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The Quarterly Journal of the International Union for Housing Finance

- The housing sector and the EU's political and financial frameworks: the sustainability state of play
- Innovation in housing decarbonisation: Austria / Germany / Italy / Latvia / Netherlands / Spain

International Union for Housing Finance

Housing Finance International

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  For further details, please contact Mark Weinrich (weinrich@housingfinance.org)

International Union for Housing Finance
Rue Montoyer 25, B-1000 Brussels – Belgium
Tel: +32 2 231 03 71
Fax: +32 2 230 82 45
www.housingfinance.org
Secretary General: Mark Weinrich

Decarbonisation Issue

Decarbonisation is not one of those catchy terms that set headlines alight. The word understandably conjures up images of some deeply scientific issue that has limited relevance to everyday life. It is certainly unlikely to grab the attention of housing providers and those lending housing finance. Yet when unpacked and presented in ordinary language as involving the need to make our energy use sustainable then the importance of the concept quickly becomes apparent.

Yet even in the housing world the issue of achieving sustainable energy use has not received the traction that might have been expected. One reason is probably the sheer size of the task. At first sight the task of rendering all homes energy efficient can seem impossibly large. This is in spite of widely circulating reports of the significant proportion of national energy use that can be ascribed to homes in the majority of countries.

In such situations concerted leadership at a political level can make a real difference, yet such leadership has been patchy and inconsistent at all levels of the climate debate. The withdrawal of the US from the Paris Climate Agreement was as large a psychological blow as it was a practical set back. The decision of the Biden administration to re-join sends a positive message, yet time and commitment have both been lost and will have to be clawed back.

There are additional problems when confronting the need to achieve decarbonisation of housing. Significant progress has been made in relation to newly built stock, in terms of higher standards although much remains to be done. However, given the slow rate at which the existing housing stock of most countries is renewed, the main task is focussed on that existing stock, with current energy performance tending to be worse the older the home. This means that the costs of improvements fall on existing owners, many of whom cannot afford to undertake such improvements without assistance or do not see the need. outside intervention is thus necessary but difficult and expensive to implement. Housing finance has begun to play a part- the EU green mortgages initiative currently being promoted by the European Mortgage Federation is one example whose progress has been covered in the pages of HFI. However, in the end, government intervention is probably inevitable to set standards and policy, to incentivise homeowners, and to assist in funding improvements. An important issue is therefore that of raising the profile of decarbonisation and highlighting progress (or lack of it) in order to incentivise governments, public authorities and others to intervene effectively and in a timely way, for time is not on our side.

The IUHF is very pleased to make a contribution to the promotion of decarbonisation by launching this special Spring 2021 issue of Housing Finance International (HFI) focusing on the progress made so far across the European Union. Originally the brainchild of Wolfgang Amann who is also a joint author of one of our articles, this issue of HFI is a joint project promoted by the IUHF and the European Federation for Living (EFL). Although our regional articles will, as usual, cover recent events across the globe, our longer articles will focus on EU initiatives in respect of decarbonisation together with reports from six EU countries: Austria, Germany, Italy Latvia, Netherlands and Spain.

Each country-specific article examines the nature of the housing stock, and significant demographic factors before going on to analyses government targets and policies, the standards in place, funding and finance for decarbonisation and, most importantly the rate of refurbishment itself when measured against the target of achieving zero net emissions by 2050.

Valuable as we hope this issue of HFI will prove to be, it will not be the end of our coverage of decarbonisation. In subsequent issues of the journal, we intend to widen the debate beyond the EU and beyond Europe. We expect that the Summer issue of HFI will cover decarbonisation in the UK and in Australia.

We make no apology for giving this issue such prominence. If we cannot as a world achieve a sustainable housing stock our future looks bleak indeed. The least we can do is to share our information and insights.

Andrew Heywood
March 2021

Contributors' biographies

Wolfgang Amann, as Director of IIBW, the Institute of Real Estate, Construction and Housing Ltd., Vienna/ has executed more than 300 research and consulting projects on housing decarbonisation, housing finance, housing policy and housing legislation. He is consultant to international organisations, national governments and the private sector and teaches real estate economics on several graduate programmes in Austria.
CONTACT: *IIBW – Institute of Real Estate, Construction and Housing Ltd., Vienna /Austria*
www.iibw.at amann@iibw.at
+43 1 9686008

Josep Casas is an expert in the design and management of housing, architecture, and urban improvement policies, with more than fifteen years of experience in the public sector. Nowadays he is Deputy General Director of Architecture and Housing in the Catalan Government. He is also co-director of the Postgraduate in Housing Policies at the UNESCO Housing Chair at the Rovira i Virgili University.
CONTACT: *jcasasm@gencat.cat*

Igor Costarelli is a post-doc fellow at the Department of Sociology and Social Research, University of Milan Bicocca. He is an urban sociologist interested in housing studies. His work focuses on social mix and residential segregation, social housing management, and comparative housing policy.

Claudia Magalhães Eloy is a consultant on housing finance and subsidy policy in Brazil, who currently works for FIPE [Fundação Instituto de Pesquisas Econômicas] and has worked for the World Bank (TA) and for the Brazilian Ministry of Cities and Companhia de Desenvolvimento Urbano e Habitacional of São Paulo (CDHU). Claudia has also participated in the development of the National Housing Plan, in the analysis of the Housing Finance System. She holds a PHD in Urban Planning at the University of São Paulo (USP), a Master in City Planning at the University of Pennsylvania, a Master in Public Administration at Bahia's Federal University (UFBA) and a BA in Architecture and Urban Planning (UFBA), with a specialization in Real Estate Finance at the Brazilian Economists Order (OEB). She also attended Wharton's International Housing Finance Program.

Justus von Geibler co-leads the Research Unit „Innovation Labs" at the Wuppertal Institute for Climate, Environment and Energy within the Division Sustainable Production and Consumption. His research focusses on the analysis, monitoring and design of innovation processes for sustainable products, services, and business models.

Joana Toni Louise Gnanko is a student research assistant at the Wuppertal Institute for Climate, Environment and Energy. The focus of her studies and work is on sustainable production and consumption structures.

Andrew Heywood is an independent consultant specialising in research and analysis of housing and mortgage markets, regulation and policy with both a UK and international focus. He is a research fellow with the Smith Institute. He is also Editor of the Journal, Housing Finance International. Andrew writes for a number of publications on housing and lending issues and publishes reports commissioned by a wide range of clients.
EMAIL: *a.heywood53@btinternet.com*

Knut Höller is a trained economist and M.B.A. with in-depth knowledge of housing policy in Eastern Europe and Central Asia. In 2001, together with various partners in Germany, he founded the non-profit 'Housing Initiative for Eastern Europe' (IWO e.V.), which supports the transition process in these countries in the housing sector.

Vanessa Khosa is the AUHF administrator at the Centre for Affordable Housing Finance in Africa [CAHF], an independent think tank working to support and grow housing markets in Africa to increase affordability. She graduated her Masters in Local Economic Development from the University of Johannesburg.

Corneille Koppelaar is an experienced international housing consultant. Throughout the last decades energy efficiency has become increasingly important for housing providers and he has been involved in various international projects to improve energy efficiency that were supported by the EC. Housing still needs to undergo an important transition in order to achieve the internationally agreed objective to become near Zero Carbon by the year 2050.
CONTACT: *ckoppelaar@globalhabitat.org*

Lily Maxwell is Network and Communications Officer at EFL and Policy and Project Officer at the EUKN (European Urban Knowledge Network). She holds a BA in Modern and Medieval Languages from the University of Cambridge and an MSc in Urban and Regional Planning from the University of Amsterdam. Lily's research specialisms include affordable and sustainable housing; (digital) civic engagement in political processes; and the urban commons. Lily speaks English, French and Spanish and has worked in academia, urban policy and digital marketing.

Silvia Mugnano is Associate Professor in Urban Sociology at Department of Sociology and Social Research of the University of Milano Bicocca (DSRS-UNIMIB). She has always researched housing issues and has participated in several EU projects on housing and urban transformation. Currently is the UNIMIB University focal point for University corridors for refugees.

Alexis Mundt, economist and historian, works as research associate at the Vienna-based IIBW – Institute for Real Estate, Construction and Housing Ltd. His areas of research include social policy evaluation, international housing policy, housing finance and housing economics. He has worked on many projects that have investigated and evaluated housing policy in European countries.

Joost Nieuwenhuijzen is Managing Director of EFL. He was previously Regional Director of the Amsterdam based housing association "Rochdale", Joost created EFL in 2008 as an international housing network of practitioners and academics, whose core aims are to facilitate mutual learning by sharing knowledge and experiences and stimulate innovation. EFL has grown to an organisation of over 70 members from 14 countries, composed of (affordable) housing providers, universities and commercial companies in the value chain of housing. It's unique in its composition and is still growing.

Tobias Peter is the director of research at the American Enterprise Institute's Housing Center, where he focuses on housing risk and mortgage markets. He has a master's in public policy from the Harvard Kennedy School and a bachelor's degree in history and applied economics from The College of St. Scholastica.

Contributors' biographies

Edward Pinto is an American Enterprise Institute (AEI) resident fellow and director of AEI's Housing Center. The Center monitors the US markets using a unique set of housing market indicators. Active in housing finance for 44 years, he was an Executive Vice-President and Chief Credit officer for Fannie Mae until the late 1980s.

Zaigham M. Rizvi is currently serving as Secretary General of the Asia-Pacific Union of Housing Finance and is an expert consultant on housing and housing finance to international agencies including the World Bank/IFC. He is a career development finance banker with extensive experience in the field of housing and housing finance spread over more than 25 countries in Africa, the Middle-East, South-Asia, East-Asia and the Pacific. He has a passion for low-cost affordable housing for economically weaker sections of society, with a regional focus on Asia-Pacific and MENA.
EMAIL: *zaigham2r@yahoo.com*

Stefan Thomas is Director of the Division "Energy, Transport and Climate Policy" at the Wuppertal Institute for Climate, Environment and Energy. His scientific work focuses on analysis, development and testing of energy efficiency policy instruments; ex-post evaluation of energy policies; and new energy efficiency business concepts for energy companies.

Henk Visscher is the Chair of Housing Quality, Process Innovation and Scientific Director at BTIC.
CONTACT: *TU Delft / Faculty of Architecture and The Built Environment, Management in the Built Environment, Building 8 (room 01.West.540)*
VISITING ADDRESS: *Julianalaan 134, 2628 BL Delft*
POST ADDRESS: *PO Box 5043, 2600 GA Delft, The Netherlands*

Florin Vondung is a researcher within the Energy Policy Research Unit at the Wuppertal Institute for Climate, Environment and Energy. The focus of his work is on energy efficiency governance in multi-level systems and the social dimension of the energy transition – particularly with regard to energy poverty.

Mark Weinrich holds graduate degrees in political science and economics from the University of Freiburg, Germany. He is the General Secretary of the International Union for Housing Finance and the manager for international public affairs at the Association of Private German Bausparkassen.

The role of technology in affordable housing

↳ By Vanessa Khosa

Over the past few years, the role of technology in affordable housing has been of increasing interest to AUHF members, and many have been at the centre of the trend in pursuing this innovation themselves. The variety of technical innovation is significant. While some tech solutions are about improving the environmental quality of building, others are exploring technological innovation in specific building materials. Still others are being used to improve the functioning and efficiency of the housing value chain – either the entire chain or specific links. At the last AUHF conference held in November 2020, ten presentations highlighted technological innovations that were changing the landscape of affordable housing on the continent.

A panel discussion hosted by AUHF member **International Finance Corporation (IFC)** explored the Excellence in Design for Greater Efficiencies **(EDGE) Green Building Certification Framework**. EDGE certification aims to reduce the building sector's environmental footprint in three areas, particularly in developing countries: Consumption of direct energy, the uses of water and the environmental impact of building materials. The EDGE certification is currently available in 160 countries including South Africa, Kenya, Ghana, and Nigeria, to name a few. The panel was chaired by Dennis Papa Odenyi Quansah, Green Building Lead of the IFC, Ghana, and included speakers from **Buildx Studio**[1], Kenya, **International Housing Solutions**[2], **Echostone Housing Systems**[3] and **Kenya Green Building Society (KGBS)**. In the discussion, International Housing Solutions shared their experiences with two developments that they funded in South Africa. Otherwise, identical, one was built to the EDGE specifications and the other not. After a year of operations, it was found that the EDGE-certified building saved the equivalent of a full month's rental in reduced water and electricity consumption.

The functioning of the housing value chain has long been a challenge, with broken links and inefficient connections between service providers – contractors, developers, financiers, and building material suppliers. AUHF member **iBUILD Global**[4] is the very first innovative fintech app of its kind to develop a tool that facilitates and manages the roles of all building actors. The use of technology such as an embedded mobile wallet, geo-tagging, and integrity verification has brought a degree of transparency to the construction sector that previously did not exist. Relevant to both formal and informal construction players, the iBUILD Global approach is connecting the links of the housing delivery value chain, improving efficiencies and driving opportunities for scale. They have recently partnered with AUHF member Shelter Afrique, to support funding and project management in Shelter Afrique's PPP projects.

Block Solutions Oy[5], a Finnish pioneer, developing a totally new eco-sustainable way of building houses is a new member of the AUHF. Its Block-module is an eco-friendly product made of biocomposite, a combination of fibres and recyclable plastics from traceable sources. The design of the block-module is very light, mobile, and versatile.

AUHF member **Miyamoto International** is a leading construction and engineering consulting company, specializing in resilient process engineering that mitigates environmental damage and protects critical infrastructure. One should not forget AUHF member **14Trees**[6] that is implementing 3D printing technology at scale to construct sustainable, low-carbon housing and schools. Its prototype house's walls were printed in 12 hours compared to nearly four days using traditional techniques. Few other notable examples include: **Moladi**, **Vela Building Solutions**, **Buildibid** and **ECOMO**[7].

New houses should be simple and convenient to use, with very little energy consumption required. Automation and intelligent networking of technological equipment will meet these demands, thus highlighting the importance of construction technology. AUHF member **EchoStone Nigeria**[8] has developed building techniques, such as high-quality concrete (CLC) and reusable panel formwork, to improve the efficiencies of the housing delivery process. The innovations remove the need for heavy-lifting equipment whilst replacing steel, aluminium, plywood, and cinder blocks. EchoStone recently completed the first phase of their initial project, which included the construction of 252 units in collaboration with the Lagos State government and achieved the distinction of becoming Nigeria's first IFC Edge certified city.

Another area of innovation is in the application of **blockchain technology** to the land registration process. In Southern Africa, the **Centre for Affordable Housing Finance in Africa (CAHF)**, **71point4** and **Seso Global** have teamed up to establish South Africa's first blockchain-based property registry as a case

[1] https://www.buildxstudio.com/

[2] https://www.ihsinvestments.co.za/

[3] http://echostonehousing.com/

[4] https://www.ibuild.global/

[5] https://block-solutions.com/

[6] https://www.cdcgroup.com/en/news-insight/news/14trees-pioneers-3d-printing-technology-in-africa-for-affordable-housing-and-schools/

[7] https://www.ecomohome.com/

[8] http://echostonehousing.com/our-solution/

management system for their Transactions Support Centre in Makhaza, Khayelitsha. The partnership is assisting the state to regularise the tenure situations of beneficiaries of the national housing programme for whom formal titles have not yet been issued. Another notable example is Crowdfundie, a new member of the AUHF.

In recent years, a number of proptech associations have been established, such as the **SA Proptech Association**[9], **Proptech Africa**, **Proptech Uganda**, **The Nigeria Proptech Association**, and **Proptech Kenya**, with several more in the works. The proptech industry is exciting because it takes advantage of global technological developments like big data analytics and artificial intelligence while still successfully and meaningfully solving local housing problems.

According to GlobalData[10], proptecs are emerging at a time when the construction industry in Sub-Saharan Africa is projected to expand at the fastest pace of all major regions in the world. The rate of Proptech-related events in Africa is also increasingly rising. AUHF conference partners **API Events**[11] widened its Proptech series in 2020 to include the East Africa Proptech Forum in Nairobi, the West Africa Proptech Forum in Lagos, and the annual Africa Proptech Forum in Johannesburg. **The 36th AUHF Virtual Conference and AGM** 2020[12], held panel discussions on the Future of Proptech in Affordable Housing in Africa[13] and a Proptech Masterclass presented by Dr Roland Igbinoba.[14]

The transition to new technologies accelerated with the Covid-19 pandemic, and this intensified the debate for technology in affordable housing. Despite the apparent and considerable opportunities that technology has to offer, the affordable housing space will need to push for its incorporation and investment in its growth. Only then will the industry be able to completely leverage technology to help the sector solve its most critical and structural problems, which continue to derail overall growth of the industry and corporate development.

The AUHF's 36th Annual Conference, held in November 2020, was on a virtual platform. Sessions from the conference are available for viewing on AUHF YouTube channel: https://www.youtube.com/channel/UCfQke_kMH-Y0QvxMCn40KIg

Presentations are also available on the conference website: see https://auhfconference.com/2020-auhf-virtual-speaker-presentations/ – Password: AUHF2020.

Sessions focussing specifically on PropTech include:

- Green Urban Growth: Achieving Sustainability
- Through Inclusive and Affordable Settlement Upgrading in Rwanda[15]
- Resolving Land Titling Challenges with Blockchain Technology: Experiences from South Africa[16]
- Masterclass Proptech[17]
- Habitat for Humanity | Terwilliger Center for Innovation[18] in Shelter: Innovations and Investments in Green Housing
- The Future of Blockchain Technology in Affordable Housing in Africa[19]
- Resilient Housing + Retrofits – A Cost-Benefit Analysis[20]
- Hometeam Venture Fund[21]
- Industrialised Construction: The New Construction Paradigm[22]
- SAGEM Smart Home in Senegal[23]
- Realising Inclusive Growth in Integrated Settlements[24]

[9] https://propertyprofessional.co.za/2019/07/18/sas-first-proptech-association-launched/

[10] https://www.bizcommunity.com/Article/196/800/196262.html

[11] https://www.apisummit.co.za/africa-proptech-forum/

[12] https://auhfconference.com/

[13] https://www.youtube.com/watch?v=ZxntF-rffIY

[14] https://www.youtube.com/watch?v=JM_9c4hFQ4I&pbjreload=101

[15] https://www.youtube.com/watch?v=NCqpF2a6VtI&list=PLcHL4R1Jd07dVkEAb3o4ugFyrR1oziqT2&index=36

[16] https://www.youtube.com/watch?v=ZxntF-rffIY&list=PLcHL4R1Jd07dVkEAb3o4ugFyrR1oziqT2&index=30

[17] https://www.youtube.com/watch?v=JM_9c4hFQ4I&list=PLcHL4R1Jd07dVkEAb3o4ugFyrR1oziqT2&index=44

[18] https://www.youtube.com/watch?v=H7ke84nonkc&list=PLcHL4R1Jd07dVkEAb3o4ugFyrR1oziqT2&index=32

[19] https://www.youtube.com/watch?v=ZxntF-rffIY

[20] https://www.youtube.com/watch?v=OwBdjCFViqc&list=PLcHL4R1Jd07dVkEAb3o4ugFyrR1oziqT2&index=35

[21] https://www.youtube.com/watch?v=ejNYdst0SaA&list=PLcHL4R1Jd07dVkEAb3o4ugFyrR1oziqT2&index=33

[22] https://www.youtube.com/watch?v=HLTy5_R0oI0&list=PLcHL4R1Jd07dVkEAb3o4ugFyrR1oziqT2&index=12

[23] https://www.youtube.com/watch?v=silSsqayIcs&list=PLcHL4R1Jd07dVkEAb3o4ugFyrR1oziqT2&index=18

[24] https://www.youtube.com/watch?v=D1tdI_8wTh4&list=PLcHL4R1Jd07dVkEAb3o4ugFyrR1oziqT2&index=25

Asia Pacific

By Zaigham Mahmood Rizvi

Australia

Australian home loan commitments soar to record-highs in late 2020

New data released by the Australian Bureau of Statistics show that, borrowing for housing finance has increased in Australia. The total value of new loan commitments for housing reached a record high in November 2020, rising 5.6% to $24 billion. The value of new owner occupier home loan commitments – not investors but people buying to live – rose 5.5% to $18.3 billion.

Australian Bureau of Statistics (ABS) head of finance and wealth, Amanda Seneviratne, said most of the money was coming in for homes that already existed. "Loan commitments for existing dwellings rose 5.9% and were the largest contributor to the rise in November's owner occupier housing loan commitments," Ms Seneviratne said.

The value of new owner occupier home loan commitments rose 5.5% to $18.3 billion in November 2020, 31.4% higher than November 2019. In November, the number of owner occupier first home buyer loan commitments rose 3.1% to reach 13,905 (seasonally adjusted), a 42.5% rise since the start of the year. This is the highest level seen since October 2009 when similar rapid growth was spurred by the temporary tripling of the first homeowner grant, which was part of the Commonwealth Governments economic stimulus package in response to the global financial crisis.

(Source: https://www.9news.com.au/national/australian-home-loan-commitments-break-records-in-november-2020/9179a845-6552-4e71-a3af-76a26772c4bc and https://www.miragenews.com/record-housing-loan-commitments-in-november-australia/)

Government incentives and low interest rates powering the housing market

In November-2020 a record $23.96bn in new housing loans were taken out. This record reveals that have little to do with the underlying strength of the economy. It means that for those still with a full-time job, things are pretty good – especially for those who are thinking about buying a home. And in November last year, the level of new housing loans was 24% above where it was 12 months earlier. The big boosts come from owner-occupiers – up 31% over the 12 months compared to just a 4% growth for investors. This lack of investor loans however is just a continuation of what has happened since 2016 when the surge of apartment building came to an end. In November 2020 the total of owner-occupier loans was 38% above what it was in January 2017, while investor loans were down 38% And among owner-occupiers the big surge has come for those looking to build a new home. It has to be said that the government's homebuilder grants of $25,000 for new builds and substantial renovations has worked as intended. Since it came into effect in June last year, the number of home loans for the construction of houses has doubled from 3,491 in June to 7,107 in November.

(Source: https://www.theguardian.com/business/grogonomics/2021/jan/19/the-gap-between-australian-house-prices-and-incomes-is-only-likely-to-grow)

Bangladesh

Untaxed money fuels real estate growth

The real estate sector has almost bounced back from Covid19 shocks, riding on a handsome investment of untaxed money. When many sectors are still struggling to recover to pre-pandemic levels, many big players have registered a 5%-10% growth in real estate businesses during September-November 2020 with a rise in sales of flats. Some 3,520 persons have bought flats with at least Tk. 32,000 million of undisclosed money, capitalizing on the scope for investing black money in the sector, according to the National Board of Revenue (NBR). According to businessmen in this sector, sales of flats have increased as untaxed money holders got the opportunity to invest their undisclosed money in real estate, paying a flat 10% tax, no questions asked about sources of their incomes. The lowering of interest rates on bank loans and land registration fees has also been an incentive. As a result, about Tk. 5,000 crore has so far been invested in this sector in the current fiscal year.

(Source: https://nationalhousingbd.com/uploads/files/NHFIL%20News%20Bulletin%20December%202020.pdf)

[1 Tk = 0.012 United States Dollar]

Unplanned housing in Bangladesh: The problem with housing societies

The Deputy Director at Bangladesh Public Administration Training Centre, Dr Mohammad Rezaul Karim provides an insight into the housing situation in urban Bangladesh and the consequences of unplanned housing. Rural-to-urban migration, the expansion of urban areas and an ever-increasing urban population are among the many factors that have forced the rapid growth of urbanisation in Bangladesh and have created the necessity for an exponential increase in accommodation. To address this demand many working people from Bangladesh's middle-class join private co-operative housing societies resulting in unplanned housing projects in urban areas.

Private housing societies in Bangladesh are on the rise as already limited government-owned housing is increasingly privatised and more and more people are moving to the city in search for better jobs, and ultimately a better life. Coupled with the relatively high rental costs of private accommodation, it is understandable why people organise themselves in housing societies to self-sufficiently buy apartments or construction plots – especially for families with low- and middle incomes. Their prime objective is to secure long-term and sustainable living spaces, especially for after retirement. For many residents, there are distinct advantages to buying property together rather than owning property as an individual. It is, therefore, suggested that the government should make efforts to further decentralise administration and establish strong local governance systems making cities the main driver for a liveable and sustainable urban future. Likewise, housing society members and property owners to follow the green city concept and secure funds for the entire development phase before starting

construction. Considerations must be given to diversify the concept of growth and development. Concentrating on fostering growth across the entire country instead of in big cities, could also stop unplanned housing, while building a better future for Bangladeshis everywhere.

(Source: https://www.urbanet.info/unplanned-housing-in-bangladesh/)

Bangladesh Government to address housing crisis among tannery workers

The second largest export earner of Bangladesh, with the current value of $1.90 bn, is the leather industry. This is under threat due to questions raised by developed/importing countries, particularly from Europe, regarding the quality of life and health issues of the tannery workers. The Government is working towards ensuring proper waste treatment plants, more spacious workplace and personal protection equipment against chemical and other health hazards. However, the aspect that plays a vital role in the workers' lives and health is their accommodation, which is considered by many to be not fully addressed. Most of the tannery workers in Bangladesh are living in the slum in the Hazaribagh area, which is densely populated and where the price is very high price. Hazaribagh is only able to provide a floor area of 1.2 m^2 per person, whereas according to ILO's standard a minimum of 6.5 m^2 is required.

The price and scarcity of land in these areas are reasons why lower income households, who are the majority of the city, are virtually kept out of the land market. The Capital Development Authority body, RAJUK does not sell land with less than an area of 97.5 m^2 which costs US$ 12,600 and would take 20 years for an average poor household, like the tannery workers, with an income of US$ 35.2 to buy (Shams, Shohel & Ahsan, 2014). Additionally, there is the cost of housing. Hence, it is not feasible for 97% of the urban poor like the tannery workers to own land. To mitigate the housing requirements of low-income people, like tannery workers, the government claims to have provided for housing rents through an increased salary.

The two government authorities in charge of building and managing housing and services in the land of Dhaka- Dhaka City Corporation (DCC) and the Capital Development Authority (RAJUK) have also been inactive in ensuring or developing any laws for land allocation or housing for the urban poor communities like the tannery workers. Some experts believe that, apart from a rise in minimum wages, to enable workers to high rents in the metropolitan areas, where the workers tend to live, the option of providing land for housing to the tannery workers through Non-Agricultural Khas Land Settlement Policy which provides land for the landless, should also be considered by the government.

(Source: https://worldarchitecture.org/architecture-news/efnpv/housing-crisis-among-tannery-workers-of-bangladesh.html)

Hong Kong SAR

Hong Kong has a housing crisis that goes beyond a critical shortage of land

Annual home supply in the coming five years is expected to be 38,280 units, based on figures in last week's budget, falling 11% short of the government's target of 43,000, according to Bloomberg Intelligence's Patrick Wong. Public housing supply will be 33% below an annual goal of 30,100. By contrast, regional rival Singapore, which runs a comprehensive public housing program, has a glut of apartments. A year ago, Hong Kong Financial Secretary Paul Chan said the government was pressing "full steam" ahead with the recommendations of a task force set up to examine inadequate land supply, though that line did not feature in the 2021 presentation. The government will sell 15 residential sites in the coming year, capable of providing a mere 6,000 homes.

Hong Kong has a housing crisis. As of 2016, the city of 7.5 million had an estimated 210,000 people living in subdivided apartments, tiny spaces carved out of existing dwellings where low-income residents pay exorbitant rents, often in older, crumbling buildings that have exceeded their serviceable life. The partitioning is frequently illegal, with electrical rewiring and plumbing alterations that create fire and health hazards. The proliferation of these invisible slums is a product of insufficient home building, itself the legacy of historic mistakes in public policy. Private developers have vast agricultural land banks in the New Territories that they could be compelled to put to use. In reality, the more significant impediments to a radical upward shift in home supply are market, economic and political.

(Source: https://www.bloomberg.com/opinion/articles/2021-02-28/hong-kong-s-property-crisis-has-no-easy-solutions)

Hong Kong's property market stabilizing

Over the past twelve years, Hong Kong's residential property prices have skyrocketed by 262% (162% inflation-adjusted), including spectacular growth of 28.5% in 2009, 21% in 2010, 25.7% in 2012, 13.6% in 2014, and 14.7% in 2017. In contrast, real incomes have virtually stagnated in Hong Kong for years.

Hong Kong's residential property price index was unchanged in 2020 from a year earlier, following a 5.5% increase in 2019, according to the Ratings and Valuation Department (RVD). When adjusted for inflation, residential property prices increased by a minuscule 0.66% y-o-y in 2020. During the latest quarter, prices fell by 1% (-3.05% inflation-adjusted) in Q4 2020.

However, larger-sized apartments are more resilient, registering strong price increases during 2020, as compared to smaller-sized apartments which saw falling prices.

(Source: https://www.globalpropertyguide.com/Asia/Hong-Kong/Price-History)

Hong Kong's housing policy

Housing policy in Hong Kong is currently formulated, co-ordinated and monitored by the Secretary for Transport and Housing. The Housing Department (HD) supports the Transport and Housing Bureau in dealing with all housing-related policies and matters. The Government promulgated the Long-Term Housing Strategy (LTHS) in December 2014. It has three major strategic directions:

1) to provide more public rental housing (PRH) units and to ensure the rational use of existing resources;

2) to provide more Subsidised Sale Flats (SSFs), expand the forms of subsidised home ownership and facilitate the market circulation of existing stock; and

3) to stabilise the residential property market through steady land supply and appropriate demand-side management measures, and to promote good sales and tenancy practices for private residential properties.

The Chief Executive's 2017 Policy Address set out four elements of the housing policy of the Government:

i) housing is not a simple commodity; while maintaining respect for a free market economy, the Government has an indispensable role to play in this area;

ii) the Government will focus on homeownership and strive to build a housing ladder to rekindle the hope of families in different income brackets to become home-owners;

iii) the Government will focus on supply and increase the supply of housing units based on LTHS; and

iv) when new supply is not yet available, the Government will optimise existing housing resources to help families awaiting PRH and residents in poor living conditions.

(Source: https://www.thb.gov.hk/eng/psp/publications/housing/hongkongthefacts/index.htm)

India

Reserve Bank of India issues directions to housing finance companies

The Reserve Bank of India (RBI) came out with a set of directions related to maintenance of the liquidity coverage ratio, risk management, asset classification and loan-to-value ratio, among others, for housing finance companies (HFCs). The central bank said these directions, which shall come into force with immediate effect, are aimed at preventing the affairs of any HFCs from being conducted in a manner detrimental to the interest of investors and depositors.

"All non-deposit taking HFCs with asset size of Rs 100 crore (1 billion) and above and all deposit taking HFCs (irrespective of asset size) shall pursue liquidity risk management, which inter alia should cover adherence to gap limits, making use of liquidity risk monitoring tools and adoption of stock approach to liquidity risk," the RBI said.

The regulator's proposal has also clearly defined home finance firms and those that are systemically important among them. RBI has also proposed that home financiers should not be simultaneously allowed to lend to a real estate developer as well as homebuyers in the developer's project.

(Source: https://economictimes.indiatimes.com/industry/banking-finance/reserve-bank-of-india-issues-directions-for-housing-finance-companies/articleshow/81068208.cms and https://www.livemint.com/industry/banking/rbi-proposes-new-rules-for-housing-finance-companies-11592403986803.html)

Much needed alignment for housing finance companies

Housing finance companies (HFCs) have traditionally occupied a significant corner of the financial sector, say Sawant Singh and Aditya Bhargava. As a sector, housing finance has also been a "safe investment" as loans secured against mortgages are considered among the least risky assets. However, adverse liquidity conditions for non-banking financial companies (NBFCs) and the crisis at Dewan Housing Finance led to stakeholders reconsidering their views of HFCs. A key consideration was regulatory arbitrage in that NBFCs are stringently regulated by the Reserve Bank of India (RBI), while the perception was that HFCs are subject to a somewhat lighter form of supervision. It was thought appropriate to align the regulatory regimes applicable to NBFCs and HFCs. Before 2019, to avoid dual regulation, HFCs were exempted from complying with the RBI's regulations for NBFCs, and were subject only to supervision by the National Housing Bank (NHB). To enable the RBI to regulate HFCs, the National Housing Bank Act, 1987, was amended by the Finance (No 2) Act, 2019. These amendments came into effect in August 2019 and were followed by a press release from the RBI that it would prescribe changes to the regulatory framework for HFCs.

The writers further opine that, the current phrases, "providing finance for housing", and "housing finance", are not defined by regulation, and are used as in general parlance. The changes propose to define these as obtaining financing for the purchase, construction, reconstruction, renovation, or repairs of residential dwelling units, and would include loans to individuals or groups of individuals for the purchase, construction and renovation of dwelling units, loans for slum improvement initiatives, loans to public agencies for construction of residential dwelling units, and loans to builders for the construction of residential dwelling units. Loans for furnishing dwelling units, and loans by way of mortgage of property for any purpose other than those prescribed will be considered as non-housing loans. It is also proposed to introduce the concept of "qualifying assets", where at least 50% of the assets of an HFC would need to be in the form of housing finance, and at least 75% of such housing finance loans would be to individuals. An HFC that fails to comply with these criteria would have to change its registration from an HFC to an NBFC. These proposals will be implemented in a phased manner over two years ending in March 2024.

(Source: https://www.mondaq.com/india/construction-planning/977320/much-needed-alignment-for-housing-finance-companies)

Indonesia

Indonesian Government releases home loan subsidies for low-income families

The Indonesian Government provided new mortgage subsidies worth IDR 1.5 trillion (USD 98.4 million) for households. The Ministry of Public Works and Housing said that around 175,000 low-income families understood to have benefited from this new provision. They also expanded the wage ceiling for qualified individuals from IDR 7 million for low-cost apartments and IDR 4 million for landed houses to IDR 8 million for all kinds of housing. "We hope that housing subsidies will help low-income households to acquire decent and affordable housing, especially in the difficult times of the COVID-19 pandemic," said Eko "Heri" Djoeli Heripoerwanto, the Infrastructure Financing Director General at the Ministry of Public Works and Housing.

This new provision is a portion of the IDR 10.3 trillion stimulus package declared by the Government to control the impact of the outbreak on household expenditure.

(Source: https://www.asiapropertyawards.com/en/ministry-of-public-works-and-housing-helps-low-income-families-with-mortgage-subsidy-indonesia/)

Government provides Tapera Program to help low-income communities with housing needs

The Indonesian Government through the Ministry of Public Works and Public Housing provides the Housing Finance Liquidity Facility [FLPP] in order to help low-income people (MBR) to access home-ownership loans (KPR). Director-General of Infrastructure Financing for the Ministry, Eko Djoeli Heripoerwanto said that the Government issued Government Regulation Number 25 of 2020 on the public housing savings program (Tapera). With the issuance of this Regulation, the task of raising funds will be handed over in stages over 7 years to Tapera to immediately procure public housing by collecting compulsory savings based on mutual cooperation from the workforce segment. This is because, according to Eko, funding cannot rely solely on a limited State Budget. "The State Budget is limited, but Tapera (principal) is mutual cooperation in the form of compulsory savings. It means only certain communities can take advantage, not all participants," Eko said during a virtual press conference on Benefits of Tapera for Workers in Jakarta.

(Source: https://setkab.go.id/en/govt-provides-tapera-program-to-help-low-income-communities-on-housing-needs/)

A fast-evolving financial ecosystem offers potential for affordable housing finance

The financial ecosystem is evolving rapidly with the advent of tech-enabled and branchless banking models. Digital platforms and digital banks are getting active in the housing finance space as well. MFIs and housing finance companies are increasingly using digital field applications and credit scoring platforms to improve customer experience, reach out to new customer segments, enhance operational efficiency and offer additional products. The banks are getting into the agency model by appointing organizations such as MFIs, NGOs and cooperatives as distribution points for offering a suite of their products.

According to McKinsey & Company the gap between demand and supply of affordable housing finance products is huge, estimated at $16 trillion. This presents a sizeable business and social impact opportunity for financial service providers (FSPs) to develop new products and services that enable housing finance for low-income families. Though in the past many traditional FSPs have lacked the tools to adequately identify, assess and monitor borrowers in the informal sector, this is beginning to change. One example of this business model is Gradana (https://gradana.co.id/grakarya), a Fintech peer-to-peer lending platform in Indonesia that focuses on property-related financing. The start-up targets first-time home buyers who have difficulty saving up for a down payment. It supports them by aggregating developers, agents, investors and banks to make property investments more accessible and affordable.

(Source: https://www.findevgateway.org/blog/2021/02/emerging-tech-based-financing-models-affordable-housing)

Bank Indonesia (BI) points to restrained residential property price growth

The latest Residential Property Price Survey performed by Bank Indonesia [BI] has pointed to restrained residential property price growth in the fourth quarter of 2020, as reflected by a 1.43% (yoy) bump in the Residential Property Price Index (RPPI), down slightly from 1.51% (yoy) in the third quarter of 2020. Respondents predicted further moderation of RPPI in the first quarter of 2021, with a figure of 1.17% (yoy). Residential property sales volume underwent a shallower -20.59% (yoy) contraction in the fourth quarter of 2020 compared to -30.93% (yoy) in the previous period, with the decline affecting all types of residence.

Concerning sources of finance, the latest survey showed that most developers continued to rely on non-bank financing in the form of internal funds, accounting for 65.46% of total capital in the fourth quarter of 2020, while customers preferred housing loans disbursed by the banking industry as the primary source of financing for residential property purchases, dominating 75.31% of total financing.

(Source: https://www.bi.go.id/en/publikasi/ruang-media/news-release/Pages/sp_234121.aspx)

Malaysia

Using EPF money to address affordability when purchasing a property

Affordability is a big problem for home buyers in Malaysia, as it is in any other country. Although a buyer can approach a bank for a loan to buy a house, yet there may remain a shortage of money for the same. In such a case, an additional source of savings of a buyer can come in handy if he/she is a citizen or Permanent Resident in Malaysia. The intending buyer can utilise his/her Employees Provident Fund (EPF) account for help, but only through Account 2. The Account 1, though bigger in volume (70% of monthly contribution) but has some restrictions on withdrawal from this account. It is for retirement saving, and can only be used by those over 55 years of age. On the other hand, Account 2 which carries 30% of monthly contribution, can be used for financing a home, financing the education of children, and for medical expenses.

This can be used to purchase/build a first house (or second house; provided that the first house has been sold or disposed). To use Account 2 to purchase a property, the buyer needs to show evidence that, booking fee and down payment for the property, together with the legal fee and stamp duty for the Sale & Purchase Agreement (SPA) have been paid. This money can also be used to reduce/redeem the housing loan for first or second house and assist a spouse to reduce/redeem his/her housing loan. However, the EPF money cannot be withdrawn for home renovation. The limit of withdrawal for a housing loan is the SPA price minus the loan amount, 10% of the SPA Price, or all savings in Account 2, whichever is lower. For self-financing, the limit is the purchase price with an additional 10% of the purchase price, or all savings in Account 2, whichever is lower.

(Source: https://www.propertyguru.com.my/property-guides/use-epf-kwsp-buy-house-malaysia-12580)

Home ownership campaign: 10% discounts & free stamp duty for buying a house

Homeownership in Malaysia is in a tricky situation – there's a demand and then there's also a supply, but financial capability seems to be an issue here. Based on Bank Negara Malaysia (BNM) insights, these supply-demand imbalances in the property market have increased since 2015. And the reason for this is not because of the strict lending rules on housing loans, but it is because houses aren't affordable anymore. This phenomenon has created another quite scary problem; unsold units. According to the Valuation and Property Services Department's (JPPH) latest figures, the number of unsold completed residential units rose from 20,304 units to 30,115 units, on a year-on-year basis.

From 1 June 2020 to 31 May 2021, a Malaysian citizen who is looking to buy a house (that is priced above RM100,000 and not more than RM2.5 million) will enjoy a minimum of 10% discount (there is a possibility for it to be more) from the property developer. On top of that, a buyer also gets a 100% stamp duty exemption on the Instrument of Transfer and Instrument of Loan Agreement depending on the house price range of the house being purchased.

(Source: https://loanstreet.com.my/learning-centre/home-ownership-campaign-promo-requirements)

[1 Malaysian Ringgit = 0.24 United States Dollar]

Maldives Islands

Exim Bank to provide $130 million funding for construction of social housing units in Maldives

Exim Bank will support the construction of social housing units in the Maldives through its USD 130 million loan to Fahi Dhiriulhan Corporation Ltd, said the lender. Exim Bank said it exchanged a letter of intent (LoI) with Fahi Dhiriulhan Corporation Ltd on February 20, and the Government of Maldives for the design and construction of 2,000 social housing units in Hulhumale, the Maldives, valued at USD 130 million. It is proposed to provide this funding under the buyer's credit programme under the National Export Insurance Account (NEIA) scheme. The project is expected to improve the socio-economic well-being of Maldivian citizens and is in line with the Government of India policy of 'Neighbourhood First', Exim Bank said.

(Source: https://www.timesnownews.com/business-economy/companies/article/exim-bank-to-provide-130-mn-funding-for-construction-of-social-housing-units-in-maldives/725113)

Mongolia

Housing shortage and homelessness in Mongolia

Mongolia is a semi-presidential republic located in Northern Asia. Known as the homeland of the 13th-century conqueror, Genghis Khan, Mongolia still maintains the traditions of a nomadic way of life. After the Mongolian Revolution of 1921, which ended the communist Chinese dominance, the Mongolian People's Republic was established in 1924. The country also went through a peaceful democratic revolution in 1990, after which, the country's ex-communist party competed for political power with the Democratic Party. In the wake of these political changes, homelessness in Mongolia, driven by a housing shortage, has become a significant concern.

Currently, homelessness is a huge issue the nation is trying to tackle. In Ulaanbaatar, the capital city of Mongolia, there are reports of

homeless people living in the sewage system. To reduce homelessness in Mongolia, the government and humanitarian organizations must determine the contributing factors, the individuals affected, and the measures being taken. As in many countries, homelessness in Mongolia is linked to a lack of affordable housing. Ulaanbaatar, for example, underwent rapid urbanization during the past decade. Mongolia's mining boom in 2012 helped immensely in the urbanization of Mongolia. After the establishment of the Privatization Law, which allowed people to freely choose residence location, many Mongolians migrated to Ulaanbaatar for more job opportunities. Ulaanbaatar's population, which was 650,000 people in 1998, increased to 1.49 million people in 2018. This migration to Ulaanbaatar was further encouraged by a series of flock-devastating winters which forced many nomadic populaces to migrate to the city.

(Source: https://borgenproject.org/homelessness-in-mongolia/)

Mongolian economy boosted via USD 250 million offering

In an effort to revitalise Mongolia's economy and drive domestic sustainable development, the housing finance company, Mongolian Mortgage Corporation together with MIK Holding have issued USD 250 million Senior Notes/Bonds. Mongolian Mortgage Corporation, a seller and issuer of mortgage-backed securities, and MIK Holding, a joint stock company listed on the Mongolia Stock Exchange, engaged a team of lawyers from Mayer Brown to advise them on the offering.

The offering of senior notes, which mature in 2024, forms a part of Mongolia's effort to improve its economy, introducing liquidity into Mongolia's mortgage market. It is expected that the offering will result in lower lending rates for Mongolian mortgage holders, while simultaneously removing the pressure from the balance sheets of commercial banks in Mongolia via the purchase of underlying mortgages. Mongolian Mortgage Corporation and MIK Holding plan to use the net proceeds gained from the offering to purchase outstanding senior notes which are due in 2022.

(Source: https://iclg.com/ibr/articles/15809-mongolian-economy-boosted-via-usd-250-million-offering)

Sustainable housing in Mongolia

Mongolia and its capital Ulaanbaatar, known as the world's coldest capital city, are in dire need of modern, sustainable, and well-insulated housing. The residential housing is mostly a legacy of dull, low-quality blocks that mimic the design and shoddy quality – with little regard to climate – of the neighbouring former Soviet Union whose influence had been felt till 1992 when both countries reoriented towards a market economy.

Almost 30 years later, the legacy is still there, and many people still live in old precast panel buildings with insufficient thermal insulation, the walls, roofs, and poorly sealed windows providing poor protection from the severe winter cold. The high thermal losses are compensated by turning the heating up. Since heat tariffs are subsidized, they provide little incentives for users to economize. In "ger" districts – informal settlements in the outskirts of Ulaanbaatar where nearly half of the city's population lives – homes are not connected to the centralized heating network. Most of them burn raw coal and firewood. This leads to the city's high levels of air pollution in winter, as well as smog-induced public health problems. The Ger Housing design and style are typical of the Mongolian habitat. In a move to partly resolve the problem, one of Mongolia's leading young female corporate presidents, Mrs. Tselmuun Nyamtaishir of Mongolyn Alt (MAK) LLC has implemented My Dream House project as part of its social responsibility effort.

(Source: https://fashionweekdaily.com/tselmuun-nyamtaishir-president-of-mongolyn-alt-breaks-ground-for-sustainable-housing-in-mongolia/)

New Zealand

New Zealand hits 'go' on home lending clampdown

New Zealand's central bank will slap new restrictions on the housing market, after warning that speculation is helping to fuel huge post-pandemic price gains. The bank announced in December 2020 that it would consult on re-introducing loan-to-value (LVR) restrictions. The harshest restrictions will apply to investors: from May 1, they will not be able to get finance for more than 60% of the value of an investment property. Speculation among economists about a similar intervention to Australia has grown after property values in smaller cities and regional areas here rose to new highs in January, fuelled by record low borrowing costs, stimulus payments and low stock levels. Data provider CoreLogic's index of dwelling values rose 0.9% in January from December, and was up 3% year on year, as the 1.6% monthly jump in regional prices more than doubled the 0.7% increase across the combined average of capital cities.

Still, those gains are overshadowed by the December REINZ house price index which rose by 17.3% year on year, with prices up 18.1% in Auckland and 16.6% outside Auckland.

(Source: https://www.afr.com/markets/debt-markets/rbnz-presses-go-on-nz-housing-market-clampdown-20210209-p570ri)

Government forces central bank to include housing in rate setting

New Zealand's Government will require the central bank to take account of rampant house prices when it sets interest rates, a change that may restrict its ability to run a loose monetary policy. The Reserve Bank's (RBNZ) remit will be amended so that the bank considers "the impact on housing when making monetary and financial policy decisions," Finance Minister Grant Robertson said in a statement. The New Zealand dollar jumped to its highest since 2017 as investors ramped up bets on higher interest rates.

The Government is under political pressure to cool an overheating housing market, which has been fuelled by record-low borrowing costs after the RBNZ responded to the coronavirus pandemic by slashing its cash rate and embarking on quantitative easing. Governor Adrian Orr pushed back against Robertson's proposal when it was first made last year, saying that forcing the bank to consider house prices when setting rates could lead to below-target employment and inflation.

(Source: https://www.bloomberg.com/news/articles/2021-02-24/n-z-government-forces-rbnz-to-include-housing-in-rate-setting)

New Zealand Government looks to cool off sizzling housing market

New Zealand's Central Bank further tightened mortgage lending to investors on Tuesday, while the government promised 'bold action' to control an inflated housing market that could impact the country's financial stability. The Reserve Bank of New Zealand lifted loan-to-value ratio (LVR) restrictions on mortgage lending to investors in April last year to spur credit flow and boost the economy hit by the coronavirus pandemic. But it decided to reinstate the restrictions from March after the housing market witnessed a rapid acceleration, with new records being set for the national median price and new mortgage lending continuing at a strong pace. "We are now concerned about the risk a sharp correction in the housing market poses for financial stability," Deputy Governor Geoff Bascand said in a statement. The move came shortly after the Finance Minister Grant Robertson promised 'bold action' on housing in his budget policy speech amid growing pressure on the government to control the crisis.

(Source: https://www.reuters.com/article/newzealand-economy-idUSL1N2KE2UP)

Pakistan

PM to lay foundation stone of housing project on 12th March

Prime Minister Imran Khan will lay the foundation stone of a scheme comprising 4,000 apartments to be built under Phase-I of the LDA City Naya Pakistan Housing Project on March 12. "On (sic) our request, the PM has expressed willingness to lay the foundation stone [of the project] for the construction of 4,000 apartments," the Lahore Development Authority (LDA) Vice Chairman S M Imran said in a press release.

(Source: https://www.dawn.com/news/1610547/pm-to-lay-foundation-stone-of-housing-project-on-12th)

Construction under Pakistani mega-housing program to begin in January

Construction under a flagship program to build five million affordable homes would start in January, a director at the Naya Pakistan Housing & Development Authority (NAPHDA) has said, after the government had worked to remove all legal hurdles to the project.

The Naya Pakistan Housing Program was one of Prime Minister Imran Khan's electoral promises in 2018 to address the country's housing backlog of an estimated 10-12 million units. According to World Bank and government data, the gap is increasing every year by roughly 350,000 units.

"From January 2021 onwards, they [builders] will start constructions," Sohail Sarwar Jaura at NAPHDA told Arab News, saying work on the project had been slow due to legal hurdles that had now been resolved. "It took two years to complete legislations and now we are scrutinizing over 1,000 mega-schemes submitted by private sector builders who will be issued no objection (clearance) certificates by Dec. 31, 2020 for development of housing societies, some as big as involving 5,000 houses," Jaura said. Earlier the Government had set up a Housing Task Force, with Zaigham M. Rizvi as the Chairman, to design an institutional framework to deliver the housing agenda and facilitate measures from the Government on fiscal and regulatory aspects of housing-supply as well as housing finance. In January 2020, through an act of parliament, the Government constituted the NPHDA to move for execution of the housing agenda as well as to regulate housing and real estate development activities in Pakistan.

(Source: https://www.arabnews.pk/node/1775181/pakistan)

Housing sector being promoted on modern lines: Minister

Provincial Minister for Housing & Urban Development in Punjab Province, Mian Mahmood-ur-Rasheed has said the government is actively working to promote the housing sector on modern lines to fulfil the vision of Prime Minister Imran Khan. While giving details here on Monday, the minister expressed the hope that after the approval of Affordable Private Housing Schemes Rules 2020 and joint-ventures rules from the provincial cabinet, speedy development of the housing sector, as well as the provision of substantive relief to builders and developers will be possible. Meanwhile, he said the process of necessary legislation had been completed to promote the housing sector, adding that builders and developers were being granted relief in the Naya Pakistan Housing Project. The program is also being moved forward through joint ventures with private builders and developers, he added.

(Source: https://www.thenews.com.pk/print/794215-housing-sector-being-promoted-on-modern-lines-minister)

Philippines

Shift from low-cost housing demand to middle-class housing

In Philippines it is expected that the next big jump in mass housing construction will come from the shift of the low-cost mass housing market to middle class housing projects, driven by the anticipated collapse in interest rates, according to a top official of a leading property management and consultancy firm. David Leechiu, CEO of Leechiu Property Consultants, Inc. (LPC), said during the Property Market Report, a virtual forum organized by the German Philippines Chamber of Commerce, that the current high interest rate for housing loans is expected to substantially reduce as interest rates collapse further resulting in a functioning mortgage market in the Philippines. Leechiu explained that what has prevented people from taking up housing loans is the high cost of money as interest rate per annum is 9-11 percent fixed for 10 years and payable over a 20–25-year period. "But that will come down soon and it is coming down now," he said.

(Source: https://mb.com.ph/2021/02/12/shift-from-low-cost-housing-demand-to-mid-class-seen/)

Real estate highlight: what women want in 2021

In the Philippines, women get it done. The country is one of the most female-forward in various categories. In the World Economic Forum's (WEF) 2020 Global Gender Gap Report, the Philippines was identified as the most gender equal country in Asia and was ranked the 16th most gender equal out of the 152 countries assessed. The country posted positive figures for categories such as women's economic participation and opportunity, wherein it closed 80% of the gender gap. The report revealed that women "outnumber men in senior and leadership roles, as well as in professional and technical professions." The Philippines was also among the top five of all countries studied for the category assessing gender wage equality. The WEF report revealed that the country had already closed its Health and Survival and Educational Attainment gender gaps, with Filipino women having a longer life expectancy than Filipino men, and with more Pinays enrolled in secondary and tertiary education compared to men. As for property search, Lamudi found that females were more active than males across various categories on the website, with women holding a larger share of page views and leads and composing the majority of property searches. With more women making waves in the corporate world, getting a higher education, and looking into properties, women continue to significantly drive industry trends.

(Source: https://www.lamudi.com.ph/journal/women-property-demands-amenities-2021/)

Republic of Korea

Korea is developing a new capital city, which will eventually result in residential houses for bureaucrats as well as for the working people

The country is building a new "administrative capital", the city of Sejong, 120 km away from Seoul, which is gradually developing into a place where families can raise children and a potential model for smart-city development. Located about an hour and a half away from Seoul by high-speed rail and bus, the city in the hills south of Seoul offers a vision of urban life in the near future. Most of South Korea's administrative functions are now packed into the Government Complex, a 73 sq. kilometre area that hosts 44 government bodies, 15 national research organizations and housing for 14,000 public servants. Only a few key bodies are left in Seoul, including the presidential office and the foreign, defence and justice ministries. Government employees call Sejong an "administrative island," said a manager at one ministry – a nickname that is partly a tongue-in-cheek reference to the no-frills nature of a city built in pursuit of administrative efficiency. A decade and a half on from

the start of construction in 2007, the first two phases of the plan for the city are complete – first the administrative relocation and infrastructure, then an expansion of housing supply.

(Source: https://asia.nikkei.com/Politics/South-Korea-s-island-of-bureaucrats-emerges-as-next-capital)

Korea's housing transaction numbers fall 35% in January

South Korea has recently witnessed a sharp drop in housing transactions. According to data from the Ministry of Land, Infrastructure and Transport on Sunday, the number of the country's housing transactions amounted to 90,000 in January, down 35.4% from a month earlier. By region, housing deals in the greater metro area fell 25.4% month on-month to 47,132-, while those in other parts of the nation plunged 43.5%. Apartment transactions slipped 39.3%, while the transactions of other types of homes fell 23.2% on a monthly basis. Industry experts said people appeared to have taken a wait-and-see approach last month, ahead of the government's property measures unveiled early this month.

(Source: https://world.kbs.co.kr/service/news_view.htm?lang=e&Seq_Code=159701)

Thailand

Thai central bank says housing loan rules still necessary

Thailand's central bank believes mortgage rules are still necessary and are not a problem for the property market, an assistant governor said. Housing developers have urged the central bank to remove the loan-to-value (LTV) rules to help boost purchasing power and to lessen the impact of the coronavirus pandemic on the sector. The LTV ratio rules, which had been relaxed twice, are still appropriate and will help curb risks in the sector, Nawaron Dejsuvan said in a statement. Despite the outbreak, mortgage loans increased 4.4% in the second quarter, a faster pace than the prior period, she said. "Given high uncertainty, the central bank will closely monitor the property market," Ms. Nawaron said.

(Source: Thai central bank says housing loan rules still necessary, Real Estate - THE BUSINESS TIMES)

Collective finance for slum upgrading in Thailand

The Baan Mankong ('Secure Housing') Programme of Thailand has been heralded as a model of participatory slum upgrading. Many scholars have praised its participatory and community-based processes, as well as its success in terms of achieving scale. The celebration of the program emphasizes its particular model of housing finance, which includes community savings, housing cooperatives, and collective loans for physical upgrading provided through a government agency. This financial model, along with the collective and participatory processes it employs, forms the foundation of the program's claims to 'empowerment.'

Some reviewers of Baan Mankong observed how this financial model actually plays out on the ground through an in-depth ethnographic study of the policy and its participants. Despite the policy makers' intentions to empower communities through access to collective finance, many participants find themselves struggling with debt and living under a new form of financialized community that reshapes their social relations with neighbors and burdens them with the responsibility for financing and carrying out development desired by the state.

(Source: https://www.tandfonline.com/doi/abs/10.1080/19491247.2020.1840906)

Balance of supply and demand maintains Thai housing market

The head of Real Estate Information Centre (REIC) of the Government Housing Bank, Vichai Viratkapan, has said that, the pandemic has greatly impacted Thailand's housing market in investments, and also sale of housing However, he said, the slowing of demand and supply has balanced the market, reducing the risk of problems from excess supply. In the first quarter, 89,024 units of ownership were transferred nationwide, down 16.7% from the fourth quarter of last year, but up 2.5% year-on-year, with a total value of 210 billion baht ($6.6 billion).

(Source: https://www.phnompenhpost.com/?url=https%3A%2F%2Fwww.phnompenhpost.com%2Fpost-property%2Fbalance-supply-and-demand-maintains-thai-housing-market)

Europe: trends in house prices and construction

↳ By Mark Weinrich

For several years now, the spring column has been used to enable us to feel the pulse of European housing markets. For the past seven years now, we have observed a synchronised growth in house prices in the European Union, which can be explained by the Europe-wide economic recovery and a supportive financial climate, boosting demand for both housing and property investment. So far, residential real estate markets in the European Union have proved resilient to the COVID-19 pandemic, as the low interest rate environment has continued to underpin demand, while loan moratoria and job protection schemes have helped to sustain household debt-servicing capacity. Nevertheless, considerable regional differences in house price development persist. The highest annual increases in house prices in the third quarter of 2020 were recorded in Luxembourg (+13.6%), Poland (+10.9%) and Austria (+8.9%), while prices fell in Cyprus (-1.4%) and Ireland (-0.8%). In the European Union as a whole house prices were up by 5.2%, and in the euro area up by 4.9% in the third quarter of 2020, compared with the same quarter of 2019.[1] However, the future direction of property prices is quite uncertain. The fundamentals do not point to an ongoing housing boom and government's COVID-19 financial support schemes will also come to an end in the near term. However, there are also no signs for a major setback in the housing market. It will be very interesting to see how prices actually develop in 2021.

In this column we have focused particular attention on house price changes in Sweden. House prices in Sweden had increased from the beginning of 2013 to the middle of 2017 by more than 60%. This boom had led the Swedish government to implement regulatory measures aimed at cooling the market. The summer 2018 edition of HFI featured an article on these regulatory measures. Presumably due to these measurers, prices fell at the end of 2017 quite sharply. They continued to decline in 2018 and stabilised towards the end of the same year, and slightly increased during 2019. However, prices increased again quite sharply in 2020. The Valueguard-KTH Housing Index, HOX Sweden, shows that house prices in Sweden have increased from January 2020 to January 2021 by almost 12%. Valuegard also notes that since spring 2020, the price developments have not followed normal seasonal patterns, probably due to the COVID-19 pandemic which may also be the cause of the accelerated house price increase. Clearly, the recent house price increases counter the efforts of Swedish policymakers to stabilize the housing market. It remains to be seen whether the price developments will cool down again when the COVID-19 pandemic comes to an end.

The occurrence of COVID-19 has caused disruptions in the construction sector, so that construction output did not move in tandem with house prices; instead, it is believed that construction volume in the EUROCONSTRUCT area[2] slumped by 7.8% in 2020.[3] However, the consequences for the individual countries differ significantly. The range goes from a small increase in construction output in Finland through stagnation in Portugal and Norway to a sharp decline of almost one fifth in the United Kingdom. Other large markets like France and Spain were also strongly affected, whereas the German market did surprisingly well since construction activities could continue relatively unhindered. Most of the large losses are due in particular to considerable disruption to construction activities in a number of countries in spring 2020, although Brexit also certainly plays a role in the sharp decline for the United Kingdom. Unlike typical economic crises, this time even the renovation sector has been heavily affected. While the construction of new buildings is estimated to have collapsed by 10.5%, the data for renovation activities shows a decline of 7.3% in 2020.

Regarding the individual market segments, the civil engineering sector is likely to be least affected by the COVID-19 turbulence. It is estimated that expenditure on infrastructure facilities fell by 3.8% in 2020 and will rise by 5.2% in 2021. However, building construction is much more negatively affected. The EUROCONSTRUCT network expects a decrease of 9.2% for the non-residential construction sector followed by a moderate increase of 2.5% in 2021. While residential construction is also expected to have fallen by 8.6% in 2020, it is predicted that the market will regain significant momentum in 2021 with an expected growth of 4.7%.

The experts of EUROCONSTRUCT expect that construction output will not exceed the pre-crisis level of 2019 before 2023, as construction demand from private households, companies and government players are likely to remain subdued for a while due to the economic turmoil. In the long term, however, construction activity continues to trend upwards. The Corona crisis has only temporarily overshadowed some positive factors like the need for housing in urban regions, for energetic renovation and for modernising the infrastructure.

[1] All data on house prices are from Eurostat: https://ec.europa.eu/eurostat/statistics-explained/index.php/Housing_price_statistics_-_house_price_index#Annual_and_quarterly_growth_rates

[2] Countries which belong to the Euroconstruct network are France, Germany, Italy, Spain, United Kingdom, Denmark, Finland, Ireland, Norway, Sweden, Austria, Belgium, Netherlands, Portugal, Switzerland, Czech Republic, Hungary Poland, and Slovak Republic.

[3] Press release on 90th EUROCONSTRUCT Conference: https://euroconstruct.org/ec/press/pr2020_90

Housing Finance in LA&C: the long road out of the Covid-19 crisis

By Claudia Magalhães Eloy

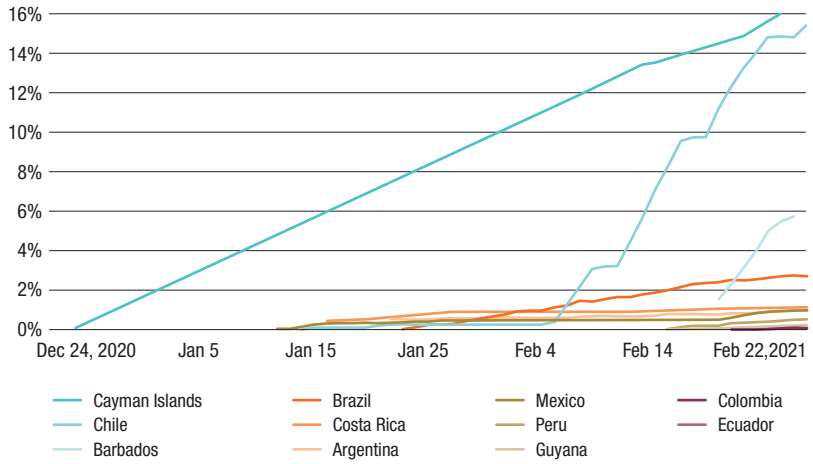
As discussed in this column in the summer and autumn issues last year, across LA&C a series of measures such as payment breaks, suspension of evictions and foreclosures were enacted to allow consumers to cope with financial difficulties arising from Covid-19 related loss of income and jobs. Concerns about economic developments in general and specific impacts on housing finance systems remain, as the Covid-19 crisis unfolds into lengthy new chapters and unforeseen outcomes.

Predictions of a harsh economic slowdown across LA&C in 2020 have been confirmed: a 7.4% contraction according to the IMF, 7.7% in Cepal's analysis[1]. The unexpected recovery in the third quarter of last year in some major economies (Brazil, Peru and Argentina), mainly as a result of the resumption of productive activity following a relaxation of the quarantine measures as well as emergency cash transfers to the poor and an improvement in external demand, provided some relief from a potentially worse economic contraction. Since late December, vaccination has started across LA&C with Cayman Islands and Chile leading the mammoth task:

This year the region is expected to rebound and to exhibit growth, yet it is likely to be insufficient to return to the economic activity levels seen prior to the coronavirus pandemic. According to Cepal, the average growth rate is expected to be 3.7% this year and "the process of recovering pre-crisis levels of Gross Domestic Product (GDP) will be slow and will not conclude until 2024". The IMF is more optimistic with a projected growth rate of 4.1% for 2021[2] but agrees that "full recovery is still a long way ahead", forecasting that the region will go back to its pre-pandemic levels of output only in 2023, and GDP per capita, later in 2025. Therefore, the region will fall behind when compared to other parts of the world. It must be kept in mind that the region

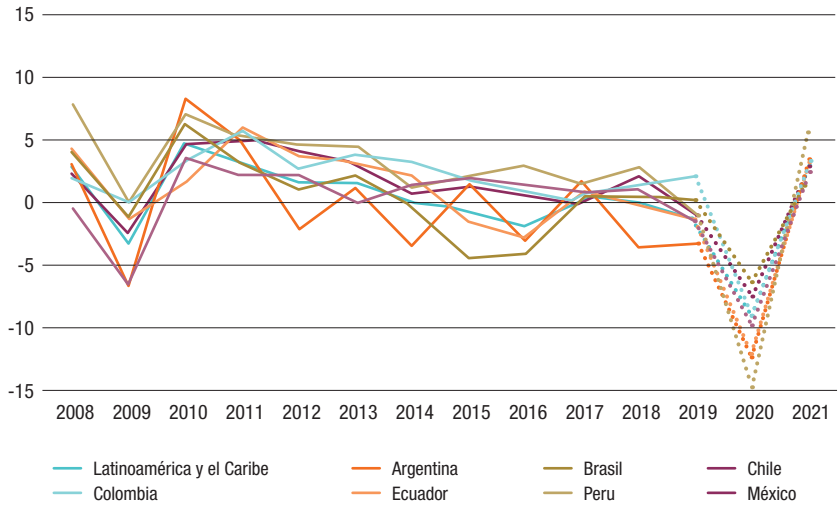
FIGURE 1 Share of people who received at least one dose of COVID-19 vaccine

Share of the total population that received at least one vaccine dose. This may not equal the share that are fully vaccinated if the vaccine requires two doses.



Source: Official data collated by Our World in Data – Last updated 23 February, 10:30 (London time) *OurWorldData.org/coronavirus • CC BY*

FIGURE 2 Growth rate of GDP 2008/2021 – LAC and selected countries



Source: Report on Financial Stability 2nd semester 2020. Banco de la Republica de Colombia

[1] https://blogs.imf.org/2021/02/08/latin-america-and-caribbeans-winding-road-to-recovery/ and https://www.cepal.org/en/pressreleases/latin-america-and-caribbean-will-have-positive-growth-2021-it-will-not-be-enough

[2] The IMF earlier projection for 2021 was of a 3.7% growth. For 2022 the Fund now estimates lower growth of 2.9%.

was already facing slow growth rates prior to the local start of the pandemic (0.3% growth on average during the 2014-2019 period).

The still unpredictable course of the pandemic which depends on the tempo of vaccination, as well as further outbreaks of virus mutations and variants, has already required the reinstatement of stricter quarantine measures in some areas, further harming the economy. Notably the service sector has been worse affected, especially travel and tourism activities, which are vital to the Caribbean area.

While benchmark rates have been kept steady at or near record lows in countries such as Brazil, Chile, Colombia, Mexico, Paraguay and Uruguay, the region's economy is threatened by elevated fiscal vulnerability, unemployment (10.7% in 2020) and informality.

Cepal argues that actual economic recovery depends on each country's capacity to maintain fiscal and monetary stimulus to support aggregate demand and productive sectors and even the IMF recognizes that "supporting vulnerable sectors most affected by the pandemic" is crucial while "removing too much fiscal support too early would jeopardize" the recovery path. The impact of the pandemic has been highly unequal in terms of spatial, gender[3] and racial dimensions as noted by the IMF[4]: "the crisis had a disproportionately large impact on employment with losses concentrated among female, young, informal and less educated workers – with consequences for social indicators."

Policies to foster employment-intensive sectors may come out as part of the LAC's strategies to economic recovery. This highlights both the important role of the housing sector in this scenario and the challenges posed. Historically across the region, the importance of the housing sector has risen in times of economic revamp strategies. Brazil is a pertinent example where massive housing construction has been fostered in two instances to boost the economy: back in the late 60s, when the housing finance system was created and in 2009, with the introduction of the 1 million housing unit (later becoming 5.5 million) Minha Casa Minha Vida Program. Housing construction and renovation are intensive employers of even greater importance in developing economies given the abundance of unskilled labor.

Housing finance constitutes a "si ne qua non" element for the housing construction strategy and, at the same time, must withstand the current crisis in a safe and sound fashion. Pablo García-Silva (Central Bank of Chile)[5] reflects that "instead of a shock in the financial system that then spreads to the real economy, the COVID-19 crisis is a shock to part of the real economy that then spreads to the rest of the real economy and to/through the financial system" [therefore] "proper functioning of financial markets is critical". Challenges regarding housing finance systems must not be underestimated. Although interest rates are likely to remain low by historical standards, inflationary pressure may rise and consequently interest rates, imposing further pressures upon mortgage borrowers. There are not yet thorough regional studies on the results of the credit flexibility measures undertaken and the effects of Covid-19 on housing finance markets and systems in LAC. It is all too soon. Here we offer some insight into selected countries:

Brazil

Emergency cash transfers were provided between April and December last year[6], constituting a temporary welfare program larger than "Bolsa Familia" and raising welfare spending by an extra 8% of GDP, briefly reducing poverty and inequality, despite the surge of unemployment.

The housing finance market performed much better than originally expected. The savings and loans system exhibited its best historical result in terms of inflow of deposits totaling over BRL 1 trillion in stock[7]. The major traditional housing finance deposit system (SFH: SBPE +FGTS) exhibited a growth of 5% in the number of units financed (approximately 860 thousand units) and of 23.8% in credit volume (in real terms). The total SFH housing credit portfolio amounts to BRL 721.6 billion (November 2020) and Abecip[8] predicts a further growth of 21% in the volume of credit in 2021[9]. It must be noted that cost of capital for banks stands at a historic low of 4.4% (June 2020).

90-day delinquency is very low, even lower than in 2019, at 0.75% for middle/upper middle-income segments (SBPE) and 1.9% for moderate and low-income segments (FGTS) as of November 2020. Overall delinquency fell mainly due to debt renegotiation and grace periods conceded. Problematic assets, on the other hand, are on the rise for FGTS (moderate- and low-income segments), reaching 7.3% of its housing credit portfolios.

According to the Central Bank's Report on Financial Stability (October 2020)[10]:

- 25.8% of the stock of total credit to individuals had been renegotiated by June 2020, 61.1% of it (15.7% of total stock) was mortgage contracts. This significant volume could exert further pressure on the index of problematic assets, since the performance of some of these contracts may deteriorate. It must be noted that 59% of total credit renegotiated (not just mortgages) is allocated to families with incomes of up to 5 times the minimum wage.
- Overall family indebtedness rose in 2020, reaching 50.3% as of October, 5.47% higher than the preceding period (of this, 2.3% relates to housing mortgages) now consuming 21.65% of incomes (from 20.14% in October 2019).
- Sensitivity analyses (stress tests) performed indicate that the Brazilian housing finance system stands firm: up to a 35% decline in real estate prices, still no agent would fail to meet Basel capital requirements or become insolvent. At a 50% decline in prices, a little over 15% of the systems' assets would become compromised.

Construction GDP contracted by just 2.8%, lower than the 4.05% estimated contraction for the country in 2020. Housing sales grew by 14.2%, fostered by larger and cheaper credit offer[11]. Almost half of last year's real estate sales (46%) were to investors, aimed at achieving either future rents or increases in property value, according to Raio-X FipeZap which ran a recent poll that shows a reverse in that trend for

[3] Women account for 55% of informal workers in LAC https://blogs.worldbank.org/developmenttalk/covid-19-latin-america-pandemic-meets-extreme-inequality

[4] https://blogs.imf.org/2021/02/08/latin-america-and-caribbeans-winding-road-to-recovery/

[5] https://www.bcentral.cl/documents/33528/133214/pgs04022021.pdf/1c94e6e0-c38b-9e2b-d8a2-97bb95cb873e?t=1612448546310

[6] Cash transfers were of BRL 600.00/adult (double for single mothers) for the first 5 months, and of BRL 300.00 (again, doubling for single mothers) from September to December 2020. Bolsa Família paid BRL 190.00 on average/family. There have been no cash transfers up to now, and Congress is debating a temporary reinstatement of the aid (PEC Emergencial), this time down to BRL 250.00 for another 4 months.

[7] SBPE, the segment of the savings and loans system channeled for housing finance totaled BRL 801.4 billion.

[8] Mortgage Banks Association – www.abecip.org.br

[9] https://www.abecip.org.br/admin/assets/uploads/anexos/2021.pdf

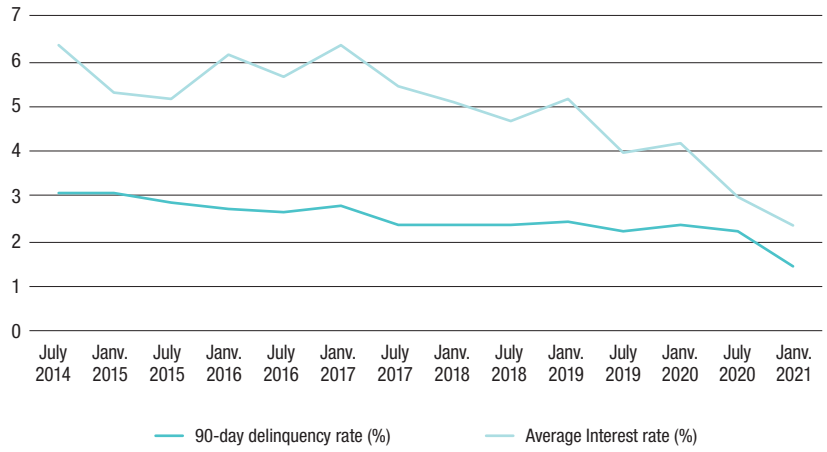
[10] https://www.bcb.gov.br/content/publicacoes/ref/202010/RELESTAB202010-refPub.pdf

[11] https://ochbrasil.blog/2020/12/22/edificacoes-um-balanco-e-perspectivas/

2021: 47% of respondents intended to purchase a house in the following 3 months, mostly for use this time (only 14% had investment purposes)[12]. Yet, some low-income homebuilders are reporting a slowdown in sales performance as homebuyers become more wary.

While the Reference Rate (Selic) has been maintained at 2% since August 2020, a historic low, economists forecast successive rises, up to 4% throughout 2021, driven by escalating inflation that should hit 3.82% this year[13] (Selic was just raised to 2.75% as this Journal went into publishing). Mortgage interest rates, down to an average of 7.7% (SBPE) and 6.1% (FGTS), as of November 2020, may rise accordingly. GDP is expected to grow by 3.29%, thus leaving the "contraction" scenario behind. Yet, the unemployment rate of 14.1% (last quarter of 2020), which has rendered 14 million people jobless, coupled with the deterioration of income distribution and smaller cash transfers may produce a more adverse scenario than expected. This may lead the housing market toward a more skewed, less inclusive pattern, typical of that prior to a decade ago. Growth will then be seen concentrated in the more affluent segments as a result of families' desire to move to more spacious homes or to own a second home in the countryside.

FIGURE 3 Chile: 90-day housing mortgages delinquency rate and average interest rates*



* Average interest rates for contracts over 90days and over 5.000,00 Unidades de Fomento.

Source of data: Comisión para el Mercado Financiero: Estadísticas de Bancos e Instituciones Financieras.

Chile

Covid vouchers were first announced in March last year[14] and were extended to the Family Emergency Income (IFE, *Ingreso Familiar de Emergencia*) in May, targeting families within the first three income quintiles and with more than half of their income coming from informal labor. Then in August, the government announced a single payment Middle Class bonus for workers that had lost at least 30% of their income relative to the previous year. Workers were also allowed to access income through the public unemployment insurance system if they had had their activity temporarily suspended or if their labor schedule was reduced to 50% by employers. Furthermore, payment deferrals were granted on loans, including mortgages (of 3 or 6 months, according to banks' policies)[15], as well as on utility bills and real estate taxes.

According to a study by Carlos Madeira (Central Bank of Chile)[16], amongst those initiatives income and expenses support had both a wide reach and a strong impact on households, especially for poorer families, while debt deferrals were more important for the richer families. He concludes that broadening and scaling up of policy efforts should therefore focus on direct income support for families.

In early January this year, a new Chilean Law (#21.299) allows for the deferral of mortgage loan installments (crédito de postergación) through the establishment of a mutual loan, which enjoys tax exemption, and creates a state guarantee, granted by Fogape (Fondo de Garantía para Pequeños y Medianos Empresarios)[17], to cover such contracts. Credits may only be used to pay full and consecutive installments of a mortgage loan, at an interest rate not higher than the original loan. The credit deferred can be paid in monthly installments at the end of the original loan term or may be distributed over a period that may not exceed the residual term of the loan[18]. By mid-February, Fogape's first tender for funds with a state guarantee for "postponed credits" registered a demand of 5.7 million UFs (Unidades de Fomento) allowing for the guarantee of over 60 thousand contracts: 56% of demand came from Banco de Chile and Banco Estado.

The housing credit portfolio, as of November 2020 amounts to $57.3 billion pesos, with 3 major banks accounting for 56.9% of market share[19]. Delinquency is falling and by last January had reached its lowest rate in the last 7 years: 1.43%.

After last year's contraction (a drop of between 6.25% and 5.7% of GDP), Chile is expected to exhibit one of the highest growth rates in the region for 2021[20]: the IMF has recently revised its projection upwards to 5.8%. The Reference Rate (TPM) is at 0.5% and the average housing finance interest rate is at 2.33%, a very low figure relative to other LAC countries. The effectiveness of the Chilean vaccination program and the more favorable economic and fiscal conditions set the stage for a faster recovery.

Colombia

Mortgage reliefs such as grace periods and extensions, as of July 2020 corresponded to

[12] https://downloads.fipe.org.br/indices/fipezap/raiox/raio-x-fipezap-2020t4.pdf

[13] Boletim Focus, Banco Central www.bcb.gov.br

[14] Targeted at poor families with no formal income: a minimum of 50,000 pesos per family in case of no children, plus 50,000 pesos per child.

[15] During the first weeks after installment deferrals were conceded (as of April 24th) the banks had deferred payments for around 12% of their loan portfolio.

[16] https://www.bcentral.cl/documents/33528/133326/dtbc_890.pdf/ae27093b-b094-a51d-7873-7ee94fef5c41?t=1603123100890

[17] With a maximum duration of five years, it guarantees up to 6 installments of the respective mortgage that had installments paid with a "Postponement Credit". https://www.carey.cl/ley-21-299-postergacion-creditos-hipotecarios/ Fogape's guarantee is limited for homes that do not exceed (commercial appraisal, at the time of signing the mortgage loan agreement) 10,000 "unidades de fomento". http://www.fogape.cl/sitio/2021/02/23/programa-fogape-hipotecario-postergacion/

[18] http://www.laleyaldia.cl/?p=11769

[19] Santander Chile with 21.4%, followed by Banco del Estado de Chile, 18.2% and ScotiaBank Chile, 17.3%.

[20] Peru is the highest, with growth expectations of up to 9%, according to the IMF.

43.3% of total credit portfolio and benefited 11.8 million credit consumers overall and 689,000 households with a housing mortgage or leasing contract (amounting to $ 49.1 billion pesos, which represents 62.5% of the total mortgage portfolio).

The average grace period for housing contracts was 4 months, but clients who were in arrears of more than 60 days before the health crisis period, were not eligible for the relief measures. In the last quarter of 2020, the 30-day delinquency rate was 4.94% and the 120-day stood at 3.42%. The housing credit portfolio grew amidst the Covid-19 crisis, reaching $73.4 billion pesos in July, 2020 and $ 75.9 billion pesos in January 2021[21]. Housing sales also grew, from 178,100 units in 2018 and 191,200 in 2019 to around 198,000 units (a 3.6% growth relative to the previous years). This increase was due to the growth in the sale of social housing (VIS), which corresponds to 68% of total sales in 2020 and showed a 9.6% growth when compared to 2019, while the sale of "no VIS" units dropped 7.4%.

Aside from deferrals already granted, the Debt Monitoring Program (Programa de Acompañamiento a Deudores - PAD[22]) created in July 2020, established that credit institutions must introduce structural payment solutions, financially viable for the debtors whose incomes have been impacted because of Covid-19. Measures should consider the different situations faced by debtors in terms of their ability to maintain payments: those as per originally contracted terms, those subject to contract renegotiation and those suffering severe financial stress that can only be overcome with the passing of time. While credit institutions have autonomy in the design of their solutions, SFC recommends that the list of measures should include reducing installment values and conceding grace or extension periods. Since most of the grace periods and extensions granted initially would have reached maturity between August and September 2020, credit institutions could start the application of "PAD" as of August 1st. Since then, up until February 2021, over 2 million debtors entered the program.

The IMF[23] observes that the Colombian financial system has so far remained resilient, highlighting that the upholding of regulatory standards was adequately combined with the granting of relief to borrowers, the release of countercyclical provisions and the enactment of loan forbearance measures. Nonetheless, credit risk and loan quality remain important concerns and "the authorities should continue to carefully monitor financial stability risks and ensure sufficient loan loss provisioning".

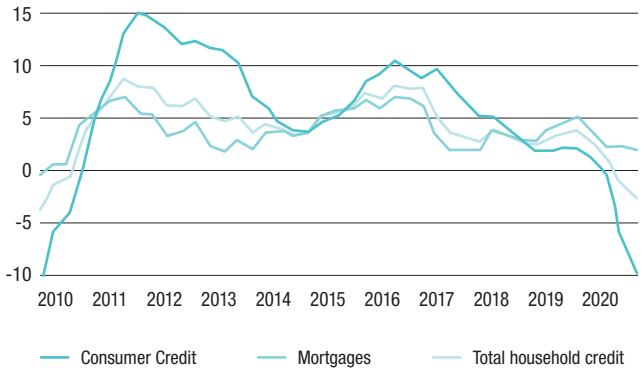
As of October 2020, according to KPMG[24], the Colombian "government had unveiled around USD 3.7 billion (1.5% of GDP) in measures to counter the effects of Covid-19, including additional cash transfers for the most vulnerable, VAT rebates for the poorest, tax deferrals for companies, and financing support for SMEs". Yet, many challenges remain. Unemployment, which hit 21.38% in May 2020, fell rapidly to a little over 13% last November and rose in December to 17.27%, continuing in January 2021. Payroll subsidies have helped preserve formal jobs[25]. Moreover, as seen elsewhere in the region, households have lost income: 73% of households lost over 10% of their incomes.

The benchmark interest rate currently stands at 1.75% and annual inflation remains well below the 3% target at 1.6% as of January 2021. Vaccination started in mid-February and the IMF expects a 4.5% growth for the country in 2021: "macroprudential actions to support credit and a battery of fiscal measures mitigated the fallout from the pandemic and laid the foundation for a return to growth".

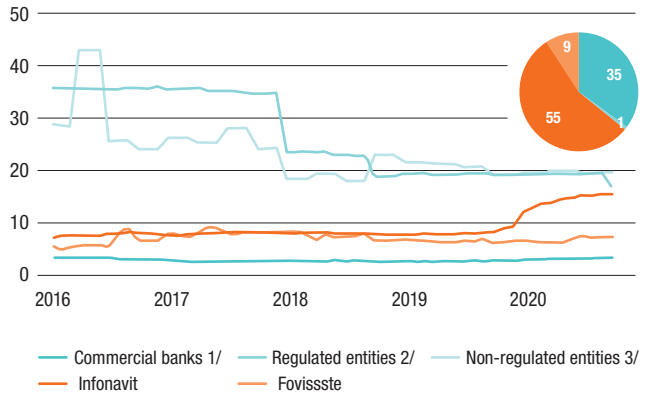
México

In the 1st semester of 2020, total mortgage origination fell by 14.8% on average (20% in real terms), the highest contraction came from commercial banks (49% of market share) 19.4% in real terms in relation to the same period in 2019[26]. The two main public institutions have sustained a lesser contraction: Infonavit (40.7% of market share) exhibited

FIGURE 4 Household credit growth
Real annual percentage change



Delinquency rate on mortgages by type of entity granting credit
Percent



Source: Banxico[27]

[21] Housing mortgage portfolio adjusted in Colombian pesos. Estadisticas economicas de Banco de la Republica.

[22] Introduced by Superintendencia Financiera de Colombia (SFC https://www.superfinanciera.gov.co/) through "Circular Externa 022" in 2020.

[23] https://www.imf.org/en/News/Articles/2021/02/12/mcs021221-colombia-staff-concluding-statement-of-the-2021-article-iv-mission

[24] https://home.kpmg/xx/en/home/insights/2020/04/colombia-government-and-institution-measures-in-response-to-covid.html

[25] Created in May, the Formal Employment Support Program (PAEF) grants legal entities a monthly monetary contribution to support formal employment. Also, the pension contribution was temporarily reduced to provide greater liquidity to employers and no default interest was charged on General Social Security System late payments.

[26] https://www.bbva.com/wp-content/uploads/2020/10/Informe-Sit-Inmobiliaria-Mexico-2S20.pdf

[27] https://www.banxico.org.mx/publications-and-press/financial-system-reports/%7BCBA12304-B9CA-9DF5-B683-DB8BB7F55069%7D.pdf

a 12.1% contraction, while Fovissste (10.3% market share), a growth of 0.7% (mostly due to the conclusion of operations pending since 2019). After March, the crisis caused by the Covid-19 pandemic had considerably reduced demand, reflecting in a decline in the second trimester and increasing delinquency: as of June 2020, the ICV (Indice de Cartera Vencida) was 3.1% for mortgage loans of commercial banks, 7.5% for Fovissste and 14.9% for Infonavit (up from 7.5% back in 2016). In September 2020, delinquency reached 15.4% at Infonavit while decreasing 2 pp at Fovissste, down to 7.3% (Fovissste has been less affected since these public sector workers have secure employment).

Infonavit has promoted support measures to maintain mortgage payments and avoid delinquencies, by offering payment breaks, interest-free extensions and using unemployment insurance, or a combination of those measures, benefitting over 450 thousand mortgagors between April and October. Yet, it's worrisome performance can be explained by the low-income segment it caters to the most, worse affected by the economic crisis triggered by Covid-19. Installment payments were expected to be resumed between September 2020 and February 2021, depending on the start date of the application and the renewal (when applicable) of the benefit. New mortgage contracts signed between November 3rd and February 23rd 2021 benefited from a 4-month deferral of the 1st installment. Due to increased unemployment and income loss, Infonavit has been reviewing its "social collection model", which includes among other measures, the possibility of introducing a payment reduction factor based on the elaboration of an economic study.

Between March and June 2020, 1.1 million jobs were lost in Mexico. The research conducted by Infonavit amongst its formal employee members (Aug2020) showed that members with lower education and age were the most affected by unemployment. According to Banxico (Mexican Central Bank)[28] the most relevant risks faced by Infonavit include those associated with a slowdown in employment, increases in informality and inflation, and also in relation to interest rates: currently the Reference Rate stands at 4% and the average mortgage interest rate, 9.7% as of June 2020 (similar to June 2015, a record low over the last decade). On the positive side, in September 2020, Infonavit's Subcuentas de Vivienda (housing sub-accounts)[29] exhibited a growth (in real terms) of 10.1% relative to December 2019. The GDP growth forecasted by Banxico to 2021 is 3.29%[30].

Concluding remarks

There is still uncertainty hanging over all of us regarding the speed and effectiveness of vaccines and therefore it is hard to be precise about the breadth of economic damage in the region. However, the significance of housing for human wellbeing and the health of housing markets and the economy is indisputable. It is for this precise reason that governments have stepped in and provided considerable market support since the start of Covid-19.

Yet, we are still to face what will happen to housing finance systems as forbearance periods, cash transfers and all kinds of support measures are discontinued. Affordability is now a more delicate issue than ever. In a region already characterized by income disparities, the overspill from the present crisis, increased unemployment, informality, and poverty, requires not only more affordable finance conditions over the long term, ensuring the capacity of borrowers to service debt once government support has ceased, but also more innovative credit risk assessment (fintechs have a promising role here). Last, but certainly not least, the supply of less expensive homes and rentals is crucial to reduce the increasing gap between prices and incomes. Therefore, more comprehensive policies must be initiated.

Looking ahead, sustainable investment strategies are becoming the new frontier. As discussed in the previous (Winter) edition of this journal, promoting sustainable energy efficient housing and green bonds is key to tapping into new financial markets and attracting investments to foster market growth.

[28] HoReporte de Estabilidad Financiera, Dec/2020. https://www.banxico.org.mx/publicaciones-y-prensa/reportes-sobre-el-sistema-financiero/%7BBB59C14C-03BE-58EE-6E0F-7D3EB65D52D5%7D.pdf

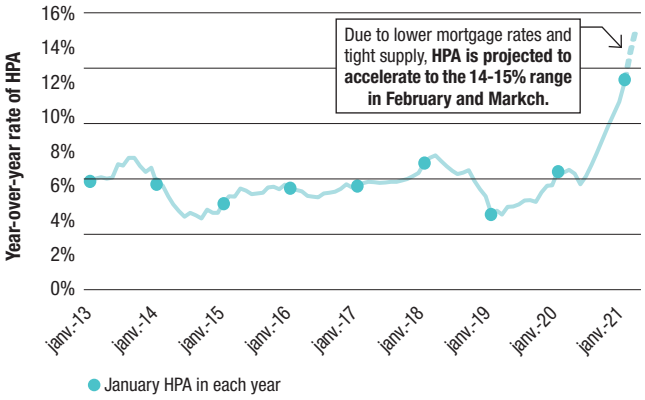
[29] Different than FGTS, where workers have indemnity accounts for each employment contract with monthly contributions (8% of salary) that can be withdrawn for a variety of (regulated) purposes, Infonavit encompasses subaccounts exclusively for housing credit (contributions correspond to 5% of monthly salaries).

[30] As of Nov/2020, Encuesta sobre las Expectativas de los Especialistas en Economía del Sector Privado, Banco de México.

The U.S. housing market continues to heat up for all price tiers

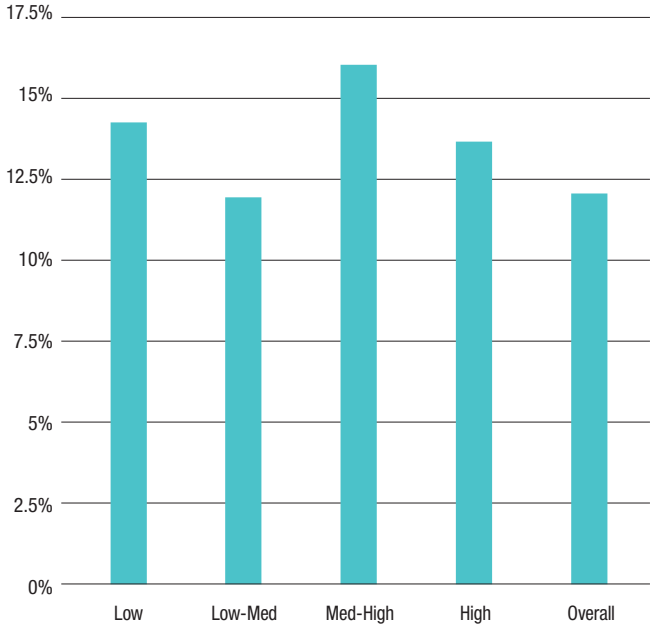
↳ By Edward Pinto and Tobias Peter

1. National Year-over-year Home Price Appreciation (HPA) for January averaged 12.1%. This is up from 10.9% a month ago and 6.8% a year ago[1].



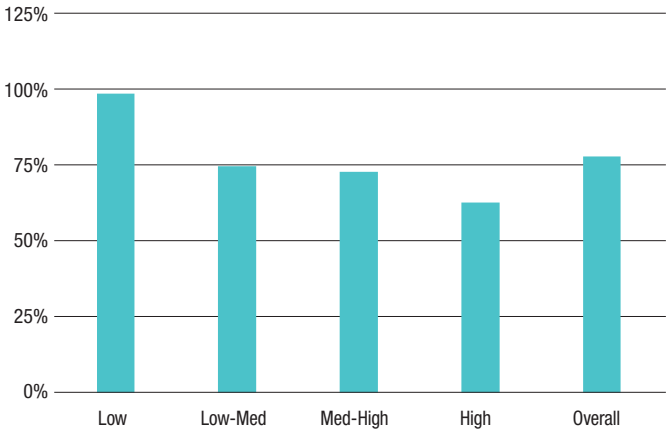
Source: AEI Housing Center, www.aei.org/housing

2. Low rates are driving high HPA growth across all price tiers.



Source: AEI Housing Center, www.aei.org/housing

3. Historically, HPA in the lower price tiers has far outpaced HPA in the upper price tiers.



Source: AEI Housing Center, www.aei.org/housing

4. HPA varied significantly among the 40 largest metros in the US. In all metros, HPA was at least 6% or higher from a year ago.

Highest HPA Metros
Phoenix, AZ: 14.9%
Charlotte, NC: 13.2%
Columbus, OH: 12.9%

Lowest HPA Metros
San Francisco, CA: 6.8%
Houston, TX: 7.1%
Dallas, TX: 7.3%

Source: AEI Housing Center, www.aei.org/housing

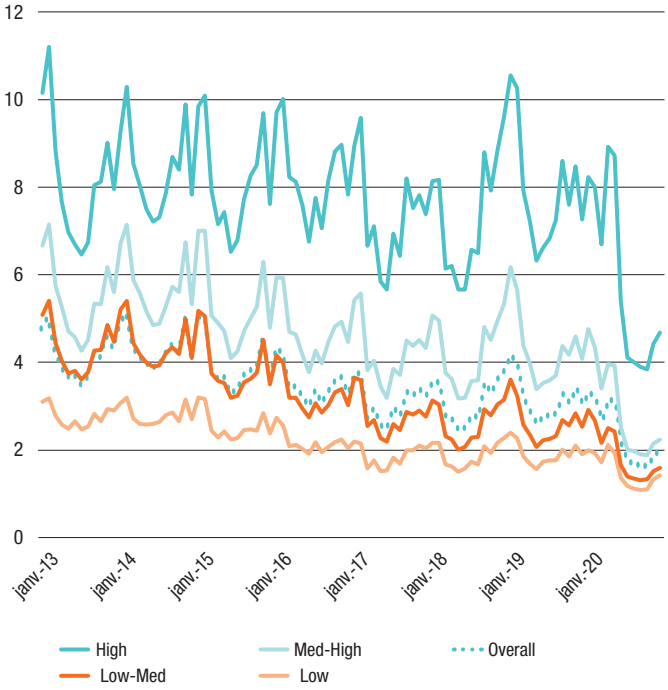
[1] The methodology and all HPA data are available here.

5. AEI expert commentary:

"Home prices are responding to sharply lower interest rates and the lower months' remaining inventory for new and existing homes, with all three series at the lowest levels in history." — Ed Pinto

"Due to low mortgage rates, the med-high and high price tiers, which are more dependent on rates, are showing the strongest rates of appreciation. This is a trend reversal from earlier times, when the low tier was appreciating the fastest." — Tobias Peter

6. Months' supply has tightened significantly across the nation and all price tiers. Months' supply stood at 2.0 months in Dec. 2020, which is down from 3.0 months in Dec. 2019.



Source: Realtor.com, Zillow, and AEI Housing Center, www.aei.org/housing

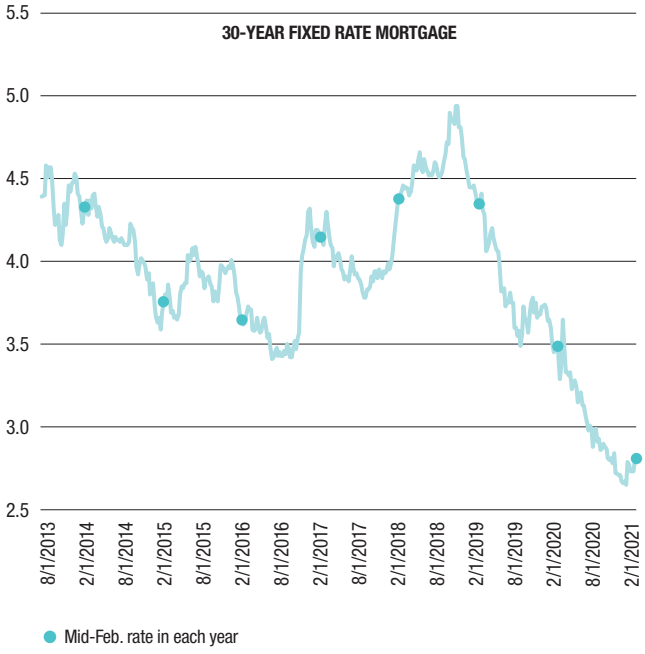
*A cross the nation, 6 months' supply is generally considered the demarcation point between a buyer's and seller's market. The lower the supply, the faster the HPA and vice versa.

MONTHS' SUPPLY (by Price Tier in December)	2019	2020
Overall	3.0	2.0
Low	1.9	1.4
Low-med	2.5	1.6
Med-high	4.1	2.2
High	7.3	4.7

Source: Realtor.com, Zillow, and AEI Housing Center, www.aei.org/housing

The Fed's Monetary Punchbowl Is Fueling Rampant Home Price Appreciation

Attendees at our July 29, 2020 briefing were the first to learn that HPA was quickly accelerating and heading to the low double digits late in 2020. Preliminary national rate of HPA for January 2021 was 12.1%, up from 6.8% a year ago and the fourth month near or at the low double digits, Nationally, HPA has ticked up again due to lower mortgage rates. After having increased by 116 basis points from September 2017 to early November 2018, rates have since declined by 213 basis points. Optimal Blue data indicate that the rate of HPA will further accelerate to 14-15% by April/May reporting time.



NOTE: Data are for 30-year fixed-rate prime conventional conforming home purchase mortgages with a loan-to-value of 80%

Source: Freddie Mac

The housing sector and the EU's political and financial frameworks: The sustainability state of play

↳ By Lily Maxwell and Joost Nieuwenhuijzen

1. Introduction

In a world where sustainability has now become priority number one, the building – and in turn housing – sector is a key battlefield in the fight for a healthier planet. As the EU's recent renovation wave report (European Commission, 2020) highlights, buildings are responsible for 40% of the EU's total energy consumption and 30% of its greenhouse gas emissions from energy. It's estimated that buildings' greenhouse gas emissions need to go down by 60%, compared to 2015 levels, if we're going to achieve the continent's 55% emission reduction target by 2030 (European Commission, 2020, a).

To meet EU and national climate targets, affordable housing providers are facing the huge challenge of building and renovating sustainably at an unprecedented speed and scale. It is no surprise, then, that national governments and European authorities are suddenly launching laws, policies and funding programmes to tackle this sector's emissions.

This introductory article will offer a brief overview of the European policy and funding frameworks that are relevant for the housing sector right now.

2. The EU Green Deal, Covid-19 and the housing sector

The EU Green Deal, which seeks to make the continent climate-neutral by 2050, was approved by the European Parliament in 2020, with the aim of enshrining the Paris Agreement in EU policy and law. Given the scale of the challenge the affordable housing sector faces when it comes to hitting their climate targets, the EU has come under pressure in recent years to help the industry achieve its sustainability targets while also protecting the principle of affordability.

As a result, the EU Green Deal has made buildings a big priority. Building and renovating sustainably, along with clean energy, are a central focus of its various spin-off programmes. Moreover, in the wake of Covid-19, the EU has said it will pursue a "green recovery" strategy and fund it via the Next Generation EU and other programmes. With the recovery plan and the EU Green Deal firmly intertwined, supporting the housing sector to become more sustainable will be an important pillar of the European green transition, as we shall see below.

3. The Renovation Wave and the EU Green Deal

The Renovation Wave is the EU Green Deal's flagship initiative to promote the sustainable renovation of Europe's existing housing stock. As the child of the EU Green Deal and the Covid-19 crisis, its notion that "renovation offers a unique opportunity to rethink, redesign and modernise our buildings to make them fit for a greener and digital society" is fitting (European Commission, 2020, a).

The Commission's Renovation Wave Communication document, released in October 2020, notes that only 0.2% of EU building stock undergoes deep renovation to reduce energy consumption each year. Unsurprisingly, they conclude that at this rate, 'cutting carbon emissions from the building sector to net-zero would require centuries' (Ibid.).

The objective of the Renovation Wave is, therefore, to double the annual energy renovation rate of residential and non-residential buildings by 2030 and to foster deep energy renovations in all cases. They estimate that this could result in 35 million building units renovated by 2030 and emphasise that this rate will need to be maintained if Europe is to be climate-neutral by 2050, as the EU Green Deal proposes.

This means focusing on making building construction and renovation more circular and sustainable and, in turn, making buildings themselves more energy-efficient, and less carbon-intensive over their full life cycle. The ever-important question remains: what does this concretely mean in the end in terms of funding? Policy and regulation are important, but funding will be a crucial enabler of transition in this sector.

As the EU knows, the housing sector cannot possibly complete their own green transition – and, crucially, meet their targets – without corresponding financing, or, at least, without proper financing. Social housing companies may be forced to sell stock to rustle up extra cash or place the burden of funding the transition on tenants (Edwards, 2020; IUT, 2020). Neither of these options are a good idea in the context of the current affordable housing crisis.

We will explore the possible funding opportunities below.

4. Funding for the EU renovation wave[1]

4.1. Next Generation EU

The Covid-19 pandemic caused a huge economic downturn for the region and the commission struggled to come up with optimum added value to help member states deal with the crisis (Edwards, 2020).

[1] The European Federation for Living (EFL) is one of Europe's key organisations promoting energy efficiency in the affordable housing sector and looking into funding for the renovation wave for its members.

The result was the EU's recovery instrument NextGenerationEU which, alongside the EU's Multiannual Financial Framework, will make available an unprecedented volume of resources (around 750€ billion), some of which can be used to 'kick-start renovation for recovery, resilience and greater social inclusion' (European Commission, 2020, a).

The most interesting funding programmes for the affordable housing sector include:

4.2. The Recovery and Resilience Facility

Total budget of 560 billion. 310 billion will go to grants and 250 billion in loans for member states, which will possibly go to support for the affordable housing sector.

4.3. REACT-EU

55 billions-worth of additional cohesion policy funding from 2020 – 2022, which may also go towards support for the affordable housing sector.

4.4. Additional funding for other European programmes or funds

Such as Horizon2020, InvestEU, rural development or the Just Transition Fund (JTF), some of which will be definitely dedicated to housing (as we will explore below).

5. The Just Transition Mechanism

Thw Just Transition Mechanism is a funding mechanism that aims to 'finance the transition' while 'leaving no one behind' (European Commission, 2020, b). The renovation wave falls under this mechanism, which will be a key tool for mobilising private finance for sustainable buildings. Crucially, it offers a public-backed funding guarantee that is often the missing part of the puzzle in many countries when it comes to sustainable renovation (Edwards, 2020).

It covers three central funding pillars: the just transition fund, InvestEU and European Investment Bank (EIB) public sector loan facility. The new Just Transition Fund will offer €40 billion, generating at least €89-107 billion investments; the inside knowledge from the Commission is that they want member states to be able to support construction and renovation of sustainable, affordable housing via this fund. It will also receive extra funding via NextGeneration EU – €40 billion to regions hit hardest by reconversion challenges (Edwards, 2020).

InvestEU will front up 15.3€ billion to mobilise €30 billion in private investments; a Strategic Investment Facility to be equipped with €15 billion from next generation EU will also be added to this.

The EIB public sector loan facility will offer €10 billion in loans, backed by €1.5 billion of the EU budget, and mobilising up to €30 billion of investments. The EIB also continues to offer ELENA support – covering technical assistance, advisory services, and project management costs for building renovation projects – social and impact housing bonds, and innovative financing via the European Fund for Strategic Investments (EFSI).

The EIB and InvestEU will be particularly useful funding sources for housing providers who are not eligible for the structural funds.

6. Horizon Europe – research and innovation under the EU Green Deal

In September 2020, we began to see the first movement towards EU Green Deal financing with the release of a number of new Horizon 2020 (H2020) green deal-oriented calls[2]. One of the calls – 4.1 – was specifically dedicated to "Building and Renovating in Resource and Energy-Efficient ways" (here at EFL, we actually submitted a bid for this call). How exactly Horizon Europe, the new version of H2020, will work will not be clear until at least November 2021.

One notable aspect of the new Horizon programme is its focus on 'adaptation to climate change including societal transformation' and 'climate-neutral and smart cities' as two of its five central 'missions'. These EU missions form 'an integral part of the Horizon Europe framework programme beginning in 2021' (Europe Commission, 2020, c). This means that sustainable housing and communities will likely be a core pillar of future Horizon Europe funding calls. Like many other programmes, Horizon Europe will also receive extra funding via Next Generation EU.

7. New European Bauhaus: A thinktank for sustainable building?

Launched in late January 2021, New European Bauhaus is the latest initiative to be released under the framework of the EU Green Deal. Supposedly a passion project of Ursula von der Leyen, the European Commission calls it an environmental, economic and cultural project aimed to design "future ways of living" in a sustainable manner (European Commission, 2020, d).

The initiative will consist of three core phases: design, delivery and dissemination, lasting about five years in total (EU Observer, 2021). However, the initiative's details are yet to be defined. There is talk of an open call for 'excellent contemporary examples that are [...] already combining sustainability, quality of experience and inclusion' (European Commission, 2020, d) with accompanying prizes, and pilot projects, funded by other EU programmes, being launched across member states. This initiative is one to watch – will it bring the concrete results in terms of scaling deep renovations among social housing providers, or only be a facilitator for vanity lighthouse projects? Time will tell.

8. A promising start to the EU renovation wave with much still to be revealed

As of February 2021, we do not yet know the details of the allocation of structural funds, nor what Horizon Europe and other funding programmes will look like. The new calls launched under the remains of the H2020 programme gave an indication of things to come: an increased focus on a just, green, and productive transition (as characterised by the New Leipzig Charter) across all sectors of society. However, the affordable housing sector will still have to wait for more news across the course of 2021 to know the extent of EU assistance for the so-called green transition in 2021-27.

It is also important to remember the importance of multiple levels of government when it comes to the housing sector's green transition and the role of regulation. How structural funds allocated to member states are apportioned to different sectors and government levels will greatly determine whether the affordable housing sector is able to "transition" across varied spatial scales and geographies. Plus, the EU's ability to force countries to adopt national regulation with respect to the energy performance of buildings (via the climate legislation) will also be a huge factor in driving EU member states to introduce policy,

[2] Recently, EFL also brought together a consortium of roughly 35 international partners for a Green Deal Horizon 2020 call, with the aim of creating a decarbonisation strategy for a number of large social housing portfolios in Europe.

programmes and funding to cover the whole building sector's sustainable transition. Plus, the local and regional level can also play a big role in introducing place-based approaches to sustainable renovation and building that cater to local populations and their needs. Ultimately, initiatives like renewable energy credits, subsidies, multi-level legislation on the "green" standards of new buildings, and schemes like the Swedish green points neighbourhood initiative, for instance, are crucial iterations and boosters of EU level initiatives and targets at the national and local level.

The key document to watch at the national level will be the long-term renovation strategies. Social housing federations need to be working and monitoring what their governments are putting on the table in terms of those strategies. An opportunity will be lost, after all, if housing is not included in national-level legislation and policy (Edwards, 2020).

Overall, we can see a promising start to a new EU approach to housing, with an increased focus on promoting and funding sustainability and affordability. Housing and urban development are still not official competences of the EU but there are also 'increasing calls to establish an EU-wide housing policy' (Hoekstra, 2020, p.77). Whether this will happen anytime soon is unclear: in the meantime, the affordable housing sector will continue to keep its eyes closely fixed on Brussels.

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Innovation in housing decarbonisation: Austria

↳ By Wolfgang Amann and Alexis Mundt

1. Structure of stock

There are some 4.9 million housing units in Austria, 3.95 million of which are main residences, the remainder are mainly second homes. Of the main residences 48.5% are owner-occupied, the rest are rental and other tenures (Statistik Austria, microcensus 2019). Consequently, with Germany and Switzerland, Austria has the lowest share of owner-occupied housing in Europe. There are, however, large regional differences across the nine Austrian regions (*"Länder"*): Vienna (one region or *"Land"*) is a rental city (only 19% owner-occupation), other regions have a higher ownership share (up to 70% in Burgenland).

The most common definition of social housing used in Austria for international comparisons is to include rental housing by Limited-Profit Housing Associations (LPHAs) and municipal rental housing in the term. A much larger proportion can be considered subsidized housing, because it also includes single-family housing that received regional housing subsidies in the self-built sector.

According to this definition, 23.6% of main residences in Austria are social housing, i.e., 7% municipal housing (i.e., 275,400 dwellings, 227,000 of which in Vienna), and 16.6% LPHA rental dwellings (i.e., 655,500 dwellings). In addition to the municipality of Vienna, the main providers of social housing in Austria are the LPHAs: From the 185 LPHAs active today, 98 are in the form of housing cooperatives, 77 are limited-liability companies, 10 are public limited companies (2020, GBV data). Altogether, the sector manages 950,000 housing units (in its own buildings and for others, e.g., municipalities, privatized units). Access to social housing is controlled by nine different regional housing laws that usually include requirements in respect of nationality (or similar), minimum age and (rather generous) income limits.

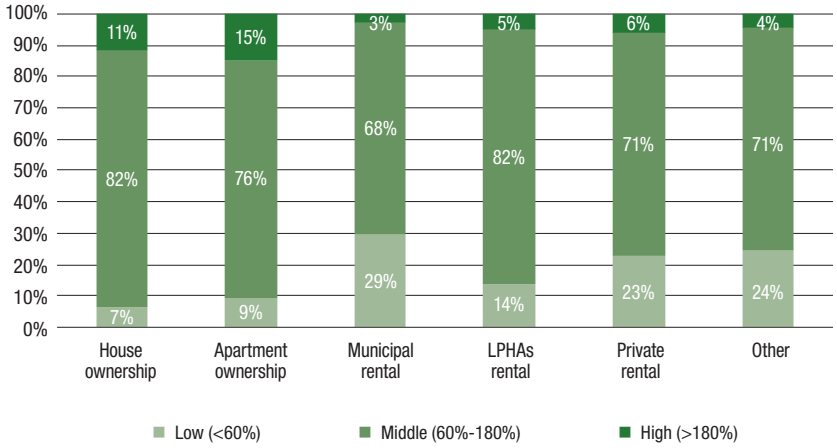
The importance of LPHAs as providers of social housing in Austria is a field that has received strong academic attention in recent decades (Matznetter, 2002; Ludl, 2003; Amann & Mundt, 2010; Amann et al., 2012; Reinprecht, 2014; Mundt, 2018) and has functioned as an inspiration to policy makers across the globe due to the sector's long tradition and beneficial housing outcomes. Some cornerstones of the sector are the long-term obligation to reinvest profits in new construction; the calculation of cost-based rents based on historical land, finance and construction costs; the privileged access to regional subsidy schemes that safeguard affordable cost-based rents; the tight and detailed legal framework formed by the LPH Act; and the two-tier framework of audits and controls.

2. Socio-demographic issues

Austria has a very segmented market in terms of price segments, particularly due to regional differences. For Vienna, rental housing options in the market can be arranged from the cheapest to the most expensive as follows: municipal rental housing (as part of social housing), old private rental stock with legal rental limits, LPHA rental housing with different forms of subsidies, private rental housing without legal rental limits, rental housing by LPHAs with market finance, new-built private rental housing with market finance. For other regions, the LPHA rental market segment takes over the function of municipal housing, i.e., it is the cheapest rental market segment and focusses on low-income households and vulnerable groups. In some regions, LPHA rental housing even dominates the rental market and there are few new private rental market projects.

For the owner-occupied market, the most expensive segments are new apartments by commercial providers in the main cities and the Western regions. In Vienna, second-hand apartments have also shown price surges in the last decades. The ownership market is strongly dominated by households investing in property, with bricks and mortar seen as a safe haven. With strongly rising prices in

FIGURE 1 Income groups across tenures



Source: Statistik Austria, microcensus 2019, Author's chart

and around the main cities, first-time buyers of detached single-family houses are confronted with affordability issues. As prices have increased markedly, young families struggle to buy apartments and increasingly depend on the rental market. The LPHA sector is directed at middle- and lower-income households, in Vienna especially towards the middle incomes, because municipal housing caters to lower income households and vulnerable groups.

Figure 1 gives an overview of the different income groups across tenures. By comparison with other segments, LPHA rental housing clearly caters more to middle-income groups, while lower-income households are clustered in the municipal stock and also in the cheap (because historic and rent-controlled) private rental stock.

3. Governmental targets on housing decarbonisation

The global challenge of housing decarbonisation has conquered the political agenda. The Programme of the current Federal Government, a coalition of the conservative People's Party (*ÖVP*) and the Green Party (since 1/2020), puts a focus on climate change mitigation. It is intended to stir all sectors of the economy to achieve net zero emissions by 2040 and thus to become frontrunner within the EU (Regierungsprogramm 2020). Decarbonisation of the building sector is a core element of this plan, even though emissions from this sector have already improved much more than other sectors over the past decades and have ceased to be one of the main pollutants today.

The main challenges are the ban on fossil energy in new construction, energy efficient deep renovation of the stock, fuel switching to renewable energy sources in the stock, decarbonisation of "grey energy", i.e., energy input to construction products, and reforms in regional planning to avoid car traffic and reduce land consumption.

Emissions in the sector "buildings" (sector CRF 1.A.4 of the emission inventory) started with around 14 million tons CO_{2eq} in 1990, with hardly any improvements until 2003, but there was a decrease of around 40% between 2003 and 2014. The economic boom in the following years created negative effects on emissions. Thus, they increased again until 2017 but returned to the lower level in 2018. The performance is particularly impressive, as since 1990 the population has increased by 16% and the total floor space by more than 50%. Simultaneously, between 1990 and 2018, CO_{2eq} emissions for heating of buildings decreased from around 1.9 tons to only 1.0 ton per capita,

A proportion of the reduced emissions is not due to real savings but originates from a switch to other areas of energy consumption, particularly towards district heating and heat pumps (both belong to the sector "energy generation"). Altogether, the sector "buildings" has always outperformed sector-specific targets, e.g., in the Climate Strategies 2002 and 2007 or in the Climate Protection Act 2011, in comparison to other sectors. The "traffic" sector has long performed poorly.

Reasons for the positive development in the sector "buildings" were much improved energy efficiency standards for new construction, a boom in housing refurbishment and the exchange of fossil heating systems with renewables. The system of housing subsidies proved extremely effective in all three aspects (Amann et al., 2012). Regulations (building codes) were only enacted later.

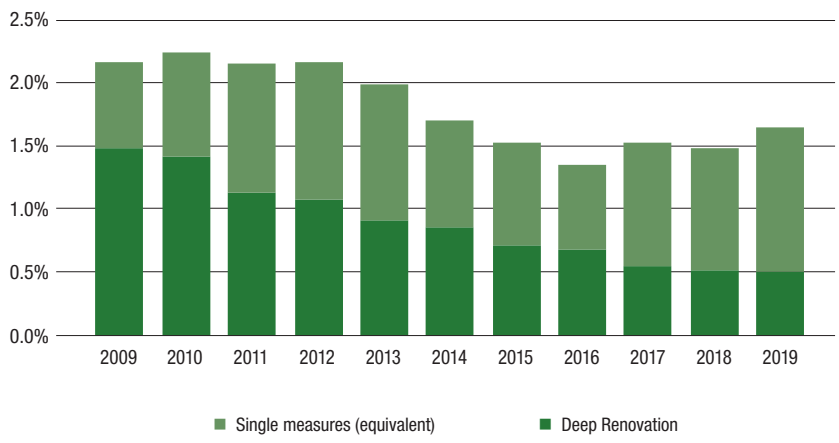
Reference to EU standards is of crucial importance, as the binding character of EU Directives helps to shorten the political process of finding consensus. Targeting net zero emissions by 2040 was a clear reference to the European Green Deal and strives to achieve this one decade earlier. A big challenge is the complicated division of authority between the Federal State and the Länder. Being responsible for building codes, the *Länder* claim authority e.g., for major aspects of the implementation of the EU Energy Performance of Buildings Directive (EPBD). In this context, they have submitted the Austrian Long-term Renovation Strategy in early 2020, which appears to be inadequate in several respects.

4. Refurbishment rate

There has been a long lasting and broad discussion about the targeted refurbishment rate, with figures of 2% to 5% quoted in different policy documents. However, both a precise definition and reliable data sources for their measurement were lacking. As for decades no international definition had been available, a new methodology was recently developed (IIBW & Umweltbundesamt, 2020). It proposes for the numerator the number of dwellings undergoing deep renovation. For less ambitious refurbishment projects, each four single measures (e.g., new façade, windows, roof, regenerative heating) would equal to one deep renovation. In the denominator, the total housing stock is stipulated (and not e.g., only those units in need for renovation). This definition not only has the advantage of being simple, but it is also data driven and allows for measurement of policy action. The main data sources are a biannual microcensus special survey of household energy source (Statistik Austria) and data from the *Länder* on refurbishment subsidies, complemented with data from the construction product industry. In the future, the new database on energy performance certificates (linked with the address registry) may be tapped.

According to this definition, the refurbishment rate peaked in 2010 with around 2.2%, but dropped to only 1.6% in 2019. The Energy Strategy 2018 (#mission2030) has defined

FIGURE 2 Refurbishment rate in Austria



Re.: estimate for 2019

Source: IIBW, Umweltbundesamt (2020)

a target of 2.0% on average until 2030. The Programme of the new Federal Government took over an earlier policy target with 3.0% until 2030. This is far more than 100,000 dwellings under deep renovation (or equivalent single measures) each year. Such an increase seems possible but requires bold action in several fields: subsidies, civil law, regulations, opinion building.

5. Energy efficiency standards

5.1. Current situation in the stock

Both the proportion of dwellings with insufficient thermal condition and refurbishment rates differ considerably over housing sectors (see chap. 1.1). The latter was as low as 1.2% (on average over the past decade) for private rental or owner-occupied apartments, but twice as high for LPHA rental apartments. It has been estimated that 1.9 million out of a total stock of 4.9 million dwellings are in need for thermal refurbishment (approx. 40%). A similar number (with a large overlap) requires replacement of fossil fuel with regenerative heating. With a refurbishment rate of 2.5%, this stock could be upgraded (or torn down) by 2040. The required refurbishment rate is lower for the LPHA sector, but higher for private rental and municipal housing. The biggest challenge arises from the rapidly expanding stock of dwellings which are not a main residence, i.e., second homes, which already represent 18% of the total housing stock.

5.2. Energy efficiency standards in subsidy schemes and building codes

As early as the 1980s, environmental policy targets entered the housing subsidy schemes of the *Länder*. From the 1990s onwards, energy efficiency measures, use of renewable sources and ecological measures were promoted by additional subsidies. From the early 2000s, ever stricter energy efficiency thresholds became a precondition for eligibility of projects for subsidies. In 2006 and 2009, treaties between the Federal State and the *Länder* pushed the subsidy systems very strongly towards becoming implementation tools for joint climate goals. At that time, energy efficiency standards of subsidized new housing construction were much more advanced than those in building regulations. In the early 2010s, almost one third of subsidized new construction conformed to the passive house standard. In 2012, a mandatory standard was introduced, similar to the almost zero energy standard required today by the Energy Performance of Buildings Directive (EPBD). With its housing subsidy scheme, Austria has achieved a leading position internationally in the implementation of ecological and low energy new housing construction (Amann et al., 2012).

Since then, stakeholders from several industries, amongst them the LPHA sector, started to oppose what was perceived as overfulfilling of European requirements (Bauer, 2013). This was one reason for housing subsidy policies of the *Länder* that moderate their ambitions of being the frontrunner in energy efficiency.

The average heating demand of subsidized dwellings was around 200 kWh/m².a in the 1980s but has decreased by approx. 85% since then (Umweltbundesamt, 2020). In recent years this level has stagnated.

In contrast to new construction, the performance of thermal housing refurbishment has long been perceived as inadequate. The focus of refurbishment subsidies is on deep renovation. Despite rather generous subsidies, a strongly decreasing number of owners were willing to accept all these strict regulations linked to financial support.

Building codes followed with a lag of several years to require energy efficiency standards similar to the housing subsidy schemes. As building codes are under the authority of the Länder, and the Länder were not willing to entrust the Federal State with the authority to directly implement EU directives in national legislation, the in-between institution OIB – Austrian Institute of Construction Engineering (*Österreichisches Institut für Bautechnik*) was established in the legal form of an association, in order to harmonise building regulations all over the *Länder*. The OIB "Richtlinien" (directives) are based on EU regulations and international standards. Subsequently, the Länder proclaim these directives in their building codes as mandatory. National implementation of the EPBD is achieved primarily via the OIB directive 6 "Energy Saving and Thermal Protection".

Consequently, the EPBD 2002 (2002/91/EG) was implemented within *Länder* legislation during the 2000s, using the short cut of OIB directives (*OIB-Richtlinien* 2007) and some civil law legislation. As for the OIB directives 2007, it lasted until 2011 until it took effect in all *Länder*. This long period from the EPBD 2002 to final implementation clearly shows how difficult and complex the coordination of all *Länder* interests is. For national implementation of the EPBD 2010 recast (2010/31/EU) with its definition of an almost zero energy standard it took almost one decade (*OIB-Richtlinien* 2011 and 2015, coming into force in Länder building codes between 2012 and 2017). The EPBD 2018 (2018/844/EU) is still on the way to nationwide implementation (*OIB-Richtlinien* 2019, followed by adoption in *Länder* building codes).

The OIB directive 6 from 2015 defined the path to improve energy efficiency standards of all new construction to almost zero emissions by 2021. It was foreseeable that at around 2019/2020 these requirements would become stricter than the energy efficiency regulations within the housing subsidy schemes. The *Länder* and the Federal State in 2017 updated the treaty from 2009 on climate protection and cancelled almost all mandatory regulations on energy efficiency and passive house standards within the housing subsidy schemes. Since then, minimum standards of energy efficiency are defined only in the building codes. All subsidy schemes of the *Länder* continue to promote more ambitious standards, but only with incentives, not any longer on a mandatory basis.

Key figures to measure the energy efficiency of buildings grew more and more complicated over time. Until the early 2010s, the only indicator was "heating demand" (*HWB*), which, until recently, was also the only criterion for energy efficiency in housing subsidy schemes. The OIB directives 2015 brought a multiplication of indicators. Since then, the Energy Performance Certificate (*Energieausweis*) has to contain 4 key figures: besides "heating demand" (*HWB*) also "Ultimate Energy Demand", CO_2 Emissions and the newly developed indicator "Total Energy Efficiency Factor". The latter indicates the level of energy efficiency of a building compared to a building conforming to the law in force in 2007 (=1.0). Hence, a level of 0.9 (for 2014) means 10% better energy efficiency than the minimum standard of 2007. The directive offers two options to reach the almost zero energy standard in new construction. Either it is possible to reach it with a significantly improved heating demand compared to 2007 (which concerns only the surface of a building, but not the heating system), or this indicator remains at the level of 2014, but energy efficiency improves significantly due to renewable energy generation on site.

In addition to these efforts towards improved standards of new construction, the strategy of fuel switch came to the fore, not only in deep renovation, but also in new construction. By 2020, a new law entered into force which prohibits oil heating in new construction. The programme of the current Federal Government

has a priority to also ban oil from use in the housing stock and to fade out fossil gas for heating of buildings by 2040.

6. Financing tools

6.1. Obligatory reserves in housing regulations

Funding schemes for thermal refurbishment and fuel switch in housing regulations are scattered. The most effective scheme in place pertains to the LPHA sector. Within the structure of cost-based rents tenants have to contribute up to 2.1 €/m² per month to a refurbishment funds. This is the main reason why the LPHA building stock is in better shape than all other housing sectors (see below).

For owner-occupied multi-apartment housing, a voluntary contribution to a refurbishment fund is general practice. However, it usually does not exceed 0.5 €/m² per month. An ongoing reform of condominium law is in preparation, which establishes an obligatory refurbishment fee, more refurbishment-friendly quorum rules and a "right-to-plug" for e-cars.

For private rental dwellings, legal regulations hardly stimulate thermal refurbishments. Accordingly, investments must be funded by the owner, with no possibility to pass on costs to the tenants without lengthy court proceedings.

A major challenge to the decarbonisation of the housing stock is the replacement of fossil gas heating in the apartment stock (in Vienna almost half of the housing stock) with regenerative house central heating or district heating. For all rental apartments, this is only possible with the expressed consent of each tenant, even if no cost increase would occur. This major barrier seems to derive from a mistaken understanding of tenant protection which hinders political reform.

6.2. Subsidies

The main instruments for housing decarbonisation are the housing subsidy schemes of the Länder. Out of the regional housing subsidy budgets, they spent up to 800m EUR in the early 2010s on refurbishment subsidies, which has decreased to below 500m EUR in recent years. The subsidies take the form of low-interest loans, grants or interest subsidies. The main beneficiaries are the LPHAs, but also commercial real estate providers and private households. High-level energy-efficient retrofitting receives the highest subsidy level, but small-scale energy-efficient renovations are also considered.

Some ten years ago, the Federal Government introduced its own tool (*Sanierungsscheck*) to promote housing refurbishment in addition to the subsidy schemes of the *Länder*. This grant originally targeted owners of detached houses but was later expanded to multi-apartment housing. Recently, the focus has again changed to fuel switch (*Raus-aus-Öl-Bonus*, see below). The yearly budgets were up to 100m EUR in the mid-2010s, but then decreased to only some 40m EUR. For future years, an increase to 200m EUR per year was announced.

Former income tax subsidies for private refurbishment works have been abolished. There are some minor tax incentives for institutional real estate owners in place, e.g., increased deductions for refurbishment of buildings under monument protection.

Photovoltaics are subsidized both in construction (via the housing subsidy schemes of the *Länder*) and with feed-in-tariffs. The latter was strongly reduced over time, with a simultaneous drop in prices of PV panels. The decarbonisation roadmap provides for a massive expansion of PV in the years to come, also in the housing sector.

Formerly, the financing tools of contract savings (*Bausparen*) and Housing Bonds (*Wohnbauanleihen*) had high significance even for housing refurbishments (Mundt & Springler, 2916). This importance has strongly decreased because of the current extremely low capital market interest rates.

All of these measures considered, Austria is still lagging behind in utilising European funds for housing decarbonisation. This concerns both EU Structural Funds (for energy efficiency renovation and housing infrastructure) and EIB lending.

7. Policy tools

Over the past decades several highly efficient policy tools have been developed, which may qualify as international good practice. The following three should be emphasized:

7.1. Subsidized housing as frontrunner for ambitious energy standards

As described above, housing subsidy schemes played a major role in the implementation of ambitious energy efficiency standards in new construction and deep renovation. Subsidized housing showed that low-energy or even passive house standards were possible at viable construction costs. This experience opened doors to bring those standards to the mainstream of new construction. As a result, there have been no complaints regarding the usefulness and feasibility of nearly zero energy construction standards.

Housing subsidy schemes promote both ambitious energy efficiency standards and ecological construction products (ban of PVC windows, promotion of timber and renewable insulation material, indicators applying to GHG emissions, acid impact, fossil primary energy etc.), greening of facades and rooftops, water saving valves, use of rainwater and grey water, percolation of rainwater etc. Recent key aspects are the reduction of building land use and compact buildings (sufficiency). As with energy efficiency standards, the practice of such green technologies in subsidized housing is substantially helping to bring them into the mainstream.

7.2. Refurbishment scheme in the LPHA sector

The LPHA sector is strongly committed to high standards in refurbishment (Amann et al., 2012). It has access to a number of financing sources that allow for regular and ambitious refurbishment measures.

The cost-based rent scheme allows for such low net rents that despite considerable contributions to a refurbishment fund long-run affordability is maintained. This maintenance and improvement contribution (*Erhaltungs- und Verbesserungsbeitrag, EVB*) is 0.50 €/m² in new buildings, but up to 2.1 €/m², according to the building's age. Strict regulations warrant that those quickly growing funds are managed safely, can be spent only for the respective building and are used only for defined measures, mainly for day-to-day repair works and for periodic deep renovation. LPHAs are allowed to spend future EVB incomes to finance renovation projects. If necessary and confirmed by a court decision, the EVB can even be increased for a limited period. LPHAs are allowed to spend savings for the heating bill for financing such measures. Finally, refurbishment subsidies of the *Länder* and the Federal State are tailored to this purpose.

Legal regulations concerning the operation of LPHAs (Limited-profit Housing Act) provide a basis for the practical needs of refurbishments, both in terms of asset management, funding and enforcement (Bauer, 2013). Within the legal framework, LPHAs are fully autonomous in the management of their assets and simultaneously act as investor, developer, and

housing manager. For this reason, they usually adopt a long-term perspective on asset management: Investment decisions in new construction and refurbishment are taken not only for reasons of short-term returns on investment, but also prioritise the retention of property values, smooth maintenance and – as a matter of course for social landlords – social sustainability (Amann et al., 2012).

7.3. Bonus for fuel switch (*Raus aus Öl Bonus*)

Linked to the refurbishment grant (*Sanierungsscheck*, see above), the Federal State has recently introduced a bonus for building owners who wish to replace their fossil heating with regenerative devices. The subsidy includes technical specifications regarding efficiency, fine dust pollution and other matters, but is nonetheless tailored to low-threshold utilization. Unlike social subsidies, this energy subsidy is applied without income limits. This bonus is intended to function as the main policy tool to promote fuel switch, especially regarding the large stock of detached houses.

8. Related measures

Other aspects of housing decarbonisation and climate change mitigation have come to the fore and are currently implemented both through subsidy schemes and buildings codes. Greening of roofs, terraces and facades is on the way to becoming common in new construction and in refurbishment. As an example, the City of Vienna has introduced a focus on this topic in current housing developers' competitions. Vienna and other cities and regions have introduced strategies to prevent heat islands, both with greenery and water in public space, lighter façade colouring, structural interventions to increase ventilation in neighbourhoods, and cooling facilities, such as foggy rain devices or cooling spots in public buildings or shops.

Another important initiative involves measures against energy poverty that are gaining political priority due to EU stimuli. Even though this is only a moderate problem in Austria, solutions to integrate low-income households seem crucial to achieve all climate goals.

9. Conclusions, challenges, limitations, realism of plans for decarbonisation

The performance of Austria in housing decarbonisation is adequate in the context of national targets as well as in terms of European comparison, but inadequate to reach the goal of net zero emissions by 2040.

Some measures currently in place have been shown to be beneficial in housing decarbonisation: Surprisingly, one of the most efficient measures is a legal stipulation in the LPH Act that makes sure LPHAs collect funds for refurbishments during the lifespan of buildings. It is a legal requirement that does not involve state subsidies but has contributed to the good performance of the sector. Additionally, regional housing subsidies in the *Länder* have helped to increase refurbishment rates in the multi-storey stock. However, refurbishment rates in the private stock, both multi-storey rental stock and owner-occupied houses, do not reach the necessary level of refurbishment activity.

We can learn from the Austrian experience that financial incentives are important but not sufficient. They must go hand in hand with an efficient legal framework. More attention should be paid to safeguard the costs of fuel switch to be distributed equally between owners and beneficiaries (tenants), but also targeted measures should be introduced to prevent energy poverty amongst low-income households that cannot cope with high investments or rapidly increasing energy costs.

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Innovation in housing decarbonisation: Germany

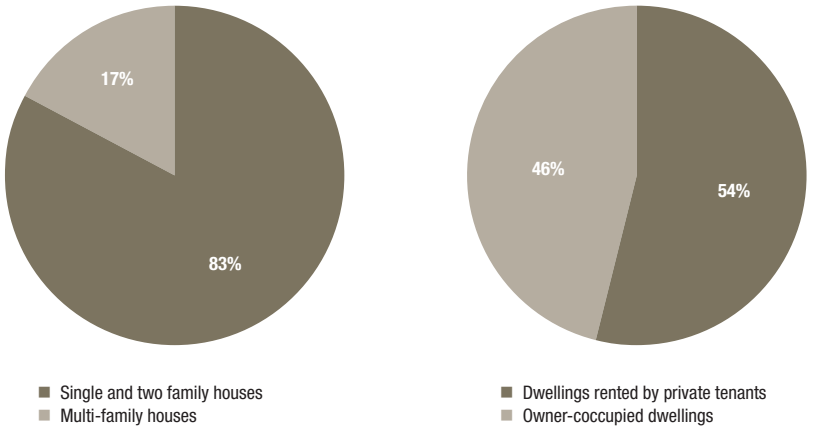
↳ By Florin Vondung, Stefan Thomas, Justus von Geibler, Toni Gnanko

1. Structure of the stock

The total residential building stock in Germany comprises 18.95 million buildings, with a total of 3.7 billion m² of heated space (as of 2018) (dena 2019: 10). 3.2 million (or 17%) of these buildings are apartment buildings and a total of 15.75 million (or 83%) are detached and semi-detached houses (cf. Figure 1). Detached and semi-detached houses therefore make up the largest share of the number of residential buildings (dena 2019: 10). With 2.2 billion m², detached and semi-detached houses also make up the larger share of total residential heated floor area (ca. 60%), while the remaining 1.5 billion m² are located in apartment buildings (dena 2016: 14). Non-residential buildings, totalling 2.7 million (with a heated net floor area of 1.35 million m²), account for one seventh of the total stock. More than half of all dwellings in Germany are rented to private tenants (Bienge et al 2018: 17). In this respect, Germany differs from other developed countries (Bienge et al 2018: 17).

Driven in particular by the rising demand for housing, investment in housing construction is increasing. In the past, there has been an annual increase in construction investments in multi-family houses of 5.8% (measurement period: 2005 to 2015) (Bienge et al. 2018: 22). According to the Federal Statistical Office, there has been an increase in the housing stock in Germany within the last few years: At the end of 2019, the growth comprises a total of 0.7% or 277,400 dwellings (compared to 2018), resulting in a total of 3.9 billion m² of floor space. In addition, both living space per dwelling (by 1 m² compared to 2010) and per inhabitant (by 2 m² compared to 2010) increased (Federal Statistical Office 2020a). The current average flat size in Germany as of 2019 is 91.9 m² (ibid.).

FIGURE 1 **Share of single and two family and multi-family houses and share of dwellings rented or owner-occupied in the German residential building stock**



Data: Dena Building Report compact 2019: 10 and Bienge et al 2018:17

While demand for affordable housing is increasing, the share of the social housing stock is decreasing (Bienge et al. 2018: 17; 25). The number of social housing dwellings has significantly declined over recent decades, from 2.87 million in 1990 to an estimated 1.07 million in 2020 (Statista n.d.[1]). This decline is a result of market based strategy, which strongly relies on providing financial incentives linked to capped rents for a specific period of time instead of setting regulatory requirements. However, in the light of increasing demand particularly in metropolitan areas (cf. section 2), corresponding increasies in rents and low market interest rates, housing developers are looking for higher ROI than enabled by the conditions for state promotional programmes. In addition, more and more of the social housing stock is no longer subject to rent control after expiration of the commitment period.

2. Socio-demographic issues

With a population of 83.2 million people (with a slight upward trend), Germany is the most populous country in the EU (Federal Statistical Office 2020b).

As are many other countries, Germany is experiencing a rise in immigration and urbanisation. The increasing urban boom in major German cities, caused in particular by the migration of young people and immigration from abroad, is increasing the demand for affordable living space (Federal Statistical Office 2019a). As a result, the average living space per person in the seven largest German cities (Berlin, Hamburg, Munich, Cologne, Frankfurt, Stuttgart and Düsseldorf) is decreasing (currently at 39 m²) (ibid.) while overall it has increased over time from ca. 35 m² in 1991 to ca. 47 m² in 2019 (Statista n.d.[2]). In contrast, outside the

[1] https://de.statista.com/infografik/12473/immer-weniger-sozialwohnungen-in-deutschland/

[2] https://de.statista.com/statistik/daten/studie/36495/umfrage/wohnflaeche-je-einwohner-in-deutschland-von-1989-bis-2004/

metropolitan areas the population is declining. The result of this development is an increasing vacancy rate, especially in rural areas (Bienge et al. 2018: 24).

The rising demand for housing in German cities has led to a significant upward trend in property prices and rents since 2010 (Bienge et al. 2018: 24). This rise and corresponding strong increases in basic rents since 2015 have resulted in an average rent burden of around 27.2 % (as a share of disposable income) in 2018 (Federal Statistical Office 2019b), which is increasingly becoming a problem for many households. Households in metropolitan areas as well as families are particularly affected (Federal Statistical Office 2019). According to a national representative survey in 2018, 13.3% of people perceive the monthly housing costs as a major burden and as many as 57.2% still as somewhat of a burden (Federal Statistical Office 2019c: 168).

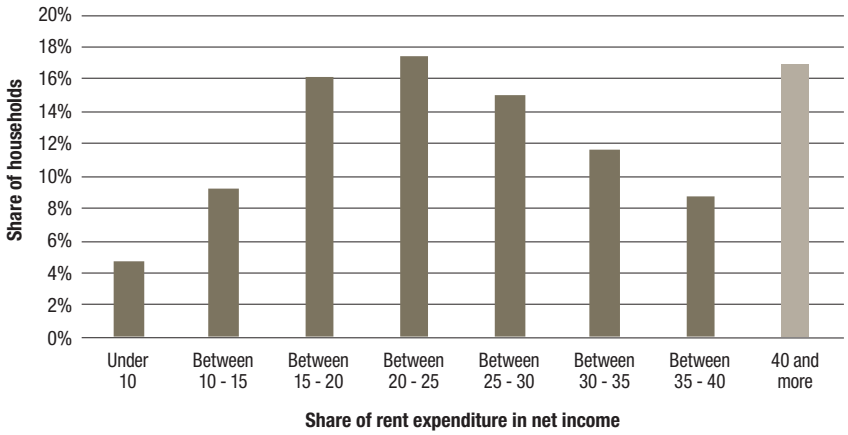
The problem of rising rent burdens is further illustrated by the fact that around 17% of German households have to spend more than 40% of their monthly disposable income on rent alone (cf. Figure 2).

According to the Federal Statistical Office, the majority (around 48%) of people receiving housing benefits are pensioners followed by dependent employees with a share of 37% (Figure 3). The data collection revealed that the housing benefit needs of employees increase significantly with the number people living in the household. Only about 2% of the self-employed receive housing allowances in Germany.

3. Governmental targets on housing decarbonisation

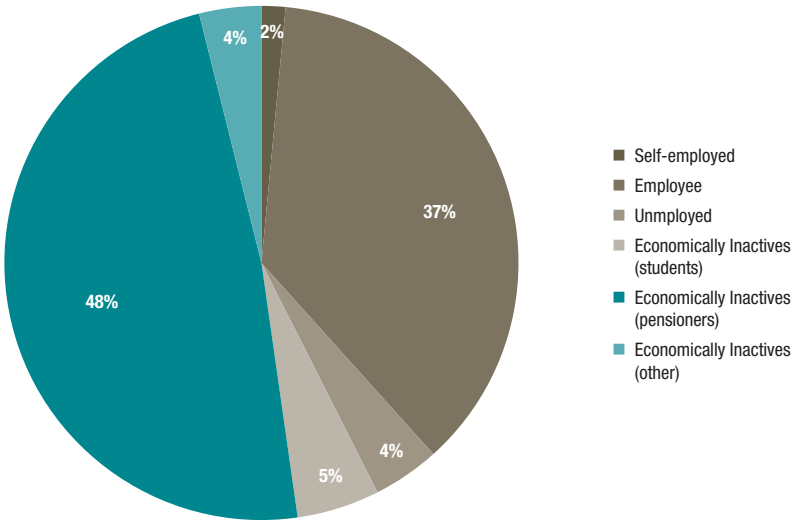
The German government's targets for decarbonising the building sector are derived from international climate targets, i.e., the goals of the Paris Climate Accord and the corresponding European climate targets. Overall, Germany aims to reduce greenhouse gases (GHG) by at least 55%[3] by 2030 and by 80-95% by 2050 (compared to 1990) (BMWi 2020: 29). Sectoral emission reduction targets in Germany are set out in the Climate Protection Plan 2050 and specified in the Climate Protection Programme 2030. According to the latter, annual greenhouse budgets of the sectors and respective reduction targets are to be defined by law and

FIGURE 2 Relative frequency of tenant households regarding their share of rent expenditure in disposable income in 2014



Source: own graph based on data from Federal Statistical Office 2019c: 167 (data from 2014)

FIGURE 3 Share of households receiving housing benefits by employment status



Source: own graph based on data from Federal Statistical Office 2019c: 169 (data from 2017)

TABLE 1 Sectoral emission reduction targets of Germany by 2030

FIELD OF ACTION	**1990** (in million tonnes CO_2-eq.)	**2014** (in million tonnes CO_2-eq.)	**2030** (in million tonnes CO_2-eq.)	**2030** (reduction in % compared to 1990)
Energy Sector	466	358	175 – 183	62 – 61 %
Buildings	209	119	70 – 72	67 – 66%
Transport	163	160	95 – 98	42 – 40%
Industry	283	181	140 – 143	51 – 49%
Agriculture	88	72	58 – 61	34 – 31%
Subtotal	1.209	890	538 – 557	56 - 54%
Other	39	12	5	87%

Source: BMU 2016: 33

[3] An adjustment of the national targets to account for the recently (December 2020) tightened EU emission reduction target to 55% compared to 1990 is yet to be implemented.

achievement of the targets to be reviewed annually (German Federal Parliament 2019: 13).

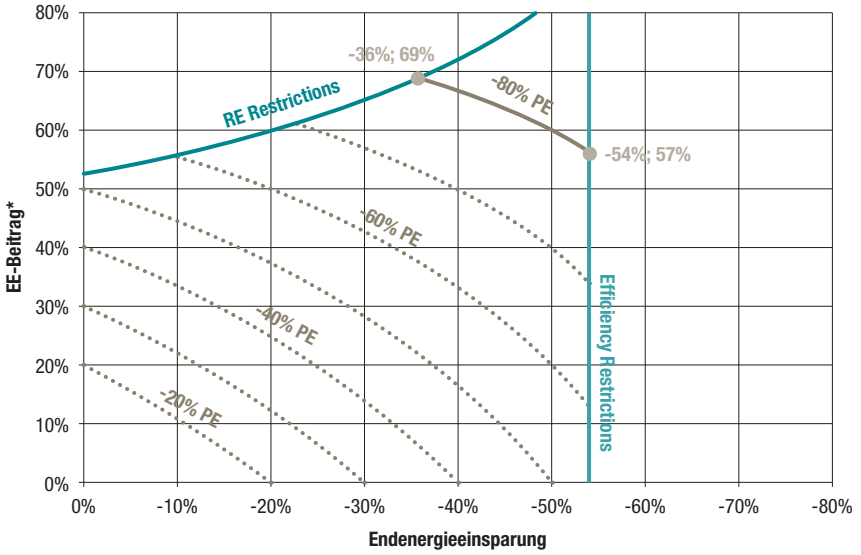
The German building sector directly causes 14% of total national GHG emissions and is indirectly responsible for as much as about a quarter of Germany's total GHG emissions (considering upstream emissions in the energy sector) (German Federal Parliament 2019: 39). In combination with a share of about a quarter (27%) of total primary energy consumption and 35% of final energy consumption, the building sector plays a significant role in the German climate protection accord (Dena 2018: 19). The residential sector accounts for 63% of final energy consumption of the total building stock (Dena 2018: 17 f.).

The climate-friendly transformation of the building stock is thus essential to achieve Germany's climate targets. The Federal Government therefore aims to reduce CO_2 emissions in the building sector by 66-67% (compared to 1990) by 2030 (cf. Table 1). This corresponds to a maximum amount of 72 million t CO_2 eq. to be emitted by the building sector in 2030 (German Federal Parliament 2019: 40).

The central document outlining the energy transition in the German building sector is the Energy Efficiency Strategy (ESG), which pursues the goal of achieving a "nearly climate-neutral" building stock by 2050 by increasing energy efficiency on the one hand and the share of renewable energies for heat and other end uses on the other (BMWi 2019a: 51 f.). The Federal Government aims to reduce non-renewable primary energy consumption of the building sector by 50% in 2030 and by 80% by 2050 compared to 2008 (BMWi 2015a). To this end, a target corridor delimited by the maximum potential for building energy efficiency (estimated at 54%) and use of renewable energies (1,800 PJ) has been defined, which translates into different scenarios with variations of the two pillars (cf. Figure 4).

In terms of achieving the target, by 2018 GHG emissions in the building sector have fallen by around 44% since 1990, from 210 m t CO_2 eq. to an estimated 117 m t (German Federal Parliament 2019: 40).

FIGURE 4 **Result of the target corridor taking into account the modelled restrictions:** Reduction of primary energy demand by 80% compared to 2008 – remaining corridor due to the restrictions in the area of renewable energies and in the area of energy efficiency / energy savings.



Note: EE-Beitrag = Contribution of renewable energies towards the decarbonisation of energy supply in %; Endenergieeinsparung = Final energy savings in %

Source: BMWi 2015a, based on data by Prognos et al. 2015

TABLE 2 **Refurbishment rates related to different measures and data bases in % of the stock**

MEASURE	Measure / data base	IWU/BEI Building stock data base 2010	IWU Building stock data base 2016	IÖW 2010 ENEF Haus (only detached and semi-detached houses)
Heating system replacement	3.17	2.8 - 3.5	3.05	2.6
Installation solar heating system	1.02	0.85 - 1.21	0.87	0.6
Facade insulation	0.87	0.82 - 1.06*	0.79*	0.9
Roof/upper ceiling insulation	1.43	1.32 - 1.65	1.69	1.7
Basement ceiling insulation	0.49	0.34 - 0.42	0.46	0.3
Window replacement	1.56*	1.34 - 1.80*	1.82*	1.6

* Area weighted, i.e., partial refurbishments are considered

Source: Metzger et al. 2019: 41

4. Refurbishment rate

There is no official definition in Germany with regard to what is considered the refurbishment rate. Due to this lack of consensus regarding the qualitative features to be considered and practical issues, there is no continuous and systematic data collection to monitor refurbishment activities over time. In a survey of 7,500 residential buildings in 2010, an annual refurbishment rate of 0.8% regarding thermal insulation measures has been identified for the years 2005-2008 (Diefenbach et al. 2010). A reliance on these findings as a basis for political strategies has however been questioned due to the small sample representing a mere 0.5‰ of the residential building stock (BBSR 2016). An updated survey in 2016 covering ca. 17,000 residential buildings found an annual refurbishment rate of 1% regarding thermal insulation measures for the period 2010-2016 (Cischinsky/Diefenbach 2018), which has since then informed both public discourse and political strategies for the residential building sector.

The same study measure identified measure-specific refurbishment rates, which have been compared (Metzger et al. 2019) with data from other sources in a recent publication (cf. Table 2)

However, data on the implementation of deep renovations is scarce. Based on a representative survey on the implementation of energy-related refurbishment measures, the German Institute for Economic Research (DIW) has estimated the share of comprehensive refurbishments (defined as four or more measures implemented) in 2014 at 0.2% (BBSR 2016a). A study by IPSOS/Navigant (2019) used expert survey and market data to estimate refurbishment rates differentiated by depth (i.e., primary energy saving levels), finding a range from 3.5 % of "Light" renovations (from 3% ≤ 30%), 0.9 % of "Medium" renovations (from 30% ≤ 60%) to 0.1 % of "Deep" renovations (> 60%).

4.1. Targets

Regarding the refurbishment of the building stock as a means to achieve the formulated sectoral target (see section 3), the Federal Government has formulated the target in its 2010 Energy Concept (Federal Government of Germany 2010) and revisited it in its Energy Efficiency Strategy 2050 (BMWi 2019b) to double the yearly renovation rate from "currently" 1% to 2%.

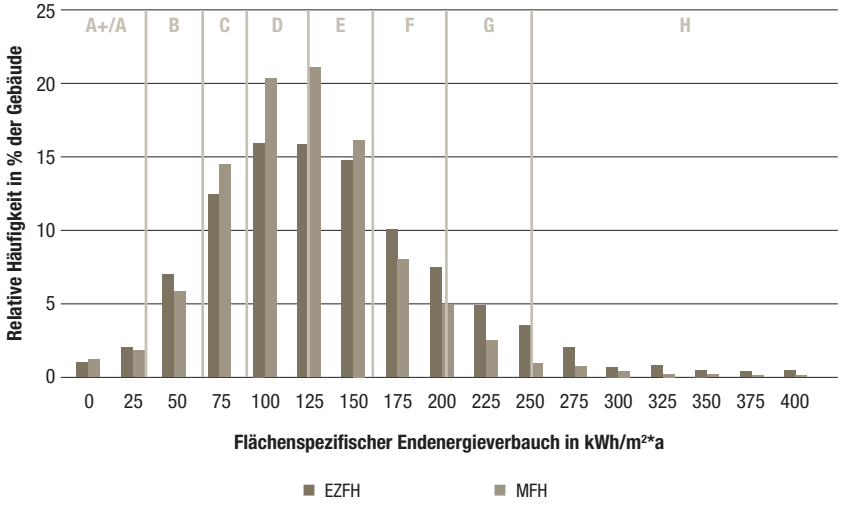
5. Energy efficiency standards

5.1. Current situation in the stock

The information base on the current energy efficiency of the German building stock is limited. Due to data protection concerns and associated costs, there is no central building cadastre systematically collecting and updating data on building energy efficiency in Germany (BBSR 2016b)[4]. Accordingly, available information is based on irregularly implemented (representative) surveys among building owners or professionals or online databases (e.g., Cischinsky/Diefenbach 2018; Metzger et al. 2019).

The following Figure 5 shows the relative frequency of the various energy building classes in Germany differentiated by detached and semi-detached houses or apartment buildings based on an assessment by dena, the German Energy Agency.

FIGURE 5 Relative frequency of the various energy building classes in Germany differentiated by detached and semi-detached houses (EFZH) or apartment buildings (MFH)



Note: relative Häufigkeit in % der Gebäude = relative frequency in % of all buildings; flächenspezifischer Endenergie-verbrauch in kWh/m²*a = floor area specific final energy demand in kWh/m²*a ; EZFH = detached and semi-detached houses; MFH = apartment buildings; Durchschnitt = Average

Source: Steuwer et al. 2018, based on data from dena (2016)

5.2. Legal requirements for new construction and refurbishment (building codes)

The Building Energy Act (GEG) is the main instrument for building energy regulation. Passed in November 2020, it transposes the additional provisions from the modified EU Directive on the energy performance of buildings (2018/844/EU) into national law and bundles the preceding legislation (i.e., Energy Saving Act (EnEG), Energy Saving Ordinance (EnEV), Renewable Energies Heat Act (EEWärmeG)) into an integrated regulatory framework. It sets minimum requirements for the energy performance of the building shell and the system technology for new buildings, and also for larger renovations of existing buildings.

5.21. NEW CONSTRUCTION

Newly erected residential buildings have to fulfil three main criteria related to heat transmission loss, primary energy demand and the share of renewable energy, that are defined by creating a reference building that is similar in the way it is built but has defined uvalues and a certain type of heating system. Based on the defined reference building standard ("Effizienzhaus 100") representing the statutory minimum energy performance requirements[5], several advanced building standards are defined, which serve as reference for the federal building energy efficiency promotion programme (see section 4.4). For example, the "Effizienzhaus 40" standard refers to a building, whose primary energy demand may not exceed 40% of that of the reference building and 55% of its heat transmission loss. In addition, the Passive House Standard is a well established though non-state standard with very low energy requirements to be proven either through the heating load of the building (max. 10 W/m²) – or through a very low heat energy requirement (max. 15 kWh/m²a of useful energy). The Heating Costs Order exempts buildings reaching the Passive House standards from billing requirements, thus creating an incentive for deep renovations of multi-family buildings.

5.22. REFURBISHMENTS

For existing buildings, the GEG only specifies a few mandatory energy efficiency requirements to be met by building owners. First, from 2015 onwards, fossil fuel based 'constant temperature' boilers have to be decommissioned after 30 years of use. Second, new heating pipes leading through unheated rooms must be insulated and third, the top floor ceiling

[4] https://www.bbsr.bund.de/BBSR/DE/veroeffentlichungen/analysen-kompakt/2016/ak-09-2016-dl.pdf?__blob=publicationFile&v=2

[5] Confusingly, the current minimum requirements for new buildings as defined by the Building Energy Act (GEG) are 75% of primary energy demand compared to the standard set in the previous revision of building energy regulation in 2014, effectively making them "Effizienzhaus 75".

must also be insulated if it is uninsulated and adjoins an unheated attic. Although considered cost-effective, the requirements are watered down by a number of exemptions (grandfathering clause, cost-effectiveness proviso) that significantly reduce the number of affected buildings and thus their impact (BBSR 2015).

In case of voluntary restoration works such as renewing the plaster, insulation of the building shell or the replacement of windows, minimum standards defined by the GEG have to be met. If only single measures are implemented or (more than 10% of specific) building parts renewed, their heat transmission coefficients have to meet the respective standards. For comprehensive renovations, an overall assessment of the energy balance compared to a reference building comparable to new construction is required. However, the primary energy demand and transmission heat losses may in this case be up to 40% and 75% respectively higher than that of the reference building.

5.3. EE standards in other regulations (e.g., subsidy schemes)

Within the BEG WG promotion programme (see section 6), the loan conditions are linked to the fulfilment of energy efficiency standards that exceed the legal requirements. The lower the proposed primary energy demand and transmission heat loss is compared to a reference building ("Effizienzhaus 100") the higher the maximum redemption subsidy levels are. From July 2021, additional promotion products with higher credit / redemption subsidy levels will be offered that require additional conditions to be fulfilled in terms of the share of renewable heat (55% of total heat demand) or a specific sustainability certification of buildings, which also considers life-cycle aspects in the production of building components.

5.4. Enforcement of EE standards in refurbishment, challenges

Monitoring compliance with EE standards is the responsibility of the federal states, which can designate a competent supervisory authority by executive order. In most cases, the lower building supervisory authorities (municipal building offices) were entrusted with this task. Due to an increasing lack of personnel (cf. Brand & Steinbrecher 2016) and a shift in priorities motivated by the housing shortage in metropolitan areas, verification of evidence is only carried out on a random basis if at all, or on an ad hoc basis if there are specific indications. Accordingly, in some cases it is assumed that the authorities will fail to enforce the requirements effectively. (Hertle et al. 2006). While there is little data on the extent of this failure to enforce effectively, a survey among state officials on the enforcement of building energy certificate regulations found varying levels of recognition, processes and/or capacities to implement enforcement requirements on the part of the responsible authorities (DUH 2015)[6].

The Building Energy Act (GEG) aims to improve enforcement by introducing additional mandatory reporting requirements for building owners. Accordingly, they are now obligated to issue a compliance statement to the responsible authorities after completion of the construction or refurbishment, in which they confirm compliance with the legal requirements (§92, 93 GEG).

6. Financing tools

Germany has a wide range of financial instruments to incentivise deep energy renovation and decarbonisation of buildings, comprising funding schemes, subsidy programmes and feed-in tariffs.

6.1. Funding schemes

In 2021, the different existing funding schemes have been merged in the Federal funding for energy-efficient buildings programme (BEG) in order to increase transparency and to facilitate access for building owners. The BEG has three components providing funding for residential buildings (BEG WG), non-residential buildings (BEG NWG) and single measures (BEG EM) offering either investment grants or low-interest loans with redemption subsidies.[7] The BEG is administered in part by the Federal Office for Economic Affairs and Export Control (BAFA) and the state owned KfW Bank with a plan to divide the task for all promotional products along the lines of the provision of investment grants (BAFA) or low-interest loans (KfW) by 2023. For renovating an existing building up to an "Effizienzhaus" standard, loans up to 120.000€ are provided (150.000€ if the share of renewable heat is 55%) with differing levels of redemption subsidies or alternatively investment grants depending on the targeted energy efficiency standard ranging from 30.000€ to 48.000€ (and 45.000€ to 75.000€ respectively). The provision is conditional on the inclusion of certified energy efficiency experts providing professional energy advice. Grants or redemption subsidies may further increase by 5%, if owners develop and follow an individual renovation roadmap (see section 7.2). In terms of single measures, insulation of walls, roof, basement and storey ceilings, replacement of windows and doors, and installation of summer thermal protection, mechanical ventilation with heat recovery (MVHR) or digital systems that optimise energy consumption or make technical equipment smartly controllable are promoted with a loan of up to 60,000€ and a 20% redemption subsidy or alternatively by offering an investment grant. Furthermore, the exchange of heating systems with hybrid, "renewable ready" fossil (i.e., gas based) or renewable systems is promoted with different subsidy / grant rates between 20 -45% (again of a maximum of 60.000 € investment costs) depending on the technologies to be implemented and replaced. Lastly, optimisation of existing heating systems by means of hydraulic balancing and the replacement of inefficient heating and hot water circulation pumps with high-efficiency pumps is promoted with 20%.

6.2. Tax Bonus

Alternatively, owners of buildings with a minimum age of 10 years can benefit from a tax deduction of up to 20% of investment costs (max. 40,000€ per dwelling) in respect of single refurbishment measures, spread over a period of three years. Costs for construction supervision and technical planning are deductible up to 50%.

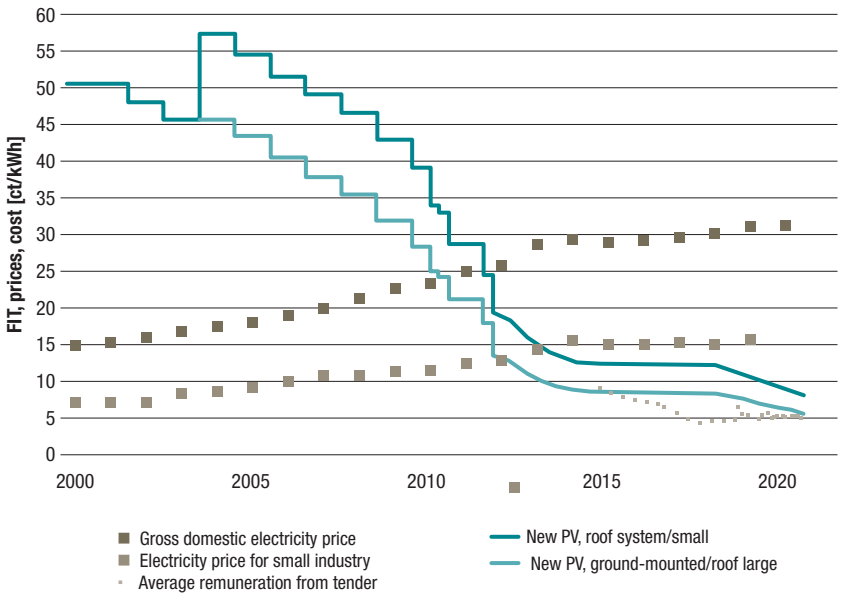
6.3. Feed-in tariffs

Additional, financial incentives for the installation of building based renewable energy plants for electricity are provided via a Feed-in-Tariff funded through an electricity surcharge under the Renewable Energy Sources Act (EEG). In order to control the increasing financial burden on end consumers due to expanding deployment of renewables, the tariff rate per kWh has been increasingly decreased from almost 60 ct/kWh in 2004 to currently 8.16 ct/kWh (as of January 2021) (cf. Figure 7). In addition, in 2014 an "expansion corridor" for different renewable power generation technologies was introduced (translating into 5 GW/a for PV) which is basically a cap after which investors receive further lowered rates per kWh. The Landlord-to-Tenant Electricity Act has extended the financial incentive for rental buildings by providing a supplement (between 2.37 and 3.79 ct/kWh depending on the size of the plant) for electricity that is generated on site and then sold to tenants.

[6] https://www.duh.de/uploads/media/Hintergrund_Regelungs_Vollzugsdefizite_270415_02.pdf

[7] https://www.kfw.de/inlandsfoerderung/Bundesf%C3%B6rderung-f%C3%BCr-effiziente-Geb%C3%A4ude/

FIGURE 6 **Feed-in tariff for PV power as a function of commissioning date, average remunera-tion of the bidding rounds of the Federal Network Agency, electricity prices and average compensation for PV power**



Source: Wirth 2020

The efficient provision of heat and electricity is incentivised by a combined heat and power (CHP) surcharge, which is paid for the electricity produced by cogeneration plants (16 ct/kWh when feeding into the grid and 8 ct/kWh for own consumption or provision to third parties).

7. Policy tools

There are several policy tools in Germany, that can be considered good practice for achieving a just transition towards a decarbonised residential building stock. They focus on different relevant aspects that need to be addressed to effectively promote this target.

7.1. Federal funding for energy-efficient buildings programme (BEG)

The most important and effective is probably the Federal funding for the energy-efficient buildings programme (BEG) that was presented in section 6. However, they are embedded in a number of other policies making them more effective, from several programmes on energy advice, offering free initial advice and 80% of subsidy for an in-depth advice, to the energy efficiency standards discussed in section 5, to energy performance certificates, and professional training of experts. We would like to present two more tools, one innovative tool and one addressing low-income households.

7.2. Individual Renovation Plan (IRP)

In the context of energy advice for residential buildings, a qualified energy consultant inspects the building and produces a comprehensive energy-consultancy report. This report includes guidance on funding-support programmes and an overview of the individual possibilities to improve the energy performance of the building. Since 2017 the Individual Renovation Plan (IRP) is available as a tool for consultation purposes. This software-supported tool helps building-energy consultants to produce a comprehensible overview of the renovation measures to be taken in a building, with a particular focus on the order in which measures should be implemented, to avoid technical or financial lock-in. This roadmap has the objective to allow the owner staged renovations taking the age of different parts of the building and system into account, as well as the availability of the owner's funds, while still achieving deep renovation in the end. Alongside energy-saving potential, opportunities to use renewable energies and the needed investments are assessed. In addition, the calculated reduction in heating costs and CO_2 emissions are highlighted. The IRP provides owners with both advice on concrete short-term measures as well as a long-term strategy and aims to set a quality standard for building energy consultation. The IRP has been one model for the Building Renovation Roadmap tool now proposed by the European commission.

7.3. State coverage of rent/heating expenses and free energy advice for low-income households

Household energy prices in Germany are among the highest in Europe (European Commission 2020). In combination with rising rent levels (see section 2), the financial burden of basic living expenses for many households particularly in metropolitan areas has considerably increased. In order to cushion against energy and rent-related financial hardship for economically vulnerable households (such as long-term unemployed), the German Federal Government largely relies on social policy. According to social security statute book II and XII, eligible persons (i.e., long-term unemployed or those unable to work) receive a basic income to cover their living expenses (including a dedicated budget for electricity). In addition, rent and heating expenses of welfare recipients up to an "adequate level" are fully covered by the state. Accordingly, though not contributing to the achievement of energy saving targets in the residential sector, heating related energy poverty is largely addressed by this approach. In addition, low-income households or those receiving welfare transfers can benefit from state funded free energy advice offers (see section 8.3).

8. Related measures

8.1. Greening

While the German Federal Government has acknowledged the positive contribution of urban greening towards more sustainable and liveable cities in a white paper (BMU 2017), the greening of buildings is largely promoted at community level via grants and reduced precipitation water fees[8]. In its yearly market report, the Federal association for building greening (BuGG) reports an increase of 7.2 million m^2 additional roof area greening in 2019 adding to a total of 120 million m^2 (BuGG 2020). Facade greening has increased significantly

[8] The precipitation water fee is a fee for the disposal of rainwater that enters the sewer system via built-up or sealed surfaces. Both private households and businesses must pay this fee if their paved properties are connected to the sewer system.

less by 90,000 m² in 2019. Roughly a quarter of all cities with more than 50,000 inhabitants promote roof and / or facade greening by means of grants and 72% by means of reduced precipitated water fees (ibid.). In addition, many of these cities have specified respective requirements in their land-use plans.

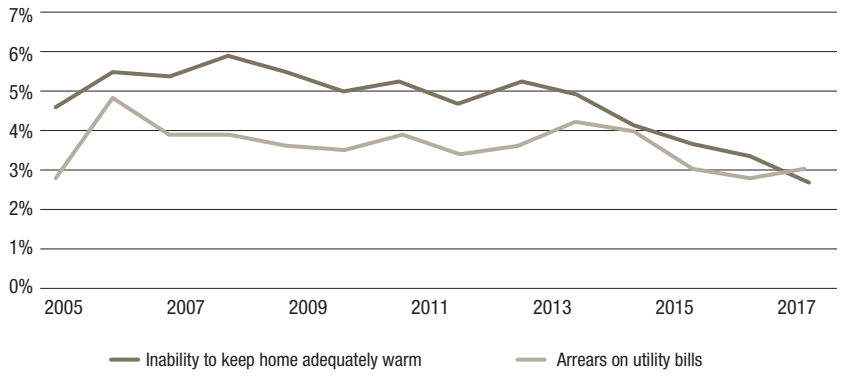
8.2. Prevention of heat islands

The National Climate Adaptation Strategy provides a political framework for adaptation strategies in different (cross-cutting) areas (Federal Government of Germany 2008). To prevent urban heat islands, German municipalities are legally authorized within the building code (§9) to consider climate adaptation measures within their urban land-use planning. Apart from greening buildings and inner-city areas, the German Environment Agency defines maintenance and creation of cold-air corridors within the built environment as a central strategy for action. This can represent a conflict with energy efficiency strategies and urban building policy targets, which aim at further densification.

8.3. Measures against energy poverty

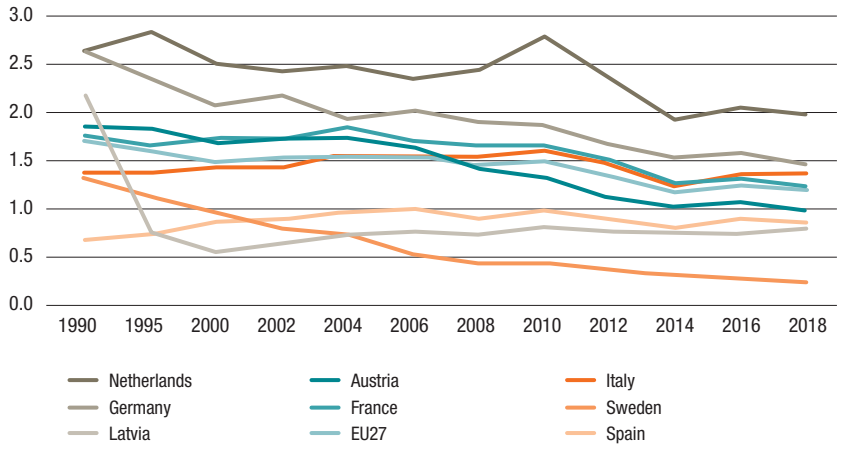
The German Federal Government does not consider energy poverty as an isolated problem but rather treats it within its wider approach of poverty alleviation via welfare state measures (BMWi 2020). Heating expenses of welfare recipients are fully covered by the state as long as they are considered reasonable, as outlined in 7.2. In contrast, allowances for electricity costs are included within the basic income, though an analysis by the Consumer Association has shown that dedicated budgets are insufficient (particularly with electric water heating) (Verbraucherzentrale NRW 2018). Also, households above the eligibility threshold (i.e., the working poor) do not have access to these benefits. As a consequence, in 2017 around 344,000 households have experienced power cuts (Federal Government of Germany 2019). Nevertheless, with regard to the development of energy poverty, the situation of households has improved over time (cf. Figure 7).

FIGURE 7 Development of energy poverty in Germany based on two consensual (i.e., subjective) indicators used by the EU Energy Poverty Observatory (www.energypoverty.eu): share of households being unable to keep their home adequately warm or having arrears on utility bills (2005-2018)



Source: EPOV 2020, based on data from the EU Survey on Income and Living Conditions (EU-SILC)

FIGURE 8 Development of emissions in tonnes CO2 eq. per capita in the EU27 and several of its member states



Source: Eurostat Emission Inventory, IIBW

While there is no Federal programme to tackle energy poverty, the Government financially supports non-state actors to provide energy saving advice to low-income households. The most prominent are the "Energy Saving Check" administered by the charitable organisation Caritas and the Energy Saving programme administered by the Consumer Association. The former trains long-term unemployed people to provide energy saving advice and low-cost technical devices free of charge to welfare recipients and low-income households.[9] The latter also provides free energy advice to low-income households. In addition, welfare recipients with arrears on energy bills can receive an interest-free loan, which is then repaid via a reduction of up to 10% of the basic income.

8.4. Planning issues

In addition to improved thermal insulation and reduction of ventilation heat loss via MVHR, the decarbonisation of heat supply systems is crucial to achieve climate neutrality of the residential building stock. While building (or district) based technologies such as heat pumps, solar heat, biomass heating and (micro) CHP will have to be deployed at larger scale, where possible (or otherwise impossible) district heating / cooling should be expanded as a more efficient way for heat / cold supply, particularly in dense urban areas. To this end, comprehensive spatial heating plans on a community level need to guide the development of district heating infrastructure. However, apart from single states (Baden-Württemberg), there is no regulatory framework governing this process of systemic energy planning.

[9] https://www.klimaschutz.de/en/projects/energy-saving-check

9. Conclusion: challenges, limitations, realism of plans for decarbonisation

Since 1990, Germany has made some progress towards decarbonising the building sector and reduced emissions by 40% (by 2018), which also translates into an overall decrease in tonnes CO_2 eq. per capita emitted (cf. Figure 8). It has done so by means of steadily increasing energy efficiency standards and providing substantial financial incentives to building owners and developers conditional on their adherence to these standards, both in new build and renovation. However, in order to create a sustainable building sector in Germany in the long term and to implement the transformation of the sector, the German government still faces numerous challenges (German Federal Parliament 2019: 40). Firstly, it has to effectively address the conflict between the need for increased private investment into building refurbishments on the one hand and increasing rents and dwelling shortage in metropolitan areas on the other. Furthermore, in order to increase the refurbishment rate of the existing housing stock to the level needed (i.e., 2% or more), additional mandatory energy performance requirements in combination with effective enforcement mechanisms seem necessary; and they should be combined with financial incentives covering the incremental costs – it is time to leave behind us the paradigm to either mandate or subsidize action. A potential approach for the private rented sector could be to link the permission for renting out a dwelling to the achievement of a certain energy efficiency standard, which is continuously tightened over time as implemented in Scotland (Scottish Government 2019). However, this must not lead to suboptimal refurbishments, so it should be coupled with a Building Renovation Roadmap. Therefore, it may be better to link mandatory energy performance requirements to the age of walls, roofs, windows, and heating systems rather than aiming to achieve a certain standard by year x. Also, structural barriers such as insufficient capacities and alternative priorities in the construction sector and training needs of crafts have to be addressed by targeted financial or legal incentives and training and information measures respectively.

In addition, further measures and short-term targets are needed, such as increasing tax incentives, targeted energy advisory services and public awareness campaigns (German Federal Parliament 2019: 40-44). One-stop shops and practical support for managing renovations should also be funded as policy tools, in order to both refurbish existing buildings in an energy-efficient manner and to construct new buildings in an energy-efficient and climate-neutral manner.

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Innovation in housing decarbonisation: Italy

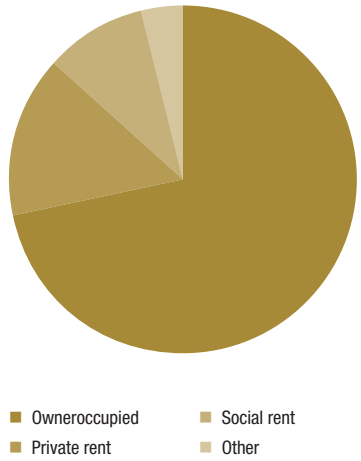
↳ By Igor Costarelli and Silvia Mugnano

1. Structure of the housing stock and significance of social housing

The structure of the housing stock in Italy follows the typical Mediterranean pattern characterized by a low proportion of social and public housing (3.7%) and a predominance of owner-occupied dwellings (71.9%) (fig. 1). The private rented sector accounts for 14.8% while 9.6% is represented by other forms of tenures which include usufruct tenancy, cooperative ownership, commodatum or free loan for use, rent with the right to buy, rent to buy[1] (Bianchi 2014).

Since 1970s the so-called "homeownership society" has become the leading paradigm in Italian housing policy at the expense of the rental sector. In 1961 census data reported that the share of homeowners and tenants was respectively about 45% and 55%. This proportion has reversed over the following decades as a consequence of homeownership-oriented housing policy. The public housing sector (*edilizia residenziale pubblica*), established in early 1900, has been increasingly catering for the needs of the most vulnerable households, playing a residual role in housing and welfare policy. About 75% of social tenants live in dwellings owned by public housing companies (*aziende casa*) and about 25% in public dwellings owned by local authorities. The size of the public housing sector has been declining as result of selling-off operations within "Right to Buy" schemes that were first introduced in 1993 (law 560/1993). Over about 30 years, roughly 22% of the total stock has been sold to sitting public housing tenants (Federcasa 2015). Right to buy schemes did not benefit social tenants equally. Better off tenants were able to access homeownership at discount rates while less well-off tenants could not. Therefore, the social rented sector went through a process of increasing concentration of low-income tenants in the most stigmatized and degraded estates.

FIGURE 1 Tenure structure in Italy (Pittini et al. 2017)



Since homeownership has become the predominant tenure form, housing policy has increasingly become marginal to the political agenda. However, since the beginning of 2000 there has been a revival of housing as a social issue, fuelling some policy changes across the country in an institutional context, characterised by a plurality of regional-based housing agendas generated by the decentralization process.

Alongside the introduction of measures for property owners, there has been increasing interest in rental housing through the design of new schemes for boosting social housing supply (Housing Acts 2008 and 2014) and revision of rental law (n. 431/1998). In 2008 the Italian Government allocated about 550 million € to co-fund new social and affordable housing (*edilizia sociale*) at below-market rates (for rent and sale) for low-middle income households through the combination of public and private funding (*Sistema Integrato dei Fondi*). In 2014 further measures were introduced to both support tenants to pay rent (housing allowance) and reinforce right-to-buy schemes, restoration and redemption of 'public dwellings', as well as fiscal allowances for tenants and landlords and new rules for the provision of social rental housing.

2. Socio-demographic issues: brief analysis of who is living in which housing segments

The demographic of homeowners in Italy is very diverse. According to the Italian National Statistics Institute (ISTAT) elaboration on EU-SILC data, the homeownership rate is respectively 74.3% and 81.7% for the richest households (fourth and fifth-income quintiles). These rates are higher than the rate of homeownership in the first, second and third-income quintiles, 55.7%, 62.9% and 68.1% respectively. Within this tenure couples with children (72.4%) and couples without children (78.3%) are more frequent than single households (57.5%). Interestingly, the share of elderly households in this sector is significant: 65.8% of single households are over 65 and 81.1% couples are over 65. The share of immigrant homeowners has increased from 12.3% in 2007 to 23% in 2012 (Zincone 2009; Daminato and Kulic 2013). The private rental sector mainly accommodates low-income groups. EU SILC data elaborated by ISTAT show that in 2008 the share of low-income people (first and second-income quintiles) who lived in rental dwellings was respectively 25.8% for the first income quintile and 23.3% for the second compared to 15.7% and 7.9% for richest households in

[1] Usufruct contract gives the tenant the right of lifetime use of a dwelling that is owned by a different owner. The commodatum, or free loan, gives a person the right to use a dwelling for a certain time, usually without charging rent. At the end of the agreed period the dwelling returns to the owner.

the fourth and fifth-income quintiles. The public rental sector (*Edilizia Residenziale Pubblica*) accommodates the poorest households in the country. Priority access is given to specific categories such as single parents with children, evicted people, households where one or more members are disabled people, and people suffering from other forms of housing exclusion including substandard living conditions. However, because the supply of social housing is too scarce, low-income households are increasingly accommodated in the private rental sector. Most low-income tenants (first and second-income quintiles) rent at market rates: 18.1% and 16.4% compared to 7.7% and 6.9% of tenants who rent at reduced rate (public housing). The latest social and affordable housing schemes (*edilizia sociale*) target the grey area of the housing market, i.e. households who are considered 'too rich' to be eligible for public housing but 'too poor' to afford rent at market price or access ownership. The grey area usually corresponds to low-middle income groups (second and third quintiles). According to ISTAT elaboration on EU-SILC data the rental housing market accommodates mainly single-parent households, with or without children, and youth, single (30%) or couples without children (24.7%).

3. Governmental targets on housing decarbonization: reference to EU directives, significance in political debates

The European Union has played a significant role in fostering laws and policies aimed at energy saving and building renovation. In respect of energy saving, the directives 2002/91/CE and 2010/31/UE were adopted through Legislative Decree no. 192/2005 and following modifications. These laws required owners to obtain a certificate of energy performance (*Attestato di Prestazione Energetica*). This certificate is needed when the owner intends to sell or rent the property. In some cases, it may be required that the contract contains a clause that confirms that the recipient (buyer or renter) was provided with information and documents regarding the energy performance of the property. The energy performance indicators and energy efficiency class of the building or single dwelling must be clearly specified on advertisements and listings when such a property is offered for rent or sale (holiday homes are excluded).

The energy system can be considered a significant tenet of broader governmental goals of sustainable growth and economic competitiveness. A National Energy Strategy was launched in 2017 (*Strategia Energetica Nazionale*) to strengthen actions with high potential for energy savings including in the construction sector. It introduced policy tools aimed at improving energy efficiency in public administration and to stimulate sustainable urban development, including plans for restructuring, energy renovation of buildings, and renewable energy (D'Alpaos and Bragolusi 2018). This strategy was expected to achieve and exceed European environmental targets for 2020 regarding a reduction in greenhouse gas emissions by 21% compared to 2005 emissions. In the long-term (by 2050) the ambition is to further strengthen energy efficiency goals by a 17-26% reduction of primary consumption compared to 2010. The building sector plays a key role in this vision, especially after the Paris agreement according to which some EU countries set energy reduction goals of up to 80%.

In implementing the EU energy policies, in January 2020 Italy launched a National Integrated Plan for Energy and Climate (*Piano Nazionale Integrato per l'Energia e il Clima*) as required by the EU Regulation 2018/1999. This plan runs for the period 2021-2030 and is based on existing strategies and national plans, such as the National Energy Strategy of 2017. It sets new targets for 2030 in terms of energy efficiency, renewable sources, and reduction of polluting emissions. Facing a goal of 51.44 Mtep final energy saving, the plan aims to reach cumulative saving estimated at 57.44 Mtep.

4. Refurbishment rate: definition, current refurbishment rate, targets

Overall, the current renovation rate for residential buildings is about 2%. The refurbishment rate for buildings, through demolition and reconstruction is below 1% per year (Carrosio 2015).

Most of the energy retrofit interventions generate limited reductions in consumption (20-30%). Since 2000 only 20% of dwellings have been renovated and only 30% of these interventions have involved energy performance (Carrosio 2015). Policy interventions are inadequate to reduce the energy consumption of existing buildings (D'Alpaos and Bragolusi 2018). Owners are often reluctant to renovate due to limited capital availability, uncertainty about the actual amount of energy savings, financial returns and the reliability of contractors (D'Alpaos and Bragolusi 2018). Future strategies to stimulate energy efficient refurbishments include continuous support for fiscal tools aimed to incentivize energy retrofit interventions in combination with funds from the Recovery Plan.

5. Energy efficiency standards: current situation in the stock

Housing construction in Italy boomed during the second post war period. However, at that time the construction approach lacked attention to the quality of the building, particularly in terms of thermal and acoustic insulation (Magnani, Carrosio & Osti 2020). The rate of new residential construction has been at a near zero level since the 2008 Global Financial Crisis (GFC).

The quality of housing is also problematic. According to census data analysed by Centro Studi Opificium CNPI in the report "Italia casa Sicura" of 2016, about 13% of all Italian households (in absolute figures more than 3 million) live in damaged dwellings (roofs, walls, floors or windows) and one quarter of the oldest housing stock (i.e. built before 1945) is classified as in a mediocre state of conservation. The share decreases to about 15% for the stock built between 1945 and the 1980s and further reduces to 4.5% for the newest stock (built after the 1980s).

About 90% of the total housing stock in Italy was built before 1990 and it does not comply with energy efficiency standard as the first law for energy saving was introduced in 1991 (law 10/1991). Because of the high number of homes in need of renovation, the housing stock in Italy has one of the highest potentials in Europe for achieving energy efficiency and reduction of GHG through retrofitting (D'Alpaos and Bragolusi 2018). This makes the energy efficiency of residential building a primary concern in Italy. Housing is responsible for 33% of total primary energy consumption (Carrosio 2015). About 80% of domestic energy consumption in Italian homes is for heating/cooling, 15% for the supply of hot water, 5% for cooking and electrical appliances and 2% for lighting. On average, energy home consumption is 190 Kwh/smq per year (the EU average is about 45% lower) (Carrosio 2014).

Italy has the strong potential to improve the energy efficiency standards of the existing housing stock which is currently very low. Regulations for energy efficiency exist mostly for new buildings, while the existing stock is a priority target of policy to incentivize energy retrofit interventions through tax deductions or

energy certificate requirements when property is set for renovation, selling or renting.

6. Financing tools: funding schemes in housing regulations

A major activity within housing decarbonisation is energy retrofit interventions of existing buildings. This has been pursued through a combination of regulatory, persuasive, and redistributive tools. Regulatory tools impose specific requirements and certification obligations when selling or renting properties. This includes the national system of energy certifications which is meant to induce the market to recognize the energy performance of a building through the mechanisms of reputation and price. However, this is far from successful as the co-existence of various bodies and diverse protocols for certification create competition in this system (Magnani, Carrosio & Osti 2020). An example of a persuasive tool is tax deductions in the case of energy renovation.

Since 1986 the law (Decree P.R. no. 917/1986) has offered fiscal deductions for buildings renovation by building owners. The occupant of the dwelling (owner) can deduct 36% of renovation-related costs (structural improvements aimed at energy saving) from their income tax (up to 48,000 euro in ten years). In 2012 the rate of fiscal deduction was raised to 50% of costs (up to 96,000 euro in ten years). During the period 1998-2016, the cost for the Italian Government due to the provision of tax incentives (in the form of tax deductions) was approximately 108.7 billion euro, while the revenue was approximately 89.8 billion of euro. The final balance is therefore negative: generating a loss of 18.9 billion euros (almost 1 billion euro per year), the incentives have proved to be excessively expensive and not cost effective (D'Alpaos and Bragolusi 2018).

Since 2007 a system of 65% tax deductions is in place for energy efficiency interventions in individual households' homes. This system is the most important and widely used incentive for energy retrofit (Magnani, Carrosio & Osti 2020). This kind of tool in support of the investments in the energy efficiency of the building stock was recently extended for the year 2020, with the budget law no. 160/2019 and the Decree n. 34/2020, so-called Relaunch Decree.

Redistributive policies direct retrofit interventions of the social housing stock. Roughly, half of social housing stock is classified as low energy efficiency (class E, F, G). This has clearly a negative impact on the quality of life and affordability for social housing households who represent the most vulnerable groups in society (Federcasa 2015). In the redistributive policy framework, the energy issue is used to enable wider functional interventions for urban regeneration. These interventions can find forms of financing through the structural funds of the European Union, although these types of interventions are marginal in Italy. Several local authorities in Italy have benefitted from EU funding for urban regeneration projects, for example the programmes URBAN I and II. These initiatives were co-financed through the European Regional Development Fund and the European Social Fund. Thanks to these funding programmes, it was possible to develop a National Operative Programme (Programma Operativo Nazionale - PON), known as "Città Metropolitane 2014 – 2020" (Metropolitan Cities 2014-2020). It amounts to 892 million euro divided as follows: 446 million euro European Regional Development Fund; 142 million euro European Social Fund; 304 million euro national co-financing. This programme aims to improve energy saving and the quality of housing conditions as well as to combat urban poverty.

7. Policy tools: implementation of the EU Green Deal

To comply with the goals of the EU Green Deal, Italy has launched the Fund Green New Deal as part of the budget law 2020 (L. 160/2019). The fund consists of about 4 billions euro (2020-2023) to spur green interventions through public-private initiatives. A part of this fund is meant to reduce GHG emissions, promote circular economy, reduce pollution etc. This fund provides the means to continue previous energy-related plans and policies.

Perhaps the most ambitious innovation to foster energy retrofit interventions in the housing stock is the so-called Superbonus 110%. As part of a strategy to boost local economies hit by the consequences of the Covid-19 pandemic, the system of tax deduction for energy efficiency renovation of the housing stock was made more attractive. Adding to other previous fiscal deduction systems, the law permits a fiscal deduction of up to 110% for energy-related expenses between 1st July 2020 and the end of 2022. Instead of benefitting from tax relief through a reduction in households' income revenue taxation, the beneficiary can now transfer the tax credit to the suppliers (housing constructors providing the renovation works) or the banks. The Superbonus is eligible for interventions promoted by condominiums, individual owners, public housing companies, housing cooperatives, third-sector associations for renovation works such as thermal insulation interventions on the casings, replacement of the winter air conditioning systems on the common parts, replacement of winter air conditioning systems on single-family buildings or on property units of functionally independent multi-family buildings and anti-seismic interventions. When one of these types of intervention is performed, one may decide to combine some additional works such as energy efficiency improvements, installation of photovoltaic systems or infrastructure for charging electric vehicles in buildings, and benefit from the tax deduction.

8. Conclusions, challenges, limitations, realism of plans for decarbonization

Despite significant financial and policy efforts centered around tax deductions, these kinds of incentives have had little structural impact on building retrofit and risk widening the socio-economic gap between households. Incentives were indeed used by many households as a means to modernize homes and often with partial and simple interventions (e.g. renew fixtures and furnaces) instead of global interventions that would be more expensive but also more effective in terms of reducing consumption and emissions. Sometimes, households refrain from adopting these measures as they perceive uncertainty about these benefits in the long-term. A key problem of tax-based energy retrofitting intervention is that a large part of the Italian population, especially the poorest households, cannot really benefit from this deduction system because of tax incapacity (i.e. when the income is too low to benefit from fiscal deduction). This means that those who most need energy retrofit interventions in their homes lack the financial means or conditions to renovate their homes. There is a risk that these policy tools reinforce inequality between more and less wealthy households. In addition, the risk of growing social inequalities goes hand-in-hand with a spatial dimension. Most investments in energy retrofitting are concentrated in Northern Italy, especially in North-East regions where the smaller scale of buildings makes it easier to intervene (Magnani, Carrosio & Osti 2020).

Another key point is that the current configuration of policy tools, regulations and incentives for housing decarbonization can be successful only in the context of flourishing construction and housing markets, which

is not the case in recent years. The most important tools, such as tax deductions and requirements for energy certificates, did not produce large scale benefits as the housing market has gone through a declining phase. It is harder to recognise energy performance as an added value of the property, justifying a higher price in the transaction, in times of economic constraints. Energy performance only influences the value of a property when there is a substantial change (e.g. passing from G rate to C rate can increase the value by 11% up). However, similar changes imply substantial financial investments.

Energy retrofitting has been pursued through market-based policy in a phase of decline of construction and the housing market resulting in a lack of structural and large scale impact. Policies could aim to incentivize a plurality of households to invest in renovation rather than individual households (Carrosio 2015). Both regulatory and persuasive policies are successful when households and businesses have opportunities to access credit and sufficient financial resources (Magnani, Carrosio & Osti 2020).

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Innovation in housing decarbonisation: Latvia

By Knut Höller

1. Structure of the Stock

The available housing stock in Latvia is rapidly ageing and depreciating. Dealing with the building stock is one of the most difficult issues of the country's further transition to a market economy. Achieving climate neutrality by 2050 in the building stock through energy refurbishment must be combined with solving some other fundamental issues, such as the availability of affordable and quality housing, thus encouraging residents to remain in and increasing their mobility within the country.

Approximately 1.4 million buildings with a total area of 206.56 million m² are registered in the country. Of all buildings 363,900 with a total area of 91.08 million m² are residential buildings. About 285,000 buildings are heated. The number of single-family houses is the largest; 309,900 (13,938 two-family houses), but by area this is only 17.6%. Multi-family buildings (three and more dwellings) represent the largest proportion of the total area (51.55 million m²) with 24.9%, although they represent only 2.81% (39,400) of the total building stock. Almost half (44%) of the residential buildings are in the capital Riga and its surroundings (Pieriga). In the very sparsely populated south-eastern region of Latgale bordering Russia and Belarus, the number of single-family houses is larger than in the Riga surroundings.

The number of non-residential buildings of around 1 million indicates that only 18.5% of all non-residential buildings are concentrated in Riga (about 74,000) and the other eight so-called large cities of Latvia (111,000). Of the non-residential buildings, only 108,000 are heated.

A large proportion (44,5%) of the multi-family buildings were built before 1941. Of these, more than 8,600 buildings have exterior walls made of wood. The constructions of the post-war years (1941-1960) were characterized by good quality and in the housing sector mainly brick buildings were built as part of the standardized Stalin-era projects.

1.1. Majority of outdated standardized multi-family buildings

Most of the buildings were built during the Soviet period and before 1992 (51%). The Soviet buildings were mostly built of industrial prefabricated construction in various typical building series, before the time when thermal requirements were significantly increased, thus, these buildings exhibit a very low level of energy efficiency.

In the period from the 1960s to the beginning of the 1990s, most of the various typical construction series were built (see picture 1). Clay bricks, aerated concrete and claydite concrete are materials widely used in external walls. Later, several special projects were carried out, and construction of reinforced concrete and claydite concrete large-panel buildings predominated.

The Association of Management and Administration of Latvian Housing (AMALH), the largest and most experienced interest group of municipal and private housing management companies, points out that the originally projected lifespan of some construction series has already been reached. The type buildings typical of the 1950s and 1960s, the so-called 'Khrushchyovkas' and 'Brezhnevkas' are technically and morally worn out. Most of the other building types will follow in this decade and the next. So far, this issue, which affects a large proportion of homeowners, has not been sufficiently addressed in terms of building physics, economics and social consequences, and appropriate strategies for dealing with it have not been developed.[1]

After gaining independence in 1991, the construction rate for new homes of the socialist era was never reached again. Only about 10% of all residential buildings were built after 2003. Of the multi-family buildings, only 3% were newly built after 2003 (4.4% after 1993). Only buildings constructed after 2015 meet the currently valid thermal requirements, and buildings constructed between 2003 and 2015 come close to meeting them.

2. Socio-demographic issues

2.1. Low population density

Population density in Latvia at the beginning of 2018 was 30 persons per km2.

The area of Latvia is 64,600 km², which is practically equivalent to the total area of 5 smaller EU countries – Belgium, Slovenia, Luxembourg, Cyprus and Malta – 63,100 km². At the same time, the population of Latvia in 2017 was 1.95 million, while the total population of Belgium, Slovenia, Luxembourg, Cyprus, and Malta was 15.32 million. The number of inhabitants in Latvia is roughly equivalent to that of the cities of Hamburg or Vienna.

By 2050, a further population decline to 1.4 million inhabitants is forecast.

After Latvia's independence, the housing market changed radically and has remained in an unstable and deformed state for about 30 years.

2.2. Deformed housing market: homeowners predominate, rental relationships mainly in the shadow market

Like many former Communist countries in Central and Eastern Europe, home ownership is by far the dominant tenure in the Latvian

[1] https://www.la.lv/sola-nodoklu-atlaides-tiem-iedzivotajiem-kuri-pasi-izremontes-savu-daudzdzivoklu-naumu (assessed on 14.2.2021).

housing market. The privatisation of the housing stock in the 1990s had the result that just over 7 out of 10 Latvian households live in housing that is owned outright (e. g. without an outstanding mortgage or housing loan), which is well above the OECD average of just under 43%. Fewer than 9% of Latvian households live in owner-occupied housing with a mortgage, which in turn is significantly lower than the OECD average of almost 25%.

Meanwhile, Latvia's rental market, consisting of both private and subsidised rentals, is very small from an international perspective, representing around 12% of all household tenures; the rental housing makes up on average 28% of housing tenures in the OECD. There is, by extension, a sizeable "shadow" rental market in Latvia, though there are no data to indicate the size of this segment of the market. Lithuania, the Slovak Republic, Hungary, Poland, Slovenia and Estonia have a broadly similar housing tenure structure. With a share of 0.4% of the total housing stock in 2016, Latvia has the smallest social housing stock in the EU (on average 8%). There are currently 7,000 people waiting for housing.

2.3. Housing situation often difficult and in poor technical condition

At the request of the Latvian government, the OECD analysed the Latvian housing market in 2019 and 2020 and made recommendations for an affordable housing policy.

Latvian households currently do not spend much on housing costs on average. Expenditure on housing and utilities is around 21% of the final consumption in Latvia and compares to the OECD average of around 23%. However, the low spending masks another challenge: poor housing quality. In many cases basic sanitation facilities in 2017 are missing. In addition, some 15% of Latvian households suffer from "severe housing deprivation". Eurostat[2] defines severe housing deprivation as living in a dwelling with overcrowded conditions in addition to at least one of the following housing deprivation measures: leaking roof, no bath/shower and no indoor toilet, or a dwelling considered too dark. OECD countries with a high rate of severe housing deprivation tend to be dominated by homeowners. In Latvia, nearly 60% of the "severely deprived population are homeowners, 25% are renters, either in the private market or in subsidised housing.

2.4. Lack of affordable housing limits society

There is another challenge that is not immediately obvious from the typical housing affordability indices: Most Latvians cannot afford a mortgage to buy a home – meaning that many renters cannot afford to become homeowners, and many homeowners cannot afford to move. Across the country, fewer than half of Latvian households could afford a new mortgage on a 50 m^2 apartment, while only one third could afford a mortgage on a 75 m^2 apartment. The OECD calls this group the so-called "missing middle" households and sees them facing the following challenges: "The first is that the housing market lacks affordable rental housing alternatives that would typically be available to lower- and lower-middle income households who may not be able to afford a mortgage to purchase a home. The second is that the large share of homeowners (who are ineligible for existing housing support) live in housing of poor quality and are not able to afford the costs associated with maintenance or upgrades.", (OECD 2020, p.51). This results in a situation where around 44% of all households (= 1/3 of population) are too rich to qualify for social housing and the housing benefit, and too poor to afford a mortgage.

As a result, the Latvian government is currently working on the issue of housing affordability, planning various programs to increase the supply of affordable housing and completing a reform of the outdated tenancy laws.

Another issue related to population decline and internal population migration from the provinces to the Riga metropolitan region is the vacancy rate of flats. The Housing and Population Census 2011[3] found another factor influencing the structure of the housing stock. One in five dwellings has no permanent occupant and is unoccupied. One challenge will therefore remain: how to deal with housing stock that is no longer needed and who bears the costs for its removal.

3. Governmental targets on housing decarbonisation

Latvia's medium- and long-term climatic objectives are presented in the "National Energy and Climate Plan 2021-2030" (NECP), that also contains the information on the housing stock and decarbonisation. This document is currently considered more important than the "Long-term strategy for the renovation of buidlings" (LTRS). Both documents were submitted to the EU Commission in 2020. The goals to be achieved in the new EU funding period 2021-2027 are included in the "National Development Plan of Latvia for 2021-2027" (NAP2027).

Latvia intends to achieve climate neutrality by 2050.

Policies and measures, described in the NECP, are mainly focused on the transport and building sectors, as well as in the heating and cooling sector. The implementation of these measures will largely depend on available EU funds, as has been the case over the past decade. This dependency so defined brings some uncertainty into national planning and the respective subordinate documents.

In terms of energy efficiency of buildings, Latvia plans to improve the energy efficiency of the entire residential building stock. For buildings, an average heat consumption for heat supply of 120 kWh/m^2/year in 2030 is foreseen. Explicit renovation targets (NECP) are in particular, refurbishment of at least 2000 apartment buildings and at least 5000 single-family buildings by 2030.

Even though the number of multi-family buildings renovated annually has been lower so far, and renovation of private single-family houses has only recently been supported at all, this seems realistic. However, this will not be enough to decarbonise the building stock by 2050, and it does not adequately reflect the energy saving potential of the building sector in Latvia.

It is assumed that by 2050, due to the age and depreciation of the stock, 30% of the residential buildings will no longer be fit for refurbishment. The LTRS and other documents indicate that 30% of the building stock is to be renovated per decade.

The necessary investments for all types of buildings by 2050, depending on their area, ranging from 200 to EUR 400/m², considering current construction costs, amount to ~EUR 19 billion. Table 1 shows the financing gap for residential buildings.

[2] https://ec.europa.eu/eurostat/statistics-explained/index.php/EU_statistics_on_income_and_living_conditions_%28EU-SILC%29_methodology_-_housing_deprivation (assessed on 14.02.2020)

[3] https://www.csb.gov.lv/en/statistics/statistics-by-theme/population/census/search-in-theme/1335-housing-and-population-census-2011-data-housings (assessed on 14.2.2021)

TABLE 1 Funding gap for apartment buildings

TOTAL FUNDING GAP FOR RESIDENTIAL APARTMENT BUILDINGS	
Variables	**Values**
Total number and area of apartment buildings	38,600 54.4 million m²
Number and area of apartment houses where it is possible to carry out cost-effective recovery	27,000 37.8 million m²
Cost of energy efficiency improvements and other emergency renovation works in EUR/m²	EUR 200/m²
Total financial need	EUR 7.54 billion
Proportion of houses potentially interested in energy efficiency measures	60%
Total investment cost (actual financing needed)	EUR 4.52 billion (60% of EUR 7.54 billion)
Potential funding required over 10 years	EUR 1.5 billion (1/3 of total investment)

Source: LTRS

For the approach to energy retrofitting, the Latvian government has defined a cost-effective approach based on Article 5 of the European Directive on the Performance of Buildings (EPBD) Directive 2010/31/EU. In practice, this means that 60-70% of Latvia's housing stock can be renovated in a cost-effective way. This is approximately 25-27,000 multi-family buildings or about 37 million m².

The NAP2027 plans improvements to the energy efficiency of 40,000 flats for the current funding period, which corresponds to approximately 800 apartment buildings (assuming a flat size of 50m²). This would result in renovation of 2 million m² in total. It is also planned that 10,000 new apartments will be built each year by 2027 within the framework of the plan.

Furthermore, considering that according to surveys 60% of the flat owners are interested in refurbishment with EU co-financing, 4,860 apartment buildings can be set as the primary target (30% per decade corresponds to 8,100 apartment buildings).

To achieve this primary goal, investments of EUR 1.5 billion would be necessary. In the NAP2027, 163,125 million EUR are indicativly foreseen as available for the renovation of residential buildings. Combined with the same amount of commercial loans, this would result in a financing budget of EUR 326 million.

The 10-year financing gaps for private houses (EUR 1.54 billion) and municipal buildings (1.63 billion) in addition to the technical and socio-economic challenges, also affect Latvian society.

Latvian citizens cannot rely of an institutionalized housing sector due to mass privatization. Dealing with this situation will occupy society for many years to come and makes the challenges of decarbonisation of the building sector seem both an opportunity and a curse. Although it has so far not been considered, the need to consider urban neighborhoods in their entirety and to develop suitable concepts for them comes into play here, both for reasons of decarbonisation and for socio-economic reasons.

4. Refurbishment rate

As a result of the mass privatisation of housing, the management, care, and maintenance of housing in the country also had to be reorganised. In this protracted process from the mid-1990s to the mid-2000s, relatively little was invested in the renovation of multi-family buildings. The fragmented ownership structure did not allow for holistic renovations and the owners mainly implemented individual measures, especially the replacement of windows and flat entrance doors. In many cases, this did not significantly improve the energy situation, and these measures were often accompanied by additional structural problems, such as mould.

State support in a noticeable and continuous approach for more energy efficiency in residential buildings started in Latvia only after accession to the EU in 2004. The EU opened the EU structural funds due to the complicated situation in the new member states because of the mass privatisation of the housing stock and thus made it possible to finance energy-efficient renovations in apartment buildings. For Latvia, this meant ending years of reluctance to support homeowners and of paying more attention to the issue of energy efficiency of buildings.

In the first financing period from 2007 to 2013, a first state support program for the refurbishment of multi-family buildings was launched. After several years of preparation for the program, the Latvian Investment and Development Agency (LIAA) finally coordinated the first funding program, which was officially regarded as a first start, so as not to set expectations too high either. Of the planned funding of EUR 77.8 million, EUR 63.2 million could be used during the funding period. Of 1,365 project applications submitted, 741 buildings were renovated. The investment costs of the completed projects amounted to EUR 149.7 million.

In the following structural fund funding period from 2014 to 2020, the state financing institute ALTUM, established in 2013, took over coordination of the funding program for energy efficiency in residential buildings. The submission of projects was launched in September 2016 and these will be implemented by 31 December 2022. An application for 989 projects for an indicative amount of EUR 420 million has been submitted throughout Latvia since the beginning of the program in spring 2016. Within the framework of the measure, construction works have been completed in 264 houses, there are 51 multi-apartment houses in the renovation process, while the other projects submitted are at different stages in the preparation of the project. The Latvian government recently allocated an additional 35 million EUR budget for the renovation of apartment buildings which will cover the potential gap between the funding periods, and some 138 additional buildings will be renovated.

Consequently, the renovation rate in Latvia is very low despite these efforts. Only about 1,000 apartment buildings have been comprehensively renovated since Latvia's independence and, as can be seen here, mainly only after 2009. The renovation rate in the last ten years was therefore around 2.5%, with large annual fluctuations due to the discontinuous provision of subsidies. The annual refurbishment rate is therefore far below 1% and its increase remains a very big challenge for Latvia in the coming years and decades.

As mentioned above, Latvia has set a target to renovate 2000 residential buildings in ten years (2021-2030) and this corresponds to a renovation rate of 5.2% (= 0.52% annually for 38,600 or 0.74% of 27,000 buildings).

The term of "refurbishment rate" is defined in the NAP2027 for the first time ever as a new indicator for which there is no data yet that allows setting a baseline and target values. For the base year 2021, the target values for 2024 are 2% and for 2027 3% as the share of renewed housing compared to total housing numbers per year.

A 'renovation wave' for the country is hugely important economically. This sector clearly requires more attention than before, including a more precise definition of the renovation rate to be achieved.

PICTURE 1

A typical 104 series apartment building from the 1970s before and after refurbishment (more than 60% energy saving). The building in Jelgava was one of the first buildings to undergo complex refurbishment and received the award in the "The Best Energy Efficient Building in Latvia" competition in 2010.

5. Energy efficiency standards

The energy consumption of the building sector (households) accounts for up to 30% of the total energy sector, so the building sector has significant potential for achieving overall energy efficiency targets. Most existing buildings have a high energy consumption and significantly lower thermal performance than can be provided by currently available technologies. Most of these buildings will be in operation for a considerable period, so a complex renovation of these buildings, improving their energy efficiency, is important. However, the existing depreciation of residential and non-residential buildings should also be emphasized. According to the data provided by the State Land Service, the total percentage depreciation of residential buildings is 38.9%, while the depreciation of non-residential buildings is 41%.

Latvian legislation took several years to replace Soviet building standards and gradually raise thermal standards. Only since 2015 have there been stricter requirements for the building envelope.

The Cabinet of Ministers Regulation on Energy Certification of Buildings (2013, amended 2015) introduced six energy efficiency classes and defines energy efficiency requirements for renovated buildings. Above the stated treshold level for heating (class F, above 150 kWh/m^2/year) buildings need energy performance improvement measures.

In April 2014 the requirements of the re-casted Directive 2010/31/EU have been included in the national Construction Standard. This is followed by the new Construction Standard (in force 2020). The new standard directly incorporates the energy performance requirements (in kWh/m2/year) for new and reconstructed/renovated buildings. In turn, the objective of the adjusted maximal U values is to eleminate the design of unsafe construction elements.

From 2021 onwards, newly constructed residential buildings must be nearly zero energy buildings and the allowed level of energy efficiency of apartment buildings that are renovated is ≤ 80 kWh/m^2/year (single-family houses ≤ 90). So far, Latvia has little practical experience with near zero-energy buildings, mostly in the form of pilot projects. This development is to be further supported with funding programmes. The benchmark for renovated buildings, on the other hand, does not seem very ambitious. In practice, higher savings have been achieved here in many cases, which make even lower target values seem realistic. If the average energy consumption was 165 kW/h/m^2/year, then it was on average 67% lower or 54 kWh/m^2/year after the refurbishment work.

Since 2010, the Law on the Management of Residiential Buildings has been in force in Latvia. Pursuant to Article 8 of the Law, a 'house file' shall be established for each residential building. The house file may be in hard or electronic form and includes, inter alia, technical documentation – technical passport (plans, schemes), project documentation, energy passport and energy plan, findings from a technical survey of the house, etc. Other information relevant to the administration and management of the residential building may be included in the house file.

There is also Cabinet Regulation No 907 of 28 September 2010 "On surveying, technical maintenance, current repairs and minimum requirements for energy efficiency of a residential house" which lays down minimum requirements for ensuring the energy efficiency of a residential building. Pursuant to this Regulation, the manager of a residential house is obliged to plan energy efficiency improvement measures if the average thermal energy consumption of the residential house exceeds the requirements laid down in this Regulation.

Especially in residential housing with its atomised ownership structure, the professional work of the administration manager and provider of maintenance services is very important. Admininistration managers have an increasingly important role to play in the planning and implementation of refurbishment projects. Latvia has taken this into account by introducing compulsory training for administrators and obilgatory qualifications, which is not yet common internationally.

6. Financing tools

The main financing instrument for energy refurbishment of residential buildings is a combination of subsidies and commercial loans. The subsidies consist of EU funds (majority, mostly 85%) and state budget funds. The available budgets are closely linked to the EU structural fund periods. This has so far periodically led to a certain discontinuity in the provision of funds and to a market standstill. As mentioned above, the state financing institute ALTUM is responsible for coordinating the state funding programme for the refurbishment of multi-family buildings and for providing the funding. The funding policy itself and the funding programme are the responsibility of the Ministry of Economy, while the Ministry of Environment and Regional Development is responsible for the public buildings.

It remains a major challenge for the Latvian government, in cooperation with commercial banks, to offer financing that motivates homeowners to make energy-efficient renovations.

Ideally, the financing of the refurbishment is possible through the saved energy costs and at the same time the subsidy share is reduced and thus a larger number of buildings are refurbished.

So far, the involvement of private actors, although one of the government's goals, in the refurbishment of multi-family buildings has not worked. The use of ESCOs, despite various efforts, has not been successful so far and obviously they are difficult to apply in housing retrofits.

In order to motivate homeowners to participate in the state subsidy programme for the renovation of multi-family buildings and to overcome the first and essential hurdle of the application, some municipalities promote the preparation of the necessary documents, such as the energy audit and the technical project. The co-financing can be up to 50% but not more than 1.75 EUR/m^2. Since the decision to renovate must be made by a majority of all homeowners together in a homeowners' meeting, this support is very important. Another instrument for the municipalities is the granting of tax allowances for owners in renovated buildings.

7. Policy tools

The instruments currently used and those that will be used in the future are a mix of investment support, regulation, information measures and the promotion of research and development.

The most important policy instrument in the housing sector is the use of EU funds together with state funds to encourage residents to take out (mainly commercial) loans to carry out complex energy efficient refurbishments. This instrument will remain the main driver for refurbishment and can be further optimised and adapted by the Ministry of Economy, the financial institution ALTUM, municipalities and social interest groups, e. g. gradually reduction of subsidies, extension of maturities etc.

The obligatory 'house files', which provide information on the condition of the buildings and are constantly updated, and certain safety measures, such as regular, legally prescribed checks of the heating and ventilation systems by the owners/owners' associations, can contribute to raising awareness among the owners.

A proven and successful tool is the campaign "Let's live warmer!" ("Dzīvo siltāk!") launched in 2010 by the Ministry of Economy when the first state support programme for the renovation of multi-family buildings started. The communication campaign, which was developed to promote energy efficiency in buildings in Latvia, also includes industry associations, companies, and experts. In addition to the administrative and organisational issues in respect of applying for projects and managing multi-family buildings, the information campaign also regularly informs people about quality standards, the technologies, and latest trends in building refurbishment. During the ten years of the campaign, several conferences, seminars, workshops, discussions, and publications were organised at national, regional and local levels. Two-way communication via social networks was established, enabling direct communication with citizens. The Ministry of Economy organised seminars, conferences, and various discussions, and participated in fairs and exhibitions. The success of the campaign can be measured by the steadily increasing number of project applications submitted for funding[4]. As part of the campaign, the competition "The Best Energy Efficiency Building"[5] has been held regularly since 2011, judging buildings renovated in the previous year.

8. Related measures

In addition to the renovation of that part of Latvia's housing stock that can be sustainably renovated, the availability of affordable housing and thus the construction of new apartments and the development of a rental housing market are a parallel major challenge for the country.

To expand the housing market on the supply side, more subsidies for attracting investors for new, energy-efficient (rental) homes are required and the long-term reform of the rental law must be completed. The Latvian government expects that once the obstacles in the rental market have been removed, around EUR 600 million will be invested annually in new and energy-efficient buildings. New buildings and renovations of social housing are also to be subsidized with state and municipal funds to support low-income people and people on the waiting lists for housing.

The funding and guarantee program for young families to improve access to residential property is to be geared more towards the purchase of energy-efficient apartments. With additional funding, more energy-efficient apartments are to be purchased than purchasing previously vacant apartments in the prefabricated buildings.

As part of the national development plan (NAP2027), the increase in the energy efficiency of private houses is to be considered for the first time. Both the legal and financial framework conditions must be created for this.

9. Conclusions, challenges, limitations, realism of plans for decarbonisation

The performance of Latvia in respect of housing decarbonisation is still modest in consideration of national targets as well as when compared to European indices, but is so far insufficient to meet the goal of net zero emissions by 2050.

Latvia continues to manage a heavy heritage that started 30 years ago with the mass privatization of poorly maintained and energy inefficient housing, which led to little progress in improving energy efficiency in buildings until recent times due to years of delay.

In the meantime, the basics have been laid for the mobilization of homeowners on the one hand and the practical implementation of building renovation by companies on the other. To achieve higher volumes and higher renovation rates together with a further deepening of renovation, the inclusion of renewable energy and innovations are necessary in the face of already emerging limitations of the capacity of the building sector. For example, the approach of serial refurbishment with prefabricated elements, which started in Estonia and is also spreading in some countries in Western Europe, would increase the renovation rate while at the same time providing opportunities for the local wood processing industry.

Together with improving access to affordable housing for the population, urban development could receive a new impetus. Integrated urban area development and solutions for buildings that can no longer be renovated and whose owners are abandoning them require optimized approaches that help to use scarce financial resources in a more targeted way.

[4] Map of completed projects: https://www.google.com/maps/d/u/0/edit?mid=zDrGv9JHde0k.k1y08oP1Ier4&ie=UTF8&oe=UTF8&msa=0&dg=feature (assessed on 14.2.2021).

[5] www.energoefektivakaeka.lv (assessed on 14.2.2021)

The inclusion of EU funds and the new possibilities offered by the EU Recovery Fund must be used even more consistently for national decarbonisation.

Ultimately, the national building renovation that is now necessary and can possibly give substantial and sustainable impetus to the domestic economy and to local growth.

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Innovations in decarbonisation: Netherlands

By Henk Visscher

1. Introduction

The Netherlands has 17.4 million inhabitants and 7.9 million dwellings. The population is still growing and households are getting smaller. There is a large shortage of suitable and affordable houses. The government wants to build 1 million new homes in the next 10 years. All new buildings will have to meet the nZEB standard. The existing building stock will have to contribute a major share of the realisation of the increasing climate ambitions. The existing stock still largely relies for heating on the Netherlands' own natural gas. Continuous earthquakes, due to gas extraction have forced the government to stop the gas production in a few years' time, which gave a big boost to the challenge of renovating the stock. In 2019 the Dutch government agreed together with all relevant stakeholder organisations on a new Climate Agreement. This agreement combines high ambitions for the reduction of CO_2 emissions with policies and measures to achieve these goals. In 2030 CO_2 emissions have to be reduced to 49% compared to 1990. By 2050 we aim to have a CO_2 emission free and energy neutral built environment. The existing housing stock plays a major role in the realisation of these goals. The majority of the stock has to be renovated to a nearly zero energy performance. In a few years' time we will have to speed up the renovation rate to 200,000 carbon-free renovations per year, a pace that is needed to make the entire stock of 6 million homes carbon free in the remaining years up to 2050. To support these goals a large innovation program has been developed.

2. Sociodemographic issues

The Netherlands has a population of 17,482,000 (2021), this is roughly 3.3% of the total EU population. There are 7,998,000 households of which 3,080,000 are one person households: (38.5%). One- and two-person households comprise 69.6% of total households, representing a change in family structure which will shape consumption patterns and the future demand for housing. The population of the Netherlands grew at an annual average rate of 0.4% from 2005 to 2015, and in the recent years, the population has increased mainly through immigration. In past years the shortage of suitable and affordable housing has become a major problem. This is most severe for new entrants to the housing market. Currently most parties agree that the Netherlands will have to build about 1 million new dwellings in the next 10 years. This is a huge challenge given the fact that in past years a yearly building target of about 70,000 was barely achieved.

The nominal GDP of the country in 2015 was € 683.5 billion, and it has grown at an average annual rate of 2.3% from 2005 to 2015. The GDP per capita grew from 33,462 €/capita in 2005 to 40,439 €/capita by 2015, and the disposable income per capita grew at an average annual rate of 1.5% during the same period (Eurostat 2017, Cues Foundation, 2019).

3. Structure of the stock

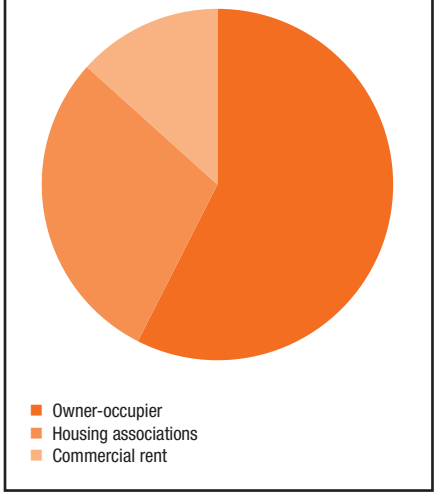
The majority of the Dutch building stock is in the residential sector (886 million m^2) which constitutes about 62% of the total floor area which was about 1430 million m^2 in 2015. The proportion of non-residential buildings is 38% of the total area which is relatively high as compared to other countries (Cues Foundation, 2019)

3.1. Ownership

In 2020 the total housing stock consisted of 7,856,000 dwellings. The largest proportion is owner-occupied (58%). The rest is commercial rent (13%) and not-for-profit rent (29%).

The not-for-profit rental dwellings are owned by housing associations. This sector could also be called social housing, but the status is different compared to many other countries. It is a broad sector and partly also available for middle- income households. The housing associations have a private status and their own decision-making power, but are governed by strong central laws. These laws determine the maximum rents and tenant allocation. Currently there are in total 296 associations varying in size between those owning less than 100 up to more than 77,000 dwellings. Over the past decades the number of associations has decreased continuously due to mergers. The larger associations have more possibilities to pursue policies of offering dwellings to a variety of tenant groups.

FIGURE 1 Ownership of the Dutch housing stock (CBS 2021)



The housing associations also play an important role in the Dutch strategy for the energy transition of the built environment. Because of their nature and mission, they can develop long term maintenance and renovations strategies. They mostly have numbers of residential buildings with similar typology and physical conditions which makes it possible to define larger renovation projects. It remains a

challenge to keep the rental costs as low as possible. Various renovation concepts have been developed for keeping the total housing costs (rent, services and energy) on the same level after an energy renovation. So, a large share of the renovation investments will have to be covered by a reduction on the service- and energy costs. For more substantial renovations that imply an increase of the rent the law requires the approval of at least 70% of the tenants of the building.

3.2. Housing Age

Roughly 48% of Dutch residential dwelling stock was built before 1970, after which date the growth in the building stock has been slowing (Figure 2). The average living area per capita in the Netherlands in 2008 was 56 m²/capita (Cues Foundation 2019). Whilst both the population and the number of households have been increasing, the housing supply is largely stagnating, causing an annual housing shortage, which is more pronounced in the urban centres of the country.

The age distribution of the residential building stock shows a large share of medium-old buildings, with about 65% of the heated floor area built between 1945 and 2000, stemming from the need for rapid reconstruction after the Second World War and meeting growing demand entailed by high economic growth and growing income per capita. Another 19% of the floor area was constructed before 1945.

The absence, and the still relatively low energy performance requirements of building regulations until the 1990s translates in a high proportion of very poorly insulated buildings.

The first thermal regulation in the Netherlands was introduced in the 1980s. The building standards have been continuously strengthened since 1990's. In 1996 the energy performance regulations were introduced, with the energy performance coefficient decreasing from 1.4 (1996) to 0.4 (2015). The 2015 standard was further tightened and the Dutch National Plan for nearly zero-energy buildings ambitiously aims for all new buildings to be nearly zero-energy (25kWh/m²) and gas-free by 2021 (BENG standard) (Cues Foundation, 2019)

4. Governmental targets on housing decarbonisation

The energy efficiency policies in the Netherlands are coordinated by the Ministry of Economic Affairs in collaboration with other ministries and are set out in the Environmental Management Act (Wet milieubeheer) and the National Energy Efficiency Action Plan (NEEAP). Since 2008, the country has relied on its Clean and Efficient Program (Schoon en Zuinig) and the Energy Transition Framework, which based the domestic energy policy of the Netherlands on the EU's 20-20-20 targets and framework. The 2011 Energy Report outlined the Netherlands's ambition to become more sustainable in its energy usage and thus transition to a low-carbon economy by 2050. On the basis of a coalition agreement (Building Bridges 2012), in 2013, the government along with other parties concluded an Energy Agreement (Energieakkoord) for sustainable growth, which aimed to double energy efficiency savings to 1.5% per year (or 100 petajoule's) by 2020 (Gerdes, 2015). Building upon the Energy Agreement, the Climate Agenda of 2013 affirmed the country's commitment to reducing CO_2 emissions by at least 40% by 2030 and by between 80% and 95% by 2050. These policies were succeeded by the current Climate Agreement of 2019, increasing the ambitions with higher goals and more far reaching policies, programmes and financial incentives (Cues Foundation, 2019)

FIGURE 2 Housing age (Cues Foundation 2019)

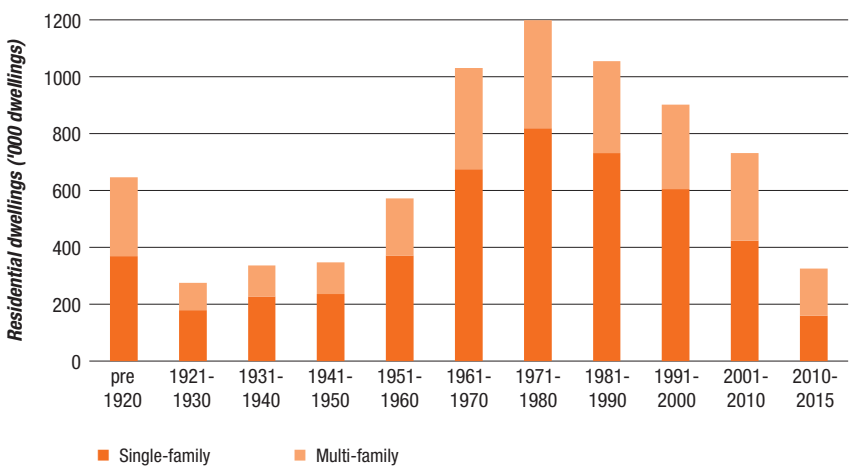
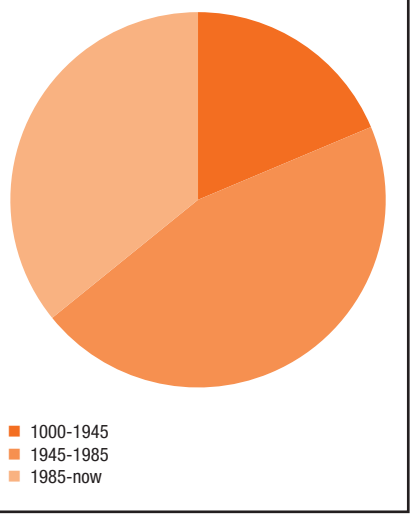


FIGURE 3 Housing age (CBS 2021)



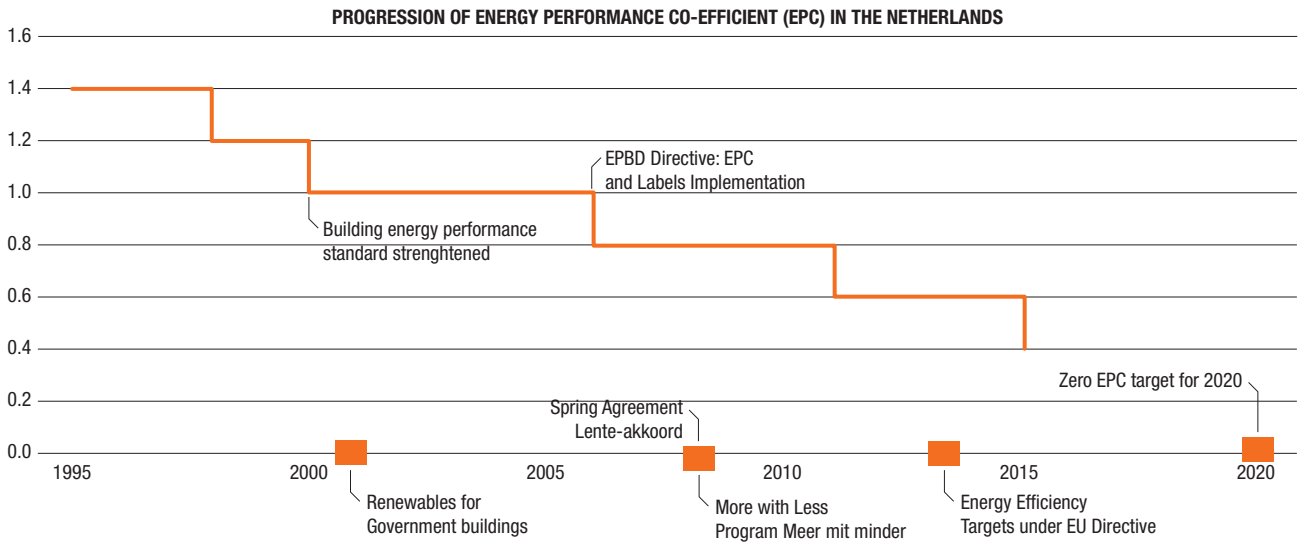
4.1. Building Standards

Building standards have become increasingly stringent since the 1990s, with the energy performance coefficient decreasing from 1.4 in 1996 to 0.4 in 2015 (Figure 4). The building codes for newly built houses were strengthened by 25% in 2011 and 50% in 2015 (compared to 2007 levels). The 2015 standard was further tightened to aim for a 50% reduction in energy usage in new buildings (compared to 2007 levels. In 2021 the nZEB requirement was implemented.

4.2. The NTA 8800

Following European regulation from the Energy Performance of Buildings Directive (EPBD) an improved calculation method for the energy performance of buildings was enforced in the Netherlands in 2020, the NTA 8800 (NEN 2018). This improved calculation method carries some major changes compared to the previous energy coefficient method. The most prominent the change from the old dimensionless coefficient, which is a building physiological calculation of the building-related energy demand, divided by a combination of floor area and building envelope area, to a new calculation standard, which is still a physiological calculation of the energy demand of a building, but divided only by the floor area, and therefore can be expressed in the dimension of kWh/m²/y. Underlying, also the physiological calculation of the energy demand of the building is

FIGURE 4 Development of energy standards in the Netherlands (Cues Foundation, 2019)



improved and updated with the latest insights regarding building (heating) services and physics.

5. Improvement of the energy performance of the building stock

Continuous policies, programmes and incentives in the past two decades have had an impact on the improvement of the energy performance of the existing stock. This had its effect on the social as well on the private sector. This is caused by a combination of adding new better performing buildings and demolishing old ones and by renovation of the existing stock. The most common measures to improve the energy performance were replacements of old inefficient gas boilers by more efficient ones, replacing single by double glazing and various insulation measures.

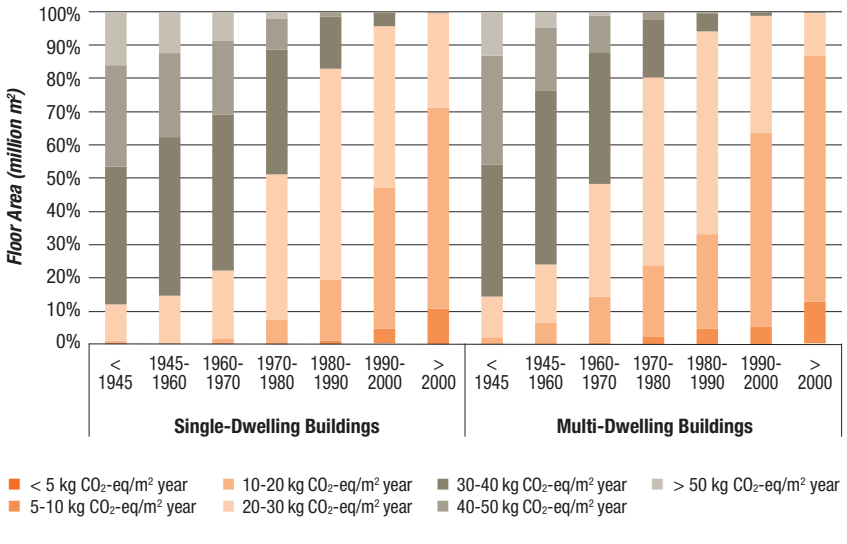
Figure 5 illustrates the carbon efficiency of the stock in terms of its GHG intensity. The effect of the building code on more energy efficient new buildings can be seen clearly. In recent years, especially after 2000, the shares of low carbon buildings have been visibly increased. Figure 6 illustrates the distribution of final energy demand of the Dutch housing stock, which, like Figure 5, reveals a clear trend towards new, more energy-efficient buildings. Some effects of the renovation efforts are, however, visible in the percentage of buildings built before 1980 with an energy demand of less than 100 kWh/m² year.

The effects of Dutch renovation programs are observable in both the single-dwelling and multi-dwelling building stock, since there are small percentages of low-carbon buildings in the buildings from older construction periods. So far, however, the applied retrofit measures have often only targeted single components (e.g., roof insulation, window replacement) instead of a comprehensive retrofit, leading to only marginal improvements in the efficiency of the building.

Since the EPBD was implemented in the Netherlands in 2008, the energy performance of the existing housing stock is being regulated through EPCs. Currently, around 2.9 million dwellings have an EPC, the majority belonging to the rental sector, and the average EPC rating in 2015 was a C (Figure 7). It is not regulated but is a means of communication. The labels only give insight into the performance of the building, without any mandatory implications to improve a building

The umbrella organization for the housing associations, Aedes, agreed in 2009 with the Government and the national tenant organization on a covenant to improve the energy performance of their stock. They defined the task so as to reach an average label B in 2021.

FIGURE 5 GHG-intensity of the building stock in 2018 according to building age and building type (Cues Foundation, 2019)



To be able to monitor the progress a large data base of the stock was developed. This is called the SHAERE data base. All housing associations have had energy performance certificates (energy labels) for all their dwellings since about 2010 and all relevant data in their own data bases. All improvements and changes to the stock are continuously implemented in the databases. Every year AEDES collects the updated data of all housing associations. This generates an overview of approximately 2 million dwellings. Since 2010 Aedes has published the progress of the energy index (this is the average coefficient of the EPC's) and thus shows the progress in renovation. Figure 8 shows the development of the index. In 2015 the calculation method changed. The yearly progress is clear and the agreed target was nearly realized in 2021. A deeper analysis of the data makes clear that the improvement per dwelling was mostly limited to a few measures. Deep renovations have been scarce so far (Van der Bent, 2021).

6. Energy performance labels versus actual energy use

Besides the physical characteristics of a dwelling that determine energy labels, the actual domestic energy use is largely influenced by the use and behaviour of the tenants. The dwellings with the worst EPC (G) in practice use far less energy than expected, while the most advanced dwellings (A) use much more. This is probably due to a combination of the rebound effect and an increase in comfort level of the dwellings (Majcen 2013a, 2013b, 2015) and underperformance of the buildings and installations. The large difference between theory and practice is called the performance gap and is recognised in more and more international studies. In a research project by Majcen (2013a, 2013b) the actual energy consumption was compared with the theoretical use according to the EPC's (Figure 8).

This research was first based on the Dutch energy labels issued in 2010 – a total of over 340,000 cases with 43 variables (regarding building location and technical characteristics, the properties of the label itself etc.). This data set was derived from the publicly available database of the EPCs. This data was, on the basis of the addresses of the households, linked to actual energy use data. The energy data was provided by the CBS (Statistics Netherlands), which collected this data from the energy companies. The combined data file was then cleaned by deleting incomplete or obviously incorrect EPCs. This resulted in 193,856 usable cases. This still large sample

FIGURE 6 Specific final energy demand distribution for heating, hot water, and ventilation of the building stock in 2018 according to building age and building type (Cues Foundation, 2019)

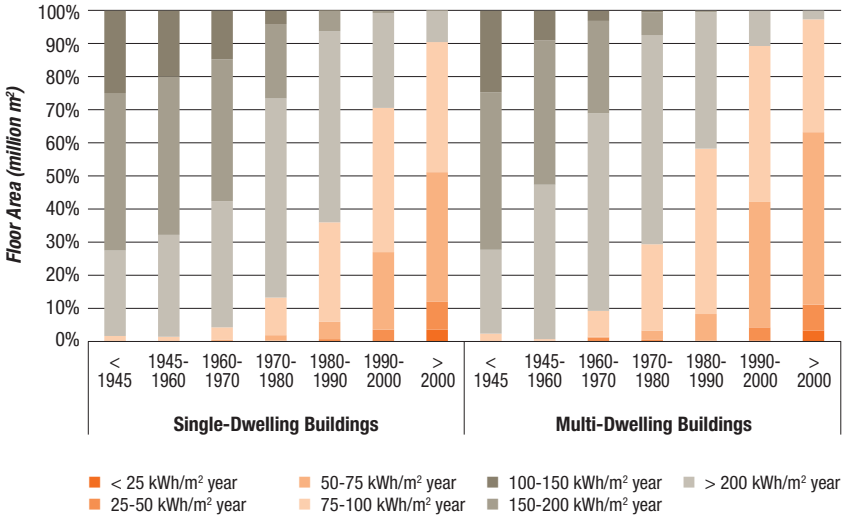


FIGURE 7 Energy labels by year of construction, Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2016

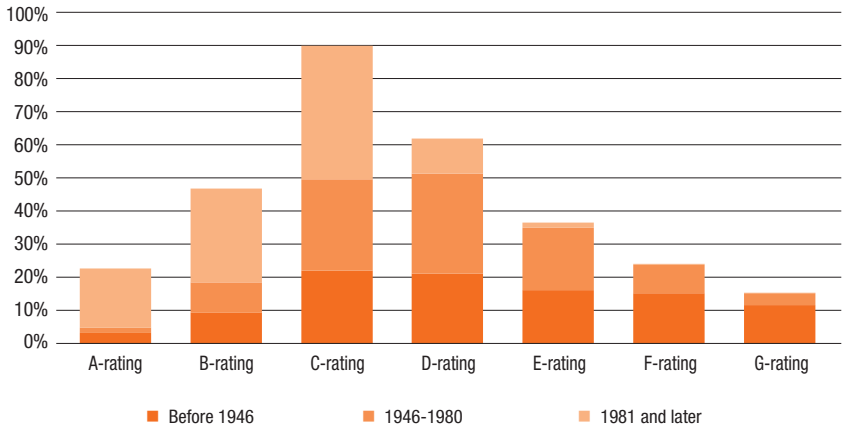


FIGURE 8 Development of average Energy Index of the social housing stock 2015-2020, Van der Bent, 2021

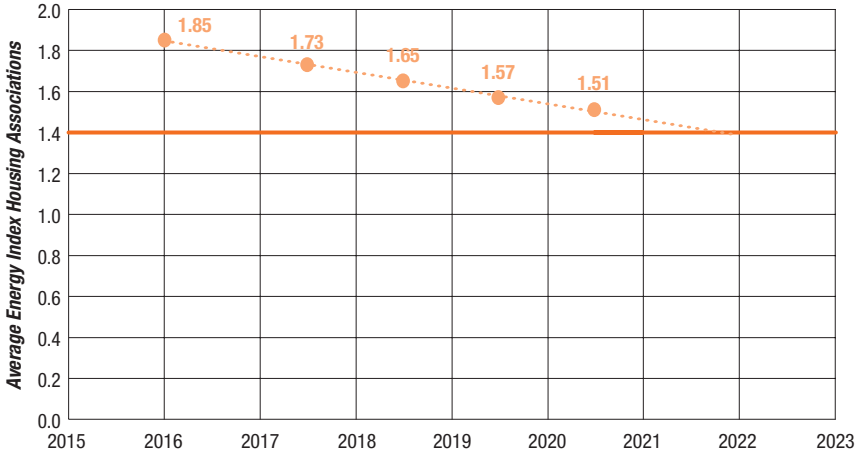
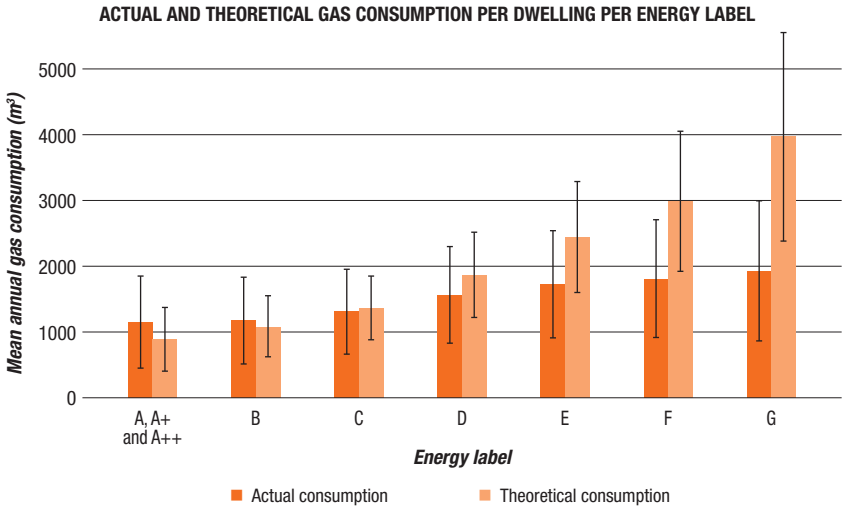


FIGURE 9 Actual and theoretical gas consumption in Dutch dwellings – per m² dwelling area (Majcen 2013a)



proved to be representative for all housing types and energy label classes. Later the research was expanded with the data of SHAERE of about 2 million dwellings of the housing associations. Also, for these houses the labels were related to real energy use and the same findings came out.

To understand how the energy label relates to the discrepancies, the gas and electricity consumption in various label categories were examined and analysed. The actual and theoretical gas use per dwelling was compared and then analysed per m² of dwelling. Little difference exists between the actual and theoretical energy use calculated per dwellings and per m², except the difference in actual gas use between label A and label B. At the level of individual dwellings, the actual consumption was identical, but at the level of m2 the dwellings in category A use less gas than dwellings in category B. This may relate directly to the fact that dwellings in label category A were found to be considerably larger than all other dwellings. From these figures it is clear that although better labels lead to higher actual gas consumption, there is a clear difference between the mean theoretical and mean actual gas consumption for each label. For the most energy-efficient categories (A, A+ and A++) and for category B, Figure 8 shows that the theoretical calculation underestimated the actual annual gas consumption. This is in contrast to the rest of the categories for which the theoretical calculation largely overestimated the actual annual gas consumption. This research indicates that the energy label has some predictive power for the actual gas consumption. However, according to the labels, dwellings in a better label category should use on average significantly less gas than dwellings with poorer labels, which is not the case. This finding also has a major impact on the way the improvement policies for energy use in the housing stock are formulated and what can be expected from the renovations.

7. The Climate Agreement

7.1. The Agreement

In 2017 the new Dutch government set some ambitious goals to meet the Paris agreement target of limiting the global heating to a maximum of 1.5 degrees Celsius. To operationalise the goals the government installed some 'round tables' with many stakeholder groups to negotiate a new national Climate Agreement. By June 2019 the Agreement was a fact and it contains many detailed goals, policies and regulations to achieve the goals (Rijksoverheid, 2019)

In the 1960's natural gas was discovered in the northern province Groningen and it was heavily exploited in the Netherlands. Ever since then, most Dutch houses and other buildings were heated by this cheap gas. From 2010 however, earthquakes started to happen in Groningen and geological investigations proved a direct causal relation with the extraction of gas from the earth. Since then, the earthquakes have appeared more and more often and become stronger, causing cracks in the houses and creating unsafe situations. The pressure on the government to reduce the extraction of the gas, increased. Today, production is already much reduced. A few years ago, the government decided to completely stop the gas extraction in 2030 and a bit later this was brought forward to 2023. The gas from Groningen has a different caloric composition than e.g., Norwegian or Russian gas and the existing heaters in Dutch homes cannot use that other gas. So, besides the climate argument, also the simple fact that Dutch houses have to find another energy source is a very strong argument for the energy transition in the housing stock. The foreseeable solutions are either connecting the houses to new to be developed district heating networks, with heat from e.g. a power plant or industry park (or biofuels), or use heat from geothermal sources, find alternative gas solutions (bio gas, hydrogen), or go to all-electric solutions with heat pumps. The all-electric solution is only useful if the house is very well insulated. Renovation solutions for such concepts are available, but so far too expensive to be cost effective.

According to the Climate Agreement, CO_2 emissions have to be reduced to 49% in 2030 compared to 1990. In 2050 we should have a CO_2 emission free and energy neutral built environment. The existing housing stock plays a major role in the realisation of these goals. The Dutch housing stock comprises of 7.5 million dwellings. The majority of these have a rather poor thermal energy rating and are mainly heated by natural gas. By 2021 yearly more than 50,000 new-build homes per year should be delivered with nZEB and without a natural gas connection and at least 50,000 existing dwellings should be made gas-free per year. These are steps towards 200,000 zero carbon renovations per year to be reached in a few years from now, a pace that is needed to make the entire stock carbon free in the 30 years up to 2050.

In order to make the challenge manageable, the built environment sector proposed a phased and programmatic approach, on the one hand working on an intensive start and on the other hand on the conditions for innovations and later up-scaling and rollout. It is important that supply parties quickly learn, through, among other things, the so called 'Starter motor' projects (projects of housing associations with subsidies to make the investments budget neutral), how to (more) efficiently make large numbers of homes more sustainable. In this phase it will mainly be done by connecting houses to district heating networks. Another initiative is called the 'Renovation Speed-Up' programme. This is a subsidy programme to stimulate larger projects (streams) of home renovations. Several housing

associations combine houses with similar typology in large tenders. The lessons from this first larger bundled demand offers opportunities for technical and organizational innovations. This allows providers to develop a more efficient and cheaper offer. Clients gain experience with tending larger numbers of renovations. These are necessary conditions for actual up-scaling. There will have to be broad experience with what is cost-effective and practically feasible in different situations, before tackling scaling up and being able to roll out on a large scale. That also gives time to work out the conditions for later scaling up and careful deployment.

For homes, the approach is a combination of persuasion and direction through the 'Neighbourhood-oriented approach'. Building owners can also be tempted at an individual level to renovate. This approach succeeds if sustainability can be recouped through the (decreased) energy bill. In order to finance these investments through energy saving and lower energy costs and make them affordable, much innovation and cost reduction is still required. That is why they will be initiated with experiments and with an innovation program to systematically learn and experiment, so that after some years a cost-effective up-scaling and roll out can take place. The conditions for up-scaling, innovation, greater efficiency and cost reduction will be realized by, making funding available and making proposals for subsidies for building-related measures, infrastructure and sustainable sources through pricing and subsidizing. This involves a slider in the energy tax, which stimulates investments in sustainability and attractive financing methods, which means that investments can receive a return. Further incentives and perspectives for action are offered by making known through standardization which (final) condition buildings have to achieve in order to be able to be heated without natural gas in the future.

To summarize: A broad spectrum of policies, measures and financial support will be applied to boost the renovation of homes. In the first years this won't be cost effective, but because of innovations and up-scaling the cost should be reduced to a cost-effective level. By then regulations and financial arrangements will more or less force all homeowners to take part in the renovation programme.

7.2. Insulation standard

The new Climate Agreement also proposes the development of a new standard to better facilitate and to force the renovation to achieve fossil-fuel free houses. The ideas for this new standard are proposed as follows: It is possible to determine a 'sensible' sustainability renovation option for dominant or characteristic types of housing in the Netherlands, based on cost benefits and desired reduction of heat demand. A so-called 'regret-free' refurbishment with which the building owner is assured that several times within the technical lifespan a radical adaptation to the same building parts is not necessary, in anticipation of the alternative to natural gas that is chosen in the neighbourhood-oriented approach. This standard is formulated at the level of the entire house (net heat demand in kWh/m^2/year, following the NTA8800 determination method). By determining the standard, the sensitivity of the standard for the (later) definitive choice of the heat alternative is explored. Not everyone will be able to renovate the whole house. For renovations, where only one or a few building parts are being tackled (such as roof, façade, floor), target values are given for insulation (in Rc, or U values) and required ventilation. But the standard is defined for the entire house yo which the target values for building parts contribute to this. It was announced that the standard and the target values would be set no later than 1 July 2019, but they are currently still being developed. The standard can be considered as one of the inputs for the guidance and therefore for choosing the most suitable heat source for a district. The 'regret-free' standard is a means to achieve the intended purpose of a low-carbon built environment. The intended standard for the existing buildings will not be mandatory for owner-occupiers in the early years, but provides interpretation about the desired energy performance of existing homes in advance of the neighbourhood-oriented approach. In 2025, the standard will be evaluated on the basis of criteria to be determined, in conjunction with other instruments and the neighbourhood-oriented approach. After that, the standard can be tightened up if necessary and backed by better support, or it can be made binding.

Unlike owner-occupiers, tenants do not have the freedom to decide for themselves how their houses will be adapted to meet the minimum requirements imposed on the dwelling from the alternative heat source. In order to give landlords a perspective for action and to protect tenants against high energy costs, the standard to be achieved by 2050 is therefore mandatory for homes intended for letting. The obligation for landlords does not mean that they disproportionately share in collective costs (volatility risk). Landlords are responsible for adapting a home, so that it meets the standard at the time that the housing is connected to the new infrastructure via the neighbourhood-oriented approach. Tenants will lend their cooperation to the necessary adjustments to prevent them or subsequent tenants from being left out in the cold or suffering very high energy costs. In order to optimally inform homeowners of all options to renovate their homes, validated information on sustainability measures and the accompanying indicative energy savings and investment profiles were planned to be provided on a website. This is linked to financing and subsidy opportunities.

8. Conclusions, challenges, limitations, reality of plans for decarbonisation

The Netherlands still has a huge challenge to realise the EU and Dutch climate goals for 2030 and 2050. The existing stock will have to contribute significantly to the goals and will have to go through a major transition. At the moment the majority of the stock is still heated by natural gas which has to be replaced by (sustainable) district heating, geothermal heating or via all-electric solutions with heat pumps. The renovation and improvement of the insulation of 200,000 existing dwellings per year in a few years' time is currently still far out of reach. It will require major technical and social innovations to increase the performance of the technologies, increase the productivity of the construction sector through digitalisation and industrialisation (prefab) and reduce the costs.

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Innovation in housing decarbonisation: Spain

↳ By Josep Casas Miralles and Corné Koppelaar

1. Introduction. Structure of the stock: brief analysis, significance of social housing

Spain has a population of just under 47 million inhabitants. There are 18,625,000 households which means that the average size of a household is 2.50 persons (Instituto Nacional de Estadistica, 2019).

As in so many countries, the housing market in Spain exhibits high demand around the big cities whilst there is heavy depopulation in rural areas. This means that the housing market is unbalanced.

During the 1960s in Spain the rate of homeownership rose steadily. Over these years, renting became relegated to those who could not afford to purchase a home and was only considered an option of choice for very specific life-events or social groups, such as professionals requiring high labour mobility. By the 1990s, homeownership was not only a symbolic marker of a 'successful lifestyle package' but was a widespread reality across every social class. So much so that a 1991 national survey showed that the rate of homeownership for working-class households was even higher than that of professionals (Nayla Fuster, 2018). In 2005 the proportion of homeowners in Spain was above 80%. (Matea, 2019)

The trend in the last 15 years has been for a gradual increase in the proportion of rental homes. From 2005 until 2018 the different types of rental tenures have increased from 19.4% to 23.9% of the total housing stock (Matea, 2019). Most of the rental stock is available in the private rental market at 14.8% of the housing stock in 2018 whilst public rental housing amounts for 2.7% of the stock. The usufruct (normally for free) of dwellings completes the tenures summed up under the heading of "rental" housing, some 6.4% of dwellings fall under this category. Just over 3 million dwellings fall within the "rental" regimes.

Compared to other European countries, the rental stock in Spain is limited. However, during the past years a revival of the rental sector has been noticeable. Certain specific groups of the population are increasingly interested in rental housing: young people, immigrants, people with temporary employment contracts, etc. Rental housing is noticeably more popular in high density urban areas (Barcelona, Madrid).

The precarious household income of certain groups of the population, high unemployment, the fixed-term character of employment contracts and the increased practice of part-time employment all have contributed to more demand for rental housing.

2. Socio-demographic issues: brief analysis, who is living in which housing segments?

The Spanish housing stock increased significantly over the last decade, with an estimated increase of 885,000 dwellings compared to 2009. The housing stock has been estimated at approximately 25.8 million dwellings in 2019 (Statista Research Department, 2020). Of these dwellings there is an important number of secondary homes (holiday apartments). Recent estimates indicated that over 6.4 million dwellings are secondary residences. (MITMA, 2019)

According to Eurostat, Spain is the country in the European Community with the highest percentage of apartment blocks and, hence, the lowest proportion of single-family houses. The most recent data (from 2011) show us that over 75% of the total stock is multifamily housing. The reason for so much multifamily housing is related to budgetary constraints. It is believed that in wealthier countries with higher family incomes (UK, Belgium, the Netherlands, and France) the tendency towards single family housing prevailed. In these countries you typically will find between 65%-75% single family housing (European Commission, 2009). The second reason for a majority of multifamily homes is the high level of urban population. The migration from rural areas to the cities in the 1960´s and 1970´s encouraged the Government to produce high numbers of new dwellings and this was most easily achieved through the planning of multifamily housing estates.

According to the Instituto Nacional de Estadistica (INE), the population of Spain will keep growing over the next 15 years. It is estimated that by 2033 the population will have risen to just over 49 million people. The growth of the population is wholly driven by immigration since it is expected that the birth rate will be lower than the death rate over that period. By the end of the period, over 25% of the population will be older than 65 years. Another international tendency is confirmed in Spain; the number of one person families is increasing significantly. As a result, more and often smaller dwellings are required to house the same population.

3. Governmental targets for housing decarbonisation: reference to EU directives, significance in political debates

The main responsibilities of the Spanish Government in the transition towards a more sustainable future, are delegated to the Ministry of Ecological Transition and Demographic Challenges (MTERD) and the Ministry of Transport, Mobility, and the Urban Agenda (MITMA). Although these ministries have different competences, in respect of energy efficiency they share common objectives and strategies, especially in the built environment

TABLE 1 Historic information regeneration projects: number of buildings and floor space per type of intervention

Year	Total		Extension		Emptied		Foundation of building	Insulation of building	Facades of building	Number of commercial units refurbished
	Number of buildings	Floor space m² x 1.000	Number of buildings	Floor space m² x 1.000	Number of buildings	Floor space m² x 1.000				
2019	24,777	1,286	4,964	958	1,097	327	3,680	7,941	9,572	3,173
2018	27,736	1,686	6,430	1,106	1,467	582	4,004	9,067	9,760	3,516
2017	28,581	1,817	6,523	1,027	1,765	792	4,352	9,641	9,770	3,728
2016	28,156	1,358	6,851	1,024	1,412	333	4,299	9,673	9,182	4,185
2015	25,825	1,222	5,970	783	1,569	440	4,195	9,527	9,318	4,804
2014	26,136	1,183	6,029	927	1,367	255	4,167	9,955	8,797	5,143
2013	25,227	1,190	6,241	834	1,485	357	3,517	9,067	8,207	4,852
2012	29,154	1,522	7,358	1,059	1,834	462	4,499	10,285	9,543	5,739
2011	30,237	1,740	7,316	1,172	2,208	570	5,228	11,977	10,106	6,374
2010	31,910	2,761	8,826	2,203	1,936	557	5,111	12,460	10,982	6,043
2009	33,267	2,495	9,217	2,013	1,825	480	4,457	12,645	11,282	6,242

Source: Ministry of transport, mobility, and the urban agenda

that accounts for an important part of the total energy consumption in Spain.

The objectives in terms of decarbonization and energy efficiency have been set by the European directives that have been adopted by the Spanish Government in different plans and strategies. Some of these are supported by investment packages and economic incentives that are necessary to get them started. Among these plans we should highlight the integral plan for energy and climate 2021-2030 (PNIEC) that was developed by MTERD and that combines efforts by different stakeholders and sectors. The government considers the construction sector and the energetic regeneration of the existing building stock as key priorities causally related to the reduction of carbon emissions.

The main goals of this plan in respect of the existing building stock are:

- Thorough regeneration of the residential building stock: improving the thermal insulation of 1.2 million dwellings and the renovation of thermal installations (air conditioning and heating) for an average of 300,000 dwellings per annum. (Gobierno de España, 2020)
- Goals for the energy performance of public buildings. Energetic regeneration of the public building stock (both central and local government) with the objective of upgrading more than 3% of the stock per annum as recorded in Article 5 of the Directive of Energy Efficiency; 300,000 m² per annum (Gobierno de España, 2020).

TABLE 2 Number of building permits and budget for regeneration

Year	Number of buildings			Budget of works x 1.000		
	Total	Residential buildings	Buildings other use	Total	Residential buildings	Buildings other use
2020	21,575	18,019	3,556	1,648,609	960,802	687,807
2019	34,818	28,364	6,454	2,788,630	1,437,037	1,351,596
2018	32,962	25,963	6,999	2,279,879	1,212,931	1,066,947
2017	32,313	25,996	6,317	2,192,004	1,148,150	1,043,854
2016	31,615	25,880	5,735	2,053,283	1,129,327	923,956
2015	31,285	25,288	5,997	2,078,238	1,126,738	951,499

* including data until september 2020

Source: Ministry of Transport, Mobility, and the Urban Agenda

Together with this plan there has been elaborated a long-term strategy for the energetic regeneration of the building stock in Spain (ERESEE2020). This was developed by MITMA but was also based on directives of the European Union focusing on the real estate sector. In this strategy of the central Government, a thorough analysis of the current condition (2020) of the building stock was executed. This analysis included elements like energy consumption, financial options for regeneration, refurbishment strategies that have been followed so far etc. The goals and objectives for the years to come in terms of the reduction of energy consumption and carbon emissions were outlined and aligned with the longer-term goals for the next 40 years.

In respect of the objectives of decarbonisation, the PNIEC-plan presents a long list of potential interventions of which the generation of clean energy based on renewable sources is a keystone. The MTERD has also published a long-term strategy for decarbonization and there is attention to energy self-sufficiency, the management of energy demand (peak load management) and civil participation in sustainability.

4. Refurbishment rate: definition, current refurbishment rate, targets, table with time series

The Ministry of Transport, Mobility, and the Urban Agenda (MITMA) periodically publishes data in relation to regeneration projects. These data include number of buildings regenerated, floor space, type of intervention (insulation, façade, foundation, etc.).

A regeneration project is always executed on an existing building. There are two main types of regeneration projects. The first type increases the size of the existing building; floor space is added incorporating new structural elements. The other type is a refurbishment or restoration. In the latter case the floor space is not altered but modifications to the building structure are realized, sometimes complementing the existing structure.

The statistical data that are presented by the Ministry differentiate between types of refurbishments: horizontal extensions and vertical extensions, restorations which either do or do not conserve existing façades and the refurbishment of shops.

In the next table the evolution of regeneration projects in terms of numbers and amount of floor space added per type of regeneration project is presented, as earlier defined.

The Ministry also presents data on the number of permissions that have been submitted for regeneration and restoration projects in terms of buildings and corresponding allocated budgets.

Neither table (on regeneration and building permissions for regeneration) specifies whether the interventions include upgrades on energy efficiency that diminish the consumption of energy and hence improve the energy rating. So, the presented figures lack detail in terms of energy efficiency of buildings and cannot be used for like-for-like comparisons of energy efficiency before and after intervention.

5. Energy efficiency standards: current situation of stock, legal requirements for new construction and refurbishment (building codes), EE standards in other regulations (e.g., subsidy schemes), enforcement of EE standards in refurbishment, challenges

In Spain, the technical requirements as defined by the European Energy Efficiency Directive, have been adopted in national building regulations.

The European Directive 2010/31/EU on the energy performance of buildings and its modification in 2018 (in European Directive 2018/844/EU) have basically been included in two, already existing, regulations in Spain: The Technical Building Code (CTE, Royal Decree 314/2006) and the Regulation on Thermal Installations in Buildings (RITE, Royal Decree 1027/2007). Moreover, the European Directive 2012/27/EU on energy efficiency has been implemented through Royal Decree 56/2016.

The Technical Building Code (CTE) establishes the minimum requirements in respect of health and safety as well as the minimum standards for energy efficiency. The minimum standards for energy efficiency are detailed in the basic document of this Code under the chapter HE about energy savings. The CTE applies both to new construction projects and to regeneration projects of existing stock. In its most recent modification (Royal Decree 732/2019) new minimum requirements have been introduced in order to align with the updated European Directive 2018/844/EU mainly revising the minimum standards of energy efficiency and to include a definition for near zero emission buildings (nZEB).

The Regulation on Thermal Installations in Buildings (RITE) determines what minimum specifications thermal installations need to comply with. These installations include heating systems, air conditioning and hot water installations. The regulation not only sets a standard in respect of thermal comfort and a healthy climate but also promotes the rational use of energy. At the moment, the Spanish Government is working on a more ambitious and demanding revision of RITE that is aligned with the objectives of the European Union and that gives guidance on automatization and passive control of energy consumption.

5.1. Energy Certificates

The Royal Decree 235/2013 introduced the requirement to supply buyers and users of a building with an energy certificate. Currently, the Ministry of Transport, Mobility, and the Urban Agenda (MITMA) and the Ministry of Ecological Transition and Demographic Challenges (MTERD) are drafting a modification to get aligned with EU Directive 2018/844/EU. The Energy Certificates will be useful in following the progress on achieving the goals that were set in the integral plan for energy and climate 2021-2030 (PNIEC) especially in regard to the regeneration of existing building stock.

An indicator for the use of the energy certificates is the number of certificates that have been issued since its introduction in 2013 until December 2019. In total, for new buildings 76,028 certificates have been issued whilst for the existing building stock 4,094,157 certificates have been supplied (Registro de Comunidades Autonomos, sd).

According to the data from the Ministry of Energy, approximately 50% of the new buildings emit carbon values below 55.5 kg of CO_2 per square meter per annum. This corresponds with Energy Rating A or B (the respective shares being rating A for 17% of new buildings and rating B for 34% of new buildings). Buildings that date back from before 2013 predominantly (81%) have an Energy Rating of E or worse meaning that they submit carbon emissions of at least 111 kg of CO_2 per square meter per annum. Of buildings built before 2013 only just over 1% qualified for Energy Rating A or B!

TABLE 3 Energy Certificates

Number of new Energy Certificates issued	A	B	C	D	E	F	G
New residential buildings (built after 2013)	13,069	26,103	13,502	11,354	10,433	432	1,135
Existing residential buildings (buit until 2013)	11,558	35,709	180,824	547,702	2,165,344	469,775	680,538

Energy Performance based on Energy Labels	A	B	C	D	E	F	G
New residential buildings (built after 2013)	17,19%	34,33%	17,76%	14,93%	13,72%	0,57%	1,49%
Existing residential buildings (buit until 2013)	0,28%	0,87%	4,42%	13,39%	52,92%	11,48%	16,63%

Source: Informe Estado de la Certificacion Energetica de los Edificios (December 2019)

6. Financing tools: grant schemes, funding, subsidies, green bonds, feed-in tariffs

The need to encourage a more sustainable society has led more and more people, companies, and governments to act and to invest in projects that improve energy efficiency. As a result of this trend, new and alternative ways of funding and innovative financial instruments to support these projects are being explored. Regulation continuously changes and in line with these changes new alternatives are considered. The following paragraph describes a number of products and instruments that are used in the Spanish market but does not pretend to include the complete range of instruments that can be found on the market.

How to fund my investment in energy efficiency? This is one of the most common questions when considering an intervention. Investments in energy efficiency or sustainability bring multiple benefits (energy savings, reducing inefficiencies, reduce carbon emissions, etc.) but monetization of these benefits is often complex and innovative. There is no "one size fits all" solution to fund the wide range of investments in energy efficiency.

We will now describe some of the instruments and tools that are currently being used in the Spanish setting.

6.1. Subsidies

Subsidies or grants are available for investments in energy efficiency and sustainability in the built environment. In Spain, because of devolved powers to autonomous regions these programmes differ from region to region. Subsidies and grants are used to stimulate investments in new technologies and also to support and incentivize private entities and individuals to invest in projects that are in the general interest of society and that are in line with government´s programmatic objectives.

Normally, the Government (either local, regional or national) will publish conditions for grant programmes in the official governmental bulletins (again this can be local, regional or national) and invites interested organisations or private people to compete for the available grants. Grants or subsidies will normally cover a part of the investment costs. Funds are supplied by the competent government but often also come from the European Union (Horizon2020 Europe, Interreg or FEDER).

Currently, all grant and subsidy schemes approved by the government are being published on a central portal. This portal is called the National System of Publishing Subsidies by the Housing Ministry and is available on: http://www.infosubvenciones.es

6.2. Guaranteed green bonds

Guaranteed green bonds are an alternative form of debt that is collateralized by a group of assets or by a specific (preferential) guarantee. The issuance of green bonds will allow the issuer to obtain debt against a discounted price. In former years, green bonds specifically became fashionable to fund projects that improve energy efficiency and sustainability. The green bonds normally have built in checks and balances to monitor performance in terms of sustainability. Like green bonds used in other countries, they are often criticized because of the bureaucratic processes (lot of paperwork and red tape) that partly wipe out the benefits of a discounted price.

6.3. Tax-exempt financing

Another financial mechanism that is being used in Spain to stimulate investments in sustainability are tax incentives. In some autonomous regions certain investments are tax-deductible. There are also programmes that give discounts on the local property taxes (IBI).

6.4. On-Bill Financing

A relatively new (not yet very common in Spain) form of funding is known as on-bill financing. This form was first introduced in the Anglo-Saxon countries where it was used as a tool to support the so-called Green Deal programme. Energy suppliers are supporting their clients to invest in energy efficiency by funding the capital investments. Through a supplement to their monthly energy bill, these clients will (over an agreed period of time) eventually pay for that investment (plus an amount in lieu of interest) back to the energy supplier. There are different types of contracts that can be used for on-bill financing.

Although availability of funding (for investments in energy efficiency or sustainability) is currently seen as one of the bottlenecks for the wider uptake of investments in sustainable energy projects, there are more and more financial products available to facilitate these investments.

A growing number of stakeholders, from private individuals to companies and governments, have decided to improve energy efficiency and have started to use renewable energy sources. The profile of investors is also changing with a lot more emphasis on environmental social governance (ESG) and this has opened new avenues for the funding of small and medium sized projects that in the past would have been hard to fund. Furthermore, new initiatives are appearing that allow the entrance of small investors even on an individual level (think about crowdfunding). The above makes us believe that in the coming years the range of financial products to fund investments in energy efficiency will keep increasing and will allow for tailor-made solutions. This will, in turn, support the growth of investments in sustainable energy projects.

7. Policy tools: the most efficient policy tools, funding, barriers

The European Union wants to mobilize a trillion euros in a decade to stimulate the transition to a green and sustainable economy with low carbon emissions. The recently approved corona (COVID-19) emergency fund that has been endowed with 750 billion euros will follow this pathway. The president of the EU has made it very clear: a green and digital future is needed that will resist the risk of climate change (European Commission, 2020).

The Spanish Government supports the objectives set by the EU and agreed to raise the goal for 2030 to a reduction of 55% in carbon emissions, compared to the baseline situation in 1990 (Energias Renovables, 2020)

Spain finds itself in a good position to adhere to this transformation since its government has already adopted an agenda strongly focused on fighting climate change, not only from an environmental perspective but also as a driver for economic growth. In this sense, the Spanish Government has put in place a regulatory framework to take advantage of the opportunities that come with the ecological transition in terms of modernisation of the economy, reindustrialisation, generation of employment and the appeal to investors.

This framework is supported by the current governmental projects:

- update in the law around climate change and energetic transition,
- long-term strategy for a modern economy, competitive and climate neutral by the year 2050,
- national integration plan for energy and climate,
- national plan to adapt to climate change 2021-2030,
- strategy to a fair energy transition
- new laws towards management of waste and contaminated land

- strategy towards a circular economy (an economic system aimed at eliminating waste and the continual use of resources)

Definitively, a framework that can lay a solid foundation under the programme objectives and that will invite all involved stakeholders to embark on this journey to transform the economy and society. All in line with the commitment towards the agreed and quantifiable climate goals as agreed upon in the Paris climate agreement.

Included in the framework of the European Green Deal is the improvement of energy efficiency in the built environment. To comply with the European objectives, Spain offers citizens and companies in the country a range of support schemes and grants. Amongst these plans you can find grants from the Institute of Diversification and Energy Savings (IDAE) and from the Ministry of Housing (MITMA) as part of the Housing Plan. (Gobierno de España, 2020), (Ministerio de Fomento, 2018) .

IDAE has offered support for the regeneration of buildings through loans from the European Regional Development Funds (FEDER) since 2013. The current programme that supports energetic regenerations in buildings (PREE) was approved by the council of Ministers on the 4th of August 2020 as per Royal Decree 737/2020. The support is being coordinated by IDAE but is managed by the regional autonomous governments. On a national level this programme has a size of € 300 million euros. Funds are distributed in proportion to the number of dwellings being managed in every autonomous community. (Gobierno de España, 2020)

The eligible interventions that are funded by this programme are: thermal insulation, the improvement of energy efficiency of the thermal installations (heating, air conditioning, etc.), the substitution of traditional energy with renewable energy (solar, geothermal or biomass) and finally the improvement of lighting installations.

In the following table you can observe the way state support was supplied destined for the energetic regeneration by IDAE during the previous programme period that ran from 2013-2018. The reader will appreciate that this is a blended form of support where a part of the investment is sponsored through direct grants, another part is funded by loans (repayable) and the remainder is invested by the building owner.

From the Ministry of Housing (MITMA) there are other support schemes available as part of the National Housing Plan 2018-2021.

TABLE 4 Results regenerations programme 2013-2018

Type of intervention	Number of apllications	Eligible costs	Direct grants	Funding	Reserved
Improvement of thermal insulation	1,181	239,917,336	76,035,734	59,320,545	135,356,278
Improvement of energy efficiecy of thermal installations	211	29,002,104	4,283,904	10,700,391	14,984,295
Substitution of traditional energy with biomass in thermal installations	56	11,258,965	1,291,856	3,334,203	4,626,059
Substitution of traditional energy with geothgermal energy in thermal installations	19	2,705,463	848,322	61,660	909,982
TOTAL	**1,467**	**282,883,868**	**82,459,816**	**73,416,799**	**155,876,614**

Source: Instituto para la Diversificación y Ahorro de la Energía

(Ministerio de Transportes, 2018) In total, there are 10 different support schemes for social improvements in the housing sector and to help urban/rural renewal and regeneration.

The Housing Plan has a budget of government grants that amounts to € 364 million euros for the year 2020 and € 372 million euros for the year 2021. One of the 10 supporting programmes is specifically dedicated to the improvement of energy efficiency and sustainability in housing. This programme is supposed to manage support for improvement of energy efficiency and the sustainability of single-family homes and residential buildings that are owned or occupied collectively. The programme supports projects that reduce the energy demand for heating and cooling by at least 20%-35% depending on the climatic circumstances at the location of the project. Energy Ratings are used to justify the obtained results in terms of energy efficiency.

Support is given with preference for dwellings and shops that were built before 1996. This support scheme is also managed by the autonomous regional governments. Grants are given, again, for thermal insulation, the renovation of heating and cooling installations, improvements in line with the requirements of the Building Code, communal building elements in the case of multifamily houses, promotion of sustainable mobility, systems of energetic management and automation, etc.

The maximum grant for a single-family house is € 12,000 euros or 40% of the capital costs of an eligible investment. In the case of households with a disabled family member this maximum can be increased to € 18,000 euros, (Gobierno de España, 2020) .

8. Related measures: measures against energy poverty etc.

Fuel poverty is related to the financial capacity of households to heat or cool their dwelling to maintain a comfortable temperature. In Spain fuel poverty has gradually increased to 9.1 % of the population in 2020 (against 8% last year). According to the Red Cross there are extreme situations where people have to choose between eating and heating.

The Spanish Government has put in place energy benefits for people that are at risk from energy poverty. There are separate schemes for heating and electricity. In 2019 the government dedicated a budget of 75 million euros to heating benefits.

Just as the international community (including the EU) has defined a set of guidelines to fight climate change and to comply with goals on energy efficiency, there has also been strong guidance on the question of how to fight fuel poverty. The latest guidance on this matter can be found in the recommendation on energy poverty published by the EU on 14.10.2020. In this recommendation a set of common indicators has been defined for all EU member states. The set was developed by the statistical office of the EU (Eurostat) and the European Energy Poverty Observatory (EPOV).

EPOV provides four different primary indicators for energy poverty, of which two are based on self-reported experiences of occupants' limited access to energy services (based on EU data). The other two indicators are calculated using household income and/or energy

expenditure data (based on Household Budget Survey data). There is also attention to indirect indications like: arrears in payments for basic services, the number of disconnections from the grid and the quality of housing.

Following these European indicators, the Spanish Government in 2018 published the National Strategy to fight fuel poverty 2019-2024. This strategy was the direct result of the adoption of urgent policies in respect of the energy transition and the protection of consumers. The strategy was ratified in Royal Decree 15/2018. (Ministerio para la transicion ecologica, 2019)

The strategic plan evolves around four main objectives:

1. Improve the knowledge about fuel poverty.
2. Improve the response to fight existing fuel poverty.
3. Make a structural change in order to reduce fuel poverty and establish a mechanism to protect consumers.
4. Increase social conscience about fuel poverty.

As a result of the above the following indicators have been chosen to follow the situation relating to fuel poverty in Spain:

You can observe a slight improvement in the indicators from 2018 to 2019. However, in the published annual observations of the Ministry there is no reference to the circumstances that caused this improvement. Hence, it is impossible to directly study the impact of interventions.

The goals that Spain has set in respect of fighting fuel poverty are related to the indicators set by the Energy Poverty Observatory (EPOV). The adopted goals are to have reduced the indicators by 25% in 2025 compared to the values from 2017 but the ambitions are higher; now aiming at reductions of 50%.

9. Conclusion

The Spanish housing market has started the transition to a more energy efficient and sustainable future. There is a strong correlation between the objectives that were set by the European Commission and the strategic plans that have been adopted by the Spanish Government. The current housing stock still needs a massive transformation. The stronger Building Codes will ensure that newly added stock is up to the desired standards. In a country with, generally, high density building concentrated in the major urban centres, the challenge will be around the energetic upgrading of multifamily housing. With a relatively high proportion of home ownership, it will be essential for private people to buy into the plans of the Government. Often, capital investments can only be earned back over a long period of time.

It will be crucial to inform the market in the most transparent way. A start has been made to collect more detailed building information, but this operation has only just started, and the ambition should be to come to a granular level of detail that is also known as a "building passport".

Only with the detailed information, holistic plans for the upgrading of buildings can be made in a way that also considers the limited resources available (time, money, energy sources, etc.)

On a higher (political) level, the building data could be aggregated and used to consider environmental strategies at the level of neighbourhoods, municipalities or even regions. Once the characteristics of the status quo are known, scenarios could be elaborated in respect of the optimal mix of energy sources, the infrastructure to supply energy and the way public and private bodies could cooperate. Compared to other European housing markets, it needs to be considered that the ownership of housing is very fragmented in Spain, with few institutions managing larger portfolios of dwellings. This means that there needs to be special attention to the way communication is managed. In general, the collaboration between different stakeholders will be key to making the operation successful. There needs to be a high level of interaction between governments, energy providers, contractors, individual households, etc.

From a financial perspective, we expect that innovative financial products will be needed and will become crucial to support the whole transformation process. Even when there is enough funding available, investments will not always be beneficial from a financial perspective. The Government will need to play a strong role in order to develop tools to incentivize private investments. The newly adopted Green Deal from the European Commission can be one of the catalysers to kickstart the transformation and gradually improve the energy efficiency and carbon footprint of the building stock in the country.

TABLE 5 Evolution of the four indicators on fuel poverty

Primary indicator	2016	2017	2018	2019
The proportion of households whose share of energy expenditure in income is more than twice the national median share	16.7	17.3	16.9	16.7
Hidden Fuel Poverty (% households)	11.3	10.7	11.0	10.6
% Population that is unable to sufficiently heat their dwelling during winter	10.1	8.0	9.1	7.6
% Arrears in payment of invoices of housing supplies	7.8	7.4	7.2	6.6

Source: Estrategia nacional contra la pobreza energetica

TABLE 6 Set objectives in respect of fuel poverty

Indicator in %	2017	Minimum goal 2025	Ambition 2025
The proportion of households whose share of energy expenditure in income is more than twice the national median share	17.3	12.9	8.6
Hidden Fuel Poverty (% households)	10.7	8.6	5.7
% Population that is unable to sufficiently heat their dwelling during winter	8.0	6.0	4.0
% Arrears in payment of invoices for supplies	7.4	5.5	3.7

Source: Estrategia nacional contra la pobreza energetica

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International Union for Housing Finance | Rue Jacques de Lalaing 28, B 1040-Brussels - Belgium | Tel: +32 2 231 03 71 | Fax: +32 2 230 82 45