

UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE



**OVERCOMING BARRIERS
TO INVESTING IN
ENERGY EFFICIENCY**



NOTE

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries. In particular, the boundaries shown on the maps do not imply official endorsement or acceptance by the United Nations.

Mention of any company, licensed technology or commercial products does not imply endorsement by the United Nations.

ACKNOWLEDGEMENTS

The publication is a result of research undertaken in the framework of the United Nations Sabbatical Programme by Oleg Dzioubinski at the Copenhagen Centre on Energy Efficiency serving as the Energy Efficiency Hub of the Sustainable Energy for All (SEforALL) Initiative.

Valuable contributions at various stages of the research and preparation of the publication have been received from the following organizations and experts:

- The Copenhagen Centre on Energy Efficiency and UNEP DTU Partnership, in particular, John Christensen, Vijay Deshpande, Tim Farrell, Susanne Konrad, Thomas Krader, Dan Howis Lauritsen, Mark Lister, Ksenia Petrichenko, Milan Rusnak, Romanas Savickas, Marco Schletz, Peter Skotner, Aristeidis Tsakiris, Xiao Wang, and Xianli Zhu.
- The UNECE Group of Experts on Energy Efficiency and its Bureau, in particular Stefan Buettner, Aleksandar Dukovski, Natalia Jamburia, Hannes Mac Nulty, and Zlatko Pavičić.
- The UNECE Sustainable Energy Division, in particular, Viktor Badaker, Scott Foster, Stefanie Held, and Iryna Lagodna.
- Respondents to the survey on overcoming barriers to investing in energy efficiency.
- Participants of the workshop “Creating the Business Case for Energy Efficiency: Engaging Governments with Industry” at the Eighth International Forum on Energy for Sustainable Development (Astana, 13 June 2017) and the session “Energy Efficiency” at the 10th Local Economic Development (LED) Forum (Tbilisi, 13 September 2017).

ECE/ENERGY/117

UNITED NATIONS PUBLICATION
Sales No. <i>15.IIE.9</i>
ISBN 978-92-1-117091-7
eISBN 978-92-1-057461-7
ISSN 1014-7225

Copyright © United Nations, 2017

All rights reserved

Front cover photo: Colourbox.dk / Alex Lukin
Design and layout: Kowsky

FOREWORD

Energy efficiency is one of the objectives of the Sustainable Energy for All (SEforALL) Initiative and one of the targets of the Sustainable Development Goal (SDG) 7. The aim is to double the global rate of improvement in energy efficiency by 2030. While significant progress is being made in energy efficiency, the improvements are not fast enough to reach the rate necessary for limiting global temperature rise to no more than 2 degrees Celsius (and preferably 1.5 degrees) by 2050 as stated in the Paris Climate Agreement.

This publication looks into barriers to investing in energy efficiency and ways to overcome them. A vast body of research on the topic of energy efficiency investments and barriers that prevent the energy efficiency potential to be fully realized exists. However, it is often the perception of those who work in the field of energy efficiency as a practitioner that may provide additional and valuable insights on the challenges and solutions for overcoming barriers to energy efficiency investments. To obtain this input a survey that looks into various aspects of the problem was developed and widely distributed among energy efficiency experts representing governments, private sector, financial institutions, international and intergovernmental organizations, non-profit organizations, academia, and independent experts.

The analysis of the survey and its conclusions and recommendations will serve as a useful tool for energy efficiency community, first of all for the policy makers who can apply the results to the situation in their countries and find approaches to improve investment climate for energy efficiency. This may include, where appropriate, improving regulatory framework, including implementation and enforcement; making financial institutions more aware of energy efficiency financing and reducing perception of its high risk; raising awareness about the multiple benefits of energy efficiency projects; and other measures as recommended in this publication.

This publication is an example of productive collaboration between the United Nations Economic Commission for Europe and the Copenhagen Centre on Energy Efficiency, part of the UNEP DTU Partnership. We expect this kind of cooperation to continue between our organizations and with other players in the area of energy efficiency for the benefit of UNECE member States and countries outside the UNECE region.



Olga Algayerova

Executive Secretary

United Nations Economic Commission for Europe



John M. Christensen

Director

UNEP DTU Partnership

CONTENTS

FOREWORD	III
LIST OF TABLES	VI
LIST OF FIGURES	VI
ACRONYMS AND ABBREVIATIONS	IX
EXECUTIVE SUMMARY	X
INTRODUCTION	1
ANALYSIS OF THE SURVEY ON OVERCOMING BARRIERS TO INVESTING IN ENERGY EFFICIENCY	5
1. Assessment of existing investment opportunities for energy efficiency and the level of investment in energy efficiency received	6
2. Regulatory and institutional support for investments in energy efficiency	7
3. Role of international assistance in increasing the level of energy efficiency investments.....	12
4. Financial environment for energy efficiency investments.....	12
5. Availability and use of financing for energy efficiency projects implementation ..	15
6. Main barriers to increasing investment and financing flows to energy efficiency projects.....	20
7. Ways to increase energy efficiency project investment viability.....	22
8. Assessment of measures in industrial energy efficiency.....	24
CONCLUSIONS AND RECOMMENDATIONS	31
ANNEX SURVEY OVERCOMING BARRIERS TO INVESTING IN ENERGY EFFICIENCY	35
REFERENCES	43

LIST OF TABLES

TABLE 1. Perception of availability of investment opportunities for energy efficiency and the level of investment in energy efficiency received in individual countries.....	6
TABLE 2. Perception of the strength of support of the regulatory framework in a country for enabling energy efficiency investments vs. existence of the regulatory framework in energy efficiency received in individual countries.....	9
TABLE 3. Existence and effectiveness of national institutions responsible for energy efficiency investment policies in individual countries.....	11
TABLE 4. Effectiveness of international assistance in increasing the level of energy efficiency investments in individual countries	13
TABLE 5. Assessment of financial environment for energy efficiency investments in individual countries	14
TABLE 6. Price of energy as an incentive to implement energy efficiency measures in individual countries	15

LIST OF FIGURES

FIGURE 1A. Type of organization represented by respondents (All countries).....	5
FIGURE 1B. Type of organization represented by respondents (UNECE region).....	5
FIGURE 2A. Existence of particular types of legislation, programmes and policies to support investments in energy efficiency (UNECE region)	8
FIGURE 2B. Existence of particular types of legislation, programmes and policies to support investments in energy efficiency (Sub-region of Eastern Europe, the Caucasus, Central Asia, and the Russian Federation)	8
FIGURE 2C. Existence of particular types of legislation, programmes and policies to support investments in energy efficiency (Sub-region of Western Europe and North America)	8
FIGURE 2D. Existence of particular types of legislation, programmes and policies to support investments in energy efficiency (Sub-region of South-East Europe).....	8
FIGURE 3A. Types of commercial financing available for energy efficiency projects implementation (All countries).....	16
FIGURE 3B. Types of commercial financing available for energy efficiency projects implementation (Sub-region of Eastern Europe, the Caucasus, Central Asia, and the Russian Federation).....	16
FIGURE 3C. Types of commercial financing available for energy efficiency projects implementation (Sub-region of Western Europe and North America)	16

FIGURE 3D. Types of commercial financing available for energy efficiency projects implementation (Sub-region of South-East Europe)	16
FIGURE 4A. Available types of budget and donor financing for energy efficiency projects implementation (All countries).....	17
FIGURE 4B. Available types of budget and donor financing for energy efficiency projects implementation (Sub-region of Eastern Europe, the Caucasus, Central Asia, and the Russian Federation).....	17
FIGURE 4C. Available types of budget and donor financing for energy efficiency projects implementation (Sub-region of Western Europe and North America)	17
FIGURE 4D. Available types of budget and donor financing for energy efficiency projects implementation (Sub-region of South-East Europe)	17
FIGURE 5A. Most widely used types of financing for energy efficiency projects (All countries).....	18
FIGURE 5B. Most widely used types of financing for energy efficiency projects (Sub-region of Eastern Europe, the Caucasus, Central Asia, and the Russian Federation)	18
FIGURE 5C. Most widely used types of financing for energy efficiency projects (Sub-region of South-East Europe)	18
FIGURE 5D. Most widely used types of financing for energy efficiency projects (Sub-region of Western Europe and North America)	18
FIGURE 6A. Main barriers to increasing investment and financing flows to energy efficiency projects (All countries and UNECE region).....	21
FIGURE 6B. Main barriers to increasing investment and financing flows to energy efficiency projects (Sub-region of Eastern Europe, the Caucasus, Central Asia, and the Russian Federation).....	21
FIGURE 6C. Main barriers to increasing investment and financing flows to energy efficiency projects (Sub-region of South-East Europe)	21
FIGURE 6D. Main barriers to increasing investment and financing flows to energy efficiency projects (Sub-region of Western Europe and North America)	21
FIGURE 7A. Main factors that can lead to increasing energy efficiency project investment viability (All countries and the UNECE region).....	23
FIGURE 7B. Main factors that can lead to increasing energy efficiency project investment viability (Sub-region of Eastern Europe, the Caucasus, Central Asia, and the Russian Federation)	23
FIGURE 7C. Main factors that can lead to increasing energy efficiency project investment viability (Sub-region of South-East Europe)	23

FIGURE 7D. Main factors that can lead to increasing energy efficiency project investment viability (Sub-region of Western Europe and North America)23

FIGURE 8. Existence of an overall energy efficiency/energy intensity (productivity) goal in a respondent’s company25

FIGURE 9A. Main barriers faced by a company when considering investment in industrial energy efficiency (All countries and UNECE region)26

FIGURE 9B. Main barriers faced by a company when considering investment in industrial energy efficiency (Sub-region of Eastern Europe, the Caucasus, Central Asia, and the Russian Federation).....26

FIGURE 9C. Main barriers faced by a company when considering investment in industrial energy efficiency (Sub-region of South-East Europe)26

FIGURE 9D. Main barriers faced by a company when considering investment in industrial energy efficiency (Sub-region of Western Europe and North America)26

FIGURE 10. Existence of an energy management system (EnMS) in a company that is certified or implemented according to a specific standard.....27

FIGURE 11. Energy efficiency measures or projects implemented by respondents’ companies in the past three years.....28

FIGURE 12A. Main business benefits to respondents’ companies from implemented energy efficiency measures (All countries and UNECE region)29

FIGURE 12B. Main business benefits to respondents’ companies from implemented energy efficiency measures (Sub-region of Eastern Europe, the Caucasus, Central Asia, and the Russian Federation).....29

FIGURE 12C. Main business benefits to respondents’ companies from implemented energy efficiency measures (Sub-region of South-East Europe)29

FIGURE 12D. Main business benefits to respondents’ companies from implemented energy efficiency measures (Sub-region of Western Europe and North America)29

ACRONYMS AND ABBREVIATIONS

BRICS	Brazil, India, Russian Federation, China, and South Africa
ECS	Energy Charter Secretariat
EE C CA RF	Sub-region of Eastern Europe, the Caucasus, Central Asia, and the Russian Federation
EU	European Union
EU W	Sub-region of Western Europe and North America
EnMS	Energy Management System
ESCO	Energy Service Company
GEEE	Group of Experts on Energy Efficiency
GTF	Global Tracking Framework
IEA	International Energy Agency
ISO	International Organization for Standardization
IPEEC	International Partnership for Energy Efficiency Cooperation
Mtoe	Million Tonnes of Oil Equivalent
NGO	Non-governmental organization
OECD	Organisation for Economic Cooperation and Development
PEEREA	Protocol on Energy Efficiency and Related Environmental Aspects
RISE	World Bank's Regulatory Indicators for Sustainable Energy
SDGs	Sustainable Development Goals
SEE	Sub-region of South-East Europe
SEforALL	Sustainable Energy for All
UNECE	United Nations Economic Commission for Europe
USD	United States Dollars

EXECUTIVE SUMMARY

Energy efficiency is widely viewed as one of the most effective ways to achieve multiple economic, social and environmental benefits and is at a core of making significant progress towards Sustainable Development Goals (SDGs). It is also recognized that significant progress is being made in energy efficiency. However the improvements are not fast enough to reach the rate necessary for limiting global temperature rise to no more than 2 degrees Celsius (and preferably 1.5 degrees) by 2050 as stated in the Paris Climate Agreement.

Increasing amount of investments in energy efficiency are necessary to reach a Sustainable Energy for All (SEforALL) objective of 2.6 percent annual improvement rate of energy efficiency. These investments are increasing globally and have reached over USD 220 billion in 2015, constituting 12 percent of total energy investments. However, they are not happening on the scale necessary to achieve a breakthrough in energy efficiency improvement (including reaching the SDG7 target 7.3 to double the global rate of improvement in energy efficiency by 2030) and goals of the Paris Agreement.

This study looks into barriers to investing in energy efficiency and ways to overcome them. A vast body of research on the topic of energy efficiency investments and barriers that prevent the energy efficiency potential to be fully realized exists. However, it is often the perception of those who work in the field of energy efficiency as a practitioner that may provide additional and valuable insights on the challenges and solutions for overcoming barriers to energy efficiency investments. To obtain this input a survey that looks into various aspects of the problem was developed and widely distributed among energy efficiency experts representing governments, private sector, financial institutions, international and intergovernmental organizations, non-profit organizations, academia, and independent experts.

The United Nations Economic Commission for Europe (UNECE) Committee on Sustainable Energy and its Group of Experts on Energy Efficiency (GEEE) has been actively engaged in the regulatory and policy dialogue addressing financial, technical and policy barriers to improve energy efficiency. At its third session in October 2016 in Baku, GEEE supported a policy analysis on overcoming barriers to investing in energy efficiency to be conducted jointly with the Copenhagen Centre on Energy Efficiency. This study is a result of research undertaken in the framework of the United Nations Sabbatical Programme by Oleg Dzioubinski at the Copenhagen Centre on Energy Efficiency in close cooperation with Senior Advisor, Vice Chair of GEEE Tim Farrell, other staff members of the Copenhagen Centre on Energy Efficiency, other members of the GEEE Bureau, staff members of the UNECE Sustainable Energy Division, and other energy efficiency experts.

The survey on overcoming barriers to investing in energy efficiency has been conducted over the period 10 January – 7 February 2017. The survey was posted on the website of the UNECE and sent to the UNECE Group of Experts on Energy Efficiency, the Committee on Sustainable Energy, the network of experts of the Copenhagen Centre on Energy Efficiency, networks of other relevant organizations, and to other experts in the areas of energy efficiency and sustainable energy. The survey was available in English and Russian. This report covers both the analysis of the first (general) part of the survey and the second

part with specific questions related to energy efficiency in industry. The survey has elicited significant interest among the energy efficiency practitioners from various countries, organizations and sectors. In correspondence and conversations with respondents, they emphasized the relevance of the approach and questions and importance and value of the study. Many experts expressed their interest in receiving the results of the analysis. Based on the responses received and follow-up correspondence and conversations with selected experts, the analysis of barriers to investing in energy efficiency and ways to overcome them has been prepared.

The primary geographic focus of the survey is the region of the UNECE comprising its 56 member States¹ from Western Europe (members and non-members of the European Union), North America (Canada and the United States), South-East Europe, Eastern Europe, the Caucasus, Central Asia, Israel, Turkey and the Russian Federation. However the survey was conducted globally and results also cover countries outside the UNECE region.

The analysis allowed to come to a number of conclusions and develop a set of recommendations.

CONCLUSIONS ON THE STATUS OF ENERGY EFFICIENCY FINANCING AND BARRIERS TO INVESTING IN ENERGY EFFICIENCY

1. Globally and in the UNECE region, there is a high or reasonably high potential for energy efficiency investments. However this potential in many countries remains largely untapped. There is a significant gap between investment opportunities for energy efficiency and the level of investments in energy efficiency in most of the countries.
2. Most countries in the UNECE region have framework legislation for energy efficiency and many have other supporting legislation, programmes and policies. In the sub-region of Western Europe and North America, essentially all components of the regulatory framework are in place and are considered to be relatively effective but not always providing very strong support and enabling energy efficiency investments. In other parts of the UNECE region, the situation varies. Some lack by-laws, norms and standards, and specific programmes and policies.
3. In general, there is a good correlation between the existence of the regulatory framework and how well it supports and enables investments in energy efficiency. For example, Germany possesses strong regulatory framework that ensures strong support for investments. In Azerbaijan and the former Yugoslav Republic of Macedonia, the regulatory framework is considered weak and it provides little support to investments. Belarus, Kazakhstan and Ukraine mostly have regulatory framework in place but the support it provides for energy efficiency investments is not considered strong, particularly in Ukraine.

¹ For the complete list of the UNECE member States see http://www.unece.org/oes/nutshell/member_States_representatives.html.

4. Institutions at the national level responsible for developing and implementing policies that support investments in energy efficiency projects exist in the countries of the UNECE region. However assessment of their effectiveness differ among individual countries: strongest in Germany and Switzerland, and weakest in Albania, Azerbaijan, and the former Yugoslav Republic of Macedonia. Outside the UNECE region, India and Mexico are viewed as having effective national institutions to promote energy efficiency.
5. Among the various levels of government, national authorities are generally considered to be providing the highest level of support for developing and implementing energy efficiency projects compared to regional (provincial) and local (municipal). A few exceptions include Canada and the United States, where authorities at the provincial and state level respectively are providing more support than the national and local levels. In Ukraine, authorities at the local level are viewed as providing more support than at the national and regional (oblast) levels.
6. International assistance is viewed as moderately effective in increasing the level of energy efficiency investments in most of the countries of South-East Europe, Eastern Europe, the Caucasus, and Central Asia. It is viewed as most effective in Albania, Armenia, Belarus, Croatia (new EU Member State), and Ukraine, while in Azerbaijan and the former Yugoslav Republic of Macedonia its effectiveness is assessed relatively low. Among the analyzed countries outside the UNECE region, effectiveness of the international assistance is highest in India and Mexico and lowest in Brazil.
7. Financial environment is not very favourable for investments in energy efficiency. Familiarity of financial institutions with financing energy efficiency projects and measures is relatively low in many countries of the world, including developed countries and countries with economies in transition in the UNECE region. Financial institutions view financing of energy efficiency projects significantly riskier compared to other types of business projects. Conditions for repayment and servicing energy efficiency loans with savings generated from improved efficiency are considered generally more favourable for projects in the public sector than for projects in the private sector but in most cases they are not too favourable.
8. Generally, the price of energy provides some but often insufficient incentive for improving energy efficiency. However, situation with the energy pricing differs significantly among countries. In the UNECE region, it provides a rather strong incentive in Ukraine and Armenia, a moderate incentive in Germany and Albania, and a very weak one in Croatia and Switzerland. Among the selected countries outside the UNECE region, the strongest incentive from energy prices is in Brazil and the weakest is in India.
9. Both globally and in the UNECE region self-financing remains the most widely used type of financing of energy efficiency projects followed by direct financing from public budgets and debt financing. At the same time, situation varies significantly both between and within sub-regions. In the Caucasus and in Ukraine, donor funds is the most important type of financing. In Croatia, the major role is played by Energy Efficiency Funds. Financing through ESCOs is important in North America.
10. Low awareness about the multiple benefits of energy efficiency projects is viewed as the main barrier to increasing investment and financing flows to energy efficiency

projects. Next important factors are lack of understanding of energy efficiency financing by banks and other financial institutions; administrative barriers and bureaucracy; and low energy prices. Some countries have identified one or two barriers as particularly important: in Azerbaijan, it is lack of specific policies and legislation and low energy prices; in Belarus – difficulties with obtaining commercial loans and other types of financing; in Kazakhstan and Switzerland – low energy prices; and in Canada and Germany – low awareness about the multiple benefits of energy efficiency projects.

11. Tax incentives and low-interest loans for energy efficiency projects are viewed as the most important factors that can lead to increasing energy efficiency project investment viability in particular countries. They are followed by stricter energy efficiency standards; training and awareness programmes; improved legislation; and de-risking of investments through Government support programmes. Specific factors are identified in particular countries as the main ones: in Armenia, Belarus, Croatia, and Ukraine – low-interest loans for energy efficiency projects; in Azerbaijan – improved legislation; in Kazakhstan – improved access to commercial financing; in Germany – tax incentives; in the former Yugoslav Republic of Macedonia, two main factors are tax incentives and implementation of energy management systems in industry; and in Switzerland also two main factors – implementation of energy management systems in industry and carbon pricing.
12. A majority of companies in the UNECE region have either internal or compliance driven energy efficiency/energy intensity goal. Energy efficiency decisions in companies are often made by the same people as core business decisions. At the same time, low priority of energy efficiency as it is not part of the core business is one of the main barriers faced by a company when considering investment in industrial energy efficiency. The other two significant barriers are lack or high cost of capital and lack of government incentives. About half of companies have some kind of energy management system (EnMS) but no more than one-fifth has EnMS that is ISO 50001 certified. Almost all companies implement some measures or projects to improve energy efficiency. Most common measures to improve energy efficiency are implemented to enhance energy efficiency of buildings and to improve energy efficiency of plant and equipment. As the main business benefits from implemented energy efficiency measures, companies consider improved production efficiency and quality, followed by general cost control, demonstration of corporate social responsibility, and compliance with legislation.

RECOMMENDATIONS FOR OVERCOMING BARRIERS TO INVESTING IN ENERGY EFFICIENCY

1. Countries should pursue higher effectiveness of the existing regulatory framework, with an emphasis on further developing, improving, implementing and enforcing secondary legislation, norms and standards, and targeted programmes and policies for energy efficiency. Those countries where certain pieces of regulatory framework are missing should consider adopting them taking advantage of experience of other countries where they exist and are successfully applied.

2. Countries should provide necessary resources to specialized institutions responsible for developing and implementing policies that support investments in energy efficiency projects. Such institutions have been shown in many cases to be effective in promoting such investments.
3. International assistance and use of donor funds for energy efficiency should continue in close cooperation with recipient countries to ensure that they are used for leveraging rather than crowding out private investments, improve knowledge of domestic financial sector in energy efficiency financing, and take into consideration multiple benefits of energy efficiency.
4. Significant efforts are required to make financial institutions more aware of energy efficiency financing and reduce perception of their high risk. Specific national policies are desirable for this to happen.
5. As there are no one-size-fits-all solutions, countries should take into account their specific circumstances when implementing policies and measures to increase investment in energy efficiency. However, using existing successful experience from other countries can be beneficial by applying best practices and avoiding mistakes.
6. Price of energy can become an important driver for energy efficiency investment. Countries where energy prices do not provide a sufficient incentive for energy efficiency should take this into consideration.
7. Raising awareness about the multiple benefits of energy efficiency projects can be recommended as one of the most effective measures to increase investment and financing flows to energy efficiency projects. This may require developing a system of assigning value to non-economic benefits, so that it can be properly taken into account when making investment decisions.
8. In the short and medium term, particularly in the countries with economies in transition, tax incentives and low-interest loans for energy efficiency projects should be considered as the most appropriate ways to increasing energy efficiency project investment viability.
9. Governments should consider creating incentives for companies for improving energy efficiency through appropriate policies. Companies should consider implementation of energy efficiency measures as those that improve production efficiency and quality, lower cost of production, help demonstrate corporate social responsibility and comply with legislation, and thus ultimately have a positive impact on the core business.

INTRODUCTION

Energy efficiency is widely viewed as one of the most effective ways to achieve multiple economic, social and environmental benefits and is at a core of making significant progress towards Sustainable Development Goals (SDGs). One of the targets (target 7.3) of SDG7 “Ensure access to affordable, reliable, sustainable and modern energy for all” is to double the global rate of improvement in energy efficiency by 2030. Energy efficiency has been called a low hanging fruit, a first fuel, and a multiple benefits provider. As stated in IEA (2016a), “All of the core imperatives of energy policy – reducing energy bills, decarbonisation, air pollution, energy security, and energy access – are made more attainable if led by strong energy efficiency policy.” It is estimated that two-thirds of the global economic potential for energy efficiency remains untapped (IEA (2016a)). In various economic sectors, economically viable untapped energy efficiency potential is estimated (for the 2011-2035 period) as follows: close to 2,000 Mtoe in the power sector, over 4,000 Mtoe in the industry and transport sectors, and over 5,000 Mtoe in the buildings sector (IPEEC 2017).

It is widely recognized that significant progress is being made in energy efficiency. For example, global improvement in energy intensity was 1.8 percent in 2015, which is higher than in 2014 (1.5 percent) and significantly higher than the annual rate in the previous decade (0.6 percent) (IEA (2016a)). A recently published Global Tracking Framework, or GTF (World Bank (2017a)) states that progress in reducing the energy intensity of the global economy continued to accelerate, improving by a 2.1 percent compound average annual growth rate in 2012–14. However, these numbers are lower compared with a Sustainable Energy for All (SEforALL) objective of 2.6 percent, which is needed to put “...the world onto a sustainable pathway toward a decarbonised energy system” (IEA (2016a)). To make this happen, significant amount of investments are needed. It is generally acknowledged that these investments will pay off both directly in economic terms and by providing multiple benefits, such as improved quality of life, job creation, improved health, climate change mitigation, etc.

These investments are increasing globally – by 6 percent in 2015. They were over USD 220 billion in 2015, constituting 12 percent of total energy investments (IEA (2016b)). The sectors where energy efficiency investments are most significant are buildings (including appliances in them), transport, and industry. IEA (2016b) lists different main drivers for these investments. For buildings and appliances, it is energy efficiency standards covering about 30% of energy consumption, as well as specific policies on building retrofits, particularly in OECD countries. In industry, larger role is played by energy prices and competitive pressures. In transport, there are competing factors – some of them slow down energy efficiency improvements (such as lower fuel prices), while others facilitate improved efficiency, including through increased share of electric vehicles (increasing standards and taxes and government spending).

In spite of the fact that energy efficiency investments are increasing they are not happening on the scale necessary to achieve a breakthrough in energy efficiency improvement

(including reaching the SDG7 target 7.3) and goals of the Paris Agreement. Limiting temperature rises to 2°C will require increasing global expenditures on energy efficiency to reach USD 550 billion a year by the 2030s (CT (2016)). Government policies are viewed as crucially important for energy efficiency investments. According to IEA (2016a), in 2015, 30% of final energy demand globally was covered by mandatory efficiency policies, up from 11% in 2000. In many cases they are able to counteract declining fuel and energy prices. There are recommendations that business cases for investment need to be strengthened by strong policy frameworks with the right economic and regulatory drivers (CT (2016)). The needed level of energy efficiency investments is only achievable by engaging private finance but the role of public finance is critical. It can serve as a catalyst for private sector investments. “Public programmes are essential to overcome both the technical and financial obstacles, stimulate energy efficiency markets to unlock the opportunity, and leverage the far greater sums of private finance needed to scale up to \$550 billion per year” (CT (2016)). It is also important to note that best practices and case studies for effectively attracting investments to energy efficiency in most cases cannot not be simply transferred from one country or region to another. They have to be adjusted to the local context (UNECE (2015)).

The World Bank publication *Regulatory Indicators for Sustainable Energy – RISE* (World Bank 2017b) assesses policy and regulatory support in 111 countries for each of the three pillars of sustainable energy – access to modern energy, energy efficiency, and renewable energy. It is a set of indicators to help compare national policy and regulatory frameworks. Total number of indicators are 27, of which 12 are for energy efficiency. Together with the *Global Tracking Framework* (World Bank 2017a) that assesses the actual progress in sustainable energy it allows to look at the conditions that allow countries to achieve significant strides in improving energy efficiency. A useful feature of the GTF report is its regional outlook with chapters on five major world regions (including the Europe, North America, and Central Asia region). Energy Charter Secretariat has been studying energy efficiency policies in countries of South-East Europe, Eastern Europe, the Caucasus, and Central Asia as one of the activities under the Protocol on Energy Efficiency and Related Environmental Aspects (PEEREA). The publications are issued as *In-Depth Review of the Energy Efficiency Policy of the country* (see ECS (2013a-d) and ECS (2017) for Albania, Azerbaijan, Belarus, Ukraine, and Armenia respectively).

The vast body of research on the topic of energy efficiency investments and barriers that prevent the energy efficiency potential to be fully realized exists. It is also acknowledged that defining and measuring investment in energy efficiency is less straightforward than for investment in energy supply (IEA 2016b). Therefore, it is often the perception of those who work in the field of energy efficiency as a practitioner that may provide additional and valuable insights on the challenges and solutions for overcoming barriers to energy efficiency investments. To obtain this input a survey that looks into various aspects of the problem was developed and widely distributed among energy efficiency experts representing governments, private sector, financial institutions, international and intergovernmental organizations, non-profit organizations, academia, and independent experts. The primary geographic focus of the survey is the region of the United Nations Economic Commission for Europe (UNECE) comprising its 56 member States from Western Europe (members and non-members of the European Union), North America (Canada and the United States), South-East Europe, Eastern Europe, the Caucasus, Central Asia, Israel, Turkey and the Russian Federation. However the survey was conducted globally and results also cover countries outside the UNECE region.

Questions of the survey were grouped in several categories:

1. Assessment of existing investment opportunities for energy efficiency and the level of investment in energy efficiency received
2. Regulatory and institutional support for investments in energy efficiency
3. Role of international assistance in increasing the level of energy efficiency investments
4. Financial environment for energy efficiency investments
5. Availability and use of financing for energy efficiency projects implementation
6. Main barriers to increasing investment and financing flows to energy efficiency projects
7. Ways to increase energy efficiency project investment viability
8. Assessment of measures in industrial energy efficiency

There is an expectation that the analysis of the survey results will add value to existing studies and will serve as guidance to policy makers and other energy efficiency practitioners in the UNECE region and beyond.

**ANALYSIS
OF THE SURVEY ON
OVERCOMING BARRIERS
TO INVESTING IN
ENERGY EFFICIENCY**

ANALYSIS OF THE SURVEY ON OVERCOMING BARRIERS TO INVESTING IN ENERGY EFFICIENCY

The survey on overcoming barriers to investing in energy efficiency has been conducted over the period 10 January – 7 February 2017. The survey was prepared in coordination with the Copenhagen Centre on Energy Efficiency and other experts. The survey was posted on the website of the United Nations Economic Commission for Europe (UNECE) and sent to the UNECE Group of Experts on Energy Efficiency, the Committee on Energy Efficiency, the network of experts of the Copenhagen Centre on Energy Efficiency, networks of other relevant organizations, and to other experts in the areas of energy efficiency and sustainable energy. Survey questions are available in Annex I. The survey was available in English and Russian.

Total number of valid responses globally is 339 from 85 countries. Of these, 230 responses were received from experts representing 47 UNECE member States. Approximately one-quarter of the respondents were female. The type of organization that these experts represent is shown in Fig. 1. The majority of experts represent business community (27-28 percent) followed by non-governmental organizations (NGOs) (14 percent) and, with shares ranging from 10 to 13 percent, by national governments, academia, international organizations, and independent experts. Smaller share of respondents represent regional or municipal authority (5 percent) and financial institutions (2-3 percent).

FIGURE 1. Type of organization represented by respondents

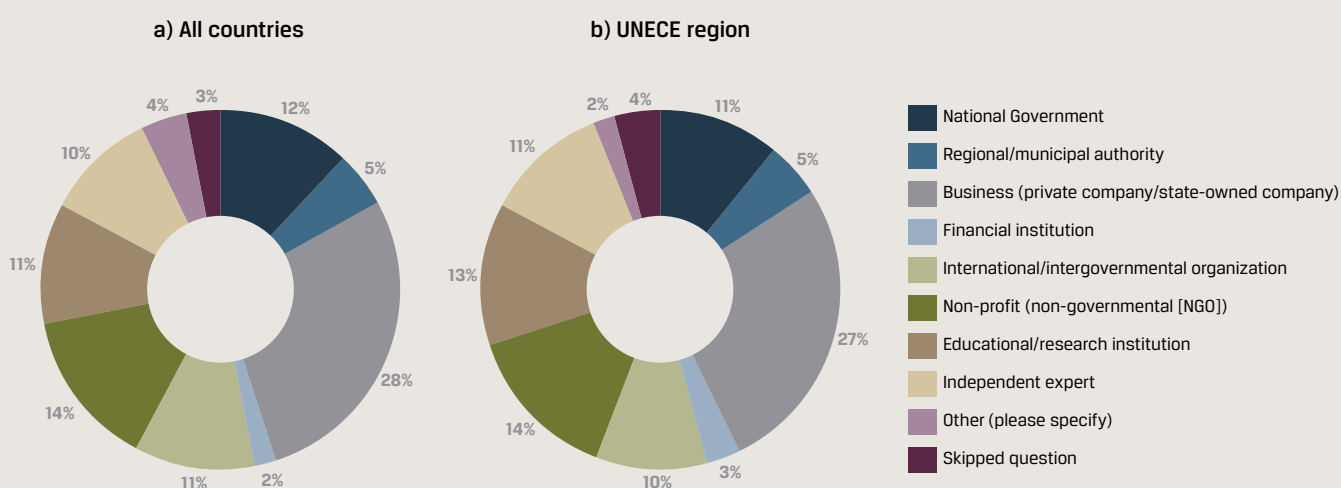


TABLE 1. Perception of availability of investment opportunities for energy efficiency and the level of investment in energy efficiency received in individual countries

SELECTED COUNTRIES	Number of responses per country	Availability of investment opportunities from 1 (very few) to 5 (very many)	Level of investment received from 1 (no/very little investments) to 5 (high level of investments)
NORTH AMERICA			
Canada	15	4.40	3.21
United States	30	4.62	3.38
WESTERN EUROPE			
Croatia	11	4.45	3.20
Germany	13	4.54	3.60
Switzerland	8	3.63	2.71
United Kingdom	9	4.11	3.22
EASTERN EUROPE			
Belarus	8	3.38	2.63
Ukraine	11	4.00	2.00
CAUCASUS			
Armenia	8	4.00	2.50
Azerbaijan	8	3.13	2.57
CENTRAL ASIA			
Kazakhstan	8	3.38	2.50
SOUTH-EAST EUROPE			
Albania	9	3.33	2.56
The former Yugoslav Republic of Macedonia	8	2.88	2.00
COUNTRIES OUTSIDE UNECE REGION			
Brazil	10	3.90	2.50
Colombia	9	4.75	2.50
India	9	4.00	2.67
Mexico	18	4.22	3.06
South Africa	8	4.75	2.63

1. ASSESSMENT OF EXISTING INVESTMENT OPPORTUNITIES FOR ENERGY EFFICIENCY AND THE LEVEL OF INVESTMENT IN ENERGY EFFICIENCY RECEIVED

Respondents generally consider that there is a significant number of investment opportunities in their countries. Answering the question on a scale from 1 (very few) to 5 (very many) the average score both globally and for the UNECE region is 3.99. At the same time, there is a significant difference between parts of the UNECE region. The sub-region that includes Western Europe (Member States of the European Union, Iceland, Liechtenstein, Norway, and Switzerland) and North America (Canada and the United States) (129 responses from 23 countries) scores significantly higher – 4.30 – than the sub-region that includes countries of Eastern Europe (Belarus, Republic of Moldova and Ukraine), the Caucasus (Armenia, Azerbaijan and Georgia), Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan), and the Russian Federation – 3.75

(64 responses from 12 countries). Even lower score is for the sub-region of South-East Europe (Albania, Bosnia and Herzegovina, Montenegro, Serbia and the former Yugoslav Republic of Macedonia) that had 23 responses from five countries – 3.22.

This initial question confirms the overall perception that in developed countries there are more investment opportunities in energy efficiency than in countries with economies in transition. If we look at responses from individual countries², they confirm the sub-regional picture overall (Table 1). However, there are significant differences within sub-regions among the countries. Most of the selected countries of Western Europe and North America score around 4.5 but United Kingdom has a lower score (4.1) and Switzerland even lower (3.6). Substantial differences are observed between individual countries in Eastern Europe (Belarus – 3.4 and Ukraine – 4.0) and in the Caucasus (Armenia – 4.0 and Azerbaijan – 3.1).

In the next question, respondents were requested to assess the level of investment in energy efficiency their country receive on a scale from 1 (no/very little investments) to 5 (high level of investments). The difference in perception of the received investments compared to availability of investment opportunities is substantial. Both globally and for the UNECE region, the average is below 3 (2.74 and 2.83 respectively). Among the UNECE sub-regions, only Western Europe and North America scores above 3 (3.15). The average score in the sub-region of Eastern Europe, the Caucasus, Central Asia, and the Russian Federation is 2.50 and is even lower (2.39) in South-East Europe.

Table 1 provides information on both questions for selected individual countries in sub-regions. Level of investment is consistently scored significantly lower than opportunities for investment in energy efficiency (from 0.6 to 2 points lower).

A few non-UNECE countries are also included in Table 1. The responses show that in selected BRICS (Brazil, India, Russian Federation, China, and South Africa) and other middle-income developing countries, there is a view by experts that there are many energy efficiency investment opportunities. The difference between the opportunities and the level of investment is in some cases even higher (over 2 points) than for the UNECE region.

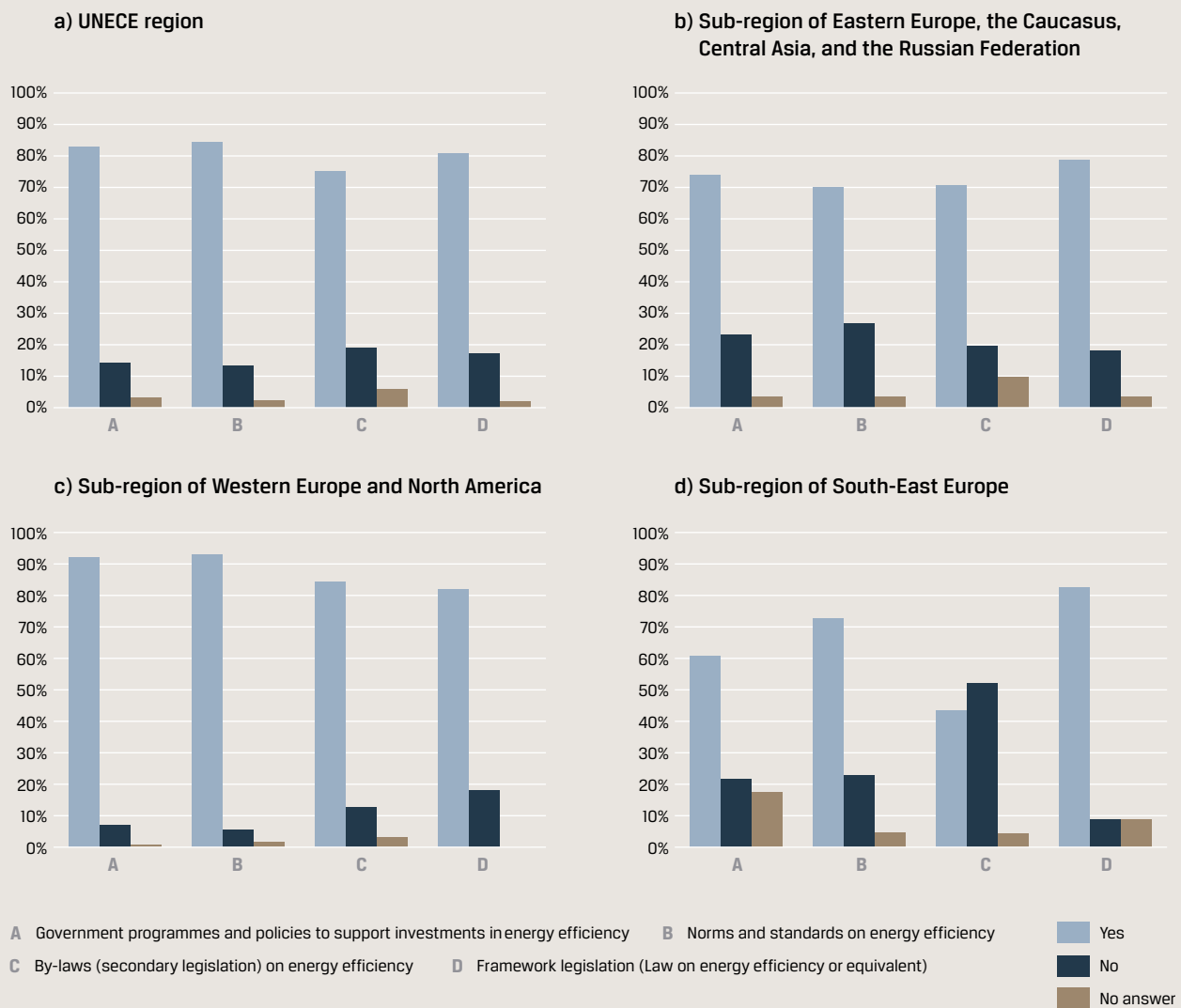
2. REGULATORY AND INSTITUTIONAL SUPPORT FOR INVESTMENTS IN ENERGY EFFICIENCY

The next series of questions have the purpose of analyzing the legislative and institutional support for energy efficiency investments.

Fig. 2 shows the existence of legislation, programmes and policies to support investments in energy efficiency. In the UNECE region as a whole, the level of positive responses is above 80 percent for the existence of framework legislation (Law on energy efficiency or equivalent) – 81 percent; government programmes and policies to support investments in energy efficiency – 83 percent; and norms and standards on energy efficiency – 84 percent. Somewhat lower is existence of secondary legislation (by-laws) on energy efficiency – 75 percent. When we look at sub-regions, the picture changes. In the sub-region of

² Data for individual countries are analyzed when the number of responses per country is eight or higher.

FIGURE 2. Existence of particular types of legislation, programmes and policies to support investments in energy efficiency (grey color - no answer was provided)



Eastern Europe, the Caucasus, Central Asia, and the Russian Federation³, all of the above is below 80 percent, with framework legislation at 79 percent, government programmes and policies at 74 percent and norms and standards and by-laws at only 70 percent. In South-East Europe, the positive responses are even lower. While the framework legislation stands at over 80 percent, the by-laws are at 44 percent, government programmes and policies at 61 percent, and norms and standards at 73 percent. This is important because usually the secondary legislation and specific norms make the framework law functional. In the sub-region of Western Europe and North America, these figures are significantly higher – over 80 percent for framework legislation and by-laws and over 90 percent for norms and standards and government programmes and policies.

³ The following abbreviations are used in the graphs for UNECE sub-regions:
 EE C CA RF – sub-region of Eastern Europe, the Caucasus, Central Asia, and the Russian Federation
 EU W – sub-region of Western Europe and North America
 SEE – sub-region of South-East Europe

TABLE 2. Perception of the strength of support of the regulatory framework in a country for enabling energy efficiency investments vs. existence of the regulatory framework in energy efficiency received in individual countries

SELECTED COUNTRIES	Support for investments in energy efficiency by the regulatory framework in your country from 1 (very little support) to 5 (very strong support)	Existence of regulatory framework to support investments in energy efficiency (average of positive responses on four types of legislation – see Fig. 2), percent
	NORTH AMERICA	
Canada	3.40	83
United States	3.45	82
	WESTERN EUROPE	
Croatia	3.64	93
Germany	4.00	94
Switzerland	3.50	84.5
United Kingdom	3.22	83
	EASTERN EUROPE	
Belarus	3.13	97
Ukraine	2.55	91
	CAUCASUS	
Armenia	2.63	78.5
Azerbaijan	2.38	36
	CENTRAL ASIA	
Kazakhstan	3.00	84.5
	SOUTH-EAST EUROPE	
Albania	3.11	66
The former Yugoslav Republic of Macedonia	2.00	50
	COUNTRIES OUTSIDE UNECE REGION	
Brazil	3.11	79
Colombia	2.89	86
India	2.78	78
Mexico	2.89	89
South Africa	3.13	62.5

However, the existence of appropriate legislation is a necessary but not a sufficient factor in making the investments happen. The experts were asked whether the regulatory framework in their countries support and enable investments in energy efficiency on a scale from 1 (very little support) to 5 (very strong support). Relative value of responses by sub-region is consistent with responses to previous question – the higher percentage of positive responses to the existence of required regulatory framework the higher the assessment of the role of regulation in supporting and enabling investments. For UNECE as a whole, the value is just above the mid-point between very little and very strong support – 3.07. For the sub-region of Western Europe and North America, where in most countries all forms of the regulatory framework exist, the value is higher – 3.39. In the sub-region of Eastern Europe, the Caucasus, Central Asia, and the Russian Federation, the value is below mid-point – 2.73, and in South-East Europe, it is even lower – 2.57.

In general, there is a good correlation between the existence of the regulatory framework and perception by experts how well it supports and enables investments in energy efficiency (Table 2). For example, in selected countries of Western Europe and North America, the support to investments is valued around 3.5 or higher, with the highest in Germany at 4.0 (strong support). However, it is worth noting that even when the regulatory framework is in place, experts often do not consider it providing very strong support and enabling energy efficiency investments. Very rarely experts used 5 (very strong support) in their responses.

In countries where regulatory framework is considered weak by experts (e.g. Azerbaijan and the former Yugoslav Republic of Macedonia), they believe it provides little support to investments (2.0 or slightly above). Belarus, Kazakhstan and Ukraine mostly have regulatory framework in place but the support it provides for energy efficiency investments is not considered strong, particularly in Ukraine (just above 2.5). Data for several non-UNECE countries are also included in Table 2.

With regards to the institutional framework, a large majority of responses affirm that countries (both globally and in the UNECE region) have institutions at the national level responsible for developing and/or implementing policies that support investments in energy efficiency projects (88 percent and 87 percent respectively). For the sub-regions, the positive response was received from 91 percent of respondents in the Western Europe and North America sub-region, 84 percent – in the sub-region of Eastern Europe, the Caucasus, Central Asia, and the Russian Federation, and 78 percent in the South-East Europe sub-region. Similar pattern is evident for the assessment of effectiveness of these institutions on a scale from 1 (not effective) to 5 (very effective): sub-region of Western Europe and North America – 3.25, sub-region of Eastern Europe, the Caucasus, Central Asia, and the Russian Federation – 3.09, and sub-region of South-East Europe – 2.81. In the UNECE region the score is 3.13 and globally – 3.07.

Table 3 presents responses from individual countries in the UNECE region and selected non-UNECE countries. Even when the response on existence of national institutions is less than 100 percent it is safe to state that such institutions exist in all the countries but maybe viewed by some experts as not fulfilling their role in developing and implementing energy efficiency investment policies (some experts skipped the question). However the assessment of their effectiveness varies in the UNECE region from around 2.6 in Albania, Azerbaijan, and the former Yugoslav Republic of Macedonia to 3.6-3.7 in Switzerland and Germany. It is worth noting high values for some non-UNECE countries (Mexico – 3.3 and India – 3.6).

The next question referred to the perception of the level of support provided for development and implementation of energy efficiency projects by authorities at various levels. Experts view authorities at the national level as most effective at providing such support. The other two levels of government (regional/provincial and local/municipal) are viewed as significantly less effective. In the sub-region of Eastern Europe, the Caucasus, Central Asia, and the Russian Federation the national level received 3.15, and both regional and local levels just above 2.6. In the sub-region of South-East Europe, the score is lower: 2.96 for the national level and just above 2.5 for both regional and local. Only in the sub-region of Western Europe and North America the regional level received score higher than 3 but still lower than the national level: the national level got 3.23, regional – 3.10, and local – 2.71.

TABLE 3. Existence and effectiveness of national institutions responsible for energy efficiency investment policies in individual countries

SELECTED COUNTRIES	Existence of national institutions responsible for energy efficiency investment policies (average of positive responses), percent	Effectiveness of national institutions responsible for energy efficiency investment policies (on a scale from 1 (not effective) to 5 (very effective))
	NORTH AMERICA	
Canada	100	2.86
United States	80	3.39
	WESTERN EUROPE	
Croatia	91	3.36
Germany	92	3.73
Switzerland	88	3.57
United Kingdom	100	3.00
	EASTERN EUROPE	
Belarus	75	3.14
Ukraine	100	2.91
	CAUCASUS	
Armenia	100	3.13
Azerbaijan	75	2.63
	CENTRAL ASIA	
Kazakhstan	88	3.13
	SOUTH-EAST EUROPE	
Albania	67	2.56
The former Yugoslav Republic of Macedonia	88	2.57
	COUNTRIES OUTSIDE UNECE REGION	
Brazil	90	2.88
Colombia	89	3.00
India	100	3.56
Mexico	100	3.33
South Africa	75	2.57

North America is an exception to this observation. This is due to a largely decentralized system of government in Canada and the United States. In both countries, the regional (provincial) authorities provide the level of support higher than both national and local (provincial governments in Canada – 3.53, state governments in the United States – 3.37). In Switzerland, which is highly decentralized, support from national level (3.25) was still the highest but difference with regional (cantons) (3.13) and local (communes) (3.0) was not large. Further on differences in countries within sub-regions, in Ukraine, the local authorities provide the highest level of support (3.2) compared to national (2.9) and regional (oblast) (2.8). In Belarus, where the government plays a major role in the economy, support from all levels of authorities is quite high with national authorities providing the most support (3.5) compared to regional (3.13) and local (3.0).

3. ROLE OF INTERNATIONAL ASSISTANCE IN INCREASING THE LEVEL OF ENERGY EFFICIENCY INVESTMENTS

The next questions aimed at assessing the effectiveness of international assistance in energy efficiency investments. Such assistance in developing and implementing energy efficiency projects is mostly relevant for the countries of South-East Europe, Eastern Europe, the Caucasus, and Central Asia. Most of them receive such assistance – positive responses are 96 percent in South-East Europe, 95 percent in Eastern Europe, 86 percent in the Caucasus, and 82 percent in Central Asia. However, even in the European Union, 65 percent of respondents answered positively. This can be explained by the fact that significant international assistance continues to be received by new EU members such as Croatia and that targeted programmes by the European Commission are considered as international assistance. This is not the case for North America – positive responses to the question whether the country receives international assistance for developing and implementing energy efficiency projects are less than 10 percent in both Canada and the United States.

The international assistance is viewed as moderately effective in increasing the level of energy efficiency investments in the sub-regions of South-East Europe, Eastern Europe, the Caucasus, and Central Asia – over 3.0 on a scale from 1 (not effective) to 5 (very effective) (except the Caucasus): 3.43 in South-East Europe, 3.55 in Eastern Europe, 2.95 in the Caucasus, and 3.36 in Central Asia. It allows to come to the conclusion that many of these countries benefit from international assistance, which plays an important role in improving investment climate for energy efficiency projects. Assessment of its effectiveness in selected countries, including several from outside the UNECE region is presented in Table 4. Among the countries that value international assistance the most are Albania, Armenia, Belarus, Croatia, and Ukraine, as well as (outside the UNECE region) India and Mexico. For Azerbaijan and the former Yugoslav Republic of Macedonia, as well as for Brazil (outside the UNECE region) its effectiveness is assessed relatively low.

4. FINANCIAL ENVIRONMENT FOR ENERGY EFFICIENCY INVESTMENTS

The next series of questions are intended to assess the financial environment for energy efficiency investments. The experts were asked to assess how familiar are financial institutions in a particular country with financing energy efficiency projects and measures on a scale from 1 (not familiar) to 5 (very familiar). The average is under 3.0 both globally (2.65) and in the UNECE region (2.84). In the sub-regions of Western Europe and North America and of Eastern Europe, the Caucasus, Central Asia, and the Russian Federation it is slightly higher (2.93 and 2.92 respectively) but still below 3.0. In South-East Europe it is significantly lower – 2.57.

According to respondents, financial institutions view financing of energy efficiency projects significantly riskier compared to other types of business projects. On a scale from 1 (much riskier) to 5 (not different from others), responses are below or close to 3.0 globally (2.78), for UNECE region (2.89) and for all sub-regions: Western Europe and North America – 2.87; Eastern Europe – 3.07; the Caucasus – 2.86; Central Asia – 2.75; South-East Europe – 3.09.

TABLE 4. Effectiveness of international assistance in increasing the level of energy efficiency investments in individual countries

SELECTED COUNTRIES	A country receives international assistance for developing and implementing energy efficiency projects (average of positive responses), percent	Effectiveness of international assistance in increasing the level of energy efficiency investments (on a scale from 1 (not effective) to 5 (very effective))
	WESTERN EUROPE	
Croatia	100	3.70
Germany	38	3.00
United Kingdom	44	3.14
	EASTERN EUROPE	
Belarus	100	3.57
Ukraine	91	3.30
	CAUCASUS	
Armenia	100	3.63
Azerbaijan	63	2.57
	CENTRAL ASIA	
Kazakhstan	88	3.00
	SOUTH-EAST EUROPE	
Albania	100	3.89
The former Yugoslav Republic of Macedonia	88	2.75
	COUNTRIES OUTSIDE UNECE REGION	
Brazil	60	2.50
Colombia	100	3.13
India	100	3.33
Mexico	100	3.67
South Africa	88	3.17

Next, the experts were asked how favourable are conditions for repayment and servicing energy efficiency loans with savings generated from improved efficiency. The responses indicate that such conditions are more favourable for projects in the public sector than for projects in the private sector but in most cases they are not too favorable: on a scale from 1 (not favourable) to 5 (very favourable), the average value is under 3.0. In the UNECE region overall the value is 2.73 for projects in the private sector and 2.92 in the public sector. In the UNECE sub-regions: Western Europe and North America – 2.95 and 3.26; Eastern Europe – 2.24 and 2.67; the Caucasus – 2.14 and 2.76; Central Asia – 2.69 and 2.93; and South-East Europe – 2.48 and 2.62 respectively for private and public sector. Sub-region of Eastern Europe is the only one where conditions for private sector are considered more favourable (but still below 3.0) than for public sector. Sub-region of Western Europe and North America is the only one where favourability of conditions for repayment and servicing energy efficiency loans is above 3.0 (3.26 for projects in public sector).

TABLE 5. Assessment of financial environment for energy efficiency investments in individual countries

SELECTED COUNTRIES	Familiarity of financial institutions with financing energy efficiency projects and measures (on a scale from 1 (not familiar) to 5 (very familiar))	View of financing energy efficiency projects by financial institutions in terms of risk compared to other types of business projects (on a scale from 1 (much riskier) to 5 (not different from others))	Conditions for repayment and servicing energy efficiency loans with savings generated from improved efficiency (on a scale from 1 (not favourable) to 5 (very favourable))	
			in private sector	in public sector
NORTH AMERICA				
Canada	2.36	2.25	2.62	3.36
United States	3.38	3.20	2.96	3.54
WESTERN EUROPE				
Croatia	3.36	3.50	2.73	3.11
Germany	3.33	3.11	3.64	3.80
Switzerland	2.71	2.86	2.83	2.50
United Kingdom	2.78	3.00	2.75	3.57
EASTERN EUROPE				
Belarus	3.00	1.75	2.50	2.33
Ukraine	3.56	3.63	2.78	2.11
CAUCASUS				
Armenia	3.38	2.88	2.75	3.33
Azerbaijan	2.63	3.25	2.13	2.50
CENTRAL ASIA				
Kazakhstan	2.63	2.25	2.63	3.00
SOUTH-EAST EUROPE				
Albania	2.56	3.22	2.89	3.00
The former Yugoslav Republic of Macedonia	2.63	2.86	2.14	2.14
COUNTRIES OUTSIDE UNECE REGION				
Brazil	1.88	1.67	2.29	2.00
Colombia	3.11	3.38	3.25	3.00
India	1.89	1.88	2.63	2.75
Mexico	2.33	2.65	3.00	2.53
South Africa	2.50	2.88	3.00	2.71

Table 5 provides information of the assessment of financial environment in selected UNECE and non-UNECE countries for energy efficiency investments.

The experts were requested to assess (on a scale from 1 (no incentive) to 5 (strong incentive)) whether the price of energy in a particular country provides a sufficient incentive for the implementation of energy efficiency measures. The responses indicate that the energy prices provide some but often insufficient incentive for improving energy efficiency. Both globally and in the UNECE region the average value is under 3.0 (respectively 2.91 and 2.82). However among the UNECE sub-regions, the values vary significantly: Western Europe and North America – 2.78; Eastern Europe – 3.38; the Caucasus – 3.05; Central Asia – 2.31; and South-East Europe – 2.70. Table 6 reflects the assessment of the situation

TABLE 6. Price of energy as an incentive to implement energy efficiency measures in individual countries	
SELECTED COUNTRIES	Price of energy provides an incentive for the implementation of energy efficiency measures (on a scale from 1 (no incentive) to 5 (strong incentive))
	NORTH AMERICA
Canada	2.77
United States	2.97
	WESTERN EUROPE
Croatia	1.91
Germany	3.09
Switzerland	1.63
United Kingdom	2.56
	EASTERN EUROPE
Belarus	2.38
Ukraine	3.90
	CAUCASUS
Armenia	3.50
Azerbaijan	2.29
	CENTRAL ASIA
Kazakhstan	2.38
	SOUTH-EAST EUROPE
Albania	3.11
The former Yugoslav Republic of Macedonia	2.38
	COUNTRIES OUTSIDE UNECE REGION
Brazil	3.90
Colombia	3.13
India	2.44
Mexico	3.28
South Africa	3.13

in selected countries. Energy price plays very different role in different countries both within the same sub-region and in different sub-regions. It provides a rather strong incentive in Ukraine and Armenia, a moderate incentive in Germany and Albania, and a very weak one in Croatia and Switzerland. Among the selected countries outside the UNECE region, the strongest incentive from energy price is in Brazil and the weakest is in India.

5. AVAILABILITY AND USE OF FINANCING FOR ENERGY EFFICIENCY PROJECTS IMPLEMENTATION

The next set of questions is related to the availability and use of financing for energy efficiency projects implementation. The respondents were asked about availability of commercial and public (budget and donor) financing for energy efficiency projects.

FIGURE 3. Types of commercial financing available for energy efficiency projects implementation

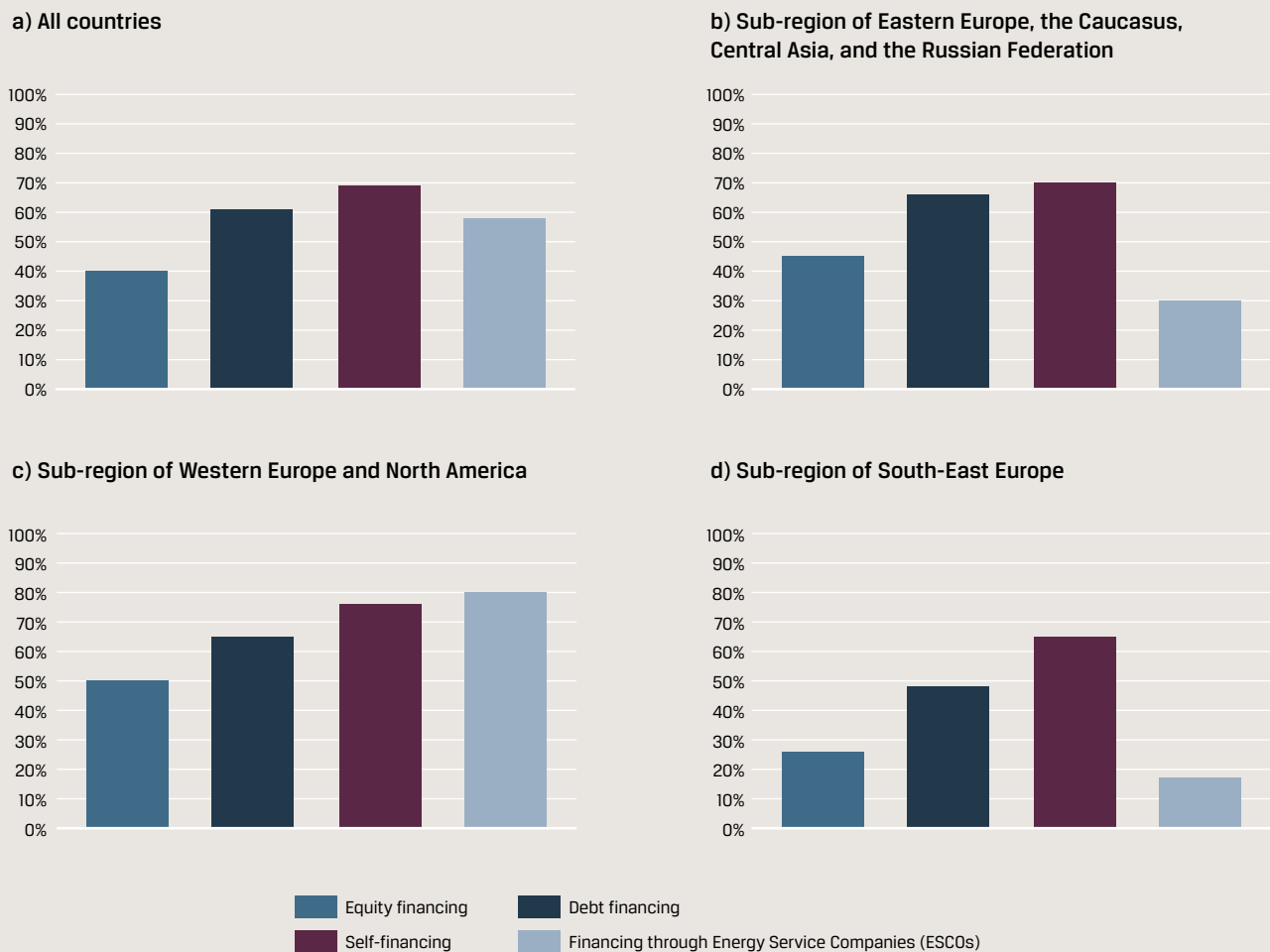
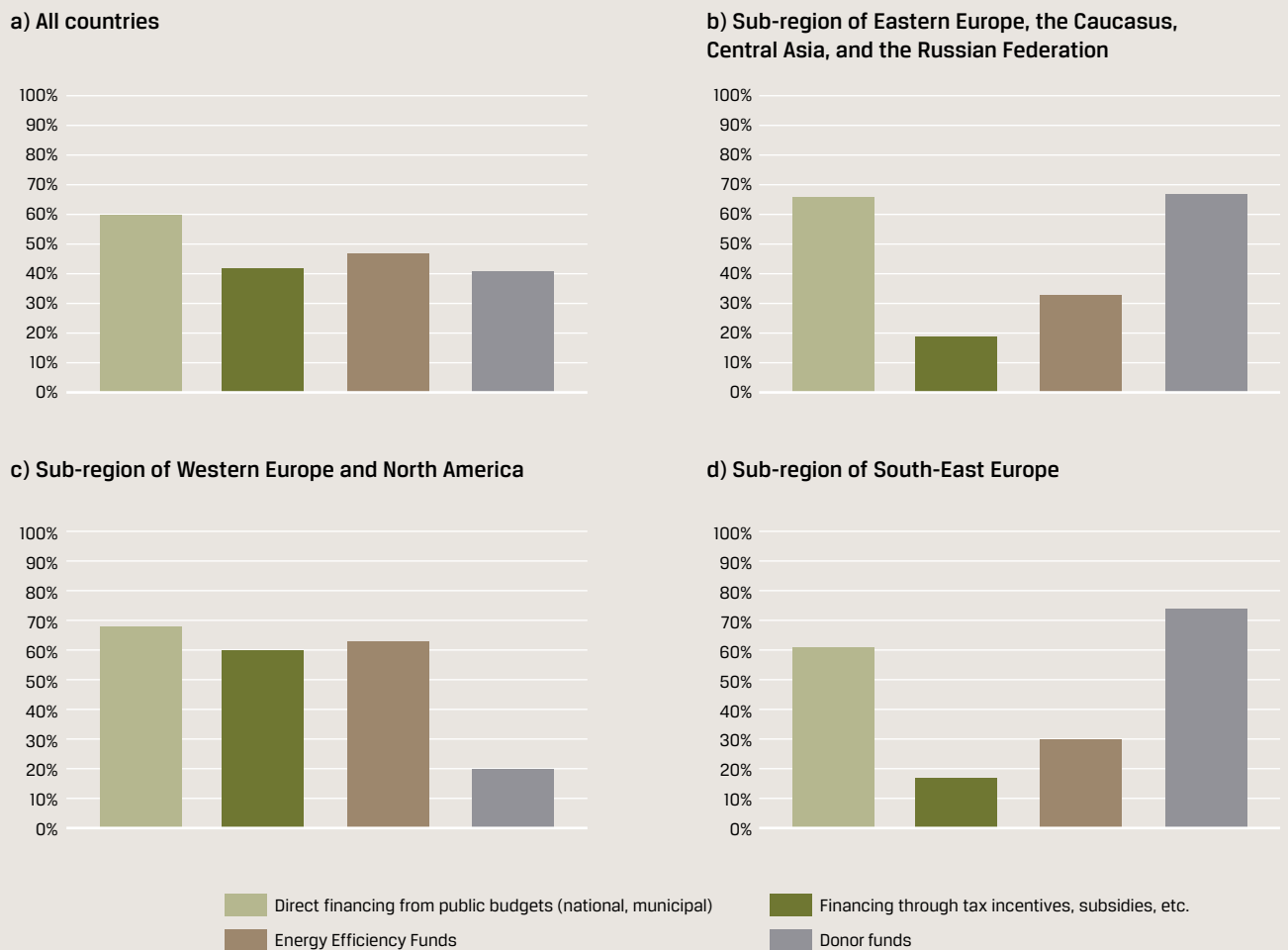


Fig. 3 reflects responses on the availability of particular types of commercial financing (multiple answers were possible). The picture is similar for global responses (Fig. 3.a) and for the UNECE region. Almost 70 percent of respondents stated that self-financing is available. Debt financing is next with just over 60 percent followed by financing by Energy Service Companies (ESCO) (just under 60 percent). The lowest availability rate is for equity financing (40 percent).

In the sub-region of Eastern Europe, the Caucasus, Central Asia, and the Russian Federation (Fig. 3.b) availability of self-financing is about the same (70 percent) and of debt financing even higher (66 percent). Availability of equity financing is also slightly higher than globally – 45 percent, while availability of ESCO financing is significantly lower, only 30 percent.

A very different picture is observed in the sub-region of Western Europe and North America (Fig. 3.c), where ESCO financing is the leading available source (80 percent), followed by self-financing (76 percent), debt financing (65 percent), and equity financing (50 percent). Compared to the previous sub-region, availability of all sources of financing is higher (in case of ESCOs – drastically higher) with the exception of debt financing, which is about the same.

FIGURE 4. Available types of budget and donor financing for energy efficiency projects implementation

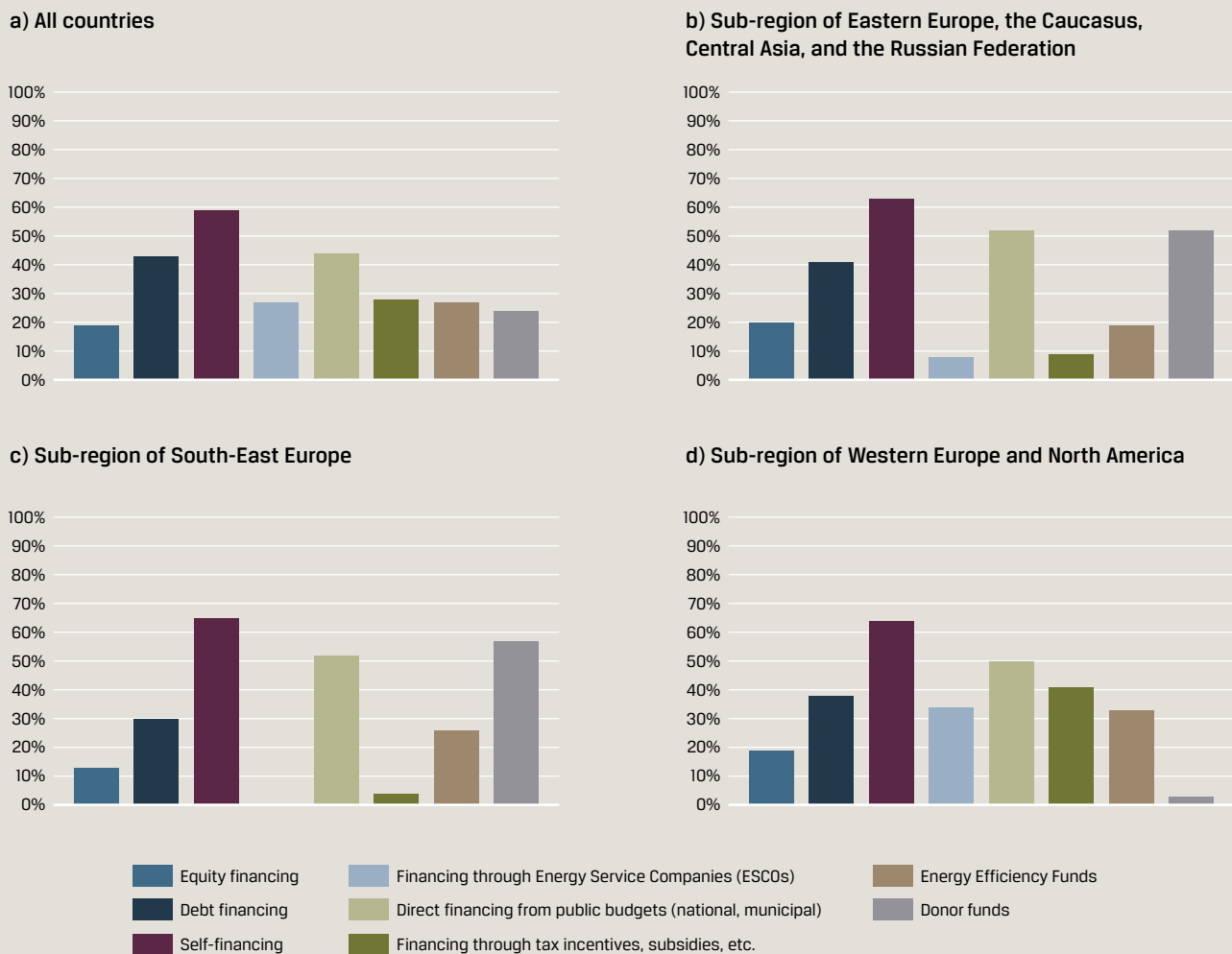


Finally, in the sub-region of South-East Europe (Fig. 3.d), availability of all types of financing is the lowest. Only self-financing is a relatively significant source (65 percent availability). Debt financing stands at 48 percent, equity financing is only 26 percent, and ESCO financing can be considered almost non-existent – 17 percent.

Fig. 4 presents information on available types of budget and donor financing for energy efficiency projects implementation (multiple answers were possible). The picture is similar for global responses (Fig. 4.a) and for the UNECE region. Over 60 percent of respondents confirmed that direct financing from public budgets is available. Financing from Energy Efficiency Funds is next with under 50 percent followed by financing through tax incentives and subsidies and donor financing (both just above 40 percent).

With regards to the UNECE sub-regions, there are strong similarities between Eastern Europe, the Caucasus, Central Asia, and the Russian Federation sub-region (Fig. 4.b) and countries of South-East Europe (Fig. 4.d). In both sub-regions the most available sources of public financing are donor financing (around 70 percent) and direct financing from public budgets (over 60 percent). Financing from Energy Efficiency Funds is slightly above 30 percent, while financing through tax incentives and subsidies was listed as available by under 20 percent of respondents in both sub-regions.

FIGURE 5. Most widely used types of financing for energy efficiency projects



A very different situation is in the sub-region of Western Europe and North America (Fig. 4.c). Direct financing from public budgets leads with 68 percent, followed by financing from Energy Efficiency Funds (63 percent) and financing through tax incentives and subsidies (60 percent). Only 20 percent of respondents stated that donor funds are available, which is consistent with responses on the role of international assistance in increasing the level of energy efficiency investments.

Experts were asked what types of financing (both commercial and public) are most widely used in a particular country. The responses are presented in Fig. 5. Respondents were asked to list up to three types that they consider most important. Both globally (Fig. 5.a) and in the UNECE region the most widely used type is considered self-financing followed by direct financing from public budgets and debt financing.

In the sub-region of Eastern Europe, the Caucasus, Central Asia, and the Russian Federation (Fig. 5.b), the picture is somewhat different. Self-financing remains most widely used (over 60 percent) but donor funds have the same importance as direct financing from

public budgets (both at just over 50 percent), with debt financing in the fourth place at just above 40 percent. Within this sub-region there are variations between Eastern Europe, the Caucasus, and Central Asia, as well as between countries of a particular sub-region. Self-financing is most important both in Eastern Europe (68 percent) and Central Asia (65 percent) but in the Caucasus it is donor funds (55 percent).

In Central Asia, direct financing from public budgets is second followed by donor funds and debt financing. In Eastern Europe, donor funds is second followed by direct financing from public budgets and then debt financing. In Belarus, self-financing is prevalent (100 percent) followed by direct financing from public budgets (75 percent) and debt financing (63 percent). In Ukraine, donor funds is most important (75 percent) followed by self-financing and direct financing from public budgets (both 64 percent). In the Caucasus, self-financing is second, followed by debt financing and then direct financing from public budgets. In Armenia, Energy Efficiency Funds and donor funds are equally important (both 75 percent) followed by debt financing (63 percent). In Azerbaijan, self-financing and direct financing from public budgets lead with 50 percent both, with four other types at 25 percent.

In the sub-region of South-East Europe (Fig. 5.c), the situation most closely resembles that in Eastern Europe, with self-financing at 65 percent, donor funds at 57 percent, direct financing from public budgets at 52 percent and then debt financing distant fourth at 30 percent. In all the sub-regions listed above other sources of financing (equity financing, financing through ESCOs, financing through tax incentives, subsidies, etc., and Energy Efficiency Funds) are considered among the most widely used by less than 30 percent of respondents.

In the sub-region of Western Europe and North America (Fig. 5.d), self-financing is the most important (64 percent) followed by direct financing from public budgets (50 percent), financing through tax incentives and subsidies (41 percent) and debt financing (38 percent). Some countries from this sub-region have different structure of most widely used types of financing. In Canada, self-financing (60 percent) and direct financing from public budgets (53 percent) are followed by financing through ESCOs (47 percent) and Energy Efficiency Funds (40 percent). In the United States, financing through ESCOs (57 percent) is even more important and is second only to self-financing (63 percent) and is ahead of financing through tax incentives and subsidies (50 percent) and debt financing (40 percent). In Germany, self-financing is also the most widely used (69 percent) but debt financing and financing through tax incentives and subsidies are also important (both 54 percent) followed by direct financing from public budgets (38 percent). In Croatia, the situation is completely different: Energy Efficiency Funds leads with 82 percent followed by direct financing from public budgets (73 percent), self-financing (55 percent), and debt financing (36 percent).

The analysis shows that it is difficult to make generalizations both between and within sub-regions, as situation varies significantly. However, self-financing remains either the most or one of the most widely used type of financing almost everywhere.

6. MAIN BARRIERS TO INCREASING INVESTMENT AND FINANCING FLOWS TO ENERGY EFFICIENCY PROJECTS

Experts were requested to express their opinion about the main barriers to increasing investment and financing flows to energy efficiency projects selecting up to three that they considered most important (Fig. 6). A relative weight of the barriers globally and in the UNECE region is presented in Fig. 6.a. Low awareness about the multiple benefits of energy efficiency projects is viewed as the main barrier followed very closely by lack of understanding of energy efficiency financing by banks and other financial institutions; administrative barriers and bureaucracy; and low energy prices.

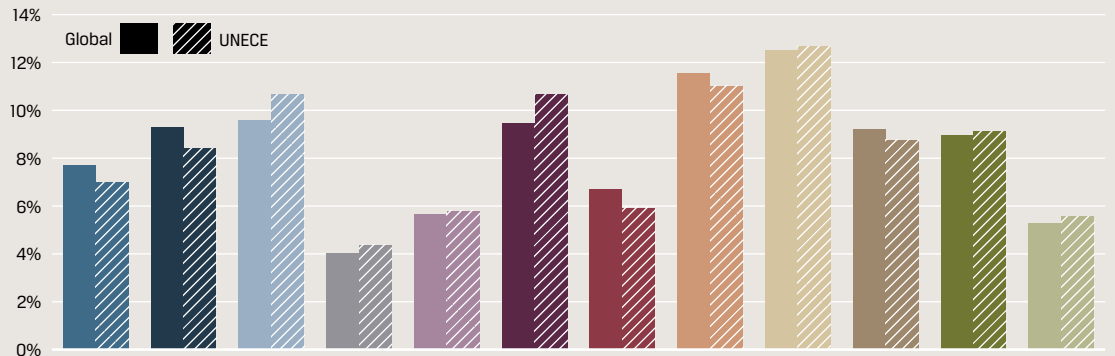
In the sub-region of Eastern Europe, the Caucasus, Central Asia, and the Russian Federation (Fig. 6.b), the following are considered as main barriers: low awareness about the multiple benefits of energy efficiency projects and high interest rates for energy efficiency projects (both indicated by 39 percent of respondents) followed closely by lack of technical expertise and capacity to identify/evaluate/implement projects (38 percent); difficulties with obtaining commercial loans and other types of financing; and low energy prices (both 36 percent). Experts see main barriers differently in particular countries of this sub-region. In Armenia, it is low awareness about the multiple benefits of energy efficiency projects (75 percent) followed by high interest rates for energy efficiency projects and lack of technical expertise and capacity to identify/evaluate/implement projects (both 50 percent). In Azerbaijan, most important are lack of specific policies, programmes, legislation, by-laws, norms and standards and low energy prices (both 50 percent). In Kazakhstan, low energy prices is the main barrier (75 percent) followed by high interest rates for energy efficiency projects (63 percent) and administrative barriers and bureaucracy (50 percent). Difficulties with obtaining commercial loans and other types of financing are viewed as the main barrier in Belarus (75 percent). The next two barriers are viewed as much less important: administrative barriers and bureaucracy and high interest rates for energy efficiency projects (both 38 percent). In Ukraine, the main barrier is rather specific compared to other countries – political/economic instability in the country (73 percent) followed distantly by high interest rates for energy efficiency projects and difficulties with obtaining commercial loans and other types of financing (both 48 percent).

In the sub-region of South-East Europe (Fig. 6.c), lack of understanding of energy efficiency financing by banks and other financial institutions is viewed as the main barrier (61 percent) followed by administrative barriers and bureaucracy (57 percent). The next four barriers were expressed by the same share of respondents (43 percent): lack of specific policies, programmes, legislation, by-laws, norms and standards; inadequate implementation and enforcement of policies and legislation; lack of technical expertise and capacity to identify/evaluate/implement projects; and problems with using savings on energy efficiency measures. As a country example, in the former Yugoslav Republic of Macedonia, three main barriers are identified (63 percent each): lack of understanding of energy efficiency financing by banks and other financial institutions; low energy prices; and administrative barriers and bureaucracy.

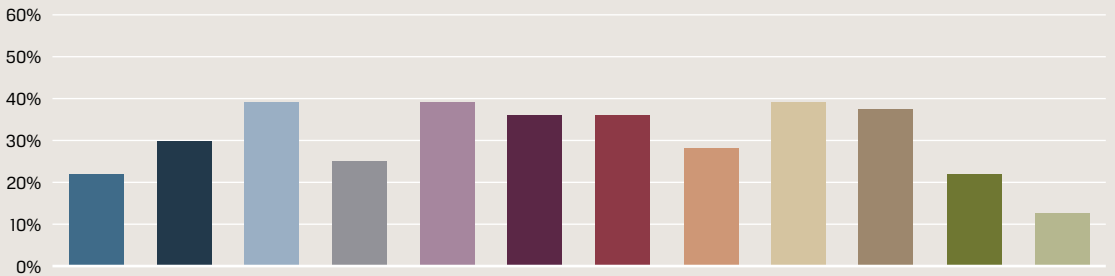
In the sub-region of Western Europe and North America (Fig. 6.d), low awareness about the multiple benefits of energy efficiency projects is viewed as the main one (48 percent) followed by low energy prices (41 percent); lack of understanding of energy efficiency financing by banks and other financial institutions; uncertainty about performance (both 40 percent); and administrative barriers and bureaucracy (36 percent). Low awareness

FIGURE 6. Main barriers to increasing investment and financing flows to energy efficiency projects

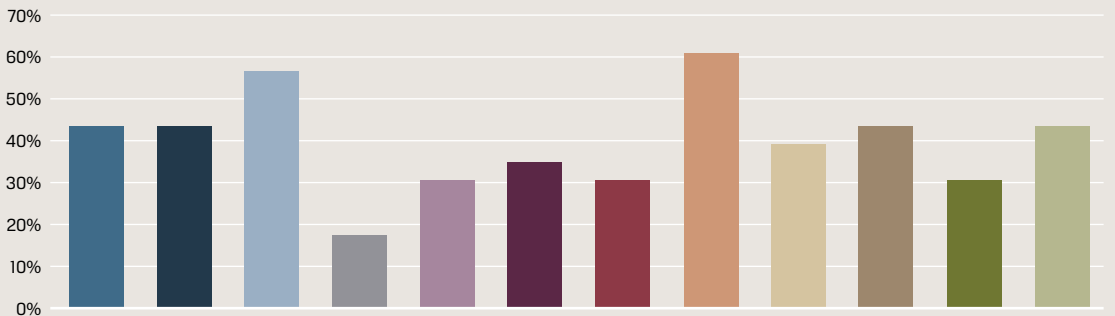
a) All countries and UNECE region (relative weight of barriers)



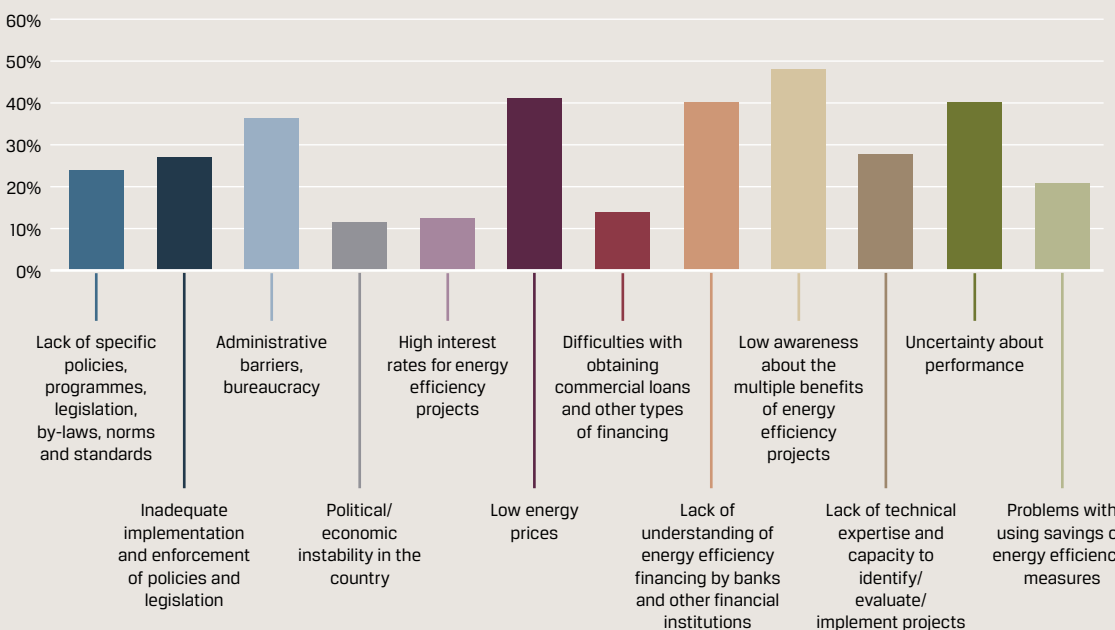
b) Sub-region of Eastern Europe, the Caucasus, Central Asia, and the Russian Federation



c) Sub-region of South-East Europe



d) Sub-region of Western Europe and North America



about the multiple benefits of energy efficiency projects is considered the main barrier in Canada (73 percent) and in Germany (62 percent), while in Switzerland it is low energy prices (88 percent) followed by low awareness about the multiple benefits of energy efficiency projects (63 percent).

7. WAYS TO INCREASE ENERGY EFFICIENCY PROJECT INVESTMENT VIABILITY

Experts expressed their views on what they consider main factors that can lead to increasing energy efficiency project investment viability in particular countries. They were asked to select up to three such factors from the proposed options. The results are presented in Fig. 7. A relative weight of these factors globally and in the UNECE region is presented in Fig. 7.a. Tax incentives and low-interest loans for energy efficiency projects are viewed as the most important factors. They are followed by stricter energy efficiency standards; training and awareness programmes; improved legislation; and de-risking of investments through Government support programmes.

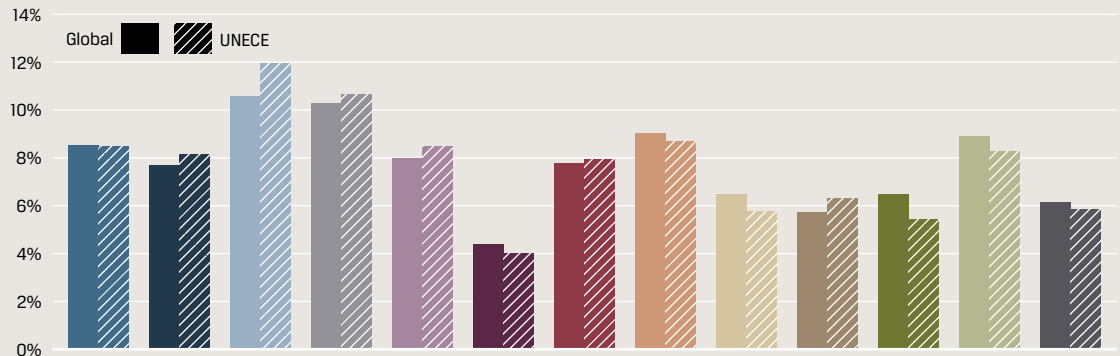
In the sub-region of Eastern Europe, the Caucasus, Central Asia, and the Russian Federation (Fig. 7.b), the following are considered the main factors for improvement of the investment environment for energy efficiency: low-interest loans for energy efficiency projects (63 percent); tax incentives (52 percent); improved access to commercial financing (44 percent); and improved legislation (41 percent). In Armenia, low-interest loans for energy efficiency projects is clearly viewed as the main factor (indicated by 100 percent of respondents) followed by tax incentives (50 percent). In Azerbaijan, the emphasis is on improved legislation (88 percent) followed by tax incentives (63 percent) and low-interest loans for energy efficiency projects (50 percent). Kazakhstan focuses on improved access to commercial financing (75 percent) followed by tax incentives (63 percent) and leveraging of commercial financing through seed funding from donors/Government (50 percent). Belarus would like to see low-interest loans for energy efficiency projects (63 percent) and improved access to commercial financing (50 percent). For Ukraine, the main factors are low-interest loans for energy efficiency projects (64 percent) and de-risking of investments through Government support programmes (55 percent).

In the sub-region of South-East Europe (Fig. 7.c), the two main factors are tax incentives and improved legislation (both 61 percent) followed by implementation of energy management systems in industry and low-interest loans for energy efficiency projects (both 48 percent). In selected countries of the sub-region, the situation is as follows. In Albania, three factors are considered of equally high importance: tax incentives, improved legislation and low-interest loans for energy efficiency projects (67 percent each). In the former Yugoslav Republic of Macedonia, two main factors are tax incentives and implementation of energy management systems in industry (both 75 percent) followed by improved legislation and improved access to commercial financing (both 63 percent).

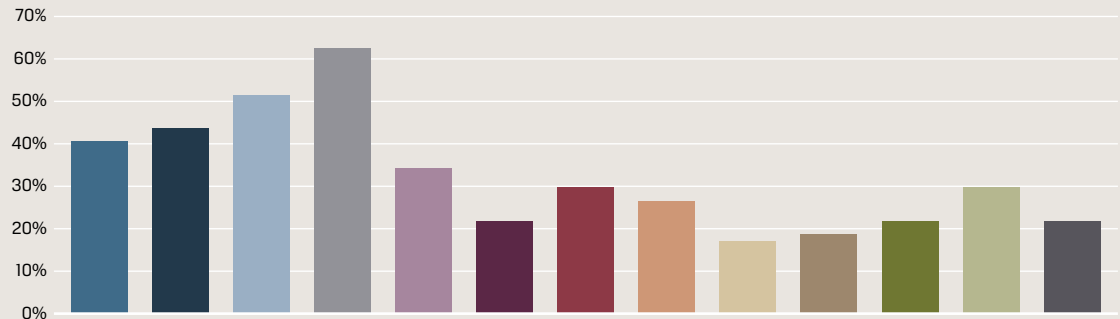
In the sub-region of Western Europe and North America (Fig. 7.d), tax incentives (43 percent) and stricter energy efficiency standards (40 percent) are viewed as the main factors followed by low-interest loans for energy efficiency projects (35 percent); de-risking of investments through Government support programmes (33 percent); and training and awareness programmes (31 percent).

FIGURE 7. Main factors that can lead to increasing energy efficiency project investment viability

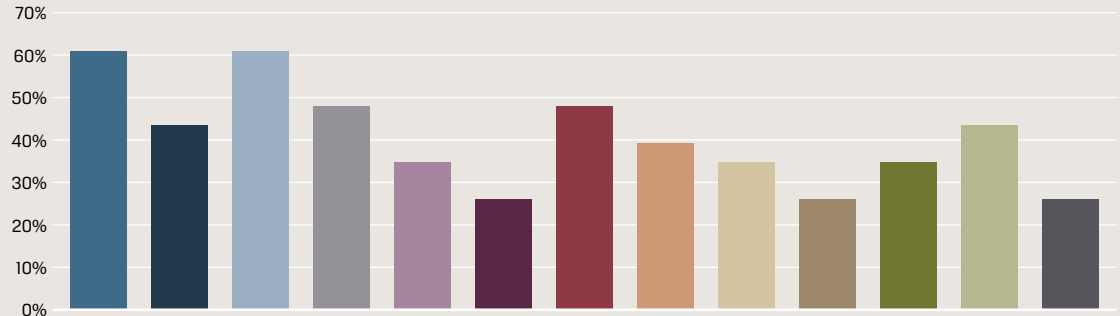
a) All countries and the UNECE region (relative weight of factors)



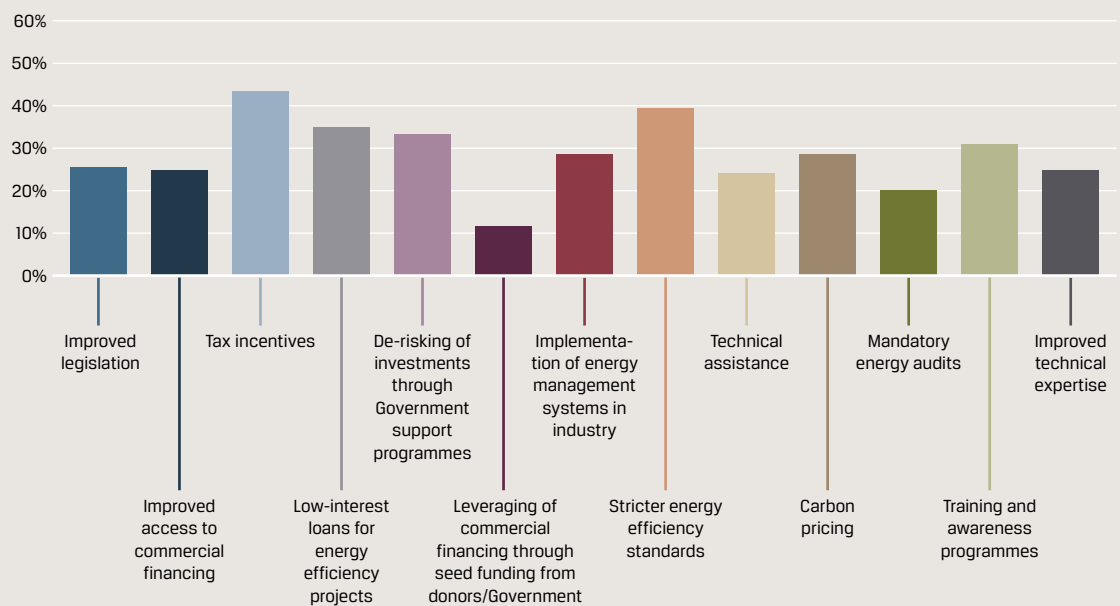
b) Sub-region of Eastern Europe, the Caucasus, Central Asia, and the Russian Federation



c) Sub-region of South-East Europe



d) Sub-region of Western Europe and North America



Canada and Germany follow the sub-regional trend for Western Europe and North America. In Canada, tax incentives and stricter energy efficiency standards (both 47 percent) are considered the main factors, with a similar assessment in Germany – tax incentives (54 percent) and stricter energy efficiency standards (46 percent) are the main factors. In the United States, several factors are considered as almost equally important: stricter energy efficiency standards (37 percent) followed by tax incentives, de-risking of investments through Government support programmes, and carbon pricing (33 percent each). Croatia's main factor is low-interest loans for energy efficiency projects (73 percent). Switzerland considers implementation of energy management systems in industry and carbon pricing (both 50 percent) as the main factors. In the United Kingdom, three factors are viewed as equally important: improved legislation, de-risking of investments through Government support programmes, and stricter energy efficiency standards (44 percent each).

8. INVESTMENTS IN INDUSTRIAL ENERGY EFFICIENCY

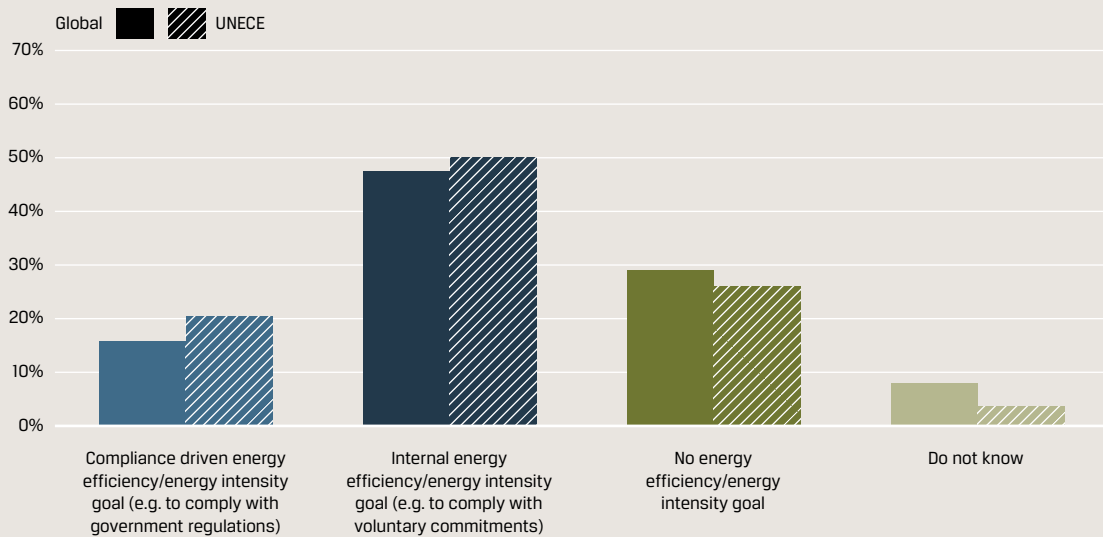
A set of questions was addressed specifically to business managers and representatives of industrial companies. Out of 339 respondents to the first part of the survey, 82 indicated that they represent this group, of which 58 from the UNECE region. Due to a low count of responses from any particular country, in this part of the report it will only be possible to analyze assessment of situation globally, in the UNECE region and some of its major sub-regions.

In response to the question whether energy efficiency decisions in their company are made by the same people as core business decisions, almost three-quarters responded positively (74 percent in the UNECE region). The highest percentage of positive responses was in the sub-region of Western Europe and North America (82 percent) with the sub-region of Eastern Europe, the Caucasus, Central Asia, and the Russian Federation very close (79 percent). In the sub-region of South-East Europe, this share is significantly lower – 44 percent.

In response to the question if their company established an overall energy efficiency/energy intensity (productivity) goal, the majority of respondents gave a positive answer (see Fig. 8).

In about 50 percent of cases in the UNECE region, it is an internal energy efficiency/energy intensity goal (e.g. to comply with voluntary commitments). Compliance driven energy efficiency/energy intensity goal (e.g. to comply with government regulations) is the reason given by 20 percent of respondents. The share of established internal energy efficiency/energy intensity goal in companies is similar for the three major sub-regions: Western Europe and North America – 52 percent); Eastern Europe, the Caucasus, Central Asia, and the Russian Federation – 46 percent; South-East Europe – 56 percent. There is a much higher share of established compliance driven energy efficiency/energy intensity goal in the sub-region of Eastern Europe, the Caucasus, Central Asia, and the Russian Federation (31 percent) than in the other two UNECE sub-regions – Western Europe and North America (19 percent) and South-East Europe (11 percent).

FIGURE 8. Existence of an overall energy efficiency/energy intensity (productivity) goal in a respondent's company



Experts were asked to list up to three main barriers that their company faces when considering investment in industrial energy efficiency (Fig. 9). A relative weight of the barriers globally and in the UNECE region is presented in Fig. 9.a.

The main barriers both globally and in the UNECE region appear to be lack or high cost of capital, low priority of energy efficiency as not part of the core business, and lack of government incentives. These three reasons are followed closely by insufficient senior management commitment or unfavourable company environment and by energy costs that are too low to provide economic incentive.

There are some differences in the perception of main barriers to investments in industrial energy efficiency between the sub-regions. In the sub-region of Eastern Europe, the Caucasus, Central Asia, and the Russian Federation (Fig. 9.b), the main barrier is considered to be lack of government incentives followed by lack or high cost of capital and little or no government policy. Slightly less important is too high investment risk. Interestingly, no expert from this region indicated low priority of energy efficiency as not part of the core business as a barrier, while it is considered to be one of the main if not the main barriers in other sub-regions.

In the sub-region of South-East Europe (Fig. 9.c), lack of information on energy efficiency opportunities is viewed as the main barrier followed by low priority of energy efficiency as not part of the core business and lack of technical expertise. Slightly less important is insufficient senior management commitment or unfavourable company environment.

In the sub-region of Western Europe and North America (Fig. 9.d), low priority of energy efficiency as not part of the core business is considered the main barrier followed by lack or high cost of capital and then by energy costs that are too low to provide economic incentive and lack of government incentives.

FIGURE 9. Main barriers faced by a company when considering investment in industrial energy efficiency (relative weight of barriers)

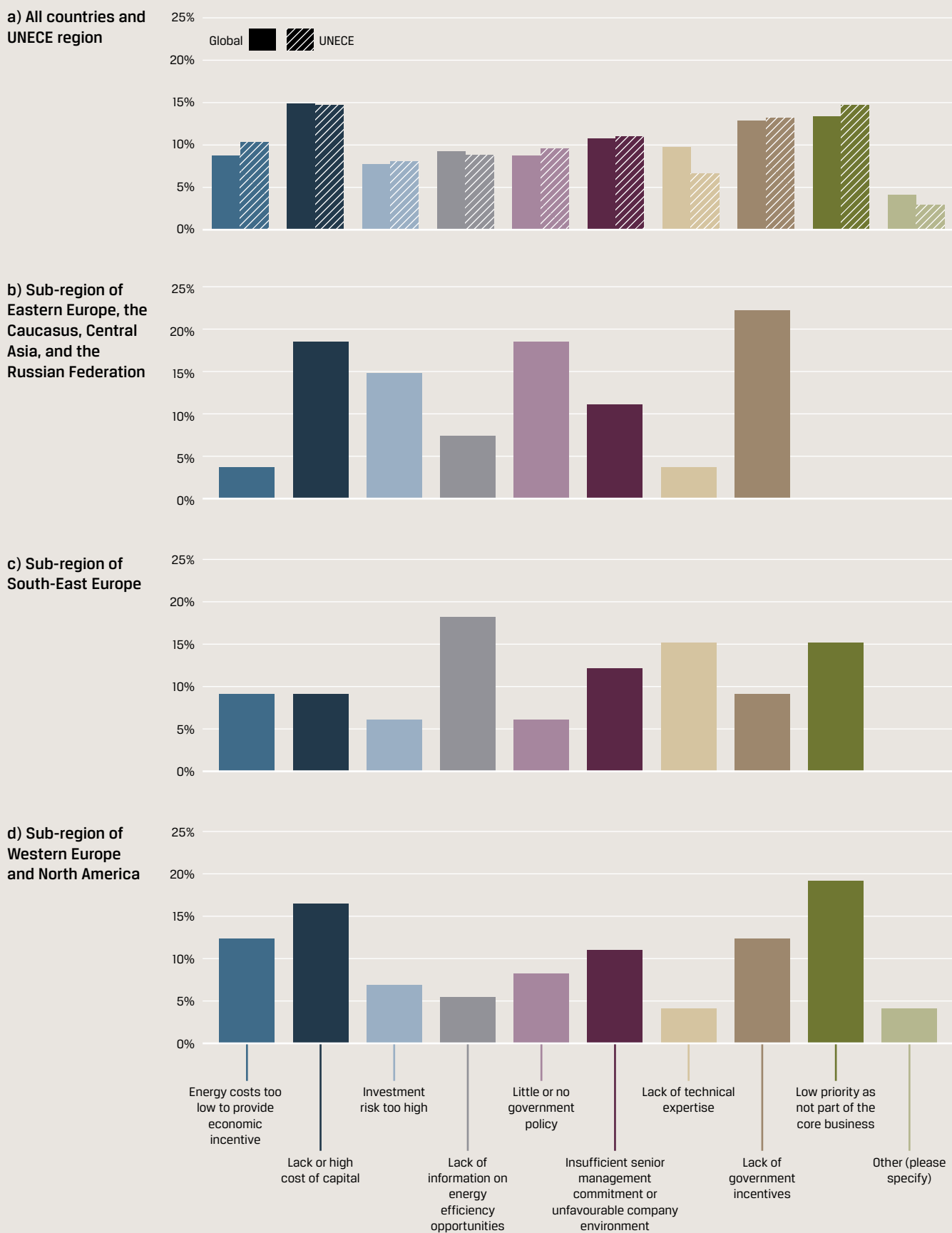
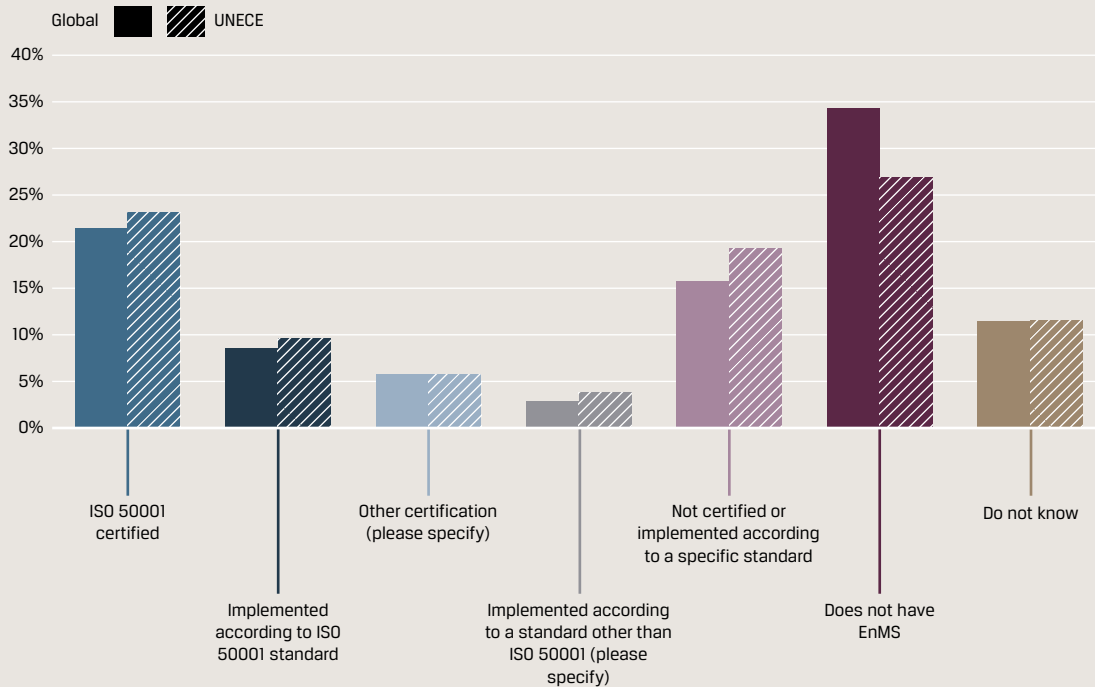


FIGURE 10. Existence of an energy management system (EnMS) in a company that is certified or implemented according to a specific standard

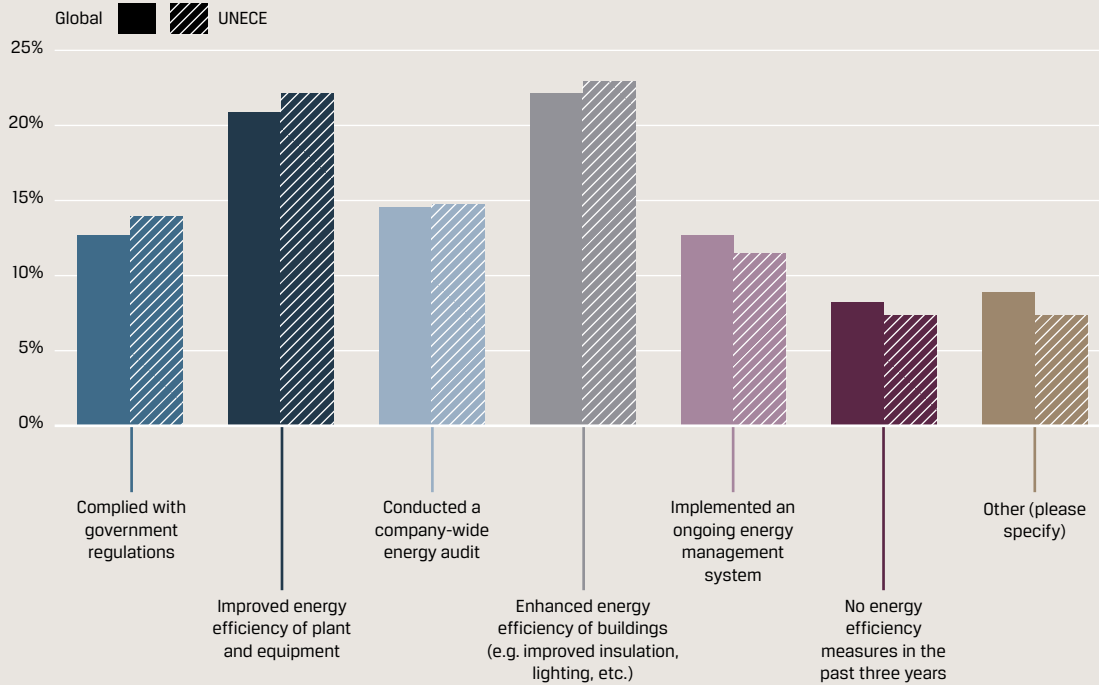


In the UNECE region, 56 percent of respondents stated that their companies regularly report progress on improving energy efficiency, for example as part of its annual report. This share is highest in the sub-region of Western Europe and North America (68 percent), followed by South-East Europe (56 percent), and lowest in the sub-region of Eastern Europe, the Caucasus, Central Asia, and the Russian Federation (38 percent).

According to the survey respondents, energy management systems (EnMS) are not widespread in companies. Just over 20 percent of experts stated that their company has ISO 50001 certified EnMS and another 20 percent has other types of EnMS (Fig. 10). In the sub-region of Western Europe and North America, 27 percent of respondents stated that their company has ISO 50001 certified EnMS. This share is 22 percent in South-East Europe and 18 percent in the sub-region of Eastern Europe, the Caucasus, Central Asia, and the Russian Federation.

Experts were requested to identify energy efficiency measures or projects implemented by their companies in the past three years. Both globally and in the UNECE region, almost all companies implemented some energy efficiency measures (Fig. 11). Only in 7 percent of companies in the UNECE region no energy efficiency measures were implemented. Most common measures to improve energy efficiency were enhanced energy efficiency of buildings (e.g. improved insulation, lighting, etc.) and improved energy efficiency of plant and equipment. These are the two leading measures for all three sub-regions. In

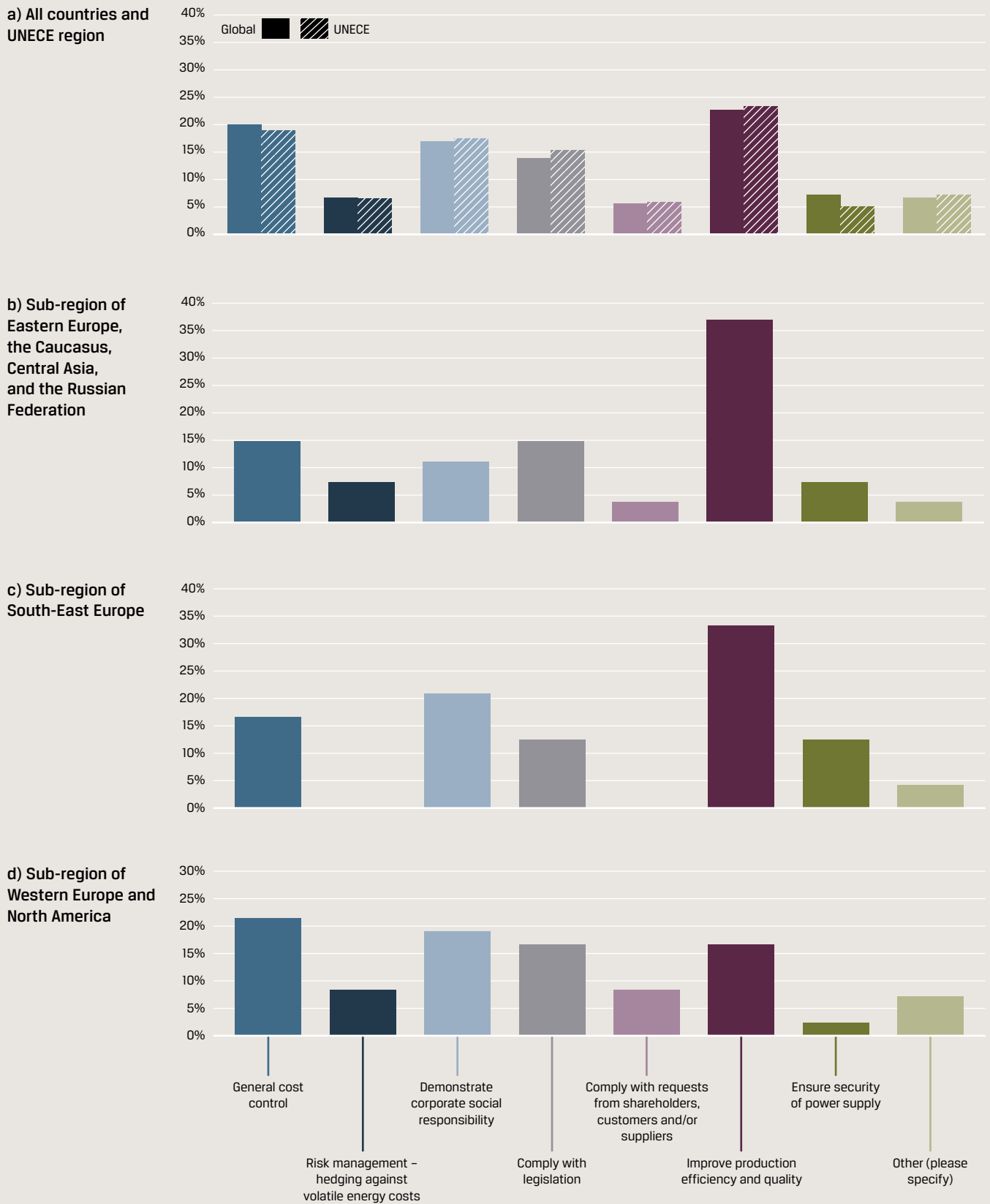
FIGURE 11. Energy efficiency measures or projects implemented by respondents' companies in the past three years (relative weight of measures and projects)



the sub-region of Western Europe and North America, they are followed by measures to comply with government regulations, conduct of a company-wide energy audit, and implementation of an ongoing EnMS. In the sub-region of Eastern Europe, the Caucasus, Central Asia, and the Russian Federation, measures to comply with government regulations were absent from responses.

In the final question of the survey, experts were asked to identify the main business benefits to their companies from implemented energy efficiency measures (Fig. 12). Both globally and in the UNECE region, the main business benefit is considered improved production efficiency and quality, followed by general cost control, demonstration of corporate social responsibility, and compliance with legislation (Fig. 12.a). In the sub-region of Eastern Europe, the Caucasus, Central Asia, and the Russian Federation, overwhelmingly the main benefit is improved production efficiency and quality (Fig. 12.b). General cost control, compliance with legislation, and demonstration of corporate social responsibility are far behind in the ranking of benefits. In the sub-region of South-East Europe, improved production efficiency and quality is also by far the main benefit followed by demonstration of corporate social responsibility and general cost control, and even further behind compliance with legislation and ensuring security of power supply (Fig. 12.c). In the sub-region of Western Europe and North America, the importance of business benefits is slightly different (Fig. 12.d). The main one is considered general cost control, followed closely by demonstration of corporate social responsibility, and then compliance with legislation and improved production efficiency and quality.

FIGURE 12. Main business benefits to respondents' companies from implemented energy efficiency measures (relative weight of benefits)



CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS AND RECOMMENDATIONS

The survey has elicited significant interest among the energy efficiency practitioners from various countries, organizations and sectors. In correspondence and conversations with respondents, they emphasized the relevance of the approach and questions and importance and value of the study. Many experts expressed their interest in receiving the results of the analysis. This confirms that the topic of the research is of significant importance and the results can be used by policy makers and other energy efficiency stakeholders in their work.

Based on the assessment from experts and resulting analysis, a number of conclusions can be made at various levels: global, UNECE region, sub-regional, country-specific.

CONCLUSIONS

1. Globally and in the UNECE region, there is a high or reasonably high potential for energy efficiency investments. However this potential in many countries remains largely untapped. There is a significant gap between investment opportunities for energy efficiency and the level of investments in energy efficiency in most of the countries.
2. Most countries in the UNECE region have framework legislation for energy efficiency and many have other supporting legislation, programmes and policies. In the sub-region of Western Europe and North America, essentially all components of the regulatory framework are in place and are considered to be relatively effective but not always providing very strong support and enabling energy efficiency investments. In other parts of the UNECE region, the situation varies. Some lack by-laws, norms and standards, and specific programmes and policies.
3. In general, there is a good correlation between the existence of the regulatory framework and how well it supports and enables investments in energy efficiency. For example, Germany possesses strong regulatory framework that ensures strong support for investments. In Azerbaijan and the former Yugoslav Republic of Macedonia, the regulatory framework is considered weak and it provides little support to investments. Belarus, Kazakhstan and Ukraine mostly have regulatory framework in place but the support it provides for energy efficiency investments is not considered strong, particularly in Ukraine.
4. Institutions at the national level responsible for developing and implementing policies that support investments in energy efficiency projects exist in the countries of the UNECE region. However assessment of their effectiveness differ among individual

countries: strongest in Germany and Switzerland, and weakest in Albania, Azerbaijan, and the former Yugoslav Republic of Macedonia. Outside the UNECE region, India and Mexico are viewed as having effective national institutions to promote energy efficiency.

5. Among the various levels of government, national authorities are generally considered to be providing the highest level of support for developing and implementing energy efficiency projects compared to regional (provincial) and local (municipal). A few exceptions include Canada and the United States, where authorities at the provincial and state level respectively are providing more support than the national and local levels. In Ukraine, authorities at the local level are viewed as providing more support than at the national and regional (oblast) levels.
6. International assistance is viewed as moderately effective in increasing the level of energy efficiency investments in most of the countries of South-East Europe, Eastern Europe, the Caucasus, and Central Asia. It is viewed as most effective in Albania, Armenia, Belarus, Croatia (new EU Member State), and Ukraine, while in Azerbaijan and the former Yugoslav Republic of Macedonia its effectiveness is assessed relatively low. Among the analyzed countries outside the UNECE region, effectiveness of the international assistance is highest in India and Mexico and lowest in Brazil.
7. Financial environment is not very favourable for investments in energy efficiency. Familiarity of financial institutions with financing energy efficiency projects and measures is relatively low in many countries of the world, including developed countries and countries with economies in transition in the UNECE region. Financial institutions view financing of energy efficiency projects significantly riskier compared to other types of business projects. Conditions for repayment and servicing energy efficiency loans with savings generated from improved efficiency are considered generally more favourable for projects in the public sector than for projects in the private sector but in most cases they are not too favorable.
8. Generally, the price of energy provides some but often insufficient incentive for improving energy efficiency. However, on the energy pricing situation differs significantly among countries. In the UNECE region, it provides a rather strong incentive in Ukraine and Armenia, a moderate incentive in Germany and Albania, and a very weak one in Croatia and Switzerland. Among the selected countries outside the UNECE region, the strongest incentive from energy price is in Brazil and the weakest is in India.
9. Both globally and in the UNECE region self-financing remains the most widely used type of financing of energy efficiency projects followed by direct financing from public budgets and debt financing. At the same time, situation varies significantly both between and within sub-regions. In the Caucasus and in Ukraine, donor funds is the most important type of financing. In Croatia, the major role is played by Energy Efficiency Funds. Financing through ESCOs is important in North America.
10. Low awareness about the multiple benefits of energy efficiency projects is viewed as the main barrier to increasing investment and financing flows to energy efficiency projects. Next important factors are lack of understanding of energy efficiency financing by banks and other financial institutions; administrative barriers and bureaucracy; and low energy prices. Some countries have identified one or two

barriers as particularly important: in Azerbaijan, it is lack of specific policies and legislation and low energy prices; in Belarus – difficulties with obtaining commercial loans and other types of financing; in Kazakhstan and Switzerland – low energy prices; and in Canada and in Germany – low awareness about the multiple benefits of energy efficiency projects.

11. Tax incentives and low-interest loans for energy efficiency projects are viewed as the most important factors that can lead to increasing energy efficiency project investment viability in particular countries. They are followed by stricter energy efficiency standards; training and awareness programmes; improved legislation; and de-risking of investments through Government support programmes. Specific factors are identified in particular countries as the main ones: in Armenia, Belarus, Croatia, and Ukraine – low-interest loans for energy efficiency projects; in Azerbaijan – improved legislation; in Kazakhstan – improved access to commercial financing; in Germany – tax incentives; in the former Yugoslav Republic of Macedonia, two main factors are tax incentives and implementation of energy management systems in industry; and in Switzerland also two main factors – implementation of energy management systems in industry and carbon pricing.

12. A majority of companies in the UNECE region have either internal or compliance driven energy efficiency/energy intensity goal. Energy efficiency decisions in companies are often made by the same people as core business decisions. At the same time, low priority of energy efficiency as it is not part of the core business is one of the main barriers faced by a company when considering investment in industrial energy efficiency. The other two significant barriers are lack or high cost of capital and lack of government incentives. About half of companies have some kind of energy management system (EnMS) but no more than one-fifth has EnMS that is ISO 50001 certified. Almost all companies implement some measures or projects to improve energy efficiency. Most common measures to improve energy efficiency are implemented to enhance energy efficiency of buildings and to improve energy efficiency of plant and equipment. As the main business benefits from implemented energy efficiency measures, companies consider improved production efficiency and quality, followed by general cost control, demonstration of corporate social responsibility, and compliance with legislation.

Based on the analysis and conclusions of the research, several recommendations can be made in order to make significant progress in closing the gap between the potential for energy efficiency investment and the actual level of investment received.

RECOMMENDATIONS

1. Countries should pursue higher effectiveness of the existing regulatory framework, with an emphasis on further developing, improving, implementing and enforcing secondary legislation, norms and standards, and targeted programmes and policies for energy efficiency. Those countries where certain pieces of regulatory framework are missing should consider adopting them taking advantage of experience of other countries where they exist and are successfully applied.

2. Countries should provide necessary resources to specialized institutions responsible for developing and implementing policies that support investments in energy efficiency projects. Such institutions have been shown in many cases to be effective in promoting such investments.
3. International assistance and use of donor funds for energy efficiency should continue in close cooperation with recipient countries to ensure that they are used for leveraging rather than crowding out private investments, improve knowledge of domestic financial sector in energy efficiency financing, and take into consideration multiple benefits of energy efficiency.
4. Significant efforts are required to make financial institutions more aware of energy efficiency financing and reduce perception of their high risk. Specific national policies are desirable for this to happen.
5. As there are no one-size-fits-all solutions, countries should take into account their specific circumstances when implementing policies and measures to increase investment in energy efficiency. However, using existing successful experience from other countries can be beneficial by applying best practices and avoiding mistakes.
6. Price of energy can become an important driver for energy efficiency investment. Countries where energy prices do not provide a sufficient incentive for energy efficiency should take this into consideration.
7. Raising awareness about the multiple benefits of energy efficiency projects can be recommended as one of the most effective measures to increase investment and financing flows to energy efficiency projects. This may require developing a system of assigning value to non-economic benefits, so that it can be properly taken into account when making investment decisions.
8. In the short and medium term, particularly in the countries with economies in transition, tax incentives and low-interest loans for energy efficiency projects should be considered as the most appropriate ways to increasing energy efficiency project investment viability.
9. Governments should consider creating incentives for companies for improving energy efficiency through appropriate policies. Companies should consider implementation of energy efficiency measures as those that improve production efficiency and quality, lower cost of production, help demonstrate corporate social responsibility and comply with legislation, and thus ultimately have a positive impact on the core business.

ANNEX

SURVEY

OVERCOMING BARRIERS TO INVESTING IN ENERGY EFFICIENCY

IN SUPPORT OF A JOINT STUDY BY THE UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE (UNECE) AND THE COPENHAGEN CENTRE ON ENERGY EFFICIENCY (C2E2)

Objective: To identify country-specific and regional barriers to investing in energy efficiency and to ascertain how these barriers can be overcome

Target audience: Experts, business managers and representatives of industrial companies, representatives of financial institutions, and government officials dealing with energy efficiency in a particular country or a small group of countries.

Note: *All information provided is treated confidentially and only reproduced in an anonymous and aggregated format.*

SURVEY QUESTIONS

First name, Last name

Male/Female

Country (please indicate the country for which you provide responses)

Name of the organization (company)

Position (title)

Website

E-mail

Phone number

Skype

1. Type of organization you represent:
 - National Government
 - Regional/municipal authority
 - Business (private company/ state-owned company)
 - Financial institution
 - International/intergovernmental organization
 - Non-profit (non-governmental [NGO])
 - Educational/research institution
 - Independent expert
 - Other (please specify) _____

2. Are there investment opportunities for energy efficiency in your country?
On a scale from 1 (very few) to 5 (very many)

3. What level of investments in energy efficiency does your country receive?
On a scale from 1 (no investments) to 5 (high level of investments)

4. Does your country have the following legislation, programmes and policies to support investments in energy efficiency?
 - a) Framework legislation (Law on energy efficiency or equivalent) Yes/No (Comments. You may list existing legislation)
 - b) By-laws (secondary legislation) on energy efficiency Yes/No (Comments. You may list examples of secondary legislation, including for specific sectors?)
 - c) Norms and standards on energy efficiency Yes/No (Comments. You may provide examples of norms and standards in particular sectors – industry, buildings, transport, appliances, etc.)
 - d) Government programmes and policies to support investments in energy efficiency Yes/No (Comments. You may provide titles of programmes and/or policies.)

5. Does the regulatory framework in your country support and enable investments in energy efficiency?
On a scale from 1 (very little support) to 5 (very strong support)
Comments

6. a) Does your country have institutions at the national level responsible for developing and/or implementing policies that support investments in energy efficiency projects? Yes/No (Comments. If Yes, please name these institutions (e.g. energy efficiency agency, unit at the ministry of energy, energy efficiency fund, etc.))
b) How effective are these institution(s)?
On a scale from 1 (not effective) to 5 (very effective)
Comments

7. How much support do the authorities at various levels provide for development and implementation of energy efficiency projects in your country?
- a) At the national level
On a scale from 1 (no support) to 5 (very effective support)
 - b) At the regional (provincial) level
On a scale from 1 (no support) to 5 (very effective support)
 - c) At the local (municipal) level
On a scale from 1 (no support) to 5 (very effective support)
- Comments
8. a) Does your country receive international assistance for developing and implementing energy efficiency projects? Yes/No (Comments. If Yes, you may wish to provide main forms of assistance, e.g. grants, soft loans, technical assistance, etc.)
- b) How effective is international assistance in increasing the level of energy efficiency investments?
On a scale from 1 (not effective at all) to 5 (very effective)
- Comments
9. a) How familiar are financial institutions in your country with financing energy efficiency projects and measures?
On a scale from 1 (not familiar) to 5 (very familiar)
- Comments
- b) How do financial institutions in your country view financing of energy efficiency projects in terms of risk compared to other types of business projects?
On a scale from 1 (much riskier) to 5 (not different from others)
- Comments
10. How favourable are conditions for repayment and servicing energy efficiency loans with savings generated from improved efficiency?
- a) For projects in the private sector
On a scale from 1 (not favourable) to 5 (very favourable)
- Comments
- a) For projects in the public sector
On a scale from 1 (not favourable) to 5 (very favourable)
- Comments
11. Does the price of energy in your country provide a sufficient incentive for the implementation of energy efficiency measures?
On a scale from 1 (no incentive) to 5 (strong incentive)
- Comments
12. a) What types of commercial financing are available in your country for energy efficiency projects implementation? (Please check all available – multiple answers possible)
- a) Equity financing
 - b) Debt financing
 - c) Self-financing
 - d) Financing through Energy Service Companies (ESCOs)
 - e) Other types – please specify

- b) What types of budget and donor financing are available in your country for energy efficiency project implementation? (Please check all available – multiple answers possible)
- Direct financing from public budgets (national, municipal)
 - Financing through tax incentives, subsidies, etc.
 - Energy Efficiency Funds
 - Donor funds
 - Other types – please specify
13. What types of financing are most widely used in your country? Please select up to three (3).
- Equity financing
 - Debt financing
 - Self-financing
 - Financing through Energy Service Companies (ESCOs)
 - Direct financing from public budgets (national, municipal)
 - Financing through tax incentives, subsidies, etc.
 - Energy Efficiency Funds
 - Donor funds
 - Other types – please specify
14. What are the main barriers to increasing investment and financing flows to energy efficiency projects in your country? Please select up to three (3) that you consider most important.
- Lack of specific policies, programmes, legislation, by-laws, norms and standards
 - Inadequate implementation and enforcement of policies and legislation
 - Administrative barriers, bureaucracy
 - Political/economic instability in the country
 - High interest rates for energy efficiency projects
 - Low energy prices
 - Difficulties with obtaining commercial loans and other types of financing
 - Lack of understanding of energy efficiency financing by banks and other financial institutions
 - Low awareness about the multiple benefits of energy efficiency projects
 - Lack of technical expertise and capacity to identify/evaluate/implement projects
 - Uncertainty about performance
 - Problems with using savings from energy efficiency measures
 - Other – please specify
- Comments
15. What are the main factors that could lead to increased investments in energy efficiency projects in your country? Please select up to three (3) factors that you consider most important.
- Improved legislation
 - Improved access to commercial financing
 - Tax incentives
 - Low-interest loans for energy efficiency projects
 - De-risking of investments through Government support programmes
 - Leveraging of commercial financing through seed funding from donors/ Government
 - Implementation of energy management systems in industry

- h) Stricter energy efficiency standards
 - i) Technical assistance
 - j) Carbon pricing
 - k) Mandatory energy audits
 - l) Training and awareness programmes
 - m) Improved technical expertise
 - n) Other – please specify
- Comments

16. The following set of questions is addressed to business managers and representatives of industrial companies. Please click Yes if you wish to continue answering these questions.
17. Are energy efficiency decisions (investment and/or strategy) in your company made by the same people as core business decisions?
- a) Yes
 - b) No
 - c) Do not know
- Comment
18. Has your company established an overall energy efficiency/energy intensity (productivity) goal?
- a) Compliance driven energy efficiency/energy intensity goal (e.g. to comply with government regulations)
 - b) Internal energy efficiency/energy intensity goal (e.g. to comply with voluntary commitments)
 - c) No energy efficiency/energy intensity goal
 - d) Do not know
- Comment
19. What are the main barriers that your company faces when considering investment in industrial energy efficiency? Please select up to three (3) that you consider most important.
- a) Energy costs too low to provide economic incentive
 - b) Lack or high cost of capital
 - c) Investment risk too high
 - d) Lack of information on energy efficiency opportunities
 - e) Little or no government policy
 - f) Insufficient senior management commitment or unfavourable company environment
 - g) Lack of technical expertise
 - h) Lack of government incentives
 - i) Low priority as not part of the core business
 - j) Other – please specify
- Comment

20. Does your company regularly report its progress on improving energy efficiency, for example as part of its annual report?
- a) Yes
 - b) No
 - c) Do not know
- Comment
21. Does your company have an energy management system (EnMS) that is certified or implemented according to a specific standard?
- a) ISO 50001 certified
 - b) Implemented according to ISO 50001 standard
 - c) Other certification (please specify)
 - d) Implemented according to a standard other than ISO 50001 (please specify)
 - e) Not certified or implemented according to a specific standard
 - f) Does not have EnMS
 - g) Do not know
- Comment
22. Which energy efficiency measures or projects has your company implemented in the past three years? Please select all that apply.
- a) Complied with government regulations
 - b) Improved energy efficiency of plant and equipment
 - c) Conducted a company-wide energy audit
 - d) Enhanced energy efficiency of buildings (e.g. improved insulation, lighting, etc.)
 - e) Implemented an ongoing energy management system
 - f) Other – please specify
 - g) No energy efficiency measures in the past three years
- Comment
23. What are the main business benefits to your company from implemented energy efficiency measures? Please select up to three (3).
- a) General cost control
 - b) Risk management – hedging against volatile energy costs
 - c) Demonstrate corporate social responsibility
 - d) Comply with legislation
 - e) Comply with requests from shareholders, customers and/or suppliers
 - f) Improve production efficiency and quality
 - g) Ensure security of power supply
 - h) Other – please specify
- Comment

REFERENCES

CT (2016), Carbon Trust. Simon Retallack et al. Available, attractive, too slow? How to accelerate energy efficiency by getting financing for it right, November 2016, United Kingdom.

CPI (2017), Climate Policy Initiative. Rodney Boyd et al. The Productivity of International Financial Institutions' Energy Interventions, March 2017, a CPI Report.

ECS (2013a), Energy Charter Secretariat. In-Depth Review of the Energy Efficiency Policy of Albania, 2013, Brussels, Belgium.

ECS (2013b), Energy Charter Secretariat. In-Depth Review of the Energy Efficiency Policy of Azerbaijan, 2013, Brussels, Belgium.

ECS (2013c), Energy Charter Secretariat. In-Depth Review of the Energy Efficiency Policy of the Republic of Belarus, 2013, Brussels, Belgium.

ECS (2013d), Energy Charter Secretariat. In-Depth Review of the Energy Efficiency Policy of Ukraine, 2013, Brussels, Belgium.

ECS (2017), Energy Charter Secretariat. In-Depth Review of the Energy Efficiency Policy of Armenia (2016), 2017, Brussels, Belgium.

IEA (2016a), International Energy Agency. Energy Efficiency Market Report 2016, OECD/IEA, 2016.

IEA (2016b), International Energy Agency. World Energy Investment 2016, OECD/IEA, 2016.

IPEEC (2017), IPEEC International Partnership for Energy Efficiency Cooperation. Supporting energy efficiency progress in major economies. Annual Report 2016, IPEEC/OECD, Paris France, 2017.

UNECE (2015), Best Policy Practices for Promoting Energy Efficiency. A Structured Framework of Best Practices in Policies to Promote Energy Efficiency for Climate Change Mitigation and Sustainable Development, UNECE Energy Series 43, United Nations, New York and Geneva, 2015.

UNEP (2016), United Nations Environment Programme. UNEP Guide for Energy Efficiency and Renewable Energy Laws, September 2016, United Nations Environment Programme, Nairobi, Kenya.

World Bank (2017a), "Global Tracking Framework 2017: Progress Towards Sustainable Energy" (April), World Bank, Washington, DC.

World Bank (2017b), Sudeshna Ghosh Banerjee et al. Regulatory Indicators for Sustainable Energy. A Global Scorecard for Policy Makers (RISE 2016), World Bank, Washington, DC.

