



OPTION 4

Stuttgart, Germany | Key figures

BUILDING STOCK

74,500 buildings

308,000 housing units

35% single family houses **65%** condominiums

80%
of single family houses are privately owned

TERRITORY

Area of 207 km² **33%**

Share of final energy consumption of households is 33 %

PEOPLE

Population of 610,000



Disposable income per citizen:
€23,024

The aim of the German Federal Government is to have a nearly climate-neutral building stock by 2050. This implies reducing space heating demand by 20 % between 2008 and 2020. There is also a target of reducing primary energy demand by 80 % by 2050.

Stuttgart's short-term goal is to reduce the primary energy consumption by 20 % compared to 1990 and to raise the share of renewable energy to 20 % by 2020. Over the long term the City of Stuttgart has a vision of becoming climate-neutral by 2050.

The issue

The energy refurbishment rate of Stuttgart's building stock is too low

About 80% of Stuttgart's buildings were constructed before the existence of the first Thermal Insulation Regulation in 1977. As a consequence, a very large energy saving potential remains unexploited. In addition to the regulations related to energy efficiency in new buildings there are regulations for the energy refurbishment of existing building stock. In the event of an extensive renovation, the primary

energy demand of the renovated building should not exceed by more than **15 % the energy demand** of a comparable new building. The state of Baden-Württemberg where Stuttgart is situated adopted additional minimum requirements for heating modernisation in existing buildings. When key components of the heating systems are replaced, heat production has to include **15 % of renewable energy**.

In 2014, about two thirds of Stuttgart's residential building stock used gas for heating, followed by oil (15%), district heating (11%) and electricity (10%). Only 2% of residential buildings (generally single-family houses) had a heating system based on renewable energy such as biomass, solar energy or geothermal energy.

The annual energy refurbishment rate of the residential sector in Stuttgart is stagnating at 1% per year. In multi-apartment buildings it is even lower. If the city wants to achieve its energy and climate goals, the rate must increase to 2% by 2020. This means, on a voluntary basis, going beyond the European Energy Efficiency Directive objectives and scope.

Existing financing instruments are underused

Germany has several nation-wide programmes promoting energy retrofits:

- **The German development bank Kreditanstalt für Wiederaufbau (KfW)** offers **soft loans** for energy retrofits of private residential buildings.
- **The market incentive** programme of the Federal Office of Economics and Export Control - Bundesamt für Wirtschaft und Ausfuhrkontrolle (BAFA) offers **grants** for replacing the heating system and integrating renewable energy technologies (solar, biomass, heat pumps).

The KfW and BAFA financial incentives can only be combined in the case of **a global retrofit** that meets the high KfW energy efficiency standards (so called «KfW Efficiency House»). When the homeowners carry out individual measures they need to choose between one of the two incentives.

In addition, in 1998 the city of Stuttgart set up its own **grant scheme**. From 1998 to June 2013 the city awarded energy renovation grants worth €24 million, leading to a total investment of €249 million. Thanks

to this, 13,536 housing units were renovated.

The financial framework for energy retrofits is currently very favourable. Nevertheless, many homeowners are concerned about **frequent changes in the legislative framework and funding instruments**. As a consequence, they are adopting a «wait and see» stance.

Non-financial barriers are more important than the financial ones

A market study revealed that **financing was not the main barrier** to energy retrofits of residential buildings. A set of **non-financial barriers** has been identified including unclear requirements for energy retrofits, untrustworthy providers (damage to buildings), high costs and lack of profitability, cost-benefit dilemma (owner vs. tenant), large effort vs. overtaxing of the owner, disturbances to residents during the work and difficult decision-making in condominiums.

Solution

The city of Stuttgart has developed a **'care-free energy renovation package'** for homeowners. The package is applicable for two types of retrofit work – the **heating system** and/or the **building envelope** – and it includes the following **services**:

- Concept and planning
- Building and construction
- Operation and maintenance (for the heating system only)
- Financing (for the heating system only)
- Guarantee and assumption of risk.

The package offers a high level of **security and flexibility to homeowners** in the form of:

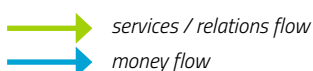
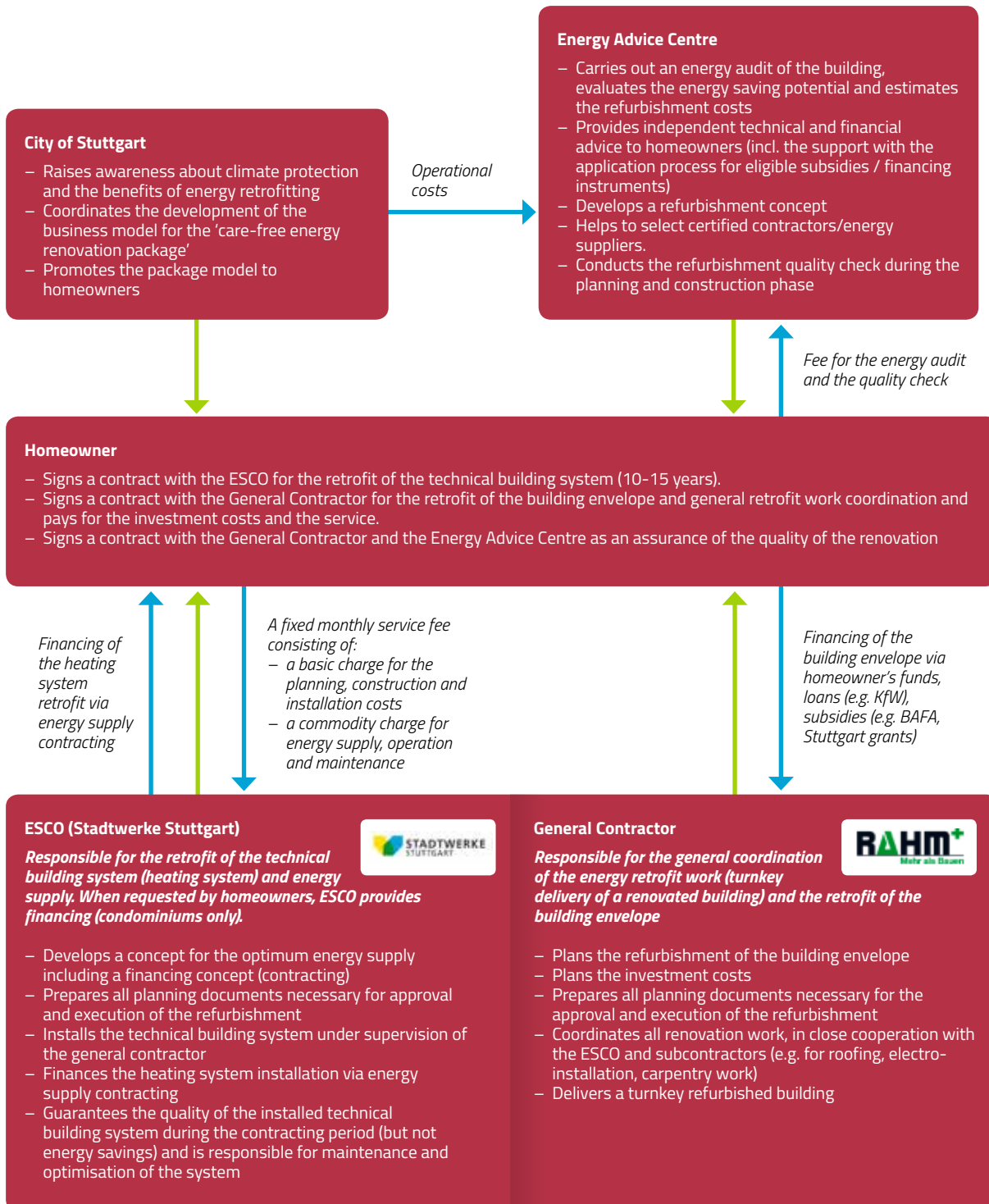
- **Standard model contracts** and tendering documents developed by the city of Stuttgart.
- Independent technical and financial **advice** accompanied by continuous **quality control** provided by Stuttgart's Energy Advice Centre (EAC). The EAC guarantees that the contracted craftsmen and building firms comply with the "Stuttgart

Retrofit Standard" which was developed to ensure high quality energy renovation.

- **High quality retrofit work is implemented** by the municipal energy utility **Stadtwerke Stuttgart** (ESCO) and a private company **'Rahm'** which is also the general coordinator of the renovation work. The ESCO guarantees the technical building system during the contracting period.
- **An energy supply contracting model is offered** to homeowners who wish to replace their heating system but cannot or do not want to take out a loan (e.g. due to their age or creditworthiness) or spend their savings. Instead of a loan, they pay a fixed **monthly service fee** to the ESCO which is the owner of the heating system.
- **Secure energy supply** - highly efficient, resource-saving and climate-friendly.
- **Modular contracts** – homeowners can benefit from and finance all or part of the proposed services.



Business Model



The care-free energy renovation package step by step

Step	Action
Set up a team	<ul style="list-style-type: none"> - A core team responsible for implementation of the contracting scheme consists of the members of the city's energy department, the Energy Advice Centre and the ESCO. - They spent about 10 hours/week or 0.25 Full Time Equivalent on the project.
Carry out a market study	<ul style="list-style-type: none"> - Low refurbishment rate despite homeowners' good financial situations, numerous subsidies and other incentives. - About 80 % of residential buildings were constructed before 1977. In about 40 % of buildings no energy retrofit measures have been carried out since 1998. One measure (mainly renewal of the heating system) has been carried out in about 30 % of buildings. - Factors such as the form of ownership, age of the owner, number of owners, construction age and size of the building have a significant influence on refurbishment activities. The refurbishment rate is the highest in small buildings or single family houses with a middle-aged owner-occupier. - Owner-occupied buildings could have a big potential (refurbishment rate is 2-3 times higher if an owner lives in the building) but 67 % of such owners are 60 years and older. - In Germany, different forms of contracting exist but energy supply contracting is the most common model with a market share of 85 %. Nevertheless, households are not willing to spend money on energy retrofit services and they are reluctant to sign a long-term contract. Condominiums rarely use energy supply contracting.
Develop a business model	<ul style="list-style-type: none"> - The city's objective is to encourage global energy retrofits. The initial business model idea was to develop a 'care-free package' which includes the financing of global retrofits (incl. building envelope) secured by the general contractor. - Unfortunately, this idea failed as none of the potential investors was willing to provide financing. Moreover, the investors found the contracting scheme too complex and suggested that homeowners hire a consultant to obtain legal and contractual advice. - Based on the market study results, the city decided to develop a business model applicable to all types of housing and homeowners. However, it is focusing mainly on condominiums of a min. of 20 apartments in multiple ownership for two main reasons: their low refurbishment rate and high energy consumption make energy retrofits profitable for the ESCO. - The city organised a series of workshops to discuss the business model idea with potential energy service providers and housing companies which: <ul style="list-style-type: none"> ▪ suggested including the contracting in the municipal grant scheme, ▪ had an issue with increasing rental prices due to energy renovation in a city with already high rents, ▪ suggested a one-stop shop for energy retrofits with high quality assurance instead of a contracting model. - Finally, one private company (Rahm+) agreed to play the role of general contractor. It coordinates the whole energy retrofit and implements energy efficiency measures on the building envelope on the condition that the homeowners pay for the investment. The ESCO (Stadtwerke Stuttgart) agreed to finance the heating system replacement via the energy supply contracting.
Set up strategic partnerships	<p>The city decided to cooperate with its key partners for the following reasons:</p> <ul style="list-style-type: none"> - The Energy Advice Centre (EAC): is a reliable and independent institution (non-commercial association) with extensive energy consulting experience. It is funded by the city of Stuttgart and its Chairman was also nominated by the city. - Stadtwerke Stuttgart (ESCO): is a municipal organisation and the city's key partner in realising Stuttgart's energy transition. It has experience with providing energy services and energy supply contracting. The EAC and the ESCO are municipal organisations and they were chosen with no tender needed. The most important criterion was that they are reliable partners which have already worked with the city on various projects. - General Contractor: offers a wide range of high quality construction and renovation services. The company has high competence in the field of refurbishment and is an expert in turnkey construction. The city presented the business model idea to several companies and Rahm+ was the only one interested and willing to sign a partnership agreement.
Launch the scheme & communicate	<ul style="list-style-type: none"> - The municipality is responsible for raising citizens' awareness of climate change and the city's energy transition. The communication and marketing of the package is part of its global communication strategy. - Flyers and posters have been developed and disseminated at several local events such as an annual event for condominiums' property managers which is organised in cooperation with the Landesbank Baden-Württemberg (LBBW) called "WEG Forum". They were also published in the annual guidelines on energy retrofits for property managers. - All key partners are involved in the communication and promotion activities, especially the EAC which acts as a front office for homeowners.



Homeowners' advantages

Homeowners visit the Energy Advice Centre and get a new energy-efficient house in just four steps:

Concept phase	Planning phase	Implementation phase	Use phase
<ul style="list-style-type: none"> - Energy audit - Independent technical and financial advice - Energy retrofit concept 	<ul style="list-style-type: none"> - Retrofit approval - Selection of technology - Detailed planning of the costs and contracting - Quality check by the EAC 	<ul style="list-style-type: none"> - Installation of technical systems by the ESCO - Building envelope retrofit by the General Contractor - Quality check by the EAC - Turnkey delivery of the renovated building. 	<ul style="list-style-type: none"> - Maintenance and optimization of the technical building system by the ESCO during the contracting period - Monthly fee payments to the ESCO / reimbursement of loans (e.g. KfW)

Energy supply contracting

Eligibility criteria		
Type of housing	Type of households	Measures
<p>All types of housing.</p> <p>For condominiums, the following condition applies when a CHP unit is installed: condominiums of a min. of 20 housing units or energy consumption of min. 200,000 kWh/year only are eligible. At this size it becomes financially attractive for the ESCO. For other technologies like solar power or heat pumps there are no such conditions.</p>	<p>Stuttgart citizens, homeowners, landlords and tenants (in agreement with the owner)</p>	<p>>Technical building system (e.g. heating system, photovoltaic or storage battery, heat pumps, etc.)</p>

Conditions

Investment amount: no limit

A fixed monthly service fee:

- A **basic charge** for the planning, construction and installation costs.
- A **commodity charge** for energy supply, operation and maintenance.

Guarantee:

The ESCO guarantees the proper functioning of the technical building systems during the contract period. It does not guarantee energy savings. However, the overall costs for the homeowner should be lower after the renovation. Before the contract is signed, the ESCO runs a financial check.

Risk:

The ESCO takes on the risks:

- Operating risks
- Homeowners not paying the service fees
- Liable for errors in planning & construction

The ESCO has its own financial guarantee system.

Beneficiary's own contribution: not required

Financing scheme highlights

Strong points	Weak points
<ul style="list-style-type: none">– A quality guarantee from the Energy Advice Centre: "Stuttgart Retrofit Standard".– Low staff costs for coordination and low risks related to subcontractors' defaults thanks to the general contractor.– No upfront costs for the technical building system retrofit (remuneration through monthly fees) and a guarantee during the contracting period.	<ul style="list-style-type: none">– Dependence on the ESCO during the contracting period.– May appear complicated for homeowners as the contracts are signed with the global contractor and the ESCO for the global renovation.– Lack of cost transparency because of a fixed price for the whole refurbishment.

Recommendations:

- A detailed market study mapping the inhabitants' needs is very important. Each city faces its own challenges which may be surprising (e. g. in Stuttgart financing is not a problem and yet energy retrofits do not happen).

Next steps: In the medium term the city aims to develop a contracting service for global energy retrofits. It has not lost hope of finding investors willing to finance the retrofit of the building envelope.

Need more details about this case study?

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