

# Green Homes & Mortgages



## A TOOLKIT FOR GREEN HOMES SOLUTION PROVIDERS

### Stand out from the Crowd!

- ✓ Be recognized as a high-caliber Green solution provider in your markets.
- ✓ Significantly increase construction budgets for projects benefiting from your Green Home solutions.
- ✓ Build awareness for your brand among decision makers of the building process
- ✓ Get your energy efficient/green solutions recognized by major developers and banks.
- ✓ Receive the benefits of co-branding with a powerful team of international Green Home stakeholders.



# Introduction

A successful and growing initiative that combines rewarding the greenest residential projects with innovative, discounted green financing, with awareness-building activities for homebuyers, with an accessible and widely-promoted GreenHomes. Solutions database for helping project design teams find and learn about your solution!



AMBER GARDENS BY ALESONOR. A NET-ZERO ENERGY HOME ELIGIBLE FOR A GREEN MORTGAGE

## Executive summary

The [Green Homes Solution Provider \(GHSP\)](#) program efficiently and credibly identifies the wide array of companies that provide the services, technologies, materials and other products that contribute to the realization of high-quality Green Homes. Project design teams seeking to achieve ambitious green residential certifications across Europe will use the [GreenHomes.Solutions](#) database to quickly identify useful solutions.

A successful “[Green Homes & Green Mortgage](#)” program – offering discounted financing for green projects – is being replicated and implemented in 12 countries whose collective populations exceed 306 Million people. This will greatly encourage residential investors and developers to set and achieve ambitious green targets for their housing projects.

GHSPs are supported with extensive and carefully targeted awareness building and other communication activities to positively engage all essential decision makers in the process. This includes a heavy focus on emphasizing that the “[Total Cost of Monthly Ownership](#)” – to include not only the mortgage payment but energy, repair and health costs – is the most relevant cost aspiring homebuyers must consider.

The project is strongly supported by the [European Commission’s Directorate General Energy \(DG Energy\)](#). It is also on the forefront of aligning the green home certifications with the [Directorate General Environment’s \(DG Environment’s\) Level\(s\)](#) framework to include [embodied carbon/Life-cycle Assessment](#) and [success towards a Circular Economy](#). The project is

being implemented by Green Building Councils and national Energy Agencies and supported by leading academic institutions including the Copenhagen Centre on Energy Efficiency; A partnership of the United Nations Environment Program and Danish Technical University.

Participation for companies at the European level is low cost and leverages the prior efforts of those companies to certify their green products and services. All monies raised from the GHSP program will be reinvested into actions to accelerate the transition to a low carbon construction and real estate industry.

Early supporters of the program will receive a significant discount and be well-positioned for the full program launch in late January 2020.



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## What is the Green Homes Solution Provider Program?

European companies selling green services and products for residential new construction or renovation projects (or “Green Homes Solution Providers”) have an opportunity to benefit from and support a successful and growing Green Homes & Green Mortgage program in 12 countries. Respected Green Building Councils and other non-profit expert organisation are certifying residential projects which qualify them for discounted “Green Mortgages”. This innovative financing in turn – along with substantial monthly energy, health and repair cost savings – allows for a greater investment in quality construction while reducing the “Total Cost of Monthly Ownership” to the homeowner. This creates significant opportunities for all companies active in selling green solutions.

More information on the Green Homes & Green Mortgage program is described later in this document. Also, comprehensive “toolkits” that explain the program have been developed specifically for Residential Investors and Developers and Financial Institutions providing mortgages for new homes and are available for your review. The Toolkits, already translated into English, **provide the rationale, methodology, detailed Green Homes criteria, a representative detailed financial model, and examples/case studies of real projects** that have been completed and certified or signed commitments to achieve the Green Homes certification.

## What are the Green Homes & Green Mortgages programs being implemented across Europe?

These initiatives [create partnerships between banks, residential investors/ project developers, home buyers and certifiers](#) to create certified green residential projects that are environmentally-responsible and energy-efficient relative to the standard offer in the market; generating financial, social and environmental benefits. Increased energy savings and other financial benefits (such as improved occupant health and less frequent/lower home repair costs) substantially reduce the mortgage default risk allowing the lender to lower the monthly interest rate while maintaining profit margins. This enables the home buyer to

invest into a more energy efficient and greener home, while lowering their total monthly cost of ownership relative to a standard home. This also creates a significant opportunity for residential investors & developers to differentiate the quality and environmental performance of their construction projects while educating consumers about the financial and other benefits.

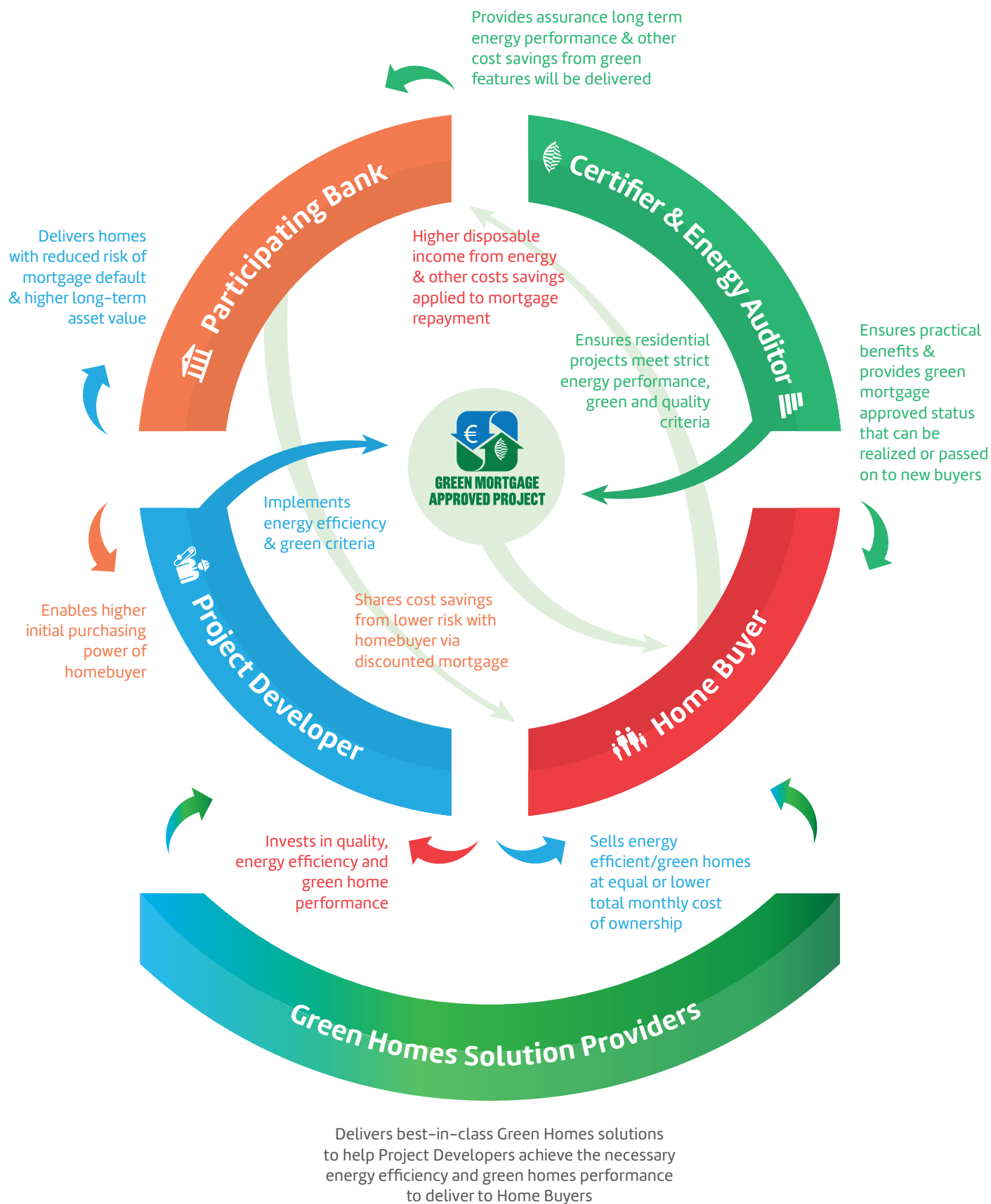
All of this helps those companies selling services, materials, technology and other products that are proven to contribute to the creation of green homes!

## Who are Green Homes Solution Providers?

Green Homes Solution Providers include all of the wide array of companies that provide the essential services, products, materials and technologies necessary to construct a Green Home project. These include:

- Architects and other designers (landscape, interior, etc.)
- Engineers (Structural, Mechanical, Electrical, etc.)
- Consultants (Real Estate Agents, Solar Orientation experts, Energy Efficiency/ Green Energy, etc.)
- Project and Construction managers
- Building materials and other product manufacturers and providers (including insulation, windows, doors, etc.)
- Green technology suppliers (heat exchangers, LED lighting, geothermal, etc.)
- Other companies that contribute to the realization of exemplary green residential projects

# Value for everyone in the program!



# The SMARTER Finance for Families project

The SMARTER Finance for Families (SMARTER) project is creating Green Homes and Green Mortgage programs across Europe. A consortium of 17 expert organizations (see “The Consortium” on page 8) have joined together to launch GHGM programs – sharing knowledge and replicating a very successful model from the Romania Green Building Council. The project benefits from the substantial work in Green Homes certifications and other market initiatives by the consortium in many of the partner countries. It then integrates this work with banking partners to jointly deliver innovative green finance products.

SMARTER’s innovative approach includes a heavy focus on addressing all key stakeholder motivations with a particular focus on the end consumer or families that must ultimately understand the benefit from buying or renovating homes that adhere to an ambitious and credible green standard.

The SMARTER project is strongly supported by the European Commission through the Executive Agency for Small and Medium-Size Enterprises (EASME)’s Horizon 2020 research program. SMARTER directly supports many ambitious yet essential

European Union objectives such as the “Secure, clean and efficient energy” Work Program, “Europe as leader in renewables”, and “a fair deal for consumers” with tools and a methodology proven to improve the market for green solutions. The research grant provides financial resources for partners to research the topic, create or improve the necessary tools and documentation, communicate the benefits to the market and interact with the institutional investment community to advocate for an ambitious standard for green finance.



The countries involved in the SMARTER Finance for Families project comprise over 300 million people!



This project has received funding under the European Union Horizon 2020 Research and Innovation funding programme under grant agreement no. 847141.

# Who certifies the green residential projects and solution providers?

The “Certifiers” of the initiative include organizations with well-established and credible experience in assessing and verifying energy performance and other green performance in building projects. This includes Green Building Councils who have created and administered internationally-recognized green residential certification tools and national Energy Agencies which have administered the implementation of Energy Performance Certificates and promoted nationwide progress. The consortium is working together and sharing knowledge

to ensure each national approach provides best-in-class assessment appropriate for the greenest housing projects.

The SMARTER Consortium members were selected due to their shared belief that green finance can radically and positively transform and improve the residential building process while creating benefits for all key stakeholders.

The Certifiers administer or utilize the following certifications to ensure credible green performance is achieved:



# Who will be your partners in the program?

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## THE CONSORTIUM





# What are the Benefits of becoming a Green Homes Solution Provider?

- When developers sign on to the lending bank's demands for the higher quality and environmental performance of a Green Home, your company is on a short list of pre-qualified solution providers that developers and construction managers can rely upon.
- Be included in [GreenHomes.Solutions](#) – a comprehensive database of the best quality services, technologies, materials and other products that contribute to the successful execution of best-in-class green residential projects.
- Escape the “lowest price” challenge
- Your existing green credentials from other credible certification programs can be automatically accepted under our stamp and recognized by Green Building Councils, residential developers creating Green Home projects in twelve (and growing!) European countries and the banks that finance them. Welcome aboard!
- Receive hands on guidance to help you create effective concepts to advertise your green capabilities to the most responsive markets. Our program provides you useful tools to convince decision makers why they should invest in quality and environmentally superior solutions.
- Establish an early leadership role in new, high-growth markets that is secured by a team of like-minded stakeholders.
- Support an initiative that brings an effective, systemic solution to the system problem that has inhibited quality green construction to date. This includes preparing your company and the markets you operate in for the coming European green standards such as [Net Zero Energy Buildings](#), [Circular Economy](#), [Construction Waste Mitigation](#) and more.
- Join to collectively market and build awareness among consumers and all decision makers in the residential construction process of the benefits of choosing green solutions

## Timeline of the Green Homes Solution Provider initiative



## What does the market think?



EnR feels that SMARTER Finance for Families will be a benefit to the objectives of European Energy Agency due to:

An innovative approach to unlocking essential, additional construction budgets for residential projects without elevating the monthly cost to homeowners/homebuyers

Actions to improve the credibility and appreciation of Energy Performance Certificates and a valuable tool for important stakeholders such as the banking industry, citizens and government agencies charged with improving energy efficiency and promoting green energy usage

The intent to better leverage public financing by creating "hybrid" solution to Energy Poverty that promise to serve more citizens while making this challenging market more appealing to private sector banks.

### Roberto Moneta

EnR President  
Head of ENEA's Department  
for Energy Efficiency



We believe that the project "SMARTER Finance for Families" will contribute significantly to meeting sustainable development goals through proposed measures to expand successful Green Homes & Green Mortgage programmes to new European markets, and to develop essential supporting tools for these programmes.

### Scott Foster

Director Sustainable Energy Division

## SKANSKA

As a developer of high quality, green office and residential projects on the Polish market and a global leader in promoting the highest levels of sustainable construct, we wanted to express our strong support for the "SMARTER Finance for Families Project". We believe it is important for consumers to have credible information related to the predicted energy performance of their homes as well as the other benefits they expect when investing in a green home.

### Bartosz-Kalinowski

Managing Director, Skanska Poland

# How to get involved and what are the costs?

## Companies wishing to join the program do so by following the following:

1. Provide Information about your Green Homes Solution to be assessed for eligibility as a "Green Homes Solution Provider". The types of evidence required varies depending on the type of solution but can, for example, include professional qualifications in sustainability for service providers or recognized green certifications for your products.
2. Pay a modest fee to support the program (see below). The "Green Homes Solution Provider" program asks companies to pay based on the size of their operations. It is intended to not be a financial burden yet provide the necessary resources for the consortium to build out initial tools.

A special offer is made for the first 250 companies who join and help us launch this important initiative!

The following annual pricing structure will remain as such for 3 years to these Green Homes Solution Provider pioneers who commit by 15 December 2019 to the program!

## How will the fees be spent?

- Promotion online, at conferences, at exhibitions, and in media for the Green Homes Solution Providers
- Creation and maintenance of a comprehensive database at [www.GreenHomes.Solutions](http://www.GreenHomes.Solutions) to be launched in January 2020.
- Providing direct assistance to project developers/investors to encourage them and support them to build the most ambitious, green projects.
- Support project teams in conducting Life Cycle Assessment of their residential projects.
- Campaigns to educate consumers on the benefits of choosing green newly constructed homes or to renovate towards a green standard.
- Provide ongoing support to the consortium necessary to continue to develop and grow the Green Homes & Green Mortgage programs domestically and internationally.

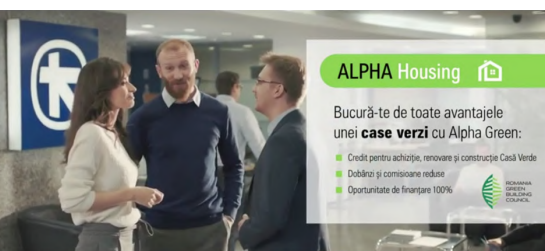
## Discounted Annual Fee for Early Leaders

€/Year	Number of persons globally
50	1 to 5
150	6 to 25
250	26 to 100
500	101 to 200
750	201 to 500
1.000	501 to 1000
1.500	1001 to 2.500
2.000	2.501 to 5.000
2.500	5.001 to 10.000
3.000	10.001 to 25.000
3.500	25.001 to 50.000
4.000	50.001 to 100.000
4.500	100.001 +

Persons employed = # or global employees or other staff;  
Fees are not including VAT

# How is the Green Homes & Green Mortgage Program and the Green Homes Solution Provider Program promoted to various stakeholders?

The members of the SMARTER Consortium have extensive experience and positive results in communicating with the building industry and growing sustainable construction markets. The SMARTER initiative also provides substantial support for creating co-branded messages with Banks, Investors/ Developers and Green Homes Solution Providers



ALPHA BANK'S NATIONAL TELEVISION CAMPAIGN TO PROMOTE THEIR "ALPHA GREEN" DISCOUNTED MORTGAGES AND RENOVATION LOANS FOR CERTIFIED GREEN PROJECTS.

The consortium has studied the systemic nature of what inhibits the development of a successful green building marketplace. This included researching green messaging, hosting focus groups and conducting surveys to potential homebuyers to tailor messages appropriately and choosing media channels which are the most effective in reaching homebuyers to deliver those messages. The clear conclusion is to deliver a multi-stakeholder approach with customized messages to explain the benefits of the Green Homes & Green Mortgage initiative to all the key stakeholders. The top three target groups include:



## Citizens

This group is listed first as their understanding and appreciation of the benefits of Green Homes will be the most important driver of a positive, market-based response. While Residential Investors/ Developers often are the first to choose the level of "green" their planned residential project will obtain, they are heavily influenced by the buying preferences of consumers as they experienced to their last project. This initiative includes evaluating what messages are working to reach Citizens and how they should be modified based on gender, culture, education-level, income-level, and other attributes to resonate best.

We are employing numerous actions that have been proven successful in raising Citizens' awareness of the benefits of Green Homes. These actions are informed by the extensive prior research and knowledge sharing that is a foundation of the SMARTER project. A brief sample includes:

### — Selling something besides

## kilowatts

Energy efficiency is, of course, a prime driver of cost savings for consumers. That said, it is often not the highest priority of Citizens. Selling comfort, protection of health, and the aesthetics of green design can often be more effective than just the energy savings. For example, often, the better acoustics and natural daylighting associated with Green Homes create a positive first impression of those visiting a Green Home for sale. Selling "Quality" versus "green" was an important finding from our focus groups.

### — A "Total Cost of Monthly Ownership view"

The above point notwithstanding, Citizens often overestimate the importance of a home's sales price – something they often pay for over 20 or 40 years – and underestimate the impact of high operating costs over time. Advertising is designed to demonstrate the true cost of owning a home beyond the mortgage payment. Clear and credible financial models – verified through the GHGM programmes – give consumers confidence that they can have a much better home and for a lower monthly total cost.

### — "Word of Mouth"

One of the most powerful drivers of changing consumer preferences is direct experience with something new. While few exemplary Green Homes projects might exist in countries implementing GHGM the initiative takes steps to provide additional promotional support for those select projects (home tours, promotion through existing channels, adding credibility to green claims of builder, etc.)

## What does the market think?



*We are confident that this project would provide a great benefit to our building industry and the citizen building potentially attractive programs to significantly increase consumer engagement and uptake of Green Homes.*

**PhD Alexandra Velická**  
General Director



*We have successfully collaborated with the Romania Green Building Council in a joint implementation of green finance initiatives and we believe the activities supported by the SMARTER Project will have a crucial positive contribution to our current and future green finance offerings as well as help improve the building industry's capacity to deliver better, safer and healthier homes to the Romanian customers.*

**Vladimir Kalinov**  
Vice President Raiffeisen Bank Romania



*Helping projects with energy efficiency and green performance differentiate themselves from their competitors using credible energy performance certificates, green certification and significant energy efficiency measures in general is part of our Green Lending strategy. Our organization will participate in the planned education and capacity building activities to support Green Housing loans.*

**David Gabelashvili**  
Director JSC ProCredit Bank Georgia  
**Levan Khmiadashvili**  
Energy Efficiency Expert



*Homes' Construction and Renovation using ambitious energy efficient and green standards will create opportunities for greener energy sources as well as assist out citizens in the form of lower energy bills and greater heating and cooling comfort, combating energy poverty.*

**Ivaylo Aleksiev**  
Executive Director

### — Raising Questions

Providing citizens with guidance on what questions to ask when visiting a residential development helps to send a signal that people are informed and do care about building quality and performance. Citizens asking more informed questions will benefit quality projects and punish mediocre ones.



### Residential Investors/Developers

will be engaged by helping the green pioneers differentiate their projects with a credible Green Homes certification and link their qualifying projects to discounted financial products dedicated to only the best EE/Green performing projects. Our initiative contributes to Investors/Developers advertising resources to help build awareness of the quality, health, comfort, financial and green benefits of Green homes. Increasing the visibility of leading green projects and informing Citizens about the details will unlock competition among Investors/Developers to move each market significantly forward.

Our initiative provides support to this essential stakeholder group. As awareness of the discounted Green Mortgages grows, the feasibility of buying a higher quality house for less monthly cost than a low quality house will become apparent and further support those Investors/Developers building green. This includes:

### — Helping to Differentiate their Projects

Applying a credible, independent Green Homes certification will send a positive signal to the market that this build is offering better homes and Citizens can be confident they will receive the quality, health, environmental benefits promised.

### — Selling "Total Cost of Monthly Ownership"

Similar to the same

point made above for engaging Citizens, Investor/Developers will be advised and supported to create advertising that demonstrates the true cost people pay each month and compare this to standard home monthly costs. Some Green Homes-qualifying projects produce energy savings equivalent to 1 to 2 monthly mortgage payments per year.

### — Demonstrating Market Readiness of Industry

Often an Investor/Developer will be concerned their green project may be on the "bleeding edge" as they are forced to train internal staff and external consultants on new green approaches, search unsuccessfully for needed solutions not yet available, etc. Using our international network and a Help Desk to support these pioneering developers we reduce concerns and allow for ambitious goals and successful projects.



### Banks offering Mortgages and Renovation Loans

As long-term "co-owners" of homes until loans are paid off, Banks should be the most enthusiastic supporters of Green Finance. Many, however, focus mostly on predicting a borrower's future income stream. This is, of course, very understandable and relevant to assessing one's ability pay back a loan on a house – whether green or not green. Involving banks to evaluate the risk differences between financing Energy Efficient/Green Homes and standard homes and re-assess their underwriting practices is essential to gain their understanding of the business case for GHGM programmes.

Working with banks to improve the mortgage risk underwriting process to appreciate the significantly different



ongoing cost profile from NZEB and other very high performing Energy Efficient/Green Homes is a major objective of the SMARTER project. Our initiative engages banks in promoting Green Homes by:

- **Demonstrating Financial Risk Reduction** Saving 50 Euros each month on energy costs contributes exactly the same as earning, after tax, 50 additional Euros. Initial research, presented in the “Green Mortgages and Green Loans: a Toolkit for Financial Institutions” shows a 32% reduction in mortgage defaults for Energy Efficient/Green Homes and even less risk as the level of Energy Efficient/Green Homes achievement improves.
- **Engaging National Banks** The GHGM programme has already received guidance from one country’s National Bank that confirmed modelled energy savings, using a credible methodology, can be included in mortgage applications as “additional income”. This sends a powerful signal to banks that GHGM programmes are both acceptable within existing legislation and recognize “a penny saved is a penny earned”
- **Improving Deal Flow Quality** Investors/Developers choosing to build Green Homes represent the upper tier of most professional builders on the market. Builders who bring quality projects to a bank create better business outcomes for all parties.
- **Differentiation and Corporate Social Responsibility** Through this initiative, Banks are informed about their ability to negatively or positively affect how the construction industry interacts with the local and global environment. Both in substance and in image, the Bank can improve its own and others’

environmental stewardship while increasing profitability for the reasons stated above.

- **Promote Green Finance as the “Hero” of a green economy and Citizens’ Well-Being** Many Citizens are very reluctant to take a loan and, in particular (and understandably), worry about losing their house. Limiting one’s borrowing is typically a good practice. When, however, the avoidance of a loan leads to sub-optimal building decisions and results in acquiring, building or renovating a home with high operating costs, negative health impacts, frequent need for repairs, and lower retained asset value over time, it is not good for either the bank or the borrower. Our initiative delivers a strong message that “borrowing responsibly to buy a Green Home will provide many years of comfort and health for your family, cost savings for your pocket, and protection for our planet and local nature.”



We will fully support this effort including enrolling our latest project “Gelovani Project” into the “Green Homes & Green Mortgage programme” to certify its energy and green performance.

M2 creates new standards of quality and comfortable living in Georgia. We are in a constant search for innovative ideas which would elevate optimal design of residential areas and construction quality to new heights.

**Irakli Burdiladze**  
CEO JSC M2 Real Estate



Last year, our organization took the first major step to promote energy efficient buildings by launching our Green Mortgage product. Considering the significant share of residential energy consumption, the widespread usage of green mortgages will contribute greatly to Turkey’s energy efficiency targets and its transition to a low-carbon economy.

**Murat Atay**  
CEO Garanti Mortgage



As an investor in the Romanian market place building better quality, more efficient, and more environmentally responsible apartments we found it invaluable to join a credible and challenging program that communicates our green achievements to the market. We further strongly recognize the benefits of our potential buyers accessing “Green Mortgages” with discounted interest rates to encourage and facilitate their purchase.

**Lucian Azoitei**  
CEO Forty Management



We think that collaborative efforts putting together sustainability excellence with the banks to reward the lower risk of greener homes with discounted interest rates will greatly help the residential market grow in the best interest of all involved stakeholders.

**Umberto Irti**  
Legal Representative COAF SRL

# Other relevant Regional and International initiatives

The SMARTER Consortium members are actively engaged with the following



**Energy Efficiency**  
Financial Institutions Group

## The Energy Efficiency – Financial Institutions Group

An expert group initiated by the European Commission and the United Nations Environment Programme – Finance Initiative to open dialogue and work platform for public and private financial institutions, industry representatives and sector experts to identify the barriers to the long-term financing for energy efficiency and propose policy and market solutions to them.

The SMARTER Project will collaborate extensively with EEFIG going forward including collecting, on an anonymous basis, post-occupancy actual energy use and energy cost data from all residential projects certified within the GHGM programmes. This data will be provided to EEFIG's De-Risking Energy Efficiency Platform (DEEP) and provide valuable European-based information.



## Level(s)

Is a voluntary reporting framework from the European Commission to improve the sustainability of buildings. Using existing standards, Level(s) provides a common EU approach to the assessment of environmental performance in the built environment. For this project, the consortium will investigate aligning their existing Green Homes rating tools with the Level(s) framework to support a common understanding and comparability among residential green homes projects.

The SMARTER project has Research tasks to adopt the Level(s) framework into the existing Green Homes certification programmes that will be used; ensuring that Energy Efficiency progress considers other “green” criteria including Life Cycle Assessments of inputs and actions of residential projects.



## “Green Building Professional”, “Green Homes Accredited Professional”, and other sustainable building education platforms

All Green Building Councils from the SMARTER consortium have contributed substantially to the development a common education platform to provide high quality, lifelong learning education to their building communities. The programme was designed for professionals and practitioners in the low carbon / circular economy and to be able to undertake projects achieving the highest ambitions of EE/Green performance.

A “Green Homes Accredited Professionals” program will be made available in the implementing partner countries that include topics such as “Green Design Principles”, “Sustainable Construction Materials and Resources”, “Financial Consideration of Green Buildings”, and “Building Envelopes of Green Buildings”.



## Train-to-NZEB and BUILD UP SKILLS

These programs are European Commission-supported projects focused on training of tradespersons to have the skills to create exemplary green buildings for the 21<sup>st</sup> century. Many members of the SMARTER consortium have direct involvement and experience or collaborations with these two projects. The experience of BUILD UP SKILLS brings an ability to reach and up-skill tradespersons.



# Opportunities & challenges for our homes

There is a direct correlation between the energy efficiency and green performance of a home and the level of quality in the design, construction and operation of that home. Fear of bank financing often leads homeowners to take suboptimal decisions who under-invest in the design and construction process (often choosing homes only on the lowest “Cost per Square Meter” value) and resulting in owning homes that are more costly to heat and cool, require more maintenance, more frequent renovations, and subject to reduced long-term asset values relative to Green Homes.

The most cost-effective moment to invest in energy efficiency and other green features of a home is at the earliest moments of its initial design and creation. This is particularly true regarding the “building envelope” or the roof, windows and walls which contribute substantially to energy efficiency performance but are costly and problematic to improve after the initial construction is complete.

In a 2013 study of 71,000 homes comparing default risks in Energy Efficient and Green Homes to standard homes a 32% reduction in mortgage default risk was found in the Green homes. The study also found that homes that exceeded the minimum standard to be considered “green” for the study exhibited an even higher reduction in default risk. The annual energy savings for green homes can be equal to one or two mortgage payments per year.<sup>1</sup>

Another comprehensive academic study found mortgage defaults were:

- 32% less likely if the apartment

building is within a mile of protected open space

- 34% less likely if the building is in a neighborhood with at least 16 retail stores
- 58% less likely if in an area where at least 30 percent of workers commute by subway/elevated train.<sup>2</sup>

A study of over 1.6 million homes in North America released in June 2014 concluded certified green homes have a 9% increased selling price relative to standard. The green homes in the study averaged 20 to 30% savings in energy and water use compared to code-built homes. A lower level of code and similar low energy prices indicate many European markets can expect similar price premiums/asset values for certified green homes as the study identified.<sup>3,4</sup>

Some of the most prevalent reasons for early damage to a home affecting ongoing energy efficiency, visual appeal and asset value include insufficient and/or improperly installed thermal and hydro insulation. Green building solutions, by design and by definition, must be durable and therefore reduce the frequency and severity of repairs to a home. Health issues of the borrower or a family member have material impacts on abilities to pay financial obligations. Holding healthier homes in mortgage portfolios will have a material, positive financial benefit from reductions:

- in accidents from better lighting and properly installed electric wiring;
- in exposure to volatile organic compounds (VOCs), formaldehyde, asbestos, lead, mold, and radon through choosing healthier building materials and utilizing

proper insulation and renovation techniques;

- in exposure to carbon monoxide and tobacco smoke from better ventilation.

Sensible financing is the best choice to bring forward the available resources early into the construction process of homes allowing the homeowner to offset their early investment in quality and energy performance (via monthly mortgage payments) with the savings (via reduced monthly energy and repair bills). Each of the above points indicate banks underwriting mortgages can offer lower costs of financing without loss of profitability due to better repayment rates and higher long term values of the properties they finance. The points that follow offer additional benefits from supporting greener homes.<sup>5</sup>

Buildings account for over 30% of total energy consumption and 40 to 50% of CO<sub>2</sub> emissions in Europe.

Key EU-driven legislation will dramatically improve the quality, energy and green performance of homes beginning now and increasingly over the next 3 years. This includes:

- Nearly “Net Zero Energy Buildings” by December 2020 requiring ultra low energy buildings with any energy use required offset by production of green energy;
- The amount of Construction Waste required to be diverted from landfills, currently approximately 25%, to be increased to 70%;
- Significant restrictions on toxic chemicals allowed in building materials and requirements to disclose the chemicals used in materials production (e.g. REACH legislation).





Sensible financial mechanisms such as Green Homes & Green Mortgage programmes prepares the Construction and Real Estate industries for this impending legislation ensuring that green building pioneers have the financial tools to deliver homes to the market today or in the near future that include a strong business case for all stakeholders.

Most countries – and all in the European Union – require Energy Performance Certificates for new buildings and during significant events for existing buildings such as sales, rentals, and major upgrades. The cost of the energy audit, therefore, no longer represents an optional or additional cost but a required cost of the real estate developer.



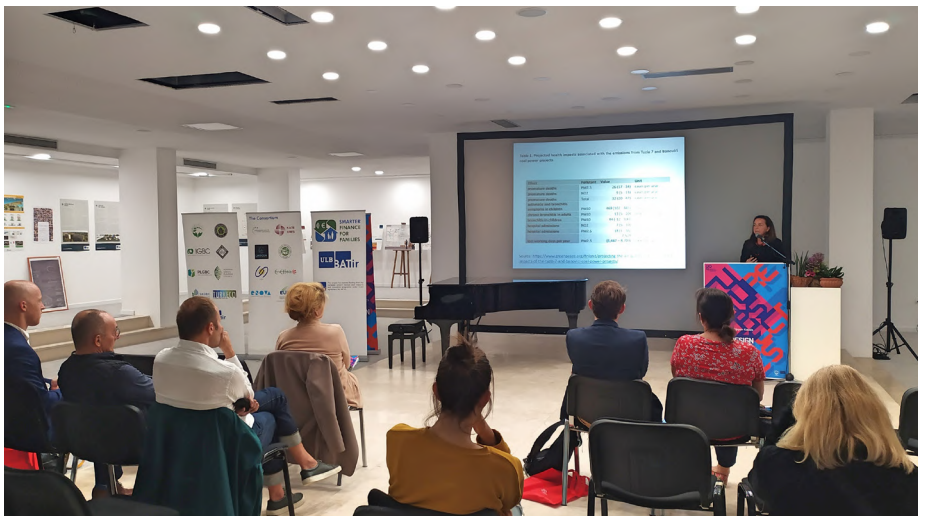
The Green Building Councils and other SMARTER consortium partners organize numerous exhibitions, conferences, workshops and other events to promote green construction approaches. This Green Home Pavilion showcases the exemplary green residential projects in Romania and the solutions that made them possible. This includes presentations about the financial,



health and other benefits of Green Homes. It is a chance to interact with both the home buying public and active real estate developers and investors. The Green Home Pavilion has proven to be the most popular exhibit and continues to add partner developers and solution providers demonstrating the growing interest in sustainable construction approaches in Romania.



GREEN HOME PAVILION@TNI



SANELA KLARIĆ PRESENTING GREEN HOMES GREEN MORTGAGES AT @MOSTAR GREEN DESIGN BIENNALE



# What is a Green Home?

There are many valid approaches to creating a Green Home but all are thoughtful in their design, construction and operation and minimize or eliminate the environmental impact of the creation and operation of the home. Here are just some of the main components of a Green Home:

## Energy Efficiency & Green Energy

Using “Bio-Climatic Design” principles (explained further below), a superior “Building Envelope” with significantly improved insulation and better doors and windows, and more efficient Heating, Ventilating, and Air Conditioning (HVAC) or natural ventilation and “Passive House” approaches; a Green Home minimizes energy use. Introduction of Green Energy – either on the home itself or through specifying contractually the delivery of Green Energy through Energy Suppliers ensures the reduction or elimination of fossil fuel derived energy.

## Location

The construction of a green home does not utilize land with important contributions to bio diversity or a city’s green space. The location reduces transportation impacts by having access to public transportation or rail or bus terminals and/or is in a “walk-able” community with the homeowner’s needs for shopping, dining, schools, etc. nearby.

## Sustainable & Healthy Materials

Green Homes utilize materials that are non-toxic to the home’s occupants and safe in their production. Heavy construction materials are chosen that are manufactured close to the construction site to minimize transportation impact. Materials that

contained recycled materials or, better, creatively “up-cycle” or “re-purpose” items that might otherwise end up as waste should be included. Durable materials mean less repair costs, less construction waste, and reduced environmental impact over time.

## Indoor Air Quality

Technology solutions or natural ventilation (or both) are employed to ensure air is both healthy and pleasant. Paints, other coatings and adhesives are chosen that do not introduce toxins into the home.

## Bio-Climatic Design: Lighting, Shading and More

Green Homes use “bio-climatic design” principles that include shading from the summer sun and collecting the winter sun with thoughtful orientation of the building and placement of the windows and skylights. Deciduous trees drop their leaves in winter to allow in sun and evergreen trees keep their leaves to protect against harsh winter winds and “solar gains” from summer sunshine. Indoor lighting is designed to ensure a safe, productive, and warm environment with a minimum amount of energy use. Designs that ensure natural daylight enters the building without solar gains in summer contribute to a Green Home.

## Construction Site and ongoing Property Management

The construction process of a green home takes important steps to ensure the building does not damage or destroy the surrounding environment (reducing/eliminating erosion, protecting existing trees and bio-diversity on the site). In addition, residents receive information and have facilities (e.g. Composting

area, Recycling Collection area, etc.) to operate their homes in an environmentally-responsible manner to ensure the home over time has a neutral to positive impact on the planet. Landscaping is created using creativity and indigenous plants to minimize “Urban Heat Islands”, reduce the need for pesticides, fertilizers and irrigation systems.

## Other Green Design Principles

Green Homes are designed to be durable to minimize repairs and heavy construction work if future needs change. Smart design allows for different uses of the home as a family’s needs change or new owners arrive with different needs. Green building principles demand better planning efforts and “Integrated Design” of the different disciplines to ensure optimal results, maximizes the use of space, avoid costly construction mistakes, and minimize waste in the building process.

## Green Homes Scorecard

A scorecard for residential projects provides a full understanding of the criteria that need to be achieved to be certified as a Green Homes approved project. An example of a scorecard for both single family and multi unit homes are available in Appendix II of this toolkit.

# How do the Green Homes certifications work?

The advisory and certification process works to ensure, a real estate investor/developer successfully meets the program's criteria. The process includes a close collaboration between the Certifier, the investor/developer seeking certification for their project, and the project team and solution providers who will undertake the necessary actions. The Steps include:

## Planning a Green Residential Project – Preliminary Review

An Investor/Developer considering certifying their project can request a "Pre-Certification Review" in a no cost or low cost manner – quickly assess the feasibility of obtaining a Green Homes certification. The investor/developer meets to discuss the project (site location, building approach, energy performance, pricing target, etc.) they intend to pursue. The process includes an estimated 2 hour meeting from which the Certifier will produce an initial indication of the feasibility in a point-by-point comparison with the established criteria.

*NOTE: It is strongly advised to begin this process as early as possible, even before a site has been selected. Projects that have already begun construction can be considered for the Green Homes certification program, but they will be held to the same requirements as projects that pursued certification from inception.*

## Registration and signing the "Pre-Certification Agreement"

The Investor/Developer wishing to proceed with the Green Homes certification registers the project and pays the registration fee. The Certifier, working with the project team and the information already collected at the Pre-Certification Review further defines the achievable criteria. The investor/developer and the Certifier agree upon which criteria must be achieved that provide the minimum

score necessary and all mandatory requirements to satisfy the established criteria of a Green Homes certified project.

A "Pre-Certification agreement" is signed by the Investor/Developer indicating the actions to be taken and the method upon which they will be assessed. Upon the signing of this document, the developer/investor can begin to market their project as "Pre-Certified for Green Homes" informing potential buyers about the program and the green criteria they are pursuing.

For those projects eligible for Green Mortgage program offered with a partner bank, this is also an indicator that this potential financial benefit can be mentioned (see "How does the Green Mortgage program work?" section below)

## Guidance toward a Green Homes certified residential project

The Certifier and a qualified energy auditor meet with and communicate the requirements to the project's design team throughout the design, construction, and commissioning process so they may guide the project to successful achievement of Green Homes criteria. Using the criteria agreed to be pursued as listed in the Pre-Certification Agreement and encouraging "Integrated Design", the process is designed to ensure projects meet or exceed compliance with the program's requirements and produce no negative surprises at the conclusion of the project. Through the "Green Homes Solution Provider" program, project teams can readily identify companies with the technology, materials, other products and services that will contribute to achieving the necessary green criteria for the project.

It is not mandatory to choose Green Homes Solution Providers as contributors to a project but the designation is intended to help project teams quickly identify qualified companies with proven results in delivering Green Homes meeting the certification required.

## Designation of the residential project as a "Green Homes certified project"

Upon project completion, the Certifier and a qualified energy auditor review the project as constructed to confirm the criteria as agreed in the Pre-Certification Agreement have been achieved. The Certifier will check that the new owners are provided adequate information to operate their home in an energy efficient and green manner. The project team is provided the final scorecard and either a notification of successful certification of the project or indications of remaining corrective actions to be taken.

## Offer a Green Mortgage to Home Buyers

Projects pursuing the Green Homes certified designation should discuss early in the process with participating banks who agree to underwrite Green Mortgages that receive discounted financing costs based on the green performance and reduced operating costs of the homes (see "What is a 'Green Mortgage?'" in the next section).

## Monitoring of the Program

Recipients of Green Homes certification agree to share energy cost data of their homes and to operate the units as advised upon purchasing the home. The data will be useful to inform the various stakeholders of the environmental and financial outcomes of the program and contribute to future improvements.

# What is a Green Mortgage?

A Green Mortgage is a unique home mortgage product offered by participating banks that reward the purchase of a certified Green Home with a discounted interest rate due to the reduced mortgage risk default and higher home values associated with Green Homes versus standard homes.

Per the definition above, a certified Green Homes residential project will have significant reductions in the utilities and repair bills allowing households to save extra cash that can be applied to paying back their mortgage. This additional monthly income for the homeowner significantly reduces the risk of mortgage default from the owner of a Green Home compared to standard homes. In return, the bank reduces the monthly interest rate relative to similar products for standard homes due to the improved default risk and higher asset values of the Green Homes in the Green Mortgage portfolio of the bank.

While Green Homes require a new approach, they do not necessarily result in increased overall project costs. We can, however, consider an additional investment of 5 to 15% for design and construction costs as a potential premium for a home to reach the quality, operational cost reduction and environmental performance of a Green Home. The “total monthly cost of ownership” of the home is, however, reduced as the monthly energy savings and lower mortgage interest rate offset the slightly larger loan required for the purchase of a Green Mortgage qualified home. Much of any green construction cost premium contributes to the quality of the construction. This allows the investor/

developer to recoup any additional investment to maintain profit margins without increasing the monthly ownership cost to the home buyer facilitating the transaction.



The Green Homes certification is the indicator to partner banks that the residential project has been assessed upon completion and satisfies the necessary criteria to receive the financial benefits of a Green Mortgage.



Our organization conducts workshops and created an educational brochure for home buyers to be informed on the financial, health and other benefits of borrowing responsibly to buy a green home.

# How does the Green Mortgage program work?

The Green Mortgage is delivered through a consortium between a participating bank, a real estate investor/developer agreeing to meet the program's criteria, a home buyer seeking the benefits of the program, and the Certifier who guides the process and evaluates the project upon completion.



**Luca Bertalot**  
**Secretary General of the European Mortgage Federation**

supporting Green Mortgage program and presenting at "Changing Finance, Financing Change" Workshop.



The Green Homes & Green Mortgage program is included as a Case Study in a green finance guide from the Energy Efficiency – Financial

Institutions Group established by the European Commission's DG Energy and the United Nations Environment Programme

## Identifying Partner Banks

The Certifier and prospective Partner Banks agree to jointly administer and promote the Green Mortgage program. The program is made available to all qualified banks offering home mortgages who agree to the required criteria. The Partner Bank will continue to be responsible for all financial due diligence associated with its normal underwriting process. The Partner Bank will agree to accept the Certifier's criteria and process of certification of that criteria being met as valid to determine residential projects qualified to receive the beneficial terms of a Green Mortgage. The Partner Bank also agrees to offer a substantive interest rate reduction commensurate with default risk reduction and enhanced long term asset value of Green Mortgage-qualified homes. This discount must be significant relative to the normal market offer and not offset by additional fees and be upheld throughout the life of the mortgage.

## Promoting Benefits for "Pre-Certified" Green Homes

The Investor/Developer agrees, at the beginning of the development process to create a residential development subject to the Green Homes Criteria and signs a "Pre-Certification Agreement" (see "How does the "Green Homes" program work?" section above). The investor/developer meets with the Certifier and Partner Bank(s) to discuss including the project in their Green Mortgage program. Upon these partners' agreement and an accepted and signed "Pre-Certification agreement", the developer/investor can begin to market their project as "Pre-Certified for Green Homes" and informing potential buyers they will have a special discount on financing

through the Green Mortgage program. It is the sole responsibility of the Investor/Developer to achieve all of the necessary criteria upon completion to enable issuance of the Green Mortgage product. All advertising of interest rates must conform to local law.

## Completion of Project, Certification and transacting Green Mortgage for Home Buyers

Upon analysis and successful achievement of a project as "Green Homes certified", the Certifier notifies the partner bank(s) that the project is eligible to receive the discounted terms of the bank's Green Mortgage product. The underwriting process is similar to the partner bank(s)'s standard procedure from this point forward.

*NOTE: while the Green Mortgage terms are made available only upon the Certification after the project has been completed, Investors/Developers must confirm with the participating banks at the inception of the project that the bank(s) are willing to issue mortgages for the project and would extend the benefits of a Green Mortgage should the project qualify.*

## Monitoring of the Program

Borrowers benefiting from Green Mortgages will agree to supply annual energy and water usage data to the Certifier, confirm of the installation of energy efficient appliances post-occupancy, and be subject to retesting of indoor air quality and water quality.

This data will be shared with the participating banks to compare predicted versus actual green performance and to determine continued eligibility for a discounted mortgage. Additionally, the partner banks will share information on portfolio performance comparing their Green Mortgage to standard mortgage results.



# Frequently asked questions

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## What are the first steps for a residential investor/developer interested in qualifying their project for Green Mortgage program?

It is important to contact the Certifier at the earliest possible point of the development process. Given the importance of site location, it makes sense to understand what is a green approach to locating your project before purchasing land. The “Pre-Certification review” determines if it is feasible to expect certification as a Green Home subject to the planned approach of the investor/developer and what are the necessary steps to achieve certification.

## What has prevented Green Mortgages from appearing until now?

Loans that reward investments in energy efficiency have existed for a number of years globally but most were focused on renovation and specific items (e.g. windows, HVAC, insulation) rather than a holistic approach necessary for a truly high performance, green home. In addition, cost effective and credible methods to assess the homes green performance did not exist in most markets; something the Green Homes certification now addresses. In recent years, financial institutions have begun to create and implement “Energy Efficient Mortgages” (or EEMs) with the most active programs being seen in the United States where the Environmental Protection Administration’s “Energy Star” program for homes was used to qualify projects. Further progress has been seen with government-sponsored entities such as the Federal National Mortgage Association (commonly known as “Fannie Mae”) that purchase mortgages from lending banks encouraging incentives for these mortgages. Conclusive evidence strongly correlating energy efficient homes with substantially reduced

mortgage default risk and higher home values over time indicates we will see far more weight given from financial institutions on the energy and green performance of the homes for which they underwrite mortgages.

Furthermore, the European Commission’s DG Energy supported “Energy Efficiency Financial Institutions Group” (see EFIG.eu) has been actively exploring methods to remove barriers to long-term energy efficiency financing. The Green Homes and Green Mortgage program is now included as a Case Study in the EFIG underwriting guide for financial intuitions on green finance.

## How is the integrity of the Green Homes assessment process assured?

The mission of the program is to ensure the transformation of the construction and real estate industry toward greater environmental responsibility. To accomplish this, creating and administering a credible and effective process to assess and reward only qualified projects for inclusion in incentive programs is of paramount importance. The Pre Certification Agreement established both the criteria and a clear indication of how successful achievement of the criteria must be achieved. Representatives of partner banks offering Green Mortgages based on the certification are invited to participate in the certification process to see firsthand how information is verified.

Furthermore, the SMARTER consortium, will, with input and governance from partner banks, residential investors/developers and other key stakeholders, establish a separate independent, non-profit organization with revenue derived only from certification activity to administer the Green Homes

certification process. This step will occur prior to May 2021.

## Is the Green Homes certification the only way to be eligible for a Green Mortgage?

The program administrators believe their Green Homes certification programs are the most cost effective and relevant method to assess green performance and resulting beneficial ongoing financial profile of homes. The Certifier does not, however, want to create undue administrative burdens or costs on residential investors/developers who may wish to pursue another recognized green home certification. Therefore, with prior consultation with the Certifier and partner banks of the Green Mortgage program, a project can be qualified for significantly reduced costs by recognizing other certification systems. Some accepted programs with residential certification tools include Living Building Challenge, DGNB, LEED, BREEAM, and HQE.

For example, a developer/investor chooses to pursue LEED for Homes certification of the project. The Certifier believes LEED “Gold” is a sufficient level of achievement to be qualified for a Green Mortgage. The Pre-Certification agreement between the investor, partner banks and the Certifier would specify the developer achieve LEED “Gold” certification and accomplish a reduced list of green criteria not already covered by LEED. The Certifier and the investor would also agree upon a significantly reduced fee – 10 to 20% of the standard certification fee plus travel costs if any, for example – to perform a one time, local assessment of the project to provide assurance to the participating banks of conformity to the Green Mortgage program goals.

# Reference notes cited in this toolkit

<sup>1</sup>**University of North Carolina Center for Community Capital – Institute for Market Transformation. *Home Energy Efficiency and Mortgage Risks*. March 2013**

The Green Mortgage program criteria require a higher level of energy efficiency improvements relative to standard than the “Energy Star” homes used in this research. These facts indicate we could expect equal or greater relative reductions in energy costs from applying green home criteria and thus similar or greater relative reductions in mortgage default risk.

The Energy Star homes used in this research must achieve energy efficient performance greater than 15% of the International Energy Conservation Code although many achieve savings of 20 to 30%. Furthermore, the green building principles and approaches rewarded by Energy Star are included in Green Mortgage criteria; each having a strong, positive impact on building quality and reduced energy costs. The program also includes a greater focus on avoiding toxicity in building materials choices which does not impact (or does so minimally) on costs for the whole project.

<sup>2</sup>**Journal of Sustainable Real Estate Volume 5, Number 1, Pivo, Gary. *The Effect of Sustainability on Mortgage Default Prediction and Risk in Multifamily Rental Housing*. San Diego, 2013**

<sup>3</sup>**Appraisal Institute. *Appraisal Institute Supports USGBC’s ‘Green’ Home Report Findings*. Washington D.C., 2014**

<sup>4</sup>**U.S. Green Building Council. *LEED® in Motion: Residential*. Washington D.C., 2014**

<sup>5</sup>**European Commission. *Energy prices and costs report working document*, p.127. Brussels, 2014**

Weighted importance of household energy products on household budgets was extracted from statistics provided by Eurostat. “The Harmonised Index of Consumer Prices (HICP) is an indicator used for monetary policy decisions and is calculated in each Member State using a common methodology.” “The assigned weight represents the importance of goods and services in a country’s consumption structure.”

Paying energy bills rank high on financial priorities of households as the energy companies have effective means of ensuring paying by stopping the supply of essential energy.

## Additional references reviewed

**ADOMATIS, Residential Green Valuation Tools. Appraisal Institute. Chicago (USA) 2014**

**BONNEFOY, X. *Inadequate housing and health: an overview*. In: *International Journal of Environment and Pollution*, 30 (3–4), p.411–429. Paris, 2007**

**ICEMENERG & ANRE, *Monitoring of EU and national energy efficiency targets*. In: *Energy Efficiency Policies and Measures in Romania*. Bucharest, Odyssee Mure, 2012**

**INTERNATIONAL ENERGY AGENCY, *Mobilising investment in energy efficiency: Economic Instruments for low-energy buildings*. Paris, 2012**

**MUNDO–HERNANDEZ, HERNANDEZ–ALVAREZ, SOSA–OLIVER, *Designing Sustainable and Healthy Homes*. In: *European Scientific Journal*, vol.10, no.20. July 2014**

# Appendix 1

## Selection of certified green residential projects for the SMARTER Finance for Families consortium



### Passive House at Wayside Cork, Ireland

This single dwelling completed in 2016 is outstanding from both low energy and ecological points of view. It was designed to meet the Passive House standard criteria, it has extremely low heating bills and a monitoring systems for CO2 level, which is controlled by the heat recovery ventilation system. The water consumption is reduced with 80% compared to a typical Irish dwelling, it has a BER rating of A1 and meets the Net Zero Energy Standard.



### Amber Gardens – by Alesonor Tunari, Romania

This luxury homes project includes 21 completed villas with a total of sixty planned. The houses are designed and constructed using bi-climatic design principles to achieve the ambitious Passiv Haus energy efficiency certification and, with photovoltaic panels installed, have already surpassed in 2014 the nearly “Net Zero Energy” standard due by European Directive in 2020. Non-toxic coatings, adhesives, and other building materials ensure the future

health of the families living at Amber Gardens. The homes and an adjacent playground and common garden use native plants and non-toxic and sustainably-sourced materials. The roads and sidewalks were designed and constructed to eliminated adverse environmental impact of the project site. This project is the first Green Homes approved project certified by RoGBC for detached homes.



### One Herastrau Park Residence – by One United Bucharest, Romania

This project to be completed in April 2017 includes 106 apartments and has committed to achieve the necessary criteria established by the Green Homes certification program. The concept of integrated design and all sustainable strategies are being considered including: significant reduction of construction waste through responsible construction management strategies, operational waste separation for households, and energy efficient measures combined with an occupant educational program to optimize and reduce all the energy consumption throughout the building lifecycle.



### Silken Park– by Durkan Residential Silken, Ireland

This project was completed in 2017 and is a residential development with 59 homes. The buildings are very efficient in terms of energy consumption, meeting the Passive House standard requirements. It was rated with BER A2 and A3, was designed to reduce water consumption by 40% compared with typical Irish dwellings and provides charging stations for electric vehicles.



### Home Cast – by Building srl Almese, Italy

This building, awarded by GBC Italia with a Gold Certificate, was created from the will of the clients to create a sustainable and efficient home. It was designed to ensure strong energy efficiency performance due to careful planning of the thermal envelope, glazing and the use of the sun as an energy source. The need to make the most of solar radiation in the winter period was met by the construction of large south-facing windows and solar collecting greenhouse. The building is shaded during the summer by appropriately-designed overhangs.





### **Casa Solaris – by Casa Solaris SRL Voluntari, Romania**

Is a single-family home located in the north of Bucharest that was competed in 2014 and certified in RoGBC's Green Homes program. It is the first of a mini ensemble of 3 individual pilot homes. It is an active house – producing more energy than needed for its current operation – due to the contribution of its 72 sqm of photovoltaic panels with surplus solar electricity being fed into the public grid. Casa Solaris is also equipped with 37 sqm of thermal collectors used for both domestic hot water production and winter heating, using an innovative approach of underground storage of the summer heat surplus eliminating the need for a heat pump. Energy efficient construction and smart solutions for heating and cooling reduced the energy load to approximately 50 Kwh/sqm/year. The technology provides a healthy interior climate with controlled humidity and uniform temperature without undesirable air flows.



### **Central District – by Forty Management Bucharest, Romania**

This project of 40 units is Pre-Certified to achieve the necessary criteria established by the Green Homes program. The innovative design concept of the building includes: complete LED illumination,

plants and trees on the facade and terraces to create a sense of nature for the residents, individual controls of heating and cooling, natural ventilation for the units, modular architecture for apartment reconfiguration, innovative architectural solutions for the terraces such as the active ceramics, filtering the air and presenting anti-pollution and antibacterial effects, non-toxic paints and adhesives, window adjustment for each apartment to enjoy a certain view and various energy efficient measures to optimize and reduce the energy consumption throughout the building lifecycle.



### **X-LOFT Prague, Czech Republic**

Is a unique residential project located near the center of Prague in a quiet location of the original development of apartment buildings in Liben. An important part of the project philosophy is the economic and ecological operation of the house. The X-LOFT project was designed to save not only the costs for its inhabitants but also nature. Facade insulation, triple glazing, solar panels, heat recovery and rainwater retention ensures a significant reduction in operating costs. The low-energy project has been awarded the SBToolCZ silver certificate, which assesses the quality of buildings in terms of sustainable construction.



### **Selenium Retro 9 – Aşçıoğlu İnşaat Istanbul, Turkey**

Selenium Retro has been designed and built in accordance with the LEED criteria set by the US Green Building Council (USGBC) to ensure healthy and comfortable indoor conditions for all users. In addition to saving energy and water costs, the negative impacts of buildings on the environment were minimized in line with the criteria for material selection. In addition, with the implementation of these criteria, healthy living quality, productivity and cost optimization for the project's inhabitants were achieved. In line with the environmental procurement policy, local and recycled materials and FSC-certified wood were specified to minimize environmental impacts.



### **The EFdeN Home – by Team EFdeN Bucharest, Romania**

The EFdeN house was designed by Romania's university team as an entry to the prestigious "Solar Decathlon Europe 2014" contest. The home was assembled in Paris for the summer contest and is now constructed at the Technical University of Construction – Faculty of Installation Engineering in Bucharest. The EFdeN house successfully defines sustainability and integrated green and healthy materials. The central architectural prototype is a greenhouse providing a multi-functional integrated green



space that delivers urban farming/ food production, natural daylight, indoor air quality, and passive solar heating as well as a relaxing living space. The project received the Green Homes certification from the Romania Green Building Council.



### **Central District 4 Elemente – by Forty Management Bucharest, Romania**

Central District 4 Elements is located in the central area of Bucharest, on 7 Fizicienilor Street, a perfectly positioned place to quickly reach the vibrant areas of the city, but sufficiently low-key to feel the protection of a quiet community.

Central District 4 Elements means: **Air**, represented by large, spacious areas, from terraces and balconies that can receive tables with chairs to enjoy the morning coffee to generous receptions and large circulations; **Water**, represented by 3 large pools and garden fountains, located in the common yard of the blocks; **Earth**, represented by more than 2500 square meters of green spaces, with flower gardens, large trees and a promenade area; **Fire**, represented by about 500 square meters allocated to the social area, with bar, grill, sun umbrellas, tables, chairs, and an outdoor cinema – spaces that encourage discussions and building friendships between neighbors.

All these elements prove that there are no houses without soul and real estate development without a community. The project is due to be completed in August 2020.



### **9 Rathmines Crescent – by Dublin City Council Dublin, Ireland**

This project owned by the Dublin City Council was completed in 2016 and certified by the Irish Green Building Council. It has 9 apartments and low operational costs due to careful design of form, insulation, junction and heat recovery ventilation system. It was built on a brownfield and its location enables very low carbon footprint from transportation and active lifestyles.



### **One Herastrau Plaza – by One United Bucharest, Romania**

Through an integrated urban residence concept, the project's two buildings will connect 147 apartments to essential neighborhood services and nearby recreation in parks and lakes; creating convenience and reducing transportation impact. Combining geometric and vegetative elements, One Herastrau Plaza is simultaneously its own square for residents and an extension of a natural landscape in the city. Bio-climatic design, a terrace, planted roofs and shaded streets are additional elements of green features of the project. The atrium in the outdoor plaza is covered with glass panels on an ornamental steel structure while the natural, locally-sourced, stone walls accent confers elegance. Ventilated facades contribute to the thermal performance of the buildings.



### **Casa Capristo Ranica, Italy**

This project is a renovation of an existing house built in 1990 to make it highly efficient and sustainable. The project moved from the use of classic systems for heating, lighting and irrigation to the use of electricity from renewable sources. A photovoltaic system with amorphous panels was installed. The heating system was built with radiant floor systems supplied by a heat pump and solar thermal panels and produced domestic hot water eliminating the gas supply.

The entire building is equipped with air treatment with continuous recirculation inside the individual rooms to guarantee indoor air quality. Rainwater is harvested from the roof and reused for watering the garden and through an integrated system for the toilets. The electrical system is realized with a domotic system in particular for the control of electrical loads that guarantees to be able to fully use the photovoltaic system.

The envelope was made of wood fiber, to ensure maximum contribution from the thermal and acoustic point of view and together with the laid parquet have PEFC certification.

The windows are in wood-like aluminum and wood, with triple glazing and high transmittance performance. There are external shading systems such as sun-shadings that can be adjusted and integrated with the home automation system to guarantee maximum internal lighting in the individual rooms.



### **Valley 21 – by Dalghias Development & Building the future**

#### **Vama Buzaului, Romania**

This project includes 60 low impact, deep green homes that incorporate bioclimatic principles and green energy usage. The project has begun the construction of what will be the anchor of the community; a hospitality center. The model home was completed and certified in September 2016. The project merges modern and traditional building methods and incorporates local, sustainable materials.



### **Casa Monica**

#### **Modena, Italy**

This single-family building has achieved the top Platinum level with 89 points out of 110 according to the GBC HOME 2011 protocol; representing a model of sustainability with respect for the historical and architectural conditions of the building. The structure of the basement is made of reinforced concrete, while the floors above ground are made using prefabricated wooden structures.

The integrated energy production system involves the use of solar thermal, geothermal and photovoltaic, combined with a heat pump; no fossil fuel is used. The further optimization of energy consumption is achieved during the summer season by a free cooling

system, which allows in some phases of the summer season to be able to cool the house directly through the energy supplied by the ground, without the need to use the heat pump compressors. It is also equipped with a heat recovery controlled mechanical ventilation system with recovery yields exceeding 90%. The air exchange system during the summer season has the function of dehumidifying the rooms.



### **Residence “Leonardo da Vinci” – by Asacert srl**

#### **Vicenza, Italy**

The architectural volumes are designed according to the maximum perception and use of sunlight, the quality of living and the considerable view, free of obstacles, on the Vicenza pre-Alps and the countryside. The geometry and the particular design and orientation of the roofs make them suitable to receive solar energy through photovoltaic panels.

The building is built in an urbanized area convenient to the center and is served by sidewalks, cycle paths and a developed public transport service. This residential development was awarded by GBC Italia with the Gold Certification. The water consumption is reduced by 39% compared to the baseline value. The condominium has been built with local or regional materials, with a high recycled content, and with third party EPD certification.



### **Hemp House**

#### **Sibiel – Sibiu, Romania**

This model house, scheduled for completion in December 2019, is a 100 sqm single family home that will utilize a combination of hemp and lime – both for the walls and for the insulation of those walls, roofs and doors.

The mix of hemp and lime ensures an optimal level of air humidity, and eliminates the risk of mold growth and the presence of pests, while also ensuring very good thermic insulation. The lime content absorbs Co 2 in the atmosphere for up to ten years and the manufacturing method requires only one third of the typical water consumption, decreasing the environmental impact of the building. All construction materials are 100% natural and of local origin.

The structure of the house is made of laminated wood with recycled wood used for the interior stairs and furniture, with locally produced wooden joinery.



### **Lake District**

#### **– by American Eco Homes SRL**

#### **Iasi, Romania**

This project in the Miroslava community near Iasi has begun construction with plans for over 600 row houses with the first tranche certified in the RoGBC Green Homes



program. The project uses innovative structurally insulated panels to achieve superior energy performance, seismic resistance and construction quality while maintaining affordability. The Lake District project's homes include passive solar design and optimize natural ventilation, Forest Stewardship Council (FSC)-certified wood, low VOC paints, adhesives, and flooring and water efficient sanitary items and landscaping. The project's construction management diverts over 50% of construction waste from landfills (with 25% being standard industry practice).



#### **Over4 prototype – by Team Over4 Bucharest, Romania**

The Over4 house is a prototype designed and built by a multidisciplinary team of students from Romania – the Over4 team – for the Solar Decathlon Europe 2019 competition. It is a modular solar passive house, assembled and disassembled multiple times both in Romania and Hungary. It is built entirely from wooden materials from sustainable sources, meets each requirement of the passive house standard and has a PV system; creating an energy independent house. It was awarded the 3rd place in the Solar Decathlon Europe competition, is pre-certified by the Romania Green Building Council with Green Homes certification and is currently under the process of full certification.



#### **Jardine Hills – by Mason Jar Dealu Mare – Prahova, Romania**

Located in the wine region of Dealu Mare, "Jardine Hills" consists of an existing main house and guest cottage and three newly-constructed guest cottages that combine a modern, green approach with a rustic design. Photovoltaic panels provide off-grid electricity (3.6 kW), while solar thermal panels and a high efficiency heat pump supply hot water for domestic use and heating the swimming pool. The entire grounds are landscaped using sustainable principles including using drought resistant plants, natural mulch and a low water use drip irrigation system. Energy efficient windows, doors, insulation and other materials combined with a state of the art air to air heat pump system heat and cool the new guest cottages; each with separate thermostatic zone and controlled with a smart phone-enabled application for remote initiation, monitoring and adjustment.



#### **Belvedere Green Homes Residence Galati, Romania**

The Belvedere Green Homes Residence Residential Complex has 14 homes, divided into two 6-dwelling buildings (Sixplex) and a duplex house, designed specifically to meet the space and comfort needs of the owner, on the ground floor and on the first floor, with its own parking, terrace

and garden. Belvedere Green Homes Residence is located in one of the most coveted areas of Galati, a quiet area, in the vicinity Arcasilor Street and is the first Green Homes certified residential project in Galati by Romania Green Building Council.

The project offers a number of advantages and facilities:

- Access to local means of transport;
- In the vicinity of Metro, one of the most popular supermarkets in the city;
- The area is attractive for the inhabitants, it can be reached in a few minutes at Shopping City Galati, accessible by public transport or by car.



#### **C Condominio Iannini L'Aquila, Italy**

Iannini condominium is the first post-earthquake Reconstruction Building certified by GBC Home. Particular attention was given to energy performance, reduction of environmental impacts and the maximization of comfort and healthiness of indoor environments. Unique, as the first realization in the Aquila area but perfectly aligned with the international practices that make Sustainable Building the main modus operandi to guarantee performances and investments. The building has achieved a 44% in water reduction and 59% reduction in energy consumption.



### **Aviatiei Park – by Forte Partners Bucharest, Romania**

Located in the north of the capital, in an area that gathers new-wave companies and businesses, The Aviatiei Park Complex meets the needs of a young and dynamic audience to live close to the workplace and save time. Future residents of the complex will have the opportunity to enjoy the surroundings, take their children to The Herastrau Park, an 8-minute walk. For shopping, Lidl and Mega Image are right at the exit of the complex, and the Promenada Mall is a 2-minute drive away.

The Aviatiei Park complex offers one, two, three or four-room apartments with a warm and welcoming atmosphere where natural light is abundant and generous. Each space is efficiently partitioned, providing residents with various possibilities for fitting and usage, adapted to a modern lifestyle.



### **One Charles de Gaulle – by One United Bucharest, Romania**

The 33 units within two, low height buildings of the residential compound respects a historic area and is dedicated to upholding the environmentally-friendly characteristics of Green Homes. This includes green terraces, high energy efficiency, use of natural materials and waste minimization and management

during construction and operation of the buildings. The project design is optimized to provide natural lighting and ventilation. Sustainable landscaping and lush gardens, carefully designed, complete the list of Green Homes benefits.



### **Vision – by Studium Green Cluj-Napoca, Romania**

This completed project of 177 apartments delivers nearly 40% energy savings relative to standard, utilizes an existing building structure to minimize resource use and construction waste, is connected via public transit to the city center, and has easy, walk-able access to numerous facilities including shopping and schools. It was the first Green Homes approved project certified by the Romania Green Building Council.



### **Camelia Warsaw – Bouygues Immobilier Polska Warsaw, Poland**

This HQE Excellent certified residential project was completed in 2018 and is located in the capital of Poland. The total usable floor space of this residential development is 7.900 sqm representing. These are 161 high quality apartments with low energy consumption in the heart of Warsaw.



### **Šumavský Dvůr Železná Ruda, Czech Republic**

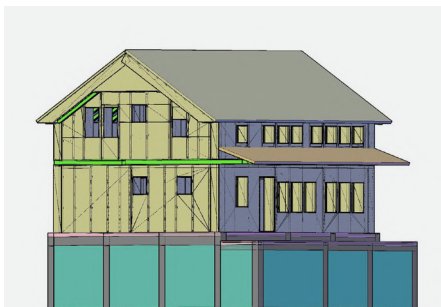
Šumavský Dvůr is a unique mountain apartment in the heart of the Bohemian Forest, in a harmonious nature with a unique view and year-round sports. It offers above-standard architecture with comfortable services. Within the framework of a good climate and a quiet zone, the location was chosen to not damage the character of the whole landscape. The project was designed to be both comfortable and sustainable because it was built with a natural character, with renewable construction materials and it has been awarded the SBToolCZ silver certificate.



### **Residence Galileo Costabissara, Italy**

The residential project completed in 2014 was the first to obtain the Gold level of GBC Homes. The complex develops a gross area of 1067 m2 and consists of 8 Energy Class A residential units. Among the various construction technologies used are the heat pump heating and cooling systems, the mechanical ventilation systems for hygienic renewal with heat recovery, the production of domestic hot water through thermal solar panels, photovoltaic panels to support the electric system, windows with triple glazing, and a rainwater recovery tank.





### **Ecological House Slava Rusă** **Slava Rusă – Tulcea, Romania**

The 80 sqm family house will be entirely energy independent, using a mix of wind and photovoltaic energy. The house has a biodynamic design, offering maximum exposure to sunlight during winter and shading in summer time. The house will include solar panels for water heating, heat recovery ventilation system and heat pumps.

The structure of the house will be made of wood, while the roof will be made of reed; a local traditional material. Natural waste water treatment will be accomplished with the reed plantation.

The house will be completed in 2020.



### **AFI City Bucurestii Noi – by AFI** **Europe Romania** **Bucharest, Romania**

The project developer, active on the Romanian market, agreed to achieve the necessary criteria to Certify a total of 1.688 units for a multi-family residential unit in the North East of Bucharest. All green energy and energy efficiency strategies are being considered at this early stage of the design project along with due consideration for site management and a plan for facilitated waste avoidance and management post occupancy.



### **Floreasca 1 – by 1development** **Bucharest, Romania**

This project of 22 luxury apartments – completed and certified in RoGBC Green Homes program in February 2015 – is in a premier residential section of Northern Bucharest, has good public transit access and is in a walkable district with shopping, schools, and other essential services nearby. The project provides superior energy efficiency and thermal comfort and incorporates sustainable landscaping and finishings including wood certified by the Forest Stewardship Council.

## Green Homes Solution Providers in the program today!

With green products such as mineral wool insulation with bio-based, formaldehyde-free ECOSE™ technology and UrbanScape™ lightweight green roof solutions KNAUF Insulation became one of the first Green Homes Solution Provider. This solution contributes to the Energy Efficiency, Sustainable & Healthy Materials, and Indoor Air Quality criteria.



VELUX roof windows provide natural daylighting and natural ventilation and use sustainably harvested forest products.



E-MOTION ELECTRIC's car charging stations are manufactured and include fast charging options for a variety of plug-in-hybrid and full electric vehicles.



## Appendix 2: Multi-Family

### Example of assessment criteria for Green Homes certified projects New Construction & Major Refurbishment, Renovation & Retrofits

		17	ENVIRONMENTAL LEADERSHIP
A1	Integrated Design	Required	To optimise the design and construction process, increase environmental performance, and reduce costs by including a wider array of expertise early in the design process. The team members who must be involved in the beginning of the design phase include architects, engineering, green building consultant and/or bio-climatic design specialist (depending on the existing green expertise of the design team), energy modelling, landscape architecture, habitat restoration, and land-use planning. An advisor will be available as part of the Green Homes certification agreement to help facilitate meetings and design charrettes to ensure optimal project approaches.
	Education for the design team	2	The Certification team will conduct workshops for the design team to explain the certification process and green building principles. The design team members will be required to attend a minimum of 3 courses within the Green Building Professional education platform. The cost of these courses is included in the Green Homes certification agreement.
A2	Life Cycle Assessment	Required	To create benchmarks, to identify and use construction materials with a low environmental impact, including embodied carbon, over the full life cycle of the building.
A3	Construction Waste Management Planning	Required	To divert from landfills and incinerators a minimum of 50% of the waste generated from construction or renovation/ refurbishment. The diversion can be achieved by implementing waste prevention measures and strategies, reuse on site, or sorting for recycling. The diversion will be based on volume of each material used and will include at least 4 materials used. Excavated soil and land-clearing debris are not considered in the calculations of percentage for this credit.
		3	If the above was achieved, additional points will be earned for a minimum of 75% of construction waste materials diverted from landfills or incineration with or without energy recovery.
A4	Responsible construction practices	3	To reduce pollution and disruption caused by construction activities and to recognise and encourage an environmentally and socially responsible approach to construction site management.
A5	Operational waste management	Required	To include within the design and construction stage a system for the homeowners to sort inside their home by at least three main categories: recyclables, biodegradable and residual waste. Recyclable materials must include mixed paper, corrugated cardboard, glass, plastics and metals.
		Required	A special outside area must be dedicated to the safe collection, storage, and disposal of the following: batteries, mercury-containing lamps, and electronic waste.
		3	If the above has been achieved, additional points can be earned for including a composting area or compost tumbler for yard clippings and kitchen food waste. The owners/tenants shall be provided with composting instructions in the manual referenced in section B2: Education for homeowner / Ensuring Green Performance
A6	Commissioning for Insulation Installation via thermography, for supply and Return Air Flow Testing, Mechanical Ventilation Testing and Low Leakage	6	Building commissioning is encouraged to improve construction quality and post-occupancy building performance by eliminating potential installation flaws and optimizing the installed systems. The process includes verifying all of the subsystems for mechanical (HVAC), plumbing, electrical, fire/life safety, building envelopes, utility plants, lighting, wastewater, controls, and building security to achieve the owner's project requirements and green performance as intended by the building owner and design team.
			ONGOING PERFORMANCE
B1	Transparency and Information sharing	Required	To establish a green building performance monitoring, financial benchmarking and to help improve the certification criteria for the future, homeowners or tenants will share energy and water usage data on an anonymous basis.
B2	Education for homeowner / Ensuring Green Performance	Required	A manual must be created and provided to all new homeowners that inform and educate about proper operation of the home in a green and cost-effective manner. This includes ensuring understanding of building systems, household waste management and non-toxic cleaning methods.
		22	SITE & LOCATION
C1	Sustainable site	Required	Development in National Parks and sensitive areas such as parkland, floodplain, wetlands, water bodies is strictly forbidden. The terms of Natura 2000 legislation will be followed.
C2	Compact development	2	To encourage higher density and compact buildings and reduce environmental impact on the site development. Provide proof of increased density for multi-family residential projects. Include calculation of dwelling units per hectare.
C3	Smart development	4	To encourage the safe reuse of former industrial or contaminated sites and to decontaminate and increase their ecological value and the value of the community.
C4	Heat Island Effect Reduction	3	To diminish the heat absorbed by both roof and non-roof structures, to improve energy efficiency and outdoor habitat for humans and wildlife via vegetative or cool roofs, green walls, high Solar Reflectance Index (SRI) pavements, etc.
C5	Rainwater management	2	To reduce the rainwater runoff from the existing site by collection and possibly reusing it for the existing landscape. Installing permanent infiltration or collection features (ex. vegetated swale/ rain garden/ rainwater cistern) that can handle 100% of the runoff from a 2-year, 24-hour storm, permeable pavement, rainwater collection, filtration and bioretention features.
C6	Reduced light pollution	Required	To reduce the energy consumption associated with the exterior lighting and reduce nighttime light pollution; increasing the visible night sky access and to improve nighttime visibility.
C7	Access to amenities	5	Easy access to amenities such as Parks, Shopping, Houses of Worship, Fitness Centers, banks and ATMs, market stores, schools, etc. to reduce traffic, fossil fuel use, and air pollution.
C8	Alternative transportation	6	To encourage green transport choices by locating the project near public transportation and through the installation of bike lockers or racks, electric charging stations, pedestrian accessibility, car sharing parking spaces, and community transportation.
		18	WATER EFFICIENCY
D1	Water metering	Required	To support water efficiency efforts by monitoring and benchmarking water use over time.
D2	Water efficient fixtures	5	To reduce total indoor and outdoor water consumption, thus contributing to a more efficient sustainable water operation activity.
D3	Plumbing or Pre-plumbing for greywater system	3	To reduce the water consumption by collecting and reusing stormwater from the site. Pre-plumbing creates the framework for possible future collection and distribution of greywater.
D4	Fully Operational greywater system	5	To reduce the water consumption by collecting and reusing greywater from the site.
D5	Water Efficient landscaping		To utilize strategies to minimize or eliminate water usage, reduce maintenance costs and toxicity from pesticides while providing enjoyable landscaped areas. Strategies include using local, adaptive plants, and non-turf landscaping solutions.
		2	At least 50% Xeriscaping with remaining landscape watered via drip irrigation
		5	100% Xeriscaping with landscape watered only via manual irrigation
		38	MATERIALS & RESOURCES

E1	Natural materials		To encourage the use of natural materials which have environmentally and economically preferable life cycle impacts such as limestone, brick, cob, hemp, wool, etc.
		2	Use 30% of the total volume of materials used on site.
		3	Use 50% of the total volume of materials used on site.
		5	Use 75% of the total volume of materials used on site.
E2	Reclaimed materials	5	To encourage the use of at least 30% reclaimed material (salvaged, refurbished or reused) in volume from the total of materials used on site.
E3	Local/regional cladding materials	4	To encourage the use of the local production and to use products that were extracted, processed or manufactured locally for maximum 160 km for 50% of the materials used; 30% from a 500 km radius and 20% of 1000 km radius.
E4	Recycled content	3	To encourage the use of a minimum of 30% recycled content materials based on volume from the total used on site.
E5	Environmentally Responsible Sources		To encourage selection of products that have been extracted or sourced in a responsible manner.
		Required	100% of Timber used must be legally forested as evidenced by a Chain-of-Custody (CoC) documentation.
		3	50% of all timber used quantified in m <sup>3</sup> must be Forest Stewardship Council (FSC) certified.
E6	Low volatile organic compounds (VOC)		To reduce the health risk of the residents by using low (up to 10 grams per liter VOC) or no VOC by reducing concentrations of chemical contaminants that can damage air quality, human health, productivity, and the environment. This applies to all paints, coatings, adhesives, and sealants.
		3	Low volatile organic compounds (VOC)
		6	No volatile organic compounds (VOC)
E7	Fire resistant materials	5	To increase fire safety by using insulation materials that are fire resistant.
E8	Renewable materials	3	To decrease dependence of non-renewable materials by using at least 30% in volume of renewables and rapidly renewables such as bamboo wood, cork, cotton (recycled denim), agrifiber, natural linoleum, etc. from the total amount of materials used on site.
		10	<b>HUMAN HEALTH &amp; WELLNESS</b>
F1	No smoking in the common areas	Required	To prevent or minimize exposure of building occupants to tobacco smoke. Prohibiting smoking in all common areas of the building. The prohibition must be communicated in building rental or lease agreements or in condo or co-op association covenants and restrictions, and provisions for enforcement must be included.
F2	Bioclimatic strategies	Required	Every regularly occupied space must have operable windows that provide access to fresh air and daylight.
F3	Formaldehyde, VOC, & Particulate testing air testing before home occupancy	Required	Air testing must occur prior to occupancy of the home to ensure Formaldehyde, Total volatile organic compounds (VOC) and particulates (PM2.5) are within healthy limits.
F4	Water testing performed before home occupancy	Required	Water testing must occur prior to occupancy of the home to ensure bacteria, Lead, pesticides, Nitrate/ Nitrite, Nitrite, Chlorine, pH, and water hardness are within healthy/acceptable limits.
F5	Acoustic comfort	3	To improve indoor comfort and relaxation sound mitigation solutions must be utilized to reduce interior and exterior noise.
F6	Biophillic Design	3	To alleviate stress and anxiety and improving the indoor environment and air quality.
F7	Urban Farming/ Food Production	4	To improve food security, support a local economy, and contribute to social inclusion Urban Farming and Food Production is encouraged. This is synergic with credit A3: Operational Waste Management and with C4: Heat Island Effect Reduction. It contributes to the greenery of the city along with efficient use of urban waste.
		45	<b>ENERGY OPTIMISATION</b>
G1	To reduce excessive energy use, shift toward low carbon energy solutions, improve energy security, and reduce energy costs.	Required	30% improvement in Kwh/m2/year energy performance compared to the minimum score for earning an "A" in the Energy Performance Certificate (EPC).
		15	45% improvement per above
		20	60% improvement per above
		25	Passive Haus Certificate
		35	True Net Zero Energy
		45	Net Positive Energy Building
		10	<b>INNOVATION</b>
H1	Various Ideas & Solutions	10	Ideas or Solutions to improve the green performance of the project can be submitted for consideration of awarding of up to 10 points.
<b>TOTAL POSSIBLE POINTS</b>		<b>160</b>	
			Certified <b>80-99</b>
			Excellent <b>100-129</b>
			Superior <b>130-160</b>

## Appendix 2: Single-Family

### Example of assessment criteria for Green Homes certified projects New Construction & Major Refurbishment, Renovation & Retrofits

		<b>17</b>	<b>ENVIRONMENTAL LEADERSHIP</b>
A1	Integrated Design	<b>Required</b>	To optimise the design and construction process, increase environmental performance, and reduce costs by including a wider array of expertise early in the design process. The team members who must be involved in the beginning of the design phase include architects, engineering, green building consultant and/or bio-climatic design specialist (depending on the existing green expertise of the design team), energy modelling, landscape architecture, habitat restoration, and land-use planning. An advisor will be available as part of the Green Homes certification agreement to help facilitate meetings and design charrettes to ensure optimal project approaches.
	Education for the design team	<b>2</b>	The Certification team will conduct workshops for the design team to explain the certification process and green building principles. The design team members will be required to attend a minimum of 3 courses within the Green Building Professional education platform. The cost of these courses is included in the Green Homes certification agreement.
A2	Life Cycle Assessment	<b>Required</b>	To create benchmarks, to identify and use construction materials with a low environmental impact, including embodied carbon, over the full life cycle of the building.
A3	Construction Waste Management Planning	<b>Required</b>	To divert from landfills and incinerators a minimum of 50% of the waste generated from construction or renovation/ refurbishment. The diversion can be achieved by implementing waste prevention measures and strategies, reuse on site, or sorting for recycling. The diversion will be based on volume of each material used and will include at least 4 materials used. Excavated soil and land-clearing debris are not considered in the calculations of percentage for this credit.
		<b>3</b>	If the above was achieved, additional points will be earned for a minimum of 75% of construction waste materials diverted.
A4	Responsible construction practices	<b>3</b>	To reduce pollution and disruption caused by construction activities and to recognise and encourage an environmentally and socially responsible approach to construction site management.
A5	Operational waste management	<b>Required</b>	To include within the design and construction stage a system for the homeowners to sort inside their home by at least three main categories: recyclables, biodegradable and residual waste. Recyclable materials must include mixed paper, corrugated cardboard, glass, plastics and metals.
		<b>Required</b>	A special outside area must be dedicated to the safe collection, storage, and disposal of the following: batteries, mercury-containing lamps, and electronic waste.
		<b>3</b>	If the above has been achieved, additional points can be earned for including a composting area or compost tumbler for yard clippings and kitchen food waste. The owners/tenants shall be provided with composting instructions in the manual referenced in section B2: Education for homeowner / Ensuring Green Performance
A6	Third party commissioning	<b>6</b>	Commissioning is encouraged to improve construction quality and post-occupancy building performance by eliminating potential installation flaws and optimizing the installed systems. The process includes verifying the thermosystem installation and all of the existing mechanical systems and security.
			<b>ONGOING PERFORMANCE</b>
B1	Transparency and Information sharing	<b>Required</b>	To establish a green home performance monitoring, financial benchmarking and to help improve the certification criteria for the future, homeowners or tenants will share energy and water usage data on an anonymous basis.
B2	Education for homeowner / Ensuring Green Performance	<b>Required</b>	A manual must be created and provided to all new homeowners that inform and educate about proper operation of the home in a green and cost-effective manner.
		<b>22</b>	<b>SITE &amp; LOCATION</b>
C1	Sustainable site	<b>Required</b>	Development in National Parks and sensitive areas such as parkland, floodplain, wetlands, water bodies is strictly forbidden. The terms of Natura 2000 legislation will be followed.
C2	Compact development	<b>2</b>	To encourage higher density and compact buildings and reduce environmental impact on the site development.
C3	Smart development	<b>4</b>	To encourage the safe reuse of former industrial or contaminated sites and to decontaminate and increase their ecological value and the value of the community.
C4	Heat Island Effect Reduction	<b>3</b>	To diminish the heat absorbed by both roof and non-roof structures, to improve energy efficiency and outdoor habitat for humans and wildlife via vegetative or cool roofs, green walls, low Solar Reflectance Index (SRI) pavements, etc.
C5	Rainwater management	<b>2</b>	To reduce the rainwater runoff from the existing site by collection and possibly reusing it for the existing landscape. Installing permanent infiltration or collection features (ex. vegetated swale/ rain garden/ rainwater cistern) that can handle 100% of the runoff from a 2-year, 24-hour storm, permeable pavement, rainwater collection, filtration and bioretention features.
C6	Reduced light pollution	<b>Required</b>	To reduce the energy consumption associated with the exterior lighting and reduce nighttime light pollution; increasing the visible night sky access and to improve nighttime visibility.
C7	Access to amenities	<b>5</b>	Easy access to amenities such as Parks, Shopping, Houses of Worship, Fitness Centers, banks and ATMs, market stores, schools, etc. to reduce traffic, fossil fuel use, and air pollution.
C8	Access to transit	<b>6</b>	To encourage green transport options through the installation of electric charging stations, pedestrian accessibility, bike trails, and community transportation.
		<b>18</b>	<b>WATER EFFICIENCY</b>
D1	Water metering	<b>Required</b>	To support water efficiency efforts by monitoring and benchmarking water use over time.
D2	Water efficient fixtures	<b>5</b>	To reduce total indoor and outdoor water consumption, thus contributing to a more efficient sustainable water operation activity.
D3	Plumbing or Pre-plumbing for greywater system	<b>3</b>	To reduce the water consumption by collecting and reusing stormwater from the site. Pre-plumbing creates the framework for possible future collection and distribution of greywater.
D4	Fully Operational greywater system	<b>5</b>	To reduce the water consumption by collecting and reusing greywater from the site.
D5	Water Efficient landscaping		To utilize strategies to minimize or eliminate water usage, reduce maintenance costs and toxicity from pesticides while providing enjoyable landscaped areas. Strategies include using local, adaptive plants, and non-turf landscaping solutions.
		<b>2</b>	At least 50% Xeriscaping with remaining landscape watered via drip irrigation
		<b>5</b>	100% Xeriscaping with landscape watered only via manual irrigation
		<b>38</b>	<b>MATERIALS &amp; RESOURCES</b>



E1	Natural materials		To encourage the use of natural materials which have environmentally and economically preferable life cycle impacts such as limestone, brick, cob, hemp, wool, etc.
		2	Use 30% of the total volume of materials used on site.
		3	Use 50% of the total volume of materials used on site.
		5	Use 75% of the total volume of materials used on site.
E2	Reclaimed materials	5	To encourage the use of at least 30% reclaimed material (salvaged, refurbished or reused) in volume from the total of materials used on site.
E3	Local/regional cladding materials	4	To encourage the use of the local production and to use products that were extracted, processed or manufactured locally for maximum 160 km for 50% of the materials used; 30% from a 500 km radius and 20% of 1000 km radius.
E4	Recycled content	3	To encourage the use of a minimum of 30% recycled content materials based on volume from the total used on site.
E5	Environmentally Responsible Sources		To encourage selection of products that have been extracted or sourced in a responsible manner.
		Required	100% of Timber used must be legally forested as evidenced by a Chain-of-Custody (CoC) documentation.
		3	50% of all timber used quantified in m3 must be Forest Stewardship Council (FSC) certified.
		7	75% of all timber used quantified in m3 must be Forest Stewardship Council (FSC) certified.
E6	Low volatile organic compounds (VOC)		To reduce the health risk of the residents by using low (up to 10 grams per liter VOC) or no VOC by reducing concentrations of chemical contaminants that can damage air quality, human health, productivity, and the environment. This applies to all paints, coatings, adhesives, and sealants.
		3	Low volatile organic compounds (VOC)
		6	No volatile organic compounds (VOC)
E7	Fire resistant materials	5	To increase fire safety by using insulation materials that are fire resistant.
E8	Renewable materials	3	To decrease dependence of non-renewable materials by using at least 30% in volume of renewables and rapidly renewables such as bamboo wood, cork, cotton (recycled denim), agrifiber, natural linoleum, etc. from the total volume of materials used on site.
		10	HUMAN HEALTH & WELLNESS
F1	Radon-Resistant Construction	Required	To reduce homeowner’s risk of lung cancer from exposure to radon in indoor air.
F2	Bioclimatic strategies	Required	Every regularly occupied space must have operable windows that provide access to fresh air and daylight.
F3	Formaldehyde, VOC, & Particulate testing air testing before home occupancy	Required	Air testing must occur prior to occupancy of the home to ensure Formaldehyde, Total volatile organic compounds (VOC) and particulates ( PM2.5) are within healthy limits.
F4	Water testing performed before home occupancy	Required	Water testing must occur prior to occupancy of the home to ensure bacteria, Lead, pesticides, Nitrate/ Nitrite, Nitrite, Chlorine, pH, and water hardness are within healthy/acceptable limits.
F5	Acoustic comfort	3	To improve indoor comfort and relaxation sound mitigation solutions must be utilized to reduce interior and exterior noise.
F6	Biophillic Design	3	To alleviate stress and anxiety and improving the indoor environment and air quality.
F7	Food Production	4	To improve food security and support a local economy. It contributes to the greenery of the city along with efficient use of urban waste.
			This is synergic with credit A3: Operational Waste Management and with C4: Heat Island Effect Reduction.
		45	ENERGY OPTIMISATION
G1	To reduce excessive energy use, shift toward low carbon energy solutions, improve energy security, and reduce energy costs.	Required	30% improvement in Kwh/m2/year energy performance compared to the minimum score for earning an “A” in the Energy Performance Certificate (EPC).
		15	45% improvement per above
		20	60% improvement per above
		25	Passive Haus Certificate
		35	True Net Zero Energy
		45	Net Positive Energy House
		10	INNOVATION
H1	Various Ideas & Solutions	10	Ideas or Solutions to improve the green performance of the project can be submitted for consideration of awarding of up to 10 points.
TOTAL POSSIBLE POINTS		160	
			Certified <b>80–99</b>
			Excellent <b>100–129</b>
			Superior <b>130–160</b>

# Appendix 3

## Financial example for Green Mortgages

*i The annual savings of a Green Homes certified apartment can equal 1 and 1/2 mortgage payments or more!*

This case study from Romania compares an average “new build” project (represented by the “B” Energy Performance Certificate score) versus a “low A” and a Green Mortgage qualified project. The various components of the energy performance of the home are quantified. A “total monthly cost of ownership” is calculated to compare the financial impact of the owner of each residential units. This model makes conservative assumptions omitting, for example, the likely reduced repair costs of a green home versus a standard home.

While the construction costs and energy prices may differ in each country, a similar financial example prepared for other countries would demonstrate the benefits of investing early in green performance to reduce the “Total Cost of Monthly Ownership”

	EPC “B” rated apartment	EPC “A” rated apartment	Green Homes certified apartment
<b>NET SAVINGS WITH GREEN MORTGAGES (in Euros)*</b>			
Sales price of 70 sqm apartment with Value Added Tax	98,000	100,100	104,300
Loan amount with 15% down payment	83,300	85,085	88,655
Monthly mortgage payment	499	510	505
Cost of energy/apartment/month (€)	101	65	33
<b>TOTAL COST OF MONTHLY OWNERSHIP: MORTGAGE + ENERGY</b>	<b>600</b>	<b>575</b>	<b>538</b>
Net monthly savings for certified Green Homes versus “B” apartment	0	25	62
Net annual savings for certified Green Homes versus “B” apartment	0	300	744

\* Assumptions: Market price: €1,400/sqm; Payment period: 25 years;

The developers will pass on the cost of the energy efficiency improvements directly to the consumers but will not add a profit on it.

## COSTS AND SAVINGS OF ENERGY EFFICIENT MEASURES

### Construction parameters

Increase in construction cost from green measures (%)	0%	5%	15%
Construction cost (€/sqm)	600	630	690
Additional construction cost from green measures (€/sqm)	0	30	90
Total additional construction cost from green measures for home (€)	0	2,100	6,300

### Energy consumption

Energy consumption for heating (kWh/sqm/year)	117	70	50
Energy consumption for domestic hot water (kWh/sqm/year)	35	15	15
Energy consumption for air conditioning (Cooling) (kWh/sqm/year)	35	20	10
Energy consumption for ventilation (kWh/sqm/year)	10	5	5
Energy consumption for lighting (kWh/sqm/year)	49	40	10
Total energy consumption for apartment (kWh/sqm/year)	246	150	90

### Cost of energy

Average price of electricity (€/kWh incl. VAT)	0.12	0.12	0.12
Average price of gas (€/kWh incl. VAT)	0.04	0.04	0.04
Annual cost for heating energy (€/sqm/year)	4.89	2.93	2.09
Annual cost for domestic hot water (€/sqm/year)	1.46	0.63	0.63
Annual cost with air conditioning (cooling) (€/sqm/year)	4.11	2.35	1.17
Annual cost for ventilation (€/sqm/year)	1.17	0.59	0.59
Annual cost for lighting (€/sqm/year)	5.75	4.70	1.17
Total annual cost of energy (€/sqm/year)	17.40	11.19	5.65
Total annual cost of energy for 70 sqm apartment (€)	1,217.72	783.18	395.79
Average monthly cost of energy for 70 sqm apartment (€)	101.48	65.27	32.98

### Energy cost reductions

Average monthly energy savings relative to “B” apartment	0.00	36.21	68.49
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## MORTGAGE RATE CALCULATION

Size of apartment (sqm)	70	70	70
Price of apartment	98,000	100,100	104,300
Percent of down payment	15%	15%	15%
Down payment	14,700	15,015	15,645
Interest rate (7 year fixed; local currency)	5.25%	5.25%	4.75%
Repayment period (years)	25	25	25
Loan amount	83,300	85,085	88,655
Yearly mortgage payment	5,988	6,120	6,060
Monthly mortgage payment	499	510	505

## Notes

