SMART SPP
innovation through sustainable procurement

Working with the market to procure sustainable solutions

A case study from the Municipality of Kolding

www.smart-spp.eu

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Partners:

Associate partners:

Index

Introduction to the case study

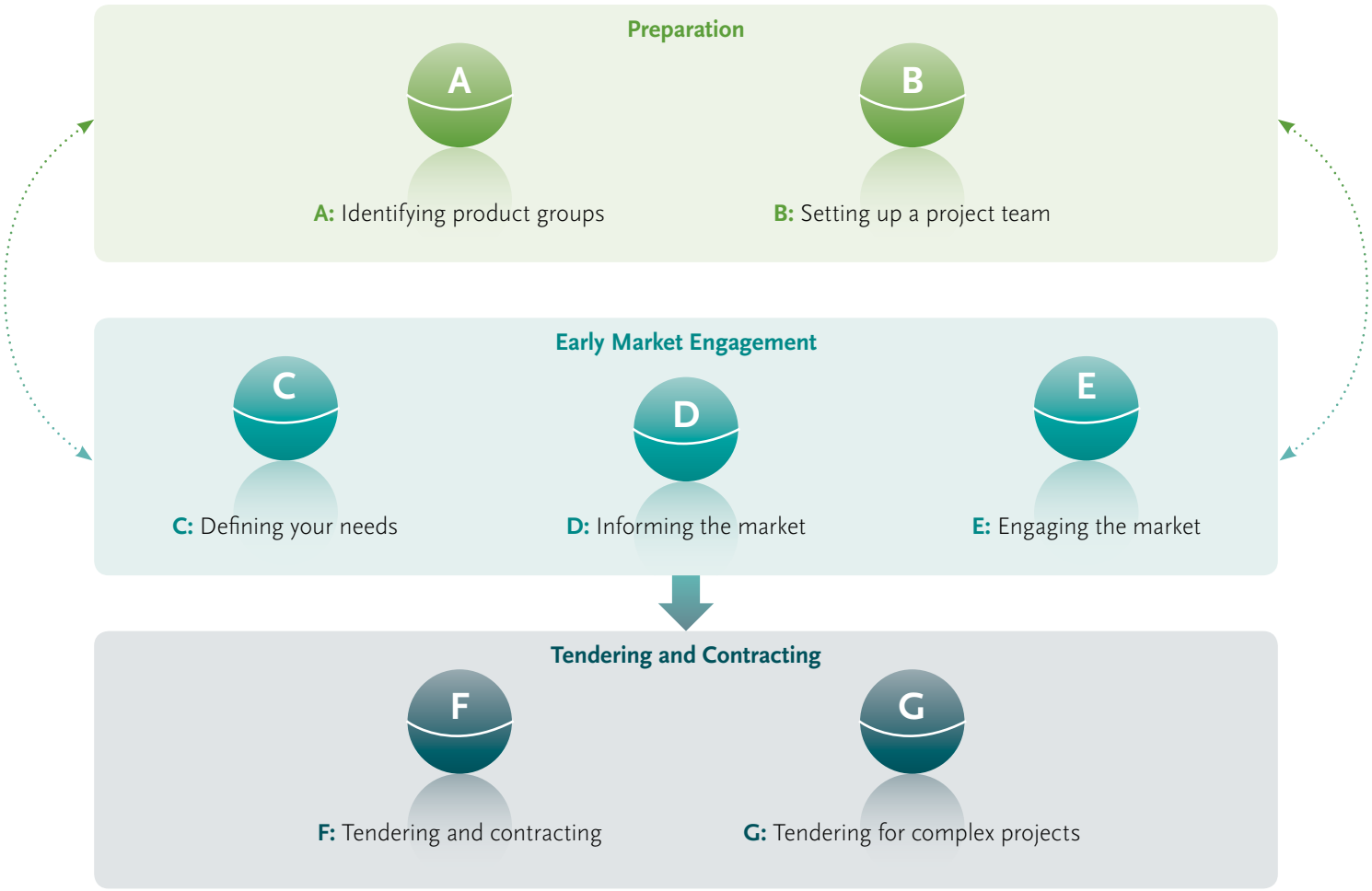
In this case study the Municipality of Kolding (Denmark) shares its experiences, conclusions and lessons learned.

These SMART SPP public authority partners have used a particular procurement approach (see figure below) which focuses on engaging the market effectively before tendering (early market engagement). This includes the assessment of the life-cycle costs and related CO_2 emissions of innovative products such as Light Emitting Diodes (LEDs) indoor and street lighting, energy efficient vending machines and electric mobility. This has been done before, during and/or after tendering.

The SMART SPP guidance includes a guide to procuring innovation, describing different ways to engage with the market, and a tool to calculate the life-cycle costs and CO_2 emissions of products. It can be downloaded at: www.smart-spp.eu/guidance.

Figure

Activities to guide authorities through a flexible approach to drive innovation through sustainable procurement



Municipality of Kolding

1. Summary

In conjunction with Kolding Municipality's vision and objectives in the energy and climate field, work is ongoing to make a strong contribution through different projects. One of the projects deals with cooperation with manufacturers in the pre-procurement phase: SMART SPP.

In the project, Kolding Municipality chose to focus on energy-efficient LED replacement light sources to replace existing incandescent bulbs, halogen bulbs and halogen spotlights. It is expected that using LED technology will lead to light sources that are considerably more energy-efficient than the existing ones.

Kolding Kommune

2. Background

With its 8,000 employees, Kolding Municipality is the largest business in the Municipality. Kolding Municipality wants to be one of Denmark's leading municipalities within the climate and energy field by the year 2021.

Energy Kolding is the overall initiative that will capture, develop, organise and implement innovative ideas and projects in the field. Within Energy Kolding, citizens and private and public businesses, organisations and research and training institutions will cooperate on the reduction of energy consumption and put into practice initiatives whose objective is to fulfil the following overall objective: "CO_2 *emissions must be reduced by 75% by 2021 compared to 1990, measured per Kolding Municipality inhabitant*".

1997 saw the adoption of the Municipality's first energy action plan, which contained ambitious goals for the period 1998–2006. The ambitions of the goals were certainly not unachievable, however: the goals were already achieved two years before the end of the plan and the CO_2 reduction markedly exceeded the desired goal as early as 2006. The Municipality's Energy Action Plan II was adopted in 2007 and its objective was to reduce electricity consumption by 8% during 2008-2015. Kolding Municipality also entered into a 'curve breaker agreement' with the Electricity Savings Fund, which undertook to reduce electricity consumption by 2% per year until 2010.

The SMART SPP project with the promotion of new, innovative, energy-efficient products is very well suited to the Municipality's overall goals.

3. Experiences from the SMART SPP approach to driving sustainable innovation

3.1 Activity A – identifying appropriate product groups

In Kolding Municipality, lighting constitutes an important part of the overall energy consumption. It was therefore obvious to look at whether the lighting could be made more energy efficient. In the first round, the focus was on energy-efficient light sources to replace the fluorescent tubes hanging in the Municipality's many institutions. LED light sources could constitute an obvious option as a replacement, since the technology is already in existence.

3.2 Activity B – setting up a project team

A project group was formed consisting of two employees, the Municipality's energy coordinator and an employee who is responsible for green acquisitions. A project employee was appointed to assist the project group with the project funds. It quickly became apparent that the project group that was formed did not have the requisite technical knowledge of LED light sources and their capacities, so the Danish Lighting Centre was hired to assist with the project by providing technical competence in lighting. A follow-up group consisting of relevant leaders in the Municipality's organisation was also formed.

3.3 Activity C – defining your needs

The Danish Lighting Centre was consulted on the choice of product group, and they were able to state that the development of efficient LED fluorescent tubes was not imminent. They recommended instead a focus on LED light sources as a replacement for traditional incandescent bulbs, halogen bulbs and halogen spotlights, since this was already a tried and tested technology where there was rapid development in the direction of more energy-efficient light sources.

A number of functional requirements for the LED light sources were developed:

- There must be a significant reduction in CO_2 emissions and in energy costs, that is, they must be significantly more energy-efficient than the current ones
- They must be able to directly replace the existing light sources without, for example, changing installations
- They must emit the same light as the existing light sources with regard to light colour and light strength and the dissemination of the light.

In cooperation with the Danish Lighting Centre, we drew up the technical specifications for the desired light sources, such as the required lifetime, energy efficiency, colour temperature and light quality (RA value). The Danish Lighting Centre also helped us to work out which manufacturers and suppliers were available on the market.

3.4 Activity D – informing the market

In order to create awareness of the project and to inform the potential suppliers of the forthcoming invitation to tender for innovative, energy-efficient LED replacement light sources, they were invited to an information meeting. The invitation was sent to the market players identified by the Danish Lighting Centre. Information on the project and the meeting was also placed on the Municipality's website. This provided contact with several market players.

3.5 Activity E – engaging the market

The information meeting was held ten months before the actual invitation to tender. At the meeting, information was provided on the project and the forthcoming invitation to tender. The technical specifications were presented to the developers, manufacturers and suppliers who turned up. The response from those participating at the meeting was that the specifications were not particularly innovative. They could already be accommodated by almost all those on the market. The message from the market was that the technical specifications should be made more stringent if the ambition was to advance the introduction of energy-efficient and innovative technologies on the market.

New and more stringent technical specifications were drawn up. These are shown in the Annex (Table 1). We then invited people to a new meeting at which the new

specifications were presented. Further dialogue also took place with the market about options and restrictions where LED and the forthcoming invitation to tender were concerned. The market's feedback was that the new specifications were innovative. The market also indicated that there are no standards in existence for matters such as the calculation of the lifetime, etc. which can be referred to, since this is a new technology. They requested that the technical specifications and allocation criteria in the invitation to tender were very specific.

3.6 Activity F – tendering and contracting

In order to make Kolding a more attractive as a collaboration partner for the market, other municipalities were invited to join the invitation to tender. This would increase the purchase volume and ensure a greater turnover for the chosen supplier. A number of municipalities were invited to an information meeting about the project and to participate in the invitation to tender. The invitation was sent to the municipalities in Kolding's procurement cooperation group ('12 By Gruppens Indkøbscentral') plus other municipalities with ambitious targets in the energy and climate field. Six municipalities from the procurement cooperation chose to participate in the invitation to tender.

An open invitation procedure to tender for the economically most advantageous tender was selected as this was the tender model that best suited the timeframe for the SMART SPP project. This procedure ensured competition on the market to go beyond the minimum technical specifications, and supply the most energy-efficient tender. The evaluation criteria are shown in Table 2). In order to make it more attractive for small and medium-sized businesses to submit a tender, the invitation to tender was divided into three sub-areas: low-voltage bulbs, 230 Volt halogen bulbs and 230 volt bulbs.

Two pilot projects were incorporated into the invitation to tender with full-scale replacement of existing light sources. This was performed in order to test out the technology, to use the results obtained to calculate the energy saving potential and as an incentive to attract interested suppliers.

The invitation to tender material included a spreadsheet indicating all of the light sources for which replacement light sources were required. The spreadsheet showed the sales figures for the traditional light sources. This spreadsheet acted as the tender list. The spreadsheet with the tender list was supplemented with a spreadsheet on which the tenderers could provide details of the lifetime, lumen output, wattage and RA value of their tendered light sources for use during the evaluation and allocation. These details were to be provided exclusively for the light sources that represented 60% of the sales. The remaining 40% consisted of many light sources with a very small turnover. The assessment was that it would be too costly for the tenderers to state the desired values for all light sources.

Midway through the invitation to tender period, potential bidders were invited to a questions and answers meeting at which they were able to ask additional questions about the invitation to tender material. There was also an opportunity to submit questions in writing. All questions and answers were placed on the municipality's website and were also sent to all interested parties.

4. Life-cycle costing and CO_2 emissions

The SMART SPP LCC CO_2 tool was drawn up to compare the offers submitted. The invitation to tender included more than 200 light sources for which we required tenders for replacement light sources. The tool cannot handle values for 200 products per tender. In order to be able to obtain the values that were to be used in the tool, it was necessary to set up an account in order to obtain values per tender.

Not all light sources have equal sales, so the accounts were worked out on the basis of weighted values. An example of a weighted lifetime calculation is shown in Table 3)

The tool gives the procurement price per item. An average price was calculated based on the individual supplier's tender prices. The discount rate and the inflation rate were also found on Danske Nationalbank's website and Statistics Denmark's website. Prices for electricity consumption were obtained from the Municipality's electricity supplier.

The SMART SPP tool was used to calculate life-cycle expenses and CO_2 emissions. When allocating points, Kolding prepared their own table, which is shown as Table 4. Points from here were keyed into the tool. The tool indicated which tender had the lowest lifetime expense and identified the economically most advantageous tenders in order of priority.

5. Conclusions and lessons learnt

The result from the tool showed that the tender with the lowest lifetime expense was not the economically most advantageous tender when taking into consideration the other allocation criteria, energy efficiency and light quality. It was also shown that it is important to have determined in advance how long the planning horizon should be. Too short a planning horizon cannot adequately take into account lifetime differences and cannot therefore indicate how frequently a light source has to be replaced.

Kolding's experiences demonstrate that when working with new technologies, you are dealing typically with a market that is not used to submitting tenders for public invitations to tender. The market is typically smaller businesses. The questions received regarding the invitation to tender material showed that the invitation to tender material was difficult to understand. It was also evident, after the contract had been allocated, that many tenderers did not understand the use of allocation criteria and the allocation of points.

It can therefore be recommended that the invitation to tender material should clearly show the way in which evaluation and allocation of points will take place, including which allocation table will be used. It can also be recommended that a meeting should be held with interested tenderers at which the invitation to tender material, the use of a tenders list and the evaluation criteria are reviewed.

For new technologies, there are neither ISO nor EN standards that can be referred to in the requirements specification or for the evaluation criteria. It is therefore important for the invitation to tender material to clearly show how the desired values will be stated, e.g. that the stated details apply to the bulb and not to the individual LED unit, where the surrounding temperature is 25°C and that a lifetime (L70) means the expected lifetime where the emission of light constitutes 70% of the bulb's lumen output. The dialogue with the market can provide an indication of how the individual values can be expressed.

The light quality (RA value) was weighted highly (20%) to ensure that tenders for light sources with a low price and poor quality were not received. Following the tender submission period, it became evident that there is no great variation in the RA value of the individual light sources. The weighted RA values for each tender varied between 80 and 86. This led to some inappropriate point intervals. Weighting the RA value so highly cannot therefore be recommended.

Before drawing up the invitation to tender material, not enough had been found out about the tool and its possibilities, including exactly which values should be keyed into the tool. This meant that it then became necessary to have several accounts in

order to obtain the desired values for the tool. A more thorough examination of the tool would have given the opportunity to set up the evaluation criteria in a way that used the tool in a more goal-orientated way.

6. Outlook

Kolding Municipality is participating in an environmental cooperation called Green Cities. In this cooperation, they are currently developing ideas for new projects. One of these is a project in which the SMART SPP progress method described in the Guide, "Encouraging energy-efficient innovation through procurement", will be used. Kolding is currently in the process of finding a suitable product area, but this will probably concern products in which the content of chemical products is problematic for both the work environment and the external environment.

7. Contact

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Annex

Table 1: Technical specification

Product group	Energy efficiency (Lumen/Watt)	Lifetime L70 (timer)	Colour reproduction (RA index)	Colour temperature (degrees Kelvin)
Indoor general lighting	50	20 000	80	2700-3000
Indoor effect lighting	40	20 000	80	2700-3000
Outdoor lighting	50	20 000	75	3000-4000

Table 2: Award criteria

Sub-criterion	Weighting in %
Lifetime price, which will include an evaluation of	55% divided by
• Procurement price	35%
• Lifetime	35%
• Operating expenses	30%
Energy efficiency (Lumen/Watt)	25%
Light quality (RA value)	20%

Table 3: Example of the calculation of weighted value for use in the tool

The example is the lifetime for the sub-area of low-voltage bulbs.

Replacement light source for	W	Base	Weighted number	Lifetime Hours (L70)	Weighted lifetime
10w 12v G4 clear or matt	10	G4	34	20000	680000
20w 12v GU5.3 Titan Ø50	20	GU5	24	35000	840000
20w 12v Ø50	20	G4	15	40000	600000
20w 12v G4 clear	20	GU5,3	15	35000	525000
35w 12v GU5,3 Titan Ø50	35	GU5	12	35000	420000
TOTAL			**100**		**3065000**
Weighted value					**30650**

The "weighted number" column is calculated on the basis of the turnover of the relevant traditional light source converted into hundredths.

The lifetime is the supplier's stated lifetime for his tendered replacement light sources.

The weighted lifetime column is obtained by: Weighted lifetime = (weighted number x lifetime).

The bottom row, "weighted value", which is marked in green, is obtained as follows: Weighted value = (sum weighted lifetime/ sum weighted number). This weighted value is used in the LCC-CO_2 tool.

Table 4: Evaluation and allocation

Evaluation	Supp, 1	Supp, 2	Supp, 3	Supp, 4	Supp, 5	Supp, 6	Supp, 7	Supp, 8
Procurement price	604,434	775,304	770,236	535,077	675,316	464,766	517,291	361,102
Weighted Lifetime	25,400	27,650	30,550	27,650	22,400	37,050	34,250	37,450
Weighted Watts	4.000	4.204	3.700	3.604	4.510	3.428	2.850	3.735
Operating costs (25 years)	1,369,635	1,439,487	1,266,913	1,234,041	1,544,264	1,173,778	975,865	1,278,897
Weighted Lm/W	50	66	76	47	40	66	52	60
Weighted RA	82	85	80	85	81	82	82	83

Conditions for the calculation of operating expenses	
Number of bulbs	5,115
number of hours per year	1,880
Electricity price (DKK)	0.3965
Distribution (DKK)	1.0278
Total electricity price (DKK per kWh)	1.4243

Formula for the calculation of operating expenses

Operating expense = ((weighted Watts x(number of bulbs x hours per day x days per week x weeks per year)/1000)x total electricity price)

Allocation of points	Supp. 1	Supp. 2	Supp. 3	Supp. 4	Supp. 5	Supp. 6	Supp. 7	Supp. 8	Max. point
Procurement price	11.50	8.97	9.02	12.99	10.29	14.96	13.44	19.25	19.25
Weighted Lifetime	5.96	8.44	11.64	8.44	2.65	18.81	15.72	19.25	19.25
Operating costs	11.76	11.19	12.71	13.05	10.43	13.72	16.50	12.59	16.50
Lm/W	6.94	18.06	25.00	4.86	0.00	18.06	8.33	13.89	25.00
RA	8.00	20.00	0.00	20.00	4.00	8.00	8.00	12.00	20.00
Total	44.16	66.65	58.37	59.34	27.37	73.54	61.99	76.98	100.00

Formulae for the calculation of points for lifetime, Lm/W and RA

The highest value gives the maximum points. If the value is equal to the minimum requirement, 0 points are given.

Points are allocated according to the formula for a linear function y = ax+b, where x gives the number of points, y gives the lifetime, Lm/W or RA, b = minimum requirement, and a = (best value – minimum requirement)/(max. point – zero)

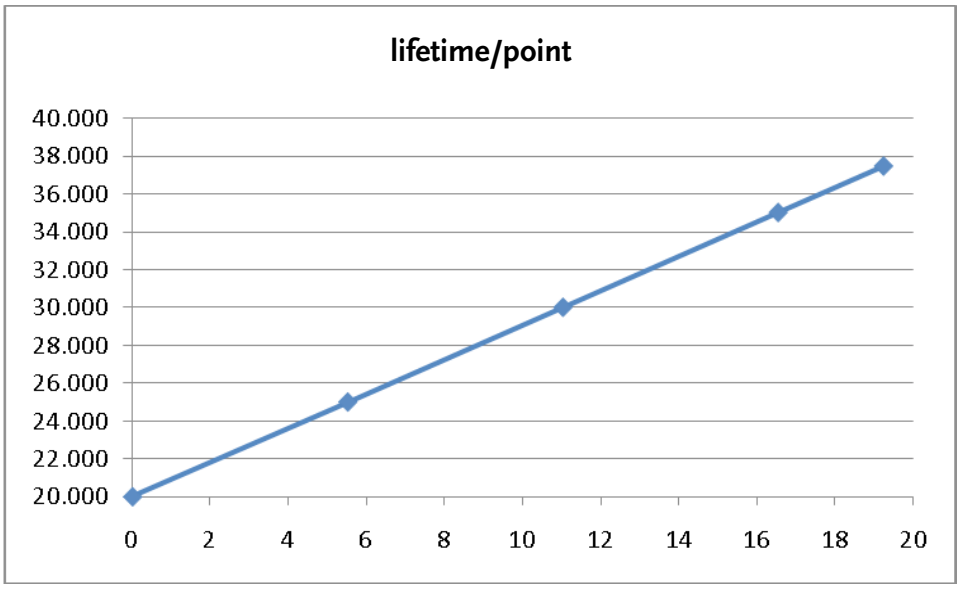
Point = (y – b)/a

The relationship between the lifetime and the point allocation is shown in the figure below.

Formulae for the calculation of points for procurement and operation

Point = max point x (lowest value)/tenderer value)

Relationship between lifetime and point allocation calculated according to the formula above.



SMART SPP – innovation through sustainable procurement

Running from September 2008 until August 2011 "SMART SPP – innovation through sustainable procurement" is a three year project which promotes the introduction of new, innovative low carbon emission technologies and integrated solutions onto the European market. This is being done through encouraging early market engagement between public authority procurers and suppliers and developers of new innovative products and services in the pre-procurement phase of public tendering.

SMART SPP is an initiative of the Procura+ Campaign, run by ICLEI – Local Governments for Sustainability and designed to help support public authorities across Europe in implementing Sustainable Procurement and help promote their achievements.

For more information visit *www.procuraplus.org*

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