

# Sweden Technology Procurement Groups (Innovation Cluster)

## Fact sheet

*for:*

**Federal Ministry for the Environment, Nature Conservation  
and Nuclear Safety (BMU)**

On behalf of:



of the Federal Republic of Germany



European  
**Climate Initiative**  
EUKI

*by:*

Ecofys: Bernhard von Manteuffel, Kristen Brand

03 September 2018

The project Bridging European and Local Climate Action is financed by the European Climate Initiative (EUKI). EUKI is a project financing instrument by the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU). It is the overarching goal of the EUKI to foster climate cooperation within the European Union in order to mitigate greenhouse gas emissions. It does so through strengthening cross-border dialogue and cooperation as well as exchange of knowledge and experience.

The information and views set out in this study are those of the author(s) and do not necessarily reflect the official opinion of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety.

This study is based on a policy paper with an overview of greenhouse gas emission reductions and policy instruments in non-ETS sectors across Europe (hereafter referred to as 'Policy Paper'). The Policy Paper can be downloaded from the EUKI website.

## ABBREVIATIONS

AID-EE	Active Implementation of the European Directive on Energy Efficiency
BeBo	Beställerguppen Bostäder
BeLok	Beställerguppen Lokaler
EC	European Commission
ESD	Effort Sharing Decision
ETS	Emissions Trading System
EU	European Union
IEA	International Energy Agency
m <sup>2</sup>	Square metre
NKI	National climate initiative ('Nationale Klimaschutzinitiative')
NUTEK	Swedish Board for Industrial and Technology Development
OECD	Organisation for Economic Cooperation and Development
SBi	Danish Building Research Institute ('Statens Byggeforskningsinstitut')
SCI	Sustainable Construction and Innovation through Procurement
SEA	Swedish Energy Agency
SEK	Swedish krona
TWh	Terawatt hour
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar

## TABLE OF CONTENTS

<b>1. Summary</b> .....	<b>1</b>
<b>2. Introduction to the instrument</b> .....	<b>2</b>
<b>3. National context</b> .....	<b>3</b>
3.1 National climate policy.....	3
3.2 Sector context .....	3
<b>4. General description of the policy instrument</b> .....	<b>6</b>
4.1 History .....	6
4.2 Legal basis .....	6
4.3 Functioning .....	7
4.4 Interlinkages with other policy instruments .....	9
<b>5. Impacts of the policy instrument</b> .....	<b>10</b>
5.1 Effectiveness .....	10
5.2 Cost efficiency .....	11
5.3 Co-benefits and side-effects .....	12
5.4 Success factors and challenges.....	12
<b>6. Transferability</b> .....	<b>14</b>
6.1 General comparability of the context.....	14
6.2 Properties of the instrument .....	14
6.3 Potential impacts .....	16
6.4 Conclusion.....	16
<b>7. References</b> .....	<b>18</b>

## 1. SUMMARY

This study explores the Swedish technology procurement groups ('Innovation Cluster') and the transferability thereof to the German context. The experiences of Sweden offer valuable insight into how the value of technology procurement groups can be maximised and ultimately contribute to the achievement of energy efficiency targets and emission reductions in the buildings sector.

After consultation with renowned German and Swedish experts, we find that the Swedish technology procurement<sup>1</sup> groups can serve as a role model for Germany. Technology procurement groups are networks where private actors collaborate to reduce energy consumption by e.g. enabling a faster introduction of new innovative energy-saving solutions to the market. These groups create a platform for close collaboration between industry/market actors and the state in order to reduce energy use in buildings.

The main Swedish technology procurement groups are BeBo for residential and BeLok for non-residential buildings. The activities of the members of the groups can increase the possibility that future efficiency improvements reach the market earlier by, for example, implementing demonstration projects. These projects prove to suppliers the real energy savings of innovative solutions amongst others by independent evaluations. It is attractive for stakeholders such as housing associations or commercial landlords to join as the initiative is inexpensive and presents a very good possibility to promote innovative technological solutions.

For policy makers technology procurement groups are an important instrument for ensuring a faster introduction of new innovative energy-saving solutions to the market, and thereby potentials for future efficiency improvements. Since they involve relatively few individuals and require little financing, the technology procurement groups can be classified as a low risk policy mechanism.

In Germany, several initiatives exist that foster the introduction of innovative energy-saving solutions to the market such as 'Mittelstand für Energieeffizienz' or 'Einsparzähler'. Although not comparable in every aspect, they serve as good examples of the general transferability of the Swedish technology procurement groups to Germany.

Although the German initiatives are also valuable for reducing emissions in the buildings sector, they all have in common that they are policy-driven and not user-driven. The main advantage of the Swedish user-driven technology procurement groups is the motivation and commitment to the overall objective. This powerful group of clients (demand side) is able to change the behaviour of the industry (supply side) by altering demand patterns.

Overall, technology procurement groups can add to existing policy instruments by incentivising motivated and committed stakeholders to pool their expertise, network and buying force to change the market to more innovative solutions in the building sector.

---

<sup>1</sup> Although 'procurement' is mainly used in relation to public procurement, in the context of Swedish technology procurement groups it refers to the word's main meaning "the process of obtaining supplies" regardless of the procuring body being a public or private entity. However, it is true that the actors within the networks are private companies.

## 2. INTRODUCTION TO THE INSTRUMENT

Technology procurement satisfies a need for a new product. The Swedish Energy Agency (SEA) defines technology procurement as “a bidding process to stimulate and promote the development and market introduction of a new technology” (Stigh, 2007). The main task for successful technology procurement is to bring together the customers that demand the new product and the manufacturer that is able to supply it (Nilsson, 2015). Technology procurement groups are networks where actors collaborate to reduce energy consumption amongst others by enabling a faster introduction of new innovative energy-saving solutions to the market (Nilsson, 2015). The effect of a market transformation where the new product (preferred case) with the higher product performance obtains market penetration is also expected to be comparable to that of the old product (base case).

In Sweden, the SEA promotes initiatives aiming to reduce energy consumption and climate impact acting for the Swedish government. These initiatives also include six technology procurement groups<sup>2</sup>. The SEA supports the technology procurement groups by covering administrative expenses, and by financing some related research, development, and demonstration (Odyssee-Mure, 2017).

The two groups that have been in operation for the longest time (i.e. since 1989) are **BeBo** (‘Beställerggruppen Bostäder’) and **BeLok** (‘Beställerggruppen Lokaler’), which have been chosen as examples for good practice in national climate policy and are analysed in detail in this study. Main focus will be set on the transferability to the German context.

---

<sup>2</sup> BeBo: landlords of apartment blocks; BeLok: landlords of commercial spaces; LÅGAN: a programme for buildings with very low energy consumption; HyLok: public sector tenants of commercial spaces; BeSmå: producers of individual homes; BeLivs: various actors involved with commercial spaces related to all aspects of the food processing chain.

## 3. NATIONAL CONTEXT

### 3.1 National climate policy

Sweden has been a pioneer in international environmental policy and was one of the first signatories and ratifiers of the Kyoto Protocol at the turn of the millennium. The current red-green government under Prime Minister Stefan Löfven has committed Sweden to becoming greenhouse gas (GHG) neutral by 2045 — five years earlier than under the previous target. Sweden already has the lowest emission intensity and the second lowest GHG emissions per capita in the European Union (EU). Sweden's 2020 target of 49% renewable energy was already exceeded in 2013 (EC, 2015). In 2016, 57% of electricity came from renewable energy sources, especially hydropower (40%), although wind power has achieved significant growth in the last ten years (SCB, 2017). Nuclear power plants contributed another 41% to electricity generation (IEA, 2017).

For the 2018 budget, SEK 5 billion (EUR 485 million) is earmarked for environmental and climate protection measures, more than twice as much as in 2014 (Government Offices of Sweden, 2017). Sweden's climate policy covers measures in all sectors.

Sweden's Effort Sharing Decision (ESD) target for 2020 is to lower emission levels 17% below 2005 and is only exceeded by Denmark, Ireland and Luxembourg. According to the Effort Sharing Regulation, Sweden and Luxembourg have the most ambitious target in Europe for 2030. By then, GHG emissions in the sectors outside the EU Emissions Trading System (ETS) are to be reduced by 40% compared to 2005.<sup>3</sup>

According to forecasts, Sweden will exceed its 2020 effort-sharing target by around 15% and achieve a decline of 32% instead of 17%, although economic output grew by 20% between 2005 and 2015 (just under 2% per year). This is especially impressive given the already low emission intensity in Sweden.

### 3.2 Sector context

By 2013, the final energy consumption of the residential and tertiary sectors in Sweden amounted to 147 TWh. This is approximately 40% of Sweden's total final energy use (SEA, 2015). In a publication of the SEA from 2017, the total annual energy consumption in the Swedish building sector is stated to be around 160 TWh (Odyssee-Mure, 2017). There is no quantified energy efficiency target for this sector (SEA, 2015).

Figure 1 shows CO<sub>2</sub> emissions associated with energy use for seven economic sectors: agriculture and fishing, electricity, industry, off-road transport, residential and commercial (buildings), road transport, and industry emissions. It is important to note that these are energy-related emissions, i.e. they do not include process emissions from industry as well as most agricultural emissions from fertilisers or ruminant animals nor emissions from waste. The residential and commercial sector (buildings) accounts for approximately 8% of Sweden's CO<sub>2</sub> emissions.

---

<sup>3</sup> For more information, please refer to the European Commission's webpage "Effort sharing 2021-2030: targets and flexibilities": [https://ec.europa.eu/clima/policies/effort/proposal\\_en](https://ec.europa.eu/clima/policies/effort/proposal_en)

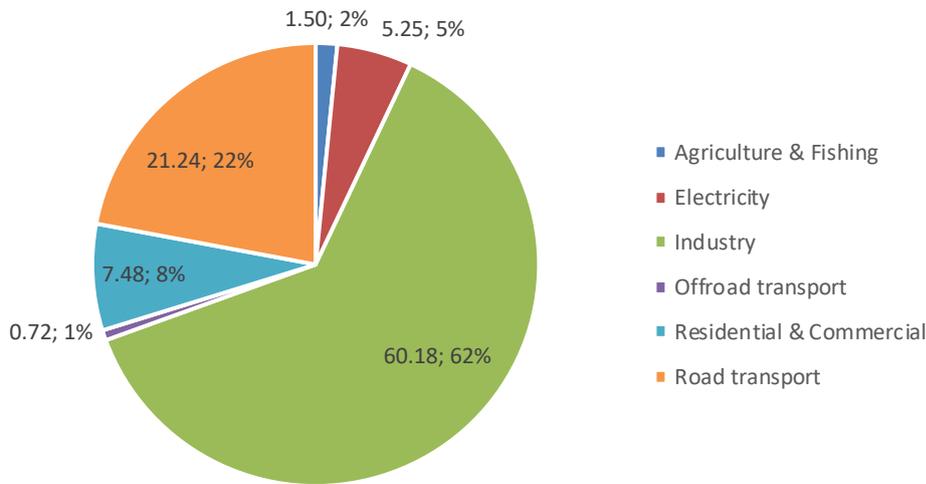


Figure 1: CO<sub>2</sub> emissions by sector in million tonnes and in % (2016) (based on (OECD, 2016), (SEA, 2018))

Figure 2 shows the total final energy use by energy carrier from the industry, transport, and the residential and service sectors. As this chart illustrates, Swedish energy supply is comparatively very low-carbon with about 75% of final energy sources coming from zero- or very low-carbon sources. Thus, even though few countries consume more energy per capita than Sweden, Swedish CO<sub>2</sub> emissions are lower than those of most other European countries (4.25 tonnes of CO<sub>2</sub> per year per capita compared to the EU average of 6.91 tonnes). This can to a large extent be traced back to the high share of low-carbon electricity (nuclear, hydropower, and wind; together over 90%) as well as a high share of district heating and biofuels in heating and transport (Sweden.se, 2018).

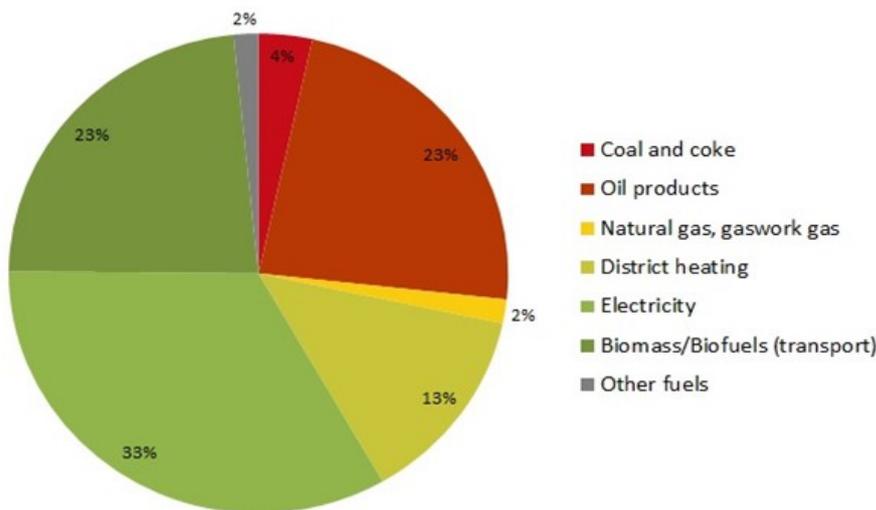


Figure 2: Total final energy use by energy carriers (2016), ((OECD, 2016), (SEA, 2018)), own representation

In Sweden, the residential property owners (landlords) are generally owners of whole blocks of flats instead of individual apartments. The landlord ensures that each apartment is supplied with heating and hot water and the tenants pay a 'warm rent' where heat and hot water is included. Household electricity

is not included in the warm rent. Therefore, the incentives for energy efficiency lie with the landlord (Odyssee-Mure, 2017).

## 4. GENERAL DESCRIPTION OF THE POLICY INSTRUMENT

### 4.1 History

The Swedish Board for Industrial and Technology Development (NUTEK) started the technology procurement programmes in Sweden in the late 1980s. The objective of these programmes was to support the market penetration of energy-efficient technologies<sup>4</sup>. For this reason, NUTEK initiated procurement groups consisting of a group of buyers or potential buyers per technology. Within NUTEK, potential suppliers were approached and invited to compete for publicity reasons and for a guaranteed number of sales when winning the competition (AID-EE, 2006).

The procurement groups, which were initially conceived as ad-hoc groupings, were transformed into permanent groups by the SEA based on the government's intention to increase the level of co-financing from participants. The aim of permanent groups is to facilitate higher sustainability ambitions and pave the way to more complex approaches that are not linked to a specific technology or piece of equipment (e.g. tools, models, management systems) (AID-EE, 2006). One of the smaller groups, BeBo<sup>5</sup>, was created in 1989 followed by the bigger group BeLok<sup>6</sup> in 2001.

For information on the various other technology procurement groups that have been active in the past in Sweden<sup>7</sup>, please refer to (Stigh, 2007).

### 4.2 Legal basis

In Sweden, the legal basis for the authorities to initiate or disperse grants to technology procurements used to be the regulation SFS 2008:761<sup>8</sup> (article 27). The agency financed 50%, and the other 50% was financed in-kind from all the members of the groups (SEA-Akkurt, 2018).

As this regulation can no longer be used to support order groups/networks/clusters, the SEA has procured the order groups within the frame of Swedish Public Procurement Act SFS 2016:1145 (Swedish Competition Authority, 2017). The networks and platforms for collaboration function in the same way as before but are financed differently (SEA-Akkurt, 2018).

The initial Public Procurement Act (LOU), that now forms the legal basis for the innovation clusters, came into force in 1994 and was amended in 2016 to reflect the EU Directive (EU DIRECTIVE 2014/24/EU, 2014) on public procurement. The Directive 2014/24/EU repealed the Directive 2004/18/EC and is a public procurement reform aimed at limiting bureaucracy and improving the efficiency of public procurement in the EU (EC, 2016). This directive facilitates the integration of initiatives, which support both sustainability and innovation. It is in this nexus that technology procurement groups can play an important role (SBI, 2016).

---

<sup>4</sup> e.g. efficient refrigerator/freezers, clothes washers, ground source heat pumps, energy-efficient windows, etc.

<sup>5</sup> Beställargruppen Bostäder, i.e. procurement group for residential buildings.

<sup>6</sup> Beställargruppen Lokaler, i.e. procurement group for commercial buildings.

<sup>7</sup> e.g. for buildings, industry and traffic (examples: super insulated windows, heat pumps).

<sup>8</sup> SFS 2008:761: State aid for research and development and innovation in the energy field ('statligt stöd till forskning och utveckling samt innovation inom energiområdet').

### 4.3 Functioning

Technology procurement groups are networks where actors collaborate to, for example, reduce energy consumption by enabling a faster introduction of innovative energy-saving solutions to the market.

On behalf of the Swedish government, the SEA promotes initiatives that seek to reduce energy consumption and the country's climate impact. These initiatives include six technology procurement groups. BeBo and BeLok are the oldest of these groups and are analysed in detail in this study. The SEA covers the group's administrative expenses and finances some related research, development, and demonstration activities (Odyssee-Mure, 2017).

**BeBo** is a network of approximately 24 residential property owners covering about 70% of Sweden's apartments. The members range from social housing associations to public authorities and professional organisations (SEA, 2015). The network's main purpose is to focus on procurement for **deep renovation** in multi-dwelling buildings and **new technologies** (BeBo, 2018).

Deep renovation is procured within the programme 'Rekorderlig renoverig' and 'Halvera Mera'. In the 'Rekorderlig renoverig' programme by 2016 five demonstration projects had been carried out with promising results (realised energy use reductions of around 30%) (SBI, 2016). The 'Halvera Mera' campaign was very successful with 31 pre-projects and 17 simpler energy inspections. A number of other property owners who wanted to participate had to be placed on a waiting list as BeBo had internal resource constraints (SBI, 2016).

The procurement of new technologies within BeBo so far comprises stimulations of early market entries for the following technologies: refrigerators, freezers, washing machines, dryers, ventilation, lighting in stairs, food processing, electrical engines. In some of these categories reductions in energy use and annual costs reaching 30 to 50% have been recorded (Odyssee-Mure, 2017).

In the BeBo programme, reductions in energy use must be proportional to the costs. Therefore, the energy savings must exceed long-term costs. The savings result from actual measured savings (energy consumption) under real operation.

**BeLok** is a network of about 21 non-residential property owners representing approximately 25% of commercial space in Sweden (SEA, 2015). The role of BeLok is to bridge the gap between users (commercial building owners) and inventors, suppliers, and manufacturers of innovative energy-efficient equipment and systems. The network's current approach is called 'Total Concept' ('Totalmetodiken') where single energy efficiency measures are bundled in a larger package. The objective is to increase the cost effectiveness of deep energy efficiency measures (Odyssee-Mure, 2017).

The Total Concept method includes the following five stages:

1. Perform thorough audit of the building
2. Design stage
  - a. Identify all measures with reasonable energy saving potential
  - b. Analyse costs and savings of all measures (and combination of measures)
  - c. Form an action package
  - d. Decide to realise the action package
3. Construction work

4. Commissioning of the building
5. One-year monitoring

Within the BeLok initiative about 45 non-residential buildings (offices, schools and other buildings) were audited by 2015. The buildings are now in different stages of the above mentioned realisation steps. By 2015, all five stages of Total Concept could be carried out for three office buildings with measured energy savings between 50 and 60% (BELOK, 2015).

Figure 3 shows one of these three office buildings having reached approximately 60% energy savings (Johborg, 2015).



Figure 3: BeLok — example office building Pennfäktaren in Stockholm before (left) and after (right) renovation (Johborg, 2015)

Table 1 shows that for the three office buildings that have carried out all steps of the Total Concept, the calculated savings are very close to the measured savings (deviation: < 2%). However, the calculated and real costs differs substantially (deviation: -27% to +200%) (BELOK, 2015).

Table 1: BeLok — completed Total Concept projects incl. monitoring, calculated vs. real costs and energy savings in three office buildings (BELOK, 2015)

Building	Locality	Floor area [m <sup>2</sup> ]	Calculated		Real outfall	
			Costs [EUR 1,000]	Energy [kWh/(m <sup>2</sup> a)]	Cost [EUR 1,000]	Energy kWh/(m <sup>2</sup> a)]
Getholmen	Stockholm	8,500	550	81	400	80
Pennfäktaren	Stockholm	12,600	450	120	690	120
Hägern	Stockholm	19,100	420	88	840	88

For Total Concept a comprehensive manual in English can be found in the tool kit ‘Total Concept: Guideline and Tools’ (CIT, 2018). The Total Concept is not only applied in Sweden but also in other Northern European countries like Denmark, Estonia, Finland and Norway.

From the perspective of a supplier, the BeLok initiative is very attractive as it offers the possibility to conduct, for example, demonstration projects with independent evaluations to document the results. From the perspective of group members (commercial landlords), the initiative is inexpensive and presents a very good possibility to promote innovative solutions (AID-EE, 2006).

#### 4.4 Interlinkages with other policy instruments

The current Swedish Public Procurement Act SFS 2016:1145 is based on the Directive 2014/24/EU. The Directive declares that construction and procurement will play an important role in the EU 2020 plan for smart, sustainable and inclusive growth (EC, 2010).

While the technology procurement groups show no direct interlinkages with other policy instruments, these networks also collaborate with other authorities in Sweden. Therefore, a lot of the projects that are generated within these platforms are also of use in other authorities that work with these questions (SEA-Akkurt, 2018).

## 5. IMPACTS OF THE POLICY INSTRUMENT

### 5.1 Effectiveness

The main aim of the technology procurement groups is to discover the potential of new technologies and help members implement new solutions via involvement in the group and reduction of initial risks. For example, BeBo is mainly driven by the following activities (BeBo, 2018):

- > Execute investigations and measurements to clarify potentials
- > Demonstrate and evaluate new solutions
- > Perform preliminary studies as a basis for technology procurement
- > Implement technology procurement
- > Market and introduce energy-efficient technology
- > Identify and disseminate experiences
- > Create a plank for the Energy Agency and other authorities within the group's areas of expertise
- > Carry dissemination activities for spreading information and engaging in activity outside of the group's membership

Considering the drives above, the groups function effectively to meet their primary aims. The SEA estimated the quantitative impact of BeBo and BeLok to be around 0.06 TWh per year in 2013. For comparison, the total annual energy consumption in the Swedish building sector is around 160 TWh (Odyssee-Mure, 2017).

There are 19 construction and renovation projects, each including multiple buildings within BeBo (BeBo, 2018) and 45 projects within BeLok (BELOK, 2015). The impact above mainly results from the following achievements of the two groups:

- > BeBo:
  - Realisation of five deep renovation demonstration projects with realised energy reductions of approximately 30% (SBI, 2016);
  - Stimulations of various early market entries<sup>9</sup> with reductions in energy use and annual costs reaching 30 to 50% (Odyssee-Mure, 2017).
- > BeLok:
  - Realisation of 45 audits of non-residential buildings. By 2015, all five stages of the Total Concept could be carried out for three office buildings (BELOK, 2015):
  - The realised measured energy savings range between 50 and 60% (BELOK, 2015).

As the primary goal of the technology procurement groups is to bring energy-efficient technologies to the market, it is difficult to determine the impact in quantitative terms. It is never clear if the technology would have reached the market without the intervention and support of the groups (AID-EE, 2006).

---

<sup>9</sup> For refrigerators, freezers, washing machines, dryers, ventilation, lighting in stairs, food processing, and electrical engines.

Because of this, the evaluations of the BeBo (SBI, 2016) and BeLok (AID-EE, 2006) programmes did not attempt to quantify the impact of the groups. Nevertheless, both evaluations confirm the current and future positive impact of the technology procurement groups for the following reasons:

- > The groups are formed by dedicated and competent representatives of companies.
- > Based on practical experiences, members can exchange ideas and formulate projects.
- > As a group the members can exert greater influence on suppliers and developers.
- > The risks of demonstration projects can be shared with the SEA and the other members.
- > The impact is generated when builders, consultants or contractors are willing to adopt new technologies that they consider to be proven technologies as a result of the demonstration projects.
- > The economic risk for the members is very low as being part of the groups is inexpensive and does not require a large investment of time for the members (AID-EE, 2006).

Looking beyond the two procurement programmes analysed in-depth in this study, Nilsson (2015) examines several further examples from the Swedish Technology Procurement Programme that was launched in the late 1980's. The analysis demonstrates that the concept of technology procurement groups is applicable and successful in various areas such as transport and industry, residential and commercial buildings.

Also, various at that time new technologies have achieved an early market entry, such as heat pumps, windows and traffic lights. The comparative energetic performance of these three technologies resulting from technology procurement group activities was typically very high, whether measured towards best available, average product in market or (average) of existing stock<sup>10</sup> (Nilsson, 2015).

## 5.2 Cost efficiency

The SEA funds the technology procurement groups BeBo and BeLok by covering administrative expenses and financing demonstration projects and some related research (Odyssee-Mure, 2017).

According to the SEA, the funding framework for technology procurement groups is defined by the following characteristics (Johborg, 2015):

- > A maximum of 50% subsidy to the procurement;
- > Maximum EUR 100,000 funding per buyer;
- > Direct subsidies never given to the product developer, instead support to buyers.

In total, the public funding of BeBo amounted to EUR 0.9 million (SEK 9 million) in 2009 and EUR 3.1 million (SEK 32 million) for the four-year period 2012–2015 (SBI, 2016).

For BeLok no such funding amounts could be ascertained, only the costs of the comprehensive audit is estimated to EUR 3 per m<sup>2</sup> (BELOK, 2015).

An estimate of EUR 1.8 million in annual funding received by BeBo and BeLok contributes to an estimated savings potential of 0.06 TWh per year ((SBI, 2016), (Odyssee-Mure, 2017)).

---

<sup>10</sup> E.g., heat pumps: improved performance by 30% compared to existing stock; windows: improved performance by 44% compared to average in market; traffic lights: improved performance by 87% compared to best available.

Despite these estimates, it is difficult to quantify the impact of technology procurement groups since the primary goal is to bring energy-efficient technologies to the market. Sales data for new technologies can be monitored and resulting savings in comparison to conventional technologies can be estimated. Since it is never clear if the technology would have reached the market without the technology procurement groups, it is difficult to determine how much of the sales and therefore of the energy savings should be attributed to them (AID-EE, 2006).

### 5.3 Co-benefits and side-effects

As outlined in chapters 4.3 and 5.1, numerous direct energy saving benefits can arise from technology procurement group activities. In the context of technology procurement groups like BeBo and BeLok for buildings the outcomes of demonstration projects are powerful tools that the group members and suppliers can refer to when promoting innovative solutions. As a co-benefit the members (e.g. the commercial landlords within the BeLok initiative) might come to the conclusion that the results of the demonstration projects are convincing enough to transfer them to their building stock (AID-EE, 2006). Furthermore, demonstration projects can raise awareness of energy efficiency amongst the public. This may lead to many imitators of the energy-efficient concepts promoted through the programme.

### 5.4 Success factors and challenges

There are many success factors in running technology procurement programmes to achieve an impact by fostering innovation.

The success of the Swedish technology procurement groups can be attributed to four pillars (IEA, 2000): organisation, process, time and funding. In Table 2 the main success factors are assigned to these pillars.

Table 2: Success factors of technology procurement groups ((IEA, 2000), (Stigh, 2007), (AID-EE, 2006), (Nilsson, 2015))

Pillar	Success factors
<b>Organisation</b>	- Initiation by public authority gives credibility to the technology procurement (high-level support)
	- Initiative may be policy-driven but organisation needs to be user-driven (continuity)
	- Selection and recruitment of interested and committed buyers/group members
	- Selection and recruitment of competent, dedicated and experienced project leader
	- Involvement of all stakeholders
<b>Process</b>	- Choice of technology, level and requirement (goal agreement)
	- Stepwise approach (e.g. 1. audits, 2. demonstration projects, 3. market dissemination)
	- Carry out demonstration projects that members/supplier can refer to
	- Pool the experience and expertise of the group members
	- Short-term feedback on project ideas
	- Independent evaluation to identify weaknesses
	- More actions than talks

Pillar	Success factors
<b>Time</b>	<ul style="list-style-type: none"> <li>- Members allocate sufficient time to the technology procurement group</li> <li>- Realistic time frames e.g. for performing demonstration projects</li> <li>- Accelerate the processes where possible</li> </ul>
<b>Funding</b>	<ul style="list-style-type: none"> <li>- Funding of demonstration projects that members/suppliers can refer to</li> <li>- Sufficient funding amount</li> <li>- Flexible funding (money where it is most needed)</li> <li>- Availability of funding (fiscal years)</li> <li>- Ensure that not some beneficiaries (equipment suppliers, universities, institutes, consultants) are favoured over others</li> </ul>

Therefore, on the one hand challenges arise when, for example, the technology procurement group is not user-driven; the members are not committed enough; or the funding is insufficient. On the other hand, when the technology procurement group does not receive enough attention and confidence from the prospective participants the visibility and resulting impact may be lacking.

Technology procurement groups are a low risk policy instrument since they involve relatively few individuals and little financing. From a financial perspective, the consequences of failure would be very limited (AID-EE, 2006).

## 6. TRANSFERABILITY

### 6.1 General comparability of the context

Both Sweden and Germany are highly-developed industrialised economies, with similarly ambitious GHG emission reduction objectives. Importantly, they are also similar in their economic structure and both feature export-oriented industrial sectors (see Table 3).

**Table 3: Key climate policy and energy indicators to assess comparability of the Swedish and German contexts ((Sweden.se, 2018), (World Bank, 2018), (Climate Transparency, 2017), (UNFCCC, 2017), (Bundesministerium für Wirtschaft und Energie [BMWi], 2017), (Statista, 2018a), (Statista, 2018b), (Central Intelligence Agency, 2018a), (Central Intelligence Agency, 2018b))**

	Germany	Sweden	Comparability
<b>General information</b>			
GDP per capita (in USD, 2017)	44,549.69	53,248.14	Comparable
Exports (in billion USD, 2016)	1,322 (32.5% of GDP)	151.4 (33.9% of GDP)	Comparable
<b>Climate policy ambition</b>			
2020 GHG emission reduction goal (compared to 1990 in %)	As close as possible to -40	-40	Comparable
2050 GHG emissions reduction goal (compared to 1990)	GHG neutrality by 2050 (80-95% reduction)	GHG neutrality by 2045	Comparable

Therefore, Sweden and Germany are highly comparable as highly-developed, industrialised countries.

### 6.2 Properties of the instrument

The SEA states that “the idea of technology procurement groups is not specifically tied to particularities of the Swedish system and therefore the concept should be transferrable to other countries” (Odyssee-Mure, 2017).

Indeed, the evaluation of the BeBo group identified the following relevant technology procurement groups around the globe (SBI, 2016):

- > The international researchers’ network of CIB W118 (clients and users in construction)
- > The European SCI Network
- > The Danish PLUS network
- > The Danish AlmenNet
- > The Dutch ‘Het Opdractsgeversforum in de bouw’
- > The Australian research centre CRC Construction Innovation

Also, numerous other international examples exist with cooperating technology procurement groups (Nilsson, 2015). The following Table 4 shows pilot projects with international project managers, their energy reduction goals, and lessons learned. Although from 2000, the information in the table depicts the important lessons learned and similar principles that have been applied in the procurement programmes of a range of countries.

Table 4: Overview of IEA Annex III Pilot Projects on international technology procurement (IEA, 2000)

Pilot projects	Project manager	Energy reduction goal	Results	Main lessons
Wet appliances: IEA DSM Drier Promotion Competition	The Netherlands	50%	Entry fulfilling all criteria	Market plans should be a condition for submitting an award
Lighting: Replacement Incandescent Lamp – Future Bulb – Competition	United Kingdom	30%	One entry, not fulfilling all criteria. Subsequent one-off prototype produced, which apparently meets criteria	Competing with other important development projects among manufacturers, as CFLs
Copiers: Copier of the Future Competition	United States	By 70-75% down to 25%	Entry and prototype fulfilling all criteria	Receipt of the award was the real challenge which was the driving force
Industrial Motors: IEA Hi-Motors Competition	Finland	20-40% reduction of losses	Two prototypes fulfilling all criteria	The award was the real challenge. Most motors bought by systems suppliers, low initial purchase price important
LED Traffic Signals	Sweden in collaboration with the Netherlands	Cost reduction of: energy 35-90%; maintenance 50-70%	In starting phase	Different interest in different countries concerning individual lamps or whole signal heads

The Swedish Technology Procurement Programme also showed that technology procurement groups are applicable to a multitude of sectors, technologies, systems and purposes (Nilsson, 2015).

Therefore, the transferability of such programmes to other countries has been proven and the concept of technology procurement groups can generally be transferred to Germany.

After consultation with renowned German country experts<sup>11</sup> however, we find that no directly comparable, policy-driven technology procurement groups exists in the German buildings sector.

Nevertheless, initiatives exist in Germany that resemble the concept of technology procurement groups. One example is the project 'Mittelstand für Energieeffizienz' (NKI, 2018) funded by the national climate initiative ('Nationale Klimaschutzinitiative', NKI) between 2012–2015. The aim of the project was to motivate the members of the network 'DER MITTELSTANDSVERBUND – ZGV e.V.' to make use of

<sup>11</sup> Martin Pehnt (ifeu), Barbara Schlomann (Fraunhofer ISI), Andreas Hermelink and Markus Offermann (Ecofys).

subsidised energy consultations to identify energy efficiency potentials. The network is an umbrella of 230,000 small and medium sized retail and craft enterprises (e.g., franchise enterprises of Edeka, Rewe or Intersport). The project was able to save more than 7,500 tCO<sub>2</sub>.

Initiatives such as the 'Einsparzähler'<sup>12</sup> (Bundesamt für Wirtschaft und Ausfuhrkontrolle [BAFA], 2018), 'STEP up'<sup>13</sup> (BMW, 2018) and 'Energiesprung Deutschland'<sup>14</sup> (DENA, 2018) resemble technology procurement groups. However, within these programmes, the initiative originates from the policy realm and not from the demand side as is the case in Sweden's BeBo or BeLok.

The above mentioned examples demonstrate the general applicability of Swedish technology procurement groups in Germany. Following the example of BeBo and BeLok, policy-initiated but user-driven groups may be formed in Germany for residential and non-residential buildings.

### 6.3 Potential impacts

As addressed in chapter 5, there are numerous benefits of technology procurement groups. Additionally, the groups support the establishment of networks and professional communication lines where based on practical experiences; members can exchange ideas; discuss new technologies; and formulate projects that they can test and apply. Yet even in Sweden, where technology procurement groups have existed for a long time, the SEA had difficulties in quantifying the impact of the groups (Odyssey-Mure, 2017). The evaluations of the BeBo (SBI, 2016) and BeLok groups (AID-EE, 2006) did not attempt to quantify their respective impacts.

While estimating the quantitative impacts of an introduction of technology procurement groups for Germany proves to be very difficult, it is clear that Germany could benefit from developing new products, systems or processes that meet buyers' requirements better than the products already on the market.

### 6.4 Conclusion

This study explores the Swedish technology procurement groups ('Innovation Cluster') and the transferability thereof to Germany. The experiences of Sweden offer valuable insight into how the value of technology procurement groups can be maximised and ultimately contribute to the achievement of energy efficiency targets and emission reductions in the buildings sector. After consulting German and Swedish country experts, we find that the Swedish technology procurement groups can serve as a role model for Germany.

The SEA has for many years financed order groups and networks to create a platform for close collaboration between industry/market actors and the state in order to reduce energy use in buildings. The purpose of the ordering groups/networks is to create a meeting place and a platform where state, business and academia together can develop energy-efficient methods, create good examples, make demonstrations and correct market failures. By gathering everyone in the field in these order groups/networks, new methods and models for energy efficiency are developed.

The primary Swedish technology procurement groups are BeBo for residential and BeLok for non-residential buildings. Through their work, member organisations can increase the likelihood that future

<sup>12</sup> Project aim: Fund innovative pilot projects for end-users by companies and company networks that save energy by monitoring energy consumption data.

<sup>13</sup> Project aim: Fund innovative energy efficiency projects through the organisation of a competition.

<sup>14</sup> Project aim: Mediate between landlords of multi-family buildings and the construction industry to reduce market barriers for serial innovative renovation solutions.

efficiency improvements reach the market earlier. This is done, for example, by implementing demonstration projects with independent evaluations that prove the real energy savings of innovative solutions to suppliers. For stakeholders like housing associations or commercial landlords the groups are attractive to join since they are inexpensive and present opportunities to promote innovative solutions.

From the perspective of policy making, technology procurement groups are an important instrument for ensuring a faster introduction of innovative energy-saving solutions to the market, and consequently the achievement of future efficiency improvements. Such programmes can be considered low risk policy tools since they involve few human or capital resources.

In Germany, there have been and currently are several initiatives that foster the introduction of innovative energy-saving solutions to the market (e.g. 'Mittelstand für Energieeffizienz', completed in 2015, or 'Einsparzähler,' currently active). Although not perfectly comparable, their existence allude to the general transferability of the Swedish technology procurement groups to Germany.

Although the German initiatives are also valuable for reducing emissions in the buildings sector, they are not user-driven but rather policy driven. The main advantage of user-driven technology procurement groups such as those in Sweden is the motivation and commitment to the overall objective, also at the political level. This powerful group of clients (demand side) is able to change the behaviour of the industry (supply side) by changing the demand patterns.

In order to reach impact by fostering innovation through the technology procurement groups, there are many success factors, the most important of which include driving force, knowledge, communication and resources. Also, overall leadership from the government, with clear goals, policies and funding is critical for success.

It is likely that technology procurement groups can add to the existing policy instruments by incentivising the various motivated stakeholders to pool their expertise, network and purchasing power to alter the trajectory of the market to more innovative solutions in the buildings sector.

## 7. REFERENCES

- AID-EE. (2006). *Evaluation of BELOK (Procurement group for commercial buildings) (Sweden)*.
- BeBo. (2018). Retrieved from <http://www.bebostad.se/in-english-dold-sida/>
- BELOK. (2015). *BELOK Total Projects: A summary*.
- Bundesamt für Wirtschaft und Ausfuhrkontrolle (BAFA). (2018). *Einsparzähler: (Pilotprogramm)*.
- Bundesministerium für Wirtschaft und Energie (BMWi). (2017). *Energieeffizienz in Zahlen: Berlin*.
- Bundesministerium für Wirtschaft und Energie (BMWi). (2018). *Förderung von Stromeinsparungen im Rahmen wettbewerblicher Ausschreibungen:: STromEffizienzPotentiale nutzen ("STEP up!")*.
- Central Intelligence Agency. (2018a). *The World Factbook: Germany*.
- Central Intelligence Agency. (2018b). *The World Factbook: Sweden*.
- CIT. (2018). *Guidelines and Tools: Total Concept profitability calculation tool*.
- Climate Transparency. (2017). *Brown to Green: The G20 transition to a low-carbon economy*.
- DENA. (2018). *Serielles Sanieren von Mehrfamilienhäusern*.
- EC. (2015). *Commission Staff Working Document: Country Factsheet Sweden*.
- EU DIRECTIVE 2014/24/EU. (2014). *Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement and repealing Directive 2004/18/EC*.
- European Commission (EC). (2010). *Communication from the Commission.: Europe 2020. A strategy for smart, sustainable and inclusive growth*. Brussels.
- European Commission (EC). (2016). *EU Public Procurement reform Less bureaucracy, higher efficiency*.
- Government Offices of Sweden. (2017). *Den största klimatsatsningen någonsin*.
- IEA. (2000). *FINAL MANAGEMENT REPORT: Annex III Co-operative Procurement of Innovative Technologies for Demand-Side Management*.
- IEA. (2017). *Sweden - Energy System Overview*.
- Johborg, C.-M. (2015). *Technology Procurement - a winning method in driving innovation*.
- Nilsson, L. (2015). *How to make the best technology even better, BAT becomes BAT+: Experiences with Procurement as an Instrument for Technical Changes on the Market*.
- NKI. (2018). *Mittelstand für Energieeffizienz: Innovatives Informations- und Beratungskonzept zur CO<sub>2</sub>-Reduzierung für die im MITTELSTANDSVERBUND organisierten 230.000 deutschen Handels- und Handwerksbetriebe zur Zielerreichung der Nationalen Klimaschutzinitiative*.
- Odyssee-Mure. (2017). *Technology procurement groups*.
- OECD. (2016). *Emission data*.
- SBI. (2016). *Evaluating BEBO - The Swedish procurement group for housing: A follow-up analysis*. Copenhagen.
- SCB. (2017). *Electricity supply and use 2001-2016 (GWh)*.
- SEA. (2018). *Facts and Figures 2018*.
- SEA-Akkurt. (2018). *Interview with Sara Akkurt, Swedish Energy Agency (SEA)*.
- Statista. (2018a). *Germany gross domestic product (GDP) per capita in current prices from 2012 to 2022 (in U.S. dollars)*.
- Statista. (2018b). *Sweden gross domestic product (GDP) per capita in current prices from 2012 to 2022 (in U.S. dollars)*.
- Stigh, L. (2007). *Technology Procurement in Sweden*.
- Sweden.se. (2018). *Energy Use in Sweden*.

Swedish Competition Authority. (2017). *Swedish Public Procurement Act*.

Swedish Energy Agency (SEA). (2015). *Energy Efficiency trends and policies in Sweden*.

UNFCCC. (2017). Sweden Plans to Be Carbon Neutral by 2045.

World Bank. (2018). Research and development expenditure (% of GDP).