

# EFFECT4buildings

Effective Financing Tools for implementing Energy Efficiency in Buildings

## Status quo report

# Status que report

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## Financial Calculation tools

Partner: Environmental Office of Lappeenranta region

### **Presentation of the tool/instrument – Financial Calculations Tools**

Building managers need more varieties and better ways of calculating the profitability of investments. The developed tool will include excel based financial calculations tool and guide for different profitability measures and guide how to use the excel-tool. The calculation tool will be downloadable, easy to use and it'll provide print ready results. It'll also be possible to include non-energy measures in calculations and it'll provide CO2 emission abatement values.

Calculator will use following profitability measures: Internal rate of return, net present value, life cycle costs and cash flow analysis.

#### Current knowledge and implementation of the tool

Most commonly used profitability measure in the target group has been simple payback period. There is a need for better understanding of the different profitability measures and for a new calculation tool.

There are many calculation tools available, but most of the tools are not well suited for our target group.

#### Target group: Who works with the tool today / have wishes to work with the tool?

Questionnaire was done for public building managers to collect information how they use financial calculations and what kind of needs they have for a new calculation tool.

Most of the target group's public building managers use simple payback period as the most important profitability measure. Also life cycle analysis is used in some cases. Among target group's public building managers there is a real need for a new, better financial calculation tool.

There are several project cases where target group will be part of the development or testing of the tool. The developed tool will be widely used by target group's building managers.

### **Motivation for working with the tool**

#### Why is the tool relevant to work with?

Public building managers lack proper tools to make better financial calculations for EE investments. Better calculations are also important when trying to convince decision makers.

#### Any policies/ legislation hindering or promoting the work with the tool?

Some departments are using simple payback period guidelines when doing EE investments. Also some funding sources require to use the simple payback time as a profitability measure.

### **Energy saving potential**

### What are the energy saving potentials for the tool?

Tool can accelerate EE investments and also help to convince that bigger retrofits can be economically profitable. Target group has over 11 million m<sup>2</sup> under management and even 1 % reduction in energy use in this building stock means energy savings of several GWh/year. Typically deep retrofit gives energy savings over 50 %. When making only the EE investment with shortest pay back period, is the energy saving typically 10-20 %. Better use of financial calculations can result making the deep retrofit instead of the investment with shortest payback period.

### How can the tool help increase the number of energy efficiency measures implemented in existing public buildings?

The tool will help building managers to better understand EE investment profitability. Tool can also be used to convince decision makers to invest in energy efficiency.

## **Best practise**

### What's the European best practise for using the tool?

Who are frontrunners? What regions have the most experience working with the tool?

European frontrunners include The Simplified Economic Evaluation Tool (CERtuS SE<sup>2</sup>T) that has been developed under the CERtuS Project and Total Concept Method developed by CIT Energy Management AB.

### Other project and initiatives

- ASCOT light – tool for school buildings
- EURONET 50/50
- Commercial Building Analysis Tool for Energy-Efficient Retrofits (COMBAT)
- Local Energy Efficiency Policy Calculator (LEEP-C)
- Energiavalinta.fi
- Energy Star Cash Flow Opportunity calculator
- TARVE – calculator developed by SYKLI Environmental School of Finland

### How do we learn from the best practices?

We study and test the current best practices. Questionnaire results, workgroup meetings and comments from stakeholders will be used to find the best ways to develop the tool further.

## **Need of development**

### Current development stage

How developed is the tool at this stage? Specification list for the tool is ready. First version of the tool is under development and testing of the first version will be performed in June-July 2018.

### What is the biggest barrier/hindrance for working with the tool?

Getting feedback from the target group will be very important when getting to testing phase of the tool.

## Summary of what the project can do to develop the tool

### What are the main obstacles for developing / implementing the tool?

Collecting experiences and developing the tool be as comprehensive as possible, yet still simple to use.

### What can the project do to develop the tools?

Project partners and target group is needed for testing and giving comments.

### What cases could be relevant for developing the tool?

In a project's case plan, there are 14 cases for the financial calculation tool from 8 partners. PP11 will participate in development of the financial calculation tool. PP1 and PP5 will participate in including non-energy measures to the tool. PP4, PP5, PP11 and PP10 will help to test the tool.

## What does the tool have in common with the other project tools?

### Similarities

The developed financial calculator tool can be used together with other tools, mainly with EPC, bundling and MSC tools.

Tool can be used as a part of training material in other tools.

## Bundling

Partner: Environmental Office of Lappeenranta Region

### **Presentation of the tool/instrument – Bundling**

Target group needs different ways of bundle investments and to make best use of Total concept method. Good calculation is needed to attract finance and to convince a bank to lend money for an investment.

### There are three types of bundling:

- 1) bundle energy efficiency measures in one building/project
- 2) bundle multiple EE acts of the same type in many building/locations to make investment big enough, ie street lighting, HVAC.
- 3) bundle multiple EE measures of different type in many buildings/locations

In this tool we'll collect experiences and propose ways to bundle investments to make them bankable and create individual recommendations for target groups involved in the project on how and when to use the bundling method.

### The output of the tool will include following:

- mapping and description of different kind of bundling methods
- models on how to bundle investments to reach bankability
- summary of the experiences and main challenges
- recommendations on the most usable ways of bundling in BSR countries for different purposes based on results from testing (case studies and conclusions) and guidelines on how to use them
- adjusted bundling methods to fit with technological solutions (WP2), other financial tools (WP3) and instrument (WP4)
- recommendation for the target group in BSR on how bundling can be used when presenting measures in energy audits
- policy recommendations to EU and national bodies on how to improve the use bundling.

## Current knowledge and implementation of the tool

Bundling methods are now yet widely used by the target group. Most common bundling type has been joint procurement or bundling of EE investments of the same type. Bundling of EE acts of the different types hasn't been common.

The target groups hasn't use The Total Concept Method and in most cases building managers aren't familiar with the concept.

In the projects case plan there are currently 9 cases for bundling tool.

Case outputs will include:

- mapping of the successfully done bundling
- scorecards of bundled investments
- training material
- recommendations
- recalculated investment plans

## **Motivation for working with the tool**

### Why is the tool relevant to work with?

Public building managers need better knowledge how to bundle different EE measures and what kind of benefits can be expected when bundling investments.

## **Energy saving potential**

### What are the energy saving potentials for the tool?

Tool can accelerate EE investments and also help to convince that bigger retrofits can be economically profitable. Target group has over 11 million m<sup>2</sup> under management and even 1 % reduction in energy use in this building stock means energy savings of several GWh/year. Typically deep retrofit gives energy savings over 50 %. When making only the EE investment with shortest pay back period, is the energy saving typically 10-20 %. Efficient bundling of the EE investments can make it profitable to do EE investments on larger scale or make deep renovation instead of single EE measure.

## **Best practise**

### What's the European best practise for using the tool?

Who are frontrunners? What regions have the most experience working with the tool?

The frontrunners with The Total Concept have been Sweden and Denmark.

- CIT Energy Management
- Byggherrarna
- Ramboll
- Bionova

### Other project and initiatives

Bundling has been successfully done in big scale in EE investments also in Italy (32 municipalities made EPC contract together for EE street lights) and France (Positif: deep renovation of 32 condimiums).

### How do we learn from the best practices?

We study and test the current best practices. Questionnaire results, workgroup meetings and comments from stakeholders will be used to find the best ways to develop the tool further. Best practices will be presented as scorecards.

## **Need of development**

### Current development stage

How developed is the tool at this stage?

We are still collecting best practices and studying The Total Concept Method in detail.

## **Summary of what the project can do to develop the tool**

Describe what kind of development work we expect to do within each tool:

What are the main obstacles for developing / implementing the tool?

What can the project do to develop the tools?

- Collect best regional examples for bundling of EE investments
- make together with PP2 the training materials and make local versions of the training material
- collect feedback of the training material and training sessions

### What cases could be relevant for developing the tool?

- PP5, PP4 and PP11 all have cases for collecting best practices and/or mapping of successful bundling of EE investments
- PP2 and PP11 have cases for developing the training material
- PP10 and PP4 have cases for recalculating EE investments plans using Total Concep Method.

## What does the tool have in common with the other project tools?

### Similarities

Bundling is often used with EPC contracts and ESCO. Bundling of EE investments is closely linked to financial calculation tool.

## Energy Investment Funding

Partner: Association of Communes and Cities of Małopolska Region

### **Presentation of the tool/instrument**

#### What is the tool about?

The public building managers need to broaden their knowledge on various ways on how to finance Energy Investments. **The Energy Investment Funding tool** is about broadening the knowledge of the target group on existing energy investment funding sources and mechanisms, different than public funding sources (e.g. EU funds). The tool is also about sharing the knowledge and experience among project partners on existing funding mechanisms in their countries and making an attempt to promote and adapt similar solutions in project countries.

#### Current knowledge and implementation of the tool

The analysis has shown that the current knowledge about the Energy Investment Funding is limited mostly to existing public funding schemes. The public buildings managers have the knowledge about existing public funding sources for EI. However, there is a lack of knowledge about other than public, funding sources or schemes in project countries.

#### Target group: Who works with the tool today / have wishes to work with the tool?

Based on the survey done among the public building managers we can see that they are very much interested in broadening their knowledge about funding possibilities for Energy Investments. This is a result of the general awareness of limiting EU funds, especially for the newer EU countries (such as Poland, Latvia, Estonia).

There are several project cases where the target group would like to get involved in the development and/or testing the tools.

### **Motivation for working with the tool**

#### Why is the tool relevant to work with?

Public building managers are seeking for new possibilities on how to finance the EE investments. A broader catalogue of the energy investment funding possibilities will be helpful in the convincing decision makers phase of the EE project management.

#### Any policies/ legislation hindering or promoting the work with the tool?

We did not identify any dedicated policies or legislations that would be focused on the EE funding.



## **Energy saving potential**

What are the energy saving potentials for the tool?

This tool can accelerate EE investments and also help to convince decision makers to invest more in EE.

How can the tool help increase the number of energy efficiency measures implemented in existing public buildings?

The tool will help building managers to better understand EE investment profitability. Tool can also be used to convince decision makers to invest in energy efficiency.

## **Best practise**

What's the European best practise for using the tool?

Who are frontrunners? What regions have the most experience working with the tool?

In each project country we may identify the front runners related to existing in those countries funding schemes, e.g. Norway is a frontrunner when it comes to EPC.

Other project and initiatives

How do we learn from the best practices?

We study and test the current best practices. Questionnaire results, workgroup meetings and comments from stakeholders will be used to find the best ways to develop the tool further.

## **Need of development**

Current development stage

How developed is the tool at this stage?

General specification list for the tool is ready. Now we are looking for the external experts who would manage the tool on our side and prepare the detailed specification, timeline and templates needed to collect information from project partners and target group.

What is the biggest barrier/hindrance for working with the tool?

It is crucial for the successful tool development to get involved (actively) all project partners and target group representatives so they can share their experiences and ideas.

## **Summary of what the project can do to develop the tool**

Describe what kind of development work we expect to do within each tool:

What are the main obstacles for developing / implementing the tool?

Collecting experiences and developing the tool be as comprehensive as possible, yet still simple to use.

### What can the project do to develop the tools?

In the development of the tool it is crucial that all project partners and target group representatives will be actively involved, both in development and in testing phase.

### What cases could be relevant for developing the tool?

In a project's case plan, there are 17 cases for the Energy Investment Funding tool from all project partners. The case ideas proposed by project partners include:

- *list of funding sources*
- *training sessions for the target group*
- *individual guidance on how to apply for funding*
- *seminars and conferences presenting the availablele funding sources and possibilities on their usage*
- *workshops where the target group members can present their best practices, exchange the ideas and learn how to improve their practices*

### **What does the tool have in common with the other project tools?**

#### Similarities

The developed Energy Investment Funding tool can be used together with other tools, mainly with the financial calculation tool, decision making tool, EPC, bundling and MSC tools.

## **Convincing decision makers**

Partner: Association of Communes and Cities of Małopolska Region

### **Presentation of the tool/instrument**

#### What is the tool about?

The idea for the tool is to focus on how to convince decision makers to invest in energy efficiency projects. The tool is aimed to provide information about various arguments that can be discussed during the decision making process, tools and instruments that can be used in the process and to share experiences (both good and bad practices) on the decision making processes and also EE project management. The preliminary idea about the tool is to focus on the following activities:

Evaluate success factors, failures and good examples on how decision makers has been convinced on energy investments

- organize series of regional conferences, workshops and study visits
- prepare policy recommendations

#### Current knowledge and implementation of the tool

The analysis has shown that the current knowledge about the convincing decisionmaking practices is not shared on a broader scale. The public buildings managers have their own experiences but

there is lack of practices and space to share those experiences and generate new knowledge on how to convince decision makers to invest in energy efficiency.

#### Target group: Who works with the tool today / have wishes to work with the tool?

Based on the survey done among the public building managers and based on discussions that we had during regional and transnational project meetings we can see that they are very much interested in broadening their knowledge about convincing decision makers for Energy Investments., as currently they base mostly on their own knowledge.

There are several project cases where the target group would like to get involved in the development and/or testing the tools.

### **Motivation for working with the tool**

#### Why is the tool relevant to work with?

Public building managers are seeking for new possibilities on how to convince decision makers to invest in EE. To provide space and develop good practices on knowledge sharing will be helpful in the convincing decision makers phase of the EE project management.

#### Any policies/ legislation hindering or promoting the work with the tool?

We did not identify any dedicated policies or legislations that would be focused on the EE funding.

### **Energy saving potential**

#### What are the energy saving potentials for the tool?

This tool can accelerate EE investments and also help to convince decision makers to invest more in EE.

How can the tool help increase the number of energy efficiency measures implemented in existing public buildings?

The tool will help building managers to better understand EE investment profitability. Tool can also be used to convince decision makers to invest in energy efficiency.

### **Best practise**

#### What´s the European best practise for using the tool?

Who are frontrunners? What regions have the most experience working with the tool?

In each project country we may identify the front runners related to various ideas on how to convince decision making processes. Most of them are related to organization of various workshops, trainings, conferences, preparation of various publications and guidelines presenting best practices in EE projects. However, this knowledge is very diffuse.

#### Other project and initiatives

### How do we learn from the best practices?

We study and test the current best practices. Questionnaire results, workgroup meetings and comments from stakeholders will be used to find the best ways to develop the tool further.

## **Need of development**

### Current development stage

How developed is the tool at this stage?

There is still need to discuss this tool more deeply with project partners and with project stakeholders. As the tool is very much linked with other tools we decided to postpone decision on how exactly it will be built for next months.

### What is the biggest barrier/hindrane for working with the tool?

It is crucial for the successful tool development to get involved (actively) all project partners and target group representatives so they can share their experiences and ideas.

## **Summary of what the project can do to develop the tool**

Describe what kind of development work we expect to do within each tool:

### What are the main obstacles for developing / implementing the tool?

Collecting experiences and developing the tool be as comprehensive as possible, yet still simple to use.

### What can the project do to develop the tools?

In the development of the tool it is crucial that all project partners and target group representatives will be actively involved, both in development and in testing phase.

### What cases could be relevant for developing the tool?

In a project's case plan, there are several cases for the Energy Investment Funding tool from all project partners. The case ideas proposed by project partners include:

- Evaluate success factors, failures and good examples on how decision makers has been convinced on energy investments
- organize series of regional conferences, workshops and study visits
- prepare policy recommendations
- Use of profitability calculations of EE investment and/or solar power investment to convince decision makers

**What does the tool have in common with the other project tools?**

Similarities

The Convincing Decision Makers tool is very much linked with all other tools, as it will be based on their results and mostly on the cases that will be collected and developed within those tools.

**Energy Performance Contracting**

Partner: Hedmark County Council

**Presentation of the tool/instrument - EPC/ESCO tool**

Energy Performance Contracting (EPC) is a model for implementation of Energy Efficiency measures with guaranteed results in public or private buildings owned by an EPC client.

In an EPC project energy savings are used to cover the costs of the investments and both technical and financial risk is hence outsourced to an Energy Service Company (ESCO), also called the EPC provider.



Table 1: The EPC model

Current knowledge and implementation of the tool

EPC is a well-documented and tested EE model used in many European countries and in the Nordic countries (Sweden, Denmark, Norway and Finland) for the last 10-15 years. It has also been introduced in some of the other countries in the Trans National Working Group (TNWG) of the EFFECT4buildings project such as Poland, Estonia and to some extent in Latvia, but the model is still not well known in the latter three countries.

This report will mainly focus on EPC in public sector – The EFFECT4buildings main target group.

In Denmark and Finland, the EPC market is strong and healthy. Denmark has had about 30 municipal projects (of 98 municipalities in total) and after the introduction to hospitals in 2016 more EPC projects in Danish hospitals are on their way. In Finland the initial public EPC projects were smaller than in the rest of the Nordic countries, but in the last few years several larger municipal projects have been implemented with success. Hence Finland seems to be the fastest growing EPC market of the four Nordic countries now.

Norway had a very strong and growing market with approximately 60 municipal projects (of 428 municipalities in total) up until two years ago. The market has since then had a considerable decline and ESCOs seem to have less interest participating in the official bids.

The Swedish EPC market has also experienced problems in the past connected to uncertainties tied to governmental support schemes, legal complexity as well as trust issues between EPC clients and providers. The market seems to have raised above these problems and new, healthy projects has been seen in the last years and hence the market may be slowly growing.

Target group: Who use EPC today / who wants to use EPC

In all the above mentioned Nordic countries there has been projects in both public and private sector. We will however focus on public sector – hence municipalities, counties and other public building owners.

Public sector is the projects main target group, but it is also an important target group for the EPC model. This sector is very promising in terms of public energy and climate goals, saving potential, customer demand and project volumes. In addition, public sector is easier to monitor and has already been monitored to some extent by energy authorities based on reporting connected to financial support schemes and/or other governmental support schemes.

## Motivation for working with the tool

### Why is EPC relevant to work with?

The EPC model is relevant for public building owners as it can help them to

- Modernise technical systems of buildings through a specialised Energy Service Company (ESCO)
- Bring a new model to install EE measures and possibility of funding through future benefits
- Enjoy guaranteed cost savings through reduced energy consumption with no or little own investments
- Strongly reduce the CO<sub>2</sub> emissions of the buildings
- Catch up with maintenance lag in public buildings
- Reach goals in public energy and climate action plans (SEAPs)
- Outsource EE tasks to professionals for performance-based remuneration

### Other motivation/benefits of EPC

- The ESCO provides a contractual guarantee of achieved savings and return on investment
- Long-term reduction of energy consumption and other operational costs
- A single supplier implements the project from start to finish:
  - Prepares project documents
  - Implements planned measures
  - Guarantees the extent of achieved savings
- The supplier and the customer share the same motivation – ensuring the optimal extent of investment with the highest possible savings
- Option of having the project financed by the energy service provider
- Improved comfort levels in the buildings
- Outsourcing of risks

Energy authorities in Norway have pointed at EPC as a suitable model to kick-start the green shift needed in municipal buildings and even gone as far as to claiming that the energy targets in the official energy and climate plans can only be met using EPC. Recent national support schemes are hence designed to priorities EE projects utilizing the EPC model.

The overall motivation for using the EPC model is that it provides higher security for implementation and better energy saving results to a lower price. Experience show investments in a higher share of mapped building area within a much shorter time span than when implementing traditional energy saving projects.

### Policies/ legislation hindering or promoting EPC

The most seen policies/legislations hindering and perceived as threats to EPC are

- Building owners and decision makers fear of legal challenges and risks involving EPC.
- Lack of involvement and support from political support and support schemes from authorities is a big threat since successful EPC market development seems to have been seen as a quality stamp and hence break down some of the uncertainties brought about by the complexity of the model.
- Public building owners and administrations has shown a tendency to want to reduce outsourcing of EE and other technical services in favour of inhouse solutions and the wish to build up a control own technical capacities and skills.
- Since 2015 there were uncertainties and legal obstacles connected to the Eurostat guidance note<sup>1</sup> as this restricted the approval of EPC in indebted communities in some of the EU states. This has recently (2018) been adapted to allow third party financing in these public owned buildings and hence appease the situation for EPC contracts.

The most seen policies/legislations promoting/providing opportunities for EPC are

- The need and wish to fulfil the energy saving targets of public energy and climate plans (both municipal and regional plans)
- Public CO<sub>2</sub> reduction targets (nationally, regionally and locally)
- Public/national support schemes – both dissemination schemes and financial schemes
- Exemplary role of public sector

## Energy saving potential

The saving potential an average Nordic EPC project<sup>2</sup> at the end of 2015 was between 18 – 50 % with an average in the mid 20-ties. The investments were paid back in between 5 and 20 years. Both the savings and the pay-back time depended on how many "non-profitable" measures or high hanging fruits were included. Each project made investments between 3 – 20 MEUR in energy improvement in public buildings. The largest projects were and can still be found in Denmark, and the smallest ones were in Finland where the market has experiences growth since then.

Similar saving results have been documented in Best Practise Cases<sup>3</sup> from several countries in Europe and in the Nordic Countries.

EPC can also increase the number of implemented measures in existing buildings according to a survey<sup>4</sup> done by the Norwegian energy agency, Enova. The assessment was based on 252 energy saving projects initiated by Norwegian municipalities from 2010 to 2016. The numbers were collected from Enovas grant programs. 208 of these were traditional projects, while the remaining 44 were EPC projects. 80 % of the municipalities implementing EPC reached their energy reduction goals, while only 13 % of the municipals using traditional projects did the same.

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<sup>1</sup> Eurostat Guidance Note: The Impact of Energy Performance Contracts on Government Accounts (Aug.2015)

<sup>2</sup> EPC in the Nordic Countries: <http://norden.diva-portal.org/smash/record.jsf?pid=diva2%3A900555&dswid=-4924>

<sup>3</sup> European Best Practise Database: <https://guarantee-project.eu/bestpractice/>

<sup>4</sup> Presentation of the survey, April 2016 and input from with preliminary findings from resent survey among EPC clients, Øyvind Moe, Enova SF. Presentation in Hamar April 2018 by Anders Solem, Enova SF.



From the survey Enova highlights the following main findings.

<b>Facts about energi efficiency projects in Norwegian municipalities/counties</b>		
<b>2010 - 2015</b>	<b>Traditional EE projects</b>	<b>EPC projects</b>
<b>Number of projects</b>	<b>208</b>	<b>44</b>
<b>EE measures implemented after mapping work</b>	<b>27 %</b>	<b>96 %</b>
<b>Share of building area where measures are implemented</b>	<b>15 %</b>	<b>88 %</b>
<b>Investment per kWh in average per project</b>	<b>0,75 €</b>	<b>0,59 €</b>
<b>Average number of months from mapping to investment</b>	<b>22 months</b>	<b>5 months</b>
<b>Energy reduction compared to mapped potential</b>	<b>5 %</b>	<b>32 %</b>
<b>Achived goals of Energy and Climate Plans in own building stock</b>	<b>13 %</b>	<b>80 %</b>
		<b>ENOVA</b>

Table 2: Facts about EE projects in Norwegian municipalities/counties (Enova SF)

Comparisons of EPC projects to more traditional methods where the municipalities implement energy measures themselves shows that traditional projects have lower energy savings at a higher cost. The implementation period is longer; hence it takes more time to achieve the results and all risks lies with the building owner.

In traditional projects 27 % of the municipalities move on to investments after mapping of the building stock, when as many as 96 % move forward with EPC projects (Figure 1). Using traditional projects they invest in 15 % of the mapped area and as many as 88 % of the mapped area in EPC projects. Energy reductions are around 5 % compared to mapped potential and of around 32 % for EPC (Figure 2), investments are 0,75 Euro/kWh and for EPC the investments are 0,59 Euro/kWh. The traditional projects take 22 months from mapping to investments in average, whilst the average for EPC is around 5 months (Figure 3).

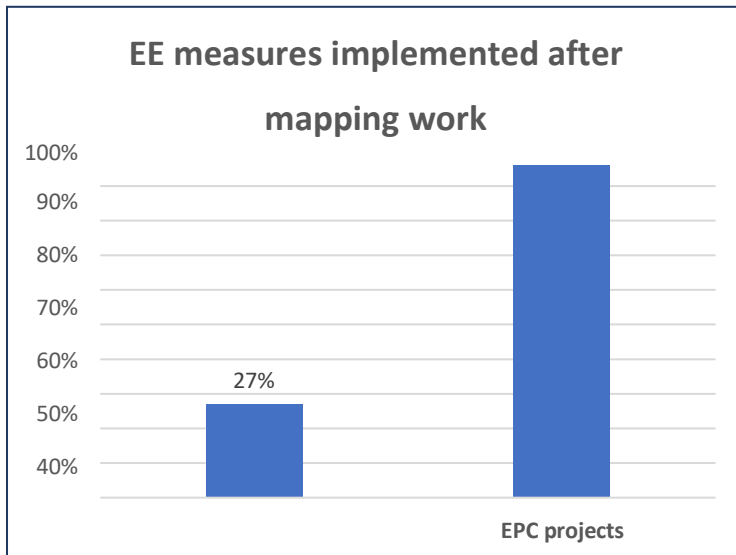


Figure 1: EE measures implemented after mapping

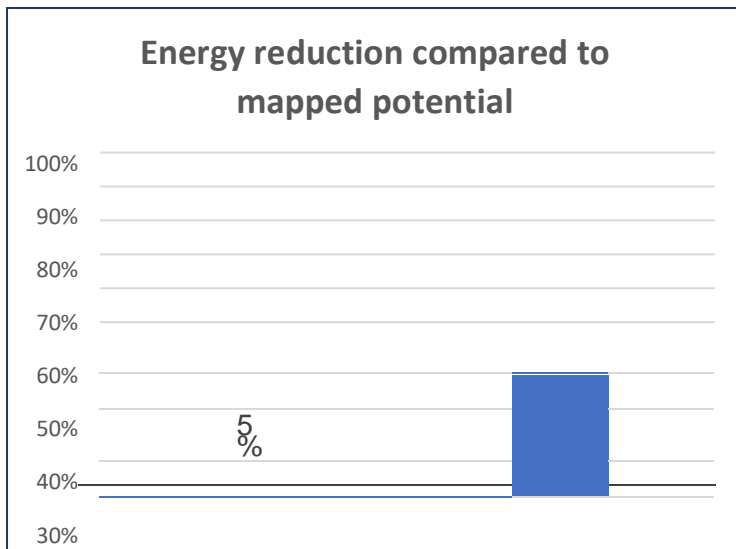


Figure 2: Energy reduction compared to potential

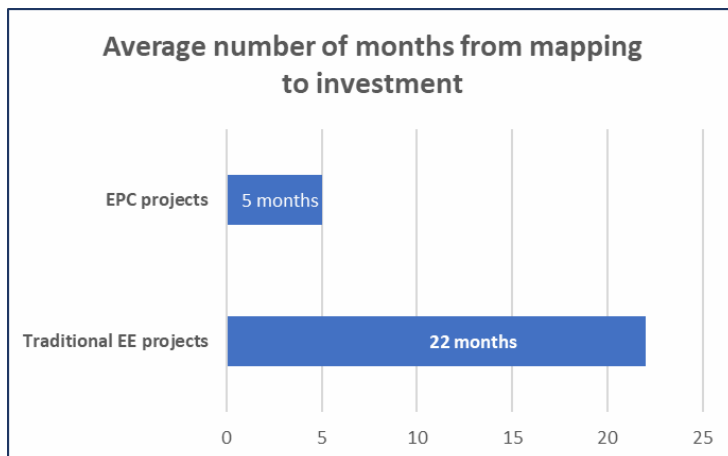



Figure 3: Number of months from mapping to investments

The survey also shows that the municipalities' experience of good projects diminishes as the EPC facilitator “finishes” their assignment. Hence, Enova think it is important that the facilitator takes part in all phases of an EPC project, to a higher degree than what is currently common in the market.

As much as 9 out of 10 municipalities would recommend EPC to other municipalities and the 10<sup>th</sup> would recommend EPC in general but have some issues with their ESCO. In EPC – as in all other projects – good and balanced communication between customer and provider is essential.

The overall conclusion was that the EPC model give a higher security for implementation, better energy saving results to a lower price, investments in a higher share of mapped building area and within a much shorter time span than for traditional energy saving projects. The latter point is especially important with a view to achieve goals of the municipal energy and climate plans, but also for achieving the saving targets of the energy authorities themselves.



**Best Practice Case:  
EPC in Kongsberg municipality, Norway**

Kongsberg is a town municipality with 30 000 inhabitants. Approximately 200 EE measures was implemented through an EPC project in 2013 in 36 municipal buildings, covering 70 000 m2 and 70 % of the municipal building stock.

The EPC contract guaranteed 36 % energy saving compared to baseline with a project duration of 11 years. During these years the project will save 6,25 MEuro each year and 68,75 MEuro during the project lifetime.

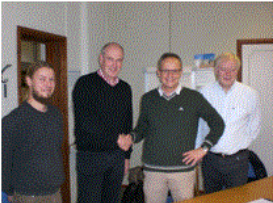


Table 3: Best Practice Case: Kongsberg

## How EPC can help increase the number of EE measures implemented in existing public buildings?

To achieve the documented saving potential of the EPC model, the aim is to develop an improved model for implementing EPC to lower the obstacles and promote best practise to increase knowledge and trust in a balanced model that ensures profit for both clients and providers.

One of the findings from the above-mentioned surveys of EE projects in Norwegian municipalities/counties illustrates how EPC lead to a much higher number of implemented EE measures than traditional EE projects (Figure 1 page 5).

## Best practise

### The European best practise for using EPC

There is a European Best Practise Database<sup>5</sup> for EPC being build up though several EU-project<sup>6</sup> initiatives. Relevant project examples from most countries represented in the TNWG can be found in this database. The EPC model varies slightly from country to country. The Best Practise cases can hence be view separately on their own value and achieved savings and serve as success stories and good examples of implemented EPC projects.

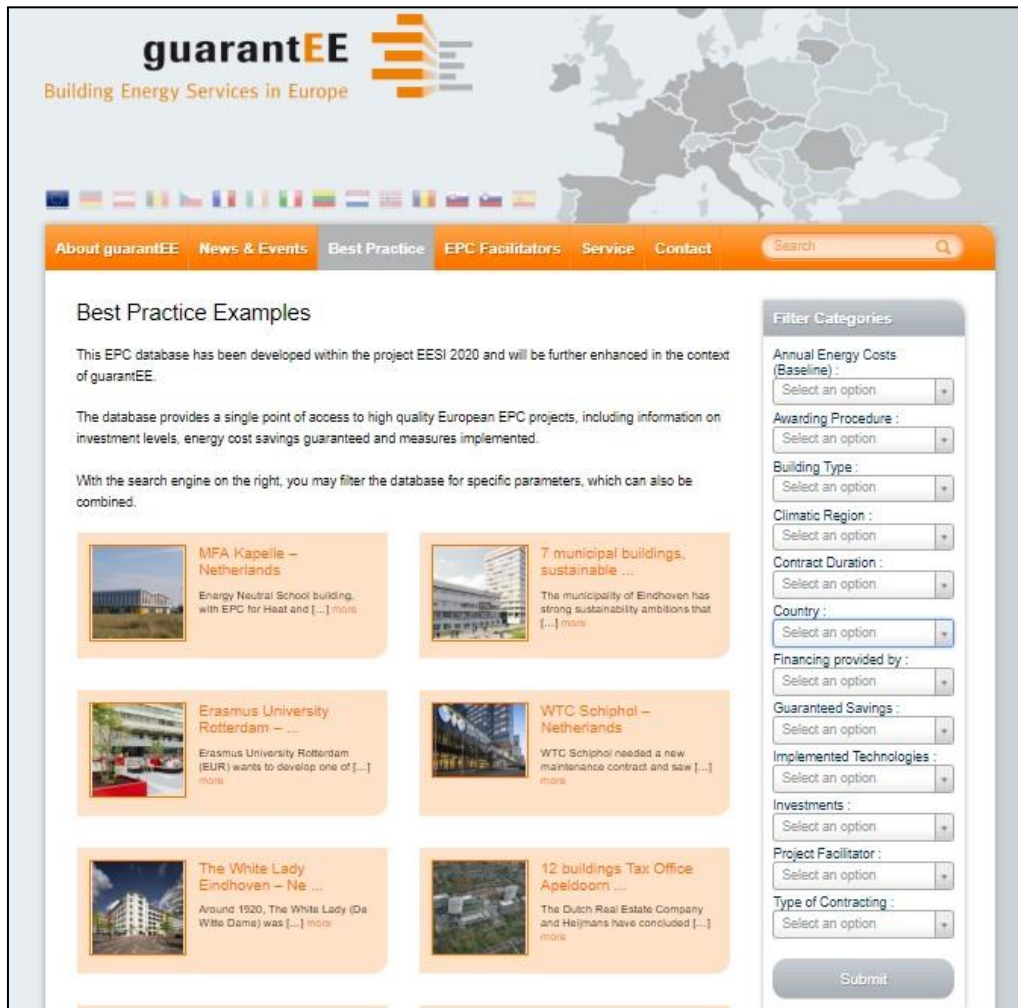


Figure 4: European Best Practice Database

An EPC market report<sup>7</sup> based on a survey involving various stakeholders (clients, ESCOs and facilitators) in 14 European countries was launched in 2017 and includes best practice and experiences.

In most of the countries (10 out of 14) the average saving potential for EPC is higher than for traditional EE projects. This is a high number considering that 9 of the 14 partner countries are emerging EPC markets while only 5 of the countries included in the survey are considered mature.

<sup>5</sup> European Best Practise Database: <https://guarantee-project.eu/bestpractice/>

<sup>6</sup> The EU-projects Transparens (www.transparens.eu), EESI2020 (www.eesi2020.eu) and guarantEE (www.guarantee-project.eu)

The main findings from analyses of strengths, weaknesses, opportunities and threats in the public EPC sector are listed in the illustration below:



Figure 4: SWOT Analyses EPC Market Public Sector <sup>8</sup>

### EPC frontrunners

Some of the EU-projects on EPC promotion (Transparens/guarantEE) have described partner countries such as Germany, Austria, the Czech Republic, France along with Norway, Denmark, Sweden (and lately Finland) as mature EPC markets whereas most others are considered emerging.

There are examples of successful projects in all mature EPC markets, but frontrunners have been in focus for special activities such as in

- **Upper Austria** where EPC projects can be subsidized with up to €75.000 or as much as 40 % of investments cost, causing a dynamic EPC market with 140 supported projects between 2006 and 2015. Combined these projects showed an investment volume of 39 M€ with granted subsidies of 3,2 M€.
- **Slovenia** where the availability and allocation of EU Cohesion Fund for technical support and funding of deep energy renovation in public buildings via integrated EPC and ESCO models have proven successful.
- **Norway**, where an official standard for EPC contracts (NS6430) was developed by a consortium of market players based on model documents developed in former EU projects were launched in 2014 and has been used as the basis for most public tenders for EPC since then.
- **Denmark**, where they have had long-lasting and large municipal EPC projects including deep renovation and in some cases overachieving saving targets.



### Other project and initiatives

EPC promotion in Europe ([www.guarantee-project.eu](http://www.guarantee-project.eu)) 2016 - 2019

European Market Study ([https://guarantee-project.eu/wp-content/uploads/2017/10/guarantEE-D2.2-EU\\_EPC\\_Market\\_Report\\_EN.pdf](https://guarantee-project.eu/wp-content/uploads/2017/10/guarantEE-D2.2-EU_EPC_Market_Report_EN.pdf))

Register of national qualified EPC-Fasilitators

National Online Pre-Check for building owners

Triple-win-approach for rented facilities ([https://guarantee-project.eu/wp-content/uploads/2017/10/guarantEE\\_D2.5\\_Brochure\\_Triple-Win-Solution.pdf](https://guarantee-project.eu/wp-content/uploads/2017/10/guarantEE_D2.5_Brochure_Triple-Win-Solution.pdf))

European Best Practise database (<https://guarantee-project.eu/bestpractice/>)

EPC Customer Handbook ([https://guarantee-project.eu/wp-content/uploads/2017/10/EESI2020\\_EPC\\_Marketing\\_Brochure.pdf](https://guarantee-project.eu/wp-content/uploads/2017/10/EESI2020_EPC_Marketing_Brochure.pdf))

Facilitators Guideline ([https://guarantee-project.eu/wp-content/uploads/2017/10/EESI2020\\_EPC\\_Facilitators\\_Guideline.pdf](https://guarantee-project.eu/wp-content/uploads/2017/10/EESI2020_EPC_Facilitators_Guideline.pdf))

Baseline Calculation, Tender documents, contract documents, business models EPC in the Nordic Countries (report 2016)

urn:nbn:se:norden:org:diva-4309

EPC Code of conduct ([www.transparensen.se](http://www.transparensen.se)) Other EU projects on EPC

QualitEE: improving 'good quality' for energy efficiency services

EnPC ([www.enpc-intrans.eu](http://www.enpc-intrans.eu))

EPC business model: <http://www.enpc-intrans.eu/language/en/epc/business-models/>

### How do we learn from the best practices?

Best Practices have proven to be crucial for development in new market areas as they are seen as pilots paving the way for new projects, reducing insecurities and other market barriers for new market actors to follow. Real learning however happens when cases also reveal obstacles that were overcome and problems that were solved. Hence all lessons learned should be a part of mapping and comparisons of best practice cases when learning is the goal.

## **Need of development**

### Current development stage

The EPC model is a developed and well-known model in the Nordic countries and in most of the countries in the EFFECT4buildings. It has been implemented in the four Nordic countries over the last 10-15 years, and can be described as a mature concept there - whereas it is more recently introduced in Poland, Estonia and Latvia. In the three latter countries there is a need for testing and adaptation of the model and dissemination of awareness and knowledge to all market actors.

Being well known and implemented does not necessarily mean that it does not have flaws, and experiences from slow marked development and recent experiences – particularly in Norway – is proof that the model needs to be examined, compared and improved to lay the ground for future healthy market growth in the TNWG.

## Main barriers for working with the EPC

- No designated legal framework for working with the tool in partner countries
- Lack of knowledge of the model – and also knowledge asymmetries between client and provider
- Lack of good practice examples and documented results (especially in Estonia, Latvia, Poland)
- Recent bad experiences and deviation from official standard for EPC (in Norway)
- Lack of trust in the model
- Complexity of the model/concept
- Lack of facilitators (initiating and development of tender documentation)
- Complexity of public procurement laws
- Too good to be true

## **Summary of what the project can do to develop the tool**

### Development work

The EFFECT4buildings project will provide comparisons of the EPC model in the different countries involved in the tool development. This will result in an analysis of strengths and the weaknesses, and it will ultimately in recommendations for further development and adaptation of the model, including user friendly and tangible tools to make the results known and disseminated in the target region (TNWG).

Based on the case plan for all tools and instruments there are 8-9 partners in the EFFECT4buildings project we will have 8-9 development cases and 3-4 test cases for the EPC/ESCO tool.

Based on planned cases and current experiences we will have a fair possibility to analyse both success stories (Best Practise cases) and pitfalls to avoid. Based on this we will attempt to gather enough input to make recommendations on how to improve the EPC-model in the future accompanied by useful and tangible material to help pave the way for various market actors with emphasis on public building owners.

### Development plan

- 1) Gather input/data from all partner cases
  - Based on "Development Case Diary" (template presented in Copenhagen)
    - Case description
    - Quantitative data
      - EE savings, CO2 reduction, EE investments, Etc.
    - Qualitative data
      - Lessons learned, Process issues, Stakeholders' input,
      - Combination of tools/instruments

Partners (PP1, PP2, PP5, PP7+8, PP10 – and of course PP3) will report experiences and results by filling in Development Case Diary
- 2) Draw up draft whitepaper based on findings
- 3) Implement findings in Level 1 test case(s)
- 4) Final White paper

Timeline

The timeline for implementation of the EPC tool development as set out in the workplan are as follows:

Tool development plan	Period 1 and 2
Diaries from level 2-5 cases	Period 2 and 3
Draft of white paper	Period 4
Draft tested	Period 4-5-6
Final White paper	Period 6

Exact deadlines and dates will be set and distributed to partners.

Development cases needed

To develop the EPC tool mapping of both success stories and failures are needed. The project will focus on real-life condition cases. Most of the cases will be level 2-4 cases using data from existing EPC projects in the target group (L4), cases from prepared EPC contracts or investment decisions (L3) and EPC projects where signed contracts and investments will be made during the project lifetime (L2). To gather data and experiences we will use a common "Development Case Diary"

Resulting in mapping and comparison of the development

Cases: Findings from these cases will form the basis for a draft whitepaper.

The next step of the development will be to implement the results, findings and recommendations from the draft whitepaper in the cases using these findings in test cases within the project lifetime (L1).

According to the work program some cases will already from the start be real cases for implementing EE measures, becoming both development cases and test cases. This means that the level 2-4 cases must have an earlier deadline than the level 1 cases as experiences from level 2-4 cases should be implemented in the level 1 development cases.

Whitepaper

The EPC/ESCO whitepaper will be based on 8-10 case studies. 4-5 cases will be gathered from the Norwegian partner (PP3) and 4-6 cases from other partners. The whitepaper will focus on analysing experiences, challenges and political obstacles and drivers in the involved partner countries for using EPC, as well as advantages and disadvantages with different EPC-models. This will include ways of financing investments and other experiences among the target group in the BSR. Information about content, experiences, model documents and guidelines will be shared with all partners.

Obstacles and drivers of the EPC market

Some obstacles and drivers are common for the EPC market in most European countries, and present to a smaller or larger degree depending on the maturity of the market.



### Main obstacles for developing the EPC tool

- Lack of designated legal framework for EPC
- Lack of active and competent EPC facilitator
- Lack of dissemination of good practice examples (success stories) and documented results in some partner countries (Poland, Estonia, Latvia)
- Complexity of the EPC model
- Complexity of the public procurement laws
- Lack of knowledge and knowledge asymmetries between clients and providers
- Lack of trust – in the model and between the contract parties
- Too good to be true?

### Main drivers for development of the EPC tool

- Large documented saving potential in public buildings
- Modernisation and maintenance backlog and needs for refurbishment in public buildings
- Chance of combining EPC with deep renovation
- Openness for outsourcing and long commitment to between contract partners
- Governmental financial support schemes
- Governmental information and promotion (dissemination of knowledge)
- Model documents, guidelines and official standards
- Municipal energy- and climate plans
- European energy legislations and directives

### **What does the tool have in common with the other project tools?**

The EPC model include several elements from the other tools and instruments in the EFFECT4buildings project. The EPC model implements several technological solutions in the clients building stock using financial calculations on energy efficiency solutions to reach its saving targets and is of an in itself a method for purchasing energy efficiency solutions.

Other tools and instruments integrated in the EPC model are

- Bundling methods; where new findings around critical masses of investments may make EPC even more desirable for investors, ESCOs and funding parties.
- Energy investment funding; other funding sources may also be interesting for both clients and providers of EPC
- Multi service contracts; findings from this tool may have valuable input to the development of the EPC model. Measures not known as EE measures with low payback time is already included in several large EPC projects resulting in longer payback time – such as deep renovation and general maintenance measures. It is possible to imagine other "non-energy measures" being included in EPC in order to reach security, aesthetic, social or other goals of public building owners.

And finally, the "Ability to convince decision makers" is important for all tools and instruments and crucial when introducing the EPC model known for its' complexity.

## Multi-service-contracting

Partner: Gate 21

### Presentation of the tool/instrument - multi-service-contracting

What is the tool about?

Current knowledge and implementation of the tool

Target group: Who works with the tool today / have wishes to work with the tool?

Multi-service-contracting (MSC) or multi-service-planning is a holistic approach to renovations. MSC challenges the unilateral perspective on energy efficiency and energy performance requirements, while instead taking other benefits into account, such as indoor climate, cleaning, commissioning and facility management.

MSC seeks to add value to a contract / internal agreement by adding aspects (indoor climate, health, facility management and commissioning) which will result in a better use of the building and better experiences for the users. The idea of MSC is to put the user in the center in order to first identify the user needs and functional requirements and hereafter calculate the energy savings.

MSC also takes a holistic approach to the renovation process, seeking to connect the construction phase with the management and commissioning phase in order to secure that the identified goals defined in the beginning are implemented.

The MSC concept can be used in several ways and on various levels within the renovation process. MSC does not only include contract models but can be internal service level agreements or similar, used by the municipalities to increase the quality of services and lower the maintenance costs. The MSC concept can also be used in the pre-planning process. Indoor climate is a focus area for many public bodies, particularly the municipalities in Denmark, however the work varies and is often linked to different strategies and plans, which takes time implementing.

### Motivation for working with the tool

Why is the tool relevant to work with?

Any policies/ legislation hindering or promoting the work with the tool?

The idea of including parameters like indoor climate, sustainability, health issues etc. into a contract in order to give more value to a contract is still rather new. There are good examples of holistic renovation projects, however overall there is:

- A Lack of building performance monitoring, which can have a negative impact in the indoor climate
- Additional costs in building renovation process due to little planning
- Organizational challenges within the public entity complicating a holistic view

The idea behind the tool is to visualize the added value of including other parameters when doing an energy renovation and using these parameters to motivate the renovation. For schools or daycare institutions it could give value to improve the indoor climate of the buildings and hereby stimulate a better learning environment. For municipalities it could also be a strategy to signal good learning environments and less sick days while also having a green profile.

Indoor climate is actualised by REACH, EBPD and CPR regulated through standards (TC 351, etc.) but overall indoor air quality requirements are not part of the EU framework.

## Energy saving potential

What are the energy saving potentials for the tool?

How can the tool help increase the number of energy efficiency measures implemented in existing public buildings?

The idea of MSC is to motivate more energy renovations, but without it being at the expense of the users' well-being when using the building. Therefore, an essential aspect within MSC is to balance energy management while at the same time taking into account other parameters which are important to the municipality.

By giving more incentives to renovate the likelihood of engaging in energy renovations increases as well as the financing opportunities.

## Best practise

What's the European best practise for using the tool?

Who are frontrunners? What regions have the most experience working with the tool?

Other project and initiatives

How do we learn from the best practices?

The Nordic countries have worked quite intensively with different aspects of MSC. Several countries work with indoor climate, but mainly in relation to air quality (ventilation) and lighting and less with parameters such as acoustic and noise.

The work with sustainable materials have also increased, however is still rather sparse. One example is the work with active roofs and facades. Another is the use of eco-friendly materials in buildings leaving a smaller co2-footprint and often creating a better indoor climate as well.

Operation and management is an essential part of MSC. It is especially in relation to construction of new buildings in public private partnerships where the operation is carried out by the contractor / self-service company that multi-service contracting is known.

What is particularly interesting about public private partnerships, is the responsibilities defined in the agreement in relation to operation, ensuring the compliance with the agreement between the operator and the building owner.

In recent years there has been a renewed focus on "commissioning" in Denmark, which initially involves incorporating and ensuring the processes in the construction process that are required to complete the completed building fully operationally on the operational side.

Below are some good examples:

- Classification systems, e.g. DGNB, where you certify your building. Originally invented in Germany, but has been implemented in Denmark.
- *Indoor climate systems in school buildings: project where innovative solutions within ventilation, light and acoustic are tested in a number of classrooms at a school in Ballerup Municipality*
- *Sunde Boliger (Healthy Homes) is a 1:1 demonstration project constructing three private houses with different use of technology: Notech (instead sustainable materials), nowtech (2015 standards), Yestech (2020 standards)*
- *"Clean day – healthy day": initiative seeking to get school children to take co-responsibility for the school cleaning.*

- *Nordstjerneskolen, Frederikshavn Municipality*: a public municipal primary school with approx. 1,200 students. The new school is constructed in a public-private partnership between the private company TEAM OPS and Frederikshavn municipality. TEAM OPS is going to run the school's buildings in a 25-year operating agreement.
- *Plan C: Flexible light at a school in Copenhagen Municipality improves focus and concentration*
- *ESCO with multiple criteria, Frederiksberg Municipality and Schneider Electric*: Holistic energy renovation of 80 municipal buildings focusing on everything from ventilation, heat, light sensors, insulation, windows change as well as and installation of renewable energy such as solar cells, household wind turbines and geothermal heat.
- *Commissioning – Operation oriented building processes: guidances by Værdibyg*  
[http://www.vaerdibyg.dk/index.php?option=com\\_docman&task=doc\\_view&gid=156&Itemid=](http://www.vaerdibyg.dk/index.php?option=com_docman&task=doc_view&gid=156&Itemid=)
- *Fedimmo project: works with measuring user satisfaction*: <http://guarantee-project.eu/be/2017/03/31/progress-fedimmo-epc-project-presented-during-belesco-networking-lunch/>
- *Comfortmeter: tool used for evaluating the comfort in the buildings. Available in 10 European languages* [www.comfortmeter.eu](http://www.comfortmeter.eu)

## Need of development

### Current development stage

How developed is the tool at this stage?

### What is the biggest barrier/hindrance for working with the tool?

One of the main barriers is Lack of understanding and knowledge on indoor climate. Renovations and indoor climate are often considered as two separate issues, also within budgets. Further, there's a need for Increased focus on the health consequences of having a bad indoor climate.

Therefore, there's a need of a new approach, a so called new "school of thought". This requires communication and dissemination of good examples and MSC concepts.

One way of quantifying the MSC is to Include health improvements in the public "business case". A good indoor climate is estimated to improve students learning ability by up to 10%. However, calculation of health improvements is not a standard financial parameter. There's a need of thorough work on formalizing and quantifying new multi-service parameters.

The establishment of public private partnerships is more prevalent in relation to construction of new buildings and less in relation to renovation, however PPP's are often proven valuable in relation to developing solutions together and defining roles and responsibilities in relation to operation and management.

Finally, the value of combining several individual solutions in to one solution can be valuable. Today, the added value of holistic energy renovations including both light (daylight and electrical light, lighting management etc.), ventilation, and acoustic ceilings is not clear enough.

## Summary of what the project can do to develop the tool

Describe what kind of development work we expect to do within each tool:

### What are the main obstacles for developing / implementing the tool?

Policy regulations, lack of funding, other priorities, etc.

## What can the project do to develop the tools?

### What cases could be relevant for developing the tool?

MSC challenges the unilateral perspective on energy efficiency and energy performance requirements, while instead taking other benefits into account, such as indoor climate, cleaning, commissioning and facility management.

Based on the case plan

### Perspectives on MSC:

Operationalize MSC with input from public building managers. What parameters do they see as the most critical to include in a contract / consider in relation to internal agreements and planning.

Expects to focus on:

- User needs and functional requirements
- Operation and management:
  - Public-private-partnerships
  - Criteria to improve management
  - Outline within what phases the budget is spent: How much money is spent in the end of the renovation phase and can we spend them more wisely earlier on in the process /give more value?
- Indoor climate:
  - what do we mean when we talk about indoor climate?
  - What is the added value of investing in a good indoor climate (and sustainability in general)?

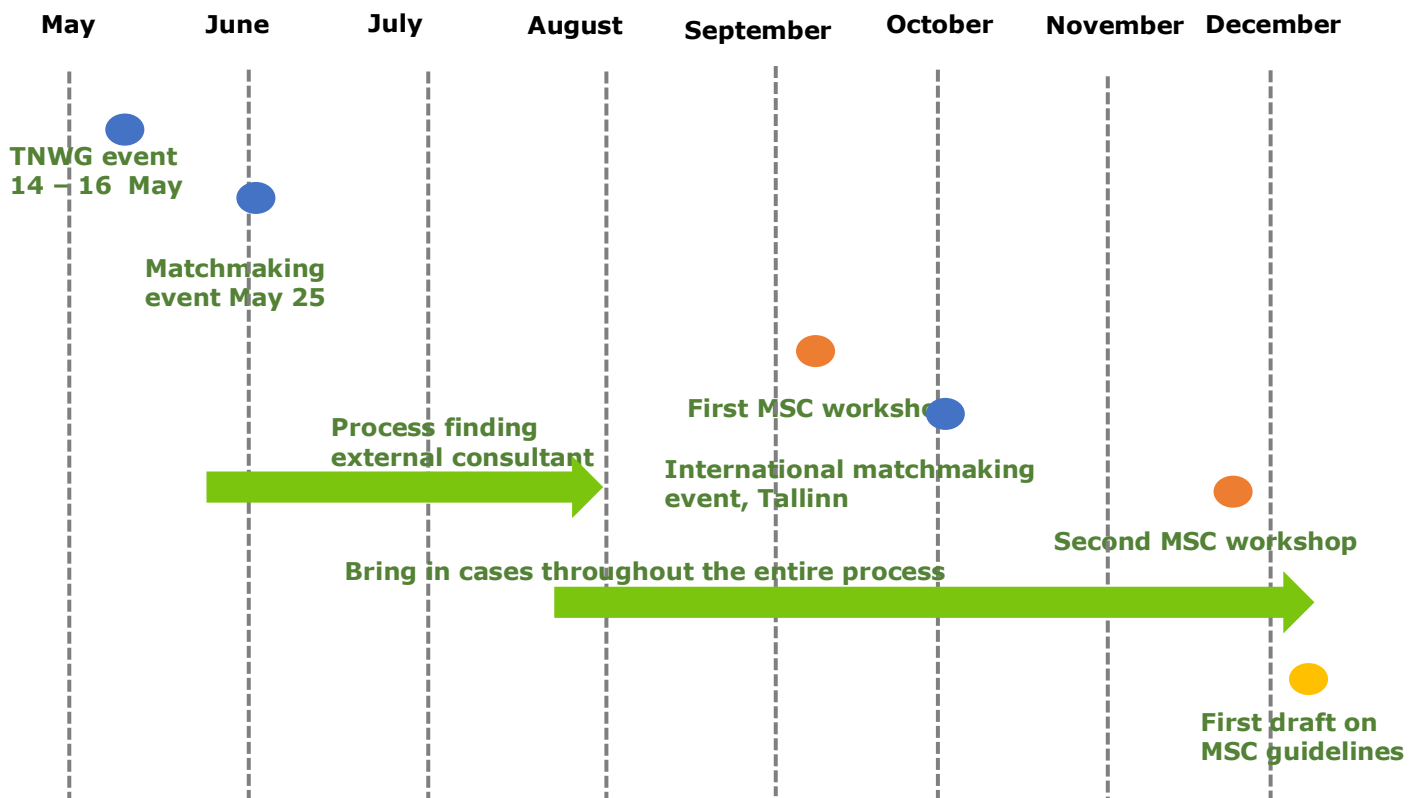
### Levels of multi-service:

- Contracting
- Internal service level agreements
- Pre-planning model (internally within the municipality / between municipality and user) – ideas from Dalarna

### Activities and outputs:

- Benchmarking: map how municipalities implement energy efficiency measures today (part of workshops).
  - Already some knowledge some interviews, but more is probably needed.
- Networking and knowledge sharing through:
  - Meetings/workshops for public building managers: building managers will be invited to attend a series of meetings
    - Facilitator. hire a consultant to run the meetings
    - Ideas for meetings:
      - Status que (how municipalities work today).
      - Mapping of hindrances/barriers help determine the MSC focus of the workshops, however the current idea is to focus a lot on building management and operation.
      - Building managers bring cases: previous renovations where they can reflect on good/bad experiences as well as current and/or future renovation projects
  - masterclass – broader perspective. Invite a broader network.
- podcasts – perspectives from workshops
- guidelines / inspiration catalogue
  - inspiration catalogue / guidelines on what to keep in mind – targeted public building managers (output form workshop)
  - white paper

- Development of multi-service model / template– the shape of the model will be will be discussed with an external consultant



What does the tool have in common with the other project tools?

MSC can be linked to some of the other project tools and instruments, such as:

Bundling: is also about bundling initiatives to finance the investments.

Financing energy investments: MSC seeks to add value to a contract / internal agreement by taking into perspective different parameters such as indoor climate, user involvement, operation and management. By quantifying the added value (in dollars, sick days etc), the incentive to renovate should increase.

EPC: MSC has many of the same perspectives as EPC. When engaging in a contract MSC adds a layer to EPC adding several parameters to the contract besides energy savings.

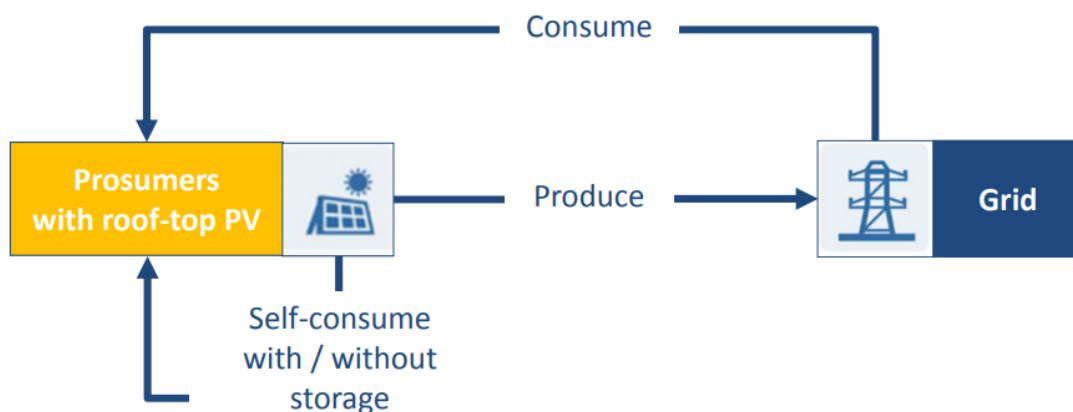
## Prosumerism

Partner: **Vidzeme planning region**

Prosumers in difference with energy consumer not only consume energy but also produce energy and can give it back the surplus to the grid or other energy consumers. Different types of prosumers starting from private residential prosumers who produce electricity at home (solar PV) to big commercial prosumers or industries whose main business activity is not electricity production. As well municipalities and public institutions like schools and hospitals could act as prosumers.

According to the G. Masson “The neologism “prosumer” refers to an electricity consumer producing electricity to support his/her own consumption (and possibly for injection into the grid).”<sup>1</sup>

### Prosumers = Producers + Consumers of electricity



In this Project a prosumer is a public figure who produce electricity through solar photovoltaic panels on their rooftops, for example, schools, hospitals etc.

### Presentation of the tool/instrument

Prosumers are users that do not only consume electricity but also produce it from RES.

Cost reduction on RES technologies that can be used on or by buildings have led to a vast amount of private, commercial and cooperative production of electricity, paving the way for an active role in the energy market.

The driving reasons are reduction of electricity bills, gaining profits and environmental or sustainable reasons.

The main target group is municipalities (public institutions). The target group will be part of the development the tool. The developed tool will be widely used by target group’s building managers.

This tool will help building managers to replicate the steps needed to become a prosumer. It will provide with all necessary calculation tools in order to calculate the payback time for solar PV systems.

<sup>1</sup> G. Masson (IEA PVPS), J. I. Briano and M. J. Baez (CREARA)



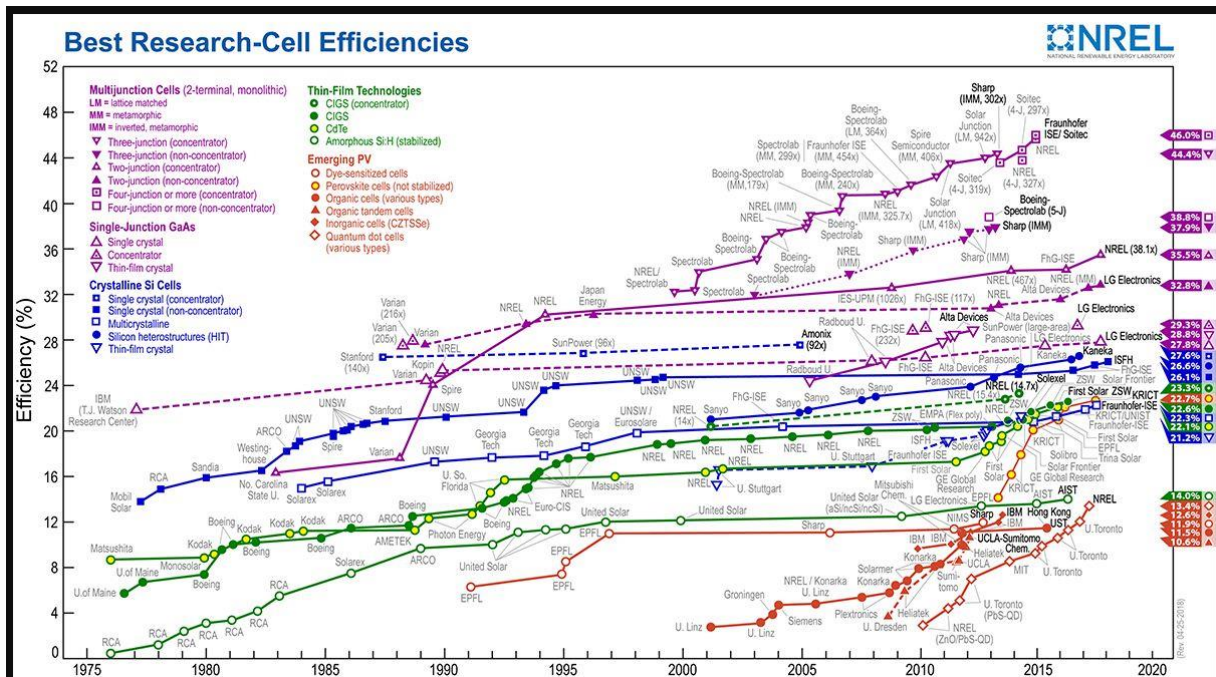
## Motivation for working with the tool

Public building managers and owners seeking to reduce their energy costs, improve energy independence and reduce their environmental impact. According to the existing energy policy most municipalities and local government are interested to promote use of RES and to reduce their energy bills.

## Energy saving potential

Energy saving potential depends on following factors:

- Area (place) where the solar pv is located;<sup>2</sup> According to this tool in Latvia 826 – 930hours



<sup>2</sup> <http://re.jrc.ec.europa.eu/pvgis/apps4/pvest.php>



## 1. Calculation tool

- Amount of m<sup>2</sup> of solar pv installed;
- Installation angle of solar pv;
- Weather conditions;
- Solar PV itself, because at the moment their efficiency varies from 10% - 46%;

## 2. Solar PV efficiency

### Best practise

What's the European best practise for using the tool?

The **Netherlands** have a net metering scheme for small or medium size systems, which is performing well as it is equal to the full consumer price. In a net metering system public grid works as a battery, saving the energy that is produced in peak months and it is compensated in winter.

**Germany** has a mix of different types of support schemes. As FiTs (Feed-in tariff) are not attractive for residential systems because they have fallen far under electricity tariffs, new support schemes have appeared to maximize self-consumption (for example an 30% investment support for the costs of battery systems).

In the **United Kingdom** prosumerism of electricity from renewable sources is supported through a combination of several systems (FiTs, a market system, a quota system and a tax mechanism).

Project iURBAN - in city of **Plodiv (Bulgaria)** in 7 public kindergartens where a Solar PV panels were installed. They were renovated in 2013 and in 2014. The solar PV systems were installed. The project ended in 2016, and at the end of it all kindergartens uncovered 40 % energy reduction and 33 % CO<sub>2</sub> reduction and 6% contribution by RES.<sup>3</sup>

<sup>3</sup> iURBAN: Intelligent Urban Energy Tool

## Other countries:

In **Latvia** net-metering model has been introduced for micro-generation since January 2014 with the aim to improve and support the use of RES in private households for self-consumption.

This is not done 1 to 1 with the final or end-consumer electricity tariff, but refers only to the part of electricity generation and therefore is not attractive enough to become a prosumer (0,04€ / kWh instead of 0,15 € / kWh = a factor of 0,25).

Only 245 micro generators (mostly solar pv systems) have been registered by 2016 in Latvia.

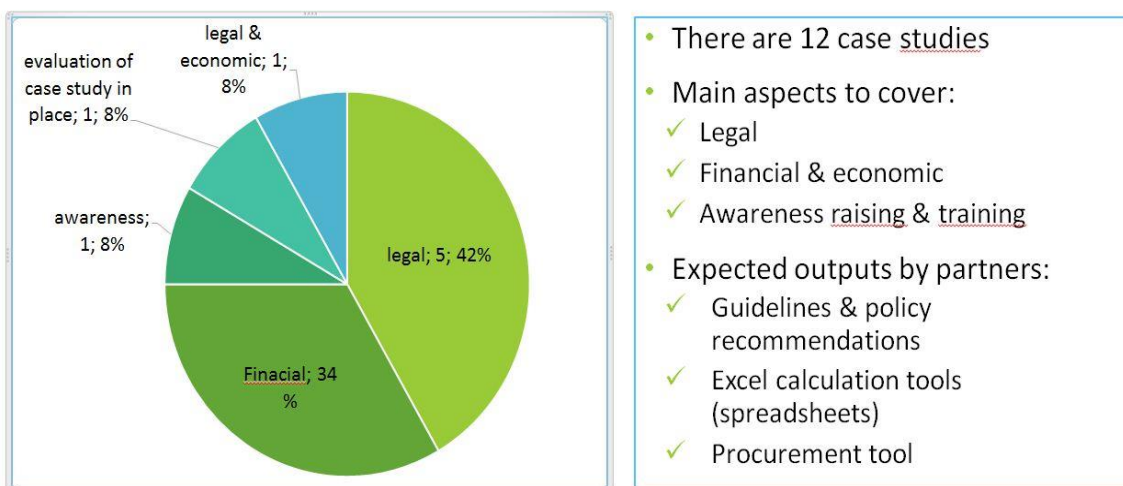
**Poland** is using a similar net metering scheme like Latvia (the factor in Latvia is 0,25), but with a much higher factor - **0,8** making it an attractive model and reflecting a similar ratio of conversion loss when using a real battery.

## Need of development

A bottleneck of a successful improvement of prosumerism is also a lack of knowledge of solar power as a reliable energy itself. For example in Latvia solar power is still thought to be ineffective, because people think their geographical location is not “sunny” enough, although results have proven the opposite.

Besides that the environmental aspect of renewable energy use is too undervalued. It is known for most peoples but it is not in the heads of decision makers and politicians. A strong lobby of stakeholders of the conventional energy producers might be one reason

The biggest challenge is overcoming a “Stop & Go” syndrome of support schemes and grid-connection rules. Solar power systems that guarantee an operational lifetime of 25 years need far-sighted, robust and sustainable decisions for prosumers.



**3. Main focus areas in prosumerism according to 12 case studies**

Analysing the previous case studies we came to conclusions, that during this project we need to work in 2 parallel ways:

1. Work with legal and financial issues in order to make this a standard process and practices that is used often in municipalities;
2. Work with the guideline tool for municipalities building managers and raise awareness.

**Summary of what the project can do to develop the tool**

During this project we want to overcome the legal barriers for public persons to become a prosumers and raise awareness of this tool. As for municipalities it would help them to be more efficient, energy independent and also would help to reach their environmental goals.

We want to know public manager opinion and work closely with them in order to find the easiest and best way how public buildings could become a prosumers. A bundling option could be considered.

**What does the tool have in common with the other project tools?**

As the improvement of becoming a prosumer is directly related to financial issues or calculation models, it is mostly important to understand what remuneration systems do exist and how their affect is. In the end the prosumer wants to know when the return of investment will be or at least wants to understand the value of the electricity he is producing. Usually solar power has only system and installation costs and close to zero maintenance. The investment costs are therefore simple to determine by requesting from specialized installing companies. But when it comes to the counting back of investment, binding rules have to be set otherwise it is difficult to determine real costs and values.

Either clients want to know:

*when does it count back or how much can I save? Does my produced kilowatt hour has the same value then what I receive from the public grid?*

New technologies have appeared with a quick load balancing, pushing overproduction straight to concrete loads. This has not yet become suitable for a broad application but it is a more efficient way of using electricity.

A prosumerism is closely linked to green leasing contracts. At the moment prosumerism in Latvia already works like that for private costumers. They can enclose contract (up to five years) with Latvenergo. This company provides households with solar panels, install them and each household can replace used energy from grid instead of energy from solar PV.

Development plan

1. Gather input/data from public buildings;
2. Interviews with maintenance companies, municipalities and other partners;
3. Pilot projects/Case Diaries – case development, calculation methods;
4. Addressing legal issues of public person to become a prosumer
5. Draw up draft project implementation plan based on findings;
6. Final summary paper

Timeline

The timeline for implementation of the Prosumer tool development as set out in the workplan are as follows:

Tool development plan	Period 1 and 2
Diaries from level 2-5 cases	Period 2 and 3
Draft project implemenetaton plan	Period 4
Draft tested	Period 4-5-6
Final summary paper	Period 6

## Green Leasing Contracts

Partner: Sustainable Building Cluster

### Presentation of the tool/instrument

A green leasing contract is an agreement between landlord and tenant that measures should be taken to maintain or improve the environment's environmental performance.

These contracts comes in different forms and in different terms such as green incentive agreements and environmental contract.

- Relevant both for renting and renting out (tenants and landlords)
- Both economic incentives, information and planning/monitoring
- Both for premises and apartments
- Either all energy use or partly, e g car heating

We have seen that the contracts can be divided into three levels for the property owner or tenant to be able to choose which grade / class suits them best:

Environmental contract with financial incentives for the tenant (As Landstingsfastigheter, Skanska and ÅF in Sweden): As regards the County councils well-functioning agreement, we will break out parts of the contract that work less well and try and see what can be improved in these.

Environmental contracts without financial incentives, instead, an agreement of follow-up, regular performance measurements & meetings, continuous improvements and eventual training are included in the contract. (Public building owner: Tunabyggen)

Individual specific energy requirements are entered into the agreement (eg Demand-controlled lighting / ventilation).

### Motivation for working with the tool

Green lease plays an important role as they create a platform for cooperation between landlord and tenant in a joint effort to reduce the environmental impact of the premises. The use of green leases seems to be rare, because there is a reputation that they do not work very well in practise. Nevertheless, there should be great potential in a well-functioning rental contract.

In Copenhagen we studied a building and a district reconstructed for a new energy system based on renewable energy. We saw problems in the area when power peaks are reached in the system. In order to avoid filling the peaks with fossil-based energy production, the energy company need to sign contracts with tenants in the area. In a contract, the tenant undertakes to allow the energy company to disconnect them from the system during a power peak. This can be an example of a thing to include in a green leasing contract.

### Energy saving potential

The tool can give incentive for both better buildings and behaviour in the building.

- Acceptance that the indoor temperature is some degree colder in winter and warmer in summer.

- Incentiv to change old equipment not at the very end of it´s lifetime but actively in a planned work as a mean to save energy.
- Tenants that are well aware of their behavior impacts the energy use in the building.
- New measures in the building are made regarding LCC .
- Measures in the building are made well planned in order to save in other areas in the building that at first sight might not be affected. (Changing old windows with four sides to clean to windows with two sides. Saves time and cleaning liquides.)
- Ability to influence other factors such as car travel to and from the building, etc.
- Incentiv to influence the tenant to use environmentally-rated materials / equipment in their organisations.

## Best practise

In Sweden, we have Landstingsfastigheter as the best example of green leasing contracts, their model is called the Dala-model and is known in the country. Other good examples are Tunabyggen, the public real-estate company in Borlänge, Skanska, ÅF Consulting and the municipality of Falun.

We are looking for more examples, and at the Copenhagen meeting, we have received suggestions from our partners. In Norway there are good examples as Entra Eiendom in Oslo and Lappeenranta also has contracts that can be used in the development of the tool.

## Need of development

To start with there is need to make a more thorough analysis of current situation - what needs to be developed? Since green lease contracts have a reputation for not working very well, this is a need to investigate **what** is not working.

Examples of green leasing tips today (that might need to be revised):

- Rent including heating, i.e. Heating, cooling and real estate should be paid by the landlord
- Household electricity should be paid by the tenant
- Cost of water should be on the tenant, unless the property management requires cold water
- The hot water cost should be on the tenant if this is of a significant size, eg. Care facilities and restaurants but not for office. Hot water consumption should be determined by measurement.

By signing the agreement according to the above, you have already come a long way by creating incentives. When this is due, the agreement can then be supplemented by an Energy and Environmental Agreement to further reduce energy use and costs.

## Summary of what the project can do to develop the tool

As mentioned earlier, we will look at this on the basis of three levels of contract depending on how extensive the contractor wants to be and how high the requirements will to be set for the host / tenant. We will test different agreements and pick out parts of contracts that can be tested separately.

Partners (Norway, Poland, Finland) have shown interest in actively participating in the testing. In Dalarna, two property managers have announced direct interest to participate. Additional managers are expected to join later. Through these attempts, the tool can be developed within all three levels described above. A training package for schools has been discussed during the period.

Types of participants:

- Public building owners
- Municipalitys
- Private building owners

Types of buildings:

- Schools
- Healthcare facilities
- Housing
- Etc

Requirements for the building / tenant:

- More than 1,000 m<sup>2</sup>
- Long rental agreement, at least 3 years
- Have a tenant in the property

Examples of measures/actions:

- Cool at a higher temperature

Make sure that the heat and cooling range is relatively large to avoid heat and cooling being applied at the same time, i.e. do not heat to 20°C and cool to 21°C. Do the coolers have to be set on 22°C?

- Operation time adapted to reality:

Is there really a need for ventilation to start at 5.30 in the morning and is in operation until 19:00.

The following principal changes to the contractual design are proposed:

- Make it less technical
- Create two agreements, one for each rent with heating and rent without heating. Today it can be difficult to understand the differences between the two concepts.
- Templates for parts of the agreement text

Expected results of the tests:

- New contracts, training packages, new parts in existing agreements.

Expected result of the project:

White paper with information about the choice of green lease contracts. Summary of challenges and experiences.

## **What does the tool have in common with the other project tools?**

We can see some similarities to the tool Multi Service Contracts and will therefore have collaboration with Gate 21 in Denmark.