USAID FROM THE AMERICAN PEOPLE | MUNICIPAL HEATING REFORM IN UKRAINE

# UKRAINE MUNICIPAL HEAT REFORM PROJECT

## National Building Energy Labeling Program

**August 2012**
This document was produced for review by the United States Agency for International Development (USAID). It was prepared by the Alliance to Save Energy and International Resources Group (IRG).

**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.

*Prepared by:*

Astghine Pasoyan, Alliance to Save Energy
Cosimina Panetti, Alliance to Save Energy
Oleksandr Nikolaienko, Alliance to Save Energy

Technical review and editorial by:

Laura Van Wie McGrory, Alliance to Save Energy
Jeffrey Harris, Alliance to Save Energy

## Contents


List of Tables ..... 6

Executive Summary ..... 7

Introduction and Background ..... 9

The purpose of building energy labeling ..... 9

Potential benefits of building energy labeling for Ukraine ..... 11

The Key Building Energy Labeling Principles ..... 13

Cost-effectiveness ..... 13

Administrative feasibility and potential obstacles ..... 14

Capacity building, enforcement, and oversight ..... 14

Summary of BEL Approach ..... 16

Summary of the legal-regulatory framework ..... 16

Overview of the technical methodology and normative base ..... 16

Existing Bylaw acts: ..... 17

Timeline ..... 20

Key Building Energy Labeling  Target Areas ..... 20

Primary categories of buildings eligible for mandatory BEL ..... 21

Primary categories of buildings eligible for voluntary BEL ..... 21

The Gradual Approach to National BEL and Recommended Phases of BEL Implementation in Ukraine ..... 21

Test/Prototype Phase ..... 23

YEAR ONE: ..... 24

YEAR TWO ..... 26

Introductory Phase ..... 26

YEAR THREE ..... 26

Expansion Phase ..... 27

YEAR FOUR ..... 27

YEAR FIVE ..... 27

Review and Adjustment based on M&E of program performance ..... 27

Development of a Measurement and Evaluation (M&E) protocol and M&E metrics ..... 27

Evaluation and Use of Evaluation Results ..... 29

Other considerations: ..... 29

Recommendation of changes and adjustments ..... 29

Responsible Entities ..... 29

Awareness ..... 30

## List of Tables

Table 1. Cost-Optimal Energy Saving Potential, Investments and Monetary Savings in Ukraine's Building Sector (to be achieved by a complex of measures during 2012-2020) ..... 12

Table 2. Energy Efficiency Classes of Buildings Provided for Building Energy Passportization..... 18

Table 3. Elements of the NEEAP-Bs Related to the BEL Program Implementation ..... 20

Table 4. BEL Program Activities by Phase ..... 22

Table 5. BEL Target Areas ..... 23

Table 6. Representative Residential and Public Buildings Proposed for the Prototype Phase Sampling for Prototype Phase ..... 26

Table 7. M&E Activities and Timeline..... 28

## Executive Summary

Buildings are responsible for about 34 percent of Ukraine's energy use, and represent a critical opportunity and need for efficiency improvement: An average Ukrainian building consumes 276 kWh/m$^2$ of energy, compared to 80 kWh/m$^2$ in an average Danish building.[1] The potential for energy savings in Ukraine's buildings sector is estimated to be 40 percent.[2] As Ukraine's construction sector recovers from the recent financial crisis, this sector's significant potential for growth presents a key opportunity for tapping into these energy savings. Building energy certification and labeling can help promote energy efficiency in new – as well as existing -- residential, public and commercial buildings.

Energy certification can supply building owners or occupants with information on their building's performance and provide incentive for improving building efficiency. For consumers interested in energy efficiency, labeling can facilitate educated consumer choice, thus increasing demand for more efficient buildings in Ukraine. Evidence from the EU and the US indicates that buildings with positive energy labels have higher occupancy rates, can charge higher rent and sales premiums, and sell or rent more frequently. Building energy labeling can thus help achieve Ukraine's cost-optimal building energy efficiency potential, which can lead to estimated monetary energy cost savings of up to $24 billion.

A building energy labeling program in Ukraine became a requirement when the country became a contracting party to the European Energy Community Treaty (ECT), ratified by Ukrainian Parliament December 15, 2010, and committed to transposition of the energy-efficiency directives of the European Commission (EC). Even prior to the efforts aimed at meeting the requirements of the European energy market integration, the Ukrainian Government had been working to develop energy efficiency legislation for the buildings sector through the Draft Law on Energy Efficiency in Public and Residential Buildings, which also is aimed at transposing some of the key requirements of the EC Energy Performance of Buildings Directive (EPBD).

The proposed program is based on the principles of cost-effectiveness and administrative feasibility. The Government of Ukraine will first need to finalize the legal-regulatory and methodological framework for building energy labeling, and will offer accreditation services (e.g., education, training, evaluation) to eligible experts to ensure effective program implementation and enforcement.

---

[1] Energy Performance: Certification of Buildings - A policy tool to improve energy efficiency. IEA Policy Pathway Series. © OECD/IEA, 2010

[2] National Energy Efficiency Action Plan for Buildings, Ukraine. 2012. Prepared with technical assistance from USAID Regional Energy Security and Market Development Program.

The primary target building groups for building energy labeling include newly constructed buildings; buildings undergoing thermal modernization, major renovation, or reconstruction; buildings being rented or sold; as well as existing buildings with a total useful floor area over 1000 $m^2$. Considering the volume of buildings subject to certification, the introduction of building energy certification and labeling on a national scale requires a gradual approach. Upon the completion of the legal, regulatory and methodological basis for certification and labeling, the program will be implemented in three phases: A prototype phase, when the methodological aspects will be tested; an introductory phase; and an expansion phase. This phased approach will allow Ukraine to test the program, identify any gaps and weaknesses, and modify the program as needed before its nationwide launch. The program's aim is the eventual application of the building energy labeling scheme on the national scale for the above categories of buildings. The program also is designed to create thousands of jobs for future accredited building energy expert certifiers.

The full scale application of the certification and labeling scheme will require a significant effort to improve public awareness and understanding of building energy labeling, its technical features, and its potential benefits for energy users.

## Introduction and Background

Ukraine's construction sector demonstrates huge potential for growth, due to several factors: low rates of existing stock per capita (averaging about 23.3 $m^2$ per person or 2.4 persons per apartment) and dated residential housing; as well as the relatively low percentage share of construction in Ukraine's GDP structure ( 3%) compared to the world average figure (about 13.4%). [3] Future growth trends in this sector are likely to be especially pronounced due to the current rapid recovery rates after the 2009 market recession. The market supply of new construction and renovation, as well as rental and sales of residential and commercial space, will dictate the size of the market for building energy certification services.

Given the importance of this sector in Ukraine, energy performance of buildings is a significant element that needs to be addressed by national energy policy, since buildings in Ukraine (as in most countries) are estimated to have the potential to deliver as much as 40 percent of the future national energy savings. Building energy efficiency thus represents an important component of Ukraine's national energy security agenda and greenhouse gas mitigation activities, and is a critical goal for improving the overall economic wellbeing of the country.

Technical potential exists to save about 60% of the current energy used in Ukraine's buildings sector; 23% of the current energy use in the buildings sector can be reduced cost-effectively.[4]

## The purpose of building energy labeling

Building energy labeling (BEL) -- based on the comparison and certification of building energy performance to a certain rating scale -- is a policy tool that can play an important role in achieving this potential, in several ways:

- Introducing building energy certification and labeling for new buildings in Ukraine can complement the ongoing legal reform aimed at energy efficiency in new residential and public buildings, demonstrate compliance with national building energy regulations, and provide an incentive for achieving higher efficiency compared with standard buildings of the same type.
- Energy certification can supply building owners or occupants with information on their building performance and provide incentive for improving building efficiency. For consumers interested in energy efficiency, labeling can serve as a tool for facilitating educated consumer choice, thus increasing demand for more efficient buildings and energy efficiency services in Ukraine.

Since buildings use so much of our available energy, small changes in the use of energy in buildings across the nation can have a profound effect on the total amount of primary energy used as well as the cost of providing that energy. The long term goal of a building energy efficiency labeling program is to reduce energy costs for consumers, businesses, and government by:

- Promoting improvements in building energy efficiency;

[3] Construction and building materials industry overview. InvestUkraine.com. Deloitte. Available at http://investukraine.com

[4] National Energy Efficiency Action Plan for Buildings (NEEAP-Bs) for Ukraine. 2012.

- Ensuring better understanding of how and where energy is used in buildings; and
- Building demand (and thus the market) for efficient housing and commercial or public buildings.

Building labeling programs for energy efficiency promote demand side management of energy consumption. To achieve this goal it is first necessary to collect data on the current energy usage of the targeted building types, in order to enable comparison of the energy consumption of individual buildings to a baseline case. Once these comparisons have been made, suggested measures can be identified for improving the efficiency of the individual buildings.

The development of a building energy labeling program in Ukraine became a necessity when the country became a contracting party to the European Energy Community Treaty, and committed to transposition of the energy-efficiency directives of the European Commission (EC). Even prior to the efforts aimed at European energy market integration, the Ukrainian Government has been working to develop energy efficiency legislation for the buildings sector through the Draft Law on Energy Efficiency in Public and Residential Buildings, which also is aimed at transposing some of the key requirements of the EC Energy Performance of Buildings Directive (EPBD).

The clauses of the 2010 EPBD Recast related to building certification and labeling include the following requirements for Member States:[5]

- Require certification for replacement elements of envelope of existing buildings that have a significant impact on energy performance.
- Require certification for technical building systems when replaced or upgraded.
- Set energy efficiency requirements for new, replacement, and upgraded systems installed in existing buildings. These must cover energy performance, installation, sizing, adjustment and control, and must include (at least) heating, hot water, air-conditioning, and large ventilation systems.
- Provide a comparative methodology for a cost-optimal balance between investments and energy costs saved through the life-cycle of the building; this must differentiate between new and existing buildings, and among different categories of buildings.
- Adopt the voluntary common EU certification scheme for non-residential buildings by 2011 (as written, or adapted to national circumstances).
- Publicly display building energy performance certificates for the following:
    - Public buildings larger than 1,000 $m^2$; the certificate cannot be more than ten years old.
    - Buildings over 500 $m^2$ that are occupied by public authorities and are frequently visited by the public (after five years 250 $m^2$).
    - Other buildings over 500 $m^2$ that have an energy performance certificate (EPC) and are frequently visited by the public, such as shops, supermarkets, restaurants, theatres, banks and hotels.
- Include recommendations for improved energy efficiency as part of the certification process – although these recommendations do not necessarily need to be displayed along with the label.
- Set an example by implementing energy efficiency recommendations in public buildings, where these recommendations are technically feasible and cost-effective.

[5] Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings. Source: http://eur-lex.europa.eu/

- Carry out random checks of a statistically significant percentage of certificates and inspection reports.

The requirement that the energy performance certificates displayed in large public buildings must not be more than ten years old is a means of ensuring that public buildings are assessed regularly. Some Member States have chosen to extend the regulation to include public buildings less than 1,000 m² as well as commercial buildings, or to make the certificate valid for a period less than ten years. Denmark, for example, has made five-year certification mandatory for all buildings (public, commercial and residential) greater than 1,000 m². Slovakia applies a threshold of 50m$^2$. In Hungary, minimum requirements are applied to all new buildings, as well as to major renovated buildings over 1,000 m$^2$ (this is expected to be changed to 200 m$^2$). The remainder of the EU countries apply minimum requirements on all new buildings without any building area threshold.

## Potential benefits of building energy labeling for Ukraine

Residential buildings consumed 33.7 percent of Ukraine's final energy consumption in 2010.[6] The sector has reported a steady growth in energy consumption: Between 2008 and 2010, energy consumption in residential buildings increased by more than 12 percent. The current statistical reporting format does not provide an adequate breakdown for the final energy consumption in public buildings; however, based on 2005 statistics, public buildings (commercial and tertiary) are responsible for 5.7 percent of Ukraine's final energy consumption, equivalent to 55 million MWh.

One of the metrics for assessing the potential for energy savings in buildings is the average annual energy consumption per square meter. On average, Ukrainian residential buildings consume 276 kWh/m$^2$ of energy (between 145 and 327 kWh /m$^2$, depending on the type of building and the climate zone[7] in which it is located).[8]

For comparison, Denmark's 2006 building code requires total energy requirements for dwellings to be no more than 71-90 kWh/m$^2$, with the lower values for larger houses (above 2,200 m$^2$) and the higher values for smaller houses (e.g., less than 110 m$^2$), including hot water and electricity for pumps and ventilation. In Germany the requirements for new buildings are based on total net energy demand and depend on the ratio between surface and volume. For apartment buildings, the requirement is for total energy demand to be no more than 75 kWh/m$^2$ of useful floor area. Norway's regulation requires a total net energy demand of no more than 120 kWh/m$^2$ for new buildings.

It is common for some EU Member States to require that existing buildings after renovation or thermal modernization (in cases when over 20% of the building space is renovated) consume not more than 140 percent of the efficiency requirement for similar new buildings. Energy consumption in existing buildings in most EU countries is at most half that of the energy consumption in existing Ukrainian buildings in comparable climate zones.[9]

---

[6] Energy Balance of Ukraine 2010.Statistic information of the State Statistics Service of Ukraine available at www.ukrstat.gov.ua.

[7] Climate zone 1 has over 3501 degree-days (DDs); Climate zone 2 – from 3001 to 3500 DDs; Climate zone 3 – from 2501 to 3000 DDs; and Climate zone 4 – under 2500 DDs.

[8] National Energy Efficiency Action Plan for Buildings for Ukraine. 2012.

[9] Examples of Good Practice in Building Regulation in Europe. Paper by INFORSE-Europe1, October 2008

With the average cost of energy in Ukraine equivalent to about $24.30 per MWh (the prices for electricity and gas are almost equal when calculated by kWh),[10] potential reductions in energy consumption as a result of better enforcement of building energy codes -- with the support of building energy certification and labelling programs -- can be expressed in terms of monetary savings (see Table 1).

**Table 1. Cost-Optimal Energy Saving Potential, Investments and Monetary Savings in Ukraine's Building Sector (to be achieved by a complex of measures during 2012-2020)**

| | Energy Consumption (MWh) | Technical Energy Saving Potential (MWh) | Cost-optimal Energy saving (ES) potential (MWh) | Necessary Investments for Cost-Optimal ES (billion $$ during 2012-20) | Monetary Savings from Cost-Optimal ES measures (billion $$ during 2012-20) |
|---|---|---|---|---|---|
| **Multi-apartment buildings** | **298,315,687** | **178,406,000** | **53,063,000** | **19** | **18** |
| **Public Buildings** | **55,000,000** | **32,000,000** | **27,415,000** | **8** | **7** |
| **Total** | **353,315,687** | **210,406,000** | **80,478,000** | **26** | **24** |

Source: National Energy Efficiency Action Plan for Buildings, Ukraine, 2012.

The estimated $24 billion of savings potential for residential and public buildings is a major economic resource that can be tapped during the 8-year period required by the EC Energy Services Directive, in part, through the implementation of building energy certification and labelling as one of the key tools for market-based promotion of building energy efficiency and enforcement of building energy codes.

Implementation of a building energy labeling and certification program will also raise demand and create jobs for a large number of engineers and newly accredited building energy performance assessors in Ukraine. Increased emphasis on energy efficiency will also create demand for efficient technologies, while helping building owners and renters save money on energy costs over the long term. In addition, the program can result in the following benefits for the buildings sector:

- Increased asset value and associated real estate prices or rental fees, as well as creation of market based incentives for building improvements by owners
- Improved operations and maintenance
- Emissions reductions to help Ukraine meet its national obligations for climate change mitigation
- Opportunity for financing energy efficiency improvements
- Job creation and retention

Residential and office buildings with higher grades on their energy labels will be more positively viewed and demanded by consumers who understand the potential for lower energy costs (as well as lower maintenance costs) in such buildings. For businesses, such labels can also contribute to a better corporate image. For rental space, buildings labeled as high-efficiency can provide a comparative advantage against competitors. Early evidence in Europe indicates that energy performance certificates that show higher efficiency levels have yielded a 2.7 percent premium on buildings' sale

[10] European Bank for Reconstruction and Development "Market Research. Residential Sector of Ukraine: Legal Regulatory, Institutional, Technical, and Financial Aspects", July 2011.

prices.[11] Experience from the United States indicates that green buildings have approximately 3.5% higher occupancy rates and rent increases of 3%.[12] A 2009 study by the Royal Institute of Chartered Surveyors compared 893 green certified buildings to 10,000 non-green buildings and demonstrated that the rental prices for green certified buildings were, on average, 6% higher; and that green certified buildings sold 16% more frequently than non-green certified buildings, all other factors being equal.[13]

In summary, building energy certification and labeling programs provide information to building owners on how and where energy is being used, enabling their owners or managers to identify cost-effective efficiency improvements that will save them (and/or their tenants) money. These programs also foster the development and availability of new and innovative technologies that can be used to meet energy efficiency goals.

## The Key Building Energy Labeling Principles

### Cost-effectiveness

As Table 1 indicates, improving energy efficiency in buildings can be a cost-effective intervention with a large savings potential in Ukraine. However, although the buildings sector is among the most cost-effective for focusing energy efficiency improvements, a number of barriers and market failures limit investment in this sector. Energy certification and labeling programs are designed to eliminate some of these barriers by raising building owners' and renters' awareness of building energy use and associated costs. This creates demand and expands the market for efficient technologies and practices in buildings.

The costs of building energy certification and labeling include:

- Program costs: The expenses incurred by public authorities for developing and enforcing a building energy labeling program. These include expenses for methodology development, training, accreditation, monitoring and enforcement, and oversight. These costs are generally paid through public budgets.
- Certification costs: The fees paid to accredited expert evaluators (assessors) for carrying out evaluations of building energy performance and for preparation of certificates and labels. These fees, which range from EUR 50 to EUR 2000 per building in the EU (depending on building size), are generally paid by building owners or users. These costs cover the fee for the service, as well as recover the training and accreditation costs incurred by accredited expert evaluators.

The combined costs of developing a certification and labeling program can thus be significant. However, given the large potential economic benefits of introducing this type of policy tool, such programs can be cost-effective in the long run. Economic benefits resulting from improvements in building energy efficiency associated with labeling programs include reduced energy costs, as well as reduced building operation and maintenance costs, in addition to the macro-economic benefits

[11] K.E. Thomsen, K.B.Wittchen. *EPBD Concerted Action. Certification: Core Theme 1*. November 2010.
[12] Green Building Standards and Certification Systems. Whole Building Design Guide. by Stephanie Vierra. September 2011.
[13] Doing Well By Doing Good? An Analysis of the Financial Performance of Green Office Buildings in the USA. RICS Research Report. March 2009

described in part 2.b, *Potential benefits of building energy labeling for Ukraine*. Other important benefits include reductions in greenhouse gas emissions associated with energy use, mitigated social pressure as a result of lower energy bills, increased comfort, and reduced weather-related health problems.

## Administrative feasibility and potential obstacles

To be effective in addressing market barriers, a building energy certification and labeling program should have the following characteristics:

- Ease of application: For certification and labeling to be effective as a policy tool, it must be simple and understandable for all parties involved in building development and operation, including building designers, accredited engineer-evaluators, building owners, and renters.
- Low cost and reasonable payback: Certification costs should not be so high as to negate the financial attractiveness of energy efficiency investments in buildings. To ensure that Ukraine's upcoming energy efficiency policies achieve widespread acceptance and implementation, these costs should be minimized to the greatest extent possible.
- Applicability to both new and existing buildings: While energy efficiency is most easily incorporated during the building design and construction phase, the largest overall potential for efficiency improvements is in existing buildings, due to the number and historical inefficiencies of these structures. More than two-thirds of all the buildings that exist today will still be in use in the next 20-30 years. Hence, despite the relative ease and lower cost of certification and labeling in new buildings, it is critical to include existing buildings in certification and labeling policies in order to tap the enormous energy efficiency potential of this sector. In cases where certification and labeling programs are designed to first apply only to new buildings, the inclusion of existing buildings can be phased in once the program is successfully underway. This is the approach proposed for Ukraine.

## Capacity building, enforcement, and oversight

Public administration of policies related to building energy performance will be implemented by the Cabinet of Ministers of Ukraine, authorized public administration bodies, and other executive public authorities identified by legislation.

The authorized public administration bodies in the area of energy performance of buildings are central executive public authorities with a mandate to ensure the implementation of State policies in the areas of construction, regional development, housing and communal economy, energy efficiency, and energy savings. These authorized public administration bodies have the following powers:

The main responsible entity for the development and implementation of the State policy in the area of construction, architecture, urban development, housing and communal economy (presently this functions are assigned to the Ministry of Development, Construction and Housing and Communal Services), shall 1) ensure that energy performance requirements for buildings or building units are set with a view to achieving cost-optimal levels, 2) establish a system for certification, 3) exercise control over the availability of certificates on energy performance of buildings, 4) conduct inspections of the accuracy of the data specified in such certificates, and 5) issue normative and legal acts and normative

and technical documents (standards, norms, procedures and rules) on the matters within their terms of reference.

The Architectural and Construction Attestation Commission, which is created by the main body responsible for the formation and implementation of the State policies in the area of construction, architecture, urban development, housing and communal economy, shall be responsible for 1) development of guidelines, programs, requirements and examinations for certifiers, and 2) accreditation of certifiers. This Commission has already been established by the Ukrainian Cabinet of Ministers Resolution #554, approved on May 23, 2011, and identified two categories of specialists in the field of construction, which should receive additional training on Building Energy Certification and pass examinations for receiving accreditation as part of this training. These categories of specialists are design engineers and building experts.

Receiving accreditation has been mandatory for all specialists in the field of construction since June 1, 2012. Specialists that received accreditation between 2009 and June 1, 2012 can receive new accreditation without passing new training.

The State Research Institute of Buildings (NDIBV) and the State Research Institute of Building Construction (NIISK) are tasked by the Government to develop the training programs for accreditation of design engineers and building experts. To further ensure the implementation of the program in the area of energy performance of buildings, the village, settlement, and city councils shall:

- approve and implement local targeted programs to promote efficient energy performance of buildings and monitor their execution;
- inform the population about the state of implementation of the local targeted programs; and
- ensure the promotion of energy efficient activities in buildings.

The owners (co-owners) of public buildings and buildings frequently visited by the public must display in a prominent place on the building -- clearly visible to the public -- the summary from the certificate of building energy performance.

Labeling programs require the involvement of a number of parties with various skills. In addition to the public authorities involved with the enforcement of the program, the users of the program include parties responsible for implementing the building labeling program, and those using the information in the label. This latter group includes engineers and designers, building developers, real-estate brokers, building owners/managers and tenants, and building energy performance evaluators, as well as financial institutions, where relevant.

Considering the complex technical methodology associated with building performance evaluation, associated legal and regulatory documentation, and materials required for design and implementation of building energy efficiency, the key players will need substantial capacity strengthening. In addition, it will be important to raise awareness among building owners and users of the benefits of the building energy label, and developers and realtors need to learn how to use the label as a tool for marketing their properties.

# Summary of BEL Approach

## Summary of the legal-regulatory framework

This Regulation on Energy Performance of Buildings is currently under development. The Regulation will establish the procedures and measures for enhancement of energy performance of buildings, targeting the optimization of internal climate in buildings and the reduction of carbon dioxide emissions resulting from the use of buildings, and will define the scope of responsibilities of public administration institutions. The foundation for building energy labeling will be based on building energy performance regulations that describe the following key procedures and measures:

a) method of calculating the energy performance of buildings;
b) estimation of minimum requirements for the energy performance of new buildings;
c) estimation of minimum requirements for the energy performance of major building renovations; and
d) obligatory energy certification of the energy performance of buildings.

This Regulation shall apply to:

a) newly constructed buildings;
b) major renovations of existing buildings;
c) sold buildings; and
d) rented buildings.

Note that the regulation applies to building of all sizes, but will be mandatory only for buildings with area above 1000 $m^2$.

This Regulation shall refer to the following categories of buildings:

a) family houses;
b) apartment buildings;
c) school buildings;
d) office buildings; and
e) mixed use buildings.

The above regulation will be developed and adopted based on the existing normative bases in Ukraine, described in the following section.

## Overview of the technical methodology and normative base

There are currently no requirements for the energy performance certification of buildings in Ukrainian legislation or regulations. The existing legal framework only has requirements and a format for energy "passports." These passports contain information about the energy efficiency of the building, and provide an energy rating for the building, based on energy classes ranging from 'A' to 'F' (see Table 2). New or renovated buildings are required to meet performance requirements corresponding to class 'C' or higher. This has been the first step toward harmonization of the Ukrainian legal framework with the EU Directives in the field of building energy certification.

Next steps toward harmonization with EU Directives include the adoption of Ukraine's draft laws in this area, including the draft Law on Energy Efficiency of Residential and Public Buildings, which was prepared within the framework of the USAID-funded Municipal Heating Reform Project in

Ukraine, and the development of a technical methodology and regulations for the energy certification of buildings.

In addition, Ukraine's new draft laws include the introduction of mandatory building energy performance certification and labels, but they do not cover existing buildings -- only new and reconstructed buildings. Therefore, substantial efforts will be needed to prepare secondary legislation in order to establish comprehensive mechanisms for implementation of energy performance certification of buildings, and to ensure its integration with EU Directives and norms.

Finally, to ensure enforcement of a certification program, Ukraine will need to assign the roles and responsibilities of the various stakeholders in this process. This document provides a description of the various roles and processes, as well as the phases and milestones of the proposed national building energy certification and labeling program in Ukraine.

The current legal framework for rules and regulations related to building energy efficiency in Ukraine consists of the following:

***Draft Law of Ukraine on Energy Efficiency of Residential and Public buildings***

The Draft Law of Ukraine on Energy Efficiency of Residential and Public Buildings[14] was approved in a first reading by the Verkhovna Rada. The Law:

- Sets out the legal, economic, and institutional principles for activities in the area of energy efficiency of residential and public buildings, and is intended to create the conditions for efficient energy consumption in these buildings.
- Sets rules for development of secondary legislation and programs on energy efficiency, promotes energy efficiency and information dissemination, and encourages the development of minimum efficiency requirements for buildings (and especially those over 1000 m²).
- Sets rules for energy certification of buildings, including:
    - Evaluation of the level of energy efficiency of buildings
    - Development of a list of required and technically and economically possible energy saving measures
    - Rules for Specialists in the field

## Existing Bylaw acts:

***State Standard of Ukraine on "Designing. Instructions on Development and Preparation of Energy Certificates (passports) of Buildings for New Construction and Reconstruction" (SSU-N B A.2.2-5:2007)*** – Starting on January 1, 2009, the building Energy Passport became an obligatory document for design documentation. The instructions define the procedure for energy auditing in buildings, which includes analysis of architectural solutions, metering of thermal characteristics of the building envelope, comparison to normative energy performance rates, determination of energy saving potential, and suggestion of feasible energy efficient measures. This standard also stipulates the energy passport rates based on energy classes that correspond with various levels of specific energy use; new or reconstructed building are requested to qualify for a class not less than "C."

[14] As noted earlier, this law was developed with support from the USAID-funded Municipal Heating Reform Project in Ukraine.

**Table 2. Energy Efficiency Classes of Buildings Provided for Building Energy Passportization**

| Energy Efficiency Classes | Difference in % between calculated or actual specific energy use, $q_{building}$, and maximal allowed $E_{max}$, $[(q_{bud} - E_{max}) / E_{max}] \cdot 100\%$ |
|---|---|
| **A** | ***minus 50 and less*** |
| B | ***from minus 49 to minus 10*** |
| **C** | ***from minus 9 to plus 5*** |
| **D** | ***from plus 6 to plus 25*** |
| **E** | ***from plus 26 to plus 75*** |
| **F** | ***plus 76 and more*** |

However, $q_{building}$ does not follow the calculation procedures of EU norms. In addition, this type of expression of energy performance does not allow for the consideration of renewable energy applications in buildings; expressing energy performance in terms of primary energy or $CO_2$ could help reflect renewable solutions in the energy passport.

The presentation of energy efficiency classes in the Energy Passport also does not meet EU requirements, for the following reasons:

- Although the calculation algorithm is based on the seasonal method (which is allowed by EN ISO 13790), it does not follow the methodology for such a seasonal approach provided in EN ISO 13790. The main discrepancies include:
    - $q_{буд}$ is designed to reflect characteristics of the building envelope, and therefore can be referred to as "energy need" (as mentioned in EN ISO 13790). However, the calculation algorithm includes a number of coefficients that reflect the influence of automatic heating system controls and factors related to emission efficiency (emissions associated with primary energy resource in use). Such adjustment of the calculation with these coefficients does not allow the consideration of $q_{буд}$ either as "energy need" or as "energy use" (since it does not include many other factors which influence energy use by heating).
    - The algorithm includes heat transfer coefficients for ventilation and infiltration. However, there is no provision to include heat recovery units for ventilation. A heat recovery unit, if present, is usually an important element in the heat balance of the building zone, strongly influencing utilization of the heat gains and heating or cooling demand. For that reason the effect of using heat recovery units should be taken into account in the calculation of the energy needs for heating and cooling and cannot be addressed via a separately determined correction factor.
    - Compared to EN ISO 13790, the Ukrainian algorithm simplifies a number of parameters, including the utilization factor for heat gains. The algorithm also contains several different types of conditioned areas (e.g., heated area, useful area, apartment area), while the EN ISO 13790 is based on calculations of heating and cooling in buildings that need room conditioning systems.
- As mentioned above, the algorithm reflects the influence of the building envelope on energy needs for heating. To incorporate the future perspective, Ukraine will need to reflect the influence of new types of technical systems, and to calculate heating, domestic hot water

needs and use, cooling needs and use, lighting use, and other energy uses (plug loads). Otherwise, it will not be possible to reflect the implementation of new solutions or technologies for heating, domestic hot water, cooling, and lighting systems in the overall energy performance requirements for buildings, and thus encourage building developers to implement such solutions.

***State Standard of Ukriane on "Energy Efficiency Section in designing documentation"*** (***SSU-B A.2.2-8:2010***) – This norm stipulates that an Energy Efficiency Section shall be included as the last section in the Design Specification and shall include necessary information about energy saving solutions, technologies, and materials present in each part of the design.

**New bylaws:**

Based on the previously developed Action Plan for EU and Ukrainian standards harmonization[15], some of the European Standards relevant to energy performance certification were adopted and submitted for approval by the Scientific-Technical Committee of the Ministry of Regional Development, Construction and Housing and Communal Services. These cover various complementary aspects of building energy performance evaluation and include the following:

- ***DSTU EN 15603 Energy performance of buildings - Overall energy use and definition of energy ratings***;

EN 15603 specifies a general framework for the assessment of overall energy use of a building, and the calculation of energy ratings in terms of primary energy, $CO_2$ emissions or parameters defined by national energy policy.

Energy certification of buildings requires a method that is applicable to both new and existing buildings, and which treats them in an equivalent way.

- ***DSTU EN 15217 Energy performance of buildings - Methods for expressing energy performance and for energy certification of buildings***;

EN 15217 provides methods to express and certify building energy performance. EN 15217 specifies:

  - overall indicators to express the energy performance of whole buildings;
  - ways to express energy requirements for the design of new buildings or renovation of existing buildings;
  - procedures to define reference values;
  - ways to design a procedure for building energy certification.

- ***State Standard of Ukraine Energy performance of buildings - Calculation of energy (need and) use for space heating and cooling ( SSU EN ISO 13790).***

- **State Construction Norm for Production Technologies on**Adoption of a methodology, setting energy performance requirements for new and existing buildings, development of

[15] EU/Ukraine Action Plan available at http://ec.europa.eu/world/enp/pdf/action_plans/ukraine_enp_ap_final_en.pdf.

energy performance certificate, inspection of boilers and air conditioning systems, accreditation of independent experts (**SCN-P.2.6-31:2006**)

The state construction norms (SCN/DBN) documents establish mandatory requirements and are regarded as legislative acts.

As noted, becoming a contracting party to the European Energy Community Treaty required that Ukraine review and transpose a number of legal documents, including the Energy Performance of Buildings Directive (EPBD). EN ISO 13790 provides methodologies for calculation of sensible energy need for space heating and space cooling for both residential and non-residential buildings. Harmonisation of the existing regulations on energy performance with the European standards is an ongoing process.

## Timeline

The building energy certification and labeling program should be implemented in coordination with other related reforms in building energy efficiency, all of which are integrated in Ukraine's National Energy Efficiency Action Plan for Buildings (NEEAP-Bs). Table 3 indicates the BEL-related actions in the NEEAP-Bs and their intended timeline.

**Table 3. Elements of the NEEAP-Bs Related to the BEL Program Implementation**

| Measure No. | Measures in the National EE Action Plan on Buildings | Year of implementation | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
| | General measures | | | | | | |
| 7 | Implementation of the system of energy certification of residential buildings | | | | | | |
| | Public buildings | | | | | | |
| 14 | Energy certification of public buildings | | | | | | |
| | Residential buildings | | | | | | |
| 16 | Introduction of a system of accreditation of independent experts on energy certification of buildings | | | | | | |

## Key Building Energy Labeling Target Areas

The National Building Energy Labeling (BEL) Program includes the following elements:

- Formation of Examination Committee, as described in the regulation.
- Targeting of prototype cities in accordance with their climate/temperature zones (at least 1 city per zone).

- Selection of building types: >1,000 $m^2$
- Development of information and outreach materials to promote the program in the pilot cities.

### Primary categories of buildings eligible for mandatory BEL

In accordance with the Draft Law of Ukraine on Energy Efficiency of Residential and Public Buildings, it is obligatory to issue an energy certificate for:

- Newly constructed buildings;
- Buildings undergoing thermal modernization, major renovation, or reconstruction;
- Buildings being rented or sold; and
- Existing buildings with a total useful floor area over 1000 $m^2$.

### Primary categories of buildings eligible for voluntary BEL

Certification of the energy performance of existing buildings shall be carried out upon request of the building's owner (co-owner) or its authorized entity (person). In the spirit of EPBD, the public sector should lead by example, and buildings occupied by state bodies or local self-government bodies and frequently visited by the public should be certified and labeled in the early stages of the BEL Program to set an example and motivate the private sector to follow.

The certificate of energy performance of an existing building must be accompanied by a feasibility study for any recommended energy efficiency improvements.

## The Gradual Approach to National BEL and Recommended Phases of BEL Implementation in Ukraine

The BEL program will be instituted in three phases: the Prototype phase, the Introductory phase, and the Expansion phase (see Table 4). This phased method will enable the certification and labeling infrastructure to grow and mature in a manner that allows for practices to be established and applied cost effectively. Lessons learned in the Prototype phase will enable corrections to be implemented in the Introductory and Expansion phases.

**Table 4. BEL Program Activities by Phase**

| | 2013 (Year one) | 2014 (Year two) | 2015 (Year three) | 2016 (Year four) | 2017 (Year five) |
|---|---|---|---|---|---|
| **Prototype Phase** | Create materials; Select locations; Public and industry announcement of effective date of prototype phase; Train industry: certifiers, building owners, managers, designers and builders. | Subset of buildings are rated and registered. Training evaluations are analyzed and program improvements are made. Information Campaigns carried out. See Table 5 BEL Target Areas for building types and schedule | X | X | X |
| **Introductory Phase** | X | X | Evaluate materials; participants surveyed for feedback and program improvements are made. Certifiers must recertify and obtain continuing education credits and be informed of this milestone requirement. Ongoing Information Campaigns. See Table 5 BEL Target Areas for building types and schedule | | |
| **Expansion Phase** | X | X | X | Evaluate materials; participants surveyed for feedback and program improvements are made Certifiers must recertify and obtain continuing education credits and be informed of this milestone requirement. Evaluation of program continues and improvements are made. Ongoing Information Campaigns. See Table 5 BEL Target Areas for building types and schedule | Revaluate materials; participants surveyed for feedback and program improvements are made. Certifiers must recertify and obtain continuing education credits and be informed of this milestone requirement. Program is rolled out country wide. Ongoing Information Campaigns. See Table 5 BEL Target Areas for building types and schedule |

As an overlay to Table 4, Table 5 (BEL Target Areas) further illustrates the proposed gradual approach to the Ukraine BEL Program. Buildings larger than 1,000 $m^2$ are targeted during years two through four; year five includes all sizes of buildings. Climate zone I is first targeted because of the higher rate of new residential construction in this zone.[16] In year two, new and renovated public and commercial buildings are rated; in year three the Program is expanded to Zone II and to sold or rented commercial buildings. In year four, renovated commercial buildings are added in Zones II and III, and in year five all buildings, in all zones, are included in the labeling program.

**Table 5. BEL Target Areas**

| Building types rated and labeled | Climate Zones | Date |
|---|---|---|
| **Public buildings and commercial new construction > 1,000 $m^2$** | I | 2014 (Year two) |
| **Above plus sold or rented commercial buildings > 1,000 $m^2$** | I, II, | 2015 (Year three) |
| **Above plus renovated commercial buildings > 1,000 $m^2$** | I, II, III | 2016 (Year four) |
| **Above plus all size buildings that are newly constructed, rented, sold, or renovated, and residential buildings.** | All (I, II, III and IV) | 2017 (Year five) |

## Test/Prototype Phase

During the two-year Prototype phase, the following activities will be carried out:

- Four cities will be targeted and a sample number of buildings in each category, as defined in Table 4, will be rated. The size of the sample will be determined by the designated implementing agency, in proportion to the available resources. Ideally, one of each residential and public building type (listed in Table 6) should be certified and labeled in each climate zone to produce a representative study, which can be used for analysis of the methodology, tools and application results. The certification findings should also be used to showcase the BEL findings and potential impact. Education and outreach materials will be developed and trainings will be scheduled and held regularly (frequency to be defined by the designated implementing agency) in each of these two years. Selected individuals, who meet the criteria laid out in the regulation, will be trained, tested, and accredited.

[16] According to Deloitte's Overview of the Construction and Building Material Industry in Ukraine, in 2011 the Kyiv and Kyiv region accounted for 27.1% of total construction in Ukraine, with another 27.7% of residential construction performed in Odessa, Lviv, Ivano-Frankivs'k regions and Crimea. Construction rates in heavily populated Eastern regions are comparatively low.

With about 13 million existing residential and public buildings in Ukraine (of which about 10 percent have been constructed in the last 20 years), the number of required accredited experts is hard to predict, as in the initial phase the mandatory certification and labeling will solely apply to a small share of new and renovated, rented and sold buildings. In 2011 the new residential housing constructed was 9.4 million $m^2$, of which approximately 4.6 million $m^2$ was in multi-apartment buildings and dormitories. While Ukraine's official statistical reports provide no detailed information on the sizes of new buildings, the majority of multi-apartment buildings in this region are larger than 1000 $m^2$. With regard to non-residential buildings, Kyiv alone has added 52,390 $m^2$ of new office space during 2011. With most of this new construction representing large buildings, and extrapolating from the European experience from the market for building energy certification services (see Box 1), for a full-scale building labeling program Ukraine will need between 5,000 and 8,000 accredited building energy certification and labeling experts. Such a market of professionals can certify between 360,000 and 600,000 buildings per year (representing 2.6-4.6 percent of the total building stock, comparable to the new construction and renovation turnover in most European countries).[17] Depending on the rate of new construction and renovation in both residential and public buildings, the number of accredited experts may need to increase.

Box 1. Certification Market Trends in Europe

In January 2012 the European Commission proposed a target of public building energy retrofits of 3 percent per year, which is expected to create about 500,000 jobs. In Poland, 7,000 experts have completed the mandatory post-graduate training course. These experts were certified and included in the central register as qualified experts for evaluation of energy performance of buildings, apartments and building parts.

In Sweden about 400 companies were accredited for building energy declaration (certification), and more than 30,000 non-residential buildings were certified.

In Denmark, about 18,000 large buildings (>1,500m2) and about 55,000 single family homes are certified each year. By 2009 Denmark had about 1,000 certified experts for building energy certification. A simple calculation indicates that, on average, 77 buildings can be certified by each expert per year, or an average building certification requires about 3 days.

Source: Concerted Action on EPBD. Nov 2010.

- All certified buildings will be rated and registered in the *public register on energy certification* by building type (new construction, renovation, sold or rented), category (family, apartment, school, office, or mixed-use), location, rating, and accredited professional name(s) in accordance with the national norms.[18]

A more detailed description of the activities that will be carried out during each year of the Prototype Phase is provided below:

## YEAR ONE:

The methodology for determining levels of energy performance defined in Annex 1-9 of the USAID Municipal Heating Reform in Ukraine Project's *Recommendations for Regulation on Certification and Rating (Labeling) of Energy Performance* (May 2011) will be used to develop the following materials for each of the five categories of targeted building types:

[17] This statement assumes that the accredited expert is working on building energy certification at full load.
[18] DSTU-N B A.2.2-5:2007 "Designing. Instruction for Development and Compilation of Building Energy Passports for New Construction and Reconstruction".

- Certification tests
- Easy to use guides
- Checklists
- Training and education materials for the construction industry

In addition, the first-year program will include the following elements:

- Assess capabilities of existing professionals, and of existing training accreditation systems and programs.
- Establish an appeals system for disputing building ratings.
- Ensure that a sufficient number of certifiers, based on market demand, are trained before launching the certification scheme.
- Train specialists to undertake desk reviews and practice audits.
- Create and make available downloadable blank Certificates and energy labels.
- Administer accreditation tests to individual building performance evaluators.
- Administer training evaluation surveys.

Activities specifically related to computer hardware and software[19] include:

- Identify computer hardware needs for a data management system to compile and store building energy certificate data.
- Develop software for managing and protecting building energy certificate data. Where possible, the system should be designed to receive information submittals via the Internet from building designers, auditors, or owners.
- Develop a query system by which the building energy certificate data can be summarized in terms of total energy consumption.
- Develop sampling and extrapolation methods, if necessary, to translate energy consumption data for small samples of buildings into estimates of energy consumption for the entire building stock or sections thereof.
- Develop new methodologies, or confirm or expand existing methodologies, for translating energy use into associated GHG emissions using statistics for fuel mixes and emissions factors.

For residential and public buildings, the National Energy Efficiency Action Plan proposed the following groups of representative buildings which can be included in the first sample group. Should funding be available, this sample would include buildings from every one of Ukraine's four climate zones.

[19] Cohen, R. (2007) Building Performance Congress, EPLable: A Graduated Response for Building Energy Certification based on Operational Rating

**Table 6. Representative Residential and Public Buildings Proposed for the Prototype Phase Sampling for Prototype Phase**

| Representative Residential Buildings | Representative Public Buildings |
|---|---|
| - **One-family cottage with the total area of 60 m$^2$;**<br>- **2-floor building with two entrances, 12m × 36m;**<br>- **5-floor building with four entrances, 1-437/1-438 series;**<br>- **10-floor building with one entrance, BPS series; and**<br>- **5-floor hostel with one entrance, 164-80-1 series.** | - Pre-school and educational institution buildings (schools and kindergartens)<br>- Buildings of design or research institutions, non-governmental and administrative buildings;<br>- Medical and recreation buildings; and<br>- Other buildings:<br>  - Physical training and sport buildings;<br>  - Buildings for entertainment and culture;<br>  - Buildings for trade and catering;<br>  - Buildings used for daily public services;<br>  - Social care buildings;<br>  - Public transport passenger service buildings;<br>  - Utility buildings; and<br>  - Multi-functional buildings and complexes. |

### YEAR TWO

- Publicize and promote accredited individuals.
- Certify, label, and register a number of sample buildings. Minimum sample size should include two of each type presented in Table 6 in each of the four climate zones.
- Develop information campaigns targeting the general public to promote the program and increase general knowledge and acceptance or program goals.
- Develop an overall quality assurance approach to include training and national examinations, validation of certificates and auditing processes.
- Establish a comprehensive quality assurance system including complaint and appeal procedures.
- Develop an initial auditing system to provide continuous monitoring of labeled buildings within the centralized administration system to measure their energy performance versus the certificate's estimate.
- Provide technical support for certifiers.

## Introductory Phase

### YEAR THREE

During the Introductory Phase (year 3), information from program participants will be assessed and the program will be modified as needed. The Program will be expanded to other selected locations and climate/temperature zones. The number of locations and buildings will be determined by the authorized agency in accordance with the available resources.

- Improved training programs will be offered 1-4 times per year (the frequency will be based on demand).
- Continuing education is required and will be administered to certifiers.

- A survey aimed at building owners and accredited certifiers will be developed in order to streamline processes and reduce barriers to building rating. These individuals will be surveyed and data will be collected and analyzed.
- Public recognition will be given for high-performing rated buildings.

### Expansion Phase

The Expansion phase (Years 4 and 5) will bring the program to full implementation and will have the following features:

- Country-wide roll out of program
- All new construction, renovation, sold or rented buildings and climate zones rated
- Public recognition for high-performing rating buildings
- Program evaluation

#### YEAR FOUR

In year 4 commercial buildings undergoing renovation will be added to the building types covered under the BEL program and the program will be further expanded to Climate Zone 3. In addition:

- Materials will be evaluated for effectiveness and revised as necessary.
- Participants will be surveyed for feedback and program improvements will be made.
- Certifiers will be informed that they must recertify and obtain continuing education credits.
- Evaluation of the program will continue and improvements will be made.
- Information campaigns will continue.
- See Table 5, BEL Target Areas, for building types and schedule

#### YEAR FIVE

In year 5 all size public buildings that are newly constructed, rented, sold, or renovated, and residential buildings in all four climate zones will be included in the program. In addition:

- Materials will be re-evaluated
- Participants will again be surveyed for feedback and program improvements will be made.
- Information campaigns will continue. See Table 5, BEL Target Areas, for building types and schedule

## Review and Adjustment based on M&E of program performance

### Development of a Measurement and Evaluation (M&E) protocol and M&E metrics

The proposed measurement and evaluation (M&E) protocol is laid out in Table 7 by program phase. Evaluation of the training and surveys of certifiers -- as well as construction industry and building owner/managers -- need to be undertaken to fine-tune materials and outreach methods. M&E activities also include evaluation of building ratings and recommendations for policy and programs to improve construction practices. It is critical that the program be re-evaluated in a continuous manner, in addition to the evaluation that is laid out in years two, three, and four, to provide continuous improvements to the program.

**Table 7. M&E Activities and Timeline**

| Monitoring and Evaluation (M&E) | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|
| **Prototype Phase** | X | Analyze training evaluations and make program improvements. | X | X | X |
| **Introductory Phase** | X | X | Evaluate training and materials; survey participants for feedback and program improvements.<br>Inform certifiers recertifying or obtaining continued education credits of obligations and track their progress. | Collect data centrally in a comprehensive administrative system.<br>Monitor and review the certification process.<br>Review data and use to foster greater overall energy efficiency. | |
| **Expansion Phase** | X | X | X | Feedback mechanism: Evaluation of program is ongoing and improvements are made. | Evaluation of commonalities in construction deficiencies and ratings of building types. Continuous evaluation. |

## Evaluation and Use of Evaluation Results

Building certification programs can identify the best candidates for cost-effective retrofits. As buildings are rated, data are collected on energy efficient measures that can improve ratings. In aggregate this information can inform city, state and country-wide initiatives to improve construction practices through:

- Training
- Outreach materials
- Incentives for carrying out recommendations for energy-saving measures
- Penalties or requirements for rehabilitation when cost effectiveness can be shown
- Codes and standards

## Other considerations:

- Link the certification scheme to other energy efficiency policies for buildings.
- Consider implementing life-cycle assessments to determine the full impact on energy use or emissions (carbon footprint).
- Assess the possibility to include in the certificate other environmental effects on energy, water and land use, global warming and ozone depletion, toxic emissions (to air, land and water), and the impact on human health (environmental footprint).
- Review data and use to further promote energy efficiency.

## Recommendation of changes and adjustments

The goal of evaluation is to create a feedback mechanism to inform improvements to the program and other potential energy saving endeavors. A successful BEL program should minimize the burden on citizens as well as the amount of paperwork required from administrators, and should not cause delays in building construction. All possible efforts should be made to automate electronic data collection and the processing of certificates.

# Responsible Entities

In accordance with Ukraine's current and draft legislation, the Ministry of Regional Development, Construction and Housing and Communal Services is responsible for government regulation of energy performance certification.

As noted above, all building experts and design engineers and certification bodies for experts and designers, as well as the accredited organizations including the public professional associations "Association of Construction Industry Experts" and "The Guild of Designers in Construction" are responsible for implementation of Energy Performance Certification of Buildings.

In order to systematize the data on energy performance of buildings and to exercise control over conformity to the related legislation, a Unified State Register of Certificates of Energy Performance of Buildings should be established. This Register should be developed and maintained by the central executive authority responsible for ensuring implementation of State policy in the areas of construction, architecture, urban development and housing and communal services.

Certificates of building energy performance should be submitted for inclusion in Ukraine's Register of Certificates of Energy Performance of Buildings by the specialists in energy performance of buildings or by the design organization that applied for the certification.

## Awareness

After the completion of the introductory phases, the implementation of a nation-wide building energy certification and labeling campaign must be accompanied by a robust public awareness campaign aimed at promoting understanding and acceptance of the program among the key stakeholder groups. The stakeholders targeted by the public outreach activities should include real-estate developers, architectural design bureaus, construction companies, and property management and brokerage professionals.

The outreach materials should highlight the achieved and future benefits of the building energy labeling and certification program. The outreach campaign also should provide extensive information about available web resources related to building energy certification and labeling.