



EPI-CREM Strategies (WP3)

Definition of common strategies and facilitating tools for the implementation of energy savings

**Energy Performance Integration in
Corporate Public Real Estate
Management**

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EPI-CREM Strategies

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Foreword

Due to rising energy prices, climate change, energy dependence and increasing shortage of fossil fuels, energy is an important issue on the political and social agenda. New information about these topics is on large scale available and the sense of urgency is clear. Drastic energy savings and reorientation on sustainable energy sources are the major challenges we are facing. This applies especially for (public) CREM¹ organizations, because they have a social responsibility. Tenants (end users) and real estate owners have to deal with the impact of the energy efficiency questions.

The technique to limit CO₂ - emission has been available for a long time and is no longer the problem. There is abundance to sustainable energy. With the current acquaintance there are now already entirely CO₂-neutral buildings, with proved techniques and yield to realize. The barriers to reach successful sustainable results lie especially in the complex close interaction with economic and social traditions and structures. This also applies to (public) CREM organizations because they stand for their social and political task in society. To work up to structural solutions is possible only if the problems are tackled in an integrated manner and on a “natural” moment.

At the moment (public) CREM organizations work sub-optimal a lot of time. Inspections and their technical information are not integral executed and integrated in (maintenance or investment) plans. Although environmental awareness is more and more a social and organizational item, energy efficiency awareness for CREM organizations is usually not a main objective in decision-making. So an integral approach and a connection between integral inspections, technical information, SHEEQ aspects (Safety, Health, Energy, Environment and Quality) and technical information (like facility, financial and asset consideration) are necessary in decision-making. If a connection is made between energy performance, energy prices and policy fields such as comfort, product quality and costs, all at once an interesting combination will arise. In this respect this is an important first contribution to the improvement of the energetic quality of the building stock.

The implementation of the EPBD directive has not only a technical, but especially an organizational impact. Tenants will have questions about certification, linked to the directive and labeling, and want to be informed about the meaning of the energy labels and the possibilities to limit the energy consumption and to increase the energy efficiency. The strong relation with the political and social role of (public) CREM organizations turns energy performances, together with the other SHEEQ aspects, into a logical component of portfolio, asset, facility and property & maintenance policies. All this means that energy consumption and efficiency is an ongoing concern and responsibility at all



levels of management and policy. The integration of the energy topics in all the organization levels and processes leads to sustainable and efficient operational management and operating results. To come to logical and applicable EPI-CREM strategies it's important to pay attention to strategies in several perspectives, like:

- Defining specific theoretical strategies to integrate Energy Efficiency for CREM organizations as a basis to develop tools applicable to CREM-organizations
- Working out these kinds of strategies in a more detailed and practical way by defining example strategies and indicating possible measurements to execute such strategies.

In this report the EPI-CREM strategies are elaborated on, based on these perspectives.

Summarized conclusion

For the EPI-CREM project there is a focus on tool making for;

- Strategy on a general organizational level
- Strategy on integration by increasing efficiency and quality in multi disciplinary information/data collection

Not all strategies can be developed in the EPI-CREM project. Every CREM-organization has to work out it's own strategies to embed energy efficiency and also the other SHEEQ aspects, therefore some examples are given in this report that can be indicative for the development of specific organizational strategies.

¹ Corporate Real Estate Management (CREM)



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1 Introduction

1.1 Strategy is about winning and succes

Strategy is about winning and succes. Only the organization who wants to win will have long term succes. It's a unifying theme that gives coherence and direction to the actions and decisions of an individual or an organization and is about internal and external environment analysis. In this respect you can define strategy as the overall plan or method for deploying resources to establish a favorable goal or effect. Tactic, as a scheme for a specific action, plays an important role in implementing a strategy.

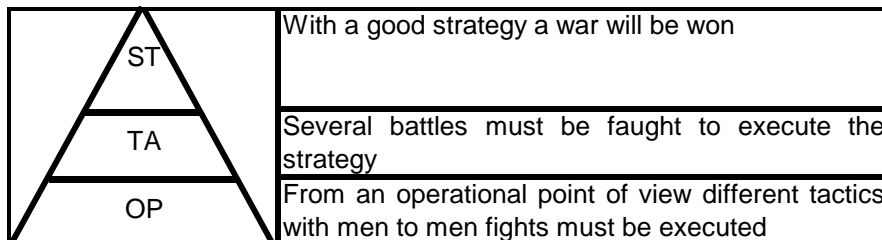


Figure 1: Strategy, tactics and operations

The characteristics of a strategy that is to be successful are:

- *Goals that are simple, consistent and based on the long term* (commitment to clearly recognized goals that was pursued steadfastly over a substantial part of the technical life time) (relentless drive, unified, focused, committed)
- *Profound understanding of the competitive environment:* design strategies around deep and insightful appreciation of the arena in which we are competing (awareness of changing attitudes, styles and social norms)
- *Objective appraisal of resources* (weakness compensating due to highly qualified teams, exploiting commitment and loyalty, unmatched determination to achieve something (winning) and superior team building)
- *Effective implementation* (capacity to reach decisions, energy in implementing them and ability to foster loyalty and commitment among subordinates) (see figure 1 and 2).

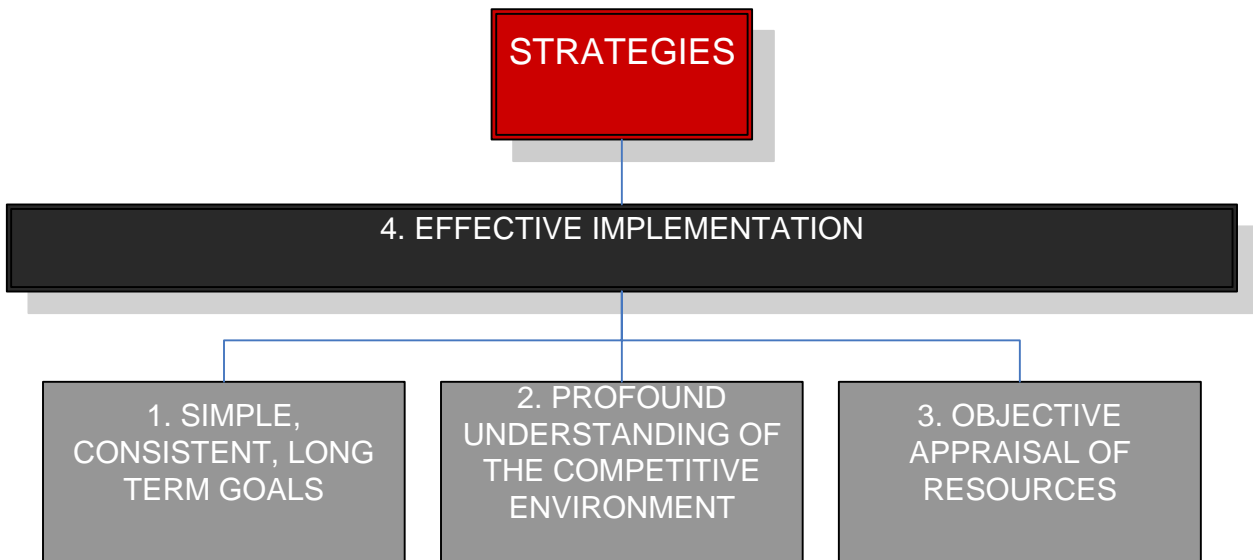


Figure 2: Common elements in successful strategies

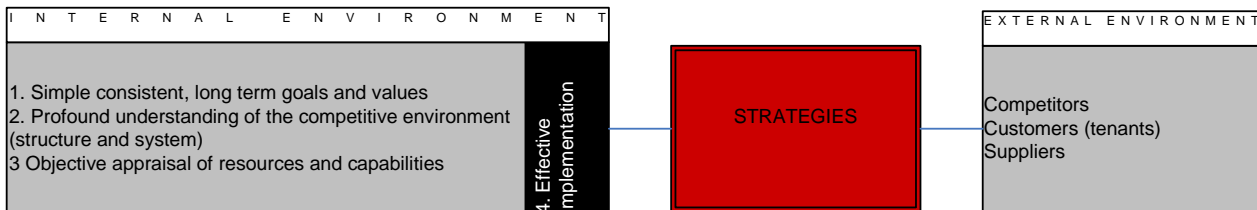


Figure 3: The basic framework between the organization and its environment

1.2 Common aspects in CREM

1.2.1 Maintenance plans due to technical inspections

At the moment (long term) maintenance costs and quality require insight based on condition inspections. 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. Several organizational and specific aspects are of influence in this respect and therefore have their reflection on the long term investing and exploitation plans.

1.2.2 Common aspects to embed in CREM organizations

Due to relevant organizational matters (like organization type, policy, ambition, politics, legislation, questions of customers (facility managers), knowledge and time) specific aspects become more important, these aspects are;

- Quality & Functionality,
- Safety & Health,



- Energy & Environment.

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

Mostly (if they are embedded) these SHEEQ aspects are embedded in the CREM process on the operational level due to property & maintenance management and on the tactical level due to facility and asset management. On the strategically level (portfolio management), these aspects are usually not an item for policy, strategy and decision-making.

To embed the above-mentioned aspect in the whole CREM process, it's important that these aspects are **integral** connected to each other. The EPI-CREM project is in general not about all these aspects, but mainly about the integral embedding of the energy aspects in CREM organizations. To embed SHEEQ-aspects, and especially energy aspects, in CREM it is important to make strategies per SHEEQ-aspect in every CREM function. The EPI-CREM strategies mainly focus on embedding energy aspects in all CREM functions. In the next chapter this will be elaborated on in more detail.

2 Strategies in CREM

2.1 Strategies in the four main CREM functions

To embed SHEEQ-aspects, and especially energy, it's important to know how the CREM processes work. This information is needed to point out the different places in the CREM process and the different levels where the energy-efficiency themes have to be integral embedded.

The field of Real Estate Management processes is occupied with four specialized management fields or CREM functions on three organizational levels:

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

These management fields and organizational levels are related to each other, as shown in the figure below. Information about SHEEQ aspects and the financial and planning aspects is circulating in the process. Policy is traveling top down in the process. For every specific function on all levels a strategy with a mission, goal and tools must be made to embed energy items (see figure 5).

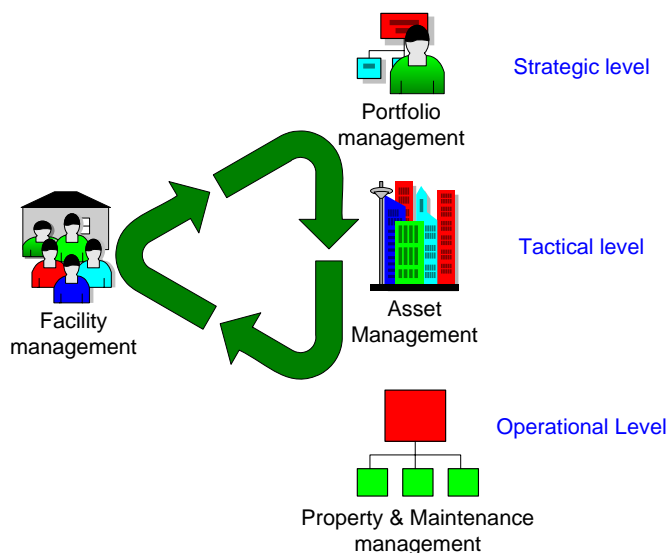


Figure 4: Four management fields and main functions in CREM

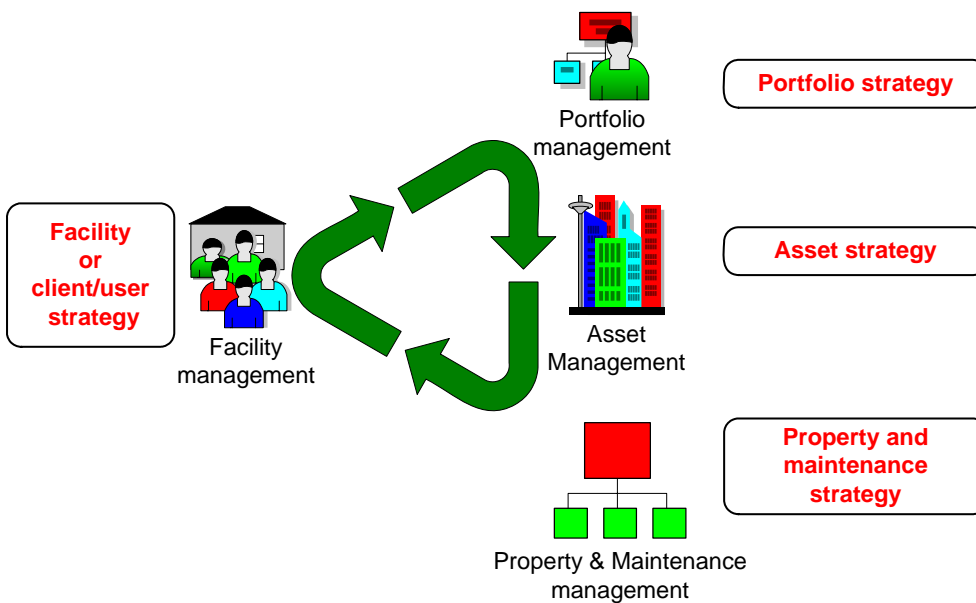


Figure 5: CREM strategies on the different organizational levels

2.2 Diversity in strategies due to diversity in CREM – organizations

On national and international level there is a lot of diversity in CREM-organizations, depending on the size of the organization and the scale and content of their work. What they all have in common are the four main CREM functions. One or more individual persons sometimes execute two or three functions in an organization. This depends on the amount and diversity of their asset. There is also a difference between public CREM and non-public REM organizations.

The intention of this report is to describe the strategies that are needed to integral embed the energy aspect in the four main CREM functions in CREM organizations. It is important to realize that strategies can be described with different purpose for different CREM organizations and that a lot of different strategies are feasible in this respect. Therefore the report focuses on the specific strategies that can function as a basis for the EPI-CREM method and the development of applicable EPI-CREM tools to embed energy in CREM. However, since this report is also intended to provide an overview of possible strategies to embed energy in CREM-processes, some strategies that could also be effective in this point of view but that don't lead directly to the specific EPI-CREM tools are also described briefly when this benefits the overview.

There is a difference in strategies to integrate energy efficiency in real estate processes (for consideration and decision making) and in strategies that focus on achieving explicit savings in energy consumption in CREM organizations. In chapter three and four these two strategy varieties/types will be discussed.

3 Strategies to develop usable tools for EPI – CREM

There are several ways to achieve an integration of energy efficiency in real estate management processes. These different ways, or strategies, can lead to the development of several tools. To develop usable tools for CREM organizations it is necessary to know the basic theoretical strategies and tactics of CREM-organizations. These strategies and tactics are described in this chapter.

At first some general strategies for organizations as a whole to embed SHEEQ-aspects, especially energy, in CREM-processes are described. Further on in this chapter specific strategies for the four main functions of CREM are described, which elaborate on the general strategies.

The described strategies are linked to real estate management processes and tools to develop. A number of these tools are part of the EPI-CREM project (as indicated below), some others are not.

3.1 General strategies in CREM-organizations

The four main CREM functions in CREM-organizations have to consider and decide about SHEEQ aspects based on collected technical, organizational, environmental, political and financial information for planning and budgeting.

At first there are strategies on a general level, which are relevant for all of the four management fields:

- Develop and increase awareness and a sense of urgency with regard to energy saving
- Develop and increase knowledge and experience to create an overview of possibilities and opportunities.

Awareness and a sense of urgency in energy saving is an essential condition to get organizations to change. A statement on energy saving and sustainability should be made by the management to start integrating energy themes in the organization. The following scheme provides an overview of the elements such a general strategy can contain:

Strategy

Vision: Consideration and decision model with SHEEQ aspects due to the different collected (technical, financial and organizational) information for planning and budgeting

Mission and goal:

- Connect different inspection information due to there comparable elements
- Consideration and decision making on several aspects and CREM functions
- Decision making on several aspects and CREM functions
- Uniform planning
- Uniform budgeting

Tactics

Ambition

- Tools must be fit for use for all EU countries
- Tools must connect multiple inspection information for several aspects
- Description of what every CREM function has to do



Tools

- SEL-list (Standard Elements List) to connect several inspections and information (not a specific EPI-CREM tool, but used as a basis for the EPI-CREM Database Integrated Information System tool)
- Several aspects to do consideration and decision-making (is represented in the EPI-CREM Reference Manual tool)
- Risk management for consideration in decision making on the different levels of information in CREM-organizations (is represented in the EPI-CREM Scenario Analyse Module tool)

3.2 Strategies related to portfolio management

The following scheme provides an overview of the specific elements a strategy that is related to portfolio management can contain:

Strategy

Vision:

- Integrate energy performance into real estate management, by setting targets on short, medium and long term plans
- Integrate energy performance aspects in consideration and decision making process, at moments of change in building stock, buying, selling asset
- Making energy performance comparable between different organizations / building stock (Mutual comparison stimulates processes of continuing improvement)

Goal: description of aspects on which consideration and decision are made

Tactics

Ambition

- Mutual comparison stimulates processes of continuing improvement

Tools:

- EPI-CREM reference manual, advices for implementation (EPI-CREM tool)
- Development of benchmark (not an EPI-CREM tool)
- Description of aspects on which consideration and decisions are made (EPI-CREM tool)

STRATEGIES TO DEVELOP USABLE EPI CREM TOOLS				
STRATEGY		TACTICS		
VISION	GOALS	AMBITION	TOOLS	
Portfolio management (Strategical)	Integrate energy performance into real estate management, by setting targets on short, medium and long term plans	Making energy performance comparable between different organizations / building stock	Mutual comparison stimulates processes of continuing improvement	Development of benchmark
	Integrate energy performance aspects in consideration and decision making process, at moments of change in building stock, buying, selling asset	description of aspects on which consideration and decision are made		EPI-CREM reference manual, advices for implementation
				guideline for description of aspects on which consideration and decisions are made (EPI-CREM tool)

Figure 6: Strategies related to portfolio management

3.3 Strategies related to asset management

The following scheme provides an overview of the specific elements a strategy that is related to asset management can contain:

Strategy

Vision:

- Integrate energy performance aspects in consideration and decision making process at moments of change in existing building stock, renovation, large maintenance etc
- Make visible which value, interest, risks, consideration and decisions have and make them comparable with measures in other disciplines, to be able to considerate and make optimal decisions

Tactics

Ambition:

- EPI-CREM reference manual advices for implementation

Model for risk management Tools:

- Consideration and decision making tool (is represented in the EPI-CREM Reference Manual tool)
- Risk management tool (is represented in the EPI-CREM Scenario Analyse Module tool)



STRATEGIES TO DEVELOP USABLE EPI CREM TOOLS			
STRATEGY		TACTICS	
VISION	GOALS	AMBITION	TOOLS
Asset management (Tactical)	Integrate energy performance aspects in consideration and decision making process at moments of change in existing building stock, renovation, large maintenance etc	EPI-CREM reference manual advices for implementation	Consideration and decision making tool
	Make visible which value, interest, risks, consideration and decisions have and make them comparable with measures in other disciplines, to be able to considerate and make optimal decisions	Model for risk management	Risk management tool

Figure 7: Strategies related to asset management

3.4 Strategies related to facility management

The following scheme provides an overview of the specific elements a strategy that is related to facility management can contain:

Strategy

Vision

- o Integrate energy efficiency and performance aspects into tenancy agreements, by exploring possibilities to achieve combined profits for tenants as well as owners of building stock
- o Develop know-how on possibilities and opportunities in the field of facility management. Influence of user behavior on energy consumption and saving also day to day monitoring of installations

Tactics

Ambition

- o Introduce standard module in tenancy agreements, about cooperation between tenants and owners, concerning energy efficiency. (part of CREM Reference book)
- o Campaign for increasing awareness on energy consumption and opportunities for energy saving at the building users. (not in the EPI CREM project)

Tools

- o Tenancy agreement

STRATEGIES TO DEVELOP USABLE EPI CREM TOOLS			
STRATEGY		TACTICS	
VISION	GOALS	AMBITION	TOOLS
Facility management (Tactical)	Integrate energy efficiency and performance aspects into tenancy agreements, by exploring possibilities to achieve combined profits for tenants as well as owners of building stock	Introduce standard module in tenancy agreements, about cooperation between tenants and owners, concerning energy efficiency. (part of CREM Reference book)	tenancy agreement
	Develop know-how on possibilities and opportunities in the field of facility management. Influence of user behavior on energy consumption and saving also day to day monitoring of installations	Campaign for increasing awareness on energy consumption and opportunities for energy saving at the building users. (not in the EPI CREM project)	

Figure 8: Strategies related to facility management

3.5 Strategies related to property & maintenance management

The following scheme provides an overview of the specific elements a strategy that is related to property & maintenance management can contain:

Strategy

Vision:

- Increase efficiency in data collection and building inspections, multi disciplinary data collection
- Use so called natural moments combination of implementation of technical energy saving measures with other measures in the field of maintenance, fire-safety, refurbishment, etc
- Develop and increase awareness of urgency in energy saving
- Develop / increase knowledge and experience

Tactics

Tools

- Tool for integrated data/information collection due to inspections (EPI-CREM Database Integrated Information System tool)
- Connect elements based on risk management (EPI-CREM Database Integrated Information System tool and EPI-CREM Scenario Analyze Module tool)
- Consideration and decision making aspects for technical risk management (EPI-CREM Scenario Analyze Module tool)
- Training for the whole project (EPI-CREM Practical Training Program for Assessors)

STRATEGIES TO DEVELOP USABLE EPI CREM TOOLS				
STRATEGY		TACTICS		
VISION	GOALS	AMBITION	TOOLS	
Property & Maintenance management (Operati	Increase efficiency in data collection and building inspections, multi disciplinary data collection		correct information/data and knoledge	efficient data/information collection due to inspections
	Use so called natural moments combination of implementation of technical energy saving measures with other measures in the field of maintenance, fire safety, refurbishment, etc	integrate all inspections in buildings to one multidisciplinary inspection methodology (MIFE)		Connect elements due to risk management
	Develop and increase awareness of urgency in energy saving			Consideration and decision making aspects for technical risk management
	Develop / increase knowledge and experience			Training for the whole project

Figure 9: Strategies related to facility management

In chapter 4 these theoretical strategies will be given a practical interpretation in the light of some example strategies that are described.

4 Example strategies for CREM-organizations to integrate Energy Efficiency

4.1 Strategies from a practical point of view

A public CREM-organization develops its strategies based on their existing and to develop products and services for existing and new target groups.

Strategies and tactics are used to acquire insight in several aspects that may be risky for the organization. These aspects are:

- Financials or economical situation (ratio income and plans)
- Organizational aspects (CREM organization and its four main CREM functions)
- Functional aspects
- Technical aspects
- Environmental aspects
- Political aspects

The importance of the financial and economical situation in decision-making is very clear. Organizational, functional and technical aspects are operational risk aspects. Operational and financial aspects can directly be used for consideration and decision-making. Environmental and political items are socially influenced aspects that cannot directly be influenced but can highly affect decision-making. They can be used for consideration and decision-making but one has to keep in mind that their influence can quickly change.

4.2 Example strategies to embed energy issues in the four main CREM functions

4.2.1 CREM – organization

Formulating an unequivocal and objective policy forms an important link between strategical goals and actual execution. On a strategical level there is a need for abstract information about relevant aspects and on the operational level there is a need for detailed information. In every function in a CREM-organization information must be recorded in order to be able to support the following function. After a decision making face in one management field, the following function has to be able to work out the information in a more detailed level.

From this point of view the four strategy levels must be integral embedded in the management functions of the CREM-process in CREM-organizations. The strategies can be very different per CREM organization. The next paragraphs will provide examples of connected strategies in a CREM-organization on the different management levels.



4.2.2 Portfolio management

A portfolio manager makes decisions about a property on three main aspects

- The yield/profit a property makes (if a property is not profitable enough it will be dissolved)
- The possible investments to an existing property and their yield
- Opportunities to hire, lease, buy or develop real estate.

Important points of attention for portfolio management are:

- Future expectation (political, commercial, market, economical) and their influences on the CREM-organization and its production process
- How is the CREM stock influenced by demographic expectations and future market share
- How is the organization and its production process influenced by production loss or (part) of asset loss
- Is there financial a/or personal space enough to realize the ambitions and goals
- Are sources and resources well managed
- Future market expectations and expansion/shrinkage

Based on these decisions and points of attention an example strategy for portfolio management can be described as follows:

Strategy

Vision : Compliance with our clients about safe and sustainable buildings

Mission : Update EPBD stock on “natural” moments in integral cooperation with our tenants

Goal : Meridian for complete EPBD stock must be at least label D

Tactics

Ambition

- Use short (mid) and long term measurements
- After major renovation buildings with D labeling must be at least have a B label
- After major renovation buildings lower than D labeling must be at least have a C label
- Newly built buildings must be at least in A++, A+ or A,
- X% of our tenants agree on our short & long term measurements,

Tools:

- Financial decision making tool due to risk management (is represented in the EPI-CREM Scenario Analyse Module tool)
- Building stock list (EPBD) with all labels and other SHEEQ qualifications indicator (not an EPI-CREM tool)
- Tenancy agreement (Is represented in the EPI-CREM Reference Manual tool)
- Long term measurement (not an EPI-CREM tool)

STRATEGY EXAMPLES FOR CREM ORGANIZATIONS					
	STRATEGY		TACTICS		Directly related
	VISION	GOALS	AMBITION	TOOLS	
	Portfoliomangement (Strategical)	Compliance with our clients about safe and durable buildings	Meridian for complete EPBD stock must be at least label D	Use short (mid) and long term measurements	
Mission			After major renovation buildings with D labeling must be at least have a B label After	Building stock list (EPBD) with all labels and other SHEEQ qualifications Indicator (Technical, Safety, Health and Energetically) Quality (not an EPI-CREM tool)	EPBD
Update EPBD stock on "natural" moments in integral cooperation with our tenants			Major renovation buildings lower than D labeling must be at least have a C label	Tenancy agreement (EPI-CREM tool)	EPBD / EE-ESD
			Newly build buildings must be at least in A++, A+ or A,	Long term measurement (not an EPI-CREM tool)	
			X% of our tenants agree on our short & long term measurements,		

Figure 10: Strategies for CREM-organizations In Portfolio management

4.2.3 Asset management

Asset Management is concerned with decisions on tactical level in the existing stock. An Asset manager has to make decisions about the aspects of Energy & Environment, Quality & Functionality and Safety & Health in the complete buildings stock of a CREM-organization.

Asset managers often have to deal with buildings that are not performing well on energy issues.

Important points of attention for asset management are:

- Optimize asset to prevent and/or minimize unoccupied assets
- Decrease (market) risks and increase the return of investment due to optimizing the assets
- Optimize asset due to increasing availability percentage
- Know your client and possible future client and their expected future development
- Know your environment and its influence or possible future influence on your CREM organization (politic, competitor)
- Optimize asset to prevent and/or minimize unoccupied assets



Based on these decisions and points of attention an example strategy for asset management can be described as follows:

Strategy

Vision: Safe & sustainable building stock management due to building type and energy qualifications

Mission: Use “natural” moments and communicate with your tenants

Goals:

- Until 2020 the EPBD meridian per building type must increase at least 2 labels, (Buildings from label D to at least B and lower than D to at least C)
- From 2009 meridian for newly builds must be A, A+, or A++
- From 2009 meridian for renovated builds must be at least a B-label

Tactics

Ambition:

- Until 2020 between 25% of total EPBD builds (330) will be renovated (for the Rijksgebouwendienst (RGD) as example this means 2,5 – 5 % of the total EPBD stock yearly)
- Newly hired or leased buildings must be at least in label C
- A newly, hired or leased building must undergo short term measurements (FCMT², IBIM³, Lightning, Heat and moisture exchange in ventilation systems)

Tools:

- Stock list with classification of building type (Indicator Technical Quality, Indicator Energy Quality SHEEQ indicators etc), EPBD qualification, gas, oil, water, electricity and heating and cooling consumption (not an EPI-CREM tool)

² FCMT Functional Control Measurements and testing of Climate installations

³ IBIM Intelligent Building information Management

STRATEGY EXAMPLES FOR CREM ORGANIZATIONS					
	STRATEGY		TACTICS		Directive related
	VISION	GOALS	AMBITION	TOOLS	
Asset management (Tactical)	Safe & durable stock management due to building type and energy qualifications	Till 2020 the EPBD meridian per building type must increase at least 2 labels, (Buildings from label D to at least B and lower than D to at least C)	Till 2020 between 25% of total EPBD builds (330) will be renovated. For the Rgd this means 2,5 – 5 % of the total EPBD stock yearly	Till 2020 between 25% of total EPBD builds (330) will be renovated. For the Rgd this means 2,5 – 5 % of the total EPBD stock yearly	
		From 2009 meridian for newly builds must be A, A+, or A++	Newly hired or least buildings must be at least in label C	Newly hired or least buildings must be at least in label C	EPBD
	Use “natural” moments and communicate with your tenants	From 2009 meridian for renovated builds must be at least a B-label	A newly, hired or least building must undergo short term measurements (FCMT, IBIM, Lightning, Heat and moisture exchange in ventilation systems	A newly, hired or least building must undergo short term measurements (FCMT, IBIM, Lightning, Heat and moisture exchange in ventilation systems	

Figure 11: Strategies for CREM-organizations In Asset management

4.2.4 Facility management

Facility Management is closest to the “end-users” or tenants in the Real Estate process. They take care of the facility services related to the use of buildings.

An example strategy for facility management can be described as follows:

Strategy

Vision: Safe and sustainable workplace (to provide optimal added value to primary processes by providing safe and sustainable workplaces, with optimal cost/quality ratio)

Mission:

- o Continued low energy consumption and continued high comfort,
- o Sustainable purchasing of energy

Goals:

- o Creating support and energy awareness among the end users
- o Integrate energy efficiency aspects into tenancy agreements
- o 10 - 15% energy and emission saving due to short term measurements
- o 5% energy saving due to user behavior measurements

Tactics

Ambition:

- o Until 2011, 10 –15% lower energy consumption
- o Until 2011, X% sustainable energy purchasing



- Until 2020, 100% sustainable energy purchasing
- X% of the end users support and think the short term measurements are giving the right results and are useful
- Less staff on technical facility management due to better functioning of building and installations
- Less sickness due to better functioning of building and installations

Tools

- Tenancy Agreement (part of the EPI-CREM Reference Manual tool)
- Energy and emission purchasing (not an EPI-CREM tool but EE-ESD⁴ tool)
- Measure, compare, report the energy, emission and sickness, due to influencing user behavior and short term measurements (not an EPI-CREM tool but EE-ESD tool)
- Facility decision making tool due to risk management (EPI-CREM Scenario Analyze Module tool)

⁴ EU directive 2006/32/EG 5 April 2006 EE-ESD (energy end-use efficiency and energy services directive)

STRATEGY EXAMPLES FOR CREM ORGANIZATIONS					
	STRATEGY		TACTICS		Directive related
	VISION	GOALS	AMBITION	TOOLS	
Facility management (Tactical)	Safe and durable workplace		10 - 15% energy and emission saving due to short term measurements	Tenancy Agreement (EPI-CREM tool)	EPBD/EE-ESD
	To provide optimal added value to primary processes by providing safe and sustainable workplaces, with optimal quality/costs ratio		5% energy saving due to user behavior measurements	Energy and emission purchasing (not an EPI-CREM tool but EE-ESD,tool)	EE-ESD
	Missions:		Ambition: Till 2011, 10-15% lower energy consumption	Measure, compare, report the energy, emission and sickness, due to influencing user behavior and short term measurements (not an EPI-CREM tool but EE-ESD tool)	EE-ESD
	Continues low energy consumption and continues high comfort,		Till 2011, X% durable energy purchasing	Facility decision making tool due to risk management (EPI-CREM tool)	
	Durable purchasing of energy		Till 2020, 100% durable energy purchasing		
	Creating support with the end users		X% of the end users support and think the short term measurements are giving the right results and are useful		
			Less staff on technical facility management due to better functioning of building and installations		
			Less sickness due to better functioning of building and installations		

Figure 12: Strategies for CREM-organizations In Facility management

4.2.5 Property & Maintenance management

Managers who are responsible for a group of buildings, as part of the entire building stock of an organization carry out the property & maintenance management. They look after (long and short term) maintenance planning, and realization of maintenance by contractors.

They have to generate technical information from technical inspections for operational, tactical and strategic consideration, and for the purpose of risk management.

An example strategy for property & maintenance management can be described as follows:

Strategy

Vision: Safe and durable properties

Mission:

- Until 2020 15% energy saving due to short term measurements
- MIFE Integral Inspection 20% of the complete stock yearly (for the Rijksgebouwendienst (Rgd) for example this means between 400 – 450 buildings and between 55 – 65 EPBD buildings),
- LTIEP between 8 – 10% EPBD buildings and 5 – 10% other stock,
- LTMP between 90 – 95% yearly,

Goal:

- Short term measurements
 - 10 –15% energy saving due to FCMT and in the future IBIM (IBIM continues and FCMT once in the 5 year together with MIFE⁵ Integral Inspections
- Long term measurements (due to MIFE Integral Inspections)
 - MIFE Integral Inspections
 - Connect different and several inspection mythologies to each other
 - Long Term Investing and Exploration Planning
 - Long Term maintenance Planning
 - Technical risk management (FMECA⁶)

Tactics

Ambition:

- Short term measurements
 - Until 2010 execution of FCMT in approximately 8- 10% EPBD buildings yearly 3 – 7% in total.
 - From 2010 execution of FCMT together with MIFE Integral Inspections for EPBD buildings 20% of the total EPBD building stock (for the Rijksgebouwendienst (RGD) for example this means 55 - 650 in total)
 - From 2010 execution of IBIG together with MIFE Integral Inspections and FCIB. In 2015 the hole EPBD building stock (for the Rijksgebouwendienst (RGD) for example this means approximately 330 buildings in total must be continuous monitoring)
- Long term measurements
 - From 2010 only MIFE integral inspections, 20% yearly of the total stock

⁵ MIFE Maintenance Installations Fire and Energy integral Inspection

⁶ FMECA Failure Mode Effect Critically Analyze (Risk management)



- LTIEP between 8 – 10% of the EPBD buildings and 5 – 10% other Stock
- LTMP between 90 – 95% of the yearly 20%

Tools:

- FCMT and IBIM (together with MIFE Integral Inspections) join forces with TNO and ISSO as research institutes and other governmental and commercial CREM organizations (not an EPI -CREM tool)
- MIFE Integral Inspections, Standard Element List to connect different and several inspections and aspect to each other (not a specific EPI-CREM tool, but used as a basis for the EPI-CREM Database Integrated Information System tool)
- Technical consideration due to risk management (EPI-CREM Scenario Analyze Module tool)
- Stock list with classification of building types m^2 , Indicator Technical Quality, Indicator Energetic Quality (not an EPI-CREM tool)
- Quality, energy consumption (gas, water, electricity, heating, cooling per building and building type) (not an EPI-CREM tool)
- Calculation tool (NEN2734) (not an EPI-CREM tool)

STRATEGY EXAMPLES FOR CREM ORGANIZATIONS					
	STRATEGY		TACTICS		Directive related
	VISION	GOALS	AMBITION	TOOLS	
Property & Maintenance management (Operational)	Safe and durable properties	Short term measurements- 10 –15% energy saving due to FCMT and in the future IBIM (IBIM continues and FCMT once in the 5 year together with MIFE Integral Inspections	Short term measurements	FCMT and IBIM (together with MIFE Integral Inspections) Join forces with TNO and ISSO as research institutes and other governmental and commercial CREM organizations (not an EPI -CREM tool)	EE-ESD
	Till 2020 15% energy saving due to short term measurements	Long term measurements (due to MIFE Integral Inspections)	Till 2010 execution of FCMT in approximately 8- 10% EPBD buildings yearly 3 – 7% in total.	MIFE Integral Inspections, Standard Element list to connect different and several inspections and aspect to each other (EPI-CREM tool)	
	MIFE Integral Inspection 20% of the complete stock yearly (for the Rgd this means between 400 – 450 buildings and between 55 – 65 EPBD	MIFE Integral Inspections	From 2010 execution of FCMT together with MIFE Integral Inspections for EPBD buildings 20% of the total EPBD building stock (This means for the Rgd 55 - 650 in total)	Technical consideration due to risk management (EPI-CREM tools)	
	LTIEP between 8 – 10% EPBD buildings and 5 – 10% other stock,	Connect different and several inspection mythologies to each other	From 2010 execution of IBIM together with MIFE Integral Inspections and FCIB. In 2015 the hole EPBD building stock (for the Rgd this means approximately 330 buildings in total must be continuous monitoring)	Stock list with classification of building types m ² , Indicator Technical Quality, Indicator Energetic (not an EPI-CREM tool)	EE-ESD / EPBD
	LTMP between 90 – 95% yearly,	Long Term Investing and Exploration Planning	Long term measurements	Quality, energy consumption (gas, water, electricity, heating, cooling per building ad building type) (not an EPI-CREM tool)	
		Long Term maintenance Planning	From 2010 only MIFE integral inspections, 20% yearly of the total stock	Calculation tool (NEN2734) (not an EPI-CREM tool)	
			LTIEP between 8 – 10% o the EPBD buildings and 5 – 10% other Stock		
			LTMP between 90 –95%of the yearly 20%		

Figure 13: Strategies for CREM-organizations In Property & Maintenance management

5 Measurements examples

To work out the example of the strategies somewhat further, in this chapter some attention is paid to measurements that can be deployed to execute a strategy in practice.

5.1 Basic and custom made measurements

CREM organizations have to deal with a building stock for several organizations and their different needs (office buildings, museums, penitentiaries, shops, shelters etc). Besides this, the building stock is also different in terms of age of the buildings, technical theoretical lifetime and condition. Therefore often-basic measurements and custom made measurements are defined.

Long-, mid- and short-term measurements can be executed by;

- facility management
- property & maintenance management

To achieve energy saving in the building stock, energy saving measurements on different levels must be executed. So the several functions in CREM have to match with the kind of measurements. Therefore a tenancy agreement is necessary.

5.2 Short term measurements

Short-term measurements must have potential to be widely implemented in the overall building stock, not only in the EPBD building stock but also in the other strategical and non-strategical building stock. Naturally all buildings and customers must be checked on useful implementation of the several measurements.

The following scheme shows an example of the practical use of short-term measurements.

Achievable ambition:

Mean annual energy saving per building must be between 10 – 15%. The annual energy saving will depend on the kind of measures that will be executed. The total energy saving for short-term measurements until 2011 must be between 8 – 12 %, whereas the total energy saving until 2020 must be 15%.

Influence on EPBD-certificate:

There is no direct influence on the result of the EPBD certificate.

Measurements:

- Local absence detection for lightning
- Functional Control Testing and Measure climate installations (FCTM) (periodical once in the 5 years together with MIFE Integral Inspections)
- Influencing end user behavior (Periodical once in the 5 years together with FCTM)
- Overall Building Installation Information Management (BIIM)
- Continuous measurements of the several quantities (gas, oil, electricity, water heating and cooling)

5.3 Mid-term measurements

The following scheme shows an example of the practical use of mid-term measurements.

Measurements:

- Heat and moisture extraction in ventilation installations
- Adjustment due to FCTM
- Adjustments due to IBIM

Influence on EPBD-certificate or EE-ESD

There is direct influence on the result of the EPBD certificate, due to heat and moisture extraction in ventilation installations. FCTM and IBIM do not have influences on the EPBD certificate. They will have influence on the custom made consult and on the EE-ESD.

Stock potential

Short en mid term measurements can be used for all types of buildings. Complex buildings and installations will achieve a better result than less complex buildings and installations. For example a museum will score very high on the FCMT, IBIM and lightning measurements. A penitentiary will score very high on FCMT, IBIM and heat and moisture extraction in ventilation installation. An office building will score on all measurements deepening on complexity. Not all measurements can be implemented in all buildings on the same time due to lack of know how and knowledge in the market, etc.









Base packages Short and mid term measures	Custom made packages Long term measures
 <p>Check and adaptations climate installations</p>	 <p>Energy storage in the ground</p>
 <p>absence detection lighting</p>	 <p>Heatpump</p>
 <p>Functional Control Measure Test Integral Building Information Monitoring performances → energy management</p>	 <p>LED-lighting (development)</p>
 <p>Behavioral measures • Stimulate low-energy consumption behaviour • Video conferencing</p>	 <p>Roof insulation with integrated solar pane</p>

Figure 14: Short-, mid- and long-term measurements⁷

5.4 Long Term Measurements

A tailor made package of coherent measurements for a building or parcel of buildings and is applied at “natural” moments, such as renovation, construction due to MIFE (Maintenance Installations Fire

⁷ Presentation, Implementation and executing EPBD for Rijksgebouwendienst by ing H.W. (Erik) Tromp



Energy) Integral Inspections. In the E (energy part of MIFE Integral inspections a tailor made package of measurements is made. Net present value must be clarified in several parts;

- Building physics NPV⁸ max 15 year
- Climate installations NPV max 8 years
- Electro installations max NPV 8 years

Characteristics of long-term measurements:

- Available knowledge and techniques on the market
- Durable saving potential
- Realizable for mid and long term
- Positive effect on the comfort
- Comply to legislation

Characteristics of measurement packages:

- Available (knowledge, market capacity)
- Substantial energy saving potential
- Realizable in mid- and long-term
- Positive effect on comfort
- Comply to legislation

Composition of tailor made measurements:

- Roof insulation. If possible in combination with (integrated) sun collectors (construction, renovation, large scale maintenance)
- Façade insulation, if possible in combination with sun collectors (renovation and new builds).
- HR++ glazing in combination with awning (construction, renovation, large scale maintenance)
- LED-lightning for lightning of art objects and terrain lightning (construction, renovation, large scale maintenance)
- Vacuum glazing in museum (renovation, large-scale maintenance).
- Sustainable energy generating:
 - Heat and cold accumulation (new builds, renovation)
 - Heat pump systems (mono- and bivalent) (new build, renovating)
 - Heat / cold storage combination with heat pump systems (new build, renovating)
 - Bio mass generating
 - Heat/electricity generator in combination with absorber cooling (renovation and large scale maintenance)
 - Wind turbines
- HR heat/cool and moisture exchangers in balanced ventilation installations (new build, renovation and large scale maintenance) (heat pump exchange wheel, heat and cold accumulation)

⁸ NPV Net Present Value

Example

A maintenance inspection conducted in 2008 revealed that the building management system ought to be replaced in 2013. There were plans to replace the boiler in 2012 and the air conditioning in 2010. Replacement of the roof construction and finishing will take place in 2020, lightning in 2016 and electrical distribution in 2018 and one year later the end-use devices. This example shows how replacement occurs at a defined moment, without taking into account the risk of breakdown if no replacement should occur. Other important aspects are not taken into account, like energy consumption and fire prevention and any other combination of systems, such as fire alarms and security systems, for example. Even worse, whether or not all this is necessary for the user/client and whether there are further technical, functional and representative requirements and desires are scarcely taken into account, if at all.

1. A maintenance inspection reveals that the 25-year-old central-heating boiler ought to be replaced. If the requirements a modern heater room must comply to are not taken into consideration here, this will have major financial consequences for planning and implementation. There will then be no financing left over for these matters. After all, a modern heater room should comply to many requirements mentioned in the building regulations, bearing in mind fire prevention, constructions and energy performance for example.

2. The same 25-year-old boiler is replaced by a state-of-the-art HR boiler, because the Integral Replacement scheme (IV) indicates this. In addition, the window frames and the glazing are replaced and the roof is insulated. These are all good but stand-alone measures, in order to economize on energy use. It is, however, of vital importance that the distribution net is adapted to this new energy conserving boiler. Otherwise – in spite of the energy saving measures – an unnecessary amount of energy will be used, and complaints about temperature and comfort may occur because the regulating technology has not been adapted.

3. The same 25-year-old boiler is replaced. All kinds of duct grids in the heater room are replaced or extended. These ducts and grids go through the fire resistant construction. If no financing, concerning fire prevention measures, is included in the maintenance inspection, the heater room will not pass the legal requirements to start operating (at present it often happens that the state of affairs as a whole passes the minimum requirements, but that it still does not comply with requirements on a number of points, with many possible risks to safety as a consequence).

4. The challenge is how to plan all the measurements so that all SHEEQ aspects are done and the building is safe and sustainable. In figure 15 the green parts indicate an example concerning the moving of measurements to one plan year. When more plan years are necessary the work must be divided in the right sequence, first the construction, then the building physics and after that the installations. For example if in a badly insulated building the heating and cooling system is completely replaced by high temperature cooling and low temperature heating a lot of complains about comfort and energy consumption will occur. The right order is to first insulate walls, roof and windows and then take installation measurements.

6 Conclusions and recommendations

In the previous chapters several strategies have been described that can contribute to the integration of energy performance in real estate management processes. Some of these strategies are useful in all of the four management fields (portfolio management, asset management, facility management and property & maintenance management) while others focus on specific processes within one of these management fields.

Not all of these strategies can be developed further in the EPI-CREM project; some of them are beyond the scope of the EPI-CREM project. Within the EPI-CREM project, we want to make a selection of strategies, which appear to be the most useful, successful and feasible to embed energy issues in CREM-processes.

Starting points in this consideration are:

- Maximum connection to day-to-day practices of real estate managers;
- Applicable as a common, basic strategy and method in the EU-countries; not specifically determined to the situation in one country;

Bearing in mind these points of attention the conclusion is to focus on the following strategies.

A strategy on a general organizational level

Integrate energy performance into real estate management processes by paying attention to the energy performance theme and giving it a specific place in all real estate management processes, from strategic/policy level to tactical and operational levels.

In the EPI-CREM project this will lead to the development of a guidance book, the EPI-CREM Reference Manual. It will describe the EPI-CREM embedding approach for the integration of energy performance aspects into (public) corporate real estate management planning processes.

A strategy on integration by increasing efficiency and quality in multi-disciplinary data collection.

This strategy concerns integrated risk management, consideration and decision making tools and leads to tools which will be used as technical consideration in property & maintenance management, but which also have an impact on the quality of decision-making (facilitain, political, environmental) in portfolio management, asset management and facility management.

In the EPI-CREM project this will lead to the development of the following tools:

- Database Integrated Information System; including Data Acquisition and Quality Control Protocol;
- Scenario Analyze Module, based on the database to facilitate negotiations between client/user and owner, for integral planning of the energy saving measures in relation with other building modifications;
- Practical Training Program for assessors.

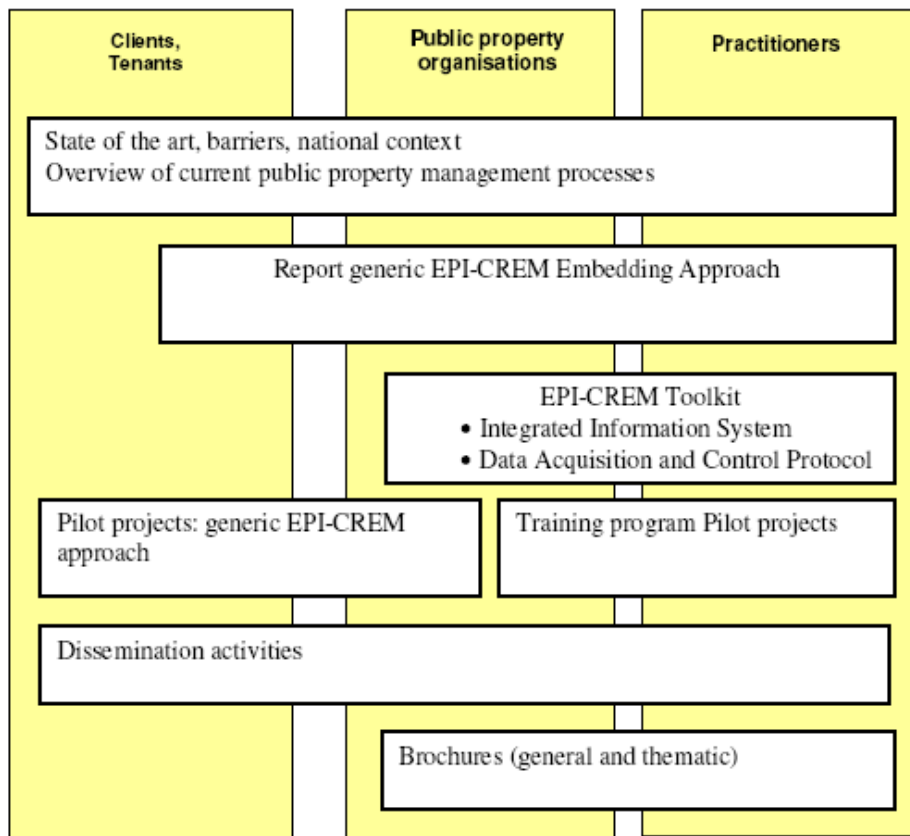


Recommendations for the development of the tools:

- Combine the results and deliverables of WP4 (CREM Approaches fit for use) and WP5 (Tool development)
- Develop a generic fit for use database integrated information/data system that is in principal applicable in all EU Member States
- Develop a fit for use training program that is easily adapted to the situation in the different Member States
- Develop a useable guideline/handbook that is specifically aimed at and applicable for all four main functions in a CREM-organization
- Develop useable instruments which are in principal applicable for every EU member state

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;
2. **The EPI-CREM toolkit**, which contains an Integrated Data acquisition and Quality Protocol, a Database Integrated Information System, a Scenario Analysis Module, a Training program for assessors and the EPI-CREM Reference Manual;
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.

Project Partners



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