



Introduction to mapping and evaluation of building performance

EFFECT4buildings Toolbox:
Multi Service Contracting; Annex 4.2a



The project “Effective Financing Tools for implementing Energy Efficiency in Buildings” (EFFECT4buildings) develops in collaboration with public building managers a comprehensive decision-making support toolbox with a set of financial instruments: **Financial calculation tools; Bundling; Funding; Convincing decision makers; Energy Performance Contract; Multi Service Contract; Green Lease Contract; Prosumerism**. The tools and instruments chosen by the project has the biggest potential to help building managers to overcome financial barriers, based on nearly 40 interviews with the target group. The project improves these tools through different real cases.

To make sure building managers invest in the best available solutions, more knowledge on different possibilities is needed as well as confirmation from colleagues that the solutions performs well. EFFECT4buildings mapped **technological solutions** for energy efficiency in buildings with the aim to share knowledge and experiences of energy efficiency solutions among building managers in the Baltic Sea Region.

This document is a part of the Multi Service Contracting (MSC) toolbox within the group of tool 4, “mapping and analysis tools for different services”. It introduces an excel tool for mapping and evaluation of energy, economy, indoor climate, physical surroundings and user involvement targeted schools and presents a questionnaire to use together with the excel tool. The excel tool can be downloaded in the MSC toolbox as tool 4.2b, ‘Excel tool for mapping and evaluation of building performance’, on www.effect4buildings.se.

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EFFECT4buildings project is implemented with the support from the EU funding Programme Interreg Baltic Sea Region (European Regional Development Fund) and Norwegian national funding. The aim of the project is to improve the capacity of public building managers in the Baltic Sea Region by providing them a comprehensive decision-making support toolbox with a set of financial instruments to unlock the investments and lower the risks of implementing energy efficiency measures in buildings owned by public stakeholders. More information:

<http://www.effect4buildings.se/>



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Introduction to excel tool

In phase 0 and phase 1 of the MSC process the building owner defines objectives together with the MSC supplier. In these phases it is important to map the condition of the buildings to assess which parameters to include in the MSC. With more knowledge gained on actual needs for improvements decision makers can prioritise objectives. After the renovation one can redo the mapping to follow up on whether the intended effect has been achieved.

The excel tool and questionnaire presented in this document has been developed in the EUDP funded project “Skolerenovering i en helhed” (Holistic school renovationⁱ). SBI (the Danish Building Research Instituteⁱⁱ) has developed the tool, which assess the performance of the building in relation to 8 parameters divided into 5 measured and 3 experienced:

- **measured**; indoor climate, physical surroundings, economy, energy consumption and user involvement
- **experienced**; indoor climate, physical surroundings and user involvement

The excel tool has two sheets¹. One with the evaluation of the measured performance and one with evaluation on experienced performance. The tool has been developed with a focus on improving indoor climate. One should always consider which mapping methods to use. This tool gives inspiration for combining several mapping methods in one evaluation tool but should be adjusted to the specific project and chosen KPIs, measurement and verification program and performance test in the MSC project.

To assess the **measured performance**, one completes the excel tools' first sheet. The background information for the indicators selected to score the performance of the parameter are developed and documented by SBI in a Danish report. Parameters are scored in 5 colours (red to green as illustrated in table 1). The scoring is done either by measuring within which interval the parameter is, by assessing how many of 5 possible indicators are present, to what extent an indicator is present or how the organisation or project framework is. Thereby also providing ideas to what could improve a parameter not getting the top score. The assessment of parameters should be done by external experts or a project working group and can require certain instruments to carry out.

¹ Tool 4.2b, 'Excel tool for mapping and evaluation of building performance', to be found on www.effect4buildings.se



Table 1 example of excel sheet 1, 'Evaluation, measured', output score of energy consumption in relation to building and heating.

Limited energy renovation	Light energy renovation	Thorough energy renovation	Meets the requirements of the applicable building regulations;	Better than the requirements of the applicable building regulations;
1 parameter	2 parameters	3 parameters	4 parameters	5 parameters

To assess the **experienced performance**, on indoor climate and physical surroundings, one hand/send out the questionnaire and then use the excel tool to analyse the answers. The survey can be conducted online or printed on paper but should be done in the same period as one is mapping the measured parameters, so these can be compared. The questionnaire is costumed to students but can also be completed by other users of the building with small adjustments. After conducting the survey, one analyses the answers by inserting number of ticked smileys to each answer in the excel sheet 'Evaluation, experienced' (see example in table 2). The excel tool will then calculate whether the area is red, orange, yellow, light green or green. This serve as an indicator of whether the area needs to be improved.

Table 2. A section of the excel sheet to follow up on answers. See the full excel sheet "Excel tool for mapping and evaluation of building performance" for more details.

☹		☹		☹		☺		☺		
-2		-1		0		1		2		
Number of responses:		Number of responses:		Number of responses:		Number of responses:		Number of responses:		
20		0		5		0		3		-1,2
1		10		1		1		1		-0,6
1		1		10		1		1		0,0
1		1		1		10		1		0,6
1		1		1		1		10		1,3
1		1		1		1		1		0,0
1		1		1		1		1		0,0
1		1		1		1		1		0,0

The questionnaire can be supplemented with qualitative interviews with teachers, students or operation staff about the experience of user involvement.

One must then prioritise what objectives to include in the project. This can be done by using the exercise 'purpose and objectives' in the MSC tool 2, "Guideline for MSC decision process", to be found on www.effect4buildings.se.



Questionnaire for students

Class/classroom: _____

Are you a boy or girl? Boy Girl

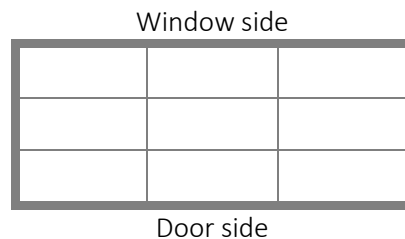
Answer the questions by ticking the smiley that applies to you:

How has the classroom been in the last week's time?

It was <u>not</u> too hot	    	It was too hot
It was <u>not</u> too cold	    	It was too cold
I did <u>not</u> feel a draft	    	I did feel a draft
I did <u>not</u> experience changing temperatures	    	I experienced changing temperatures
The air was fresh	    	The air was stale
There was <u>no</u> bad smell	    	There was a bad smell
The air was <u>not</u> dry	    	The air was dry
The class was calm	    	The class was <u>not</u> calm
I did <u>not</u> experience annoying noise	    	I experienced annoying noise
I could hear clearly what the teacher said	    	I could <u>not</u> hear what the teacher said
I could easily see what was on the smartboard	    	I could <u>not</u> see what was on the smartboard
I could easily see what was written on the whiteboard	    	I could <u>not</u> see what was written on the whiteboard
There was plenty of daylight	    	There was too little daylight
I have <u>not</u> experienced problems with bright sunlight	    	I have experienced problems with bright sunlight
The quality and strength of the light from the lamps were appropriate	    	The quality and strength of light from the lamps were not appropriate
The control of the lamps was suitable/good	    	The control of the lamps was <u>not</u> suitable/good



Where do you sit in class in relation to windows and door? Tick with one mark:



Other facilities and areas of the school?

I like the school's outdoor areas



I do not like the school's outdoor areas

I like the school hallways



I do not like the school hallways

I like the school's toilet facilities



I do not like the school's toilet facilities

I like the school's special-subject rooms



I do not like the school's special-subject rooms

How has your last week at school been?

Great



Miserable

How have you felt the last week at school?

I could breathe freely



My nose was congested

I did not have a headache



I had a headache

I have not experienced problems with dry eyes



I have experienced problems with dry eyes

My throat was fine



My throat felt very dry

It was easy to concentrate



It was difficult to concentrate

I was not at all tired



I felt very tired


I have wanted to learn









I have not wanted to learn




How has your last week outside school been?

Great  Miserable

How have you felt the last week outside school?

I could breathe freely		My nose was congested
I did <u>not</u> have a headache		I had a headache
I have <u>not</u> experienced problems with dry eyes		I have experienced problems with dry eyes
My throat was fine		My throat felt very dry
I have had time to relax		I have <u>not</u> had time to relax
I have had the opportunity to participate in leisure activities		I have <u>not</u> had the opportunity to participate in leisure activities

How have you slept at night in the last week's time?

Great  Miserable



ⁱ Holistic School renovation. Learn more about the project on the Danish website:
<https://www.gate21.dk/evalueringstvaerktoj/>

ⁱⁱ Danish Building Research Institute. Learn more: <https://www.en.match.aau.dk/internal-matchmakers-department-profiles/Danish+Building+Research+Institute+%28SBI%29/>

