BUILDINGS FOR THE VISEGRAD FUTURE

supported by Visegrad Fund

Buildings for the Visegrad Future: Comparative Study (Draft)

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Foreword

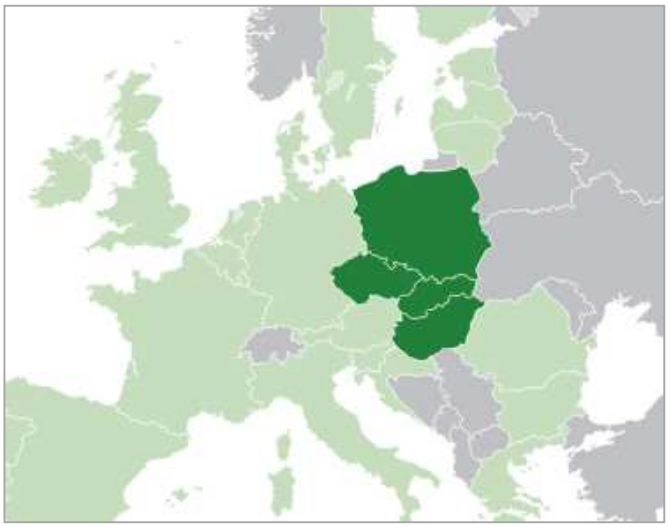
Compilation of this Comparative Study has been made possible thanks to the generous support of the International Visegrad Fund and is part of a larger project „Improving energy security of the Visegrad through better energy efficiency of buildings“, pursued by a consortium including Buildings for the Future (Slovakia, project leader), Chance for Buildings (Czech Republic), Hungarian Energy Efficiency Institute (Hungary, MEHI) and National Energy Conservation Agency (Poland, NAPE).

The Comparative Study provides a brief overview of existing public policies promoting renovation and energy efficiency of buildings in individual V4 countries. The Study identifies best practices and pressing issues mainly in the 4 policy areas energy performance certification of buildings, innovation and sustainability of buildings, incentivizing building renovation after 2020 with limited EU funds and upgrading housing conditions of low income population in the Visegrad.

The Study is based on previous work, public data and expertise of the project organizations and their experts.

Introduction

Quoting Wikipedia, “The Visegrád Group, Visegrád Four, or V4 is a cultural and political alliance of four Central European states – the Czech Republic, Hungary, Poland and Slovakia, that are members of the European Union (EU) – for the purposes of advancing military, cultural, economic and energy cooperation with one another along with furthering their integration in the EU. All four nations in the Visegrád Group are high-income countries with a very high Human Development Index. If counted as a single nation state, the Visegrád Group would be the fifth largest economy in Europe and the 12th largest in the world.”



The region of 533 thousand square kilometers is home to 64 million people with an average GDP per capita of 25,962 EUR. “Most people live in Poland (38 million), followed by the Czech Republic (nearly 11 million), Hungary (nearly 10 million) and Slovakia (5.5 million).,” concludes Wikipedia.

The building stock, ownership of housing and climate conditions are very similar in V4 countries. So are the negative societal, environmental, economic and energy security impacts of energy inefficient and non-renovated buildings.

In Slovakia alone, these include the highest energy bills per income in the European Union, 3 thousand premature deaths annually due to air pollution caused by heating with solid fuels and 1.5–2.9 times more frequent health issues due to unsatisfactory housing. Figures for other V4 countries are very similar (see Energy Factsheets by EC and below). Public policies promoting quality

renovation and new-build are needed to reduce these negative and deliver the positive impacts of buildings.

Just in healthcare cost attributable to low quality of buildings, the Visegrad region bears cost of 5,3 – 11,2 billion EUR a year. On the other hand, comprehensive research suggest that healthy buildings increase productivity by as much as 8 % (in office buildings alone), which is a potential 66,5 billion EUR in GDP increase (conservatively considering 4 % productivity increase).

Comprehensive and effective policy framework for all types of buildings and population segments is, however, lacking across the V4 as national capacities are insufficient to focus on the entire issue in its broad scope. The need for policies is huge, though: 2/3 of Visegrad residential buildings have yet to be renovated more than 40 years since being built. The 2030 EU targets and the Paris Accord goals will increase the need for investment, yet European Union Funds / European Structural and Investment Fund availability will decrease. New innovative financing models incentivized by public policies are needed more than ever.

Trends

Just like other European countries, the Visegrad will face three major trends in the coming decades with major impacts on buildings, their renovation and construction:

1. **Climate change** – represented in the region by higher average temperatures, lower precipitation, longer periods of heat waves and drought and, finally, extreme weather such as storms and howling winds. The challenge is two-fold: reduce green-house gas emissions by 80-95 % by 2050 on path to low-carbon economy (EU commitment) and adapt the economies and societies to new climate. Improving energy efficiency of buildings, if done properly, goes hand-in-hand with adapting buildings to climate change and cutting their emissions. Buildings in V4, built predominantly before 1990 in line with past regulations based on the climate conditions of 1950´s, are naturally not fit for the changing climate.
2. **Ageing population** – In 2007 – 2017, Visegrad countries aged faster than the EU on average. In Slovakia, people above 65 will form 30 % of population in 2050, compared to the current share of 15 %. The challenge is to make buildings fit to help the increasing group of older people cope with higher temperatures and other representations of climate change, but also to make buildings fit to provide the services this part of society needs.
3. **Urbanization** – this global trend will continue to move people from rural areas to towns and cities in the low urbanized V4, as well. In Slovakia alone, we expect this will add 25 % of the current residential building stock in cities by 2050.

Energy security

As documented by Eurostat charts included in this Study, Visegrad economies rank among the most energy intensive, energy import depending countries with low share of renewables in the European Union. Heavy investments into interconnections in recent years help improve energy security of the V4, but the root-cause and risks remain. V4 does not have their energy supply in own hands, yet their economies largely rely on energy. While shifts in industry are slow and linked to concerns of

rising unemployment, buildings – consuming about 40 % of all energy – should be explored for energy savings to sustainably improve Visegrad´s energy security.

Building Stock

The residential sector in V4 countries is very similar. Predominantly built in 1920 – 1990, about half of all dwellings are in single-family homes and 35 – 69 % of flats in multi-apartment buildings are located in panel blocks built in the communist era. Roughly 2/3 of residential buildings still need to undergo their first major renovation since being built. Apartments are mostly occupant-owned (90 %) with somewhat lower figures in the Czech Republic and Poland where around 20 % of the stock is managed by municipalities or rental housing companies.

New construction has seen an increase in recent years following the economic renaissance after the crisis and is expected to continue, as flats are scarce. Compared to the EU average of 400 – 500 dwellings per 1000 inhabitants, Visegrad countries, except for Hungary, have a gap to bridge.

Data on public buildings or private non-residential is much less available (with exception of Slovakia). Yet, schools, health care facilities and public offices are the infrastructure to deliver public services and ensure future prosperity through well educated, healthy and productive society. Public buildings should therefore role model quality renovation and inspire private owners to invest into their own asset renovation.

Energy efficiency of buildings before renovation is very low – owing to their period of construction. Unfortunately, renovation of buildings, even with public support, is often performed at level below potential. Energy savings thus don't achieve the potential level and low efficiency is locked in for another 30 years until the next major investment.

High energy demand of buildings (along with relatively low salaries and other factors) is documented by the high share of household income spent on energy related to housing – the four Visegrad countries all rank within the first six places in EU.

Buildings in Visegrad countries are closely linked to air pollution and its negative impacts on health and productivity. 70% of single-family buildings in Poland use coal, amounting to 3.5 million coal-fired boilers (which collectively consume more than 9 million tons of coal per year). 28.8% of buildings have boilers that are more than 10 years old. About 3 million of these installations are based on manually fed boilers, an outdated technology which leads to significant air pollution.

Key Public Policy Areas

We believe there are four areas where public policies could play a major role in upgrading Visegrad´s building stock, as a means to contributing to their national economies and well-being of societies. As we have confirmed in preparation of this Study, the issues of (failing) energy certification, (lacking) innovation, incentivizing renovation after 2020 (with limited EU funds) and housing of low income groups are common and specific to Visegrad region. Given how limited the capacities to develop public policies are in the individual countries, it makes sense to pay attention to these policy areas on a synergic Visegrad level.

Energy certification and building permits

The purpose of energy certification of buildings is similar to energy labelling of home appliances – drive investments through making energy efficiency visible and understandable. While all Visegrad countries introduced Energy Performance Certificates (EPC) roughly a decade ago, they still fall short in delivering on their intended purpose.

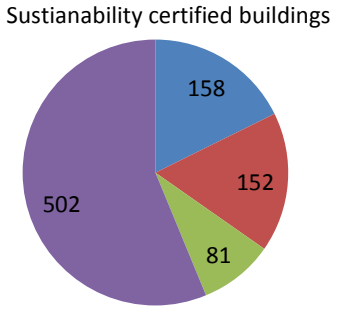
Experts agree that the reasons are as follows:

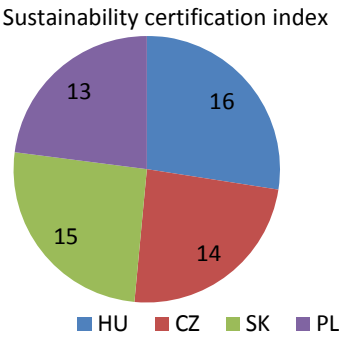
1. Energy efficiency stated in EPC can be adapted to fit requirements rather than reflect real state of the building. While EPC´s are provided by experts licensed by national governments (sometimes via professional chambers) that need to participate in training and pass (repeatedly) exams, their work is checked mostly for formalities or administrative errors. The risk of losing the license and therewith their job is very low.
2. Building and use permit are granted to investor based on existence of an EPC and regardless of energy class stated in the EPC. Thus buildings where energy efficiency is below requirements are built and used. For instance, in Slovakia, more than 10 % of EPC´s for new built single family homes issued in 2017 list energy class C or worse, while class B has been required since 2012 and class A/A1 since 2016.

There are various simple methods to improve the situation, such as defining unified software solution to calculate energy efficiency (that would simplify later checks of calculations), minimum procedure requirements including physical visit to the building instead of "desktop calculations" or introduction and use of penalties, including cancellation of the license to remove price-dumping, worst-performing certifiers from the market.

Innovation

Nearly Zero Energy Buildings will become obligatory soon – in 2018 in case of new public buildings (e.g. social housing in Slovakia – approximately thousand apartments a year) and 2021 in case of all other buildings. Climate change adaptation of buildings needs to be performed on new built and renovated buildings now, as the next opportunity will arise only after another 30 years during the next renovation. Sustainable buildings represent a minority of new built stock, although in some market segments and Visegrad geographies they have become the norm (e.g. larger office buildings in Bratislava and other capitals). As shown in the charts below, while absolute numbers differ substantially, when compared to country and population size (index), Visegrad countries are home to comparable number of certified buildings.





Yet, innovation in building construction is left to the decisions of enlightened investors in most cases in Visegrad region. This is despite the good example of the New Green Savings program in the Czech Republic that proved its impact on quality of new single family homes. While energy passive houses are counted in dozens a year in Hungary, Poland and Slovakia, there are approximately 600 of them built a year in the Czech Republic. This is presumably thanks to the New Green Savings program, and the positive lesson is that the program works by providing subsidies just as well it works by profiling energy efficient buildings in society – as market players and experts confirm.

Some early birds are there – Slovak programs aimed at renovation of multi-apartment and public buildings link the level of support to the level of energy efficiency achieved. However, systematic approach, especially in new build is missing.

And while existing innovation support and capacities may be limited, there are interesting achievements from the private sector. The Hungarian NOAH House – patented energy active house solution and the Slovak Ecocapsule, self-sustainable smart house powered solely by solar and wind energy, are worth mention, among other endeavors.

Building renovation after 2020 (limited EU funds)

The investment need just for deep renovation of building stock (residential and public buildings, excluding private non-residential) at renovation rate of 3 % p.a. is 7.7 billion EUR a year in Visegrad 4. We estimate the real investment is at the level of 2.5 billion EUR annually. This figure does not include investment need in the segment of new buildings where attention should be paid on ensuring needed quality (healthy buildings, adapted to climate change and fit to the ageing population of Visegrad).

Approximately 70 % of the 5.7 billion EUR allocated to energy efficiency of buildings in the Visegrad´s ESIF funds in 2014 – 2020 has already been awarded, contracted or spent by early 2018. Concluding from the past experience, the next “EU funds” will not be physically available before 2023. And the EU negotiations about the Multi-annual Financial Framework (“EU Funds”) have just started, but it is already apparent that Visegrad countries will see their ESIF allocation adapted. Certainly in terms of target investments, where “hardware” projects, such as building renovation, might be replaced.

The value of incentive programs in Visegrad countries amount to approximately 1.05 billion EUR a year – disbursed in subsidies or soft loans. The ESIF money constitutes more than half of that. Therefore, planning how to bridge this gap is very urgent and important – though replacing the fall out of ESIF money would only ensure maintain the current level of investment at best, not to speak about investment at the level of investment need.

Low income housing

Approximately 20 % of Visegrad population (15 million people) can be classified as low income. 7.2 million of people in Visegrad countries are estimated to live in energy poverty – not able to keep their homes warm or pay their bills. In fact, Visegrad countries rank among the six EU nations with highest share of income spent on energy bills related to housing.

While improvement of the situation of households can to a large extent be the result of an increase in income, energy poverty should be seen not as an aspect of income poverty but as a separate dimension of deprivation: e.g. "almost 6% of Poland's population (2.1 million) was energy poor, but not income poor. The vast majority (2/3) of the energy poor were rural areas' inhabitants. This is a consequence of the relatively lower incomes of rural areas' inhabitants and the fact that they live in detached houses, often quite large and of low energy efficiency," a situation observed in other V4 countries, as well.

Yet, there are no programs at all to help these vulnerable groups alleviate the problem. To be precise, the Czech Republic provides state financial aid on housing to about 600 thousand people and Hungary introduced regulation to keep energy prices at artificially lower level. While these programs may release the burden, they do not aim at improving housing conditions systematically.

The issue of low income is often linked to air pollution from solid fuel heating and resulting smog. People with low income live in vicious circle: their low income makes them use solid fuels as the cheapest solution, which causes air pollution, thus respiratory health issues, leaving people with even lower income and unable to switch to better paying jobs.

Systematically, low income households should be assisted in improving their homes – not only reducing their energy bills – to provide healthy and cost-effective housing or by providing alternative – affordable rental housing in areas with economic activity and hence job opportunities, but rental housing only represents 6 – 20 % of the building stock and new development is slow.

Case Studies

Energy certification in Hungary

While energy certification has its issues everywhere, the Hungarian approach and effort to ensure proper quality is worth the attention. There are approximately 2,500 registered experts in Hungary, issuing more than 150 thousand Energy Performance Certificates a year, mostly in case of sale or rent of a building. EPCs are registered in a central database operated by the Lechner Non-Profit organization. The database is partly public, energy performance class can be searched by address of a building and statistical information from the database is publicly available, too.

The licenses for the "Qualified Experts" are issued by the Hungarian Chamber of Engineers and the Chamber of Architects who run exams. It is mostly civil engineers, architects or mechanical engineers that become Qualified Experts, but other engineers are eligible as well. Long and detailed courses are regularly organized by universities and training institutions, although the exam can be taken without such a course via self-study.

In addition to the obligatory exam, any member of the Hungarian Chamber of Engineers and the Hungarian Chamber of Architects – not only Qualified Experts – has to attend regular short training programs in order to keep their knowledge up-to-date. The topic of *building energy regulation* is an obligatory element of these programs. The system is an efficient means to maintain constant interest towards lifelong learning.

The cost of a certificate for an apartment unit is prescribed by the law (20 €/hour, which is typically cc. 40 -60 € + VAT per unit). The same price applies for single-family houses. This cost has often been criticized by experts as unrealistically low and it thus has a strong negative impact on the quality of the certificate – a symptom seen in many countries. However, travel costs, measurement costs and data collection costs can be added to the above value (up to a maximum of circa 70-75 € + VAT per unit). For non-residential buildings, there is no legally prescribed amount on the cost of an EPC, but in practice, the certificate costs between 100 € and 1,500 € depending on the size and complexity of the building.

Ensuring quality is paramount in making energy certification deliver its value, i.e. driving energy efficiency investments. The first level of EPC quality control in Hungary is performed by the online database system that automatically checks the license of the energy expert and identifies any unrealistic figures in the EPC. The second and third control levels are performed by the Hungarian Chamber of Engineers. 2.5 % of the EPCs are controlled by an office check and 0.5 % (i.e. 20% of the 2.5%) is verified on-site. Both actions are carried out by independent experts and all control results are recorded in an electronic database. The share of incorrect EPCs is below 10%. If the quality control detects a miscalculation of a difference by more than two energy classes, the expert loses his license for 3 years.

Investors are also "motivated" to meet their obligations. In case of a new building, the EPC must be presented within 90 days of issuing the occupancy permit. If this is not done, the owner will be required to pay a penalty fee. The Building Authority has the right to compel the preparation of the missing EPC in these cases. The penalty can be repeated any time until the EPC is uploaded into the electronic database.

New Green Savings in Czech Republic

The New Green Savings remains to be the flagship subsidy program in the Central and Eastern European region, effectively driving energy efficiency investments primarily in the single family home market. Why is it so? What are the success factors behind it?

The current program (original one dates back a few more years) is a continuous call for the period of 2015-2021. The program offers subsidies for renovation and construction of single-family home (in Prague also for multi-apartment buildings) for both individual and legal entities. The level of support – 30 - 40 % of eligible cost – is linked to the depth of renovation or quality of new construction. Yet, single measures (e.g. windows replacement) are supported as well, making the program flexible and attractive to a large target group of potential recipients. Subsidies are available also for implementation of renewables, greenroofs or heat recovery, bonus points are awarded for use of sustainable construction products.

Financial allocation of up to EUR 750m is massive and comes from ring-fenced EU-ETS revenues. Since 2014 more than EUR 150m (CZK 4bn) of support has been disbursed to 18357 projects, i.e. 8400 EUR per project on average. The average level of support has been 32 % in case of shallow renovation and 46 % in case of complex, deep renovation.

The success factors include mainly:

1. **Heavy investment into promotion of the program at its inception.** Your target group must be aware of the option to apply for subsidy and must have positive feelings. Press release or press conference by the minister is simply not enough; proper campaign is needed and New Green Savings prove that. Also, promoting the program promotes renovation at the same time and makes it a topic – which on itself becomes a trigger for investment for many people.
2. **Continuous call.** Instead of short windows to apply for subsidy, a continuous call enables home-owners to invest when it is most suitable for them, allows them enough time to prepare the application and gives them security that their efforts – often time consuming and lasting – to prepare application will not go idle because they missed deadline. Home owners are program´s clients, hence the program must cater to their needs and abilities.
3. **Long-term commitment.** Ring-fencing revenues from EU-ETS system for multi-annual period is a political commitment that again gives home owner certainty and enables them to plan their investment. Some need a year or two to save up the last bit or to first buy their home and then renovate it. Governments should respect the natural renovation cycle.
4. **Implementation capacities.** Sufficient administrative teams need to be in place to handle not only the incoming applications on time, but also to provide home-owners with consultations and advice.

Although generally successful, the Ministry of Environment responsible for the program still tries to find ways to further improve the program. Right now, they are planning new promotional campaign.

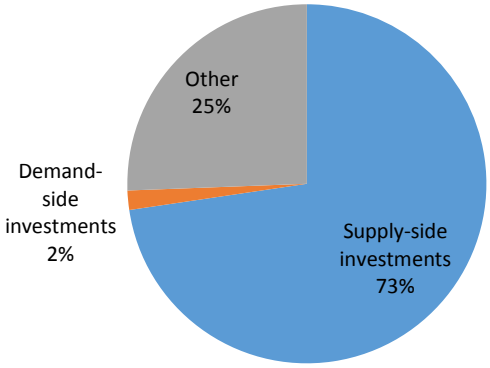
Prioritization of investments

Poland is highly dependent on coal and its economy is very energy intensive. Despite being central to the European Union's objectives of energy security and a rapid transition to a low-carbon economy, funding for energy renovation of buildings only accounts for around 2.8% of Cohesion Policy Funds, which are the biggest funding stream available to EU countries.

A similar situation is visible in Polish energy policy, where funding streams are allocated first of all to energy supply infrastructure. The construction of one nuclear power plant in Poland can consume €16-18 billion till 2030. This is 16-17% of the total funding needed to renovate 50% of country building stock. The final cost of building the LNG terminal in Świnoujście was €866 million, including EU co-financing over €211 million. At the same time planned support for renovation of single-family buildings is only €43 million.

The Efficiency First principle should be systematically applied by introducing the requirement to provide a cost-benefit analysis comparing supply-side investments with demand-side alternatives (e.g. build new gas pipeline vs. investing in deep renovation to decrease gas demand). Additionally the non-energy benefits (e.g. reduced air pollution) should be included.

The lack of a strategic approach to building renovation is combined with scarce project financing by the EFSI in Poland. This is in stark contrast to other EU countries. For example, Finland has five energy-related EFSI projects, of which three invest in energy efficiency of buildings. Also, the use of ETS revenues for demand site infrastructure could be increased. A well designed redistribution of auction revenues may become an impulse for the modernization of the Polish economy, especially in selected areas of building energy efficiency (single-family renovation programme) and energy supply.



Energy priorities of international financial institutions (EIB, EBRD, KfW and the World Bank). 'Other' includes renewables, financial framework, smart meters etc.
Energy priorities of international financial institutions (EIB, EBRD, KfW and the World Bank

Our analysis of the energy priorities of four main international financial institutions (EIB, EBRD and the World Bank) shows that almost 73% of their energy investments are directed to supply-side infrastructure, gas, heat and electricity (see chart). Reports have shown that once built, the new infrastructure has a lifetime of 40 years or more. Investing in more supply-side infrastructure cannot be the only solution. While additional supply-side investments are required in Poland to ensure a stable energy supply, the central focus should shift to measures that lower the overall demand and improve air quality. However, to stimulate a healthy and vigorous investment climate for building energy efficiency in Poland, several barriers must still be overcome, such as decreasing uncertainty in the market, reducing energy subsidies, making legislation predictable in the long term and silo approach of public agencies working in the area of buildings renovation and energy efficiency.

Charts and Figures

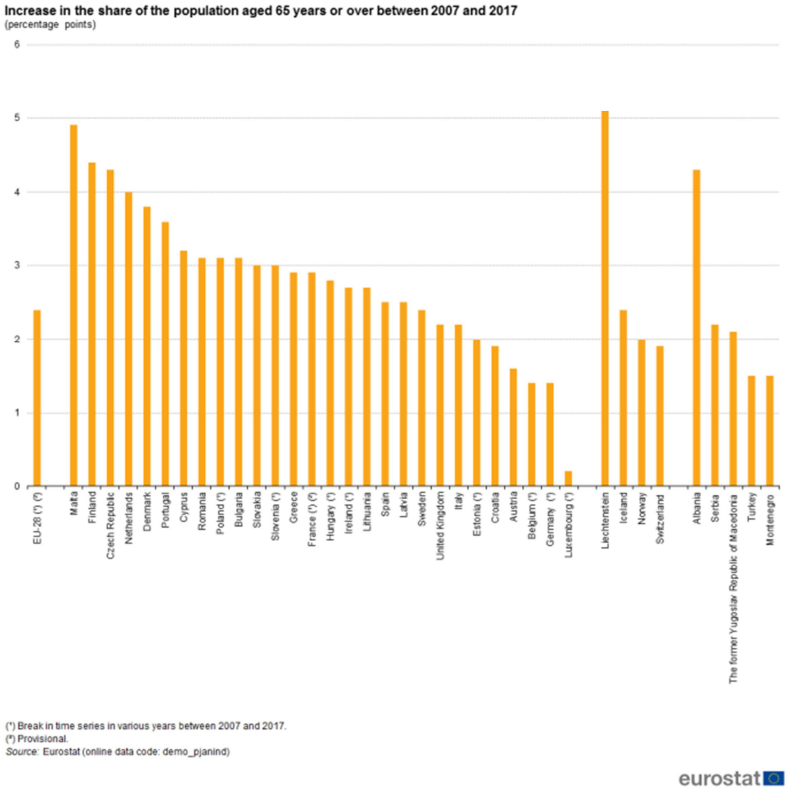


Chart: All Visegrad populations age faster than the EU-28 average.

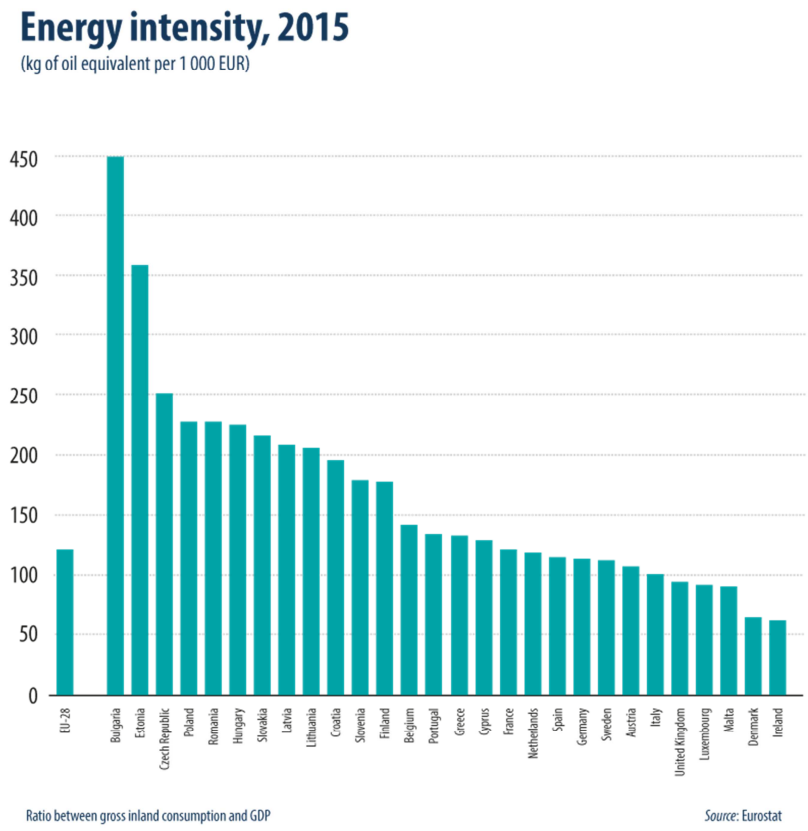


Chart: The four Visegrad countries are among the seven EU countries with highest energy intensity of economy.

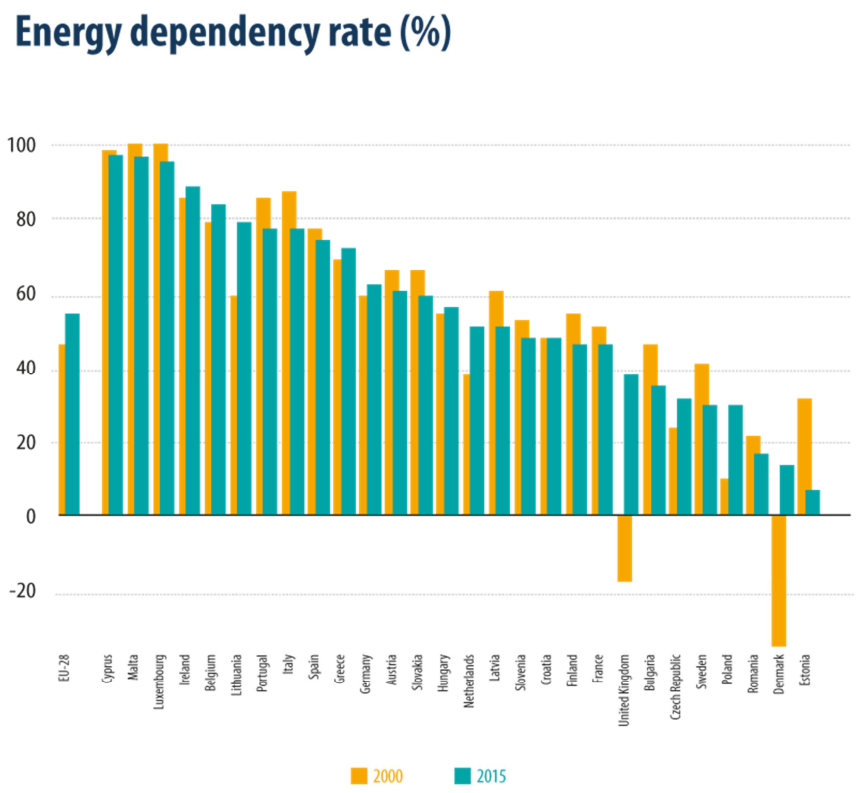


Chart: The Visegrad is depending on energy imports.

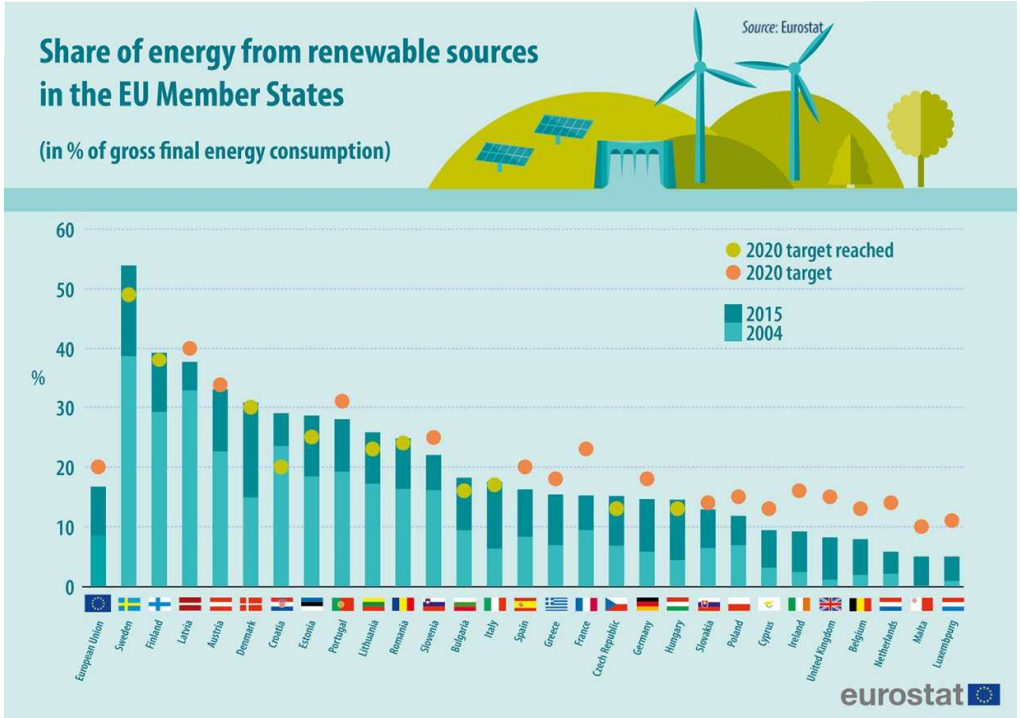


Chart: None of the V4 countries sources more than 15 % of its energy consumption from renewables, ranking low compared to many other EU Member States.

Table: Building stock in Visegrad Countries

	Czech Republic	Hungary	Poland	Slovakia
Dwellings per 1000 inhabitants	392	440	353	353
Owner occupied apartments	75%	90%	80%	90%
% of dwellings in SFH	44%	60%	37%	52%
Single-family homes (SFH)				
Nr of dwellings	1 895 000	2 640 000	5 007 000	1 008 795
Dominant period of construction	1920-1990	1946-1980	1920-1990	1920-1990
Renovation	25%	20%	30%	40%
Renovation rate	1,40%	no data	no data	2,50%
Multi-apartment buildings (MAB				
Nr of dwellings	2 416 000	1 760 000	8 423 000	931 605
Dominant period of construction	1920-1990	1946-1980	1920-1990	1960-1990
Renovation	40%	30%	50%	60%
Panel blocks - % of MAB dwellings	50%	35%	no data	69%
Renovation rate	1,40%	no data	no data	3,00%
New construction - new flats finished				
Average 2013 - 2017	26 037	9 529	145 375*	15 634

** Estimate based on older data*

Chart: Share of household energy expenditure by income group (2014)

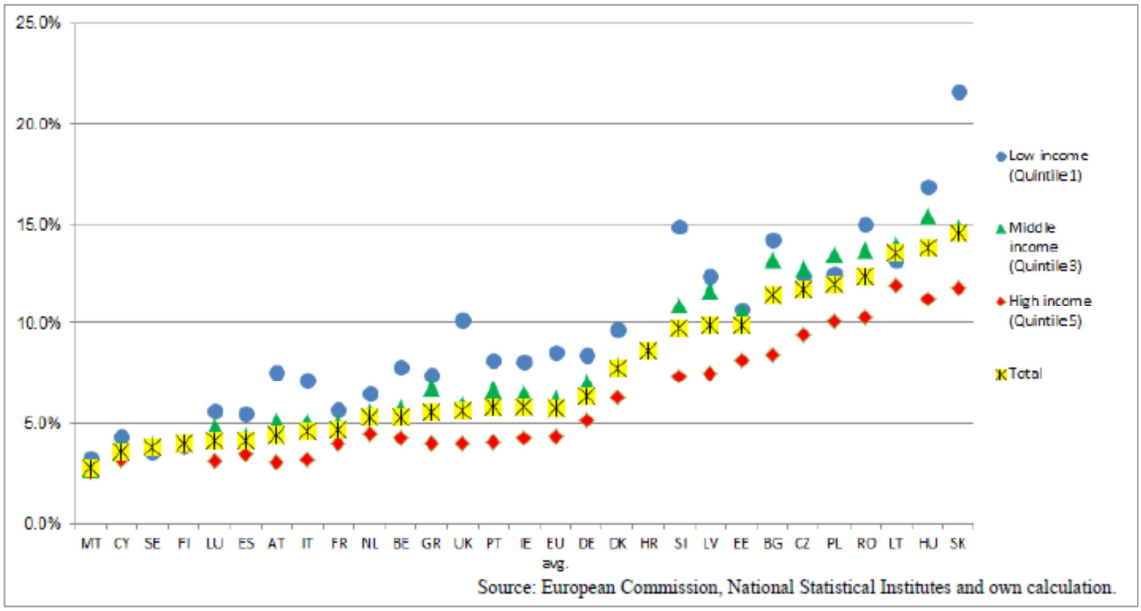
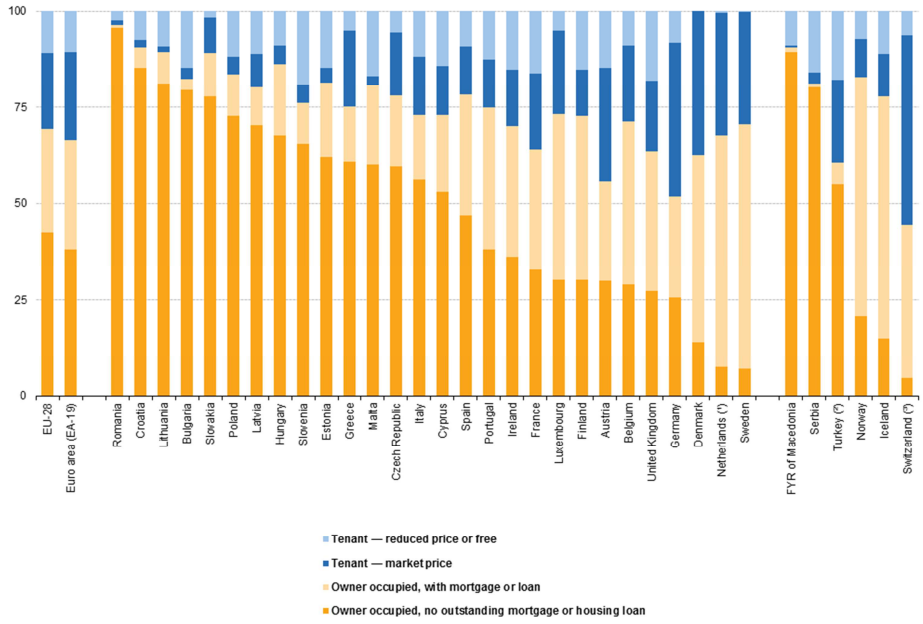


Table: Energy efficiency regulation

	Czech Republic	Hungary	Poland	Slovakia
EPC legislation aligned with EPBD	Yes	Yes	Yes	Yes
Cost optimum requirements from	2013	2018	2013	2016
NZEB – public buildings – from	2018	2019	2019	2018
NZEB – private buildings – from	2020	2021	2021	2021
U value – façade – W/(m^2.K)	0,30	0,24	0,23	0,22
U value – roof – W/(m^2.K)	0,24	0,17	0,18	0,15

Table: Major incentive programs in Visegrad countries (S – subsidies, L – soft loans)

	Czech Republic	Hungary	Poland	Slovakia
SFH renovation	New Green Savings (S)	Low interest loans (0 %) since 2017 Home Warmth (S): based on the ETS quota revenues, HUF 6-8 billion/year	Thermo-renovation&Repairs Fund (S) National / Regional Fund for Environmental Protection and Water Management (NFOŚiGW/WFOŚiGW) (S,L)	Insulate.SK (S)
Multi-apartment b. renovation	Integrated Regional OP (S; regions), New Green Savings (S; Prague)			SFRB (L),
Public building renovation	Operational Programme Environment (S)	Grants from EU structural funds		OP Environment and Integrated Regional Development (S)
New build – residential	New Green Savings (S)	"CSOK" subsidies to families to buy a new or used flat (social policy)	-	-
New build other (specify)	OP Environment (S; public buildings), OP Entrepreneurship and Innovation for Competitiveness (S; commercial buildings)	Reduced VAT (5% instead of 27%) for newly built single or multi-apartment houses for a 4-year period between 2016-2019.	-	-
Rental housing	Integrated Regional OP	-	-	Social Housing Subsidies (S,L)
Sustainability	New Green Savings (S) – bonus points for certified materials	-	-	-
Climate adaptation	New Green Savings (S) (green-roofs, graywater heat recovery, PV)	EU funds for municipalities to develop action plans (SEAP / SECAPS)	-	OP Environment (S)



(1) Provisional data.
(2) 2013.
(3) 2014.
Source: Eurostat (online data code: ilc_lvho02)

Chart: More than 75 % of dwellings in V4 is occupant owned, hindering workforce mobility and low income housing solutions.

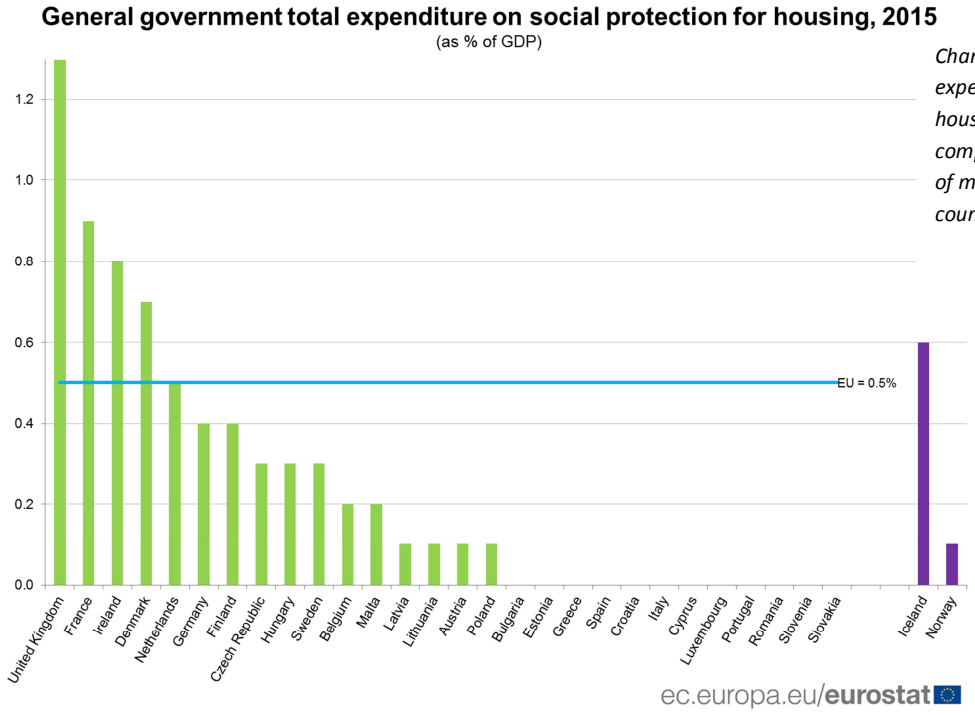


Chart: The low level of expenditures on social housing in Visegrad, compared to a number of more advanced EU countries.

Resources

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http://ec.europa.eu/eurostat/cache/infographs/energy-2017/index.html
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