



Factsheet: Sweden

Current use of EPCs and potential links to iBRoad

Residential buildings account for about 70% of the Swedish building stock. Many of the buildings built during the Miljonprogrammet, an ambitious public housing programme running in the 1960s and 1970s, are in dire need of renovation. Energy Performance Certificates (EPCs) are primarily requested when a building is changing owner, which is also a common trigger for renovation activities. The EPC includes a list of potential measures targeting each building. The current political discourse is more focused on increasing the building rate of new constructions to meet the increasing demand than on renovating the existing building stock. Energy audits for single-family dwellings are currently very rare in Sweden.

Overview of the building stock

Total building floor area:

682 Mm² (2013)

Share of residential floor area:

70%

Number of single-family houses:

2.2 million (44% of total residential buildings)

Percentage of buildings built before 1990:

86%

Average residential energy consumption:

188 kWh/m²

Average residential envelope performance:

0.80 W/m²°C (2014)

Major renovation rate:

0.88% (2014)

All data comes from the EU Building Stock Observatory

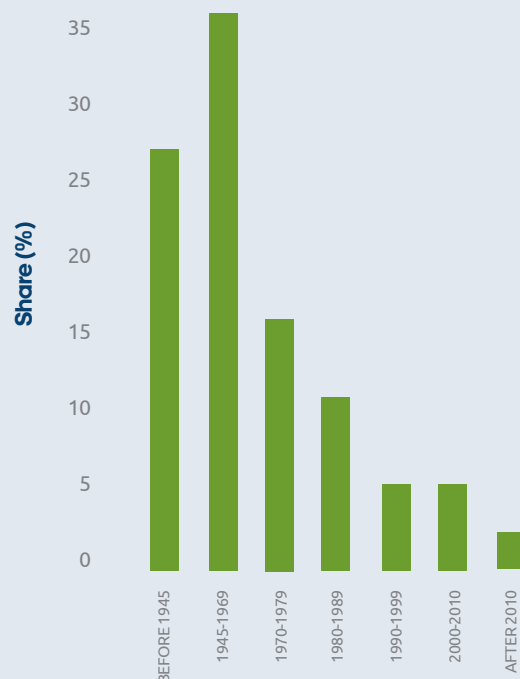


Figure 1: Swedish building stock per construction year
(Source: EU Building Stock Observatory)

Between 1965 and 1975, during the Swedish Miljonprogrammet (the million programme), more than 1 million dwellings were constructed. These dwellings were mostly multi-family buildings in suburban areas, but also single-family houses (semi-detached, terraced houses, etc.). The industrialised construction methods used resulted in many similar buildings built [1]. Estimates show that 75% of these multi-family buildings need an upgrade [2].

Around 715,000 single-family dwellings were constructed between 1961 and 1980. The average energy use of these houses is approximately 40% higher than the corresponding energy used in houses constructed between 2011 and 2013. Just like multi-family buildings, single-family dwellings built during the Miljonprogrammet have many similar building characteristics [3]. The most common trigger for the renovation of single-family dwellings is the change of ownership, where the renovation takes place before the new owner moves in [4].

Overview of existing policies and financial schemes

In Sweden, the implementation of the Energy Performance of Buildings Directive (EPBD) is the responsibility of the Ministry of Enterprise and the Ministry of Environment. The managing body is Boverket, the Swedish National Board of Housing Building and Planning. Boverket manages the building regulations as well as the EPC system. Sweden amended their building performance requirements to comply with the EPBD requirements, with the latest update made in 2016 [5] [6]. The overall goal of the country is to increase energy intensity by 50% until 2030 compared to 2005-levels [7].

Sweden has several governmental instruments

to overcome existing barriers and boost energy renovations, listed below:

- The country has a system of energy and carbon taxation, incentivising energy efficiency and the use of renewables.
- The Swedish government has proposed to allocate 1 billion SEK (about €100 million) per year to the renovation of residential buildings in socio-economically challenged areas [2].
- A tax deduction (Rotavdrag) on the cost of labour for repairs, maintenance or conversion and extension of residential accommodations has been introduced. The tax reduction was lowered from 50% to 30% of labour costs on July 1, 2016. The maximum amount of aid is still 50,000 SEK (about €5,000) per year [7].
- The Swedish government has launched a financial support scheme to install grid-connected photovoltaics (PVs) on buildings. The subsidy covers up to 30% of the investment costs, with a planned budget of about €92 million per year (2018-2020) [8].
- Boverket provided a national information centre for sustainable buildings in 2017, which will start its activity in January 2018. The purpose is to offer guidance to building owners, aiming to increase the number of renovations and the quality of the works [7].
- The Swedish Energy Agency launched Energi-lyftet in 2015. This initiative is an on-line training course aiming to enhance basic skills in low-energy building among operators in the construction sector. The training is aimed at clients, architects, engineers, construction project managers, managers and technicians and will run until 2018 with the possibility of an extension [9].

Since July 2017, all new building permits should comply with the nearly Zero-Energy Building (nZEB) standard, implying that the nZEB definition equals to the current building code. A new single-

family dwelling should not exceed the primary energy consumption of 90 kWh/m² /year, with an average U-value of 0.4 W/m²°C. The requirements are the same for existing buildings undergoing renovation, but then adjusted depending on the size of the renovation measures [10]. The government is planning to tighten the building code again in 2021 [11].

The new nZEB regulation had a real effect on the building code. The energy requirements changed from being indicated in the final energy consumption to the primary energy consumption. Primary energy factors are being introduced for district heating/cooling, biomass, oil and gas [6]. Since the nZEB definition was first implemented in the 2017 building code, no reliable statistics are available at this point.

The experts' opinion^{*}

- **The main barriers for energy efficiency improvements are the high cost of renovation and the uncertainty of which measures to implement.**
- **There are many alternatives to invest in beyond energy efficiency. The most common investments are the ones that are not visible, such as insulating the house foundation.**
- **A better understanding of the building stock would allow the authorities to better target renovation subsidies.**
- **Including non-energy measures in the renovation package could be a trigger for investment.**

^{*} based on interviews and feedbacks received from national experts

The implementation status of the EPC

EPCs were introduced in Sweden in 2006 through the Energy Declaration Act and the first EPC was issued in September 2010 [13]. The Energy Performance Certificate system is run by Boverket, which is responsible for the supervision, the control and the management of the national EPC database.

The purpose of the EPCs is to facilitate an effective energy use and a good indoor environment of the buildings. The EPC should also work as an informative instrument, acting as a useful tool for the building owner [2]. It is required by law that

newly constructed buildings and buildings that are sold should have an EPC. The compliance rate is high with 90-95% of sold buildings getting an EPC [13].

The EPC must be displayed in relevant advertisements, shown to the buyer before a transaction and handed over to the new owner or tenant after the deal is completed [13].

All EPCs are accessible by address on the Boverket's website. The information that can be obtained online is the (i) ID-number of the EPC, (ii) the date of issuance, (iii) the energy performance

rating (given as a single value of specific energy in kWh/m²/year and energy class) and if (iv) a radon check and (v) ventilation controls have been completed. Energy class A of the EPC means that the building's energy performance required is half the requirement of the Swedish building code [13].

Boverket is responsible for the validity check of the EPCs. Input data are automatically controlled by a software. For single-family houses, Boverket only performs compliance checks when prompted by complaints by the end-user (i.e. the new owner of the building) [13].

EPCs must be issued by a certified building/energy expert. The organisations that carry out the certification of experts are accredited by the Swedish Board for Accreditation and Conformity Assessment (SWEDAC). The certifying bodies are under SWEDAC's supervision and have the right to revoke a license if the expert has shown incompetence, or has issued an incorrect or false EPC, although, this has not yet occurred [13].

When issuing an EPC, the energy expert must inspect the building to establish the energy performance and identify cost-effective measures. The proposed measures must be cost-effective and energy efficient, without negative effect on the indoor environment. The recommended measures are often very generic, e.g. "lower your indoor temperature" [11].

FACT BOX

EPCs in Sweden

Responsible authority:

Boverket, Swedish National Board of Housing, Building and Planning.

Availability of a central registry of EPCs:

Basic information is searchable by address

Number of EPCs issued:

681,984 [12]

Percentage of buildings with EPCs:

14%

Period of validity of an EPC:

10 years

Recommendations included in the EPC:

The energy expert suggests recommendations from a possible list of cost-effective measures.

Energy label/continuous scale:

Energy label

Price range for an EPC:

Around €1,000

Median EPC:

Not available

Body responsible for performing quality checks:

Boverket

Penalties for qualified experts for non-compliance:

Mainly administrative

Number of certified energy experts:

823

Requirements to become a certified energy expert:

Technical education (Master), five years' experience (at least 2 years on energy performance or indoor air quality), an exam to re-take every five years to renew the license [13], and being hired by one of the certification bodies.

Indicative cost of training for energy experts:

The test to become a certified energy expert is 2500 SEK (€250) and the application is an additional 5800 SEK (€580).

The experts' opinion

- Many single-family house (SFH) owners perceive the EPC just as an obligation (often when selling the building) and, in general, do not pay much attention to the energy score or content.
- All interviewees considered the information in the EPC as being 'slightly useful' when preparing a renovation. The recommendations included were considered too generic. Another problem highlighted was that the suggested measures in the EPC are supposed to be cost-effective, which means that measures not following this criterion are being excluded.
- Only a few people consider the EPC when purchasing a house.
- Experts also concluded that building owners want the cheapest possible EPC, which in some cases has a negative effect on its quality.
- The current EPC system does not reflect if the proposed measures have been implemented or not.
- It would be good to make use of the data in the EPC registry. "We (Boverket) are currently looking into how that can be done. But then we must take into account personal integrity, data protection, etc. Maybe it is about the level of availability you have for the data. Maybe make it possible to compare different buildings with some kind of tool, to make it easier for the individual property owner".

Current status of energy audits and potential market for iBRoad

This section is about energy audits and tools, which are not included in the EPC framework. The audit described here is not identical to the energy check needed to produce an EPC.

Energy audits of single-family dwellings are very rare in Sweden. Municipalities have an appointed energy advisor, to whom individuals (e.g. SFH-owners) can ask questions about the potential energy efficiency improvements of their house. Normally, the building owner is contacting an installer, or the component supplier, when planning renovation measures (e.g. replacing the windows).

The market for energy performance calculation tools is not very restricted in Sweden and several tools exist. The Swedish Home Owners Association refers to a tool called Energikalkyl, for building owners to use when planning renovation measures, such as adding further insulation [14]. Energikalkyl is owned by the Swedish Energy

Agency and aims at helping building owners to reduce their energy consumption. Other common software/tools include VIP-Energy [15], BV2 [16], IDA ICE [17] and the Passive House Planning Package [18].

The individual building renovation roadmap (iBRoad) could support the building owner with a more comprehensive understanding of the building and its renovation needs. Many of the renovation measures are 'shallow' and sometimes badly advised. The experts emphasise that advising building owners to take the correct renovation decision would be welcomed by the market.

The experts' opinion

- An obstacle to energy audits in Sweden is the labour cost, which is relatively high. The reluctance to invest in energy audits can also be explained by a lack of understanding of the benefits it would entail, but also of the wider benefits (staged) deep renovation can bring.
- Most experts think introducing recommendations for (staged) deep renovation would be welcomed by the market, especially mapping out the order of measures, as this is not reflected in the current tool.
- One expert thinks most people use online search engines to find out which measures to implement. The information they find is often insufficient and sometimes inaccurate.
- Regarding the labour cost for energy auditing, if the energy auditor spends three extra hours compared with the current time to issue an EPC, it will cost the end-user about €300 more. Convincing the building owner of the added value is difficult.
- A complete concept that makes the homeowner's decisions easier would be helpful, especially if linked with a smart financial solution (e.g. ESCO).
- A Swedish iBRoad could be coupled with an online database, either developed by authorities or on a voluntary basis. Making the building renovation information available, visible and comparable could boost the interest in building renovations.

References

1. J. Erson, "Att spara på värme - Energieffektiviseringar i fjärrvärmeanslutna flerbostadshus från miljonprogrammet i Uppsala," Uppsala Universitet, Uppsala, 2016.
2. Boverket, "Underlag till den andra nationella strategin för energieffektiviserande renovering," 2016.
3. T. Ekström, "Passive house renovation of Swedish single-family houses from the 1960s and 1970s," Lund University, Lund, 2017.
4. B. &. Energimyndigheten, "Förslag till nationell strategi för energieffektiviserande renovering," 2013.
5. Concerted Action - Energy Performance of Buildings, "Implementation of the EPBD," 2015.
6. Boverket, "Boverket's building regulations – mandatory provisions and general recommendations, BBR," 2016.
7. Sveriges regering, "Sveriges fjärde nationella handlingsplan för energieffektivisering (NEEAP)," 2017.
8. Regeringskansliet, "Fler ska få stöd för att sätta upp solceller på taken," [Online]. Available: <http://www.regeringen.se/pressmeddelanden/2017/09/ fler-ska-a-stod-for-att-satta-upp-solceller-pa-taken/>.
9. Energimyndigheten, "Energilyftet - för dig som arbetar med framtidens byggnader," 2017. [Online]. Available: <http://www.energimyndigheten.se/energieffektivisering/byggnader/energilyftet/>.
10. Boverket, "Nära-nollenergibyggnader i Sverige," 2017. [Online]. Available: <https://www.boverket.se/sv/byggande/uppdrag/nara-nollenergibyggnader-i-sverige/>.
11. iBRoad, "Interview with experts," 2017.
12. Boverket, "Trend - Energideklarationer," 2007-11-01 - 2017-10-31, [Online]. Available: <https://www.boverket.se/contentassets/1fc456aa2c514a4fb7c3dd84a78a0299/2017-11-01-trend-energideklarationer.pdf>
13. C. Action, "2016 Implementing the Energy Performance of Buildings Directive (EPBD) Featuring Country Reports," 2016.
14. Energimyndigheten, "Energikalkylen," 2017. [Online]. Available: <http://energikalkylen.energimyndigheten.se/sv/smahus/>.
15. StruSoft, "VIP-Energy," 2017. [Online]. Available: <http://www.strusoft.com/products/vip-energy>.
16. CIT Energy Management AB, "BV2 - Energiberäkningsprogrammet," [Online]. Available: <http://www.bv2.se/9/index.php>.
17. EQUA, "IDA Indoor Climate and Energy," 2017. [Online]. Available: <https://www.equa.se/en/ida-ice>.
18. Passive House Institute, "Passive House Planning Package (PHPP)," 2017. [Online]. Available: http://passivehouse.com/04_phpp/04_phpp.htm.

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Annex

Swedish Energy Performance Certificate

Sammanfattning av

ENERGIDEKLARATION

Nybyggnadsår:

Energideklarations-ID:

ENERGIKLASSER

A

B

C

D

E

F

G

D

DENNA BYGGNADS
ENERGIKLASS

Energiprestanda:
72 kWh/m² och år

Krav vid uppförande av
ny byggnad [jan 2012]:
Energiklass C, 55 kWh/m² och år

Uppvärmningssystem:
Värmepump-frånluft (el)

Radonmätning:
Utförd

Åtgärdsförslag:
Har lämnats

Energideklarationen är utförd av:
 , 2014-02-18

Energideklarationen är giltig till:
2024-02-18

Energideklarationen i sin helhet
finns hos byggnadens ägare.

För mer information:
www.boverket.se/energideklaration

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