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CLEAN ENERGY PROGRAM**

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**REPORT ON ANALYSIS OF GREEN BUILDING RATING AND CERTIFICATION SYSTEMS
– AN APPROACH FOR GEORGIA**

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ENHANCING CAPACITY FOR LOW EMISSION DEVELOPMENT STRATEGIES/EC-LEDS CLEAN ENERGY PROGRAM

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CERTIFICATION SYSTEMS – AN APPROACH FOR GEORGIA**

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DISCLAIMER

The author's views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

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ACRONYMS

AP	Accredited Professional
BEES	Building for Environmental and Economic Sustainability
BREEAM	Building Research Establishment Environmental Assessment Method
DGNB	German Sustainable Building Council
LEED+EBOM	LEED for Existing Buildings: Operations and Maintenance
EPC	Energy Performance Certificate
EPD	Environmental Product Declaration
EPBD	Energy Performance of Buildings Directive
ERN	European Regional Network
EU	European Union
GBC	Green Building Council
GBCWG	Green Building Certification Working Group
GHG	Greenhouse gases
LCA	Life-Cycle Analysis
LEED	Leadership in Energy and Environmental Design
MOU	Memorandum of Understanding
SBtool	Sustainable Building Tool
TRACI	Tool for the Reduction and Assessment of Chemical and other environmental Impacts
USGBC	United States Green Building Council
World GBC	World Green Building Council

EXECUTIVE SUMMARY

The present report summarizes the considered arguments and advice on the selection of a green building rating, certification and labeling system based on the comparative analysis and discussions conducted with the Georgian Green Building Certification Working Group (GBCWG).

The negative effects of climate change and the growing public awareness of environmental issues are creating pressures on every industry to come up with creative solutions to reduce emissions of CO₂. Green buildings represent one of the most significant and exciting opportunities for sustainable growth on both a national and a global scale.

Stakeholders in the construction industry are demonstrating their commitment to solve environmental problems by building in a more environmentally friendly manner through the use of green building assessment methods for their buildings. The construction sector's sense of social responsibility is also generating demand for certification systems to measure the environmental performance of buildings.

As sustainability becomes a key issue for occupiers, it also has a growing impact on investors, with market demand driving sustainable real estate which is gradually being viewed as the best investment. According to many reports published by Schneider Electric and McGraw Hill Construction, utilizing green building strategies reduces environmental impacts, ensure occupant satisfaction, drive better business outcomes, and maximize asset value. Property investors and developers are constantly seeking new strategies to deliver green buildings that attract tenants and buyers while maximizing "green value". Investments in green buildings pay back through increased rental rates and asset value and reduced utility bills.

Two green building rating and certification systems have gained widespread recognition worldwide, i.e. Leadership in Energy and Environmental Design (LEED) and Building Research Establishment Environmental Assessment Method (BREEAM), This report recommends supporting green building certification using these two rating systems, while developing a Georgia-specific rating system focused on existing buildings that is based on lessons learned from implementing these two systems in Georgia.

The important role of certified/eco-labeled green building products in these rating systems is also presented. GBC Georgia should take advantage of the ECO-Platform created by the World Green Building Council (World GBC)'s European Regional network (ERN) where information on eco-labels is regularly shared. Also, GBC Georgia should promote environmental declarations for any Georgian green products so that manufacturers can sell their green products in international markets and the domestic market as it develops.

Most investors in Europe today consider green certification to be important when developing or investing in new buildings. Most investors like REDEVCO¹, EMAAR² and companies like SIEMENS³

¹ Redevco is an independent, pan-European real estate investment management company specializing in retail property. The combined portfolio comprises 450 properties at top locations in major cities across Europe. The tenant base includes many major national and multinational retail companies throughout Europe.

² Established in 1997, Emaar Properties is a Public Joint Stock Company listed on the Dubai Financial Market. A pioneering developer of integrated master-planned communities, Emaar has transformed the real estate sector in Dubai, United Arab Emirates.

and DEUTSCHE BANK⁴ have expressed a desire for a single certification scheme that allows 'level playing field' comparisons and benchmarking. However, it is not clear if and when this will take place. The World Green Building Council (World GBC)'s European Regional Network (ERN) is considering development of a single certification scheme in line with this desire of key real estate investors, including a system to evaluate green building materials. This trend should be monitored so that Georgia's Green Building Council can determine how much effort to put into the Georgia-focused green building rating and certification scheme.

I.0 GREEN BUILDING RATING AND CERTIFICATION SYSTEMS

There are a number of environmental certification systems acting as voluntary standards for buildings around the world. The most popular systems, as summarized in the previous report on the *Assessment of Green Building Issues and Recommendations for Developing a Rating and Certification Scheme (May 2014)* include:

- LEED (Leadership in Energy and Environmental Design),
- BREEAM (Building Research Establishment Environmental Assessment Method),
- GREENSTAR (developed based on LEED and BREEAM by the Australian Green Building Council),
- SBtool (Sustainable Building Tool) from Canada,
- DGNB (German system); and
- CASBEE from Japan.

From the colder climates of North America and to Eastern Europe to the warmer Mediterranean and humid Dubai, to the central Japan climates, these certification systems are widely used. As such, multi-national companies must adhere to numerous rating and certification systems depending on the company's preference. For example Coca Cola invests in LEED certification and REDEVCO invests in BREEAM certification for their real estate investments.. A global standard may seem an attractive, efficient prospect, especially for these multi-nationals trying to coordinate uniform design teams. However, a green global standard is not currently possible to achieve, given the different circumstances of each country, from climate to the availability of materials and land, and opportunities for power generation, culture adaptation, and legislative support. Therefore, these systems are not designed to be used across different regions and countries and their respective requirements represent local conditions.⁵

³ Siemens Real Estate (SRE) manages the company's real estate portfolio, overseeing the operation of its real estate holdings including all real-estate-related services, as well as having responsibility for leasing and disposing of real estate assets and implementing all construction projects Siemens-wide. With innovative concepts like the Green Building Initiative and the energy efficiency program, SRE optimizes resource allocation while at the same time making buildings more energy efficient.

⁴ RREEF is the real estate investment management business of Deutsche Bank's Asset Management division. RREEF is one of the world's largest real estate investment managers, investing in commercial and residential property, and real estate securities globally.

⁵ Erten D., K.Henderson, B.Kobas. *A Review of International Green Building Certification Methods: A Roadmap for a Certification System in Turkey*. Proceedings of Fifth International Conference on Construction in the 21st Century (CITC-V) "Collaboration and Integration in Engineering, Management and Technology" Istanbul 2009.

It is common to accept the ‘triple bottom line’ approach of integrating environmental, economic, and social aspects of sustainability. Many people have criticized LEED and BREEAM because they are lacking in systematic economic and social criteria. But it is important to remember that the focus of these certification systems is environmental impact. Bringing wider factors may dilute these systems’ effectiveness at producing environmental improvement. On the other hand, one may argue that transport and ecology are also broader factors (beyond the building), and incorporating them reduces greenhouse gas (GHG) emissions and eventually helps the user reach the goal of reducing GHGs which is the fundamental reason for building green. The DGNB (the German system) defines a 2nd generation green building system and incorporates social and economic factors as well. DGNB-International has been engaging with international green building councils and trying to enter to new markets. But because it has much higher standards and less experience dealing with international clients, it has not been as successful as LEED and BREEAM.

During the 2nd meeting Green Building Rating and Certification Working Group held in Tbilisi on 3 June, 2014, the author orchestrated a discussion of the strengths and challenges of LEED and BREEAM. We summarize in this report these two major certifications schemes that have become the leaders in the international arena and comparatively demonstrate the key features of these systems for potential adoption and/or adaptation for Georgia. We then discuss the minimum conditions available in Georgia that will enable the effective use of these systems. This comparison will provide grounds for understanding the need for a Georgia-specific national green building rating and certification system, which is one of the options considered in this report.

It is advisable to develop a Georgia-specific system for existing buildings which better aligns with sustainability principles using information based on the lessons learned from other certification systems. LEED for existing buildings’ operation and maintenance (LEED+EBOM) and Building Research Establishment Environmental Assessment Method for buildings in use (BREEAM-In-Use) should be considered as guides for an eventual Georgian green building rating system for existing buildings. When developing a Georgian system for existing buildings, GBC Georgia should strive to achieve comparable environmental benefits and market viability of LEED+EBOM and BREEAM-In-Use, while accepting the realities of the Georgian building sector, at least in the short term while some of the limitations in Georgia still exist, such as availability of some green building materials.

To further refine the recommendations, closer consideration was given to the following key factors:

1. political context: norms, regulations, and standards relevant for Georgia in the long-run
2. Required accompanying tools and skillsets, such as modeling and simulation requirements
3. Ease of application of the systems
4. Availability and accessibility of resources and reference materials
5. Procedures for accreditation of assessor professionals.

Political Context

Standards provided by European Union (EU) directives (e.g., the Energy Performance of Buildings Directive (EPBD) (IPF, 2007)) are increasingly being adopted by many countries. With the signing of the EU Association Agreement, Georgia is also moving in this direction. LEED and BREEAM refer to norms, regulations and standards relevant for the US and UK.

Currently local GB construction material certification schemes for manufactured GB construction components do not exist. Presently in Georgia, a construction law is in the initial stages of

development. This law will set requirements for some building components relating to EE and GB concepts.

Tools and Skillsets

BREEAM has aligned its energy requirements to the EU's Energy Performance Certification (EPC) system. The BREEAM scheme awards points to buildings for the energy section based on the results of a standard EPC analysis, allowing the adoption of industry-wide building assessments for energy. Turkey has adopted the EPC as mandatory for buildings greater than 10,000 m². The owner has to provide the energy certification of the building before selling or renting the building. One of the most critical aspects of BREEAM is selection of how one performs energy analysis. Despite legislation, significant progress has yet to be made in widespread adoption of the EPC in Turkey, and in particular when using BREEAM.

LEED on the other hand, does not accept an EPC result and only accepts energy simulation results to measure energy efficiency. Energy modelling is pre-requisite for obtaining LEED certification. There is no alternative compliance path for using EPC instead of energy modelling. Simulation programs used to do energy modelling may vary between industry professionals. ENERGY PLUS, EQUEST, HAP, DESIGNBUILDER are some of the frequently used energy simulation programs. ENERGY PLUS is free and can be downloaded from the US Energy Department's web site. Engineers, especially those with mechanical backgrounds, can learn and use these programs with the guidance of experienced academics/professionals after receiving training.

BREEAM provides online resources, but the assessor needs to register his/her firm with BRE-GLOBAL and must have liability (professional identity) insurance in order to work as an assessor. All certification and audit work is completed by the BREEAM Assessor, a report is written about the building and is submitted to BRE-GLOBAL. BRE-GLOBAL only approves/rejects assessor's report.

On the other hand, LEED provides a high degree of standardization to design teams, making LEED easier to implement in practice. The LEED reference manuals (available for purchase and download from USGBC web page) are useful documents which LEED accredited professional (APs) may use to deepen their knowledge of the subject.

Availability and accessibility of resources and reference materials

With legitimacy and accountability being cornerstones of these systems, the use of standardized materials (manuals) may improve efforts of creating a roadmap to design and construct with sustainability principles in Georgia.

It is quite easy to access the LEED and BREEAM manuals on line. BRE-GLOBAL (BREEAM) provides free access to its manuals but USGBC (LEED) charges a fee to purchase the manuals. For LEED manuals, E-copies are downloadable and can be purchased with a credit card.

USGBC is allowing GBCs to translate the manuals if they have the capacity. BRE-GLOBAL provides an option for adaptation if GBC's sign an MOU and pay a fee for the name extension (for example BREEAM-NL for Dutch version of BREEAM).

Procedures for Accreditation of assessor professionals

The only way to become an International BREEAM Assessor is to attend a 3-day course provided by a BRE-GLOBAL trainer, pass a test and complete 10 short assignments in 3 months. However,

anyone who can pass a LEED test independently (also available on-line) can become a LEED Accredited Professional (AP). Also, one can complete the LEED assessments and consult on LEED certification without being a LEED AP. Using a LEED AP helps to achieve 1 point out of a 110 point system.

2.0 THE RELATIONSHIP BETWEEN INTERNATIONAL GREEN BUILDING SYSTEMS AND ECO LABELS FOR PRODUCTS

As noted before, the integrity of green building rating and certification is impossible without the use of adequately analyzed and rated materials. The materials used in green construction must contribute to the sustainability of the structure and ecosystem around it. Use of environmental labeling of products can provide means for legitimately rating and certifying the buildings at large.

There are three types of environmental (“eco”) labels for products:

Type I environmental labels are multi-criteria third party programs that award environmental labels to products meeting a set of predetermined requirements.

Type II environmental labels specify requirements for self-declared environmental claims made by manufacturers, importers, distributors, retailers or anyone else likely to benefit from such claims.

Type III environmental product declarations (EPDs) are primarily intended for use in business-to-business communication, but their use in business-to-consumer communication under certain conditions is not precluded. Type III EPDs require an independent agency to oversee the EPD process.

The ISO has developed standards for these three types of environmental labeling programs based on the depth and variety of quantitative and qualitative information involved in the analysis, the range of products covered, evaluation criteria, verification by third parties, and ownership of the label. A summary of the features of type I, II and III labeling is provided below:⁶

Type I - Environmental labeling: Qualitative Information for special products, verification of eco-labeling body, pass-or-fail criteria; received by consumers.

Type II - Self-declared environmental claims: Qualitative/quantitative information, for all products and services, no quality check, no third party verification; no pass-or-fail criteria; received by consumers/ professional purchasers.

Type III - Environmental product declarations (EPDs): Qualitative Information, for all products and services; Third-party certification and verification; Life-Cycle Analysis (LCA) based; no pass-or-fail criteria; received by professional purchasers. An EPD communicates

⁶ Source: The environmental assessment tools and methods demonstrated and assessed in the DANTES project http://www.dantes.info/Tools&Methods/Environmentalinformation/othertools_label.html

verifiable, accurate, non-misleading environmental information for products and their applications, expressed in information modules, which allow easy organization and expression of data throughout the life cycle of the product. However, this approach requires that the underlying data should be consistent, reproducible and comparable

ISO 14025 was created to play a role in regional eco-label programs, such as the European Union Integrated Product Policy. ISO 14025 is becoming the early benchmark for EPDs.

For EPDs, Life cycle assessment (LCA) is analyzed in 5 stages:

1. Raw material acquisition,
2. Manufacturing,
3. Transportation,
4. Use, and
5. End of life.

These 5 elements can be assessed within a site life-cycle using a tool developed by U.S. EPA called TRACI – the “Tool for the Reduction and Assessment of Chemical and other environmental Impacts.” In the U.S., TRACI can provide most of the information required for an EPD. Product and company information was recently added.⁷ In 2009 the U.S. EPA’s TRACI Impact Categories were used for LEED V4: The USGBC has developed a set of impact categories that more closely align with the mission and vision for ongoing LEED development. All credits within the LEED V4 system have been weighted through this approach. The impact categories were developed to include the following features for the rated materials:

- a) Reduce contribution to global climate change,
- b) Enhance individual human health, well-being, and vitality,
- c) Protect and restore water resources,
- d) Protect, enhance, and restore biodiversity and ecosystem services,
- e) Promote sustainable and regenerative material resource cycles,
- f) Build a greener economy, and
- g) Enhance community: social equity, environmental justice, and quality of life.

There are many LCA tools in the market. Others include SimaPro LCA software⁸, Building for Environmental and Economic Sustainability (BEES)⁹, Athena’s Impact Estimator¹⁰, Building Life Cycle Cost¹¹, EcoScan¹², GaBi¹³, TEAM¹⁴, and openLCA¹⁵

⁷ More available at: <http://www.greenbuildinglawupdate.com/2014/03/articles/sustainability-1/epds-are-among-the-hottest-topics-in-green-building/>

⁸ SimaPro collects, analyzes and monitors the environmental performance of products and services. It allows modeling and analyzing complex life cycles, following the ISO 14040 series recommendations. <http://www.pre-sustainability.com/>

⁹ BEES is a Windows TM -based software program aimed at designers, builders, and product manufacturers. It provides a way to balance the environmental and economic performance of building products. BEES measures the environmental performance of building products by using an environmental life-cycle assessment approach specified in the latest versions of ISO 14000 draft standards. <http://www.nist.gov/el/economics/BEESSoftware.cfm/>

The Georgian market can easily use SimoPro or GABI4 software. These are the most commonly used software in Europe and they can be purchased online, with online training available. Georgia's construction market will benefit from developing databases in Georgia, with the GBC Georgia supporting adoption of the software.

Though new, there is increasing interest in EPDs because LEED v4 recognizes EPDs. Additionally, while EPDs most directly contribute one LEED v4 point, they potentially have a role to play in 21 different LEED credits. The new versions of the green building codes (IGCC 2015 and ASHRAE 189.1-2015) are each considering the use of EPDs.

3.0 RECOMMENDATIONS FOR GB CERTIFICATION AND PRODUCT LABELING

Based on the review of international experience in green building and material rating and labeling practices, the analysis of the current market trends in Georgia as well as trends in which these international schemes are evolving, the EC-LEDS team recommends an approach which would set forth a building certification scheme which could be used immediately under the current conditions while the Georgian green building industry is slowly evolving.

¹⁰ The Athena Sustainable Materials Institute's Impact Estimator is free LCA software for Architects and designers seeking the Whole Building LCA credits in LEED®v4, Green Globes®, the International Green Construction Code (IgCC), and the California Green Building Standard Code (CALGreen). Requiring no special expertise to use, the software allows construction industry professionals to explore the environmental footprint of different material choices and core-and-shell system options.

¹¹ Computer program that provides an economic analysis of proposed capital investments expected to reduce long-term operating costs of buildings or building systems. BLCC complies with American Society of Testing Materials (ASTM) standards related to building economics and NIST Handbook 135, Life-Cycle Costing Manual for the Federal Energy Management Program.
http://www1.eere.energy.gov/femp/information/download_blcc.html

¹² Ecoscan 3.0 analyzes the environmental impact and cost of products. The software tool can be used by managers and engineers who implement EcoDesign in real life product development.
<https://www.tno.nl/index.cfm>

¹³ Different versions of GaBi software are available from educational to professional use of Life Cycle Analysis to evaluate life cycle environmental, cost and social profiles of products, processes and technologies. <http://www.gabi-software.com/international/index/>

¹⁴ TEAM™ is a professional tool for evaluating the life cycle environmental and cost profiles of products and technologies. It contains comprehensive database of over 600 modules with worldwide coverage.
<http://ecobilan.pwc.fr/en/boite-a-outils/team.jhtml>

¹⁵ openLCA is a free open source software, for modelling and assessing Life Cycle Assessment, with various import and export options. A basic framework for life cycle assessment (LCA) calculation. <http://www.openlca.org/>

- a) Develop an interim approach which is capable of evolving into a national scheme
- b) make maximum use of either existing technical regulations and standards, or those which Georgia intends to develop/adopt in the foreseeable future.

Similarly, a relevant approach to the labeling of the building materials is needed.

3.1 Building certification scheme

Based on the review of international trends and the current status of the Georgian urban development and market trends, the LEED and BREEAM systems both have major advantages to offer Georgia. While BREEAM has its distinct advantage of being based on European norms and standards and being in full harmony with the EU Energy Performance in Buildings Directive, LEED in turn offers a large online knowledge base, which could be a substantial reference source for the developing Georgian building assessor's market.

Both LEED for existing buildings' operation and maintenance (LEED+EBOM) and Building Research Establishment Environmental Assessment Method for buildings in use (BREEAM-In-Use) can serve as transitional stepping stones for the development of a Georgian green building rating system for existing buildings, which will be required when the green building certification market expands and there is more demand for a system completely aligned to national conditions.

In the interim, Georgia can make use of both schemes and comparatively demonstrate their applicability for adoption/adaptation for Georgia.

3.2 Building Materials

While the EC-LEDS project seeks a quick and appropriate way to promote international green building certification systems in Georgia, the emphasis on building materials should be no less important. Promoting environmental performance declaration (EPD) for building materials is an integral part of these systems. The market (meaning product manufacturers) must prepare to certify products if they want to sell to the green market.

The recommended action plan for Georgian materials' market is to move the green market forward as follows:

- Follow the EU trend through the Europe Regional Network (ERN) of WGBC since they are working to agree on a common set of functional criteria to assess the sustainability of buildings, including materials;
- Take advantage of the ECO-Platform created by ERN where information on ECO Labels are regularly shared. Promote environmental declarations for any Georgian green products so that manufacturers can sell their green products in domestic and international markets
- Prepare a Georgian Guide for Sustainable Materials.