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# Public sector innovation

## Case Study on the City with Energy Efficiency: SEE Stuttgart

**Framework Service Contract 151364-2009 Ao8-BE - Specific Contract "Lessons from ten years of innovation policies and of public sector innovations in Europe"**

*Funded by the*



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# Introduction

Today, the public sector has to innovate itself if it wants to raise its efficiency, to provide solutions for societal challenges and to meet the increasing demand of businesses and citizens in a rapidly changing and technologically evolving environment.

With the objective to deepen knowledge and understanding of public sector innovations, 6 case studies will present a specific case in the most inspirational manner evidenced in Europe or in third countries keeping in mind its replicability to other EU Member States.

The public sector includes all organisations in the field of the public administration, irrespective of their funding source and the legal form of the supplier. The type of innovation can be a product, a process, an organisational innovation, or an innovation on communication.

For the purposed of the case studies, public sector innovation is defined as the following:

- *Product innovation*: the introduction of goods or services that are new or significantly improved with respect to its characteristics or intended uses. This includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics.
- *Process innovation*: the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software.
- *Organisational innovation*: the implementation of a new organisational method in the public service's practices, workplace organisation or external relations.

This definition encompasses new innovations as well as the adoption or diffusion of innovations (innovations developed elsewhere). The innovation can directly or indirectly affect the public administration itself, other parts of the sector or a dedicated public sector (such as health, transport, security), and/or the private sector in general or a dedicated group within the private sector (e.g., SMEs, the self-employed, a NACE sector) and/or end users such as citizens.

## 1. Short summary of the case

At first sight, the selected case of the German city of Stuttgart seems to be related to climate change and environmental aspects and one may wonder, how it fits with public sector innovation. The link is becoming more obvious when functions of the public sector and challenges are addressed: Cities as conglomerates of people and industries, and they are equally conglomerates of energy demand. The density renders them a prime target for energy saving measures, for experimenting with new mobility and living concepts. The climate change is a prime challenge in Germany and is addressed at all levels – federal, regional (Land), and local (cities and communes) level. It is commonly addressed as energy change ('Energiewende') and includes energy efficiency policies as well as substitution of fuel and atomic energy via regenerative energies. In this respect, the public sector in cities (as elsewhere) is not only the owner of buildings, buyer of energy, or provider of energy, but public administration has a number of means at hand to coordinate, to provide incentives, and to act as a role model for supporting a much broader uptake by the local inhabitants and businesses. While new constructions follow energy efficient regulations, the challenge is to renovate the building stock dating from before the 1980s.

Scale effects can be achieved - CO<sub>2</sub> emission of cities for example can be addressed best by a spatially inclusive insulation of buildings and by the provision of climate neutral energy (Wuppertal Institut 2010).

Spatially inclusive insulation could be organised bottom-up by neighbourhood initiatives and building owners are free to install photovoltaic or solar panels. These individual activities however can be upscaled, more efficiently organised and thus become cheaper for the individual and with a larger environmental impact if they are well communicated and coordinated by public administration.

Stuttgart is one among a growing number of German and other European cities ('[Energy Cities](#)') aiming to use the power of public administration and the public sector to influence and shape the demand and use of energy. The city has won a competition and uses this funding in order to set up an energy roadmap by 2016, lasting until 2050.

## 2. Aspect of innovation

SEE ("Stadt mit Energieeffizienz Stuttgart") is one of the winners of the competition 'Energy-efficient city' launched by the Federal Ministry of Education and Research (BMBF) in 2008, where in the end, five cities were selected. They receive each €5 million during 2011-2016.

The competition of the BMBF addresses the challenge of energy efficient cities. It aims at three objectives:

- To develop and implement forward-looking ideas;
- To conceptualise "cities as a system";
- To develop service innovations as a key role.

The BMBF aims to fund innovative concepts to rearrange energy systems of cities. By selecting five model cities, the competition aims to provide role models and hands-on practical knowledge for the spreading of concepts and their implementations in the public sector and to foster innovation in industry and society.

Since energy consumption is mirrored in growing energy costs, it puts pressure on the public sector, industry and private consumers alike. Which concrete goals to set and

how to achieve them, however, is difficult to envisage. The public sector, here the city of Stuttgart, thus decided to use SEE to develop a strategy that includes all actors and activities at all levels and to implement the strategy. By 2016, the goal is to develop an energy roadmap with a target of 2020 and lasting to 2050.

The strategy has three phases. In the first phase, an analysis at **macro perspective** provided a clear picture about the energy consumption in the city by sector. In the second phase, a **micro analysis** addressed individual actors, including private households, and identified optimisation potentials. Since not all sectors are enthusiastic about the price to pay for this goal, it is important to develop service models in order to motivate many possible actors (citizens, landlords, industry, etc.). Experience in national and international demonstration projects where the city of Stuttgart was or is involved, indicate *the role model function of the public sector for the acceptance of measures in the private sector*. Thus, it is important to realise short-term significant energy efficient changes in the public sector and to communicate them actively. The development of measures is based on a cost-benefit analysis, it involves different actors and takes into account the time needed for implementation, the periods when effects can be measured, the costs, public acceptance and overall effects.

The SEE strategy thus aims to provide a systematic deduction for communal energy saving strategies, the choice for measures and their monitoring.

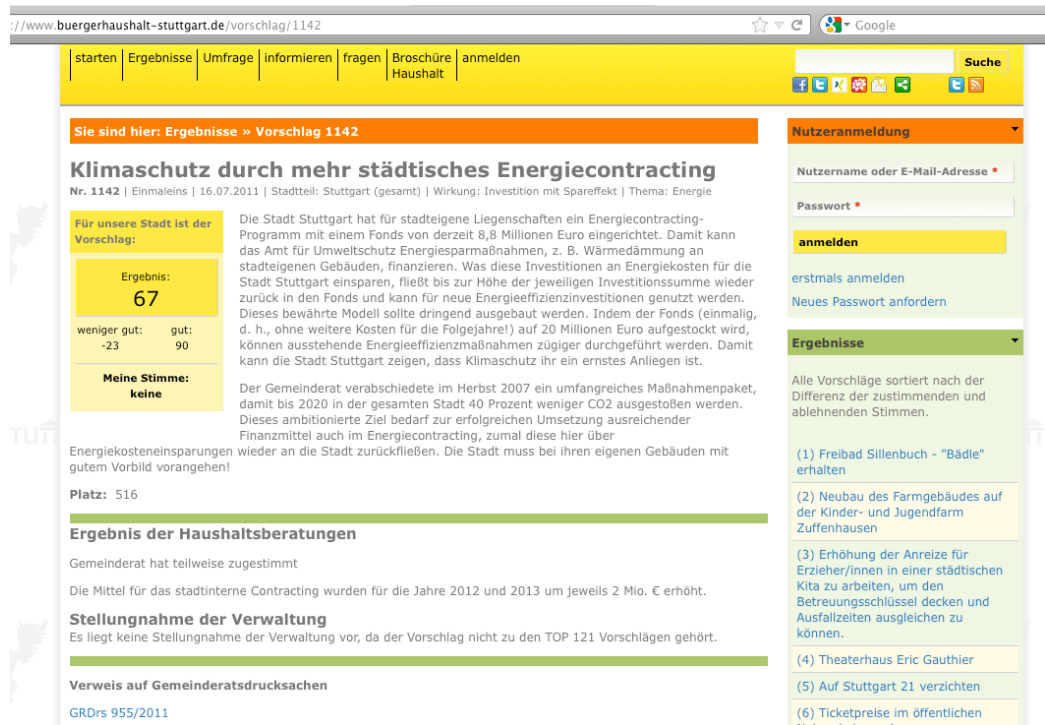
As a result of the macro analysis, Stuttgart has set its energy saving goal: by 2020 it aims to consume 20% less energy than it did in 1990, and 20% of its energy consumption should be provided by renewable energies. Its goal is to set up an energy roadmap until 2050. Based on a number of scenarios, the energy reduction potentials of political, technological and socio-economic measures are analysed and used as a basis for a long-term, open energy road-map that can be adjusted when appropriate. Over time, it provides the basis for discussions and actions.

So far, the project is more concerned with individual private uptake than with industry and businesses. A major part of the micro analysis will be a panel analysis of up to 1.000 private households, in order to measure and monitor energy consumption patterns, and to provide tailored advice. In order to communicate the process and results, TV broadcasting is envisaged. For the business sector, the city policy makers assume that it is in its own economic interest to reduce energy consumption and thus costs. Energy reduction and the business sector are however regulated mostly by national regulation – at local level, cities and communes have only one hard means, the business tax which they can set on their own. Thus, a number of soft measures (aim to) address the business sector, such as training for energy scouts – individuals who could identify energy saving potentials in firms -; or annual competitions and prizes for the most energy-efficient firm. The idea to couple the business tax to the level of energy efficiency of buildings or companies, will need some good justification and ‘roundtable’ discussion.

Among the measures aimed at the business sectors, one is dedicated to a form of participation, namely the ‘roundtable energy efficiency’. This is seen as a means to exchange information and best-practices by sector. The city acts as coordinator and moderator. This form is also envisaged to discuss measures most likely to earn criticism and no immediate acceptance.

Stakeholder consultation as a means to increase acceptance and to obtain know-how on the specific design of the measure is used for selected measures. In this respect the city of Stuttgart is funding an interactive website which invites the habitants to provide ideas, to appraise ideas, and the public administration to respond (see Figure 1).

Figure 1 Bürgerhaushalt-stuttgart.de



The strategy – i.e., the macro balance as well as the results of the strategy model are monitored on a continuing basis (energy controlling, energy monitoring of a sample of households) and reported bi-annually.

The case provides a number of innovative measures interesting to individual households and the business sector alike. One with a possibly high potential in terms of energy saving but also in terms of net financial gains is contracting. This may also foster new services and business opportunities in the financial sector. Industries benefitting directly from the energy related measures are those in construction, renewable energies, and smart mobility.

### 3. How it started

In the case of Stuttgart, the city of Stuttgart is the initiator of SEE. The project is in cooperation with EnBW AG (Energy Baden-Württemberg AG), and two research partners, namely the Fraunhofer Institute for Bauphysik (FhG-IBP for construction physics) and several relevant institutes of the University of Stuttgart. Associated in a cooperative manner are also a number of local or Länder-level associations and corporate bodies such as the chamber of architects and the association of the retail industry of the Land, the energy consulting centre and the airport of Stuttgart, industry like Bosch and Daimler but also local banks as well as the local associations of landlords and tenants respectively.

Stuttgart has a long-standing history in terms of energy saving and energy efficiency policies. The city participated in several national and international projects and uses the experiences gained from its participation in the divers projects in its energy and environmental policies since many years.

Within SEE, the Fraunhofer Institute and the University of Stuttgart are responsible for the macro analysis, the identification of optimisation potentials, development of measures and the analysis of impacts. The city of Stuttgart has a coordinating function for the implementation of the strategy and a role model function for private sector and private household uptake.

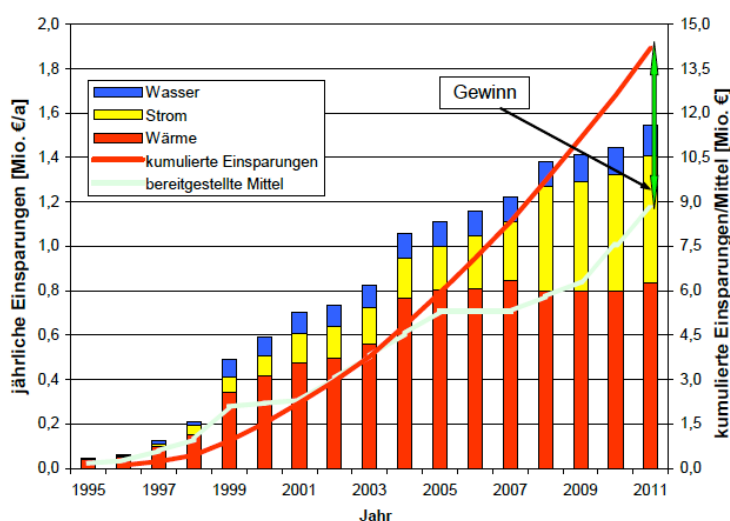


## 4. Obstacles and solutions

One of the major dilemmas and a challenge to overcome is to increase the rate of thermo insulation of buildings of private households. In Stuttgart, as in most German cities, the rate of ownership of individual houses is low. The majority of people rent apartments in privately owned or commercially owned buildings. Despite existing financing measures available in Germany via the KfW banking group, only 2% of the privately owned buildings built before 1984 in Stuttgart annually are actually refurbished to save energy. Results of the micro analysis indicated that 48% of the 73.000 residential buildings are owned by private individuals, the majority aged 50+, the rest is basically owned by housing societies. While these tend to maintain a continuous budget for refurbishment investments, the private owners tend to see their ownership as a form of pension and are reluctant to invest in energy saving measures with no immediate private gain in particular since they tend to pay these investments from own equity instead of external funding commonly used by commercial entities. This principal-agent problem is due to the issue that owners have to bear the costs for the (often costly) refurbishment while tenants profit from lower energy consumption. In Germany, only 11% of those costs can be shifted to the tenant per year.

In order to remedy this low rate, Stuttgart aims at widening and adapting an existing contracting-model for financing energy related refurbishments, so far used internally in the public sector. Financing options for energy-related saving measures for communes are either own resources (i.e., dedicated budget items), through external contracting, public-private partnerships, or – the so-called **city-internal contracting model**, which was developed in 1995 in Stuttgart, and diffused to several other German and non-German cities. This internal contracting model uses liquidity within the commune, in particular the environmental office, which has its own budget. Since the various public entities in a commune do not necessarily plan budgets for refurbishments, they 'borrow' the money from the environmental office. Since the refurbishments then affect energy bills, the initial investments are paid from the gained cost savings until the investment is repaid. On average, this takes 7.3 years. From 1995 to 2011, €8.8 million were contracted, €14.2 million were obtained due to energy savings so that there is a net gain for the internal contracting of €5.4 million (see Figure 2). In terms of CO<sub>2</sub> reduction, investments due to the internal contracting model realised a reduction until 2011 of about 87.000 tons.

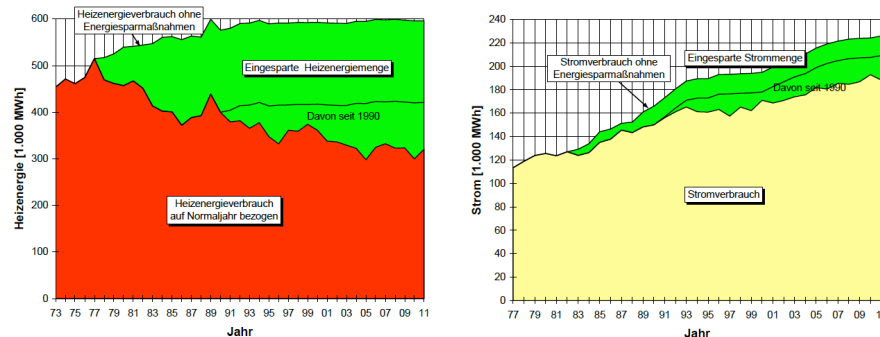
Figure 2 Energy cost savings due to internal contracting



Source: Landeshauptstadt Stuttgart (2012), Energiebericht 2011

The Environmental office provides data on energy consumption in the building stock of the public sector. The curves in Figure 3 show the net gains due to energy saving investments for heating (left) and electricity (right).

Figure 3 Energy savings for heating and electricity (1970s to present)



Source: Landeshauptstadt Stuttgart (2012), Energiebericht 2011

Since this internal contracting model proves to be successful in terms of lowering energy consumption and CO<sub>2</sub> emissions, and provides a net gain for the public sector, it is envisaged under SEE to be extended to private households. Financial aspects are already discussed with local savings banks. For the legal aspects, expert reports are commissioned.

The main energy user is, however, the industry sector. While campaigns are envisaged to foster industry's own energy-savings, these campaigns have a relatively low impact on real energy consumption patterns. The most effective measure would be an energy-related business tax that rewards low energy consumption. This tax will be discussed in the 'roundtable' events.

## 5. Lessons learnt

The public sector acts as catalyst and role model. Stuttgart's internal contracting model is a financing model that offers even limited additional revenues to communes – instead of having to pay the benefits to an external contractor in other financing forms. In terms of energy saving potential, the public sector in Stuttgart shows a limited potential, limited mainly due to a longer tradition of energy saving measures at public level. With SEE, the public sector has nevertheless taken the lead in an approach to energy-efficiency that includes the public and the private sector. The city aims to provide a benchmark analysis by sectors, identify individual energy-saving potentials, and suggesting various measures. Within a micro analysis, the suggested measures are evaluated in terms of uptake (acceptance) and impact (energy saving). Public consultation ('roundtables') and a broad stakeholder involvement as well as active communication of achievements are promoting the concept and the goal.

In order to foster changes in energy consumption and behavioural patterns, the case shows that

- the public sector can act as a role model in terms of efficiency;
- best practice models working well in the public sector such as the internal contracting, can be adapted and should spread to the private households for greater uptake of necessary investments in older, residential buildings;
- A convincing database (here: energy consumption flows of the public sector as available for a long period, as well as the envisaged detailed analysis of 1000 private households) can be used for a factual discussion and may positively influence unpopular decisions;

- A broad consensus involving all stakeholders and commonly agreed milestones are important to set up a long-term roadmap and strategy.

## Appendix A Bibliography

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