to redefine France’s environment policy within a process called “Environment Round Table”\(^3\). The aim of the Environment Round Table was to define the key points of government policy on ecological and sustainable development issues for the coming five years.

For the first time, the Round Table brought all the civilian and public service representatives together around the discussion table, thus forming 5 colleges: the State, unions, employers, NGOs and local authorities.

For three months, workgroups met to propose concrete action to be implemented at national, European and international level. In October 2007, these proposals were opened up to debate by a range of public groups.

Following this debate stage, 4 round tables were organised. On 25 October 2007, the French President presented the conclusions of these discussions.

After these stages a stage looking at the technical, legal and administrative aspects started, the objective was to assess how best to implement all the measures decided upon.

By the end of 2007, around thirty operational committees meet to define guidelines and objectives for operational programs.

At the same time, assessment and monitoring committees, formed on the basis of the five colleges represented throughout the Environment Round Table process, were set up to monitor the work undertaken by the operational committees.

Actually, final recommendations and measures issued from ‘Environment Round Table’ process are discussed to the French parliament.

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   [http://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000000813253&dateTexte=]

   [http://www.ecologie.gouv.fr/IMG/pdf/PLANCLIMATANGLAIS.pdf]

In the field of energy efficiency objectives, the objectives arising from Workgroup 1 "Combating climate change and controlling energy" within the Environment Round Table are the following:

- Make an ambitious and determined contribution to the European "3x20 by 2020" objective
- Include France in the "factor 4" group – fourfold reduction of our emissions by 2050
- "+20 Mtoe by 2020": increase our renewable energy production by 20 million tonnes of oil equivalent by 2020 and reach, or even exceed, a 20% proportion of renewable energy in energy end-use
- Energy savings and reduction of greenhouse gas emissions: opening of sector-specific sites and introduction of immediate operational and/or structural measures
  - Construction: reduce energy consumption by approximately 20% in service-sector construction and 12% in residential construction within 5 years, and by more than a third by 2020
  - Transportation/mobility: lower greenhouse gas emissions by 20% in the next 12 years

The main important measures for the building sector discussed in the parliament for their integration in the future law are:

- New buildings: By 2020 each new construction should fulfil the requirements of label "BBC Effinergie", (low consumption building label). The annual primary energy consumption should be less than 50 kWh ep/m²/year. (this value is corrected by a factor depending on the climatic zone)
- Existing buildings: By 2020, 38% reduction of energy consumption
- A specific program on energy efficiency for the 800 000 social housing owned by the state.
- Renewable: By 2020, minimum 20% of energy is renewable

Other Energy Efficiency Policy & measures in building sector:

- White Certificate Trading: Under the French programme of White Certificate Trading, suppliers of energy (electricity, gas, heating oil, LPG, heat, refrigeration) must meet government-mandated targets for energy savings achieved through the suppliers' residential and tertiary customers. Suppliers are free to select the actions to meet their objectives, such as informing customers how to reduce energy consumption, running promotional programmes, providing incentives to customers and so on. A list of activities was ratified to help the various actors to facilitate the operations. Those exceeding and undercutting their objectives can trade energy savings certificates as required for common compliance. Energy suppliers who do not meet their obligation over the period (2006 - 2008) must pay a penalty of Euro 0.02 per kWh. Lump evaluation of energy savings are established for each process, expressed in kWh of final energy, cumulated and present worth over the life of the product. The first, experimental phase of the scheme will run for three years from 1st July 2006 to 30th June 2009. It is intended that during this time, the scheme will result in 54TWh of cumulated energy savings.

- Public - Private Research Partnerships: "Industries of the Future": On 25th April 2006, France announced a series of public-private research partnerships, including three to
reduce dependence on petroleum products and mitigate climate change. Projects slated to receive substantial public funding from the Agency for Industrial Innovation (AII), included:

- an €88 million programme to improve energy efficiency in buildings through improvements in insulation, heating, lighting and ventilation,
- a €96 million project for a "green chemistry" initiative to develop cost-effective methods for replacing petrochemicals with agricultural products;
- a €62 million initiative to develop new ene

- Preferential Loans for Domestic Energy Conservation Projects: On 5 October 2006, the French Government announced the creation of a 10 billion Euro fund for the funding of domestic energy conservation projects with low-interest loans. Available from January 2007, the low-interest loans are based on tax-free bank CODEVI accounts (Compte pour le Développement Industriel). Now paying 2.75% a year in interest and capped at 4,600 € per person, these accounts will expand to 6,000 € as of January 2007 in order to bear the measure. This financial measure is complementary to the 2005 tax credit scheme. The acquisition of a domestic energy efficient equipment will then entitle at the same time to a price reduction (tax credit scheme) and a low-interest loan (CODEVI measure).

- Implementation of EU Energy Performance of Buildings Directive (EPBD) (see § 4.2.): In parallel, to complement implementation of the EPBD, France has created two building energy efficiency labels respectively "High Energy Performance" (HPE: Haute Performance Énergétique) and "Very High Energy Performance" (THPE: Très Haute Performance Énergétique).
2.3 Austria

For Austria, the subject environment - and climate protection is very important. So there are developed substantial strategies to reach the terms of reference of the Kyoto Agreement and other EU Directives. The main strategies and consequent laws, directives, agreements and subsidy programs are:

- Climate Strategy and Climate Protection Funds
- Implementation EU Directive 2002/91/EG on the energy performance of buildings (EPBD), containing
  - “Energieausweis Vorlage Gesetz” (law for the issue of Energy Certification)
  - Guidelines for calculation of the Austrian Institute for Constructional engineering (Österreichisches Instituts für Bautechnik-OIB)
  - Adjustment of the existing building regulations in each Austrian province
- Austrians national Energy Efficiency Action plan, resulting from EU Directive 2006/32/EG on energy end-use efficiency and energy services
- “Ökostromgesetz“ (law for green energy/electricity)
- Article 15a agreement for housing allowances
- Environment allowances on national level
- “klima:aktiv" programs of the Federal Ministry

Climate Strategy

The Council of Ministers decided the “new Climate Strategy” at the 21.03.2008. The main objective is, to fulfil the obligations to reduce greenhouse gas emissions within the requirements of the Kyoto Agreement.

Therefore, in the year 2002 the Austrian strategy for the goal achievement from the Kyoto Agreement was adopted by the Federal Government and the conference of governors from the Austrian provinces. By now, with this concluded adjustment, Austria’s goals for climate protection shall be advanced farther.

The climate strategy 2007 bases on a broad mixture of measures and rests basically upon the columns:

- Industry
- Housing
- Expansion of the local public transport
- Additional purchase of CO2-emission certificates from foreign countries by the year 2012

In addition to this, the establishment of a climate protection fund in the amount of 500 million EURO was decided. Therefore, 50 millions EURO were appropriated in 2007, the other 150 millions EURO will be appropriated in the years 2008 to 2010. The appointed amount of 500 million EURO is ranked as the starting basis. Also the economy was invited to take part at this fund.

Austria’s goal of climate control, the reduction of 13% of the greenhouse gas emissions until the end of the Kyoto period 2008-2012, shall be achieved by concurrent improvement of the three columns:

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4 Chronology by importance.
5 National label of the Federal Ministry for different kind of climate protection initiatives.
EPI-CREM Status of national contexts and state of the art about CREM processes, September 2008, WP2
Use, with economic consideration, of reduction potential on national level by enhanced application of existing and market-ready technologies, especially in the fields of energy efficiency and renewable energies taking account of regional available resources.

Advancement for the development of new technologies, which enable a potential for the manifestly reduce of greenhouse gas emissions also beyond the commitment of the Kyoto period.

Use of the cost-efficient potential of flexible instruments within the scope of the JI/CDM-program as well as the EU-emissions trade.

The definition of this focus follows the idea of sustainability that is a substantial economic, ecologic and social effect.

Implementation EU Directive 2002/91/EG on the energy performance of buildings (EPBD)
A detailed description of measures for the implementation of the EU Directive 2002/91/EG (EPBD) in Austria is described in § 4.3.

**Austria’s Energy Efficiency Action Plan**

The Austrian Energy Efficiency Action Plan results from the implementation of the EU Directive 2006/32/EG on energy end-use efficiency and energy services, which was passed by the European Parliament and the council at the 05.04.2006.

This directive requires measures from each EU member state, which make an impact on the end-consumers. The result, saving of CO₂-emissions, was defined with 1%/year, or, under the period under review until 2016 with 9%. This regulation takes places additionally to the obligations required by the EPBD.

The main goal of the Action Plan is it, to influence end-consumers in their behaviour regarding their energy consumption and their attendance to use methods and equipment to reduce their energy consumption.

**Law for green energy/electricity**

The goal of the Austrian green energy law is on the interests of the climate and environmental protection. These are for example:

1. The part of electric energy in facilities on the basis of renewable energies shall be advanced to the reference level of 78,1% until the year 2010, following the Directive 2001/77/EG.
2. Efficient input of findings for the use of renewable energies
3. A technology and political focus with regard to the attainment of market maturity for new technologies
4. A guarantee of the investment sureness for existing and future facilities
5. The generating of electric energy from renewable energies as per principles of the European Community Law, especially directive 2003/54/EG and 2001/77/EG shall be advanced

Until the year 2015 the construction and expansion of eco power plants will be financially supported at such a rate that hereby a part of 15%, measured at the purchase quantity of public supply systems to end-consumer, will be generated.

For all the facilities who produce green electricity there are fixed feed-in tariffs legally concerted. Through this, investments in such plants can be taken a long-dated economic and ecologic consideration.
At the moment (summer 2008), the amendment of the law is in work, so that there are no concrete data about details that can be published at the moment.

**Environment Allowances on national level**

The environment allowance (UFG⁶) in Austria has its aim in the avoidance and reduction of burdens from air pollution, climate-damaging gas, noise and waste. The sphere of influence, as energy political instrument and addition to the housing allowances, is especially the producing sector, but also the private and public service sector and the energy conversion sector.

Chief policy-maker for matters on the environment allowance in Austria is the Federal Minister of the Ministry for agriculture and forestry, environment- and water management, who decides on guidelines and the grants of allowances within his authority.

For this function, the Federal Minister is advised by the “Commission in matters for environment allowances in the in- and outland”. Towards the applicant for grant, the Federal Minister is attended by the “Municipal Credit Public Consulting GmbH” as handling agent, which decides about the possibility to subsidy.

The operational environment allowances in the inland are addressed to companies, which want to invest in the sectors renewable energies, efficient use of energy, clean air, reduction of noise, waste and operational measures referred to traffic.

Concrete, there are defined the following sectors:

Change to district heating systems, biomass plants, demonstration plants, efficient use of energy, production of energy from biogenic waste, energetic optimisation of wastewater-cleaning plants, research, fossil power-heat coupling, geothermal energy, solar energy conversion, stream producing plants, thermal refurbishment of buildings, avoidance and reduction of dangerous waste, noise and air pollution and distribution of heat.

Since the commencement of the UFG in the year 1993, there were 7,687 projects allowed until the end of 2005 lonely in the sector operational environment allowances in the inland. In the year 2005 there were 1,387 projects allowed, this is just about 1/5 of all allowed projects until this date.

The environmentally relevant investment volume for the operational allowances in the inland amounts 2,2 Mrd. EURO in the timeframe from 1993-2005. From this amount, 453,9 Mio EURO on allowances were allowed. This is an average quote of allowances of 20,4%. For comparison: In the year 2005 the investment volume was aggregated to 333,1 Mio EURO, the subsidy present value aggregated 63 Mio. EURO. So the average quote of allowances amounted 19%.

The biggest part of allowances was allowed in the sector renewable energy and after that efficient use of energy. Most of the projects in the timeframe from 1993-2005 were allowed in Upper Austria, (21%). After this, the following provinces also had a big part on allowances: Tyrol (20%), Lower Austria (14%) and Styria (13%).

Most of the projects were allowed in the sectors hotel and catering trade (36%), producing of material goods (20%). The biggest part of subsidy accrued with 40% of the sector producing of material goods and with 33% to the sector energy - and water supply.

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⁶ Umweltförderungsgesetz.
**klima:aktiv Programs of the Federal Ministry**

Klima:aktiv started in 2004 and is an initiative by the Federal Ministry. The goals of all klima:aktiv programs are active save if the climate, so klima:aktiv is part of the Austrian climate-strategy. Klima:aktiv wants to advance the market introduction of environmental friendly technologies and services.

Klima:aktiv is an addition to the political measures of the Austrian climate-strategy. The duration of klima:aktiv is up to 2012, the initiative is financed by the Federal Ministry. Yearly there are about 8 Mio EURO appropriated for all programs.

All klima:aktiv programs have the goals to reduce CO2 and advance the use of renewable energies. The programs are divided into four main themes: building and refurbishment, renewable energies, save energy and mobility. Under these themes there are different programs.
3. Overview of public building stock

3.1 Netherlands

General
In the Netherlands there are several Public Real Estate Management organizations on several levels;

- Governmental (state owned)
  - Rijksgebouwendienst (“Governmental Building Agency”)
  - Dienst Vastgoed Defensie (Ministry of Defense’s Real Estate Services)
  - Bouwdienst Rijkswaterstaat (Ministry of Traffic and Public works)

- Railways
- Provinces
- Municipalities

Besides there are some organisations which are former, or partial State-owned organisations which have Real Estate with a public character, for example Amsterdam Airport Schiphol, Dutch Railways company NS, KPN (national Telephone company) and TNT (former national Post company).

Rijksgebouwendienst
The Rijksgebouwendienst is one of the biggest Public CREM organizations in the Netherlands. It maintains approximately 2000 buildings. The portfolio is very distinctive due to it's variety, from centuries-old monumental buildings, modern office buildings, penitentiaries, courthouses until archive/record buildings, museums, storage, shelter and laboratory buildings. All these buildings represent approximately 7.2 million m², that’s an incredible 8000 football fields and are spread around the Netherlands. 45% of the total Rgd building stock is in use as an office building. With this the Rgd is responsible for 10% of the total office building real estate. Approximately 7% of the Rgd building stock is owned by the Rgd en 30% s leased or hired.
Public housing for:
The Rijksgebouwendienst is responsible for housing of public (governmental) bodies and international public organizations and Royal Dutch family. Basically, all divisions of the government are clients, with the Ministry of Justice being the biggest. Clients of the Rijksgebouwendienst are:

Ministries and related services: 125,000 civil servants, 40,000 of whom in The Hague.
Judicial institutions: 50,000 detainees, supervised/guarded by 18,000 employees.
18 national museums with a total GFA € 1,1 million m².

<table>
<thead>
<tr>
<th>Building type</th>
<th>RGD</th>
<th>DVD</th>
<th>RWS</th>
<th>Province</th>
<th>Munici-</th>
<th>Semi-public organisations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office building</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<tr>
<td>Accommodation building</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Penitentiary building</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Court house</td>
<td>x</td>
<td></td>
<td></td>
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<tr>
<td>Residential building</td>
<td>x</td>
<td>x</td>
<td></td>
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<tr>
<td>Education / simulation building</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<tr>
<td>Museum building</td>
<td>x</td>
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<td>x</td>
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<tr>
<td>Railway station; airport; bus station</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Control rooms (bridges, railways, harbour, lock, pumping station)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Storage/garage/shelter building</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<tr>
<td>Workshop building</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Laboratory building</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Recreation/sports building</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
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<td>x</td>
</tr>
</tbody>
</table>

Table 3.1: Public Real Estate Management organizations by building type

Buildings for healthcare and education (like hospitals, nursing homes, primary and high schools, universities) are formally not defined as public buildings in the Netherlands; the state has no direct influence and responsibility for these types of building. However, the state has a certain level of indirect influence by financing and regulations. See also in § 4.1.4.
**Some data about public buildings**

As part of the European project EPA-NR a survey has been done in 2005 which describes the context regarding the non-residential building sector in the European Member States. For the Netherlands this survey shows that non-residential buildings represent about 1% of the total building stock, counted in number of buildings. Since the floor area of residential buildings (we have calculated with an average of 100m^2) is considerable smaller as the floor area of average non-residential buildings, the ratio in m^2 floor area is quite different, about 14% non residential / 86% residential.

The following charts will provide some general information concerning the composition of the non-residential building stock (excluding industrial sites and buildings for storage), the energy consumption for specific sectors in the non-residential building stock and a more general breakdown of the energy consumption in the non-residential building sector as a whole.

<table>
<thead>
<tr>
<th>Total (all) buildings stock</th>
<th>No of Bldgs</th>
<th>Floor Area (m^2)</th>
<th>Ownership(*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total residential buildings</td>
<td>671000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Non-Residential Buildings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offices</td>
<td>45000 - 55000</td>
<td>4000000</td>
<td></td>
</tr>
<tr>
<td>Health care</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>hospitals</td>
<td>133^ (51500 beds)</td>
<td></td>
<td>116000000</td>
</tr>
<tr>
<td>nursing</td>
<td>328^ (50000 beds)</td>
<td></td>
<td>25300000</td>
</tr>
<tr>
<td>elderly</td>
<td>1342 (109000 places)</td>
<td></td>
<td>83330000</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>primary</td>
<td>7571</td>
<td>679</td>
<td>261000000</td>
</tr>
<tr>
<td>secondary</td>
<td>72</td>
<td>58</td>
<td></td>
</tr>
<tr>
<td>medium professional education</td>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>high professional education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>university</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horeca (incl. hotels)</td>
<td></td>
<td>20400000</td>
<td></td>
</tr>
</tbody>
</table>

(*): Use the corresponding codes:
1: Public (state owned)
2: Public (municipality/city owned)
3: Private (single building owner)
4: Private (multiple building owners)
5: Rented
6: Other (specify)

Table 3.2: Composition of the non-residential building stock
### Table 3.3: Energy consumption for specific sectors in the non-residential building stock

<table>
<thead>
<tr>
<th>Sector</th>
<th>Thermal (Units*)</th>
<th>Electrical (Units*)</th>
<th>Total (Units*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (all) buildings stock</td>
<td></td>
<td></td>
<td>1068 PJ</td>
</tr>
<tr>
<td>Total Non-Residential Buildings</td>
<td></td>
<td></td>
<td>242.9 PJ</td>
</tr>
<tr>
<td>Offices</td>
<td>118.1 PJ</td>
<td>77 PJ</td>
<td>195 PJ</td>
</tr>
<tr>
<td>Health care</td>
<td></td>
<td></td>
<td>242.9 PJ</td>
</tr>
<tr>
<td>• Hospitals</td>
<td>28.6 PJ</td>
<td>14.3 PJ</td>
<td>42.9 PJ</td>
</tr>
<tr>
<td>• Nursing</td>
<td></td>
<td></td>
<td>1506 MJ/m²</td>
</tr>
<tr>
<td>• Education</td>
<td>12.7 PJ</td>
<td>6.4 PJ</td>
<td>19.1 PJ</td>
</tr>
<tr>
<td>• Sports facilities</td>
<td>8.0 PJ</td>
<td>6.4 PJ</td>
<td>14.4 PJ</td>
</tr>
<tr>
<td>• Swimming pools</td>
<td></td>
<td></td>
<td>7.7 PJ</td>
</tr>
<tr>
<td>• Other</td>
<td></td>
<td></td>
<td>7.7 PJ</td>
</tr>
<tr>
<td>Stocks / workshops</td>
<td>27.0 PJ</td>
<td>27.0 PJ</td>
<td>54.1 PJ</td>
</tr>
<tr>
<td>Shops</td>
<td>20.7 PJ</td>
<td>30.2 PJ</td>
<td>50.9 PJ</td>
</tr>
<tr>
<td>Hotels (incl. hotels)</td>
<td>19.1 PJ</td>
<td>17.5 PJ</td>
<td>36.6 PJ</td>
</tr>
<tr>
<td>Defense buildings</td>
<td>3.2 PJ</td>
<td>3.2 PJ</td>
<td>6.4 PJ</td>
</tr>
<tr>
<td>Conference centres</td>
<td></td>
<td></td>
<td>4.9 PJ</td>
</tr>
<tr>
<td>Prisons</td>
<td></td>
<td></td>
<td>0.0 PJ</td>
</tr>
<tr>
<td>Production halls</td>
<td></td>
<td></td>
<td>49.5 PJ</td>
</tr>
<tr>
<td>Railway stations</td>
<td></td>
<td></td>
<td>0.0 PJ</td>
</tr>
<tr>
<td>Rest</td>
<td>8.0 PJ</td>
<td>11.1 PJ</td>
<td>19.1 PJ</td>
</tr>
</tbody>
</table>

### Table 3.4: Breakdown of the energy consumption in the non-residential building sector

<table>
<thead>
<tr>
<th>Activity</th>
<th>Energy (PJ)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space heating</td>
<td>101.5 (g) + 1.7 (e)</td>
<td>43%</td>
</tr>
<tr>
<td>Sanitary hot water</td>
<td>9.2 (g) + 0.9 (e)</td>
<td>4%</td>
</tr>
<tr>
<td>Cooling</td>
<td>0.4 (g) + 7.0 (e)</td>
<td>3%</td>
</tr>
<tr>
<td>Ventilation</td>
<td>12.5 (a)</td>
<td>5%</td>
</tr>
<tr>
<td>Lighting</td>
<td>52.9 (a)</td>
<td>22%</td>
</tr>
<tr>
<td>Office equipment</td>
<td>45.6 (a)</td>
<td>19%</td>
</tr>
<tr>
<td>Services</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Humidification</td>
<td>1.0 (g) + 0.1 (e)</td>
<td>0.5%</td>
</tr>
<tr>
<td>Pumps</td>
<td>4.0 (e)</td>
<td>2%</td>
</tr>
<tr>
<td>Other</td>
<td>5.9 (g)</td>
<td>2%</td>
</tr>
</tbody>
</table>
3.2 France

General

The public real estate properties consists on three main categories which differ by their legislations and specific jurisdiction:

- The buildings of the state: Ministries and their associated buildings
- The public buildings managed at regional and local level (regional authorities) with a measure of autonomy, example secondary schools are managed by regions, schools are managed by departments and primary schools are managed by municipalities. In this category there are other type of buildings such us city councils, gymnasiums, technical buildings, etc.,
- Public hospitals.

The last two categories have a same legislation.

In the following a sharing of buildings area according the central administration (2005).

<table>
<thead>
<tr>
<th>Administrations centrales</th>
<th>Surface utile nette, répartition des 837 532 m² (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affaires étrangères</td>
<td>4</td>
</tr>
<tr>
<td>Culture et communication</td>
<td>3</td>
</tr>
<tr>
<td>Ecologie et développement durable</td>
<td>2</td>
</tr>
<tr>
<td>Emploi, cohésion sociale, logement</td>
<td>2</td>
</tr>
<tr>
<td>Economie, finances et industrie</td>
<td>25</td>
</tr>
<tr>
<td>Jeunesse, sports et vie associative</td>
<td>1</td>
</tr>
<tr>
<td>Outre mer</td>
<td>9</td>
</tr>
<tr>
<td>Services ministres</td>
<td>8</td>
</tr>
<tr>
<td>Agriculture et pêche</td>
<td>3</td>
</tr>
<tr>
<td>Défense</td>
<td>16</td>
</tr>
<tr>
<td>Education nationale, enseignement supérieure, recherche</td>
<td>6</td>
</tr>
<tr>
<td>Transport, équipement, tourisme et mer</td>
<td>12</td>
</tr>
<tr>
<td>Intérieur et aménagement du territoire</td>
<td>1</td>
</tr>
<tr>
<td>Justice</td>
<td>3</td>
</tr>
<tr>
<td>Santé et solidarité</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 3.5: Percentage of building area by administration
Some data about public buildings

- General data about energy consumption [year 2000] (www.minefi.gouv.fr/)

The public building stock represents 40% of the non residential building stock and more than 15% of residential building stock.

Data that results from studies made by CEREN\(^8\) and inquiries made by SOFRES \(^9\) give the following information about energy consumption (in 2000):

- energy consumption of real estate buildings [mainly ministries and their associated buildings] : 8 TWh
- energy consumptions of building stock managed by municipalities : 29.8 TWh
- energy consumption of educational building stock (including private establishments) : 26.6 TWh
- energy consumptions for health care sector (hospitals including private establishments) : 26.1 TWh

In conclusion: It is estimated that energy consumption of public building stock is between 85 and 88 TWh which represents 14.5 million tonnes of CO2 emission.

Remark: some public buildings are not taken into account in these data.

\(^8\) CEREN : Centre d’études et de recherches économiques sur l’énergie
\(^9\) SOFRES : Société française d’études par sondages
Distribution of the energy consumption and energy invoice of buildings of the state in 2001 [mainly ministries and their associated buildings].

In 2001, an inquiry was set up to estimate the energy consumption of a number of ministries. The results are shown in the following picture:

Figure 3.2: Energy consumptions and energy costs of the establishments of the state in 2001

Comments: For the studied buildings the energy consumption is around 3.4 TWh for 189 millions euros energy invoice. The ministries of justice and economy count for half of this total energy consumption. The figure distinguish the heating energy consumption and the energy consumption for the other uses of buildings.

References:

10 Chiffres clés du bâtiment : Publication de « Agence de l’Environnement et de la Maîtrise de l’Energie »
Unit energy consumption progress and unit energy cost progress of the public building stock [ministries and their associated buildings].

Figure 3.3: Evolution of the unit energy consumptions and the unit energy costs of the establishments of the state with normal climate

Comments: during the period 1995 – 2001 the unit energy consumption decreased in 4.4% that is a mean of 0.6% a year.

The improvement of the energy performance of buildings and their equipments and the improvement of the use of buildings allowed a decrease of the consumption of heating, however the consumption of the other uses increased.
Structure of the expense of energy by size of municipality in 2000

**Figure 3.4**: Energy cost according the municipalities sizes

**Comments**: In 2000; the total final energy consumption of buildings managed by the municipalities is around 29.8 milliards kWh that corresponds to 510 kWh per inhabitant.
Unit energy consumption per m² and unit energy cost per m² per type of building in the municipalities.

Figure 3.5: Energy consumption and energy cost per m² for the main municipalities buildings type in 2002

Comments: The energy consumption is around 150 to 160 kwh/m² and a cost around 7 and 9 €/m² for all the building types.

The results depends mainly on the size of municipality due to the use of buildings (except of primary schools, the other buildings are longer used in the big municipalities, it explains the higher energy consumption).
3.3 Austria

**General**

In the most cases the buildings are divided in different building categories. These are for example:

1) Office buildings 7) Hotels
2) Kindergartens and compulsory schools 8) Restaurants and taverns
3) Colleges and universities 9) Event facilities
4) Hospitals 10) Sports facilities
5) Nursing homes 11) Sales agencies
6) Guest houses 12) Other conditioned buildings

The categories can be different from state to state. Not every town has enough information about the building stock to give detailed information about numbers of kind of buildings.

In Vienna for example every division has his own lists of their building stock. There are about 70 divisions in Vienna and the building stock is different from division to division. For example: schools, kindergartens, office buildings etc. At the moment, the government is working on a project to find out more information about the building stock and use these information to find out for which buildings an energy performance certificate must be done. This is for all buildings which are owned by the government.

The Bundesimmobiliengesellschaft (BIG) is also preparing a project to collect data information about their building stock.

**Some data about public buildings**

- **General**

The last Austrian census registered 2.05 Million buildings and approx. 3.86 Million flats. The census has not only comprised the whole of Austria but also municipalities and smaller regions. The results are a basis for several measures of the public administration, for economic decisions and for scientific tasks.

Three quarters of Austria’s buildings are single-family or semidetached houses, every 10th building consist of 3 to more flats, 14% or 280 000 buildings are non-residential, whereas 37 500 buildings equalling 1.83% belong to the federal state, the federal provinces and to the municipalities. Due to missing data a further breakdown to m² has not been possible (also Statistics Austria didn’t have data regarding square meters).
Figure 3.6: Austria’s way to the Kyoto target -
(Data source: Kyoto Progress Report/Fortschrittsbericht 2008)
All together space heat- and small energy consumers cause a yearly emission of about 14.2 Million tonnes of CO2-equivalents (CO2, N2O, CH4)\textsuperscript{11}. Thereof the public and the private segment represent 3.4 Million tonnes, whereas there has been a dramatic rise of 28.4 % (von 2.65 Million tonnes of CO2) in reference to the year of the Kyoto-Agreement. However the emissions of private households have decreased back to 12.5% since then.

The remarkable growth in energy consumption of public and private services, which has risen by 47% since 1990 is responsible for yearly emissions of 1.2 Million tonnes of CO2 standing for more than 1/3 of the emissions produced by space heating.

- Energy sources and consumption

Space heat is mainly produced by the following energy carriers listed below. Their share of the total energy consumption can be seen in the subsequent diagram and table.

Figure 3. 7 : Sankey-diagram of the Austrians energy flow  
(data source: AEA)

<table>
<thead>
<tr>
<th>Energy Carrier</th>
<th>PJ</th>
<th>GWh</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>oil</td>
<td>86</td>
<td>23 890</td>
<td>25.4</td>
</tr>
<tr>
<td>gas</td>
<td>81</td>
<td>22 500</td>
<td>23.9</td>
</tr>
<tr>
<td>coal</td>
<td>11</td>
<td>3 060</td>
<td>3.2</td>
</tr>
<tr>
<td>district heat (not renewable)</td>
<td>34</td>
<td>9 570</td>
<td>10.2</td>
</tr>
<tr>
<td>district heat (renewable)</td>
<td>8</td>
<td>2 100</td>
<td>2.2</td>
</tr>
<tr>
<td>combustible waste</td>
<td>2</td>
<td>560</td>
<td>0.6</td>
</tr>
<tr>
<td>bio mass</td>
<td>74</td>
<td>20 560</td>
<td>21.8</td>
</tr>
<tr>
<td>ambient heat</td>
<td>7</td>
<td>1 940</td>
<td>2.1</td>
</tr>
<tr>
<td>electric current (not renewable)</td>
<td>20</td>
<td>5 560</td>
<td>5.9</td>
</tr>
<tr>
<td>electric current (renewable)</td>
<td>16</td>
<td>4 440</td>
<td>4.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>339</strong></td>
<td><strong>94 180</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Table 3. 6 : Distribution by energy carrier

\textsuperscript{11} Klimaschutzbericht der Republik Österreich für das Jahr 2008 (Berichtsjahr: 2006)
EPI-CREM Status of national contexts and state of the art about CREM processes, September 2008, WP2
As indicated above the energy consumption for space heat and hot water in the year 2004 was made up of a share of 31.4% (107 PJ, 29 600 GWh) renewable energy carriers and a share of 68.6% (232 PJ, 64 570 GWh) non-renewable energy carriers.

Unfortunately it is not possible to display the energy consumption distribution of non-residential buildings, as this share as well as the using space of this building segment is not object of data collection for Statistics Austria.

The outcome of an extrapolation, based on known data of the energy bookkeeping of an Austrian federal state, shows that the energy consumption of about 37 500 non-residential public buildings lies by about 3.5 PJ or 12 600 GWh. The resulting energy saving potential is enormous and will be dealt with in the following.
The extrapolation of the energy consumption of non-residential public buildings leads to the conclusion that suitable thermal refurbishment measures would reduce the energy consumption of the building stock, built before 1991, by at least 50%, which would mean a decrease of energy use by 1.4 PJ or 5 000 GWh per year. This would equal CO2-emissions of 0.75 Million tonnes per year.
4. National implementation of EPBD focus on public buildings

The Directive 2002/91/EC of the European Parliament and Council on energy efficiency of buildings [2] was adopted on 16th December 2002 and entered into force on 4th January 2003. It is considered as a very important legislative component of energy efficiency activities of the European Union designed to meet the Kyoto commitment and responds to issues raised in the recent debate on the Green Paper on energy supply security.

Estimates project a cost-effective savings potential realizable by 2010 of around 22% within the building sector - if this potential was realized, around 20% of the EU Kyoto commitment could be met. Transposition of this Directive by 2006 at the latest will allow a portion of this potential to be translated into reduced energy consumption.

The Directive is foremost a measure that concerns a very large number of actors on all levels and with different impacts and different motivations: designer, housing associations, architects, providers of building appliances, installation companies, building experts, owners, tenants, essentially all energy consumers in the European Union.

It will greatly affect awareness of energy use in buildings, and is intended to lead to substantial increases in investments in energy efficiency measures within these buildings.
4.1 Netherlands

4.1.1 Implementation of the EPBD in Dutch legislation

In the Netherlands the legislation transposing the EPBD can functionally be divided into three parts concerning the following topics:

- Issuing the Energy Performance Certificate. This aspect has been transposed through the Decree Energy Performance of Buildings (BEG) by the end of 2006 (see figure 1);
- Setting Energy Performance Requirements for new buildings and major renovations. This aspect has been accounted for through the Building Decree since 1995, with regular updates of the requirements (see figure 1);
- Setting up an approach for boilers and air conditioning systems. This aspect is presently accounted for through the several laws (like the Environmental Law) that already existed in the Netherlands concerning regular inspections of boilers and air-conditioning systems on performance aspects. A more harmonised approach with mandatory inspections concerning air-conditioning installations is currently under development in new legislation.

In the following we will further elaborate on the first two topics mentioned above.

In the Netherlands the building legislation (decrees and regulations) is based on the Housing Act, which has been in place for many years. The Decree Energy Performance of Buildings (BEG) is the basic legislative provision which transposes the EPBD into Dutch legislation (in December 2006). The BEG is worked out in an underlying regulation: the Regulation on Energy Performance of Buildings (REG). The REG mainly focuses on the Energy Performance Certificate in case of sale or renting out of buildings and on displaying the certificate in public buildings.

In the REG specific requirements on form and content of the Energy Performance Certificate are given. Some of these requirements refer to a code of conduct to guarantee the quality of the assessment, the BRL-series:

- BRL 9500 sets requirements for the assessment process, the energy experts and the NL-EPBD-process certificate, which authorizes experts within a certified company to issue Energy Performance Certificates;
- BRL 9501 sets requirements for the calculation method of the energy performance of existing buildings to be used for building certification.

Both BRL’s refer to formal publications issued by ISSO, providing detailed information on the assessment process and calculation method (ISSO 82 for Residential buildings and ISSO 75 for non-residential buildings) and the testing of the software (ISSO 54).

Besides to the REG, the BEG also refers to the Building Decree, concerning energy performance requirements for new buildings and major renovations. This building Decree has already been in force for many years. The Building Decree sets requirements for the energy performance of buildings in terms of an Energy Performance Coefficient (EPC). These requirements have to be met when new buildings are constructed or existing buildings undergo a major renovation. The calculation of this EPC is based on the Dutch Energy Performance Standards; NEN 2916 for non-residential buildings and NEN 5128 for residential buildings. These standards have been developed and adjusted according to the European CEN Standards on this subject (NEN Standard 5128 for new buildings and NEN Standard 2916 for major renovations).
4.1.2 Calculation procedures

In the Netherlands the calculation procedures for the energy performance of buildings are based on asset rating (or calculated rating). Two different sets of calculation methods have been developed, one for new and one for existing buildings.

4.1.2.1 New buildings and major renovations

For new buildings and major renovations the basic calculation method has already been available since 1995. The method is described in two official standards, NEN standard 2916 for non-residential buildings and NEN standard 5128 for residential buildings. According to the Building EPI-CREM Status of national contexts and state of the art about CREM processes, September 2008, WP2
Decree the energy performance calculation by means of this model has already been mandatory since then in case of construction of new buildings and major renovation. The calculation approach results in an energy performance indicator called the Energy Performance Coefficient (EPC) as an indicator that represents the energy efficiency of a building. Requirements for the EPC are set in the Building Decree.

4.1.2.2 Existing buildings

For existing buildings the energy performance is expressed in an energy performance indicator called the Energy Index (EI). The method of calculating the EI is presented in ISSO publication 82 and 75 for residential and non-residential buildings. This calculation method is based on the original Dutch EPA method. BRL 9501 provides quality assurance of the method through a test with requirements that have to be met. The development of the software for calculating the energy performance of existing buildings is being left to the market. New calculation models and software will be tested according to BRL 9501. The Dutch test set (ISSO publication 54) is available and was deduced from the international known.

4.1.3 Energy Performance requirements

The energy performance requirements for both new and existing buildings are part of the Building Decree. For new buildings and major renovations of existing buildings Energy Performance Standards (NEN standard 5128 and NEN standard 2196) describe how to determine the required Energy Performance Coefficient (EPC). The Building Decree sets the specific EPC-requirements that new buildings and buildings that undergo major renovation have to meet. These EPC-requirements vary depending on the user typology of the building and are sharpened on a regular basis. For existing buildings that undergo major renovation the 1000 m² threshold is not relevant (EPBD article 6). All renovations that a building permit is required for are obligated to meet the EPC-requirements; the size of the building does not matter for this obligation. For both residential and non-residential new buildings the EPC is set so strict that considering alternative systems of energy supply is self-evident (EPBD article 5).

The EPC is an overall indicator reflecting the energy use based on primary energy use. Heating, cooling, ventilation, lighting and hot water are taken into account. The EPC-requirements should be met in construction of new buildings and major renovation of existing buildings by taking energy efficiency measures and honouring minimum requirements for several aspects, like insulation and air tightness, which are prescribed in the Building Decree. Before the building permit is issued the EPC calculation must prove that the EPC-requirements are met.

In case of existing buildings the Building Decree also sets minimum requirements for the EPC as well as on component level (ventilation and isolation). Depending on the nature of the renovation local authorities can grant exemption from these requirements.

4.1.4 Building certification

From January 2008 for every building an energy performance certificate is obligatory when it is sold, rented out or constructed (residential as well as non-residential buildings). For the display of the certificate in public buildings a different time frame has been accepted, this will be mandatory as of January 2009 for all government buildings that are accessible for public (‘public buildings’). The procedure for the certification of public buildings is the same as for buildings that are sold or rented out.

The definition that is used for ‘public buildings’ in the Netherlands is:
“Buildings with a useful floor area over 1000 m² that house government institutions or public services that provides services to the public and are therefore visited by a large amount of people on a regular basis”.

Examples of public buildings are buildings for ministries, regional or municipal authorities, district water boards and court houses. Schools and health-care buildings are excluded as public buildings because these services are in general not directly provided by the Dutch government, but by private parties.

Until the beginning of April 2008 about 183,000 certificates have been handed out for existing buildings, mainly for residential buildings. Only a minority of these certificates are for non-residential buildings (perhaps a few thousand, exact numbers are unknown), since the certification of existing non-residential buildings is in numbers far behind on the certification of residential buildings in the Netherlands (Source: SenterNovem).

A number of public bodies are ahead of the obligations for public display of the certificate that starts in 2009 and have already issued certificates at this moment. Private non-residential building owners seem to be still somewhat reluctant to start building certification, and only do this in case they are obligated to do so when a building is rented out or sold. The building certificate is not really used as a tool for making energy saving possibilities visible yet.

Figure 2 below shows an example of the Dutch energy performance certificate. The energy performance certificate consists of 2 pages. On the first page the energy class of the building is indicated. The classes run from A (very energy efficient) to G (very energy un-efficient). Next to the letter that indicates the energy efficiency also the Energy Index is indicated and the standardised energy use per m² nett floor surface is indicated in MJ/ m².

On the first page the building for which the energy certificate is issued, is indicated and the date until when the certificate is valid. On the bottom of this page also the assessor of the certificate is mentioned.

On page 2 of the certificate the specific version of the calculation method for the Energy Index is mentioned. Also the energy saving measures that are generally advised are described on page 2.
Figure 4.2: Example of the Dutch energy performance certificate (page 1)
4.1.5 Inspection of boilers and of air conditioning systems

Inspections of boilers (article 8)

The system that the Netherlands has implemented will lead, with regard to the inspection issues as described in the directive, to the intended result on the basis of both a voluntary scheme and legislation. This system consists of 3 main paths.

1. Domestic buildings with an individual boiler

In the Netherlands small boilers are checked and maintained every year or every two years, depending on the type of boiler.
To stimulate the replacement of older boilers by a new energy efficient condensing boiler, a web-tool has been developed for consumers: ‘de Verwarmingswijzer’ (‘heating indicator’).

The tool gives consumers insight, based on the current installation and the current gas use, if a new and energy efficient heating system is economically viable.

2. Boilers larger than 100kW

For large boilers (>100 kW) the Netherlands complies with current legislation in the Environmental Law. This means a mandatory regular inspection of the boiler according to a specified scheme.

3. Inspection based advice on the heating system

For non domestic buildings and domestic buildings with a collective boiler a tool has been developed to advice the owner and/or user of the building on possible measures to make the installation more energy efficient. With this tool, the ‘Installation Performance Scan’, the installer or advisor scans the existing installations of the building, heating as well as cooling, on energy efficiency. The tool provides an integral check on the generation, controls, distribution etc. Altering the installations on the basis of the scan can lead to energy use reduction and reduction on the chance of breakdown of the installation and higher comfort levels in the building.

**Inspection of air conditioning systems (article 9)**

EPBD Article 9 on the inspection of air conditioning systems is fully implemented in the Netherlands. However, the inspection of air conditioning systems is dispersed amongst different parts of national law. Therefore, an improvement will be made to aggregate the inspection of air conditioning systems completely into environmental law.

The inspection of the air conditioning system will be coordinated with the inspection on behalf of the CFC-regulation. This will come into force at the end of 2008.

**4.1.6 Independant experts**

To guarantee the quality of the building certificates that are issued, it is stated in the BEG that only energy consultants with a valid NL-EPBD-process certificate, as referred to in BRL 9500, may issue building certificates. The NL-EPBD-process certificate is issued by certification-institutes that are accredited by the Council for Accreditation. These certification-institutes issue the NL-EPBD-process certificate to consultancy firms that fulfill the requirements (among others in level of education of the assessors that has to be granted by passing an exam) set in BRL 9500 (see figure 3).

![Figure 4.4: The authorization of experts for the certification of buildings](image)
4.1.7 Enforcement

In the Dutch implementation of the EPBD two aspects are subject to enforcement: the compliance with the energy performance requirements for the construction of new buildings and major renovation of existing buildings and the energy performance certification in case of sale or renting out of existing buildings.

Before starting the construction of new buildings and major renovations of existing buildings an EPC calculation must be delivered to prove that the EPC-requirements are met. Checking if the EPC-requirements are met and the enforcement in case of non-compliance is the responsibility of the local authority. The sanction for non-compliance is withholding a building permit.

The obligation for energy performance certification is laid down in the BEG and is not embedded in the Dutch Civil Code. The BEG is based on the Dutch Housing Act, this means that the enforcement on the compliance of the BEG requirements is laid down in private law.

In case of sale or rent the owner is primarily responsible for presenting the Energy Performance Certificate. This obligation is expected to become an item of interest in model acts of the Fraternity of public notaries. With several real estate organizations and rental organizations special arrangements will be made to stimulate compliance.

Disputes between the owner of the building and a buyer or tenant about not presenting an energy performance certificate at the required moment can, if necessary, be brought before court. Currently there are no plans for sanctions in administrative law or intentions for criminal prosecution in case of non-complying. If practical experience suggests that this is a serious shortcoming in the enforcement of the BEG requirements, sanctions can be considered for the future. In addition, the necessity of sanction can be reduced by launching various financial and fiscal stimulating instruments based on the condition of a demonstrable EP certificate.
4.2 France

4.2.1 Implementation of the EPBD in French legislation

The transposition of EPBD in French legislation was introduced through the simplified law on 2004. A part of calculation procedures of energy performance of buildings and thermal regulation for new buildings, France had to introduce into law all the other articles of EPBD.

In France the ministry of ecology and sustainable development who is the ministry in charge to set up building’s thermal regulations (energy performance).

4.2.2 Calculation procedures

In France, the energy performance of buildings is mainly based on asset rating, Operational rating is also used but only for few applications. The asset rating results from the calculation methods of energy performance of buildings.

Depending on the application detailed method or simplified method are used.

For thermal regulation two different sets of calculation methods have been developed, one for new buildings (Th-C-E.)\(^{12}\) and one for existing buildings (Th-C-E ex). These two methods are very similar, there are detailed method mainly based on CEN standards.

These methods able to calculate primary energy consumption and conventional indoor temperature to appreciate summer comfort.

The main requirements of thermal regulation are based on these two values, however the calculation method gives other outputs such as for example the final energy consumption by energy carrier.

The energy certificate for houses and for collective residential buildings for which the heating system is individual is based on asset rating. The calculation method used is a simplified method.

4.2.3 Energy performance requirements

4.2.3.1 New buildings

The latest thermal regulation for new buildings was set up on 2005 – RT2005. It's applied for all new buildings residential and non residential. The requirements are expressed us following:

- Primary energy consumption per m² and per year is less than primary energy consumption per m² and per year calculated for notional building.
- For residential buildings, Primary energy consumption per m² and per year is less than an absolute value that depends on the type of heating system and climate zone.
- For a certain kind of buildings (defined by decree), the conventional internal indoor temperature is less than the conventional internal indoor temperature calculated for notional building.

• Minimum requirements by components.
This thermal regulation is based on the calculation method Th-C-E which is described in official standard “see note 12”.

For new buildings with a total useful floor area over 1000 m² study of technical, environmental and economic feasibility of alternatives systems is mandatory.

4.2.3.2 Existing buildings

For existing buildings a thermal regulation was set up in case of thermal renovation. This thermal regulation presents two levels depending on the size of the building, the cost of thermal renovation and the date of the achievement of building construction.

• Thermal regulation by components
This regulation is applied to buildings for which the useful floor area is less than 1000 m² or the cost of thermal renovation is less than 25% of construction cost defined by decree.
It consists on minimum requirements for each component that is changed or installed.

• Global Thermal regulation
This regulation is applied to buildings for which the area is greater than 1000 m² and the cost of thermal renovation is more than 25% of construction cost defined by decree and built after 1948.
The requirements are similar than new buildings.
This regulation is based on calculation method Th-C-E ex .
In addition, study of technical, environmental and economic feasibility of alternatives systems is mandatory.

4.2.4 Building certification

From September 2006, for every building an energy performance certificate is mandatory when it is sold.
From Mai 2007, for every residential building an energy performance certificate is mandatory when it is rent.
From Mai 2007, for every new constructed building (new building) an energy performance certificate is mandatory.

Specific case of public buildings

From December 2007, an energy certificate is mandatory for public buildings (depending on their category), it should be placed in a prominent place clearly visible by public.

• Public buildings for which the energy certificate is mandatory :
Buildings or part of buildings with a total useful floor area over 1000 m² occupied by public authorities and by institutions providing public services to a large number of persons [buildings from category 1 to category 4 – cf. article R. 123-19 of construction code] and therefore frequently visited by these persons.

In the following a definition of the category for buildings occupied by institutions providing public services and visited by public:

EPI-CREM Status of national contexts and state of the art about CREM processes, September 2008, WP2
o Category 1: more than 1500 persons
o Category 2: between 701 and 1500 persons
o Category 3: between 301 and 700 persons
o Category 4: 300 persons and less except category 5

The number of persons taken into account for the determination of the category understands the public and the staff not occupying independent premises.

- The certification scheme for public buildings

The certificate includes the following information:

- The identification of building or part of building and its useful floor area
- Identification of energy carrier and description of the main thermal characteristics of building and its components including PV (a template is given)
- The average final energy consumption for lighting, office automation, heating, domestic hot water, cooling, elevators and other uses.

  The average value is based on energy meter readings of the three last years or of the conversion of effective duration of energy meter reading to a one year energy meter reading.

  In the case the energy meter reading is not available by use, the values should be given by energy carrier.

- By use or by energy carrier the average primary energy consumption (that corresponds to the average final energy consumption).
- Annual cost of final energy consumption.
- Classification of the average primary energy consumption (by useful area or by brut area) according the template and the scale.
- Annual CO2 emission (that corresponds to the average final energy consumption).
- Classification of CO2 emission (by useful area or by brut area) according the template and the scale.

Three templates and three different scales (for primary energy in kWh/m²/year and for CO2 emission in kg/m².year) are given depending on the type of building:

- Type1: Offices Buildings, buildings mainly with administration activities and educational buildings
- Type2: Buildings for which the occupation is continuous (example hospitals)
  - Type: other public buildings not included in type 1 or type 2

- The part of renewable primary energy
- Recommendations of improvement (energy management and thermal renovation)
- The period of energy meter readings
- The date of decree that give the energy prices

In the following an example of template for public buildings type 1.
Page 1: Includes the identification of the building, its overall useful area and its usable surface as well as the average quantity of final energy, primary energy and annual energy expenses by use (see also page 1.bis).

Page 2: Description of the main thermal characteristics of the building and its components including PV.

Page 3: Recommendations of improvement (energy management and thermal renovation).

Page 4: Recommendations of improvement (energy management and thermal renovation).
Figure 4.5: Certificate template for public buildings type 1 (*Offices Buildings, buildings mainly with administration activities and educational buildings*)

- Point on the implementation of certification for public buildings

Certificates must be realized by a certified and independent expert and for many public organisations; this measure concerns a large number of buildings, the preoccupation in 2008 was to define the procedure to fulfil the requirements and to answer the obligation of display the energy performance certificate, in particular organizations began by launching calls for tender towards certified companies or experts.

More than 120 local authorities are members in the European Campaign Display [4] through the European association Energy cities [5]. So more than 2800 poster are edited today.

Half of the edited ‘display’ posters concern schools, come then administration buildings, then the socio-cultural buildings. All these edited posters are not displayed mainly because there is a lack on the organization of a campaign or a lack of political accompaniment.

These posters report indicators of energy performance of the buildings (energy consumption, CO2 emission) and water consumption, they however do not correspond exactly to the requirements registered in the decree concerning the certification of public buildings.

Today, the association energy cities works in partnership with a banking organism to promote the energy display of the public buildings in Europe, in particular to give local authorities a tool of self-assessment of the energy performance of buildings. The appeal to an independent expert and the display of the certificate according to the national requirements (decree) remain however mandatory.
4.2.5 Independent experts

To guarantee the quality of the building certificates, it is stated that only energy consultants with a valid certificate could deliver energy certificate. The process certificate is issued by certification-institutes that are accredited by the Council for Accreditation. These certification-institutes issue the process certificate to consultancy firms or independent experts that fulfil the requirements (among others in level of education).

4.2.6 Inspection of boilers and air conditioning systems

The EPBD [2] states that "regular maintenance of boilers and of air-conditioning systems by qualified personnel contributes to maintaining their correct adjustment in accordance with the product specification and in that way will ensure optimal performance from an environmental, safety and energy point of view". It also asserts that "an independent assessment of the total heating installation is appropriate whenever replacement could be considered on the basis of cost-effectiveness".

A voluntary approach instead of mandatory boiler inspection has been approved by Parliament for the implementation of Article 8. In 1997 the Ministry of Industry, the Ministry of the Environment and the Finnish oil sector established a co-operation program on furthering energy conservation in oil-heated properties. By refurbishing ageing oil heated properties, remarkable savings of heating oil have been achieved. Since the beginning of 2003, Government subsidies have also been given for residential buildings for changing old heating systems to such systems that utilise renewable energy sources. These already existing instruments are the basis for the voluntary approach.

According to the new Act on Inspection of Air-Conditioning Systems, inspections will be compulsory for cooling equipment with a nominal cooling efficiency of at least 12 kilowatts, and will only be needed where cooling systems are based on the use of compressors. Such equipment shall be duly inspected at least every ten years. The new act come into force on 1st January 2008.

The policies and measures under development and already in place to fulfil this requirement are detailed below:

- Decree No 2006-1147 of September 14, 2006 relating to the energy diagnosis of performance and the state of the indoor installation of natural gas of the buildings proposed with the sale. Article R. 134-6. - The state of the indoor installation of natural gas envisaged with the L.134-6 article is carried out in the privative parts of the their dependence and dwelling houses.

- The inspection of the heating systems envisaged with article 8 of the EPBD [2] is transposed in French legislation by article L224-1 of the Code of Environment. A decree project relating to annual maintenance for the boilers of a power ranging between 20 and 400 kilowatts is in the course of finalization. It stipulates the annual maintenance which comprises the checking of the boiler, its cleaning and its adjustment. This annual maintenance must be carried out by a company carrying on the activity of maintenance of the materials and equipment intended for the heating of the buildings in conformity with the standards of maintenance and maintenance quoted in the decree. The certificate of maintenance is presented in the event of control carried out within the framework of the provisions of the article L. 226-2 of the code of the environment.

- Existing measures : Contracts of exploitation of heating basically applied in France indicate the services traditionally as follows : Energy supply necessary to the operation of the equipment (P1), Control and "current" maintenance of the installations to carry out all the 2 or 3 years (P2), "Guaranteed Total" includes obligatorily the operations of large maintenance(P3). These contracts are based on the activities of maintenances according to the current standards in strengths including "sheeq" aspects.
4.3 Austria

4.3.1 Implementation of the EPBD in Austrian legislation

The realisation of the EU Directive 2002/91/EG containing all aspects of energy efficiency in buildings has been regulated by the Obligation of Energy Performance Certificate’s Submission Act (Energieausweis-Vorlage-Gesetz) in Austria, which was issued on 3rd August 2006.

This law indicates that the seller has to bring forward an Energy Performance Certificate when selling a building.

The person who leases out the building has to submit an Energy Performance Certificate which is not older than 10 years at the date of selling or when handing over the contract.

This law has been enacted on 1st January 2008.

Details regarding the implementation are regulated in the laws and directives of the federal states themselves – as it is common in Austria. Consequently the contents can differ from one another, however the realisation is still based on the above mentioned law and on the calculation method which is going to be described in the following.

Implementation of the EPBD consists of the following parts:

- Energy performance requirements and calculation guidelines for new and existing buildings (to be implemented on the level of the Austrian provinces: integration in the building codes of the provinces; the majority of provinces is delayed.)
- Energy certificate (Energieausweis-Vorlage-Gesetz is a federal law and contains the obligation to present an energy certificate; the law is dated 3. April 2006 and went into force 1.1.2008 for buildings dated after 1.1.2006. For buildings with a building permit issued before 1.1.2006, the energy certificate has to be available from 1.1.2009 on. Because integration of energy performance requirements in the building codes of most provinces is delayed, energy certificates are not available in most provinces, either.)
- Inspection of boilers (the obligation for inspection is integrated in the heating and air pollution legislation on the level of the Austrian provinces; a respective agreement according to Article 15a Federal Constitutional Law “Vereinbarung gemäß Art.15a B-VG über das Inverkehrbringen und die Überprüfung von Feuerungsanlagen” is being negotiated among the Austrian provinces in order to agree on a harmonized method for boiler inspection. The draft method is existing and is being partly applied.).
- Inspection of air conditioning systems (the obligation for inspection is integrated in the heating and air pollution legislation on the level of the Austrian provinces; no method available for the inspection of air conditioning systems).

4.3.2 Calculation procedures

The Austrian civil engineering institute “Österreichisches Institut für Bautechnik” (OIB) was assigned by the federal provinces to create the basic conditions necessary for the implementation of the EPBD in Austria. In this context existing structural regulations also need to be formulated. The necessity for such an action arose on the one hand from the European efforts to harmonise the regulations and on the other hand as a result of the Austrian requirements. The efforts of Austria go however far before the time of the EPBD. Already in May 1997 the expert advisory board “Energieausweis” was founded with the goal to standardise the characteristic energy values.
regarding funding and building regulations of the federal provinces as well as the issuing of the energy certificate throughout Austria.

After the EPBD came into effect, the harmonisation efforts have been intensified. The relevant OIB guidelines were decided consentaneously by the representatives of all federal states in a general meeting on 25th April 2007. The guidelines were based on the consulting results of the expert team which was constituted by the federal states. The work of this committee was coordinated by the OIB on behalf of the regional authority’s conference “Landesamtsdirektorenkonferenz”.

The OIB guidelines serve as a basis for the harmonisation of the constructional regulations and can be used by the federal states for this purpose. To what extent the OIB guidelines are legally obligatory is subject to the federal states.

Each of the six constructional regulations have their own OIB guideline. Regarding fire protection a general guideline no. 2 was compiled and further “special guidelines for "fire protection in company buildings" (guideline 2.1) and for "garages and roofed parking spaces and park decks" (guideline 2.2) were put together.

The following contains an exhaustive list of the six OIB guidelines, whereby guideline no. 6 is the essential one for the implementation of the EPBD:

- Guideline 1 Mechanical firmness and stability
- Guideline 2 Fire protection
- 2.1 Fire protection for company buildings
- 2.2 Fire protection for garages and roofed parking spaces and park decks
- Guideline 3 Hygiene, health and environmental protection
- Guideline 4 Guaranteed and barrier-free use
- Guideline 5 Noise control
- Guideline 6 Energy saving and insulation against loss of heat

4.3.3 Energy performance requirements

The following contains a description of the most substantial requirements regarding the thermal quality of the building envelope and the house-technical facilities of residential and non-residential buildings. Energy performance requirements are defined in OIB Guideline 6 and have been implemented (directly or with few adaptations) in the building codes of the 9 Austrian states.

Energy performance requirements refer to heating energy demand in the residential sector and to heating energy demand as well as to cooling energy demand in the non-residential sector.

In both sectors, there are different requirements set for new construction and building renovation. Requirements take into account the surface to volume ratio.

More detailed requirements have been defined, but will not be listed in this summary.

4.3.3.1 General

According to the definition constructional facilities are in all parts to be planned and carried out in such a way that their energy demand is as low as possible corresponding to today's technical state of the art.

Basis is the intended use of the constructional facility; the associated needs (in particular heating, hot water supply, cooling, ventilation, lighting) are to be considered.
The evaluation, whether the energy quantity is low corresponding to today’s technical state of the art, has to be taken into particular consideration:

- type and intended purpose of the plant;
- warranty of an appropriate room climate for the intended purpose, whereby in particular unfavourable effects as insufficient ventilation or warming up in summer are to be avoided;
- the comparativeness of revenue and expense regarding the energy savings.

4.3.3.2 Thermal heat demand requirements in newly built residential buildings

The thermal heat demand for newly built residential buildings is essentially dependent on the so-called characteristic length $l_C$ of the building which complies with the reciprocal and surface/volume value. The requirements have been on the one hand defined for the period after the legal regulations come into effect and on the other hand for the future (starting from 01.01.2010):

<table>
<thead>
<tr>
<th>new residential buildings in kWh/(m²y)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>until 31.12.2009</td>
<td></td>
</tr>
<tr>
<td>$H_{WB,BGFh,WG,max,Ref} = 26 \cdot (1+2,0/lc)$</td>
<td></td>
</tr>
<tr>
<td>highest 78,0</td>
<td></td>
</tr>
<tr>
<td>from 01.01.2010</td>
<td></td>
</tr>
<tr>
<td>$H_{WB,BGFh,WG,max,Ref} = 19 \cdot (1+2,5/lc)$</td>
<td></td>
</tr>
<tr>
<td>highest 66,5</td>
<td></td>
</tr>
</tbody>
</table>

Table 4. 1 : Thermal heat demand for new residential buildings

In buildings with a living space ventilation system that includes heat recovery, the maximally permissible annual heating energy demand for heating $H_{WB,BGFh,WG,max,Ref}$ reduces itself down to 8 kWh/m²a.

4.3.3.3 Thermal heat demand requirements in the case of a major refurbishment of residential buildings

The definition of “a major renovation” of a residential building applies when the construction costs altogether do not exceed 25% of the building value (without consideration of the land value and the surrounding facilities) or when at least 25% of the building envelope is renovated, or when at least three of the following parts of the building envelope and house-technical facilities are renewed collectively or repaired to a predominant part:

- window area
- facade,
- roof or the ceiling of the upper floor
- domestic technical facilities

If these conditions are fulfilled an energy certificate is to be issued or respectively has to be submitted. Depending on the characteristic length $l_C$ of the building the following defined maximum values are valid for the thermal heat demand:
Table 4.2: Thermal heat demand for major renovation of residential buildings

In buildings with a living space ventilation system that includes heat recovery the maximally permissible annual thermal heat demand $\text{HWB}_{\text{BGF,WGsan,max,Ref}}$ by 8 kWh/m²a.

4.3.3.4 Thermal heat and cooling demand requirements in newly built non-residential buildings

For non-residential buildings of the building categories 1 to 11 the following maximally permissible annual thermal heat demand $\text{HWB}^*_{V,NWG,max,Ref}$ per m³ conditioned gross volume (calculated with the user profile of the residential building in accordance to the OIB manual) needs to be met, depending on the geometry (characteristic length lc) and in relation to the reference climate:

Table 4.3: Thermal heat demand for new non-residential buildings

In buildings with a spatial air-technical facility with heat recovery the maximally permissible annual thermal heat demand $\text{HWB}^*_{V,NWG, max,Ref}$ reduces itself by 2 kWh/m³a or by 1 kWh/m³a, if not more than a half of the useful floor area is supplied with a spatial air-technical facility with heat recovery.

For non-residential buildings additionally either the summery overheating has to be proven, whereby the actual internal power loads have to be considered or the maximally acceptable externally induced cooling demand $\text{KB}^*_{V,NWGsan,max}$ per m³a gross volume of 2,0 kWh/m³a has to be restrained.

4.3.3.5 Thermal heat and cooling demand requirements in the case of a major refurbishment of non-residential buildings

The following maximally permissible annual thermal heat demand $\text{HWB}^*_{V,NWGsan,max,Ref}$ per m³ conditioned gross volume (calculated with the use profile of the residential building in accordance to OIB manual) needs to be met, depending on the geometry (characteristic length lc) and in relation to the reference climate:

In buildings with a spatial air-technical facility with heat recovery the maximally permissible annual heating energy demand $\text{HWB}^*_{V,NWGsan,max,Ref}$ reduces itself by 2 kWh/m³a or by 1 kWh/m³a, if not more than a half of the useful floor area is supplied with a spatial air-technical facility with heat recovery.

For non-residential buildings additionally either the summery overheating has to be proven, whereby the actual internal power loads have to be considered or the maximally acceptable externally induced cooling demand $\text{KB}^*_{V,NWGsan,max}$ per m³a gross volume of 2,0 kWh/m³a has to be restrained.
4.3.4 Building Certification

The layout of the first two pages of the Energy Performance Certificate (for Buildings) - Energieausweis is regulated in the OIB guideline no. 6 and is uniform in all federal states.

Austrian standard ÖNORM H 5055 (Edition: 2008-02-01 Energy certificate for buildings) displays the energy efficiency scale which only relates to heating energy demand for both residential as well as non-residential buildings (see table below). Regarding non-residential buildings this can be misleading information because cooling energy demand might be even more important than heating energy demand. This challenge will be solved in the course of further developing the energy certification scheme in Austria.

Referring to the reference climate including the appropriate temperature and radiation values, buildings in mountainous locations (e.g. at the Arlberg) can be compared with buildings located in large or small valleys (e.g. Vienna). Moreover a calculation with reference to the climate at a specific place is carried out, in order to identify the expected energy demand of a particular location.

![Figure 4.6: Example of energy performance certificate](image)

The standards and guidelines decidedly exclude the issuing of an Energy Performance Certificate (for Buildings) - based on energy consumption values, since the influence of the user behaviour is judged to be too large and thus the explanatory power of such a computation of the characteristic energy indexes would be reduced.
Figure 4.7: Influence of user behaviour to the heating demand (Source: HAUS der Zukunft)

The buildings are classified as residential and non-residential, depending on their predominant use. Non-residential buildings can additionally be distinguished into the following 12 categories. For each of them separate user profiles were defined:

1) Office buildings  
2) Kindergartens and compulsory schools  
3) Colleges and universities  
4) Hospitals  
5) Nursing homes  
6) Guest houses  
7) Hotels  
8) Restaurants and taverns  
9) Event facilities  
10) Sports facilities  
11) Sales agencies  
12) Other conditioned buildings

An allocation to one of the building categories also has to take place within a building, if “the zone” or area is larger than 50 m² respectively if it exceeds a portion of 10% of the conditioned gross floor area.

4.3.5 Independent Experts

The Austrian Federal Ministry of Economics and Labour and and Chamber of Commerce have issued information material on the admission of experts. With reference to this information material civil engineers and consulting engineers with a background in architecture, construction, building physics, environmental technologies, building services engineering, etc., and skilled trades working in the building sector are allowed to calculate energy certificates according to EPBD. However, this only relates to self-employed experts. Due to the fact that also employed experts are allowed to calculate energy certificates, some Austrian states decided to define the required expertise in the building regulation, together with the other requirements set by the EPBD.

4.3.6 Inspection of Boilers and conditioning Systems

Inspection of boilers and air conditioning systems is regulation on the level of the Austrian states. In most cases the legislation on heating systems and emissions has been revised to cover the requirements set by the EPBD. Regarding the inspection of boilers, a treaty between the federal government and the Austrian states (according to article 15a federal constitutional law) has been developed, in order to establish a harmonised approach in Austria. Regarding inspection of air conditioning systems a guideline for inspection has been developed, commissioned by the City of Vienna. This guideline has been further developed in co-operation with the HARMONAC project (Intelligent Energy for Europe project), to provide a common solution for the Austrian states.
5. Energy end use and Energy efficiency for services directive [3]

A directive on energy end-use efficiency and energy services was adopted in December 2005 and came into force in April 2006. The directive requires member states to draw up national action plans to achieve 1% yearly energy savings in the retail, supply and distribution of electricity, natural gas, urban heating, and other energy products including transport fuels. The 1% target is only indicative but the national action plans will need approval from the Commission and will be reviewed every three years. The process will be spread over nine years, with the following steps:

- 30 June 2007 is the deadline for member states to submit their first energy efficiency action plans
- 30 June 2011: deadline for second round of national action plans
- 30 June 2014: deadline for third round of national action plans.

The Sectors covered are households, agriculture commercial and public sectors. The target is only indicative but the national action plans will have to be submitted to the Commission for approval and will be reviewed every three years.

For public sector, the obligation is to take energy efficiency into account in public procurements related to the purchase of vehicles, buildings and other equipment.

A harmonized measurement system for energy savings will be put in place so that energy savings can be compared from one member state to the other. The calculation method allows member states to take into account measures initiated as early as 1991.

The directive also sets up a harmonized framework for common definitions, consumer information, certification schemes for energy services providers, as well as dedicated contractual, financial and legal instruments aimed at creating a single EU market for energy efficiency.

According to the Commission, the directive will also serve as an umbrella to complement and improve the implementation of existing EU energy efficiency legislation (Energy Performance of Buildings Directive, Combined Heat & Power Directive and the directives on the energy labeling of appliances).
5.1 Adoption of ee-esd by member states - the national energy efficiency action plans [neeaps]

A first, painful conclusion is that nearly all Member States missed the deadline for submitting their National Action Plan (NAP). Only the UK and Finland had their NAP ready by June 30, 2007. Even today there are still a few NAPs to be finalized.

Based on the 17 NEEAPs (National Energy Efficiency action Plans) submitted by 1 December 2007, the Commission gives a first assessment of the strategies adopted by Member States, in the following the conclusion of this assessment:

NEEAPs offer an opportunity to focus on energy efficiency, an issue of strategic importance to the achievement of the EU's goals. A first examination of the plans gives some encouragement. However, it seems also to indicate a considerable gap in several Member States between the political commitment to energy efficiency and the measures adopted or planned, as reported in the NEEAPs, and the resources attributed to preparing it.

Among the seventeen NEEAPs reviewed by the Commission, several present comprehensive strategies and plans likely to deliver savings beyond the required 9%. However, many seem to present a business-as-usual approach. The Commission looks forward to further plans and to the exchange of experience and best practice. The Commission will do its part to help Member States with their implementation of the plans.

This focus on energy efficiency in EU energy policy is justified. Looking to global challenges of climate change, security of supply and development, widespread improvements in energy efficiency must play a fundamental role.

Global markets for energy-efficient products and services will be very large, and players in the lead markets which the EU and its Member States are constructing by their various policy actions will be in a strong position. In a similar way, cooperation on energy efficiency can be made a positive force in international relations. The Commission's initiative on an international platform on energy efficiency is intended to help develop standards, trade and technology transfer.

Progress towards strategic objectives agreed in March 2007 will be assessed in the 2nd Strategic Energy Review. The Review should help in formulating recommendations for future policy development, and in taking forward further work on an EU energy policy for Europe. This will certainly include energy efficiency.

http://ec.europa.eu/energy/demand/legislation/end_use_en.htm#efficiency
5.2 National Energy Efficiency action plans - Focus on public sector

The documents of NEEAPs for Netherlands, France and Austria are available on the website: http://ec.europa.eu/energy/demand/legislation/end_use_en.htm

In the following a summary of energy efficiency measures related to public sector:

5.2.1 Netherlands

Article 5 of the directive requires the public sector to play an exemplary role in meeting the energy saving target set out in Chapter 2. The policies and measures under development and already in place to fulfil this requirement are detailed below:

- Sustainable public procurement

Within Europe, the Netherlands is a frontrunner when it comes to sustainable procurement. It has been agreed upon in the government that in 2010 100% of central governmental procurement will take sustainability (including energy efficiency) criteria into account (Kamerbrief van 14 juli 2006 van de Staatssecretaris van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer (Kamerstukken II 2005/2006,30 300 XI, nr. 134)). For regional and local government, this percentage will be 50%, but currently negotiations between national and local governments are taking place with the aim to raise the percentage.

In the programme Sustainable Operational Management for Governments (DBO) criteria on sustainable procurement are developed. Energy efficiency will often be an important part of the criteria. By the end of 2010, criteria for 80 to 100 product groups will have been developed. The programme is jointly operated by the national government and the representative organisations of regional and local government. Progress of the programme will be monitored biannually. The website www.senternovem.nl/duurzaaminkopen contains all information about the programme and criteria. The website is also an important tool to disseminate knowledge on energy efficient procurement, together with conferences, workshops, newsletters and other activities, undertaken by DBO and other organisations working on public procurement.

- Local agreements

Furthermore, the Dutch government will make agreements with local authorities to reduce carbon dioxide. These agreements will contain various aspects, like 2% energy efficiency improvement in buildings, 1.5% energy efficiency improvements considering public lighting, renewable energy, etc. and subsidy schemes.

- Climate neutral government

The buildings of the national government will be climate neutral from 2012 on. In the first place this will be done by increasing energy efficiency and the use of renewable energy. The remaining emissions will be compensated for. So far, 19 local governments have ambitious plans to become climate neutral cities between 2015-2020. Apart from their own building stock, mobility and operational management, they will stimulate energy efficiency and renewables in households and commercial companies. This number is expected to increase, also as a result of the above mentioned agreements. Furthermore, the government plans to install energy efficient lighting in public space at increased speed.
Government as Launching Customer

The exemplary role of the central government will also be undertaken by acting as ‘launching customer’. Government will apply innovative energy concepts in housing and mobility. Through its buying volume, the government can give a strong impetus to the development of innovative concepts, products and services. The website of the initiative can be found on www.launchingcustomer.ez.nl. Through the combination of these measures, the Dutch government fulfils the obligations under article 5 of the ESD. The focus lies on items b and c of Annex VI of this directive, but the Dutch government also contributes to the other items of Annex VI.
5.2.2 France

Measures intended to make the public service exemplary in energy efficiency are the following:

- **Circular dated 28 September 2005 on the exemplary role of the State in energy savings**

  Prime Minister’s Circular No 5.102/SG, dated 28 September 2005, on the exemplary role of the State in energy savings, is the reference defining the State’s action principles on this issue. It is available at the following address: www.industrie.gouv.fr/energie/developp/econo/pdf/circulaire-28-09-05.pdf It issues a reminder that the State is obliged to contribute to this change in behaviour and to set an example within the context of public control. The measures recommended by the circular will allow for a significant reduction in the State’s energy consumption, which will also have a positive impact on the budgetary plan.

  Amongst the guidelines set, the obligation to renew the State’s car pool with fuel-efficient vehicles that emit less than 140 g/km of CO2 stands out in particular. Requirements are also defined in terms of energy performance on renovation or construction of public buildings, as well as for optimisation of heating consumption. Any office equipment purchased should also be energy-efficient.

- **National action plan for sustainable public procurement**

  The regulation of public contracts has been adapted on the basis of Community Directives 2004/17/EC and 2004/18/EC, of 13 March 2004, in the form of Decree No 2004-15 of 7 January 2004 on the public procurement code. Requirements relating to the environment may be integrated by public buyers, in particular in the classification and contract award criteria. The public procurement code has meanwhile been amended by Decree No 2006-975 of 1 August 2006 on the public procurement code and the circular dated 3 August 2006 on the public procurement code application manual (OJ, 04/08/2006).

  On these bases, and within the context of the national sustainable development strategy (SNDD), a national action plan for sustainable public procurement (PNAAPD) has been drawn up, subject to electronic public consultation, from 14 December 2006 to 25 January 2007, and sent to the European Commission.

  The Plan sets ambitious targets in terms of sustainable public orders for the period 2007-2009, in the wake of the SNDD, particular in terms of State buildings and vehicle fleets. The PNAAPD is available online at www.ecoresponsabilite.ecologie.gouv.fr.

- **Guides aimed at public buyers**.

  In order to encourage public buyers to manage energy savings and foster sustainable development, guides have been written, in particular:

  - the guide for writing technical clauses of public contracts for operation of heating with or without major equipment maintenance and with an obligation to achieve a result (May 2007)
  - the guide to environmentally-responsible public procurement – Energy efficiency in contracts for operation of heating and air conditioning for the existing real estate pool.

- **Mobility and transportation**

  Decree No 2006-1663, of 22 December 2006 (OJ, 23/12/2006) establishes a partial bearing of the cost of subscription bonds relating to travel between their usual place of residence and their place of work by State employees and employees of the State’s public administration establishments.
working outside the Ile-de-France region. It involves the extension throughout France of a measure in existence previously in Ile-de-France constituting an incentive to use public transport.

The same decree No 2006-1663, in Article 6 thereof, lays down the obligation for all authorities in a built-up area with more than 100,000 inhabitants to draw up a mobility plan (Authority Transport Plan) within two years. These plans relate to work-related journeys and commuting between home and work. They should encourage local modal shift initiatives. Furthermore, on renewal of their vehicle fleets, the State and certain public persons (public establishments, public operators, national undertakings, local and regional authorities and their grouping) are obliged to acquire or use a minimum proportion of 20% electric, NGV or LPG vehicles under 3.5 tonnes, if they run a fleet of more than 20 vehicles, pursuant to Article 24-III of the law on air and efficient use of energy codified in Article L8B of the highway code and its application decree of 17 August 1998 (OJ, 18/08/1998). Where State departments are concerned, the aforementioned Prime Minister’s Circular No 5.102/SG, dated 28 September 2005, requires State departments to renew their car pool with fuel-efficient vehicles that emit less than 140 g/km of CO2.

- **Work of the operational committees of the Environment Round Table**

Several operational committees (COM-OPs) have been assigned for preparing the implementation of and for monitoring the measures adopted within the framework of the Environment Round Table. Where the exemplary status of the public sector is concerned, the main COM-OPs are:

- COM-OP No 4 "Exemplary State", coordinated by Mrs Hélène Gisserot, former Deputy Chairwoman of the Audit Office and Mr Claude Martinand, Deputy Chairman of the National Roads Authority.

- COM-OP No 28 "Exemplary authorities", chaired by Mr Philippe Richeret, Chairman of the Bas-Rhin General Council, Daniel Percheron, Chairman of the Nord-Pas de Calais Regional Council and Marc Censi, Chairman of the Assembly of French Local Authorities.

- The contributions of other COM-OPs are also involved in this approach, in particular the aforementioned COM-OP No 1 "New public and private buildings".
5.2.3 Austria

Measures relating to the public service sector are programmes, energy services and other measures that improve energy efficiency in public service buildings (in particular space heating, including auxiliary energy, hot water, lighting, ventilation and air-conditioning, large scale cooling, electrical appliances), as well as in other end-use and building types, and that have effect in the period from 2008 to 2016.

- **Measures relating to the building shell, in the case of new-builds**:
  - Improving the thermal quality of the building shell in the case of new-builds and renovations: 6 measures are described, the objective is to reduce losses of usable energy, or requirement for, usable energy for heating and cooling purposes.
  - Integration of passive heating and cooling in new-builds: one measure is described, the objective is to avoid or minimise the requirement for heating, cooling and air-conditioning.

- **Measures relating to the building shell, in the case of renovation**
  - Improving the thermal quality of the building shell by means of renovation: 7 measures are described, the objective is to reduce losses of usable energy, or the requirement for usable energy for heating and cooling purposes.
  - Increasing the thermal renovation ratios: According to the most recent buildings and housing census, the renovation ratio for 1991–2001 was approx. 1.4 %; however, thermal renovation (facade) only approx. 0.8 %; increase in the renovation ratio to at least 3 % (2008–2012) and, in the medium term, to 5 % per annum.

- **Measures relating to building installations (heating, cooling, hot water and ventilation)**
  - Installation of new, high-efficiency energy conversion systems: 15 measures are described to reduce the final energy consumption in the private residential sector through the use of high-efficiency energy conversion systems.

- **Measures relating to building installations (heating, cooling, hot water and ventilation), in respect of their ongoing operation**
  - Optimisation of existing energy conversion systems to achieve greater energy efficiency: 5 measures are described to reduce the final energy consumption in the public services sector through improvement measures, as well as regular servicing and inspection of energy conversion installations.
  - Domestic environmental subsidy (DES) for efficient energy utilisation: 3 measures are described to improve energy efficiency and optimise mechanical systems.

- **Measures relating to appliances, lighting and energy-efficient technologies**:
  - Acceleration of the market, penetration of innovative, energy-efficient technologies, and preparation of the market for such technologies though targeted procurement: Introduction of mandatory energy efficiency criteria in public procurement. Support for the introduction on the market, and accelerated market penetration, of innovative energy-efficient technologies. The public sector is to establish itself as a sector preparing the market for innovative – 5 measures are described.
  - Promoting of energy-efficient technologies for exterior lighting: Optimal use of energy-efficient exterior lighting systems. Use of energy-efficient lighting...
technology, preferably use of LEDs for decorative lighting; 5 measures are described.

- **Measures relating to spatial and urban planning**
  - Consideration of energy efficiency aspects in the leasing of premises by municipal agencies: one measure is described. More premises may be leased only if they comply with certain minimum criteria in respect of energy.

- **General measures in the public service sector**
  - Promotion of contracting and interacting in the public sector: the objective is environmental and climate protection, and creation of employment, without additional demand on budgets; 5 measures are described.
  - Improving energy efficiency in the public sector through energy management and cost-transparent administration: Awareness raising and energy management to be used as means of encouraging users to save energy, 6 measures are described.
  - Consideration of energy efficiency in planning and procurement in the public sector: **The objective is greater integration of energy efficiency in public decision-making processes, example effect.**
    - Procurement directives for electrical appliances and installations, as well as training and consultation measures for energy-related or procurement-related matters.
    - Planning of new-builds to low-energy and passive-house standards.
    - Lowering of the limit values for energy indices, mandatory establishing of the low-energy house standard, planning emphasis on solar architecture.
    - Consideration of external costs in investment decisions, widening of efficiency calculation.
    - Mandatory establishing of minimum energy indices and other efficiency criteria in competitions and invitations to tender.
    - Establishing of efficiency standards for installations.
    - Greater integration of energy aspects into public development and
  - Local authorities in exemplary role – Advice to local authorities concerning efficient use of energy to raise awareness in local authorities, example effect
    - Support for various energy-related activities of local authorities
    - Supervision, certification and classification of activities of local authorities relating to energy and climate policies
    - Creation and expansion of a consultation service for local authorities, for energy related matters (energy consultation network) - Energy accounting, benchmarking, renovation strategies, invitation of tenders for optimisation measures, reporting
    - Appointment of energy advisers and personnel with responsibility for energy in the local authority administrations
    - Creation of an instrument for extended regional and local energy planning (handbook)
    - Periodic auditing of energy accounting data –
• Inclusion of energy efficiency considerations at an early stage in construction planning
• Information, consultation and training of local authority employees
• Optimisation of implementation of energy measures and monitoring of implementation (creation of an implementation folder), use of multiplier effects (events) - Establish links between the implementing authorities and the private construction specialists / investors / planners

  o Energy efficiency programmes and action plans
    • Renovation plan, extending to 2010, for Federal State buildings, with contracting models
    • Supporting of local administration through introduction of local energy concepts - Preparation of fully considered energy supply concepts for regional planning
    • Implementation of a thermal insulation offensive for local communities

  o Subsidies and financing
    • Readopting of an energy-saving investment programme for buildings within the Federal State
    • Award of financial aid to local authorities is to be dependent on energy and environment related criteria
6. Description of national CREM processes

Public real estate management is organised differently in the countries and within the same country, the way public real estate is managed could be different from one organisation to another.

However the main functions in real estate management process are defined in the same way, these functions could be presented differently but the content of each function doesn’t differ from one country to another.

According Pity va der Schaaf [6] the definition of Public real estate management is the management of a government’s real estate portfolio by aligning the portfolio and services to:

- The needs of the users
- The financial policy set by treasury
- The political goals that government wants to achieve

Public real estate management is closely related to corporate real estate management (CREM). In theory, public real estate management incorporates the same disciplines as corporate real estate management: general management, asset management, facility management and cost control. Unfortunately, the theories, opinions and experiences described in corporate real estate literature are not always applicable to a public setting for the following main reasons:

<table>
<thead>
<tr>
<th>Business</th>
<th>Government</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leaders are driven by the profit motive</td>
<td>Leaders are driven by desire to get re-elected</td>
</tr>
<tr>
<td>Money from customers</td>
<td>Money from tax-payers</td>
</tr>
<tr>
<td>Competition</td>
<td>Monopolies</td>
</tr>
</tbody>
</table>

Table 6.1: CREM versus PREM

- Influence of political steering and governance within public organisations
- The number of external stakeholders is important in public organisations, so the boundaries of the playing field in which real estate manager has to operate become unclear and more difficult to handle than in the private sector.

6.1 Four main functions in CREM

The field of Real Estate Management processes is occupied with 4 specialized management fields on three organizational levels, known as:

- Facility Management (tactical level)
- Portfolio Management (strategically level)
- Asset Management (tactical level) and
- Property & Maintenance Management (operational level)

These management fields and organisational levels are related to each other, as shown in the scheme below.
Information about the SHEEQ aspects [Safety & Health, Energy & Environment and Quality], the financial and planning aspect, is going around in the process. Policy is going top down in the process. Due to every specific function on every level a strategy must be made to integrally embed the energy aspect.
6.2 Overview of national CREM process for public buildings

6.2.1 Netherlands

Introduction

Real Estate Management on the field of Public buildings can be divided in three levels; national, regional and local level.

The working processes in Real Estate Management are not stated in regulations; each organisation is free to organize the Real Estate processes on its own way. However there are some basic themes and tasks which will have to be dealt with.

The four main functions, described in the previous paragraph are embedded by most of the Real Estate departments in their way of working, although not always explicit visible in their organisational structure. So portfolio management, asset management, property & maintenance management and facility management have found their place in many Real Estate Departments. Most Real Estate organizations have started with Property & Maintenance management; then started with Facility Management.

Portfolio management and Asset management are management fields which have been introduced later, or still have to be implemented. These management fields are based on the vision that Real Estate has an strategic position in an organisation, and should contribute to the quality of primary processes and core business.

On national level this strategic way of thinking and acting with Real Estate is already common, on regional and local level, it is not yet a current way of management of Real Estate, especially in “medium” and smaller municipalities.

National Real Estate

Real Estate on national level is managed by 3 organisations, as mentioned in chapter 3.1;

The Rijksgebouwendienst is responsible for the building stock of all Ministries, excluding the Ministry of Defense and the Ministry of Traffic and Public Works / Infrastructure;

The DVD (Dienst vastgoed Defensie) is the real estate services of the Ministry of Defence, responsible for all building stock and sites;

The Ministry of Traffic and Public Works has its own Department for building and managing their infrastructural works, including, control centers etc.

Besides the building stock of these Governmental organisations, there are public buildings in the ownership of privatised organisations, for example railway stations and airports.

Remarks

As a representative of the government the Rijksgebouwendienst and DVD have to set an example in Public Real Estate management; therefore the Rijksgebouwendienst and DVD are in the Netherlands a forerunner in using new techniques, methods, setting new standards in the way of working.
Most of the buildings are in property of Rijksgebouwendienst, DVD and RWS; a small part is rented from commercial Real Estate companies, this concerns mostly offices.

**Regional Real Estate**

The Netherlands are on regional level subdivided in 12 Provinces. Provinces manage Real Estate for their own organization, mostly concentrated at one central office in the province-capital.

Provinces have a role in the management and administration of regional (traffic) infrastructure, like roads, waterways (canals, rivers), infrastructural works (harbours, locks, pumping stations) and buildings for control and operation, storage, workshops.

**Remarks**

In the Real Estate stock of provinces are very few public buildings; mostly only the head-office.

**Local Real Estate**

At local level there are municipalities. In the Netherlands there are on this moment about 450 municipalities. This amount is still decreasing, because of the national policy of merging two or more smaller municipalities (less than 15,000 inhabitants) into larger new municipalities with more than 40,000 inhabitants, or incorporate them in larger existing municipalities.

Municipalities have each a great variety in Real Estate, but all municipalities have a common mix of specific buildings.

The building stock of most municipalities consists of one or more of the following building types:

<table>
<thead>
<tr>
<th>Building type</th>
<th>Public</th>
<th>Non-public</th>
</tr>
</thead>
<tbody>
<tr>
<td>Town hall /office buildings</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Office, garage, workshop, accommodation buildings for Fire Brigade</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Office, workshop, garage, shelter, storage and accommodation buildings for Public Works (service / maintenance on roads / streets / parks/public areas)</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Community centre</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>museum and education building</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Specific municipal monuments; (historic town gates); sometimes without function</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>recreation/sports building; swimming pool</td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>

**Table 6.2 : Public, non public Building types in municipalities**

The responsibility of municipal building stock is in many cases divided on several departments within the municipality, for example departments for Education; Sports/Welfare; Public Services. Strategic choices on the Real Estate on building, buying, selling etc. will be made by those departments. The operational maintenance tasks are often centralised within a municipal building services department.

Recently some larger municipalities decided to centralize all the Real Estate in one department. The users of the buildings, the several (functional) departments of the municipality, then become EPI-CREM Status of national contexts and state of the art about CREM processes,
actually tenants of these buildings. By centralizing the portfolio management of municipal building stock, the supply and demand in Real Estate can be optimized. For example a useless former primary school building can be used and renovated to a community centre.

Remarks

In the years after the second World war, there were many municipalities with a residential building stock; but all these are now privatised organisations.

Municipalities have a restricted responsibility in the management and administration of (primary) school buildings; there is an increasing role in this for the board of public and specific school types.

Trends

In the management of governmental, provincial, and municipal (public) real estate there are some trends to recognize:

- Increase in scale: merging municipalities; larger contracts with external contractors, for longer periods
- Increase in professionalism: strategic approach, more attention to portfolio and asset management
- Focussing on strategic and tactical aspects and managing instead of executing tasks with own staff;
- Outsourcing of parts of Real Estate processes: operational Property and Maintenance Management, sometimes parts of the Facility Management.
- On local level is an increasing number of municipalities where Real Estate management is centralized, with all buildings under responsibility of one department.
6.2.2 France

In the management of its real-estate park, the state stayed for a long time away from the movement of modernization that knew private companies and certain foreign administrations.

Some recurring criticisms were made by the parliament and the audit office on the defect of strategy, the absence of instruments of piloting and the lack of building stock knowledge.

In this context and besides the measures taken from 2003 in the domain, the government decided in 2005 to engage an initiative of modernization accelerated with the objective to enable state to insure completely its function of owner, by managing its building stock in a successful way.

The president of the republic engaged in January, 2006 a new stage by deciding that the property of the buildings of the state would be confided to a new service France domain.

The real-estate council of the state was formally established by decree on October 16th, 2006. The Instruments set up to allow the state to assume its function as an owner are the following:

- Maintain the level of ambition in transfers: a target of 500 millions € in transfer was set up for 2007.
- Apply a strategic frame: each ministry has to elaborate and keep up to date a multiannual plan of real-estate strategy concerning all the office buildings which it occupies (SPSI).
- Put the state in owner's situation towards the administrations: Budgetary rents were experimented at first on 3 ministries, widened to local administrations and in the course of generalization to the decentralized services, the modalities of calculation of the rents are close to those of the market. Specific solutions will be used for Public buildings managed at local level (local authorities) depending on the specific situations.

To modernize the maintenance of the buildings of the state, the following proposals were formulated:

- Identify, professionalise and mutualise the functions maintenance and develop the projected piloting of the works.
- Create stable rules of financing basing on the responsibility of the administrators (managers) in the context of the budgetary rents.
- Integrate the real-estate function in information system: a successful real-estate information system of management is in the course of development for ministries.

Studies and missions were then launched at national level to analyse the financial and technical issues about the organisation and the financing of the maintenance of the state buildings.

At the conclusion of these missions, it appeared following points:

- The real-estate management is in full reform.
- The expenses of big maintenance are difficult to determine due to the heterogeneousness of the real estate property of the state and to the variety of organizations of real estate management. It however appear that the organisation is in progress; in particular functions such us asset management, property management and facility management are more and more introduced.
According these decisions and these changes and also taking into account the actual context of climate change and energy performance of buildings directive and other national laws, ministries and local authorities are actually in phase of reflexions and organizations on the way to assume real-estate management.

**Centralisation versus decentralisation of ‘huge maintenance’ in the ministries**

There is in several ministries a structure situated in central level, dedicated to the real-estate management of which competences vary strongly from a ministry to another.

Real estate management is mostly based on a software of the market who is often adapted to the needs of each ministry. In another hand each ministry try to build its political strategy based on standard indicators such us occupation ratio, cost ratio, etc...

The following table describes for 6 ministries the structure in charge of real estate and the used software for real estate management:

<table>
<thead>
<tr>
<th>Ministry</th>
<th>Structure in charge of real estate</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ministry of finance</td>
<td>Sous direction de l’immobilier à la DPMA et bureaux en charge de l’immobilier dans les directions réseaux</td>
<td>Antilope</td>
</tr>
<tr>
<td>Ministry of equipment</td>
<td>Délégation à l’action foncière du secrétariat général et direction générale du personnel et de l’administration</td>
<td>GPI</td>
</tr>
<tr>
<td>Ministry of ‘intérieur’</td>
<td>Sous direction des affaires immobilières de la DEPAFI</td>
<td>GESPAT</td>
</tr>
<tr>
<td>Ministry of foreign affairs</td>
<td>Service des affaires immobilières de la direction générale de l’administration</td>
<td></td>
</tr>
<tr>
<td>Ministry of defence</td>
<td>Direction de la mémoire, du patrimoine et des archives et service d’infrastructures de la defense (SID)</td>
<td>Sagri</td>
</tr>
<tr>
<td>Ministry of justice</td>
<td>Sous direction de l’immobilier de la direction des affaires générales</td>
<td>Patrimo</td>
</tr>
<tr>
<td>Ministry of culture</td>
<td>Bureau de la politique immobilière à la direction de l’administration générale</td>
<td>in course of acquisition</td>
</tr>
</tbody>
</table>

Table 6.3 : Structure in charge of REM and used software by ministry

In the most advanced ministries, the real estate management includes asset management, property management and facility management.

The financial management of huge maintenance is centralised in a few number of ministries however the budget is not necessarily centralised. Versus ministry of justice, the ministry of defence has centralised all the budget for ‘huge maintenance’ except department of ‘gendarmerie’.

In the ministries where the budget of huge maintenance is centralised, where the decisions are made in central level, the budget is after transferred to operational units at local level for execution of maintenance and its payment.

Several analysis shows that for a given ministry it’s more important to better organise the diagnosis of buildings, to enforce technical issues of maintenance and to allow decisions at local level than to focus on centralisation of the maintenance and its means for the whole ministry.

The idea to centralise real estate management for all ministries is not realistic because there are big differences between ministries on the way they practice real estate management, some of them makes huge efforts and success to implement an efficient scheme, others are working in this ways and others has not really organisation of real estate management. In another hand, the building stock of all ministries is very important, the type of buildings are different from one ministry to another and the activities in the buildings are different. For all these reasons, it was stated that a
centralisation of real estate management, in particular huge maintenance for all ministries isn’t a good approach.

There is only one case for which a global decentralisation was introduced, it concerns a particular part of building stock of ministry of defence: 11000 dwellings. The whole management was assumed by a private organisation. This organisation assumes the maintenance and conservation as well as renovation of buildings, it pays 40% of the rents to the state and keeps 60%, it additionally receives subsidies for maintenance and renovation from the state. The legality of this management is discussed today and performances of this organisation seem to be criticized.

A part of a global decentralisation, two other kind of decentralisation exists:

- Decentralisation (or deconcentrated) of complete services in the perimeter clearly defined by certain equipments (examples the contracts of operation and maintenance of heating and air conditioning incorporating the total guarantee of the material equipments and their renewal, the said contracts P3.

- Decentralisation (or deconcentrated) of partial services with fixed perimeter on the whole site: in this case a private property management organisation is in charge of real estate management. About renovation, it is advised that this private organisation acts in representative and not in provider, its role is to suggest a program of renovation and execute it, however, it’s the owner who make decisions and assumes responsibilities, who sign the contracts with external body. For these reason, it is essential that the ministry maintains in his services a minimum of technical skills.
6.2.3 Austria

6.2.3.1 Real Estate Management at federal level

The former federal building construction office (Bundeshochbauamt) was restructured in the year 2000. All federally owned real estate properties were devolved into the property of the Bundesimmobiliengesellschaft.b.m.H (BIG). Approximately 65 historical buildings which are among Austria’s cultural heritage alternatively which have a great connection to the Republic of Austria were not devolved. Those buildings are in care of the Burghauptmannschaft Österreich (BHÖ). The Burghauptmannschaft Österreich is incumbent on the real estate management and on the construction management of all real estates and buildings in Austria belonging to the Federal Ministry of Economics and Labour’s range of resources.

6.2.3.1.1 Tasks of the Bundesimmobiliengesellschaft (BIG)

The federal real estate association is responsible for the real estate management of the federation. Administration, letting, utilization and maintenance of existing objects as well as the development of new objects are part of the tasks of the real estate association. The real estate association is organized as a private organization and is completely in the property of the Republic of Austria, represented by the Federal Minister for economics and labour. The real estate association has completed 464 new building construction projects and overall renovations (Generalsanierung) with a total volume of 2,30 billion Euro since its establishment. At present about 56 projects with a volume of approximately 554 millions Euro are being carried out. Numerous building projects are under planning.

- Structure and field activities of the BIG

<table>
<thead>
<tr>
<th>Press/Revision</th>
<th>Finance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organisation and Quality Assurance</td>
<td>Corporate Group Controlling/Construction Controlling</td>
</tr>
<tr>
<td>Management Board</td>
<td>Law Department</td>
</tr>
<tr>
<td>Planning and Construction</td>
<td>Corporate Law and Ownership Right</td>
</tr>
<tr>
<td>CAD and Space Management</td>
<td>Personnel</td>
</tr>
<tr>
<td>Facility Services</td>
<td>Communication Systems (IT/SAP)</td>
</tr>
<tr>
<td>Procuration Management and Infrastructure</td>
<td></td>
</tr>
<tr>
<td>Coordination Object- Facility Management</td>
<td></td>
</tr>
<tr>
<td>Marketing</td>
<td></td>
</tr>
</tbody>
</table>

Table 6. 4 : Structure and field activities of the BIG

6.2.3.1.2 Commission of the Burghauptmannschaft (BHÖ)

A big part of the building stock from the Burghauptmannschaft presents a limited usage because of the special building construction (protection of historic buildings and monuments). These objects are classified as buildings with special obligations, for example according to national law. They are mostly used for the upper organs of the federal government or sovereign commissions.

Because of the protection of historic buildings, it’s not possible to cultivate these buildings in form of usual current real estate management. A refinancing of building or technical measures as usual
for other “normal” public buildings is not possible. There is no possibility to commercialize these objects cost-effective. One example is Viennas Hofburg:

The main business of the Burghauptmannschaft is Property Management, general support of building and technical measures and special services such as fire protection. Further they are instructed to manage cultural events.

The Burghauptmannschaft administrates a lot of institutions which were ancient government institutions, for example the Bundesmuseum, Tiergarten Schönbrunn or the Spanische Hofreitschule. During the last years these institutions were outsourced and now they are managed by private arranged organizations.

Because of the under-resourced situation of theses institutions, the buildings were not carried over into the respective institution, but they got a legal right of use in form of rent, lease or life tenancy on the building or the property wherefore the Burghauptmannschaft receives money for the Austrian Republic. With this money the financing of building and technical measures is not possible, because of the small amount.

Moreover it has to be said that these private arranged organizations do not have the necessary know-how in building constructions either so that an outsourcing of the objects into the organization did not seem to be useful.

Due to the scarce budgetary, the Burghauptmannschaft was induced to put innovative administrative and economic measures (change of organisation, use of modern business economic methods) or to choose modern financing models, for example Public Private Partnership-Projects.

By the structural measures the BHÖ contributes substantially at the preservation of the urban features, particularly in Vienna, Salzburg and Innsbruck, what the tourism influences positively. Much restoration and rehabilitation work cannot be done by “normal” building contractors but only by architecture and rehabilitation specialists.

6.2.3.2 Real estate management on local basis

6.2.3.2.1 Tasks of the City Vienna concerning the construction and facility management

- Administration and preservation of the urban official buildings including the termination and dissolution of contracts in order to procure office space, supply of infrastructural services as far as no other agency is responsible for it,
Required representation of the city Vienna in court, the urban yards of the parsonage (Pfarrhof), fanes, accessible chapels and patronages (with exception of the fanes and chapels in cemeteries, hospitals and nursing homes),

Other buildings as well as urban areas and/or buildings for which according to the distribution of functions no closer content reference exists to the tasks of another agency and as far as this is not assigned to other agencies,

As well as administration of restaurants and/or cabinets in traffic buildings.

Furthermore the building management assists other agencies at price evaluation of information concerning the construction and building management.

Among the strategic and operational measures of the construction and building management are:

- Establishment of new buildings and annexes
- Performance of rebuilding
- Structural alterations and abruptions
- Execution of preservation measures
- Co-operation at the creation of draft and execution plans

Furthermore planning, establishment, installation, management, preservation and expertise of:

- Warmth-, cold-, ventilation-, climate-, machine-, sanitary-, electrical-, lightning protection- and promote-technical equipments of all kind,
- Alarm systems in agreement with the municipal department 68 according to the Viennese disaster management law and crisis management law including performance of functional test,
- Communication-engineering equipments of all kind such as wirings in objects, video constructions, telecontrol systems, broadcasting equipments, power control units, (Nebenuhrenanlagen), alarm systems, (Aufrufanlagen), access systems, public-address systems, gate intercoms (Torsprechanlagen), antenna installations as well as other communications-engineering equipments which exclusively serve special purposes.
Further services are:

- Performance of competitions and procedure for callings in expert opinion for construction projects of municipal department according to the agreement with the municipal department 19,
- Studies on planning of plants of the energy industry (including associated energy-saving, energy-optimizing and environmental exculpatory measures),
- Control of heating systems on their economy,
- Co-operation with tariff affairs of the chimney sweepers,
- Management of an on call service and of a service ministration in order to recover interferences and emergencies on constructional and technical equipment to preserve buildings and examination of electrical system,
- Acquisition of the premises for purposes of the magistrate or for other facilities of the city Vienna as far as this is not devolved to different agencies,
- Technical expertise of private kindergartens, schools, hoards and institutes for youth welfare service.

- Structure of the construction and facility management (magistrate department 34) of the city Vienna

<table>
<thead>
<tr>
<th>B construction and facility management</th>
<th>Deaneries</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Schools and kindergartens</td>
</tr>
<tr>
<td></td>
<td>Specific functions</td>
</tr>
<tr>
<td>Object Management</td>
<td>Energy management, environment and technique</td>
</tr>
<tr>
<td>Strategy, Quality Management and Controlling</td>
<td>Strategy, Quality Management and Controlling</td>
</tr>
<tr>
<td>Central Services</td>
<td>Finances</td>
</tr>
<tr>
<td></td>
<td>Service supply and placing</td>
</tr>
<tr>
<td></td>
<td>Personell and education</td>
</tr>
<tr>
<td>Operation and technical service</td>
<td>Office</td>
</tr>
<tr>
<td></td>
<td>Operation and technical service</td>
</tr>
<tr>
<td></td>
<td>Infrastructure services</td>
</tr>
<tr>
<td></td>
<td>New building construction renovation and overall refurbishment</td>
</tr>
<tr>
<td></td>
<td>Planning</td>
</tr>
<tr>
<td></td>
<td>Refurbisment and adaption</td>
</tr>
<tr>
<td></td>
<td>Administration</td>
</tr>
</tbody>
</table>

Table 6.5: Structure of the construction and facility management (magistrate department 34) of the city Vienna

The classification of the buildings is carried out differently depending on the municipal department. At present no uniform building designation is usual. In line with the registration of all necessary information the classification of the buildings however is to take place according to the inventory regulation of the city Vienna in the future.
- Classification of building types in the city Vienna according to the inventory regulation\textsuperscript{14}

<table>
<thead>
<tr>
<th>Building types</th>
<th>Residential premise</th>
<th>Official building</th>
<th>Schoolhouse</th>
<th>Institution building and premises</th>
<th>Cultural buildings</th>
<th>Other buildings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Official building</td>
<td>Schoolhouse</td>
<td>Institution building</td>
<td>Memorial buildings, memorials</td>
<td>Gym halls</td>
</tr>
<tr>
<td></td>
<td></td>
<td>headquarters</td>
<td>in collar administration</td>
<td>Marketstands</td>
<td>Reliefs, Mosaic, Graffity, memorial tablets</td>
<td>Stables, barns, outbuildings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Own schoolhouses</td>
<td></td>
<td>Barrack</td>
<td>Ruin</td>
<td>(Steigertürme), .. tower (Übungstürme)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Schoolhouse in collar administration</td>
<td></td>
<td>Kiosks, stands</td>
<td>Fountains, wall fountains, memorial fountains</td>
<td>Advertising column</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Public (Bedürfnisanstalten)</td>
<td>Plastics, sculptures</td>
<td>Fuel pumps, gas pump</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Factories</td>
<td>Other artworks</td>
<td>Transformer substations (Trafohäuschen), ...(Schalthäuschen)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Glasshouses</td>
<td>Museums, cultural buildings</td>
<td>Measuring facilities, ...(Meßhütten)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Garages</td>
<td>churches, chapels</td>
<td>Other spezial objects</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Magazines, storehouse</td>
<td>Palaces</td>
<td>Look-outs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Boiler houses</td>
<td></td>
<td>Bunker</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Other premises</td>
<td></td>
<td>Other buildings</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Premises</td>
<td></td>
<td>..(Brückenwaagen)</td>
</tr>
</tbody>
</table>

\textbf{Table 6.6: Classification of building types in the city Vienna according to the inventory regulation}

\textbf{6.2.3.2.2 The municipal program for energy-efficiency in Vienna (SEP)}

The municipal program for energy-efficiency (SEP) shall reduce the energy consumption in a sustainable way, without constraining the standard of living of the citizens. The measures of SEP

\textsuperscript{14} Inventarvorschrift für den Magistrat der Stadt Wien (IVM), genehmigt mit Erlaß der Magistratsdirektion vom 27.10.1994, MD-2254-2/94.
were developed for the sectors household, private facilities, public facilities, private industry and producing industry.

Basis of the SEP is the European Union guideline over the total energy efficiency of buildings which came into force in May 2006. The guideline purports the European Union member states to save 9% as a goal within nine years and obligates them to the following measures:

The schedule for the implementation of the guideline plans the following steps for the member states:

- Until November 2006 the member states can convey practices for the evaluation of energy conservation.
- Until 30th June 2007 the member states must convey the first EEAP - with total goals (Gesamtzielen) and stopovers in Gigawattstunden (GWh).

Further EEAPs are in each case due on 30th June 2011 and on 30th June 2014.

**6.2.3.2.3 Contracting Offensive**

The contracting offensive was a co-operation group of the federal real estate association, the Federal Ministry of Agriculture; Forestry, Environment and Water Management and the Federal Ministry of Economics and Labour. Reasons for the offensive were the postponement of energy-saving investments of federal buildings due to missing budget. According to the successful enforcement of a Contracting project with 46 Viennese federal schools the ministry decision lead to the redevelopment of 300 real estate properties by means of Contracting in the year 2001. The particular energy saving partners identified, realized, financed and were in charge for the appropriate energy saving measures.

To the 300 buildings of the federation belong:

- Federal Ministry of Education, Science and Culture
- Federal Ministry of Finances
- Federal Ministry of Judiciary
- Federal Ministry of the Interior
- Federal Ministry of Economy and Labour
- Federal Ministry of Agriculture; Forestry, Environment and Water Management
- Federal Chancellery of the Republic of Austria
- Parliament
### Start of the Offensive

- **Decision at the council of ministers**: March 2001
- **Government agreement**: March 2003

### Basis data

<table>
<thead>
<tr>
<th>Buildings</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Premises</td>
<td>300</td>
</tr>
<tr>
<td>Buildings</td>
<td>Approx. 500</td>
</tr>
<tr>
<td>(Poolart) Resort free (ressortiere) Pools</td>
<td></td>
</tr>
</tbody>
</table>

### Duration Contracting-Offensive

- **Project preparation until contract signing by contractors for the first 11 pools**: September 2002 until March 2005
- **Extension of the offensive for further pools**: from March 2005
- **Contract period**: 10 years (plus 1.5 years backlash)

### Costs

- **Energy costs of all BIG buildings with federal use, suitable for the Contracting**
  - Costs heat energy: 14.8 Mio. €/year
  - Costs electricity: 19.7 Mio. €/year
  - Total costs: 34.5 Mio. €/year

### Energy success (Energetische Erfolge) (current results)

- Guaranteed (averaged) savings: 19.83 %
- Current guaranteed savings: 3.4 Mio. €/year

### Further planned energy cost savings (assumption 20% savings)

- Pools BMI, BKA, federal schools Burgenland (shortly before announcement): approx. 900,000 €/year
- Universities: 4 Mio. €/year
- Caserns: 2 Mio. €/year
- Judiciary institutions and museums: 1.3 Mio. €/year
- Total of planned savings: 11.4 Mio. €/year

### Economical success (current results)

- **Economical impulse**
  - Economical impulse by investors of the contractors (net): 15 Mio. €
  - Total impulse through hard and soft investment (net): 24 Mio. €

### Workstations

- **Organization of workstations** (Investmentphase): approx. 300
- **Organization of permanent workstations**: approx. 50

### Ecological success

- By at present assigned pools: 16,500 t/year

### Further planned CO₂ savings (assumption 20% savings)

- Pools Federal Ministry of the Interior (BMI), BKA, federal schools Burgenland (shortly before announcement): 4,300 t/year
- Universities: 19,000 t/year
- Caserns: 14,500 t/year
- Judiciary institutions and museums: 6,200 t/year
- Total of planned CO₂ savings: 60,500 t/year

### Costs of the settlement of the project

- **Co-operation group**: 200,000 € per partner (Ministry of Agriculture; Forestry, Environment and Water Management - Federal Ministry of Economy and Labour – Federal real estate association)
- **Additional contribution of the Federal Ministry of Economy and Labour**: 1.3 Mio. € total over 11.5 years for the services of the energy special representative 43,300 € for public relation service of the Austrian Energy Agency

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**Table 6.7 : Figures, data and facts for Contracting-Offensive**
6.2.3.3 Energy special representative of the federation and the provinces (Energiesonderbeauftragte des Bundes und der Länder)

In Austria the so-called energy representative agents exist since the oil crisis in the 1970’s. Altogether 23 energy representative agents work in all federal states in Austria. The energy representative agents are assigned to the Ministry of Economics. Their main task is the monitoring and optimization of the energy consumption of all federal buildings as well as the consultation of the users of federal real estates.

For the monitoring of the energy consumption a database called the “GISY database” was installed. Hereby the consumption data is collected monthly from the particular users of the buildings and conveyed in form of excel tables to the energy representative agents. On the basis of these figures abnormalities and optimization potentials can be discovered.

Further tasks of the energy representatives are:

- Evaluation of data out of the GISY database
- Performance of evaluations of economic efficiency
- Issue of energy certificates
- Issue of energy statistics on the basis of the GISY database
6.2.4 Short comparison between the three participating countries

In order to better understand the various characteristics of public real estate management (PREM) and the main differences between the three participating countries, we have chosen to make analysis for a case study in the role and position of PREM within each government. The case study concerns the ministries of the state.

6.2.4.1 Public real estate management: task for government or privatised task? [6]

France

In the most cases this task is for government, however for a very specific part of the building stock, this task could be private. There is one example in France where the global task of real estate management is assumed by a private organisation, it concerns a part of residential building of ministry of defence.

However, within real estate management, some functions are assumed by private companies such as operation and maintenance of heating and air conditioning systems.

Netherlands

In the Netherlands the building stock for governmental organisations and departments on national level, is all managed by governmental departments, as described in § 6.2.1

However there are some trends to organize more flexibility and more responsibilities to market parties.

Some governmental tasks are outsourced, or privatised. Post, telecommunication, and Public Transport are almost completely privatised on national and local level.

Operational tasks on for example immigration and asylum policy and social services/security are outsourced to semi-governmental organisations.

The Rgd and RWS have several pilot projects to get experiences on public-private cooperation; in which government and commercial parties invest in long term agreements/contracts for operating infrastructure (highways, tunnels) or buildings.

Austria

Public real estate management on the federal level had been a public task for a long time. Several years ago the Bundesimmobiliengesellschaft (BIG) was founded with the purpose to take over real estate management of public buildings on the federal level (based on a specific law). The BIG is the building owner of federal schools, university buildings, and ministry offices but also the owner of other non-residential and also residential buildings. BIG develops also new buildings, but the major part of the business is building renovation. Building operation is outsourced or the responsibility of the tenants. Although BIG is a private company, there is a specific department of the federal ministry of economics and labour closely working together with BIG. On the level of the 9 Austrian states there are similar developments, and the degree of privatisation differs.
6.2.4.2 Public real estate management as a public task: management of real estate management centralised or decentralised? [6]

Centralisation versus decentralisation issue is often confused with the concentration versus deconcentration discussion.

Centralisation and decentralisation have to do with decisive power and money whereas concentration and deconcentration are about the grouping of activities.

Centralised decision making combined with deconcentrated knowledge and services is very well possible.

In the following a precision should be given when talking about centralisation / decentralisation because it could concerns only one ministry or all the ministries.

France

There is no centralisation of PREM for all the ministries, Centralisation / Decentralisation concerns a given ministry because the ministries are organised on central administrations and associated departments that are disseminated over the country.

<table>
<thead>
<tr>
<th>Operation</th>
<th>Decentralised</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentrated</td>
<td>Ministry of defence&lt;br&gt;Ministry of justice&lt;br&gt;Ministry of ‘intérieur’</td>
</tr>
<tr>
<td>Deconcentrated</td>
<td>Other ministries&lt;br&gt;Ministry of defence for a part of residential buildings, decentralisation goes to a private organism</td>
</tr>
</tbody>
</table>

Table 6. 8 : France, practice of ministries on the type of decision making and operation within PREM process

Centralisation means:

- Centralisation of the responsibilities of some real-estate functions [asset and portfolio management] : financial decisions, implementation decisions, arbitration between rent and property
- Centralisation of the important maintenance (huge maintenance) [property management] : decision about investment expenditure when exceeding a threshold defined internally
- Centralisation of the management of the buildings of central administrations on an entity connected with a General Secretary or with a head office of administration.

Netherlands

<table>
<thead>
<tr>
<th>Operation</th>
<th>Decentralised</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentrated</td>
<td>PM : all ministries&lt;br&gt;AM : all ministries&lt;br&gt;FM : Ministry of Defence</td>
</tr>
<tr>
<td>deconcentrated</td>
<td>FM Ministry of Justice&lt;br&gt;FM Ministry Traffic/Public works</td>
</tr>
</tbody>
</table>

Table 6. 9: The Netherlands, practice of ministries on the type of decision making and operation within PREM process
**Remark:** Centralised means: in one organisation/department; but this organisation can be established on decentralise locations in the country.

**Austria**

Decisions are taken in the partly or fully privatised real estate companies on the federal level (Bundesimmobiliengesellschaft), on the level of the 9 Austrian states, and on the level of 2357 municipalities. In many cases, operation is outsourced.

<table>
<thead>
<tr>
<th>Operation</th>
<th>Decentralised</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentrated</td>
<td>Federal level represented by the owner of federal buildings (Bundesimmobiliengesellschaft)</td>
</tr>
<tr>
<td>Deconcentrated</td>
<td>Level of the 9 Austrian states and ca. 2357 Austrian communities; represented by private and partly public building owners on the state level</td>
</tr>
</tbody>
</table>

Table 6.10: Austria, practice of ministries on the type of decision making and operation within PREM process
6.3 Organisational structures

Based on the processes described in the previous paragraph § 6.1, we can discern some basic organization forms, depending on the size of an organization and their building stock.

6.3.1 Real estate management in large organizations

A large CREM organization is larger than 1.000.000 m² gross floor surface. Real Estate Management is organized in separate, specialized departments. The Real Estate strategy (portfolio management) is leading and puts down frameworks for building and maintenance management and projects. Facility management represents the user interests and is active on the interface with property- and asset management.

![Diagram](image)

**Figure 6.2: Structure of REM in large organisations**

**Note:** In this scheme the division of tasks between Facility Management, Asset/Property Management and Project Management is visualized in main lines; there will be differences in each specific organization.
6.3.2 Real Estate management in medium sized organizations

A medium sized CREM organization is between 100.000 and 1.000.000 m² gross floor surface. The real estate strategy is a separate organization component, or has been coupled to a strategic/policy component within the primary processes (general management). Building management is a separate department that looks after all tactical/operational matters regarding to Real Estate.

Note: In this scheme the division of tasks between Real Estate (strategy) and Building Management is visualized in main lines; there will be differences in each specific organization.

6.3.3 Real Estate management in small organizations

A small CREM organization is less than 100.000 m² gross floor surface. In small organizations, established in one or a few locations, the management of Real Estate is generally not a separate function or department, but integrated in primary processes. Real Estate strategy and policy are no separate topics. Decision-making concerning Real Estate matters takes place at the general management of the organization; mostly in a financial/administrative context. The operational implementation and/or supervision of third parties (contractors) take place by an estate caretaker.

Note: In this scheme the division of tasks between Strategy / Management and Operational Management is visualized in main lines; there will be differences in each specific organization.

6.3.4 Structuring of decision making on energy-saving measures

For finding starting points to create energy-awareness and to embed energy-themes in Real Estate processes, two matters are relevant:

1. Tracing and addressing the right persons, this means those persons that make the decisions with regard to energy saving,
2. Giving an overview of the aspects (within and outside off the organisation) that are important in making these decisions.

In the previous paragraphs an overview is given by means of structuring of real estate processes and a division in organisation forms. The decision to take energy-saving measures follows a certain course in which the following aspects are visible:

- **Recognizing** the situation that energy saving is possible. Knowledge of energy saving possibilities and attention for the energy theme are important aspects in this matter.
- **Admitting** that taking energy-saving measures is desirable. Important is to develop a view on the energy-theme’s importance (internally and externally), and to develop the perception of one’s own role, performance and responsibility in the field of energy-efficiency.
- **Willingness** for taking energy-saving measures (at individual and / or at organisation level) related to acquaintance with possible energy-saving measures.
- **Ability** of carrying out energy-saving measures. Several company-internal aspects are relevant here, such as staff capacity, company policy, policy objectives, but also knowledge of energy saving practice and possible measures, insight in advantages and financial aspects (investment, turnover, stimulation, financial processes).

- **The action:** actually taking energy-saving measures. Relevant in this context are the concrete skills to implement energy-saving measures and to embed energy saving in the real estate management.

- **Monitoring** and evaluating the implemented energy measures is necessary to deal with energy saving in a structural manner.

These elements have a mutual relation within which they are conditional for each other, but not by definition in chronological order. For example, not being able to take energy-saving measures, could influence negatively on the willingness to take energy-saving measures.
7. Integration of energy saving in CREM process

CREM organisations are confronted with various regulations in various fields. These regulations can be distinguished in Safety and Health, Energy & Environment and Quality: “SHEEQ aspects”.

To give a SHEEQ aspect the place it deserves in a CREM function and the CREM-process an integral approach is necessary. Especially for the aspect Energy an integral overall approach is necessary.

In this chapter after a description of SHEEQ aspects in CREM, an analysis of decision making in relation with energy is given.

7.1 Description of “sheeq” aspects in CREM

7.1.1 General description

Quality & functionality

Quality inspections are in many countries used for insight in condition and replacement costs and planning. Portfolio managers are making decisions (rendering, dissolve or investing) based on technical inspection information and sometimes more items like politics, policy etc. Asset managers are using this technical information for a overall technical condition indicator of there stock divided over building types. In the Netherlands there is a standardized norm for condition inspections (NEN2767).

Also condition inspections are used for purchasing or renting a building. In an ideal perspective all SHEEQ aspects should be integral used for purchasing or renting a building. This won’t be always possible, because of the pressure for decision making.

Energy & Environment

Energy is due to EU legislation yet embedded in CREM in the function of Property and Maintenance management. In this legislation the providing of energy performance certificates of certain buildings is compulsory and must be executed by certificated organizations. Custom (building)-made-advice is on request. This advice has to meet regulated norms. In this advice measures and costs for executing these measures must be calculated. There is no direct and integral link with quality (condition inspections) or functionalities and other aspects.

Safety & Health

In the EU is standardized legislation on electrical safety. For fire safety there is legislation for developing and use buildings. In the Life Cycle there is not enough attention for fire safety. Both are embedded in the function of the property and maintenance management and partly in the facility management. Depending on the urgency a property manager will spend money to resolve the failures. Mostly these inspections are not integrated in one main planning.
### 7.1.2 Inspections methods and experiences in Austria, Netherlands and France

The following table gives an overview of the current inspections in France, the Netherlands and Austria.

<table>
<thead>
<tr>
<th>Maintenance / Quality</th>
<th>France</th>
<th>Austria</th>
<th>Netherlands</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>several laws on maintenance and periodic inspections depending on building sector in particular for public buildings are concerned: Air conditioning, the other equipments (elevators, etc.), electricity, heating, ventilation and air quality, fire safety, lighting</td>
<td>- ÖN EN 15341 “Maintenance – Maintenance Key Performance Indicators“ - ÖN CEN/TS 15331 “Criteria for design, management and control of maintenance services for buildings“</td>
<td>NEN2767-1 &quot;Status / condition measurement of building- and Installationparts“ PART-1: METHODOLOGY NEN2767-2 &quot;Conditiemeting van bouw- en installatiedelen“ PART-2: defaulting list</td>
</tr>
<tr>
<td>Installation legislations</td>
<td>several laws in environmental legislation</td>
<td>- Several laws at federal level - Building legislation on the level of the 9 Austrian provinces</td>
<td>A-0 made by DVD and Rgd (several NEN's environmental legislation etc etc)</td>
</tr>
<tr>
<td>Fire</td>
<td>Specifications in the building codes of preventive fire protection as well as inspections</td>
<td>- Specifications in the building codes of the 9 Austrian provinces - TRVB-Guidelines and Austrian standards (Önorm) concerning structural and preventive fire protection as well as inspection - OIB-Guideline 2 &quot;Fire protection“</td>
<td>NPR6059 &quot;Firesafety inspektion (not for residential buildings)” (NPR stand for National Practical Guidline)</td>
</tr>
<tr>
<td>Energy</td>
<td>- Inspection of boilers and air conditioning systems according EPBD - requirement depending on the installed load</td>
<td>- OIB-Guideline 6 &quot;energy saving and thermal protection“ - Laws at federal level (Obligation to present a energy performance certificate for buildings) - Laws at provincial level (building laws as well as subsidized housing laws) - Austrian standards (Önorm) - Inspection of boilers and air conditioning systems according to EPBD legislation on the level of the 9 Austrian provinces; requirement and intervall depending on the installed load; harmonised to a certain extent in the course of the implementation of the EPBD</td>
<td>National evaluation guideline BRL9500, ISSO75.1 Guidline &quot;Energy Performance advice non residential buildings“ Energyperformance certificate + Common part, ISSO75.2 Guidline &quot;Energy performance non residential buildings“ custom made advice, ISSO75.3 Guidline &quot;Energyperformance certificate“ formula structure</td>
</tr>
</tbody>
</table>

Table 7.1 : Current inspections in Austria, France and Netherlands
7.2 Decision making in CREM in relation with energy

7.2.1 Analysis of the four main functions in crem and energy integration

To embed the ‘SHEEQ’ aspects, especially energy aspects, it’s important to know how the CREM process work in general.

There are several descriptions of the CREM processes. But overall there are 4 specialized main functions in CREM that influence the process the most. So therefore we simplify the processes to these 4 main functions. This information will be used to point out the different places in the CREM processes on the different levels where the energy-efficiency themes have to be embedded.

The Real Estate Management processes are occupied with 4 specialized management fields on three organizational levels, known as:

- Facility Management (tactical level)
- Portfolio Management (strategically level)
- Asset Management (tactical level) and
- Property & Maintenance Management (operational level)

![Figure 7.1: REM process: the four management fields](image)

The way Real Estate management is organized differs by organization, but the essential part of it consists of a number of characteristics. Depending on the size, scope and complexity of the organization and its building stock the processes will be categorized and structured under one or several organization components (departments). These management fields and organisational levels are related to each other. Information about the SHEEQ aspects, the financial and planning aspect, is going around in the process. Policy is going top down in the process. Due to every specific function on every level a strategy must be made to integrally embed the energy aspect
It is important to know on which level, which type of decisions are made: at strategically, tactical or more operational level. It concerns on the one hand the policy decisions to give structural attention to energy saving and on the other hand the operational decisions to carry out energy-saving measures. Depending on the organization (size and professionalism in building management), decisions on policy and operational decisions take place on several spots in the organization or coincide both.

Also the complexity or the scope of the energy measures has an impact on the kind of the decision process in an organization. For smaller adaptations which lead to energy saving and which are appropriate within the usual policy practice, decisions can be made also at a tactical or operational level.

General aspects, about which choices must be made, are among others:

- responsibility and division of labour and roles concerning the Real Estate management functions within the organisation
- the required capacity and expertise in relation to these responsibilities and roles;
- carrying out by own organization or outsourcing the processes of organization and implementation?

These aspects also apply with respect to the implementation of the theme energy saving. Thereby the following questions and points of interest are relevant:

- Is there sufficient expertise and capacity available to give “energy” a place in the work processes;
- Are relevance, usefulness, need and chances recognized;
- Is there eagerness, enthusiasm and ambition with the subject to start with it and achieve results?

In the next 4 sections a number of processes and linked decisions are described by means of the 4 Real Estate management processes. Thereby conditions and obstructions which (can) play a role in taking these decisions are also discussed.

### 7.2.1.1 Facility Management

Facility Management is most close to the “end-users” or tenants in the Real Estate process. They take care of the facility services related to the use of buildings. Depending on the responsibilities agreed, Facility management is involved in daily maintenance, smaller adaptations, user behaviour and energy consumption related to the costs. FM is the essential link in giving feedback of user experiences to choices and decisions in the other Real Estate processes.

**What**: they often have to deal with the energy consumption costs.

**How**: periodical or cyclic measuring and store energy consumption data.

**Why**: insight in energy consumption.

**Needs**: reporting system, consideration system, tactical energy and emission saving strategy.

**Stage of use: monitoring**

After realization the building(s), the stage of use starts. In this period it becomes visible if the realized building meets to the expectations. Periodic measuring and/or evaluation of gained experiences, and learning from that information, is of vital importance for an optimum
harmonization of “supply and demand” in the real estate process. Especially with respect to energy a frequent monitoring is important, to achieve optimum results.

With respect to energy saving, the following questions and points of interest are relevant:

- Is there any awareness and attention to energy saving at the level of the users of buildings?
- Is there sufficient expertise to inform and instruct users, and to arouse enthusiasm on the issue of energy-saving?
- Are there opportunities to couple the energy topic to a direct importance for the primary process? (for example comfort increase, restriction of sickness absenteeism; better indoor climate etc)
- Are there financial mechanisms which make it possible to invest, and have an acceptable pay back period / return on investment?
- Is there sufficient expertise with regard to purchase of (sustainable) energy;
- Is there sufficient expertise in monitoring, analyzing and decision-making in relation to energy expenditure?
- Organizing feed back from building users’ experiences, related to energy, to new building developments

7.2.1.2 Portfolio management

A portfolio manager makes decisions about a property on 3 main important aspects;

- does the property pay/yield and how much,
- do we have to invest for yielding and how much.
- If a property does not yield enough it will be dissolved.

Decisions to hire, lease, buy or develop Real Estate are made by asset management in dialogue with and in accordance with the vision/strategy of Portfolio management.

What; they have a building stock vision, in which the energy-aspect is taken into account. In a strategy/policy it is more closely developed how to handle the building stock and the energy-aspect.

Besides this they have to deal with investing cost above the normal maintenance reinvesting costs. Quality (as one of the SHEEQ-aspects) is leading in the decision process. Costs for energy saving, better safety and health are on top of the normal planned maintenance costs.

How; use and check the strategy / classify energy saving investments together and integral with maintenance reinvestment costs.

Why; decisions are made in accordance with the strategy/insight in the energy-aspect and the other SHEEQ aspects and their costs.

Needs; energy and emission saving strategy/policy, integral classification, consideration and decision system. Decisions are often made on net present value and value for money.
Areas of special attention are:

- Translation of primary processes to Real Estate policy and related services;
- Related issues, for example working conditions for employees (end-users of the buildings), (fire)security, environment, monument care;
- Defining priorities concerning the intended results and available resources;
- Required instruments for process control, which management information is necessary, and which appliances and processes must therefore be arranged.

With respect to the subject “energy saving” the following questions and points of interest are relevant:

- Has energy saving a place in the strategic Real Estate policy?
- What are the objectives with respect to energy saving?
- Is there any combination and integration of objectives, like energy saving, technical quality/condition, security, health aspects of the workplace, maintenance, cost reduction?

Dissolving a property is not interesting for government CREM organisations, because the property is still managed / used by another organisation and still has a bad energy performance. What strategy do we need to solve this problem?

Yield or performance are not only a financial issue, but have also to do with aspects as how is the comfort in the building, installation performance, fire, electrical, personal safety, overall perception of the user (“fit for use”) etc etc. These aspects should be classified.

Investing is not only important from a financial point of view, but also political and social commitment is important for public CREM organizations.

7.2.1.3 Asset management

Asset Management is concerned with decisions and housing solutions on tactical level in the existing stock, made in accordance with the strategy of Portfolio management: do we hire or buy etc? An Asset manager makes decisions on the SHEEQ aspects of the buildings in the stock.

What; they have to handle with buildings in their stock or add buildings to the stock.

How; dealing with the energy strategy/policy of the portfolio management label energy consumption on users, buildings and installations and add the energy aspect integral with the other SHEEQ aspects.

Why; stay focused on the strategy/insight in energy performance of a building, building type or entire stock with the other SHEEQ aspects.

Needs; tactical energy and emission saving strategy, integral classification, consideration and decision system.

The role of asset management is focused on optimizing the management of the present building stock, within financial and qualitative frameworks. Objectives and resources have to be adjusted to each other. The financial framework must be developed, especially because there are large annual variations in the amount of maintenance and renovation measures, and therefore large variations in the required budgets.

Concerning the subject energy saving, the following questions and points of interest are relevant:

- What are the financial structure and frameworks with respect to possible (extra) investments on energy saving?
- Are financial structures or mechanisms an obstacle to integration of energy measures in the Real Estate management?
- Are the effects of cost recovering (return on investment) sufficiently becoming apparent?
- Who have the profit from energy- and cost saving measures; is there possibly a "split incentive" problem?
- Is there financial space for investments; are there financing possibilities?

### 7.2.1.4 Property & maintenance management

Property and maintenance management is carried out by building managers, who are responsible for a group of buildings as part of a total building stock. They look after (Long and short term) maintenance planning, and realisation of maintenance by contractors.

**What**: they have to generate technical information, due to technical inspections for operational, tactical and strategically consideration due to risk management.

**How**: energy inspection and advice of the user behaviour, building and installations integral with the other SHEEQ aspects.

**Why**: insight in technical SHEEQ measures, replacement/investing costs and planning

**Needs**: integral inspection mythology, consideration due to risk management system, system to connect data from several and different inspections to each other, operational building, building type and stock, energy and emission saving strategy.

This process concerns especially the technical management, on location - and building level. In this context the (sub) processes of building inspections, developing long-range plans, and preparing annual plans take place.

![Figure 7. 2 : (Sub) processes in maintenance management.](image)

#### 7.2.1.4.1 Inventory / inspection process

An inventory of the present situation (0-measurement) gives insight in qualitative and quantitative aspects of the building stock. Available information / data is collected by means of field and desk research. For a large part this concerns quantitative information (size of buildings, drawings,
specifications, current contracts). In addition to this, information has to be acquired periodically by field research. This concerns especially technical information on the inventory and quality of the buildings, installations and grounds. Moreover a research on the functional quality of the housing is important, especially when changes in the primary work processes appear.

All Real Estate information has to be stored, unambiguous and accessibly, mainly by using software systems.

With respect to energy saving, the following questions and points of interest are relevant:

- Is information collected periodically on energetic quality, energy consumption and costs, maintenance defects, or other points of interest?
- Is the required expertise available (own staff or hired?)
- Is the collecting of this information and the information itself combined with other aspects such as maintenance; comfort and/or security?

Referring to the inventory (present situation) and the Real Estate policy (desired situation) a long-range plan is drawn up to make visible which measures and costs are involved with the implementation of the desirable situation.

With respect to energy saving, the following points of interest are relevant:

- expertise with regard to measures, investment costs and savings on energy;
- explore possibilities for combination of different kind of measures (maintenance, security, comfort etc.);
- explore the optimum moment (year) of implementation, from the point of view of for example risk control; restriction of nuisance for the building-users; avoid destruction of capital; maximize the return.

7.2.1.4.2 Decision-making and implementation on annual plans

By means of the long-range plan it will become clear whether the real estate policy and available resources (budgets) are in balance. If the available budget is structurally to low, budget and policy have to be adapted to each other, and priorities have to be made.

An objective method for granting priorities is important in this matter. The result of this harmonization is a maintenance policy and associated long-range-plan, which has been tailored optimally to the wishes and (financial) possibilities of the organization, and in which energy saving measures are well embedded. On this basis an annual plan is determined. After approval of this annual plan and allocation of the required budgets the plan can be carried out. In this stage control of the process of implementation is important. This happens preferably in a thematic manner, where this process is controlled on project management aspects like quality, money, time, organization, information and risk management.

A good preparation by means of specifications, work descriptions and implementation planning gives control - and targeting tools for the implementation. Regular reports concerning progress control and budgetary control inform the management on the implementation.

With respect to energy saving, the following points of interest are relevant:

- required tools to make integrated assessments, where functionality, energy, security, health, technique etc. are ranked on their interests and/or risks.
- expertise with regard to purchase and tender energy measures;
- expertise with regard to approval of implemented energy measures.
### 7.2.2 Shynthesis – the place of energy in CREM process

In the following a suggestion for a kind of checklist to be filled in by each actor according to the four function of CREM process:

<table>
<thead>
<tr>
<th>Portfolio management</th>
<th>Asset management</th>
<th>Property management</th>
<th>Facility management</th>
</tr>
</thead>
<tbody>
<tr>
<td>which questions should be addressed to integrate energy issues in this stage of the process</td>
<td>which questions should be addressed to integrate energy issues in this stage of the process</td>
<td>which questions should be addressed to integrate energy issues in this stage of the process</td>
<td>which questions should be addressed to integrate energy issues in this stage of the process</td>
</tr>
<tr>
<td>Who is responsible?</td>
<td>Who is responsible?</td>
<td>Who is responsible?</td>
<td>Who is responsible?</td>
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<tr>
<td>From which useful information is needed, or what useful links should be made?</td>
<td>From which useful information is needed, or what useful links should be made?</td>
<td>From which useful information is needed, or what useful links should be made?</td>
<td>From which useful information is needed, or what useful links should be made?</td>
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<tr>
<td>checklist of relevant point for organisations to embed energy in the process</td>
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</tbody>
</table>

Table 7.2: Checklist of questions to be addressed at each stage of REM process
7.3 Obstacles to energy-saving measures in existing non-residential building stock

There is a number of general obstructions with regard to taking energy-saving measures known from literature (Zijlstra, 2007 *1):

- Conscience, knowledge and accessibility of information are insufficient.
- Lacking faith in information and impact of measures;
- Total implementation costs are larger than turnovers;
- Financing possibilities are (too) limited.
- Insufficient offer from the market
- Split incentive between owner and user.
- Decision-making level wasn’t involved sufficient
- Limited amount of decision-making moments is available (natural moments)

Concerning the third point “total implementation costs larger than turnovers” can be noticed that organizations don’t calculate and decide (only) on the basis of the costs and turnovers of a saving investment. There are so called hidden costs. Those costs could be relatively high, and can not always be expressed in money in the case of non core business investments. Examples are:

- Costs for information collection and research.
- Uncertainty concerning the result (pay back period) of the investment.
- Costs of internal organization, tendering contractors; to much fuss;
- Access to financing for non core business investments;

The primary processes of an organization always have main priority above energy saving, certainly when restricted time, money and attention is available. However, a number of the aforesaid obstructions could be resolved, by connecting energy-saving measures to different “natural moments” (daily building management, regular maintenance, modernization and large maintenance) and to the interest for primary processes. Professionally facility management with regard to non-residential building stock can be of considerable value in this matter (SenterNovem, 2007 *2).
8. Recommendations on energy integration in CREM process

Public real estate is managed differently in various countries, it mainly depends on national and governmental context CREM organizations use Real Estate for business activities. For that reason, every activity has, due to its function, its own need for specific real estate.

Depending on the amount of stock, CREM-organizations have databases with property related information. Relevant data for the possessed properties are costs and actual values (€) and the remaining lifetime of the buildings and their installations. Mostly these data are collected by inspections (at location) of the buildings and its installations.

This type of technical inspection gives insight in the technical condition of the building. Functionality, planning, maintenance costs and components’ replacement costs. With this information on building and installations level it is possible to generate a long term investing and exploitation plan for a building and its installations.

Due to organization type, policy or ambition, politics, legislation, questions of customers (facility managers) knowledge and time, specific aspects became more important. One can think of aspects such as:

- Safety & Health,
- Energy & Environment.
- Quality,

These aspects are also known as SHEEQ-aspects (Safety, Health, Energy, Environment, and Quality). Almost every EU member state has SHEEQ aspects in its building legislation.

These aspects are more considered in the CREM process on operational level. (Property & Maintenance management) and in case of Facility Management. On strategic level (Portfolio management) and tactical level (asset management), these aspects are used to a lesser or greater extend for decision making.

To embed energy in the CREM process it is important for CREM organizations to consider energy integrally with Quality and the other mentioned SHEEQ aspects.

The EPI-CREM project is not focused on all of these aspects, but specially on the integral embedding of the energy aspects in the CREM process.
9. Conclusion

Real estate of the state is one of the building stock for which potential of energy saving is important because the importance of this building stock and the use of energy in these buildings.

Two main specificities make the real estate management for these buildings difficult:

- Building stock is not homogeneous because it composed of different buildings type: offices buildings for administration, residential buildings, technical premises, specific premises such as museums for example, educational buildings, prisons, etc… In France for example the part of offices buildings is around 23%,
- Public buildings very often have a symbolic meaning and could serve purposes quite distinct from their meaning as a workplace. The public real estate manager has to consider political goals and policies,
- Public real estate managers have to deal with many more external stakeholders than their colleagues in the private sector.

Real estate management is in progress in most countries, it has changed over the years and the actual context of climate change is now accelerating the dynamic of improvement. In France for example the financial law has introduced on January 2006 budgetary rents for public buildings (ministries and their associated buildings) and created a specific service ‘France domaine’ who has to assume the estate owner functions in particular it controls the use and the maintenance of buildings and can for example decide to resituate no fully occupied buildings. However this service is not in charge to assume the maintenance of buildings. Analysis on the different possibilities on how to assume this mission are going on.

Public real estate is managed differently in France, Netherlands and Austria. However in the specific management schemes each country deals with the same issues and the four main functions of real estate process: portfolio management, asset management, property management and facilities managements.

Many obstacles exist on the integration of energy on the CREM process. There is however an opportunity to embed energy in the CREM process by using an integral approach which consists to integrate energy issue with SHEEQ aspects: Safety & Health, Energy & Environment and Quality.
10. References

Communication from the commission
Action Plan for Energy Efficiency: Realising the Potential
{SEC(2006)1173}
{SEC(2006)1174}
{SEC(2006)1175}


Project Description

EPI-CREM aims to improve energy efficiency and rational use of energy across public building stock in Europe by embedding energy issues in decision making processes within Corporate Real Estate Management (CREM) at a strategical level, and translating those decisions into tactical and operational levels of building management. This way the decision making process surrounding energy saving measures is embedded in the CREM-process, and is made structural and more cost effective. To reach these goals EPI-CREM provides a strategy and a set of tools enabling building owners and users to make the energy aspect an integral aspect of Corporate Real Estate Management.

The expected project results are:

1. **The EPI-CREM embedding approach**, where energy efficiency and rational use of energy issues are embedded into public property management processes.
3. **20 EPI-CREM Pilot Projects**, testing the embedding approach and the developed tools.
4. **Dissemination of the EPI-CREM results** in relevant networks and sectors like the public building real estate sector, consultancies, architects, tenants, umbrella organisations, knowledge providers and national authorities, with special attention to the new European Member States.
5. **A concise overview of current public property management processes**, highlighting institutional barriers for energy saving and sustainable energy strategies. This overview serves as the basis for developing the EPI-CREM embedding approach and the tools.
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