



PRIMES
Green Public Procurement



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Retrofitting public buildings in Holbæk

Holbæk Municipality and SEAS-NVE

- An efficient method for implementing energy renovation projects
- A strong alternative to ESCO without the use of construction funds
 - Enables Municipalities to engage in comprehensive energy renovation projects



Undløse School, Holbæk Municipality

Introduction to case

SUMMARY

An efficient method for implementing energy renovation projects

- A strong alternative to ESCO without the use of construction funds

Holbaek Municipality and the energy utility SEAS-NVE have developed an efficient in-house model to achieve attractive financing of energy renovation projects with both short and long-term payback periods. The model enables the Municipality to engage in comprehensive energy renovation projects taking several factors into account, such as work environment and indoor climate. The model also enables SEAS-NVE to implement energy savings according to National and European energy efficiency obligations as an energy-supply company.

The purpose of this case study is to describe the in-house model, which has paved the way for the expansion of energy renovation projects to include long-term energy efficiency achievements without the use of construction funds. The Model has been named the BVE Model BVE stands for the Calculation Model for Assessment of Energy Renovation (Beregningsmodel til Vurdering af Energirenoveringer). This publication is intended to reach actors dealing with energy renovation and climate initiatives in public buildings, including operators of the buildings as well as decision-makers.

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CASE CONTENT AND CASE ISSUE

Holbaek upgrades energy goals and faces new challenges

The Danish municipalities are well advanced in terms of implementing energy-saving and energy-efficient initiatives and solutions. In Denmark, 76 out of 98 municipalities signed a Climate Municipality Agreement, which obliges municipalities to reduce CO₂ emissions by a minimum of two percent per year. In the Zealand Region, 16 out of 17 municipalities signed a Climate Municipality Agreement. Holbaek Municipality became a Climate Municipality in 2009 and committed to the goal to reduce the municipality's CO₂ emissions by three percent each year until the year 2018. As part of the obligation Holbaek Municipality prepared an 'Action Plan for Sustainable Development 2010' which contained a clarification of seven areas of specific importance in their work towards reducing their CO₂ emissions. In 2013, the municipality had reduced their CO₂ emissions by 12.6% compared to 2009, corresponding to 1,991 tons of CO₂.

In 2013 Holbaek Municipality faced the challenge to rethink their methods to achieve energy efficiency and engage in new energy renovation projects. Most energy projects with shorter payback periods had already been conducted and were typically replacements of boilers and ventilation systems. The municipality was therefore facing a challenge in terms of achieving further CO₂ savings. Furthermore, Holbaek Municipality had limited financial resources and had to think carefully about how their resources should be allocated.

Many municipalities have gradually implemented "easy" energy saving initiatives with a payback period of less than three years. The challenge for the municipalities is therefore to finance energy renovation projects with a longer payback period. However, projects with longer payback periods are often hampered by limited construction funds. As a consequence municipalities look for alternative ways to finance energy renovation projects.

For this reason, some municipalities choose to use an in-house model, where completion and funding remains within the organization. Holbaek Municipality has taken advantage of just such an approach.

SOLUTIONS APPLIED

New model for energy renovations – for better financing

SEAS-NVE and Holbaek Municipality developed the BVE-model, as a method to spot buildings with renovation potential. They call this the BVE-model, and it is a systemic assessment of the building including a financial evaluation. On the basis of this it is possible to undertake projects completely financed by Energy loans. SEAS-NVE and Holbaek Municipality have worked closely for a long time,

profitability factor of 1.33, the project can be financed as an energy loan without the use of construction funds.

Contract tendered

Example 1: A-huset in Tølløse

A-huset in Tølløse is a multifunctional building containing a school, a library and an office. The building was designated as a building of great energy renovation potential because of its high energy consumption per m2 concerning electricity and heat. Based on a preliminary analysis 11 activities were outlined and combined into one energy renovation project.

Table 1: Assessment of A-huset in Tølløse, Holbæk Municipality, using the BVE Model

Energibesparende foranstaltning Beskrivelse	Leve-tid år	Mængde m ² /stk	Enheds- pris kr./enhed	Pris i alt ²⁾ kr.	Energibesparelse					Vurdering						
					Energi investering ³⁾ kr.	El kWh/år	Fjern- varme kWh/år	Varme naturgas kWh/år	Vand m ³ /år	Økonomi 4) kr./år	TBT 5) år	RF 9) >1,33	NNV 6) kr.	Rent- abel? 7)	CO2- reduktio n kg CO2/år	
EM Punkt 1, Skal ikke laves	20			0						0						0
EM Punkt 3 Rør isolering i Fyrrum	20			0	1.200				270							55
EM Punkt 28, Tagvinduer	30			0	165.000				2.300	1.518	108,7	0,28	-130.452	nej	469	4.020
TF Punkt 101, Toiletudsugning	20			0	20.000	880			18.400	13.614	1,5	13,61	211.742	ja	4.020	4.020
TF Punkt 102, rørisolering ved trappe	20			0	7.000				1.200	792	8,8	2,26	6.482	ja	245	245
TF Punkt 103, Udskiftning af facader	30			0	900.000				21.776	14.372	62,6	0,48	-572.901	nej	4.442	4.442
TF Punkt 104, fjerne gammel udsugning	40			0	30.000				12.360	8.158	3,7	10,88	193.262	ja	2.521	2.521
TF Punkt 105, Balance varmeanlæg	20			0	125.000				18.620	12.289	10,2	1,97	84.197	ja	3.798	3.798
TF Punkt 106, Ur på ventilation i børnehave	20			0	3.000	4.493			10.750	14.598	0,2	97,32	245.505	ja	3.554	3.554
TF Punkt 107, ur på brugsvandskirkulation	10			0	500	396			2.600	2.377	0,2	47,55	22.998	ja	650	650
TF Punkt 108, Cirkulationspumper	10			0	6.000	880				1.470	4,1	2,45	8.526	ja	267	267
TF Punkt 109, Belysning	15			0	350.000	23.707				39.591	8,8	1,70	190.351	ja	7.183	7.183
TF Punkt 110, Skal ikke laves	40			0						0					0	0
				0						0					0	0
				0						0					0	0
	25,9			0	1.607.700	30.356	0	88.276	0,00	108.957	14,8	1,75	261.544	ja	27.206	27.206

As shown in Table 1, right column, activity 2 and 5 have a payback period of respectively 108 years and 63 years. This makes them non-profitable. However, by combining them with 9 other activities with shorter payback periods, the total payback period for all project activities ended up being approximately 15 years. Based on the BVE assessment, Holbæk Municipality decided to finance the project through Energy loans equivalent to the total energy investment of 1.6 million DKK. The project results in energy savings of 118,000 kWh/year and an annual CO2 reduction of 27,200kg CO2/year.

Example 2: Undløse School

Undløse School needed to replace a number of old windows and was also designated as a building of great energy efficiency potential. Holbæk Municipality possessed construction funds to replace half of the windows in the building. However, by including other activities which would improve the energy efficiency of the building, it became possible to replace all windows. A total of 10 project activities were identified, and by combining these, a viable energy project was established and the school's energy profile improved.

Table 2: BVE assessment of Undløse School, Holbæk Municipality

Energibesparende foranstaltning Beskrivelse	Leve-tid år	Mængde m ² /stk	Enheds- pris kr./enhed	Pris i alt ²⁾ kr.	Energibesparelse					Vurdering						
					Energi investering ³⁾ kr.	El kWh/år	Fjern- varme kWh/år	Varme naturgas kWh/år	Vand m ³ /år	Økonomi 4) kr./år	TBT 5) år	RF 9) >1,33	NNV 6) kr.	Rent- abel? 7)	CO2- reduktio n kg CO2/år	
EM 1, Isolering af pumper	20			11.000	11.000				5.690	3.755	2,9	6,83	52.928	ja	1.161	1.161
EM 33, efterisolering af hulmur	40			35.000	35.000				17.940	11.840	3,0	13,53	289.055	ja	3.660	3.660
TF 101, Varmeanlæg	20			120.000	120.000				6.915	4.564	26,3	0,76	-42.309	nej	1.411	1.411
TF 102, Vinduer bygning 1952	30			550.000	550.000				21.079	13.912	39,5	0,76	-233.371	nej	4.300	4.300
TF 103 Cirkulations pumper	10			25.000	25.000	2.659				4.441	5,6	1,78	18.891	ja	806	806
TF 104 Vinduer bygning 1962	30			300.000	300.000				19.297	12.736	23,6	1,27	-10.139	nej	3.937	3.937
TF 105, udsuger i kemi	20			1.000	1.000	1.577				2.634	0,4	52,67	43.831	ja	478	478
TF 106, Frekvensomformer slukkes	20			50	50	17				28	1,8	11,36	433	ja	5	5
TF 107, Dobbelt dør til depotrum	30			15.000	15.000				594	392	38,3	0,78	-6.077	nej	121	121
TF 108 Cirkulationspumper	10			11.000	11.000	756				1.263	8,7	1,15	1.479	ja	229	229
				0						0					0	0
				0						0					0	0
				0						0					0	0
				0						0					0	0
				0						0					0	0
				0						0					0	0
	28,2			1.068.050	1.068.050	5.009	0	71.515	0,00	55.565	19,2	1,47	114.720	ja	16.107	16.107

As shown in Table 2 a replacement of the windows only would not have been a profitable investment (project 4 and 6). However, by combining the investment with other activities with shorter payback

periods the overall project ended up being profitable and was therefore possible to finance through energy loans. The overall project requires an investment of approximately 1 million DKK and has a payback period of 28 years. The project provides an overall saving of 75.000kWh/year and 16.000kg CO2/year.

Procurement approach

A holistic approach to energy renovations

The BVE Model allows Holbaek Municipality to acquire a holistic view of their energy renovation projects. By taking renovation perspectives of the entire building into consideration, the profitable activities can help finance less profitable activities and hereby include activities which would not have been undertaken otherwise. The new method facilitates Holbaek Municipality in their strategic planning and promotes solid and long-term renovation projects taking factors such as the working environment and indoor climate into account. Besides greater potential for energy efficiency, this holistic mindset increases support and understanding among consumers and operators of the buildings. This improves consumer satisfaction and contributes to greater public attention.



The BVE Model also highlights cooperation and coordination internally in the organization and how this can be strengthened. Holbaek Municipality has previously experienced a lack of coordination between operators and constructors, however the BVE Model increases the coordination between the various working groups. Additionally, the BVE Model focuses on the employees who operate the building in order to ensure their sufficient expertise and know-how.

SEAS-NVE and Holbaek Municipality have jointly developed a model providing funding for projects with longer payback periods without the use of construction funds. Projects may instead be financed with Energy loans. The Model is an interesting alternative to ESCO and has the potential to be extended to other Danish municipalities.

Results

	Investment volume (€)	Energy savings (kwh/year)	CO ₂ reduction (tCO _{2e} /year)	RES triggered (toe/year)	Payback time (years)
A-house Tølløse	214.471	118.000	0,272		14,8
School of Undløse	134.023	75.000	0,016		19,2

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About PRIMES



Across six countries in Europe; Denmark, Sweden, Latvia, Croatia, France and Italy, PRIMES project seeks to help municipalities overcome barriers in GPP processes, many of which lack capacity and knowledge.

PRIMES aims to develop basic skills and provide hands-on support for public purchasing organisations in order to overcome barriers and implement Green Public Purchasing. This will consequently result in energy savings and CO₂ reductions. – www.primes-eu.net

About GPP 2020



GPP 2020 aims to mainstream low-carbon procurement across Europe in support of the EU's goals to achieve a 20% reduction in greenhouse gas emissions, a 20% increase in the share of renewable energy and a 20% increase in energy efficiency by 2020.

To this end, GPP 2020 will implement more than 100 low-carbon tenders, which will directly result in substantial CO₂ savings. Moreover, GPP 2020 is running a capacity building programme that includes trainings and exchange. – www.gpp2020.eu



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