Green Homes & Mortgages
A toolkit for residential investors and developers

Paying less for more!

Superior Building Quality
Reduced Mortgage Default Risk
Lower Energy and Repair Costs for Homeowners
Better Health for Families
Greater Environmental Responsibility for our Planet

SMARTER FINANCE FOR FAMILIES
“... residential investors and developers can greatly facilitate a rapid and profitable transformation of the construction and real estate industry toward a low carbon/green economy.”
Executive summary

Supporting the creation of Green Homes through a credible, cost-effective certification program represents an 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. Financial institutions – through the issuance of Green Mortgages tied to certified Green Homes – can significantly reduce their mortgage default risk and raise the asset valuation of homes they finance and can, therefore, offer a lower cost of financing. Lower financing costs provides the homebuyer with greater purchasing power to invest in improved construction quality as the Green Mortgage accurately values the significant reduction in energy, repair and health costs of those who purchase Green Homes. Green Mortgages will also help the Romanian marketplace better appreciate the positive value of sensible borrowing to invest properly at the beginning of the building process. This initiative creates a consortium between a bank, the investor/developer, the home buyer and the certifier to certify green residential projects that are environmentally-responsible and energy efficient relative to the standard offer in Romania 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.

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 Université Libre de Bruxelles and the Copenhagen Centre on Energy Efficiency; A partnership of the United Nations Environment Program and Danish Technical University.

The introduction of such a financial product is very timely in the context of the current and impending European Directives that require progress toward Net Zero Energy Buildings, significantly reduced construction waste, and reduced toxicity of building materials compulsory for all new and existing residential buildings. Growing energy security concerns and rising energy costs reward residential projects that require less costly and natural scarce resources to build and operate. By contributing to the creation of certified Green Homes, residential investors and developers can greatly facilitate a rapid and profitable transformation of the construction and real estate industry toward a low carbon/green economy.
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Opportunities & challenges for Romania’s 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.

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.

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 exceed 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.1

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.2

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 the market can expect similar price premiums/asset values for certified green homes as the study identified.3,4

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 the ability to pay financial obligations. Holding healthier homes in mortgage portfolios will have a material, positive financial benefit from reductions in accidents:

- 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.

Buildings account for over 30% of total energy consumption and 40 to 50% of CO2 emissions in Europe.
Key EU-driven legislation will dramatically improve the quality, energy and green performance of homes beginning now and increasingly over the coming years. This includes:

- Nearly “Net Zero Energy Buildings” by 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 Romania Green Building Council organizes the Green Home Pavilion@TNI in partnership with the National Real Estate Fair held twice yearly in Bucharest. The Green Home Pavilion showcases the country’s exemplary green residential projects and the solutions that made them possible. RoGBC also delivers 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. Green Home Pavilion@TNI has proven to be the most popular exhibit at the tradeshow and continues to add partner developers and solution providers demonstrating the growing interest in sustainable construction approaches in Romania.
Implications

Economic
The increasing energy costs and relative insufficient energy efficiency in homes will constantly be augmenting the strain on households’ available monthly cash and limiting the ability to pay debt obligations. Poor building quality increases maintenance/repair costs and reduces the future market value of homes in the event they must be repossessed by the bank; raising potential losses of mortgage portfolios and raising the cost of borrowing for potential homeowners.

Social
Loss of energy subsidies without adequate preparation will affect all households for all income levels. This does, however, disproportionately affect the low and middle-income class of the population as the energy bill is a higher percentage of their income and they generally live in lower quality (hence lower energy efficient, albeit smaller) houses.

Unstable energy security reduces policy options to confront aggressive petrol driven countries leading to increased or prolonged conflict.

Environmental
At the planned rate of construction, the negative impact on the environment of home construction is increasing significantly, as well as the stress on the stock of conventional fossil fuels and on the supply of natural resources.

Need For Action

In consideration of the above facts and implications, engaging the financial industry, residential investors/developers and those that provide the necessary solutions to develop energy efficient and environmentally-responsible homes are a necessary and economically-preferable solution to reduce financial risk of mortgage portfolios and “future proof” homes for upcoming conditions in the near and long term. Banks’ mortgage portfolios will perform better if homebuyers select sensible, cost-effective homes with the long-term financial outlook of the property considered at the time of taking the mortgage and purchasing the home. The role of investors/developers and green building solution providers in leading the way is of paramount importance.

Given a growing supply of conclusive evidence concerning the challenges with the security and projected long-term costs of conventional energy supplies, and the lower maintenance costs of green homes, ‘business as usual’ is the risky choice for banks wishing to minimize risk in their mortgage loan portfolios.

Steven Borncamp
Project Director, SMARTER Finance for Families
Lead Author, Green Homes & Green Mortgage program

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, addition 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.

Ilaria Bertini
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

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 Itri
Managing Director COAF SRL
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 some of the main components of Green Homes:

**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 biodiversity 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 nontoxic 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 us 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.

**Bioclimatic Design: Lighting, Shading and More**
Green Homes use “bioclimatic 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 biodiversity 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 changes. 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 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.

**[Insert Certifier’s Organization]**
Green Homes Scorecard
This scorecard of criteria (see Appendix 2) provides a full understanding of the criteria that need to be achieved to be certified as a [Insert Certifier’s Organization] Green Homes approved project. The scorecard for both single family and multi unit homes are available in Appendix II of this toolkit.
How does the Green Homes Certification Program 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 will be achieved that provide the minimum score necessary and all mandatory requirements to satisfy the established criteria of a Green Homes certified project.

The investor/developer and the Certifier agree upon which criteria will be achieved that provide the minimum score necessary and all mandatory requirements to satisfy the established criteria of a Green Homes certified

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 and advise the project's design team throughout the design, construction, and commissioning process to 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 Approved 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 Approved 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.

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.

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 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.
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.

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.

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.

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.

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.
Value for everyone in the program!

Delivers homes with reduced risk of mortgage default & higher long-term asset value

Higher disposable income from energy & other cost savings applied to mortgage repayment

Ensures residential projects meet strict energy performance, green and quality criteria

Ensures practical benefits & provides green mortgage approved status that can be realized or passed on to new buyers

Provides assurance long term energy performance & other cost savings from green features will be delivered

Implement energy efficiency & green criteria

Shares cost savings from lower risk with homebuyer via discounted mortgage

Sells energy efficient/green homes at equal or lower total monthly cost of ownership

Invests in quality, energy efficiency and green home performance

Delivers best-in-class Green Homes solutions to help Project Developers achieve the necessary energy efficiency and green homes performance to deliver to Home Buyers

Delivers homes with reduced risk of mortgage default & higher long-term asset value

Green Homes Solution Providers
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.

SMATER’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.
Benefits to Stakeholders

General benefits of the project

- Elimination of the initial cost barrier for implementing energy efficient residential projects;
- Overcomes other market failures that seriously inhibit the construction of greener, more energy efficient homes including:
  - The "agency problem": the different interests of the developer and buyer are aligned though bank financing;
  - The "information problem": lack of understanding of some home buyers of the reduction in the overall life-cycle costs due to energy efficiency measures is overcome by the energy audit, green criteria, coaching through the process and bank financing;
- The "rationality problem": people do not always act rationally in their economic interests when assessing short-term vs long-term benefits. Introducing a Green and Energy Efficiency component into financing brings a new incentive that transforms long-term benefits into short term (monthly) benefits.
- Demonstrates a concept that can be replicated and scaled upward.

Certified Green Homes require due consideration of indoor air quality, elimination of toxic building materials including paints, other coatings, adhesives and flooring, superior and efficient lighting quality, and other attributes that ensure a more healthy, enjoyable and valuable home.

The project will also bring important benefits to all stakeholders

For the investor/developer, this program provides

- Market differentiation as the Certified Green Homes program is the only significant, project-level indicator of quality, long-term cost savings, and green performance on the local market;
- Assurance of increased buying power of interested home-buyers;
- Increased demand for a unique market offering and competitive advantage (as the home-buyer will not feel the burden of the increased initial costs that are covered by the loan).

For the bank, this program provides

- Introduction of a new financial product with predictable costs and revenues allowing differentiation in a highly competitive banking market;
- Reduction of risk of mortgage default in the bank’s mortgage portfolio via the introduction of loans underwriting homes with lower energy and maintenance costs, and higher asset values;
- An effective program that aligns the banks’ social and environmental responsibility objectives with the types of preferred projects they choose to finance;
- Demonstration of the bank’s recognition of the higher value of green buildings in terms of income security, quality, and market value;
- Contributes to significantly improving the environmental responsibility of the construction and real estate industry that also improves energy security and economic opportunities from a low carbon economy.

For the home-buyer, the program provides

- Benefits from a higher-quality and energy efficient house with a net positive monthly financial benefit from energy savings and a discounted mortgage interest rate;
- The health attributes associated with Green Homes include reduced exposure to toxic materials (including carcinogens) and, for example, reduced incidence of asthma. Over the length of homeownership, this can provide significant financial benefit by lowering medical costs and reducing work days lost due to illness;
- A higher price in case of reselling the house due to a high “A” score on the Energy Performance Certificate, additional green criteria and the associated quality improvements.

What does the market think?

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

In 2017, 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 BBVA Mortgage
Risks & Mitigating Factors

Lack of demand for housing, green or otherwise

This is related to the general state of the market and not the Green Mortgage program. A Green Homes certified project should, ceteris paribus, have a higher demand than regular buildings in every market situation; a fact demonstrated by strong sales of the first generation of green residential projects.

Overestimation of the energy efficiency savings by the certified auditors

The Green Homes certification process is carefully constructed to ensure planned objectives deliver expected results. The energy auditor and the Certifier assessor must be engaged at the earliest possible moment to instruct the design team on likely outcomes of their decisions. This risk is also mitigated by choosing energy auditors for the project who share the goals of estimating and realizing energy savings rather than “checking the box” of an administrative task.

Lower than expected performance of energy savings equipment and installations delivering less energy savings

The Green Homes program’s requirements to achieve a top energy score provide strong assurance that the building will perform to expectations. Critical components of green homes ranging from effective insulation and high efficiency Heating, Ventilating, and Air Conditioning (HVAC) equipment must function correctly to achieve the promised economic performance necessary to reduce mortgage default risk. Solutions recommended for the program have been thoroughly researched, implemented elsewhere with clear results and, in the case of most systems, backed by manufacturers’ guarantees.

Furthermore, close participation of the solution providers contributing to the pilot projects ensures that issues will be resolved quickly. Lastly, the Green Mortgage requirements to share ongoing energy performance on other operational data will provide continuous feedback to the construction industry improving the required skills to introduce best-in-class green solutions.

Falling energy prices

Despite persistent macroeconomic challenges, energy prices and energy scarcity are predicted to go substantially higher. An increasing willingness of the EU and local government to “price carbon” and tax inefficient energy saving behaviour greatly reduces the likelihood that the energy price to the end consumer will decrease. Dramatic technological advances in “green” energy might reduce long term prices but the widespread, positive economic benefits that would accompany this welcome scenario should clearly outweigh the smaller differential in expected financial savings from energy efficiency measures.

We have reached a critical point where the risk of “business as usual” with respect to financing new homes introduces significant future risk compared to instituting changes that improve the performance of the residential projects regarding energy use, resource use and construction quality. There is a significant opportunity to preempt the impending challenges by participating in a sensible and conservative approach to reducing risk in the housing market via greener construction approaches.
About the Administrator of the Program

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Who will be your partners in the program?
Other relevant Regional and International initiatives

The SMARTER Consortium members are actively engaged with the following:

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 21st 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.
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 EEFIG.eu) that has been actively exploring methods to remove barriers to long-term energy efficiency financing. This Green Homes and Green Mortgage program is now included as a Case Study in the EEFIG 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, with continued expansion of the program, the [Organisation name] will, with input and governance from partner banks, establish a separate legal organization with revenue derived only from certification activity to administer the Green Homes certification process.

Is the Green Homes certification the only way to be eligible for a Green Mortgage?
The program administrators believe their Green Homes certification program is 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.
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 that the developer achieve LEED “Gold” certification, accomplish a reduced list of green criteria not 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.
What are green mortgages & how will they revolutionise home energy efficiency? (London, Wordl GBC, 2017), link

“A green mortgage offers a way of unlocking additional finance for renovation from the private sector, bringing a whole new group of stakeholders into the campaign for green buildings - mortgage banks... It also puts the top of energy efficiency and sustainability front of mind for the building owner at an important stage in the building's life, when typically, decisions about property renovations may be made.”


Nikhil Kaza, Roberto Quercia, Robert Sahadi, Home Energy Efficiency and Mortgage Risks: An Extended Abstract (San Francisco, Ca, Community Development Investment Review, issue 01, 063-069, 2014), link

“including the debt-to-income ratio. Utilizing energy audits as part of the mortgage underwriting process would help homeowners make informed decisions about energy efficiency investments and likely promote long-term efficiency of the house”.

Sandra K. Adomatí, Residential Green Valuation Tools (Chicago, IL, Appraisal Institute, 2014), link


## Appendix 1: Multi-Family

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

<table>
<thead>
<tr>
<th></th>
<th>ENVIRONMENTAL LEADERSHIP</th>
<th>Required</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Integrated Design</td>
<td></td>
<td>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, engineers, 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.</td>
</tr>
<tr>
<td>A2</td>
<td>Life Cycle Assessment</td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>A3</td>
<td>Construction Waste Management Planning</td>
<td>Required</td>
<td>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.</td>
</tr>
<tr>
<td>A4</td>
<td>Responsible construction practices</td>
<td>3</td>
<td>To reduce pollution and disruption caused by construction activities, and to recognize and encourage an environmentally and socially responsible approach to construction site management.</td>
</tr>
<tr>
<td>A5</td>
<td>Operational waste management</td>
<td>Required</td>
<td>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.</td>
</tr>
<tr>
<td>A6</td>
<td>Commissioning for Insulation Installation via thermography, for supply and Return Air Flow Testing, Mechanical Ventilation Testing and Low Leakage</td>
<td>6</td>
<td>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.</td>
</tr>
</tbody>
</table>

### ONGOING PERFORMANCE

<table>
<thead>
<tr>
<th></th>
<th>Required</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>Transparency and information sharing</td>
<td>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.</td>
</tr>
<tr>
<td>B2</td>
<td>Education for homeowner / Ensuring Green Performance</td>
<td>Required</td>
</tr>
</tbody>
</table>

### SITE & LOCATION

<table>
<thead>
<tr>
<th></th>
<th>Required</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>Sustainable site</td>
<td>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.</td>
</tr>
<tr>
<td>C2</td>
<td>Compact development</td>
<td>2</td>
</tr>
<tr>
<td>C3</td>
<td>Smart development</td>
<td>4</td>
</tr>
<tr>
<td>C4</td>
<td>Heat Island Effect Reduction</td>
<td>3</td>
</tr>
<tr>
<td>C5</td>
<td>Rainwater management</td>
<td>2</td>
</tr>
<tr>
<td>C6</td>
<td>Reduced light pollution</td>
<td>Required</td>
</tr>
<tr>
<td>C7</td>
<td>Access to amenities</td>
<td>5</td>
</tr>
<tr>
<td>C8</td>
<td>Alternative transportation</td>
<td>6</td>
</tr>
</tbody>
</table>

### WATER EFFICIENCY

<table>
<thead>
<tr>
<th></th>
<th>Required</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1</td>
<td>Water metering</td>
<td>To support water efficiency efforts by monitoring and benchmarking water use over time.</td>
</tr>
<tr>
<td>D2</td>
<td>Water efficient fixtures</td>
<td>5</td>
</tr>
<tr>
<td>D3</td>
<td>Plumbing or Pre-plumbing for greywater system</td>
<td>3</td>
</tr>
<tr>
<td>D4</td>
<td>Fully Operational greywater system</td>
<td>5</td>
</tr>
<tr>
<td>D5</td>
<td>Water Efficient landscaping</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>100% Xeriscaping with landscape watered only via manual irrigation</td>
</tr>
</tbody>
</table>

### MATERIALS & RESOURCES

<p>| | | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E1</td>
<td>Natural materials</td>
<td>To encourage the use of natural materials which have environmentally and economically preferable life cycle impacts such as limestone, brick, cob, hemp, wool, etc.</td>
</tr>
<tr>
<td>-----</td>
<td>-------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>2</td>
<td>Use 30% of the total volume of materials used on site.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Use 50% of the total volume of materials used on site.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Use 75% of the total volume of materials used on site.</td>
<td></td>
</tr>
<tr>
<td>E2</td>
<td>Reclaimed materials</td>
<td>To encourage the use of at least 30% reclaimed material (salvaged, refurbished or reused) in volume from the total of materials used on site.</td>
</tr>
<tr>
<td>5</td>
<td>To encourage the use of at least 30% reclaimed material (salvaged, refurbished or reused) in volume from the total of materials used on site.</td>
<td></td>
</tr>
<tr>
<td>E3</td>
<td>Local/regional cladding materials</td>
<td>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.</td>
</tr>
<tr>
<td>4</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>E4</td>
<td>Recycled content</td>
<td>To encourage the use of a minimum of 30% recycled content materials based on volume from the total used on site.</td>
</tr>
<tr>
<td>E5</td>
<td>Environmentally Responsible Sources</td>
<td>To encourage selection of products that have been extracted or sourced in a responsible manner.</td>
</tr>
<tr>
<td></td>
<td>Required 100% of timber used must be legally forested as evidenced by a Chain-of-Custody (CoC) documentation.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>50% of all timber used quantified in m³ must be Forest Stewardship Council (FSC) certified.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>75% of all timber used quantified in m³ must be Forest Stewardship Council (FSC) certified.</td>
<td></td>
</tr>
<tr>
<td>E6</td>
<td>Low volatile organic compounds (VOC)</td>
<td>To reduce the health risk of the residents by using low (up to 10 grams per liter VDC) 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.</td>
</tr>
<tr>
<td>3</td>
<td>Low volatile organic compounds (VOC)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>No volatile organic compounds (VOC)</td>
<td></td>
</tr>
<tr>
<td>E7</td>
<td>Fire resistant materials</td>
<td>To increase fire safety by using insulation materials that are fire resistant.</td>
</tr>
<tr>
<td>E8</td>
<td>Renewable materials</td>
<td>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.</td>
</tr>
<tr>
<td>10</td>
<td>HUMAN HEALTH &amp; WELLNESS</td>
<td></td>
</tr>
<tr>
<td>F1</td>
<td>No smoking in the common areas</td>
<td>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.</td>
</tr>
<tr>
<td>F2</td>
<td>Bioclimatic strategies</td>
<td>Every regularly occupied space must have operable windows that provide access to fresh air and daylight.</td>
</tr>
<tr>
<td>F3</td>
<td>Formaldehyde, VOC, &amp; Particulate testing air testing before home occupancy</td>
<td>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.</td>
</tr>
<tr>
<td>F4</td>
<td>Water testing performed before home occupancy</td>
<td>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.</td>
</tr>
<tr>
<td>F5</td>
<td>Acoustic comfort</td>
<td>3 To improve indoor comfort and relaxation sound mitigation solutions must be utilized to reduce interior and exterior noise.</td>
</tr>
<tr>
<td>F6</td>
<td>Biophilic Design</td>
<td>3 To alleviate stress and anxiety and improving the indoor environment and air quality.</td>
</tr>
<tr>
<td>F7</td>
<td>Urban Farming/ Food Production</td>
<td>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.</td>
</tr>
<tr>
<td>G1</td>
<td>To reduce excessive energy use, shift toward low carbon energy solutions, improve energy security, and reduce energy costs.</td>
<td>30% improvement in Kwh/m2/year energy performance compared to the minimum score for earning an “A” in the Energy Performance Certificate (EPC).</td>
</tr>
<tr>
<td></td>
<td>Required 15 45% improvement per above</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20 60% improvement per above</td>
<td></td>
</tr>
<tr>
<td></td>
<td>25 Passive Haus Certificate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>35 True Net Zero Energy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>45 Net Positive Energy Building</td>
<td></td>
</tr>
<tr>
<td>H1</td>
<td>Various Ideas &amp; Solutions</td>
<td>Ideas or Solutions to improve the green performance of the project can be submitted for consideration of awarding of up to 10 points.</td>
</tr>
<tr>
<td>TOTAL POSSIBLE POINTS</td>
<td>160</td>
<td></td>
</tr>
</tbody>
</table>

Certified 80-99
Excellent 100-129
Superior 130-160

23
**Appendix 2: Single-Family**

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

<table>
<thead>
<tr>
<th>17</th>
<th>ENVIRONMENTAL LEADERSHIP</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Integrated Design</td>
</tr>
</tbody>
</table>

**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 hours 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. |

| 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 | A special outside area must be dedicated to the safe collection, storage, and disposal of the following: batteries, mercury-containing lamps, and electronic waste. |

| A6  | Third party commissioning  | 6 | 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. |

**ONGOING PERFORMANCE**

| B1  | Transparency and Information sharing  | Required | 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  | 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. |

| 22 | SITE & LOCATION |

| C1  | Sustainable site  | Required | Development in National Parks and sensitive areas such as parkland, floodplains, 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. |

| 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, low 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 cisterns) 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  | Access to transit  | 6 | To encourage green transport options through the installation of electric charging stations, pedestrian accessibility, bike trails, 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  | 2 | At Least 50% Xeriscaping with remaining landscape watered via drip irrigation |

| 5  | 100% Xeriscaping with landscape watered only via manual irrigation |

<p>| 38 | MATERIALS &amp; RESOURCES |</p>
<table>
<thead>
<tr>
<th>E1</th>
<th>Natural materials</th>
<th>To encourage the use of natural materials which have environmentally and economically preferable life cycle impacts such as limestone, brick, cob, hemp, wool, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
<td>Use 30% of the total volume of materials used on site.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Use 50% of the total volume of materials used on site.</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Use 75% of the total volume of materials used on site.</td>
</tr>
<tr>
<td>E2</td>
<td>Reclaimed materials</td>
<td>To encourage the use of at least 30% reclaimed material (salvaged, refurbished or reused) in volume from the total of materials used on site.</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>E3</td>
<td>Local/regional cladding materials</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>E4</td>
<td>Recycled content</td>
<td>To encourage the use of a minimum of 30% recycled content materials based on volume from the total used on site.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>E5</td>
<td>Environmentally Responsible Sources</td>
<td>To encourage selection of products that have been extracted or sourced in a responsible manner.</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>75% of all timber used quantified in m³ must be Forest Stewardship Council (FSC) certified.</td>
</tr>
<tr>
<td>E6</td>
<td>Low volatile organic compounds (VOC)</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Low volatile organic compounds (VOC)</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>No volatile organic compounds (VOC)</td>
</tr>
<tr>
<td>E7</td>
<td>Fire resistant materials</td>
<td>To increase fire safety by using insulation materials that are fire resistant.</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>E8</td>
<td>Renewable materials</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>F1</td>
<td>Radon–Resistant Construction</td>
<td>To reduce homeowner’s risk of lung cancer from exposure to radon in indoor air.</td>
</tr>
<tr>
<td></td>
<td>Required</td>
<td></td>
</tr>
<tr>
<td>F2</td>
<td>Bioclimatic strategies</td>
<td>Every regularly occupied space must have operable windows that provide access to fresh air and daylight.</td>
</tr>
<tr>
<td></td>
<td>Required</td>
<td></td>
</tr>
<tr>
<td>F3</td>
<td>Formaldehyde, VOC, &amp; Particulate testing air testing before home occupancy</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>Required</td>
<td></td>
</tr>
<tr>
<td>F4</td>
<td>Water testing performed before home occupancy</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>Required</td>
<td></td>
</tr>
<tr>
<td>F5</td>
<td>Acoustic comfort</td>
<td>To improve indoor comfort and relaxation sound mitigation solutions must be utilized to reduce interior and exterior noise.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>F6</td>
<td>Biophilic Design</td>
<td>To alleviate stress and anxiety and improving the indoor environment and air quality.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>F7</td>
<td>Food Production</td>
<td>To improve food security and support a local economy. It contributes to the greenery of the city along with efficient use of urban waste.</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>This is synergic with credit A3: Operational Waste Management and with C4: Heat Island Effect Reduction.</td>
</tr>
</tbody>
</table>

**ENERGY OPTIMISATION**

<table>
<thead>
<tr>
<th>C1</th>
<th>To reduce excessive energy use, shift toward low carbon energy solutions, improve energy security, and reduce energy costs.</th>
<th>Required 30% improvement in kWh/m2/year energy performance compared to the minimum score for earning an &quot;A&quot; in the Energy Performance Certificate (EPC).</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>15</td>
<td>45% improvement per above</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>60% improvement per above</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>Passive Haus Certificate</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>True Net Zero Energy</td>
</tr>
<tr>
<td></td>
<td>45</td>
<td>Net Positive Energy House</td>
</tr>
</tbody>
</table>

**INNOVATION**

<table>
<thead>
<tr>
<th>H1</th>
<th>Various Ideas &amp; Solutions</th>
<th>Certified 80–99</th>
<th>Ideas or Solutions to improve the green performance of the project can be submitted for consideration of awarding of up to 10 points.</th>
</tr>
</thead>
</table>

**TOTAL POSSIBLE POINTS 160**

<p>| | | |</p>
<table>
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<tr>
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<tbody>
<tr>
<td></td>
<td>Certified 80–99</td>
<td>Superior 130–160</td>
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</tbody>
</table>

Excellent 100–129
Appendix 3

Financial example for Green Mortgages

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”

<table>
<thead>
<tr>
<th>NET SAVINGS WITH GREEN MORTGAGES (in Euros)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPC &quot;B&quot; rated apartment</td>
</tr>
<tr>
<td>Sales price of 70 sqm apartment with Value Added Tax</td>
</tr>
<tr>
<td>Loan amount with 15% down payment</td>
</tr>
<tr>
<td>Monthly mortgage payment</td>
</tr>
<tr>
<td>Cost of energy/apartment/month (€)</td>
</tr>
<tr>
<td>TOTAL COST OF MONTHLY OWNERSHIP: MORTGAGE + ENERGY</td>
</tr>
</tbody>
</table>

Net monthly savings for certified Green Homes versus "B" apartment

Net annual savings for certified Green Homes versus "B" apartment

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.

<table>
<thead>
<tr>
<th>COSTS AND SAVINGS OF ENERGY EFFICIENT MEASURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction parameters</td>
</tr>
<tr>
<td>Increase in construction cost from green measures (%)</td>
</tr>
<tr>
<td>Construction cost (€/sqm)</td>
</tr>
<tr>
<td>Additional construction cost from green measures (€/sqm)</td>
</tr>
<tr>
<td>Total additional construction cost from green measures for home (€)</td>
</tr>
<tr>
<td>Energy consumption</td>
</tr>
<tr>
<td>Energy consumption for heating (kWh/sqm/year)</td>
</tr>
<tr>
<td>Energy consumption for domestic hot water (kWh/sqm/year)</td>
</tr>
<tr>
<td>Energy consumption for air conditioning (cooling) (kWh/sqm/year)</td>
</tr>
<tr>
<td>Energy consumption for ventilation (kWh/sqm/year)</td>
</tr>
<tr>
<td>Energy consumption for lighting (kWh/sqm/year)</td>
</tr>
<tr>
<td>Total energy consumption for apartment (kWh/sqm/year)</td>
</tr>
<tr>
<td>Cost of energy</td>
</tr>
<tr>
<td>Average price of electricity (€/kWh incl. VAT)</td>
</tr>
<tr>
<td>Average price of gas (€/kWh incl. VAT)</td>
</tr>
<tr>
<td>Annual cost for heating energy (€/sqm/year)</td>
</tr>
<tr>
<td>Annual cost for domestic hot water (€/sqm/year)</td>
</tr>
<tr>
<td>Annual cost with air conditioning (cooling) (€/sqm/year)</td>
</tr>
<tr>
<td>Annual cost for ventilation (€/sqm/year)</td>
</tr>
<tr>
<td>Annual cost for lighting (€/sqm/year)</td>
</tr>
<tr>
<td>Total annual cost of energy (€/sqm/year)</td>
</tr>
<tr>
<td>Total annual cost of energy for 70 sqm apartment (€)</td>
</tr>
<tr>
<td>Average monthly cost of energy for 70 sqm apartment (€)</td>
</tr>
<tr>
<td>Energy cost reductions</td>
</tr>
<tr>
<td>Average monthly energy savings relative to &quot;B&quot; apartment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MORTGAGE RATE CALCULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size of apartment (sqm)</td>
</tr>
<tr>
<td>Price of apartment</td>
</tr>
<tr>
<td>Percent of down payment</td>
</tr>
<tr>
<td>Down payment</td>
</tr>
<tr>
<td>Interest rate (7 year fixed; local currency)</td>
</tr>
<tr>
<td>Repayment period (years)</td>
</tr>
<tr>
<td>Loan amount</td>
</tr>
<tr>
<td>Yearly mortgage payment</td>
</tr>
<tr>
<td>Monthly mortgage payment</td>
</tr>
</tbody>
</table>
Appendix 4

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.

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.

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 bio-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.

One Herastrau Park Residence – by One United
Bucharest, Romania
This project, completed in September 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.

Aviati Park 1 – by Forte Partners
Bucharest, Romania
Aviati Park 1 is a residential complex of 176 units, located in the North of Bucharest in the immediate proximity of public transportation and surrounded by over 10 000 sqm of green spaces.

Aviation Park is a closed circuit residential project, in which the housing units are connected to each other via alleys, small public squares and other green spaces, offering a boost of privacy and exclusivity to the tenants.
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.

One Herăstrău Towers – by One United Properties
Bucharest, Romania
One Herăstrău Towers, developed by One United Properties, is a residential project talking the Green Homes sustainability standards. The complex is Pre-Certified in the program and due to be completed in 2020.

The One Herăstrău Towers project includes a mix of residential units, offices and commercial spaces. The ground floor of the building will have a commercial purpose and includes 5,055 sqm of office space. The two towers will contain 139 housing units. In addition, two levels will be allocated to the arrangement of parking spaces.

The two towers will offer the tenants a panoramic view towards Lake Herăstrău and the northern area of Bucharest and large terraces. In carrying out the works, measures will be implemented to achieve a high level of energy efficiency.

Selenium Retro 9 – Aşçıoğlu İnşaat
İstanbul, 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.

Central District – by Forty Management
Bucharest, Romania
This project of 40 units was completed in October 2017 and is Green Homes Certified by RoGBC. 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.

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 Fiziceniilor 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 sqm of green spaces, with flower gardens, large trees and a promenade area; Fire, represented by about 500 sqm 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.

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 covers were 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.

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.
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.

Wings – by Studium Green
Cluj-Napoca, Romania
This residential project, developed by Studium Green, obtained the Green Homes pre-certification in 2019. Located in the Zorilor neighborhood west of Cluj-Napoca, the project comprises 228 apartments that have good public transit access and are well connected to numerous facilities including medical centres and commercial areas.

The biomimetic architecture offers an innovative and emblematic touch. The orientation of the building ensures abundant natural daylight throughout the day.

The unique configuration of the apartments is accompanied by a set of sustainability measures, such as: intelligent architectural and efficient LED lighting, mineral wool insulation, waste sorting via underground infrastructure, charging stations for electric cars, as well as 3500 sqm of green spaces within the complex, for the increased comfort and well-being of residents.

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.

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.

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.

**Candominio Ianini**  
**L’Aquila, Italy**

Ianini 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.

**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.
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.

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.

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.

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.

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.

West Side Park – by Studium Green
Cluj–Napoca, Romania
West Side Park, developed by Studium Green in Cluj–Napoca, is a residential project comprising of 244 apartments.

The project stands out through the generous high performance windows and large balconies in each apartment, the ventilated facade includes photocatalytic ceramics, treated with titanium dioxide, which protects against pollution and constantly produces active oxygen. The project also hosts the largest green suspended terrace in Transylvania with an area of 2500 sqm along with other green spaces on the premises, freely accessible for tenants.

The West Side Park residential project was completed in 2019 and has received the class “A” for energy performance.

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.
The compartmentation of each apartment was designed so as to ensure optimum functionality, paying attention to details and using quality interior finishes.

The Petru Rareș 1259 qualified for the Green Homes pre-certification and is projected to be completed in 2020.

**One Mircea Eliade – by One United Bucharest, Romania**

One Mircea Eliade is developed on the site of the former Automatica factory, located between the Primaverii and Floreasca neighborhoods.

It houses 236 apartments and is part of a larger development project that includes: One Floreasca City, the One Tower office building, a Food Hall concept, restaurants, a gym with a swimming pool and adjacent to the Floreasca Park.

The project implements sustainability measures related to energy efficiency, responsible construction practices, resource optimisation, thus offering to the occupants alternative transportation options and a healthy interior environment.

The investment targets the entire area, not just the three buildings, that will result in a positive impact on the nearby road infrastructure.

**Ecological House Slava Rusâ – 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.

**OH Plaza – by One United Bucharest, Romania**

One Herastau Plaza is a luxury residential project with 156 apartments, located in the vicinity of Lake Floreasca, Herastau Park and the Promenada Shopping Mall. The setting ensures an easy access to all public transportation facilities.

Numerous features are included to minimize energy consumption, such as: automation of lighting in public spaces, separate energy meters for each tenant, LED lighting installations and motion sensors, biophilic design.

The complex offers special playgrounds for children, as well as many green areas. The finishes are made of high quality materials: hardwood floors, wooden decks for terraces with tiles and granite and non toxic varnishes and paints.

**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.

**Petru Rareș 1259 – by Global Invest Bucharest, Romania**

The Petru Rareș 1259 residential project will be developed in two phases, totaling 177 Apartments. Located between Victoriei Square and Banu Manta Boulevard, the project is very well connected to the most important interest points in the city.
Green Homes Solution Providers in the program today!

With green products such as mineral wool insulation with bio-based, formaldehyde-free ECOS™ technology and UrbanScape™ lightweight green roof solutions, KNAUF Insulation became one of the first Green Homes Solution Providers. 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.

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.

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.

Green Campus – by Studium Green
Cluj-Napoca, Romania
The residential Green Campus, developed by Studium Green, was the first residential complex in Romania designed and built according to the green building criteria. The project promoted a variety of innovative solutions such as the use of environmentally friendly materials, zero VOC paint, LED lighting system for the common spaces, separate waste collection system for 5 waste types, energy efficient lifts with energy recovery, green façade and intensive green roof, recovered materials and over 50% of locally produced materials. The building has an area of over 15000 sqm and comprises 191 apartments.

Completed in 2014, Green Campus became the first green residential building in Romania, focused on innovation, environmental protection and occupant health and wellbeing.
**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.

**Gramont – by BPM Development**  
*Bucharest, Romania*

The Gramont residential complex was built on the site of a former perfume factory, whose façade was recovered and fully integrated into the project.

It is located in the immediate vicinity of Carol Park, as well as some important cultural objectives of Bucharest: the National Museum of Contemporary Art, the Mausoleum in Carol Park, the Technical Museum and the National Library. The site provides very close proximity to kindergartens, primary schools, high schools and national colleges, universities and academies.

Some of the sustainability features include responsible construction practices, sustainable materials, energy efficiency, biodiversity improvement, superior interior air quality, biophilic design and alternative transportation solutions.

**Air Residences – by NAI**  
*Bucharest, Romania*

Air Residence – One, developed by NAI Romania, is a residential project located in the northern area of Bucharest near the Aviatiei district. The project comprises 11 apartments, distributed on 4 floors.

Air Residence aims to create a healthy living environment; symbiotic with nature. Some of the sustainable features include mineral wool insulation, underfloor heating, photovoltaic panels in the common spaces of the building, aiming to reduce to zero the costs associated with the consumption of electricity in these common spaces. To encourage a sustainable lifestyle, the project provide a secured parking spaces for bicycles.

**Stejarii 2 – by Tiriac Imobiliare**  
*Bucharest, Romania*

Stejarii 2 is a residential project of 57 000 sqm, developed by Tiriac Imobiliare, in the Northern part of Bucharest.

Some of highlighted sustainability features include energy optimisation, measured to reduce the water consumption, sustainable materials, e-car charging stations, biophilic design, abundant daylighting and infrastructure for separate waste collection.

In addition, the complex offers a variety of services, from sports activities, to spaces for relaxation and wellness.
Rahmaninov Residences
– by Lorem Ipsum
Bucharest, Romania
The Rahmaninov Residential project is a luxury property located in the immediate vicinity of Verdi Park and Lake Floreasca, offering panoramic views.

The residences include 6 floors covering a built area of 23,000 sqm; the project is well connected to the office area in the north of the Capital. The project will include a cafe, concierge service and other easily accessible amenities.

The project excels in the energy efficiency area, offers a superior interior air quality, uses high performant materials, e-car charging stations, sustainable green spaces and innovative waste management solutions.

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.

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.
“Increased energy savings and other financial benefits substantially reduce the mortgage default risk allowing the lender to lower the monthly interest rate while maintaining profit margins.”