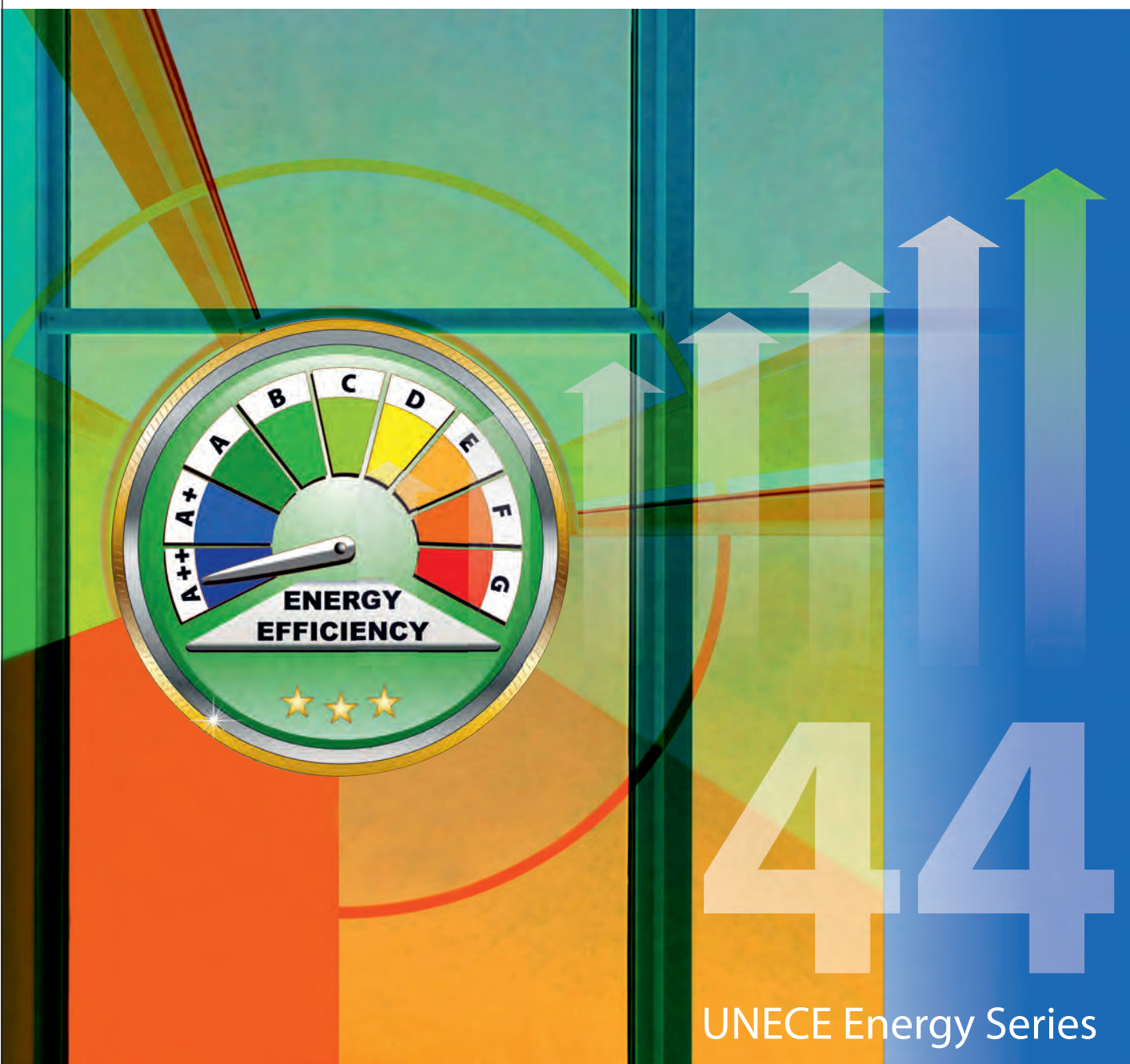


UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE

# ANALYSIS OF NATIONAL CASE STUDIES ON POLICY REFORMS TO PROMOTE ENERGY EFFICIENCY INVESTMENTS



UNECE Energy Series



UNITED NATIONS

UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE

# ANALYSIS OF NATIONAL CASE STUDIES ON POLICY REFORMS TO PROMOTE ENERGY EFFICIENCY INVESTMENTS

SYNTHESIS REPORT BASED ON CASE STUDIES FROM ARMENIA, AZERBAIJAN,  
BELARUS, BRAZIL, CHINA, CROATIA, EGYPT, GEORGIA, KUWAIT,  
MONTENEGRO, MOROCCO, SOUTH AFRICA, TAJIKISTAN, THAILAND, TUNISIA,  
URUGUAY, ZAMBIA



*Empowered lives.  
Resilient nations.*



**UNITED NATIONS**

NEW YORK AND GENEVA, 2015

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## FOREWORD

In line with the Sustainable Energy for All (SE4All) initiative of the United Nations Secretary-General, the United Nations Economic Commission for Europe is working to help member States secure access to affordable, reliable, sustainable, and modern energy. Achieving these outcomes is essential for the world to develop sustainably. The SE4All initiative has doubling the global rate of improvement in energy efficiency by 2030 as one of its three objectives. Improving energy efficiency is the best way to get more out of existing resources, supporting economic growth, and reducing energy costs. However, many barriers impede the collective ambition of sustainable development.

Improving energy efficiency requires coordinated actions of a multitude of actors, including governments, public and private sector companies, financial institutions, civil society, and other stakeholders. Only actions taken simultaneously on institutional, legal, regulatory, economic, financial and socio-political levels can create and promote a favourable environment for policy reforms that would allow national and international financial institutions to make investing in energy efficiency business-as-usual.

This publication has been prepared in the framework of the United Nations Development Account project “Promoting Energy Efficiency Investments for Climate Change Mitigation and Sustainable Development”. The project was implemented jointly by all five UN Regional Commissions with UNECE as the lead agency. It aimed to identify barriers to energy efficiency policy implementation and to provide recommendations to the policymakers on the development and implementation of policy reforms that can support market formation and foster favourable climate for investments in energy efficiency.

This publication provides a synthesis of policy incentives that should be in place in order to stimulate and ensure successful energy efficiency policy outcomes. The report is based on national case studies which highlight that most of the countries have started to implement energy efficiency policy but that the scope and the degree of maturity of these policies vary considerably. Some countries are working on all or most of the aspects of energy efficiency policy and hence are more successful in achieving benchmarks, while others are focusing on one particular aspect. The publication concludes with recommendations on collaborative measures that can catalyze new energy efficiency investments in countries and respective regions.

This study may become a useful tool for national governments, the business community, experts, project developers and other stakeholders in monitoring the progress of undertaking energy efficiency measures in various countries and remaining at the cutting edge in terms of applying and distributing best practices of energy efficiency improvements.



Christian Friis Bach  
Executive Secretary  
UNECE



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## ACRONYMS AND ABBREVIATIONS

ADEREE	National Agency for the Promotion of Renewable Energy and Energy Conservation of Morocco
ANME	National Agency for Energy Conservation of Tunisia
CCS	Carbon Capture and Storage
CDM	Clean Development Mechanism
CFL	Compact Fluorescent Lamps
CFLB	Compact Fluorescent Light Bulbs
CIS	Commonwealth of Independent States
CNG	Compressed Natural Gas
CoM	Covenant of Mayors
DEEI	Department for Energy Efficiency Measures In Industry of Tunisia
ECA	Economic Commission for Africa
ECE	Economic Commission for Europe
ECLAC	Economic Commission for Latin America and Caribbean
EDC	Energy Development Corporation of South Africa
EDS	Energy Development Strategy of Montenegro
EE	Energy Efficiency
EEL	Energy Efficiency Law of Montenegro
EEPC	Energy Efficiency Program-based Contracts
EES	Energy Efficiency Strategy of Montenegro
EL	Energy Law of Montenegro
EMS	Energy Management System
EnC	Energy Community Treaty
ENCON	Energy Conservation Promotion Fund
ESCAP	Economic and Social Commission for Asia and Pacific
ESCO	Energy Service Company



ESCWA	Economic and Social Commission for Western Asia
ESIB	Energy Savings in the Building Sector
EU	European Union
EUR	Euro
FDI	Foreign Direct Investment
FNME	National Energy Conservation Fund of Tunisia
GCR	Greater Cairo Region in Egypt
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse Gases
GVEP	Global Village Energy Partnership
HEP	Hrvatska Elektroprivreda, National Power Company of Croatia
HPP	Hydro Power Plant
LPG	Liquefied Petroleum Gas
MASEN	Agency for Solar Energy of Morocco
MEW	Ministry of Electricity and Water of Kuwait
NDP	National Development Plan of Zambia
NEEA	National Energy Efficiency Agency of the Republic of South Africa
NGO	Non-Governmental Organization
OVS RP	Old Vehicles Scrapping and Recycling Programme of Egypt
PEEI	Energy Efficiency in Industry Programme of Tunisia
PPP	Public-Private Partnership
PV	Photovoltaic
R&D	Research And Development
SANEDI	South African National Energy Development Institute
SEAP	Sustainable Energy Action Plan Of Tbilisi And Rustavi Municipalities Of Georgia
SSA	Sub-Saharan Africa

UN RC	United Nations Regional Commission
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
USD	United States Dollar
WB	World Bank

## SIGNS AND MEASURES

Bar	unit of pressure, equal to 100,000 Pascal
barrel	unit of volume, equal to 158.98730 liters, applied to oil in the present report
CO <sub>2</sub>	carbon dioxide
GWh	gigawatt hours
kg	kilogram
kWh	kilowatt hours
kWh/m <sup>2</sup>	kilowatt hours per square meter
m	meter
m/s	meter per second
m <sup>2</sup>	square meter
m <sup>3</sup>	cubic meter
Mtoe	million tons of oil equivalent
MW	megawatt
NO <sub>x</sub>	mono-nitrogen oxides NO and NO <sub>2</sub>
°C	degree Celsius
SO <sub>x</sub>	sulfur and oxygen containing compounds, <i>e.g.</i> SO, SO <sub>2</sub> , SO <sub>3</sub> and higher sulfur oxides

## EXECUTIVE SUMMARY

Developing countries and countries with economies in transition are confronted with a wide range of economic and environmental problems caused in part by inefficient and polluting energy systems. At the same time their economies provide some of the most promising opportunities for energy efficiency improvements as well as for reducing global greenhouse gas emissions. In order to realize this potential, there is a need to develop a systemic and full-fledged strategy to promote self-financing energy efficiency initiatives that can raise economic productivity, diminish fuel poverty and reduce environmental pollution.

Private investors do not finance energy efficiency projects in many countries because dedicated sources of financing are lacking and local banks are generally unfamiliar with such investments. Lack of financial incentives together with energy pricing policies that are unfavourable for investors further exacerbates the situation.

Furthermore, financing energy efficiency projects is unattractive in the absence of policy, institutional, regulatory and legal support for their implementation. Lack of knowledge and experience on how to select and formulate energy efficiency investment projects is often a challenge for local experts.

Based on experience in developed countries, which have had relatively successful energy efficiency strategies, this report synthesizes policy incentives that should be in place to stimulate and ensure successful energy efficiency policy outcomes. The incentives fall into three groups of desired policies: 1) legal, institutional and regulatory; 2) economic and financial; and 3) socio-political. Having a set of these policies in place at a sufficient degree in a particular country is a basis for improving energy efficiency.

The analysis of the case studies provided by the project countries has shown that all the project countries are dealing with energy efficiency issues to some extent. However, the maturity level of energy efficiency policy varies from country to country and from region to region. Some countries have moved to establish an energy efficient economy by creating necessary conditions such as developing an institutional base, introducing appropriate laws and regulations, creating financial and economic incentives for attracting investments from national and international sources as well as introducing social policies conducive to increasing energy efficiency and energy savings among the general public. Other countries do not meet those conditions.

Thus, even though certain results have been achieved already, there is more work to be done to implement successful energy efficiency policies. In order to increase the energy efficiency investments, each country should deal with barriers comprehensively. Only actions taken simultaneously on institutional, legal, regulatory, economic, financial and socio-political levels can ensure the successful creation and promotion of a favourable environment for national and international investors to perform their activities in the area of energy efficiency in a particular country.

Through their collaboration the UN Regional Commissions (RCs) can assist member States to build and strengthen their capacity to implement effective regulations and policies, to establish market-based mechanisms, business models and investment tools for promoting energy efficiency. To achieve this goal the UN RCs should make a strong commitment to facilitate the transfer of knowledge, best practices and expertise among their members, avoiding duplication and waste of financial and human resources. This would enable member States to optimize the use of resources, create synergies and build partnerships among national, regional and international experts, and catalyze the increase of private capital flows into energy efficiency projects.

## INTRODUCTION

A global consensus is emerging that progress in energy efficiency is the most effective way of mitigating climate change. This is partly because of the vast potential for energy efficiency improvements to reduce CO<sub>2</sub> emissions that can be implemented relatively quickly, cheaply and reliably. Cost-effective energy efficiency improvements and clean energy technologies are self-financing given favourable economic and regulatory conditions exist in markets around the world.

The project “Promoting energy efficiency investments for climate change mitigation and sustainable development” was conceived as a set of wide-ranging regional assessments, including case studies, expert workshops, business development training courses and senior policymaker seminars. One of the main goals of these assessments and the current synthesis report has been to single out the existing barriers for energy efficiency policy implementation. Another goal was to provide recommendations for the policymakers of the participating countries that would assist them in development and implementation of policy reforms that can support market formation and foster a favourable climate for investments in energy efficiency. To achieve these goals, an interactive approach has been applied with direct contributions from experts, which have been collected, analyzed and consolidated in the present synthesis report.

In particular, this report provides an overview of regulatory, institutional, economic as well as socio-political conditions in selected countries of each project region (corresponding to the regions of the UN Regional Commissions) and a summary of main activities undertaken by national Governments and international institutions in selected project countries. Also the report establishes a benchmark, as a set of required energy efficiency policies, against which the energy efficiency policy framework in each individual participating country can be measured, and offers options to move closer to this desired benchmark for each country.

The report is structured as follows: Chapter 1 of the report sets a benchmark, identifying the policies necessary to be in place to ensure successful energy efficiency policy outcomes and a favourable investment climate. The following five Chapters (Chapters 2 to 6) of the report are dedicated to the review and analysis of the selected studies and proposals of the options to move closer towards the indicated benchmark. The chapters are divided on the basis of five UN Regional Commissions participating in the project, namely Economic Commission for Europe (ECE), Economic and Social Commission for Asia and Pacific (ESCAP), Economic and Social Commission for Western Asia (ESCWA), Economic Commission for Latin America and Caribbean (ECLAC), and Economic Commission for Africa (ECA). The chapters are further subdivided into sections focusing on specific countries under consideration. The subsequent Chapter 7 presents a comparative analysis of reviewed case studies regarding their current status with respect to the established benchmark and its policy facets. The last Chapter 8 provides conclusions and consolidates the recommendations related to enhancement of energy efficiency investments in participating countries and collaborative measures that UN RCs can undertake to catalyze new energy efficiency investments in the regions.

## Chapter 1: Benchmarking

Developing countries and countries with economies in transition are confronted with a wide range of economic and environmental problems partially caused by their inefficient and polluting energy systems. However, it is notable that at the same time their economies provide some of the most promising opportunities for energy efficiency improvements as well as for reducing global greenhouse gas emissions. In order to fulfill this potential, there is a need to develop a systemic and full-fledged strategy that aims at promoting self-financing energy efficiency initiatives, which can raise economic productivity, diminish fuel poverty and reduce environmental pollution.

An overview of the level of development of energy efficiency market in the countries of United Nations Regional Commissions shows that energy, economic and climate change policies are mature in most developed economies across the world (*e.g.*, Japan, Western European countries, Canada, and the United States). In these countries, the energy efficiency market is dominated by energy-efficient technologies and sustainable energy efficiency services (supply and demand), because of the specific energy efficiency policy and regulatory instruments developed and implemented. It also should be noted that some developing countries and countries with economies in transition have also achieved considerable results in increasing their energy efficiency. Among the five Regional Commissions, the UNECE region is home to the largest and most developed energy efficiency markets and the UNECE Secretariat, together with several other regional organizations, possesses extensive experience in promoting energy efficiency improvements. Implementation of a number of projects under the Energy Efficiency 21 Programme, including “Financing Energy Efficiency and Renewable Energy Investments for Climate Change Mitigation” project provided extensive and valuable experience and insights regarding energy efficiency policy development, promotion and implementation, which have been shared with other RCs, as appropriate.

Based on the experience of the UNECE as well as individual countries, which have proved to have a successful energy efficiency strategy, this section develops a benchmark that can serve as a reference point for policy makers and energy experts in the field of sustainable and efficient energy use. This benchmark is a synthesis of policy incentives that should be in place in order to stimulate and ensure successful energy efficiency outcomes. The benchmark may be virtually subdivided into three groups of desired policies: 1) legal, institutional and regulatory; 2) economic and financial; and 3) socio-political. A set of these policies in place at a sufficient degree in a particular country is a basis for successful formulation and implementation of energy efficiency policies and related projects.

Further analysis of the presented case studies will be conducted against this benchmark, and its derivatives. In particular, the presence of the following policy incentives will be carefully considered and will serve as performance indicators for each individual country under the review of the present report.

#### Legal, Institutional and Regulatory Incentives:

- transparent structure of regulatory framework;
- legal and legislative stability with regular and coordinated updates and revisions of the primary legislative and policy framework;
- existence of secondary legislation and operational instructions, tools, standards and procedures necessary to implement primary legislation or strategic programmes;
- transparent administrative and authorization procedures for new energy efficiency and energy saving projects;
- efficient use of public procurement and tendering processes for energy efficiency projects and programmes;
- existence of operational and effective national Governmental entity responsible for energy efficiency;
- effective cooperation between different Governmental bodies involved in energy policy as well as between appropriate authorities at national and at local levels.

#### Economic and Financial Incentives:

- market-based energy price formation;
- energy tariffs, which fully recover costs (and therefore increase profitability of energy efficiency projects) and take into account the environmental costs of energy supply (therefore offer incentives for a change of behavior of final consumers);
- environmental and economic efficiency guaranteed through sufficient infrastructure for energy transmission and distribution;
- sufficient payment rates and/or profitably regulated customer tariffs that provide adequate financial means for infrastructure improvements and development;
- possibility for establishment of public-private partnerships or full privatization of energy companies, which alleviate a conflict of interest between the company profitability and the pursuit of political interests through socially popular pricing policies;
- availability of public funds for financing of initiatives and programmes, such as dedicated credit lines providing soft loans, tax exemptions or support schemes for third-party financing;
- low interest rates applied by local banks to medium- and long-term loans and unrestrictive requirements for collaterals;
- advanced feed-in tariff schemes that ensure the least cost approach while considering future technology development, changes in market competition and optimum resource utilization.

#### Socio-political Incentives:

- political commitment to implement the necessary policy reforms;
- qualified human resources and sufficient professional expertise among local authorities for implementation of identified projects;
- sufficient experience in financing energy efficiency projects and awareness among commercial banks of possible economic benefits arising from energy efficiency projects;
- capacity building, existence of training and education possibilities for professionals with adequate skills for conducting energy audits, identification of attractive project opportunities, and preparation of bankable project proposals;
- awareness on the side of consumers, who regard energy as a valuable good and are ready to change their consumption behavior.

The presented set of policy measures serves as a framework for identification of country-specific policy recommendations to overcome barriers to investments in energy efficiency. The recommendations take into consideration the country-specific political and economic situation.

In general, the commitment to take the necessary steps towards approaching the established benchmark will bring project countries to the level required to achieve successful outcomes in formulating and executing energy efficiency policy. In particular, introduction of aforementioned policies would allow the project countries to overcome the following existing challenges:

- absence of policy and institutional support, which discourages private investors from financing energy efficiency projects;
- lack of economic incentives and financing for investments in energy efficiency projects and absence of adequate financing mechanisms;
- lack of adequate knowledge and experience on expert level in identifying and formulating energy efficiency investment project proposals and presenting them as bankable project proposals.

## Chapter 2: UNECE Region – Review, Analysis and Options to move forward to established benchmark for selected countries

Countries of the UNECE region are among the richest and most developed in the world, however the degree of differentiation in the region is significant. Some of the countries can be characterized as highly developed energy markets, using efficient technologies and having universal sustained access to electricity and fuels. Others, nevertheless, still experience inefficiencies in production, transmission and distribution of energy, and a lack of investments into energy efficiency projects. One thing that countries of the region have in common is a very high level of energy consumption. About half of the global energy production is consumed in this region. Therefore, promotion and implementation of the energy efficiency policies in the UNECE region may not only improve individual country's energy and environmental prospects, but also significantly contribute to a global sustainable energy future.

The analysis below covers the following countries: Armenia, Azerbaijan, Belarus, Croatia, Georgia, and Montenegro. The case studies for Armenia, Belarus, and Croatia have been provided by the UNDP Europe and CIS Regional Centre. It should also be noted that Armenia, Azerbaijan, and Georgia are also member States of ESCAP.

### Section 2-1: Armenia – Cogeneration Based District Heating Restoration Project in Avan District of Yerevan City implemented in the framework of “Armenia – Improving the Energy Efficiency of Municipal Heating and Hot Water Supply” UNDP-GEF/00035799 project<sup>1</sup>

Armenia has no domestic resources of fossil fuels and heavily depends on imported primary energy sources. Existing domestic primary energy resources, namely hydropower resources, meet only 8.1% of Armenia's energy demand. In this regard, ensuring energy security, including diversification of imported and domestic energy resources, promotion of energy savings and energy efficiency are the key priorities of the strategic development of Armenia's energy sector.

Heat supply sub-sector is one of the major consumers of energy resources and one of the largest greenhouse gas (GHG) emitters in Armenia. However, it has a significant potential for energy savings through improving energy efficiency (33% of total energy saving potential of Armenia). Considering the necessity to ensure efficient, safe, affordable and clean heat supply, in 2005 the United Nations Development Programme (UNDP) jointly with the Global Environment Facility (GEF) initiated a project aimed at improving energy efficiency of municipal heating in Avan district of Yerevan.

The project proved to be a success story. It contributed to the improvement of the energy efficiency regulatory framework and application of advanced technologies. One of the direct outcomes of the project's technical assistance was inflow of more than USD 9 million foreign direct investments in restoration of district heating system in Armenia.

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<sup>1</sup> Cogeneration Based District Heating Restoration Project in Avan District of Yerevan City, Armenia implemented in the framework of “Armenia - Improving the Energy Efficiency of Municipal Heating and Hot Water Supply” UNDP-GEF/00035799 project, [http://www.unece.org/fileadmin/DAM/energy/se/pdfs/gee21/projects/cs/CS\\_Armenia.pdf](http://www.unece.org/fileadmin/DAM/energy/se/pdfs/gee21/projects/cs/CS_Armenia.pdf)



The project was successful mainly due to reduction of commercial risk to the level that stimulated investment in the market. It was largely achieved through the public support scheme for promoting cogeneration-based district heating restoration. Adoption of the preferential feed-in tariff for electricity produced from cogeneration allowed keeping an affordable heating tariff for residents. The mitigation of commercial risks for investors was provided through guaranteed high revenue from the electricity sold to the grid at the favourable tariff, and high revenue from heat sales due to the high connection rate of the residents ensured by competitive and affordable heating tariff. Thus reduced commercial risks through creation of favourable economic and administrative environment for attracting private investments were critical for project's success.

Before the beginning of implementation, UNDP-GEF project studied and identified the key barriers to a successful energy efficiency policy in Armenia, which comprised underdeveloped institutional, legal and regulatory system, economic and financial risks, as well as low awareness and lack of capacity for the development and implementation of the energy efficiency projects.

In particular, the regulatory framework in Armenia lacked both short- and long-term planning for development of a feasible, energy efficient and environmentally friendly energy policy. Business environment for attracting private investments was highly unfavourable due to unclear distribution of responsibilities and accountability among national and local authorities for making key policy decisions and a lack of social support schemes for implementation of energy efficiency projects. High financial risks and large capital investments complicated and discouraged execution of potential projects on a commercial basis. Existing tariff policy hampered promotion of energy efficient and environmentally friendly solutions, which as a result led to the lack of incentives and implementation plans for restructuring and privatization of the energy supply providers.

On the institutional side, national and local authorities as well as potential project developers lacked capacity, experience and appropriate skills for initiation and implementation of energy efficiency projects.

The project implemented by UNDP-GEF stimulated Armenia to move closer to the desired benchmark by creating the necessary framework for investments in energy efficiency projects. The policy strategy to further achieving the established benchmark should be based on the "lessons learned" from the implemented project.

Thus, the key conclusion from this UNDP-GEF project in Armenia that can be translated as an option to move towards the established benchmark is that despite the important role of the State in defining the national energy strategy and creating appropriate legal and regulatory framework, only private sector participation may allow implementation of energy efficiency projects in affordable, environmentally friendly and sustainable manner. Private companies are more competitive, flexible in their policy design and faster in adjustments to a new market environment. To implement a national energy efficiency strategy Armenia needs a new approach, where the Government cooperates with individual private investors, through establishment of public-private partnerships in implementation of the country's energy efficiency policy.

Investors' confidence is critical for private investors to get involved. Therefore, the ultimate focus of public policy should be on reducing commercial risks to a level that stimulates investment in the market. The projects are attractive to private investors if public support schemes and mechanisms are in place and investors are reasonably sure, on the basis of regulations issued by public authorities, that they will get adequate return on investments. Therefore, the Government should establish and support a stable economic and institutional

environment for investments and investment support schemes should be long-term, avoiding frequent changes in administrative procedures.

On the fiscal and economic policy side, the Government should implement a tariff system policy that creates incentives for demand side savings, simultaneously ensuring energy supply companies to recover their fixed costs regardless of customers' consumption level, thus mitigating utilities' risk from reduced demand. Implementation of demand side regulation and consumption-based billing system is a way to ensure that the actual consumption-based payment system creates proper incentives for energy savings and establishes transparent economic relationships between the power supply company and its consumers.

Technical assistance is crucial for successful project implementation in terms of raising awareness and increasing capacity of private companies. Its key elements should include assistance in development of prefeasibility study; assistance in negotiations between private sector and national authorities; organization of consultations with local communities; surveys of public opinions; involvement of international expertise and experience; monitoring and verification of the medium-term and final achievements of the project.

## Section 2-2: Azerbaijan – Analysis of the Policy Reform Impact on Sustainable Energy Use in Buildings<sup>2</sup>

The Republic of Azerbaijan is the biggest of the three countries of the Caucasus in terms of its size, population and available energy resources. At present country's energy needs are met almost entirely with its gas and oil resources. However the country's energy efficiency is very low and it has the highest energy intensity index in the Caucasus region. The potential of energy efficiency is evaluated to be about 30% of total energy consumption.

The issue of energy efficiency in Azerbaijan is directly linked to energy efficiency in buildings. According to some estimates, 55% of energy consumption in Azerbaijan accounts for buildings. In order to improve building energy performance, the Energy Savings in the Building Sector (ESIB) project was launched in 2010 with the support of the European Commission and INOGATE programme<sup>3</sup>. The project paid a particular attention to decreasing energy losses in the building sector by means of energy audit. Several important measures have been implemented under INOGATE programme. The project activities aimed to support the development and the enforcement of energy efficiency-related regulatory base in the building sector including drafting of building standards and codes, as well as the promotion of regional harmonization of policies and regulatory practices. Another objective of the project was to support an enabling investment climate for energy conservation projects, including identification and assistance in the preparation of energy efficiency investment projects in the building sector for submission to international financial institutions. Furthermore, the project focused on assessing the needs for strengthening capacity in energy auditing, building technologies and design, and providing appropriate capacity building, training and networking programmes.

In addition to internationally supported initiatives, Azerbaijan has recently made important steps at the national level, which aimed at creating conditions for an extensive development

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<sup>2</sup> Azerbaijan national case study for promoting energy efficiency investment. An analysis of the Policy Reform Impact on Sustainable Energy Use in Buildings, [http://www.unece.org/fileadmin/DAM/energy/se/pdfs/gee21/projects/cs/CS\\_Azerbaijan.pdf](http://www.unece.org/fileadmin/DAM/energy/se/pdfs/gee21/projects/cs/CS_Azerbaijan.pdf)

<sup>3</sup> The INOGATE Programme is an international energy cooperation programme between the EU, the littoral States of the Black and Caspian seas and their neighboring countries since 1996.

of energy saving and energy efficiency. One of the examples is the programme “City planning and construction code for Azerbaijan” that was adopted in September 2012. This programme served as a basis for energy saving and energy efficiency at the stage of designing and construction of new facilities by developing relevant norms and regulations. A number of other State programmes aimed at socio-economic development of the Republic of Azerbaijan contain important provisions for energy sector improvements.

However, along with the current achievements in energy policy implementation, Azerbaijan needs to overcome many obstacles that hinder the improvement of energy efficiency in the energy sector. Still relatively uncompetitive environment and insufficient investments are the results of the existing structure of the energy sector, which is marked by a low degree of private sector involvement. This happens because only a handful of major energy operating companies dominate the energy sector in the country. All of them are State-owned and vertically integrated with full monopoly in energy production and supply.

The current level of both national and foreign investments in the energy sector is not sufficient to overcome low energy efficiency caused by a high proportion of obsolete facilities in the energy sector, energy losses during production, transmission, distribution and use of energy resources and insufficient use of energy efficient technologies.

On the legal and regulatory side, even though all major energy-related legislation, including by-laws were adopted in Azerbaijan in the late 1990s, there are still some old legal and normative acts in place, which need to be updated so that they correspond to the current situation and as a result can facilitate the implementation of current energy policy needs. Furthermore, many provisions of energy legislation in Azerbaijan have a general character and are not duly applied in practice.

In general, current efforts of some Governmental bodies and other stakeholders to increase energy efficiency in Azerbaijan have been fragmented and dispersed. In order to achieve long-term energy sustainability the focus of policy makers should be placed on developing an integrated strategy and plan of actions, as well as improving the legal framework that would take into account regulatory, legislative and financial dimensions of energy policy reform.

In order to move closer towards the benchmark established in Chapter 1 the Government of Azerbaijan should make further steps to increase energy efficiency and reduce the negative environmental impact of energy use by developing appropriate and sustainable policy framework in the area of energy efficiency. The energy efficiency policy formulation should be based on short-term, medium-term and long-term objectives.

In the short term, the Government should increase the budget flexibility and autonomy to improve the efficiency of Government-funded organizations and budgeting principles based on full-cycle costing in order to capture the benefits of long-term investments. The establishment of a dedicated Governmental entity to coordinate the activities related to energy efficiency projects can facilitate the processes and procedures for projects’ approval, public procurement and tendering. The Government should encourage development and use of new energy efficiency models based on international “best practices” by cooperation with international experts and institutions.

In the medium term, the Government should develop and adopt new standards, norms and regulatory acts on energy performance, and simultaneously establish institutional and financial mechanisms of their management. That should encompass the development of economic incentives for energy efficiency projects and programmes. That should be done through creation of public funds with a focus on the sectors and technologies where energy saving and energy efficiency potential is the greatest. When national funds are limited or not available foreign investment should be attracted by creating favourable investment

environment. National treatment should be provided to foreign investors by ensuring non-discriminative conditions compared to national investors<sup>4</sup>.

To move closer towards established benchmark, the Government of Azerbaijan should also aim at establishing a legal framework for energy efficiency, which needs to be full-fledged with accompanying well-formulated secondary legislation and in compliance with international standards.

In the long term, the Government should aim at restructuring tariff policy by adjusting tariff levels and design, taking into account customer classification so that tariffs reflect the true cost of production and internalize environmental costs. Additionally, the Government should ensure regular monitoring of policy implementation, *inter alia* by establishing a system of energy audits, and communicate results to all concerned stakeholders.

To deal with the issue of limited awareness and lack of experience in energy efficiency project development and implementation, the Government should establish wide-scale awareness raising programmes at the national and local levels with the purpose of training specialists in sustainable use of energy resources.

### Section 2-3: Belarus – UNDP-GEF Project (2007-2011) “Removing Barriers to Energy Efficiency Improvements in the State Sector in Belarus”<sup>5</sup>

Belarus is a major energy importer, mainly for crude oil and natural gas. Continuously rising prices of imported fossil fuels lead to negative trade balance and insufficient competitiveness of the economy. For these reasons, energy efficiency has gained a top priority for the Government of Belarus since mid-1990s. The application of a combination of administrative and market measures has brought tangible results. From 1996 to 2012, three National Energy Saving Programmes were successfully implemented. Furthermore, Belarus has developed and introduced several energy efficiency strategy and policy documents as well as several plans of action. New institutional structure has been significantly facilitating the implementation of programmes and projects aimed at the reduction of energy intensity and improvement of energy efficiency on the supply and demand side. As a result, the energy intensity of GDP has dropped by 65% compared to 1995, and its annual reduction rate during this period was at least 4%. During this period the energy savings were growing from 1.5 to 2.5 million tons of coal equivalent per year, *i.e.* 5-6 % of primary energy consumption. Furthermore, almost five-fold carbon intensity reduction was achieved and the share of the renewable energy sources doubled.

Notwithstanding these achievements Belarus is still unable to demonstrate a sustainable decoupling of economic growth and GHG emission trends. The current trend of GHG emissions is approximately 1-2% increase per year, and the forecast shows that emissions will be increasing at least until 2020. Belarus needs to implement a long-term policy to modernize its power industry and reduce the rate of fuel consumption per unit of produced energy. Despite the current efforts to retrofit the outdated power generation facilities, today’s accumulated depreciation of main assets remains quite high (52.1%). While the heat supply system accounts for 70% of the gross energy consumption, the heat supply pipelines have out-of-repair rate of 50-60% with the resulting considerable heat supply losses.

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<sup>4</sup> National treatment is a principle in international law, which essentially means treating foreign and national citizens equally. Thus, if a state grants a particular right, benefit or privilege to its own citizens, it must also grant those advantages to the citizens of other states while they are in the country.

<sup>5</sup> UNDP/GEF Project (2007-2011) “Removing Barriers to Energy Efficiency Improvements in the State Sector in Belarus”, [http://www.unece.org/fileadmin/DAM/energy/se/pdfs/gee21/projects/cs/CS\\_Belarus.pdf](http://www.unece.org/fileadmin/DAM/energy/se/pdfs/gee21/projects/cs/CS_Belarus.pdf)

Such conditions clearly determine not only an urgent need for an efficient energy mix, but also a strong energy efficiency policy. Without reforms in the energy sector and investments in the energy sector the country will not be able to move towards the established benchmark that can ensure sustainable energy future of the national economy. To promote well-functioning and self-sustained energy efficiency policy the Government of Belarus should aim at overcoming some barriers.

The main institutional barrier for energy efficiency investments in Belarus is a dominant status of the State in economic activities, which hinders the development of a proper private sector. Most Belarusian companies, which are not fully State-owned, still have partial and often significant share of State ownership. Furthermore, monetary savings achieved by the companies that receive State funding must be returned to the State budget and thus cannot be used for repayment of investments.

Lack of liberalization and privatization processes and the extensive influence of the State in all energy activities further pose economic barriers, which hinder the development of attractive financial environment for private investments. In addition, low and State-subsidized domestic tariffs for electricity and heat endanger the profitability of bankable projects. The banking sector capacity is also limited and faces a number of barriers. Most potential energy efficiency projects are long-term, while commercial bank loans are only available for up to seven years, and the interest rates are relatively high. Additionally, procedures to obtain soft loans (*e.g.* from international financial institutions) to finance energy efficiency projects are often very complex and lengthy.

The current market structure and business environment in the Belarusian economy indicates a general lack of awareness on the importance of financial mechanisms and instruments for private investment projects. It is partially caused by insufficient knowledge on the part of administration personnel and key specialists in State sector enterprises in terms of elaborating and managing economically effective investments.

To overcome the existing barriers in the area of energy efficiency policy the Government of Belarus should make appropriate steps to implement energy efficiency measures, which would pave the way towards approaching the benchmark.

In particular, the Government should encourage and support private sector development and its initiatives in the area of development and implementation of energy efficiency projects. The energy efficiency business models should include possible schemes for optimization of investment and financing policies and touch upon the issues of business planning and investment appraisals, rules and modalities for investment agreements, tendering procedures, preparation of bank offers and loan applications.

The Government of Belarus should also define and establish adequate framework conditions to allow growth of the market for energy services. Changes in relevant laws and regulations are necessary. It particularly concerns the banking sector, which should be encouraged to finance long-term projects. Additionally, the current complex procedure of obtaining bank loans for energy efficiency projects should be simplified.

The Government should also seek and encourage support from international donors and investors to address lack of funding for energy efficiency projects. Simultaneously the Government should focus on mitigating perceived risks among local lenders and investors and increase awareness and know-how among local key stakeholders.

To approach the benchmark, the Government should also enhance capacity building programmes and provide training for the staff of ministries, regulators, and other agencies working in the energy sector to ensure that they have the capacity and means to develop successful strategies and implement policies promoting energy efficiency. With the purpose

to overcome the lack of awareness and capacities among private companies, the Government with the support and participation of international institutions jointly with local banks should focus on capacity building of local businesses on the preparation of bankable projects.

#### Section 2-4: Croatia – Lessons Learned from UNDP-GEF Project in Croatia: Promoting energy efficiency investments for climate change mitigation and sustainable development (2005-2011)<sup>6</sup>

As a newly acceded Member State of the European Union (EU) Croatia faces an imperative of increasing energy efficiency. At the moment, as is the case in many countries emerging from planned economy structure, energy use in Croatia remains rather wasteful: Croatia consumes 12 percent more energy per unit of GDP than EU average. Even though Croatia has its own gas and oil resources, in particular substantial natural gas reserves, dependency on imports of primary energy sources is high. Energy dependency from imports contributes to country's trade deficit, which in turn keeps the local currency (kuna) under pressure. Inefficiencies in energy use largely come from the buildings sector, since most buildings were constructed under planned economy when heat and energy tariffs were kept below cost-recovery levels.

To address the issue of sustainable energy use the UNDP together with GEF developed and implemented an energy efficiency programme for Croatia in 2005-2011. The project mainly aimed to address inefficient energy use in public sector buildings. Thus, it established energy efficiency as a policy priority and as a practical tool for effective housekeeping in the whole public sector in the country, including local and county authorities, as well as central Government ministries and agencies. The project introduced the Energy Management System (EMS) covering practically all public sector facilities in Croatia. During its implementation period the project attracted exceptionally high local co-financing that was four times higher than the initial budget of the UNDP-GEF project. The GEF funds served as seed money, but it was the local funding that actually allowed a country-wide roll-out and implementation of EMS in the whole public sector.

In practical terms the programme produced about USD 18 million cost savings and cut the annual GHG emissions by 63 thousand tons of CO<sub>2</sub> equivalent. Additionally, the project changed the perception and business-as-usual practice regarding energy efficiency in the public sector. It also raised awareness and changed attitude towards energy efficiency in a large part of the society by its information campaigns, outreach activities and free energy efficiency advisory services, targeting primarily the residential sector. More than 5,500 public officials and energy experts, including energy auditors, were trained to implement energy efficiency policy measures.

During preparation and implementation of the project a number of features related to energy efficiency policy in Croatia have been revealed. In general the situation in energy efficiency market can be characterized by weak demand and underdeveloped supply resulting in very few implemented projects. Energy statistics shows that market inefficiencies stem from poor utilization of cost-effective energy efficiency measures and technologies. The so-called "market failures" are the result of a number of existing barriers, which have regulatory, institutional, financial and social nature, and which distance Croatia from the established benchmark.

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<sup>6</sup> Lessons Learned from UNDP-GEF Project in Croatia: Promoting energy efficiency investments for climate change mitigation and sustainable development (2005-2011), [http://www.unece.org/fileadmin/DAM/energy/se/pdfs/gee21/projects/cs/CS\\_Croatia.pdf](http://www.unece.org/fileadmin/DAM/energy/se/pdfs/gee21/projects/cs/CS_Croatia.pdf)

The administrative barriers for energy efficiency projects in Croatia are mainly characterized by complex authorization procedures for energy efficiency projects as well as by a lack of coordination between various Governmental agencies involved in energy efficiency policies. There is a weak institutional framework, which reduces incentives to initiate, develop and implement energy efficiency policy, and the national support for programmes and projects related to energy efficiency is rather limited. The regulatory development in Croatia has been conducted at a very high pace. That could be regarded as a positive factor to support project development, however this rapid legislative development creates problems for project developers to follow and comply with regulatory changes.

One of the main economic barriers for the development of energy efficiency projects in Croatia is capital constraint. This includes high up-front costs of energy efficiency investments, combined with the limited financial resources of the targeted end-user groups to invest in energy efficiency projects on their own. It should be also noted that the bank sector in Croatia is very dynamic and there is a number of banks competing for clients and offering loans. A survey among bank representatives showed that banks are able and willing to provide financing for commercially viable energy efficiency projects, however there is a lack of market demand for financing such projects. Thus, despite the availability of credit lines, the promotion of funds for energy efficiency projects among bank customers is virtually non-existing. As a result, available financing mechanisms remain unused. Additionally, the de-facto market monopoly of the national power company HEP (Hrvatska Elektroprivreda) constitutes a barrier for new market entrants in the energy sector.

Local experience and capacity to successfully identify, specify and implement energy efficiency projects is generally low in Croatia. Existing energy efficiency manufacturers and service providers are fragmented, narrowly specialized and unable to provide turnkey integrated solutions. Moreover, they lack knowledge on long-term benefits resulting from energy management and energy efficiency improvements. As a result, there is a lack of foresight, analysis, planning and ways of implementation of the energy efficiency policies and projects.

The project implemented by the UNDP-GEF revealed the key “lessons learned”, which may be formulated as recommendations for further development of national energy efficiency strategy and thus as options towards approaching the benchmark.

The main conclusion is that the continuous efforts are needed to further formulate energy efficiency policy and design tools (*e.g.* forecasts, least-cost plans and indicators) for effective and efficient project implementation and monitoring. In this respect, the implementation of energy audits and establishment of Energy Management Information System should serve as a practical tool for monitoring, evaluation and verification of achieved results of the forthcoming energy efficiency projects.

In order to strengthen the implementation of adequate regulatory measures, the Government should evaluate the implementation effectiveness, including cost-effectiveness, as well as the socio-economic effects of policy measures employed. In particular, to reduce the administrative burden for the project developers, one single responsible authority, which can set clear and integrated guidelines for authorization procedures for projects, should be established. A crucial point for the success of the projects is an active project support by national and local authorities. Therefore public acknowledgement of energy efficiency efforts as well as related press coverage is one of the most important tools to raise interest of the stakeholders.

Furthermore, marketing efforts and capacity building regarding national financial institutions able to provide financing for projects are necessary. Marketing campaigns should be aimed at raising awareness about the availability of financing schemes and to improve the expertise

on energy efficiency within commercial banks. Such campaigns should comprise information dissemination about financing schemes to project developers and client enterprises and provide assistance and training to local banks.

One of the important conclusions of the UNDP-GEF project is that though the support from donors and international financial institutions may be needed to kick-off the projects, their scaling up is crucially dependent on national resources. Therefore, local authorities and banks are the key drivers of successful projects implementation.

Additionally, in order to create a positive image for investments in energy efficiency and encourage further initiatives in this area the Government of Croatia with participation of local and regional authorities should develop suitable information, awareness raising, guidance, and training programmes for representatives of public sector at all levels and private businesses.

### Section 2-5: Georgia – Municipal Energy Efficiency Policy Reforms in Georgia<sup>7</sup>

There are different types of energy resources available in Georgia, however, except for significant hydropower resources, their amount is relatively limited. Due to this fact Georgia's national economy largely depends on the imported energy. To reduce energy dependency and increase energy efficiency, Georgia has acknowledged the importance of energy efficiency policy for country's development and made first steps for its implementation in the mid-1990s.

Since then significant positive changes in terms of energy efficiency policy have taken place. In 2010 Tbilisi municipality and four other Georgian municipalities (Rustavi, Gori, Kutaisi and Batumi) signed the Covenant of Mayors (CoM), committing to implementation of municipal energy management policy. To date Tbilisi and Rustavi municipalities have developed their own Sustainable Energy Action Plans (SEAPs), envisaging specific energy efficiency measures and defining possible energy saving potential. In particular, Tbilisi identified as critical the improvement of the City's energy performance in such sectors as buildings, urban transport (public vehicles and public transportation), public lighting, municipal waste and waste water treatment management, electricity and gas distribution networks, and green spaces. In case of Rustavi, such sectors as buildings, transport and infrastructure, including lighting and green spaces have been identified as sectors with high potential of achieving energy savings.

Some projects have been already developed and implemented or are being implemented in the framework of SEAPs in Tbilisi and Rustavi municipalities. Among them there are projects aimed at decreasing energy consumption and emission reductions in transport sector (*i.e.* introduction of traffic lights management system, extension of subway lines, improvement of public bus services, *etc.*); in buildings sector (*i.e.* installation of efficient lighting systems, building exterior insulation, installation of space heating system – local boilers operating on natural gas and use of bio-waste briquettes for heating) – just to mention a few of the projects.

Besides specific projects targeted at specific sectors, very important measures aimed at raising public awareness in the area of energy efficiency have been carried out. They aimed at educating general public on energy efficiency potential for mitigation of global and local environmental, social and economic problems. Particularly, starting from 2011 Tbilisi municipality has been supporting activities (*i.e.* exhibition of thematic posters and students' works "Sustainable Energy in Architecture") implemented within Georgian Sustainable

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<sup>7</sup> Municipal Energy Efficiency Policy Reforms in Georgia,  
[http://www.unece.org/fileadmin/DAM/energy/se/pdfs/gee21/projects/cs/CS\\_Georgia.pdf](http://www.unece.org/fileadmin/DAM/energy/se/pdfs/gee21/projects/cs/CS_Georgia.pdf)



Energy Weeks. Beginning from 2012, Rustavi municipality in partnership with non-Governmental organizations (NGOs) organizes Intelligent Energy Days including such events as “Let’s Save Energy” for ethnic groups living in Georgia, energy efficiency training workshops, and thematic exhibitions for young artists.

Even though two municipalities in Georgia, Tbilisi and Rustavi, have already started implementation of measures proposed in their SEAPs, implementation of energy efficiency measures has a chaotic character. It happens due to voluntary/non-binding nature of CoM policy and due to the lack of commitment at the local level, which is a consequence of underdeveloped legal and institutional framework at the national level. There is a need for a comprehensive legal framework providing for the implementation of the envisaged energy efficiency measures and planning of such measures on a country-wide scale, which should be done by the national Government. Currently the major policy document defining efficient utilization of the power resources in Georgia is the Resolution of the Parliament of Georgia from June 2006. Since then a sound legislative basis and institutional framework for the improvement of energy efficiency in the country has not been created. Furthermore, a lack of coordination between responsible agencies at the national and local levels hinders implementation and enforcement of currently existing legal mechanisms.

Georgia needs development of forward-looking energy strategies and energy efficiency policies and creation of relevant institutional framework to lead development of related legislation and promotion of sustainable energy policy within the Government. Currently, energy market regulations to support effective energy services in Georgia are underdeveloped, which discourages development and implementation of specific energy efficiency programmes to enhance energy performance and introduction of energy efficiency measures.

Taking into account current challenges to ensuring sustainable energy future in Georgia, the Government should implement a range of measures that, according to the benchmark discussed in Chapter 1, can be categorized in three groups, *i.e.* institutional, economic and socio-political. The Government of Georgia should pay particular attention to elaboration of comprehensive energy policy and strategy, which would guide sustainable energy development by providing clear and justified objectives, estimates of acceptable risks, and a framework for further improvements. Importantly, this policy should reflect potential contribution of energy efficiency to meeting increasing energy demand and improvement of security of energy supply.

At the institutional level, the Government should seek strengthening the role of appropriate ministries to develop and implement energy efficiency strategies and programmes, as well as increasing capacity of these ministries and other related institutions responsible for the development and enforcement of the necessary legal framework in the energy sector. The Government should ensure that all State institutions both at the national and local levels have adequate resources and mandates for the implementation of the energy efficiency policies and programmes. Furthermore, all State institutions both at the national and local levels should have better coordination of efforts among each other as well as with private sector and NGOs acting in the area of energy efficiency.

In practical terms, the Government should take steps towards development and enforcement of related legislation, policies measures and programmes to promote energy efficiency, while considering the experience of other countries that effectively utilize technical and financial assistance provided by various international organizations. Both at the national and local levels the initiatives should be taken to enhance knowledge and raise awareness on efficient consumption of energy through targeted energy efficiency educational campaigns and actions.

On the financial and economic policy side, the Government should analyze opportunities created by various national and international financial institutions that are able to provide resources for financing energy efficiency programmes. Additionally, the Government should aim at establishing stimulating business environment for formulating and implementing new projects in the area of sustainable energy and energy efficiency through information and experience exchange with national and international experts, as well as importing new technologies and know-how.

## Section 2-6: Montenegro – An Analysis of the Policy Reform Impact on Energy Performance in Buildings<sup>8</sup>

Montenegro has very few traditional energy resources. Besides some lignite reserves, Montenegro does not possess any other fossil fuel resources. However, due to its geographic location it has vast hydropower, wood and solar resources. With the constant increase in energy consumption Montenegro has become a significant energy importer. It imports up to one-third of its electricity demand and all of its fossil fuel demand.

With the purpose of introducing energy policy reforms and becoming more integrated in the regional and EU energy markets, Montenegro became a Contracting party of the Energy Community (EnC) Treaty in 2005. Under this framework Montenegro committed to follow the EU energy policy and harmonize its energy related legislative and regulatory system with the EU directives. Montenegro's obligations increased when it became a candidate for the EU accession in 2012. In order to fulfill its commitments under the EnC, in 2005 Montenegro adopted Energy Efficiency Strategy (EES) and Energy Development Strategy of Montenegro by 2025 (EDS).

The building sector in Montenegro has very high energy saving potential. Based on this, both EES and EDS prioritize policy improvements in this sector. In particular, the priority measures that EES focuses on are improvements and harmonization of regulatory framework for the housing sector with energy saving standards; education of professional staff in building sector on energy saving measures and benefits; information and awareness raising campaigns for end-users and financial incentives for tenants for implementation of energy saving measures. In its turn the EDS, which based its proposed activities on the results of EES, sets the basis for adoption of specific legislation on energy efficiency, institutional building for energy efficiency and implementation of the relevant EU directives as general requirements for setting up a system for improvement of implementation of energy savings measures.

Since the adoption of EES and EDS, Montenegro has started to carry out concrete actions in the building sector, especially public buildings. The reason for starting with public institutions, aside from their bad condition and need for energy savings, is the fact that implementation of energy efficiency measures in public institutions has shown success in other countries in gaining support from local Governments and communities for further implementation of such measures.

To date many activities aimed at implementation of energy efficiency measures in building sector are ongoing. In spite of the fact that regulations for energy efficiency in buildings have not been adopted yet, Montenegro started implementing energy efficiency measures at the national and local levels. At the national level Montenegro received international loans for implementing measures for educational and health public service buildings. At the local level, the capital Podgorica offers financial subsidies for building reconstruction, such as

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<sup>8</sup> An Analysis of the Policy Reform Impact on Energy Performance in Buildings, [http://www.unece.org/fileadmin/DAM/energy/se/pdfs/gee21/projects/cs/CS\\_Montenegro.pdf](http://www.unece.org/fileadmin/DAM/energy/se/pdfs/gee21/projects/cs/CS_Montenegro.pdf)

insulation of existing building envelopes. The project is reckoned to be a good example of energy efficiency policy in Montenegro.

Despite certain success of the energy efficiency policy implementation that has been achieved after Montenegro joined the EnC, there are still shortcomings that need to be dealt with in order to move closer towards established benchmark.

In particular in the past there was relatively little political and financial support for implementation of planned activities under both EES and EDS, which main goal was the adoption of legislative and regulatory framework for energy efficiency policy implementation. Recognizing this need in 2010 Montenegro adopted Energy Law (EL) and Energy Efficiency Law (EEL) that both deal with energy efficiency. Despite the adoption of the EEL, which contains a strong commitment to achieve energy efficiency targets, the Government of Montenegro has not yet set up a regulatory framework needed to define these obligations, methodologies and rights in detail.

One of the achievements made towards increasing the monitoring and verification of energy efficiency policy measures is that Montenegro has started to organize educational programmes and training of energy auditors, who are responsible for data collection, measurement of final energy consumption in buildings, and development of recommendations for measures needed for ensuring energy savings. However, there is still no obligation at the national level for energy audits to be performed, and information systems are mostly in a preparatory phase at both the national and local levels.

To pave the way towards achieving the benchmark, and more particularly reaching the targets set in the EES and EDS, the Government of Montenegro should put the main focus on developing clear strategic, legislative and regulatory framework and expand energy efficiency measures implementation beyond the building sector to other sectors that have high potential for energy savings, such as industry and transport.

These goals bring energy efficiency legislation under huge demand. Additional incentives for developing and implementation of energy efficiency legislation stem from Montenegro's efforts to join the EU that require conformity with EU high energy efficiency standards and legislation. Therefore, the Government of Montenegro should focus on ensuring enforcement, appropriate updating and upgrading of existing laws, as well as formulation and adoption of new energy efficiency legislation.

It is also evident that energy efficiency goals cannot be reached by using only domestic public funds or loans from international financial institutions. Thus, clear and obligatory regulations and legislation should be established and introduced in order to attract additional financial inflows. Laws and regulations should be able to ensure secure participation of private investors.

Additionally the Government should introduce further regulations based on the EEL regarding mandatory energy audits. Capacity building and educational programmes such as training of energy auditors has to be prepared and organized for sectors with high energy savings potential.

Another important issue is that for ensuring further development of Montenegro energy sector, there is a need for reliable data that will be used for sound forecasts and more effective planning of energy saving measures. Thus, the formulation and adoption of regulatory framework will help pointing out additional improvements that need to be realized regarding the energy statistics.

## Chapter 3: ESCAP Region – Review, Analysis and Options to move forward to established benchmark for selected countries

The ESCAP region is characterized by vast social, economic, geographical and development disparities. This region is a home to more than 60% of world population. With the rising demand for energy due to ongoing economic and industrial development, the ESCAP region is in need of decisive energy efficiency improvements to guarantee the sustainability of the economic growth of its members. Given the strong political will shown by some countries and the numerous existing national and international programmes, the region is well placed to benefit from more systematic improvements in energy efficiency.

The analysis below covers the following countries: China, Tajikistan and Thailand. Tajikistan is also a member State of the UNECE.

### Section 3-1: China – Case Study on China’s Industrial Energy Efficiency Policies<sup>9</sup>

The period from 2006 till now, that is marked by the 11<sup>th</sup> (ended in 2010) and 12<sup>th</sup> (ongoing) Five-Year Plans in China, has been critical in the history of China’s energy development. With the continuous and rapid growth of national economy, China is ranked as first and second in the world in terms of total primary energy production and total primary energy consumption respectively. Energy consumption per industrial added value serves as one of the important indicators for reflecting the industrial energy consumption efficiency. From 2005 to 2010, China’s energy consumption per industrial added value considerably decreased, with an accumulative falling range of 26% and annual decrease of 5.8%.

China’s industrial development can be characterized by decreasing energy intensity, accelerated structural optimization, remarkable improvement of equipment and manufacturing capacities and continuous improvements of technologies. China’s adherence to market-oriented strategy stimulated the enhancement of the capability of independent innovation, increase of the input of scientific research funds and implementation of special projects on technical upgrading to promote the technical progress and innovation capability of China’s industrial enterprises.

The recent China’s achievements mainly stem from a number of new policies and programmes that have been dedicated to increasing energy efficiency. Newly introduced energy efficiency measures have a comprehensive character covering institutional, legislative, and financial policy facets, moving the country towards established benchmark.

During the 11<sup>th</sup> Five-Year Plan the Government of China introduced the System of Responsibility for Achieving Energy Efficiency Goals. This system requires each provincial Government to incorporate specified energy consumption reduction plans and annual plans for local economic and social development. Simultaneously the State Council made specific arrangements for tracking and evaluation of the policy results. Under this System, Government authorities at the five levels, *i.e.* from the national Government to province, municipality, county and town, and key energy-consuming enterprises established institutions in charge of energy conservation and developed appropriate energy efficiency management measures, thus laying solid organizational grounds for successful implementation of the long-term energy conservation goal in China. Furthermore, the

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<sup>9</sup> Case Study on China's Industrial Energy Efficiency Policies, <http://www.unece.org/fileadmin/DAM/energy/se/pdfs/gee21/projects/others/China.pdf>

national Government established specific Financial Funds Reward for Designated Energy Efficiency Projects, which ensured that the central financial department arranges necessary funds and gives support and rewards to ten major key energy conservation programmes. Thus the objects of financial rewards are the key energy consumption enterprises implementing technical transformation projects of energy conservation with annual energy savings above a specified benchmark.

To stimulate the production of energy efficiency products the Government of China gradually replaced the policy of “preferential” Governmental purchase of energy efficiency products to a “compulsory” one. The Government has also introduced a preferential tax policy for energy conservation aimed at enterprises engaged in environmental protection, energy and water conservation projects. According to this policy from the first to the third tax year, the enterprises’ production and operational income are exempt from the corporate income tax, and for the fourth to sixth year it is levied at half rate. Additionally, for enterprises that use the catalogue of special equipment for environmental protection and energy and water saving, 10% of the equipment investment can be used as a credit to offset the corporate income tax of the same year. The preferential tax policy for energy conservation stimulated the initiatives of production, sale and use of energy efficient equipment and improved its market share.

To further improve energy efficiency management of key energy-consuming units, the Top 1,000 Enterprises Energy Conservation Action Programme has been introduced in nine key energy consuming sectors, *i.e.* steel, non-ferrous metals, coal, electric power, petroleum and petrochemical, chemical industry, building materials, textile and paper-making. The Programme aims at supporting efforts to conduct transformation projects of energy conservation technologies in top 1,000 enterprises. As a result, energy consumption indicators per unit of products of top 1,000 enterprises decreased significantly. Through the programme of strengthening energy efficiency management, over 95% of the top 1,000 enterprises established dedicated energy management organizations and hired energy management personnel.

Summarizing China’s energy efficiency policy during the 11<sup>th</sup> Five-Year Plan period, the country introduced several new energy efficiency mechanisms such as contract energy management, energy efficiency benchmarking, power demand side management and energy conservation voluntary agreement. Relevant financial institutions, investment organizations, research institutions and advisory bodies also participated in implementing the industrial energy efficiency policy, which helped to overcome obstacles that enterprises faced in technical consulting, project implementation, investment and financing, and consistently stimulated China’s industrial energy efficiency.

Along with positive developments in China’s energy efficiency policy, the country still faces some challenges. First and foremost, they are coming from the discrepancies in policy objectives over the short and long term. China is in the stage of industrialization. Therefore the growth of traditional industries, which are often highly energy intensive, may result in considerable economic benefits in the short term. However, the policy of energy efficiency and energy saving has more of a long-term nature. Therefore, both national and local Governments are confronted with certain problems in handling the relationship between industrial development, energy conservation and emissions reduction.

Another shortcoming is that several energy conservation mechanisms specified in relevant laws are still not put into practice. Some by-laws and regulations are still underdeveloped. Meanwhile, a number of energy conservation standards are in urgent need of development and improvement. In addition, insufficient implementation capacity also influences the effects of those policies. In some areas, energy efficiency management capacities are weak

in general and the energy conservation institutions are overloaded. Therefore, some newly introduced energy efficiency measures do not guarantee expected outcomes.

Prices for natural resources and energy in China are still not fully market-based and the tax regulation effects are still not obvious. In addition, the financing channel for energy efficiency is still partially restricted and support mechanisms for financial institutions investing in the energy efficiency projects need further improvement.

Currently, the growth of heavy industry in the country is still faster than light industry and energy consumption per unit of industrial product is still lagging behind international advanced level. There is a high potential for energy efficiency. There is an urgent need for rationalization of relationship between economic development and energy conservation. For this purpose, Government authorities at each level should improve the understanding of energy conservation and energy efficiency as well as emission reduction policies in order to optimize the industrial structure by considering the long-term goals and benefits from energy conservation and savings.

Since the Government of China plays a leading role in the economy, promotion of industrial energy efficiency is mainly implemented through administrative means. However, considering the long-term effects, the energy efficiency and conservation goals should not only be reached through the Governmental initiatives. Energy efficiency projects and programmes should benefit from well-functioning market mechanisms, private finance and technological transfer.

The implementation of energy efficiency management policies also needs to be strengthened. That will reduce lack of capacity-building policies, reduce the difference in the level of energy efficiency professionals' teams, and increase information exchange and technology transfer.

### Section 3-2: Tajikistan – National case study of energy production and consumption sector in the Republic of Tajikistan "Promotion of investments into energy efficiency to mitigate climate change impact and ensure sustainable development"<sup>10</sup>

In the last decade, energy efficiency became one of the policy priorities for the Republic of Tajikistan. A number of policy incentives in place as well as introduction of new legislation on energy efficiency, such as the Government Resolution of 2 November 2011 "On approval of the Programme on efficient use and conservation of power resources 2012-2016", have brought considerable positive changes. As a result, investments in energy efficiency have increased more than three-fold and reached almost 3.5% of the national GDP with public funding from all sources amounting to at least 30% of investment costs.

However Tajikistan still experiences serious difficulties and deficit in the energy sector. This is caused by insufficient domestic energy resources, low tariffs, and energy losses due to depreciation of manufacturing equipment. Illustratively, the depreciation of fixed assets in the power industry on the whole is 60-65%, including more than 75% in the rural distribution networks. Consequently, the existing energy equipment and facilities do not meet the requirements at the current stage of country's development. The deficiency is also associated with the lack of available alternative energy sources, energy intensive industrial production, excessive electricity consumption by population, high cost of fuel supply for

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<sup>10</sup> National case study of energy production and consumption sector in the Republic of Tajikistan "Promotion of investments into energy efficiency to mitigate climate change impact and ensure sustainable development", <http://www.unece.org/fileadmin/DAM/energy/se/pdfs/gee21/projects/others/Tajikistan.pdf>

thermal power generation, and persisting problems related to the export of electricity surplus.

The economic environment of the energy sector of Tajikistan is characterized by instability thereby causing potential threats to energy security of the country. GDP per unit of consumed energy resources is very low – USD 0.5 per kg of fuel in oil equivalent, which is nearly five times lower than the average world figure (USD 2.4 per kg of fuel in oil equivalent). At the same time per capita electricity consumption index in 2011 (2,367 kWh per capita) is nearly nine times higher compared to the low income countries (269 kWh per capita). According to the International Energy Agency energy intensity of Tajikistan's GDP is 11 times higher than in the Russian Federation and 20 times higher than in Germany. This suggests extremely wasteful energy consumption patterns in the country alongside with an enormous potential to improve efficiency of energy consumption, while moving towards established benchmark.

In recent years, the Government of Tajikistan has made some progress in developing and implementing energy efficiency policies. This is reflected in a number of new laws and programmes focused on introducing measures aimed at increasing energy savings and reducing energy intensity. However there are still many remaining gaps and shortcomings. They are associated with deficiencies in regulatory, financial and institutional frameworks of energy efficiency policies.

Insufficient legal base together with existing gaps and contradictions in the current legislation, delays in the adoption of by-laws and regulations, which are essential for successful implementation of energy conservation and energy efficiency measures, have negative impact on the implementation of the national policy in this area.

Lack of organizational resources for the development and timely adoption of effective and appropriate solutions in the area of energy efficiency in Tajikistan further decrease the potential of successful outcomes in implementation of State energy efficiency policy.

Persisting energy deficit and high energy intensity in Tajikistan is also determined by the limited internal financial possibilities to cover high capital costs of implementation of energy efficiency projects.

Additionally, in the preceding years due to the insufficient funding and lack of qualified specialists there were no monitoring procedures regarding energy efficiency. That is why efficiency assessment and energy saving programmes are immature.

Given the current status of the country energy system a lot of work needs to be done to approach a benchmark policy that ensures successful energy efficiency and sustainable energy outcomes. In particular, modernization of existing power facilities, construction of new transmission lines and substations with modern equipment, automation and modernization of the measuring and data collection systems are among the priority issues. Government support and creation of a favourable investment climate is decisive for strengthening energy policy in Tajikistan aimed at promoting investments in energy efficiency and climate change mitigation. To accomplish these tasks it is necessary to develop and implement large-scale investment projects directed at energy efficiency and energy conservation on the basis of public-private partnerships. That can ensure the inflow of financial resources not only from the national budget but also from private domestic and international investors.

To achieve the benchmark the Government of Tajikistan should also implement some specific steps. First and foremost, the Government should enhance the authority and capacity of State agencies in charge of coordination of energy efficiency policy, line

ministries, as well as power generation and supply companies, with clear deadlines and quantified targets in the area of energy efficiency.

Second, the Government should focus on bridging the gap between energy efficiency policy formulation and its implementation. For that the Government should develop new and update existing dedicated laws as well as other legislative acts in the field of energy conservation and energy efficiency. In developing appropriate changes in legislation of Tajikistan international experience in legislative reforms to facilitate investment support to improvement of energy efficiency should be considered. After the legislative base is updated and new related laws are introduced, the Government should aim at streamlining the adoption of secondary legislation and technical standards. Additionally, it should implement measures to monitor the enforcement of energy efficiency laws. That would lead to development of consolidated policy, help formulating energy efficiency programmes and project proposals by professional community and attract investors.

Third, the policy of Government agencies at all levels should be of long-term nature and should involve a variety of financial and economic mechanisms. Specifically, energy prices should reflect the actual costs while taking into account the interests of vulnerable consumer groups.

Last, given the ongoing decentralization it is important for the Government to be sure that the municipalities are able to take responsibility for energy policy. It is necessary to delegate fiscal power to local authorities as an opportunity to raise awareness of local authorities pertaining to energy efficiency issues. Since the areas of energy saving technologies and alternative energy are relatively new the country needs qualified professionals and managers at all levels to achieve the ongoing reform objectives. To achieve that, dedicated trainings, awareness raising and capacity building programmes are crucial.

### Section 3-3: Thailand – Promoting Energy Efficiency Investment for Climate Change Mitigation and Sustainable Development<sup>11</sup>

Thailand's energy consumption has increased continuously due to economic expansion over the last several years, making Thailand a net energy importing country. Aiming to reduce heavy dependency on energy imports, Thailand has been implementing various proactive energy policies to sustain energy security. The key energy policies of Thailand include: 1) enhancing energy security to ensure sufficient energy supply for economic development and increasing energy self-reliance for the people's wellbeing; 2) monitoring energy prices to be appropriate, stable and in line with the economic and investment situation; 3) promoting research and development of all forms of alternative energy on a continuous basis; 4) emphasizing creation of energy saving discipline as a national culture and encouraging local administration agencies to be focal points for disseminating "Energy Saving Culture"; 5) protecting the environment from the impact of the energy industry, generated by both the energy production and the consumption processes, as well as promoting tackling of global warming and supporting the Clean Development Mechanism (CDM).

Another important facet of the Thailand energy policy aims at increasing energy efficiency. Tangible efforts in this regard were made in the 1980s when the Government of Thailand adopted and put in force its Energy Conservation Promotion Act, B.C. 2535. The Act aimed at promoting energy conservation, energy efficiency, and renewable energy development. In particular, the Act empowered the Government of Thailand to implement various measures through the National Energy Policy Council to improve the efficiency of energy use in

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<sup>11</sup> Promoting Energy Efficiency Investment for Climate Change Mitigation and Sustainable Development, <http://www.unece.org/fileadmin/DAM/energy/se/pdfs/gee21/projects/others/Thailand.pdf>



different sectors, in particular, energy conservation in industrial companies, energy conservation in buildings, and energy conservation in machinery, equipment and promotion of energy efficient materials. Under this law, the Energy Conservation Promotion Fund (ENCON Fund) was established to provide financial support to Government agencies, State enterprises, non-governmental organizations, individuals, and businesses that wish to implement measures to increase energy efficiency. The sources of the ENCON Fund are oil fund, contributions, surcharges, and Government subsidies. There have been four phases of ENCON programmes since 1995. The current fourth phase covers the period of 2012-2016.

Since the start of implementation of the Energy Conservation Promotion Act together with its dedicated ENCON Fund the Government has been taking a number of steps aimed at promoting energy efficiency and energy saving policies and projects both at the State and local levels. The Government has been encouraging investments into energy conservation programmes through providing working capital, grants and subsidies to Government agencies, State enterprises and private sector companies. Additionally, financial support was provided to Government agencies, educational institutions and private organizations to be used for research and demonstration projects on energy development and conservation, and environment protection. Also, public awareness and capacity building in the area of energy efficiency were promoted and encouraged through education and training on energy efficiency as well as marketing and information campaigns.

To date the ENCON programme has completed three phases. Their implementation helped Thailand not only make progress on the way towards approaching the benchmark but also identify main challenges for the implementation of energy efficiency policy and single out the key “lessons learned”, which give further grounds for the constructive analysis and development of targeted policy recommendations. Specifically, the ENCON programme has shown that:

- encouraging consumers to buy or use energy efficient equipment/appliances with energy efficiency labels is an effective measure for promotion of energy efficiency programme;
- establishment and enforcement of energy standards for appliances, *e.g.* minimum energy performance standards, reduce distribution and use of products with low energy efficiency;
- Energy Service Companies (ESCOs) services under both savings sharing scheme and guaranteed savings scheme reduce credit risk and performance risk for energy efficiency improvement projects by providing turnkey energy services with performance based and/or lending based contracting to energy users and boost lenders’ confidence;
- professional development and training in energy conservation of energy managers, who are responsible for energy management and operation, monitoring and verification, consultancy and engineering services provision, planning and supervision, is necessary for promotion of implementation of energy conservation measures;
- public awareness can be raised and behaviour can be changed through provision of knowledge about energy conservation to the general public via the teaching/learning process in educational institutions, fostering youth awareness, and other information activities;
- there have been barriers in cooperation among relevant ministries. Establishment of a Governmental agency/organization responsible for planning, supervision and promotion of implementation of energy conservation measures can be helpful in ensuring compliance with energy efficiency requirements.

There is a positive dynamics in the area of energy efficiency in Thailand. It is expressed in a number of newly introduced policies and initiatives. However, to reach a desired benchmark the Government of Thailand should take further steps to guarantee further energy efficiency policy development and implementation.

First, the Government should ensure further enforcement of the Energy Conservation Promotion Act that proved to be a successful legal instrument for energy efficiency policy implementation. The Government should aim at introducing mandatory energy efficiency labeling and mandatory energy performance standards for energy efficient equipment, vehicles and buildings. Enforcement of the energy efficiency standards in large energy companies may encourage their customers to use energy efficiently.

Second, the Government should allow energy prices to reflect the actual costs of production. Additionally, the Government should aim at application of tax measures as an important tool to promote energy efficiency with a goal of changing people's energy consumption behaviour.

The Government should encourage promotion of technological development and innovations, through improving research and development (R&D) programmes in the area of energy efficiency and reducing technological costs. Particular efforts should be made to promote energy efficient technologies that are technically proven but not commercialized in the domestic market.

The Government should focus on development of human resources and institutional capacity by training professionals who can conduct energy management and operation, monitoring and verification, provide consultancy and engineering services, and planning, supervision and promotion of implementation of energy conservation measures and energy efficiency projects. Support should be also provided for development of institutional capacity of agencies and organizations in both public and private sectors, responsible for planning, supervision and promotion of implementation of energy efficiency projects. Furthermore, the Government should aim at general public awareness creation and behavioural change, by provision of knowledge about energy efficiency and savings to the general public via, for instance, introducing energy efficiency issues in the curriculum of educational institutions.

## Chapter 4: ESCWA Region – Review, Analysis and Options to move forward to established benchmark for selected countries

ESCWA comprises 17 countries located in the Northern Africa and Western Asia. The energy sector of the ESCWA region has played and will continue to play an important role globally as well as within the region. It serves as a main source of revenue through oil and (to a lesser extent) gas export and it could potentially satisfy energy needs for economic and social development. However, more than 20% of the population in rural and urban poor areas of ESCWA member States do not have access to energy services and as many are highly underserved. Moreover, in many cases, the efficiency of energy production and consumption in the region requires improvement.

Three case studies of the following ESCWA member States are reviewed below: Egypt, Kuwait, and Tunisia. It should be noted that Egypt and Tunisia are also member States of ECA.

### Section 4-1: Egypt – Policy Reforms to Promote Energy Efficiency in the Transportation Sector of Egypt<sup>12</sup>

Transportation sector is considered one of the main drivers for social and economic development in Egypt. It is also one of the major energy consuming and polluting sector of its economy. During the years 2012-2013, transport sector accounted for 23% of Egypt's total energy consumption and for 48 % of total petroleum consumption. As a result, total CO<sub>2</sub> emissions from transport sector accounted for 49 million tons during the same period representing 26% of total CO<sub>2</sub> emissions by all economic sectors. The continuously escalating energy demand for transport sector resulted also in the increase of both gasoline and diesel imports that accounted for about 1.1 million tons and 6.9 million tons during the same year respectively. It also contributed to the drastic increase of the petroleum energy subsidy that reached more than USD 18 billion in 2012-2013.

Despite the vital role that transport sector plays in achieving both economic and social development in Egypt and although several energy efficiency policy had been implemented during the last decades, energy consumption levels by that sector are still high reflecting the inefficient use of energy in addition to the need for more reform of the existing energy efficiency policies and measures. Population growth, particularly in major crowded cities and regions like the Greater Cairo Region (GCR), resulted in severe problems putting more pressure on existing transport systems and infrastructure. The limited capacity of existing public transport fleet by the early 1970s that relied mainly on buses and trams for intra-city passenger transport and on railways and buses for intercity public transport in addition to its inconvenience and lack of appropriate maintenance led to the switch of a significant volume of passengers from public transport to private cars. A similar switch of freight transport occurred from railways and river transport to road transport, mainly trucks. That situation resulted in turn to more traffic jams and consequently more fuel consumption and pollutant emissions. Other negative impacts include the increase of gasoline and diesel imports, the tremendous escalation of energy subsidies, and more economic returns loss. Unless effective

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<sup>12</sup> Policy Reforms to Promote Energy Efficiency in the Transportation Sector in Egypt, <http://www.unece.org/fileadmin/DAM/energy/se/pdfs/gee21/projects/others/Egypt.pdf>

energy efficiency measures and policy reforms are undertaken that situation is expected to worsen.

Recognizing the adverse and negative impacts of the transport sector on environment, and also taking into account socio-economic factors the Government of Egypt started introducing appropriate policy reforms and measures. They include, *inter alia*, measures aimed at promotion and development of public transport, fuel switching, development of transport infrastructure, and traffic management:

1. vehicles emissions testing and engine tuning programme, where inspection is made free of charge as an incentive to encourage vehicles owners to participate in the programme;
2. improving traffic management that aims at achieving smooth traffic flows and consequently more efficient fuel consumption and lower pollutants emissions. This is to be done through: 1) redesigning traffic signals; 2) eliminating obstructions to traffic; and 3) grade separation and public transport solutions;
3. restricting vehicle use and ownership in GCR and Alexandria as they are considered as the highly populated and crowded regions of the country.

Other examples of implemented policy reforms, in the form of programmes and projects that proved to be able to attract energy efficiency investments and be bankable, include the GCR Old Vehicles Scrapping and Recycling Programme (OVS RP), use of Compressed Natural Gas (CNG) as a fuel for motor vehicles, and development and construction of the Cairo Metro.

The analysis and evaluation of implemented phases of these projects so far revealed certain important issues as well as key drivers for its success, which should be considered in the future policy planning and implementation. In particular, the analysis showed that the following:

- in order to encourage behavioral changes towards energy efficiency improvements and attract the necessary investments, there is a need to create incentives along the whole programme or project value chain;
- awareness raising regarding the energy efficiency issues as well as related projects and programmes is considered one of the key drivers for the success of the future projects implementation. Awareness raising plays vital role in attracting interest of different stakeholders as well as securing the necessary political support for implementation;
- strong and solid cooperation among different stakeholders participating in the projects' development and implementation (for instance through public-private partnership (PPP)) proves to be also one of the key success drivers that help reducing risks and creating self-enforcing system of accountability and responsibility among project's stakeholders;
- success in implementation of pilot programmes and projects encourages implementation of similar and often larger scale projects;
- financial incentives can offer an attractive platform for households and population to participate in the projects.

The implemented phases of the aforementioned projects have been rather successful and significantly contributed to widening the experience and "lessons learned". This is a result of a comprehensive approach to the implementation of policies selected by the Government of Egypt, which, at the same time, includes institutional, financial and socio-political drivers for the reform.

At the same time, despite the achieved positive results in implementing the projects, there are still a number of challenges and barriers that hinder the energy efficiency policy implementation. Among those are lack of adequate, effective and reliable financial schemes and mechanisms, which leads to misallocation of financial resources and lack of adequate investments necessary for the development and implementation of energy efficiency projects. In addition, participation of private sector in financing and managing energy efficiency projects is not often sufficient for a successful balanced partnership. The regulatory barriers include inadequate and underenforced energy efficiency standards and regulations. These factors, in combination with obsolete technologies and lack of qualified personnel, significantly reduce the incentives and capacity for energy efficiency projects development and implementation. Finally, there is a need for a set of proper legal enforcement mechanisms that could incentivize new energy efficiency policy implementation. For example, although the current prevailing Environmental Law No. 4 of 1994 sets certain limits for pollutants emissions, it does not, however, cover all pollutants such as NO<sub>x</sub> and SO<sub>x</sub> and to a large extent is not enforced.

Nevertheless Egypt can be considered on the right path towards achieving its energy policy goals. However in order to ensure the sustainability there is a need for multifaceted policy approach that according to the benchmark should cover institutional, economic, financial, legal, and socio-political areas.

From the institutional point of view, it is important to create adequate incentives throughout the whole value chain of energy efficiency programmes and projects in order to encourage behavioral changes towards energy efficiency improvements and attract necessary investments for their implementation. It is necessary to create a strong and solid cooperation among different stakeholders, whereas the Government should provide a strong political support. The Government should develop or support pilot projects to encourage similar energy efficiency projects development and implementation by private sector. In order to have all the energy efficiency policy components carefully worked out it is essential to have a well-defined scope of programmes and an effective approach for their implementation. It includes careful project planning, close monitoring, good coordination among different stakeholders, keeping detailed records for project activities through its database, and performing random surveys to estimate intermediate results of the project.

From the economic perspective, it is also essential to ensure the cooperation of public and private entities in energy efficiency policy and projects development and implementation. Through establishment of PPP it is possible to share and thus reduce individual costs and risks that may arise during project planning and implementation phases. That can significantly increase a number of the stakeholders participating in the projects, thus increasing its scope as well as financial resources and expertise needed for its implementation, as well as risk mitigation.

On the financial side, it is necessary to create and make widely available cost-effective financial mechanisms and incentives that can help project developers and managers to overcome high upfront investment cost barriers. This can be in a form of favourable interest rate and loan conditions. The Government of Egypt may also provide financial support in the form of Government subsidies, tax exemptions and customs waivers for imported parts and components needed for production of energy efficient equipment.

From the legal perspective, it is recommended that the Government of Egypt strictly enforces and regularly revisits legislation related to energy efficiency policy. And on the socio-political side, it is recommended to conduct awareness raising campaigns regarding the benefits of efficient use of energy resources to encourage the behavioural change of general public.

## Section 4-2: Kuwait – Economic and Environmental Benefits of Promoting Energy Efficiency for Buildings in Kuwait<sup>13</sup>

Significant increase in energy consumption has been documented in Kuwait in the last two decades with a rate of increase in electricity consumption being one of the highest in the world. Several factors including population growth, subsidized energy prices, and lack of stringent energy conservation code have contributed to this phenomenon. Kuwait currently utilizes almost 300,000 barrels of oil per day for electricity generation. The consumption is expected to increase to as high as 900,000 barrels per day or 20% of its oil production by 2030, thus significantly reducing oil revenues of the country. Moreover, the economic situation in the country may be even further worsened due to significant budget spending for energy subsidies. Kuwait is one of the top two (together with United Arab Emirates) countries in the world for energy consumption subsidies per person.

Approximately 70% of energy consumption in Kuwait is attributed to buildings. The trend for high energy demand for buildings in Kuwait is expected to continue over the next decade due to the fast population growth and significant urbanization. A significant portion of the electricity demand and consumption is associated with air conditioning in buildings. Thus, during winter months, the energy consumption remains low and flat and is mostly attributed to base-load demands such as lighting, plug loads, and other devices that are operated independently of the outdoor conditions. Air conditioning energy consumption increases with increasing outdoor temperature during the summer.

The Ministry of Electricity and Water (MEW) is the sole supplier of electricity resources in Kuwait. The growing energy needs in Kuwait is forcing MEW to introduce energy efficiency policies in the country especially in the highly energy-consuming buildings sector. Minimum requirements for efficient energy use in buildings have been enforced by MEW for all new and retrofitted buildings since 1983. New conditions and demands required the revision and update of the energy conservation code of practice, which was finalized in 2010. However, the application of the 2010 energy conservation code of practice has been rather slow and most likely will take some time before it is fully implemented in the new and retrofitted buildings. Thus, a significant part of the existing building stock in Kuwait still complies with the requirements of 1983 Energy Conservation code of practice.

Some assessments show that the application of 1983 version of the code of practice (code-1983 case) can save 11% of the annual energy consumption when the house has no insulation for exterior walls and roof and utilizes single pane windows (worst case design). However, the application of the 2010 version of the code of practice (code-2010 case B) leads to 32% savings relative to the worst case design. Therefore, the MEW should require that any new building has to comply with the 2010 version of energy conservation code practice.

The application of the 2010 instead of the 1983 energy conservation code of practice to new construction has significant benefits (estimated to be 164 GWh in annual energy savings, 94 MW in electricity peak demand reduction, and 143 thousand tons reduction in annual CO<sub>2</sub> emissions). The national energy efficiency retrofit programme focusing on the entire existing building stock has even higher economic and environmental benefits (up to estimated 8,934 GWh in annual energy savings, 5,105 MW in electricity peak demand reduction, and 7,773 thousand tons reduction in annual CO<sub>2</sub> emissions). Thus, the implementation of a retrofit

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<sup>13</sup> Case Study Analysis of Economical and Environmental Benefits of Promoting Energy Efficiency or Buildings in Kuwait, <http://www.unece.org/fileadmin/DAM/energy/se/pdfs/gee21/projects/others/Kuwait.pdf>

programme alone can lead to significant economic and environmental benefits for Kuwait even if only a small fraction of the existing stock is targeted.

In order to implement its energy efficiency programmes for buildings Kuwait needs to overcome some barriers to the progress of policy implementation. One of the most critical barriers is considered to be a lack of financial incentive to increase energy efficiency and savings, thus reducing energy consumption in the buildings. This is a consequence of the high energy subsidies and lack of awareness of general public regarding the actual cost of energy. For instance in Kuwait, it is common for landlords to combine rent with utility bills, which serves as disincentive for tenants to save energy as it has no implications for their rental costs. There is also a lack of standards and regulations that may encourage energy savings in public buildings. The vast majority of buildings in Kuwait are air-conditioned 24 hours per day regardless of whether these buildings are occupied or not. Additionally, at the moment there is a lack of institutional capacity to implement energy efficiency policy, which is expressed in slow application of regulations and reforms attributed to the difficult political climate and cumbersome administrative procedures. There is also a lack of qualified professionals able to develop new energy efficiency projects as well as lack of investments needed for their implementation.

Based on the analysis above, it can be concluded that Kuwait needs to undertake a number of steps to approach the benchmark established in Chapter 1 of the present report and thus to improve its energy efficiency policy performance, especially in the building sector.

First and foremost, the energy pricing policy should be revised. The Government of Kuwait should start to gradually reduce energy subsidies. That would ensure that energy prices adequately reflect the actual cost of energy. That in its turn will stimulate the households to react to the new conditions by changing their consumption behaviour. Moreover, the Government may further influence the population energy consumption opportunities by separating the utilities bills of the households from other bills, so that the consumers are aware of the energy costs and are encouraged for taking steps towards energy savings. The installation of individual meters for all apartments and houses may further facilitate the energy saving strategy.

Another Governmental policy aimed at improving operation of buildings and thus reducing energy consumption should encourage installation of intelligent control systems such as programmable thermostats, daylighting controllers, and occupancy sensors. The national energy efficiency retrofit programme can help introducing these intelligent control systems as well as energy efficient appliances and air-conditioning systems not only in the new buildings but also in the existing building stock in Kuwait.

The financial resources needed for implementation of energy efficiency projects, such as retrofit programme, can be provided by the Government of Kuwait at least in the first phase of implementation. These resources may be generated from the savings coming from gradual elimination of energy subsidies. Further investments should be attracted from private financial sources, both domestic and foreign. To encourage that the Government of Kuwait should create a favourable investment climate by decreasing administrative hurdles, so that the approval procedures and regulations associated with implementation of energy efficiency projects are executed in a non-discriminative, accountable and timely manner.

Additionally, in order to ensure that the energy efficiency policies meet modern requirements and challenges, the Government of Kuwait should ensure that the energy efficiency rules and regulations, such as energy conservation code of practice, are duly updated and implemented. The Government should also pay attention to attracting modern energy efficiency technologies in collaboration with energy experts through participation in international sharing of know-how and best practices.

### Section 4-3: Tunisia – Policy reforms to Promote Energy Efficiency in Industrial Sector<sup>14</sup>

Since early 2000 due to the double effect of both exhaustion of its oils reserves and growing increase of its domestic needs Tunisia has become a net energy importing country. In 2012, the energy deficit reached 1.6 Mtoe representing 20% of primary energy demand. Heavy reliance on imported energy sources made Tunisian economy vulnerable to international oil prices, which negatively influence the overall economic situation in the country. These effects have been alleviated to some extent due to the energy conservation policy adopted in Tunisia since the 1980s, combined with economic policy choices focused on the expansion of the service sectors and the development of high value added industries. Due to that, the primary energy intensity has been falling over the last two decades, with an overall decrease of 27% between 1990 and 2011.

In order to expand its energy efficiency market, the Government of Tunisia adopted an ambitious strategy. For instance, contribution of the Energy Efficiency programme targeting on the industrial sector (Energy Efficiency Performance Contracts – “EEPC”, and cogeneration) was about 42% in total energy savings, reflecting the role played by this sector in the Tunisian energy conservation strategy.

Given the urgency to intensify energy conservation efforts, Tunisia is planning to further reinforce its energy conservation policy and strategy by setting more ambitious objectives for energy efficiency and renewable energy. Thus, the new Energy Efficiency Action Plan aims at reducing primary energy consumption by 17% in 2020 and 34% in 2030. It is expected that industrial sector will greatly contribute to these savings, mainly through cogeneration and energy efficiency innovative actions directly geared towards optimization of the industry processes.

Energy efficiency policy in the Tunisian industry relies on three types of complementary and coherent tools: institutional, regulatory and financial. These are combined with technical support programmes in forms of technical assistance for industrial companies, monitoring of their projects implementation, technical studies, and capacity building, which significantly contributed to the Tunisian energy efficiency improvements.

The institutional facet of energy efficiency policy in Tunisia is mainly represented by the National Agency for Energy Conservation (ANME), which has a specific department dedicated to energy efficiency measures in industry – “DEEI”. The main role of the department is to assist public authorities to define energy efficiency policy in the industrial sector and ensure its implementation. DEEI is at the heart of support system to project developers and to different stakeholders, whose goal is to increase the adoption by Tunisian companies of energy efficiency technologies and energy management systems with consequent increased productivity and competitiveness.

Regulatory tools are defined by a set of legal texts and regulatory framework, mandating the practice of energy auditing of industrial facilities according to a certain criteria. Thus, in September 2004, a decree was promulgated in order to set the conditions for the subjection of large energy consuming companies to mandatory and periodic energy audits and to specify arrangements for its implementation. Similarly, new large energy consuming companies are subject to preliminary authorization by the Government authority in charge of energy (Energy Performance assessment). Importantly, after the energy audits are performed, the company has a possibility to sign an EEPC with ANME, which opens up the

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<sup>14</sup> Policy reforms that were implemented to Promote Energy Efficiency in the Industrial Sector, <http://www.unece.org/fileadmin/DAM/energy/se/pdfs/gee21/projects/others/Tunisia.pdf>



opportunities to profit from benefits granted by the National Energy Conservation Fund – “FNME”, in the form of investment subsidies for energy efficiency and renewable projects. In addition to these lines, fiscal incentives cover energy efficiency equipment needed for the implementation of industrial action plan. Commercial banks also provide financial support to industries, which are willing to increase their energy efficiency indicators. The financial incentives come in form of credit lines on very advantageous conditions in terms of interest rates, maturity periods, and grace periods.

Development and implementation of energy efficiency projects in industry has been also supported by the Energy Efficiency in Industry Programme (PEEI), funded by GEF/WB. The goal of the PEEI is to overcome barriers inhibiting development of a sustainable market for energy efficiency investments. PEEI also aims at promoting ESCOs as an instrument to boost the energy efficiency market by implementing pilot financial incentives. To reach these goals, PEEI focuses on three components: 1) Providing additional subsidies of 10% to energy efficiency investment in complementarity to 20% subsidy of FNME. Support investments in energy efficiency projects by granting an additional allowance of 10% on top of benefits granted through the Industrial Competitiveness Development Fund or/and by the Energy Control National Fund; 2) Guaranteeing energy efficiency investments implemented through Energy Performance contractors to ensure their bankability and to facilitate creation of ESCOs; 3) Providing technical assistance to improve the understanding of all stakeholders (companies, financial institutions, ministries and Governmental agencies, and technical centers) on how such investments could be made.

Despite significant achievements made in the area of energy efficiency and energy savings, the Tunisian experience also shows that any incentives are not immediately effective in case any barriers such as (including but not limited to) lack of awareness about energy efficiency; low technical capacity; lack of trust among key stakeholders (ESCOs, banks, industrial companies and Governmental entities), *etc.* exist.

Therefore, building on this experience Tunisia should continue improving the environment for energy efficiency projects implementation. According to the benchmark, such undertakings should be based on main support and strategic areas, which have to operate in a coherent and simultaneous way. These include institutional, regulatory, legal, economic and socio-political dimensions.

More specifically, institutional improvements should focus on introduction of energy efficiency information system that, based on pertinent indicators, can allow for continuous evaluation of energy efficiency policy in all related economic sectors. On the regulatory side, the Government of Tunisia should ensure reinforcement and consolidation of mandatory energy audits and practices of systemic enforcement of monitoring and verification.

The Government should also establish and ensure a well-functioning financial supportive mechanism, such as, for instance, favourable interest rates and loan guarantees. Also the Government should focus on reinforcement of the role of ESCOs by enhancing their technical capacities and providing them with new funding mechanisms.

The Government should also introduce capacity building programmes aimed at raising awareness among experts and potential investors about energy efficiency projects. The general public should be educated and trained on possibilities of individual energy efficiency and energy saving. Additionally, the Government should support large-scale dissemination of energy efficiency technologies and best practices.

## Chapter 5: ECLAC Region – Review, Analysis and Options to move forward to established benchmark for selected countries

As a result of local availability of natural resources and policies pursued by the member States of ECLAC region, primary energy production in Latin America and the Caribbean has been traditionally based mainly on petroleum. However, since 1970s its share as an energy source has been falling steadily, while the share of natural gas used for primary energy production has been steadily increasing. At the same time, in recent years countries of the ECLAC region have started to formulate and implement more and more projects in the area of energy efficiency and renewable energy.

This Chapter is dedicated to the analysis of energy efficiency and renewable energy policies in two of the ELCAC member States, namely Brazil and Uruguay. It should be noted, that at the point of submission of the case studies for these two countries, no particular project has been yet finalized. Therefore, the analysis below has a forward-looking character and focuses on policy facets required for successful projects' implementation.

### Section 5-1: Brazil – Improving Energy Efficiency in Brazilian Sugarcane Industry for Climate Change Mitigation and Sustainable Development<sup>15</sup>

Brazil has a long tradition of applying renewables in power and transportation sectors. Hydroelectricity is responsible for almost 80% of total power generated in the country. However, the drought that occurred in 2001 prompted Federal Government to diversify energy supply sources, favoring the inclusion of a reasonable share of thermo power plants, many powered by natural gas. It also created a market share for renewable sources of energy such as wind power and biomass.

Since 2004 the Brazilian Government has been implementing a Programme for Incentive of Alternative Sources. The Programme aims at increasing shares of wind, biomass and small hydroelectric power plants in total electricity production by guaranteeing purchasing of electricity from such renewable energy projects under 20-year fixed-price contracts. Wind power has managed to overcome natural gas in offering lowest prices, while sugarcane bioelectricity still running behind. However, many believe that subsidized wind generation can intensify artificially lowered electric prices, thus imposing economic problems on competitive generators that are needed to maintain system reliability. Therefore, considerable attention is also dedicated to sugarcane bioelectricity production. Besides its economic relevance, sugarcane can also provide a substantial contribution to the country's primary energy sources. Currently, around 50% of sucrose in sugarcane is directed to production of 27 million m<sup>3</sup> of ethanol per year, of which 24 million m<sup>3</sup> are supplied to the Brazilian fuel market. The latter, in turn, displaces 18 million m<sup>3</sup> of gasoline, on an energy equivalent basis. This fact brings a remarkable opportunity for power production from more than 420 sugar and ethanol mills spread out through the country.

Although bioelectricity from sugarcane biomass has become increasingly competitive for large-scale generation expansion, its potential is still largely unused. Two issues contribute to this fact: existing tax incentives given to wind power; and unequal dispute conditions with

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<sup>15</sup> Improving Energy Efficiency in Brazilian Sugarcane Industry for Climate Change Mitigation and Sustainable Development, <http://www.unece.org/fileadmin/DAM/energy/se/pdfs/gee21/projects/others/Brazil.pdf>

natural gas, which can provide continuous energy supply when required, while sugarcane bagasse can generate power just during cane harvesting season.

On the positive side, it should be highlighted that drought periods in Brazil suitably coincide with sugarcane harvesting seasons, creating ideal conditions for supply of sugarcane derived bioelectricity into the electricity grid, partly offsetting more expensive gas power. Indeed, sugarcane biomass can play a peak shaving role compensating for energy supply deficits from small-scale hydro and intermittency of wind power generation.

In addition, it diminishes CO<sub>2</sub> emissions, together with emissions from degrading biomass in the field. Offset of gas in power sector will certainly be utilized elsewhere, for example in the transportation and industrial sectors where it would in turn offset oil demand, resulting into net reduction of emissions in the country.

When developing policy for increasing energy efficiency in sugarcane business, three major energy efficiency configurations were considered: 1) modernization of existing mills with bagasse burning capacity greater than 160 tons per hour, including installation of extractor-condensing turbines, producing steam at 90 bar and 520°C; reducing steam processing demand to 360 kg per ton of cane; and operating year-round with collection of 30% of available cane waste; 2) new plants using the same configuration suggested for existing big mills and 3) modernization of existing mills with bagasse burning capacity less than 160 tons per hour, including installation of extractor-condensing turbines, producing steam at the minimum pressure of 65 bar and 480°C and also operating year-round with useful collection of 30% of available cane waste.

In order to benefit from energy efficiency potential and in particular to make sugarcane biomass one of the largest sources of electrical power production in Brazil, all stakeholders involved in business should openly discuss and identify which policy, institutional, legal and economic reforms and other actions are required. According to established benchmark energy efficiency projects should be encouraged and made possible by establishing favourable institutional and legal climate, introducing more broadly applicable financing options and technical assistance, as well as organizing information and awareness raising campaigns.

In particular, on the financial policy side the Government of Brazil may consider elaboration of dedicated fiscal and funding schemes for highly efficient producers. For example a special fiscal regime was established for wind industry, in case a mill makes additional investments to generate above the agreed minimum level. Another example of incentive could be an increased subsidized funding from development banks for an acquisition of highly efficient and sizable equipment for central power stations in sugarcane mills.

Thorough analysis of all costs involved in the process of bringing cane stalks with leaves to the mill's processing unit should be performed to be able to establish a fair price for power produced from sugarcane wastes. For that the Government should encourage launching of educational and specific training programmes in rural areas with the purpose to educate personnel involved in manual sugarcane harvesting.

To increase bankability of new projects the Government should aim at decreasing initial installation costs of new power generation units in highly efficient sugarcane mills. Development of partnerships among private and public research organizations focusing on technological innovations for collecting sugarcane waste should bring better solutions for projects development and implementation.

On the legal side, the Government of Brazil should introduce and duly enforce related legislative acts, and at the same time pay due attention to updating and upgrading overall existing energy-related regulation, including laws, by-laws, acts, etc.

As well there is a strong need for qualified professionals and managers at all levels and in all energy-related areas. To achieve that, dedicated trainings, awareness raising and capacity building programmes are crucial.

## Section 5-2: Uruguay – Improving Energy Efficiency in Uruguay Rice Sector for Climate Change Mitigation and Sustainable Development<sup>16</sup>

Energy efficiency is one of the most important tools to address increasing energy demand. According to the latest available Uruguay National Energy Balance (2011), demand for energy in Uruguay is increasing. Specifically, from 2004 the demand growth stood at around 7%, a historic rate for the country. The National Energy Policy of Uruguay was introduced in 2010 as an institutional framework that is aimed at stimulating development of measures to reduce energy costs through energy efficiency and use of non-conventional renewable energy in the energy matrix. In particular, it established a short-term goal where the participation of renewable energy sources (wind, solar, biomass waste and micro hydro) would reach 15% of total electrical energy generation in near future.

Uruguay has been working in the energy efficiency projects implementation using GEF funds since September 2005. In line with several achievements, such as energy rating label campaigns, topical training and education, as well as promotion of ESCOs, the projects revealed barriers to energy efficiency development. These barriers include weak institutional basis for project development, reflecting limited experience of policy makers, unclear policy objectives, and lack of interest in energy efficiency initiatives. General economic environment does not look favourable for energy efficiency projects. Lack of private investment and limited public funding significantly reduce the number of potential projects. There is also lack of know-how regarding latest technological developments in the area of energy efficiency and general lack of socio-political support for promotion of energy efficient policies.

Financial climate for implementation of energy efficiency projects in Uruguay is also not considered favourable. Financial barriers include: high cost of all financing options; lack of trained local professionals to assess project risks; lack of interest in energy efficiency and renewable energy projects from local financial institutions side; lack of knowledge and experience regarding financing energy efficiency projects and programmes from banks side; and high risk perception by local financial institutions. In addition a financial bias towards investing into large energy companies projects at the expense of medium and small companies is also noted. This happens due to the fact that decisions to invest in energy efficiency and renewable energy projects are mainly based on credit quality of companies requesting those resources, rather than the quality of the project itself.

In order to decrease the dependency of Uruguay on conventional energy sources and increase the share of renewable energy use, experts have recently developed a project aimed at using rice husk to cogenerate energy. Firstly, consolidation of the rice sector in the production matrix of Uruguay may facilitate implementation of this energy efficiency project. Secondly, it is a sector that has a great geographic diversity and economic strength. Furthermore, it is a full-fledged industry, with transparent rules, established players, and a strong integration, which has a continuing public interest in the industry development, improvements and innovations.

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<sup>16</sup> Improving Energy Efficiency in the Uruguay Rice Industry for Climate Change Mitigation and Sustainable Development, [www.unece.org/fileadmin/DAM/energy/se/pdfs/gee21/projects/others/Uruguay.pdf](http://www.unece.org/fileadmin/DAM/energy/se/pdfs/gee21/projects/others/Uruguay.pdf)

The aim of the proposed project is to apply efficient technology to a remnant of an industrial by-product (rice husk) to cogenerate energy (electricity and heat), minimizing the use of hydrocarbon resources and decreasing the volume of generated wastes. Project is clearly aligned with the outlined objectives in the Energy Policy of 2010, as it promotes efficient and rational use of energy from cogeneration and use of a renewable source (biomass) to transform environmental liabilities in energy efficiency. Use of rice husk as an energy fuel is known in Uruguay, however rice husk is still an environmental liability for most establishments, since it is not used for any purpose and its disposal is not rationalized.

The rice husk cogeneration projects may solve a challenge of insufficient private involvement, which is identified as one of the most significant barriers for energy efficiency and renewable energy projects implementation. Own energy generation gives access to a cheaper power source than the fossil generated one, because it uses products that come from the same production process and in some cases (as for the rice husk) saves the costs of waste disposal. Thus, from a private investor point of view renewable energy industry development has an impact on new businesses development and, as a result, impacts the economic growth.

Both from the public and private sector point of view, the development of renewable sources provide economic savings since currently Uruguay depends on imports of conventional energy sources, such as crude oil. Additionally, the application of renewable energy and energy efficiency technologies may result in reductions in carbon footprint. It is especially important because high carbon footprint represents barrier to trade on environmental protection grounds. This in turn would limit considerably access of Uruguayan exports to different markets especially to those in developed countries.

Hence, Uruguay is currently focusing on elaborating various options to develop energy policy of Uruguay, which would promote wider use of renewable energy, push creation and development of a new modern technological basis, and increasing energy efficiency of existing technologies.

However, in order to implement ambitious energy policy plans the Government of Uruguay has to undertake a number of steps. According to the benchmark, established in the first Chapter, such policy reforms should focus, first of all on institutional, legal, economic and socio-political aspects.

In particular, the Government should work on specific strategic goals and clear targets for renewable energy and energy efficiency policies. Setting and properly communicating such targets to related Governmental bodies, financial institutions and general public would facilitate policy implementation. Line ministers will be able to develop and streamline their strategies with announced Governmental energy policy objectives. Potential investors in turn will be able to assess the size of renewable energy and energy efficiency markets, and the risk associated with investments in these sectors, whereas the population will be able to adjust their consumption behavior and decisions.

On the legislative policy side the Government should ensure stability of the State legal system. Being stable, the legal system, however, should not have a static character; therefore the Government should ensure implementation of regular and coordinated updates and revisions of primary legislation related to energy policy, so that it reflects modern demand and requirements. Furthermore, the Government should introduce operational instructions, tools, standards and procedures necessary to implement primary legislation and strategic programmes in the area of renewable energy and energy efficiency.

On the financial policy side, the Government should ensure availability of public funds for financing of initiatives and programmes in energy efficiency and renewable energy fields.

These can be in form of dedicated credit lines, soft loans, tax exemptions and support schemes for third-party financing.

The Government should also facilitate the development and implementation of renewable energy and energy efficiency projects through dissemination of information and best-practicing regarding worldwide-implemented technologies and successful projects in the world. Furthermore, the Government should provide for capacity building, training and education possibilities for professionals with the purpose to educate them to conduct energy audits, identify attractive project opportunities, and prepare bankable project proposals. Once such projects are developed, assessed and identified, this information should be delivered to domestic and foreign investors through advertising and marketing campaigns.

## Chapter 6: ECA Region – Review, Analysis and Options to move forward to established benchmark for selected countries

The ECA Region is composed of the 53 countries of different sizes, demographic characteristics and socio-economic development levels. Patterns of energy production and consumption are also very diverse on the African continent. Africa is known to be lagging behind other major world's regions in terms of level of industrialization, modern energy consumption and electrification rates. Africa has the lowest electrification rate in the world and it is anticipated that half of the population living in Sub-Saharan Africa (SSA) will still be without access to electricity by 2030 if strong policy measures are not taken to reverse the current situation. Yet, the region is endowed with fairly significant energy and other natural resources. In spite of low level of development of its energy resources, the ECA region is a net energy exporter, as it produces more energy than it consumes, particularly in case of oil and natural gas.

The analysis below will cover three countries, namely Morocco, the Republic of South Africa and Zambia. It is useful to note that Morocco is also a member State of ESCWA Regional Commission. Another important point is that at the moment of submission of case studies, the described projects were at the stage of planning and development. Therefore, it is not feasible to make any specific analysis regarding the projects as such. Thus, the analysis and recommendations of this report focus on an overall policy environment and the degree of maturity of energy efficiency policy of the countries under consideration.

### Section 6-1: Morocco – Case Studies on Policy Reforms in Africa<sup>17</sup>

Morocco is a net energy importer. With rising fuel prices and a rapidly growing population the cost of energy imports is now seriously aggravating the country's current account and trade deficit. Imported energy in 2011 was 95.5%, energy import bill was USD 10.1 billion, and subsidies for petroleum products were USD 4.8 billion. In 2012, energy imports accounted for over a quarter of total imports, while trade deficit grew by 8% to a record USD 23.6 billion. Long-term increase in energy needs will mainly be due to energy-intensive sectors such as chemical industry, building infrastructure, and tourism. Specifically, according to some assessments Morocco's planned and anticipated economic projects will increase energy demand by 185% by 2030, and electricity demand by 68% by 2030. To support the implementation of such projects, Morocco has developed an ambitious document – the Moroccan Energy Strategy 2020-2030. With no oil resources and heavy reliance on energy imports, Morocco intends to utilize the most of its wind and solar resources potential to become a top renewable energy producer.

In terms of its current installed capacity, Morocco is already a regional leader, with 32% derived from renewables, mostly hydropower. Wind in Morocco is highly abundant in nearly all coastal regions. Wind potential could be of 25,000 MW. Moroccan solar resources are significant with an extremely favourable irradiation of more than 2,300 kWh/m<sup>2</sup> per year, which is 30% higher than the best sites in Europe, and is therefore attractive to foreign investors. The country has a USD 9 billion Solar Plan to develop 2,000 MW by 2020 using 10,000 hectares of solar installations based on Concentrated Solar Power and Photovoltaic technologies, and will yield 5.6 million tons of avoided CO<sub>2</sub> emissions.

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<sup>17</sup> Promoting Energy Efficiency Investments for Climate Change Mitigation and Sustainable Development. Case Studies of Policy Reforms and Regulatory Frameworks, Chapter 4.1, <http://www.unece.org/fileadmin/DAM/energy/se/pdfs/gee21/projects/others/ECA.pdf>

In terms of improving its energy efficiency, the country is targeting on optimization of energy use specifically in building sector, including reducing consumption through demand-side management measures, and more efficient lighting practices. Some case studies estimate that the projected number of households by 2030 (7.6 Million households) has a potential of generating 26,600 GWh of electricity if each housing unit would be equipped with a 5 kW solar photovoltaic (PV) system. The daily consumption of electricity can decrease almost 6 fold for an average household if it switches compact fluorescent light bulbs (CFLBs). This can bring significant energy savings together with considerable decrease of GHG emissions.<sup>18</sup>

Morocco also aims at efficient use of wood in traditional heating systems in both urban and rural areas; improvement of urban transport efficiency through better Governance and increased energy performance of infrastructure. The energy efficiency strategy aims to attain energy efficiency savings of 12% by 2020 and 15% by 2030, mainly from industry, commercial and residential buildings, and transport.

To achieve these goals Morocco intends to set-up support funds for energy efficiency programmes and has already designated the National Agency for the Promotion of Renewable Energy and Energy Conservation (ADEREE) to oversee its energy efficiency programmes. The country has also established the Agency for Solar Energy (MASEN), which is a prime contractor for solar power projects.

On the legal side, in 2010 the Government of Morocco introduced the Renewable Energy Law, which aims at fostering and promoting renewable energy and regulating the commercialization and export of renewable energy.

Aforementioned Morocco's energy strategy, declared in March 2009, aims at diversifying the energy mix around reliable and competitive energy technologies, in order to reduce the share of oil to 40% by 2030. It also aims at developing national renewable energy potential; making energy efficiency improvements a national priority; developing indigenous energy resources by intensifying hydrocarbon exploration activities and developing conventional and non-conventional oil resources; and integrating into regional energy market, through enhanced cooperation and trade with both other Maghreb and the EU countries.

Several case studies have been made to evaluate the potential of specific renewable energy technologies. As a result, it has been identified that Morocco has significant potential for electricity generation from Solar PV systems. With an average insolation of 2,300 kWh/m<sup>2</sup> per year, Morocco has the potential to meet its electricity demand from Solar PV technology. The technology is well understood and therefore easy to replicate and scale-up from small-scale household systems to large-scale solar power plants.

In order to grasp the benefits from introduction of new energy efficiency and renewable energy technologies as well as improve overall investment climate for related projects, the Moroccan Government should introduce a set of policies. According to the benchmark, these policies should cover institutional, legal, economic and socio-political aspects.

The analysis above has shown that Morocco has a relatively strong institutional set-up for conducting energy policy. The Morocco's Energy Strategy has clear objectives and reasonable deadlines. The existing legal provisions in the Moroccan energy efficiency and renewable energy legislation give a firm ground for implementation of the Government policy. However,

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<sup>18</sup> With a mandatory installation of solar PV systems per household were instituted, additional 9.18 million metric tons of CO<sub>2</sub> would be saved. Also, for every kWh of electricity generated from coal-fired plants, there is 0.993 kg CO<sub>2</sub> equivalent emitted. Therefore, by use of CFLBs, each household would avoid 2.443 kg CO<sub>2</sub> per day. Thus, for a total 7.6 million households in 2030, 6.777 million metric tons of CO<sub>2</sub> equivalent would be avoided in 2030 alone, due to use of CFLBs.



the country should pay attention to the conduct of regular updates of existing legislation and introduction of secondary legislation that can help to implement and administer the existing laws.

On the economic policy side, the Government should aim to lower the cost of renewable energy production. Such policy measures can include instituting incentives such as lowering import duties for renewable energy and energy efficiency equipment, promoting local manufacturing of production equipment, and investing in R&D to improve production efficiency. Additionally, energy efficiency projects should have an access to various guarantees. Such guarantee mechanisms should seek to engage financial institutions by supporting and sharing the credit risk of energy efficiency investments. In this way they help financiers to accept the risk for debt lending and act as a catalyst to scale up private investment in energy efficiency.

The Government should encourage banks to give a preferential treatment to energy efficiency project investors. This can be in the form of loans with, for instance, low interest rates and/or interest-free periods at the start of the loan term. Such preferential loans can be delivered through public-private partnerships where the Government provides a financial support to the bank, which in turn offers a preferential interest rate to its customers.

Additionally, the Government should tackle the issue of insufficient knowledge on the investors' side regarding the existing projects. This lack of knowledge among finance providers about energy efficiency and renewable energy investment opportunities prevents project developers from accessing capital.

The Government of Morocco should also aim at facilitation of international and interregional cooperation with foreign experts to learn about best practices and technological innovations in the field of energy efficiency and renewable energy projects' implementation. The Government should also encourage the development of information databases, which can help to improve monitoring of energy efficiency and renewable energy planning and development, as well as raising awareness and building capacity of national and local stakeholders and institutions operating in the field.

## Section 6-2: Republic of South Africa – Case Studies on Policy Reforms in Africa<sup>19</sup>

The South African economy is extremely energy intensive compared to international standards, with only a handful of countries having higher intensities. In addition, South African industrial energy efficiency is on average significantly lower than in other countries. This is an important factor, given that at the moment industry and mining consume over 60% of electricity produced in the country, and the inclusion of commerce takes this figure to almost 75%. Therefore, residential energy use makes up a far smaller portion of final energy demand than in other countries, and demand from poor households is even smaller. Residential consumers use only 16-18% of South Africa's electricity production. This is the outcome of the energy intensive nature of the economy, and extreme income differences in the country.

South Africa plans to diversify its energy mix. Already now South Africa uses its vast solar and wind resources. However, it is estimated that in the longer term around 9 to 16% of total energy demand could be met by biomass sources including agricultural residues, cuttings

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<sup>19</sup> Promoting Energy Efficiency Investments for Climate Change Mitigation and Sustainable Development. Case Studies of Policy Reforms and Regulatory Frameworks, Chapter 4.2, <http://www.unece.org/fileadmin/DAM/energy/se/pdfs/gee21/projects/others/ECA.pdf>

from forestry operations, as well as dedicated energy crops. Household biogas digesters and landfill gas also have a large potential market share.

More specific projects examine the prospects of mandatory installation of solar PV systems, and the replacement of paraffin with bioethanol for cooking in the households. Together with considerable energy savings and thus money saving potential these projects predict significant GHG reductions. Particularly, 91.4 million metric tons of CO<sub>2</sub> could be saved if renewable energy and energy efficiency mandatory policy measures to install solar PV systems in each household are instituted. The mandatory use of CFLs by total (projected) 16.7 million households in 2030 would result in avoidance of 14.891 million metric tons of CO<sub>2</sub>. In the case of paraffin, the business-as-usual emissions are projected to increase to 33 metric tons of CO<sub>2</sub> by 2030. However, bioethanol use has the potential to reduce GHG emissions to 3.4 million metric tons in 2030.

In order to facilitate the implementation of its energy policy plans, the South African authorities have established a number of institutions in the country. In 2006 South Africa established the National Energy Efficiency Agency (NEEA). It is responsible for implementation of demand side management and energy efficiency projects in the country. It is also responsible for awareness-raising campaigns and training programmes in energy efficiency and promotes cooperation with all agencies involved in the sector to ensure best practices sharing.

The Energy Development Corporation (EDC) of South Africa supports the development of renewable energy and alternative fuels through providing State funding. Specifically, EDC targets market sectors where there is insufficient private sector involvement as well as where the Government, for strategic reasons, believes State investment is required. The South African National Energy Development Institute (SANEDI) is an implementing agency of the Department of Energy of South Africa. It was also created to assist the country to reach its energy goals. It focuses on awareness-raising and increased uptake of “green” energy. Its portfolio includes data and knowledge management on energy, energy efficiency, fuel technology, low-carbon energy and transport, carbon capture and storage (CCS), as well as energy end use and infrastructure.

In the framework of its energy efficiency programmes, South Africa targets: Industry (*e.g.* energy efficient motors, energy audits, and energy managements systems), Utilities (*e.g.* rebates for energy savings), Transport (*e.g.* extra levies on inefficient vehicles used to cross-subsidize more efficient vehicles), Residential (*e.g.* distribution of compact fluorescent lamps (CFLs) at subsidized prices mainly in areas with capacity bottlenecks, mandatory standards and labels for appliances, vehicles and buildings, and promoting use of liquefied petroleum gas (LPG) as a cooking fuel rather than electricity) and Public (*e.g.* educational campaigns and energy efficiency (EE) funding for Government buildings).

The South Africa Energy Efficiency Strategy set out a national target (currently not mandatory, only a policy objective) for energy efficiency improvement of 12% by 2015 and provides for a number of “enabling instruments”. The Biofuels Industrial Strategy of 2007 proposes the adoption of a 5-year pilot programme to achieve a 2% penetration level of biofuels in national liquid fuel supply. The Strategy recommends the use of a fuel levy exemption for biodiesel and bioethanol.

An overview of the institutional set-up of South Africa shows that there are numerous policies, programmes, and strategies dedicated to creating an enabling environment for energy efficiency and renewable energy projects development and implementation. Therefore, it can be concluded that South Africa is on the right path if the goal is to reduce energy dependence, increase the share of renewable energy in the energy mix and decrease energy intensity of economic activities of industries and households.

However, it should be highlighted that despite the positive motion and right trajectory of the South African energy policy, some initiatives and policy objectives have a declarative character and do not contain provisions that make them binding. Furthermore, to make a progress towards achieving the benchmark and thus ensuring full-fledged fulfillment of the policy objectives, the country still has to overcome a number of existing barriers and implement a range of policy incentives.

Therefore, the South African Government should consider strengthening the legal framework for energy policy implementation and fill the existing legal gaps by creating necessary laws and by-laws. Thus the Government should develop a comprehensive legislative framework, which will streamline procedures related to energy policy and related projects implementation. Such legal base should also establish an enabling environment for financial activity of foreign capital on the territory of South Africa. Thus the laws need to be introduced to create supportive and accountable legal mechanisms for investment attraction into the country.

Besides attraction of foreign investors, the Government of South Africa should engage and provide support to local project developers and investors, especially those who represent small and medium businesses. Thus, the Government should provide a number of incentives, such as, for instance, tax rebates and loan guarantees. Also the Government should focus on mitigating perceived risks among local lenders and investors and increase awareness and know-how among local key stakeholders.

Moreover, taking into account an enormous potential of the households for contributing into renewable energy use and energy efficiency improvements the Government should engage them through financial stimulus as well as awareness raising campaigns regarding existing energy efficiency and renewable energy technologies. Additionally to a positive effect of increasing an efficient renewable energy use, it would allow the population to engage in the value chain and thus meaningfully promoting their access to modern clean energy services and participation in economic development on sustainable basis.

The Government of South Africa should also encourage promotion of technological development and innovations, through improving R&D programmes by collaborating with international experts. Particular efforts should be made to promote energy efficient and renewable energy technologies that are technically proven in other countries but not commercialized in the internal market.

### Section 6-3: Zambia – Case Studies on Policy Reforms in Africa<sup>20</sup>

Zambia has a range of primary energy sources, including coal, hydropower and biomass. However, Zambia is heavily reliant on imported petroleum products, which account for 37% of total energy demand of the country. Currently Zambia's total energy demand exceeds internal energy generation and despite its vast hydro and biomass resources, the country often experiences power shortages. Moreover, approximately only 19% of population in Zambia has access to electricity. The majority of electrified households are in urban areas, while only 2.2 % of rural people have access to electricity.

Despite its current difficulties in ensuring sufficient energy supply, Zambia has an enormous potential for its improvement, especially by expanding the use of internally available renewable energy sources. For instance, its solar insolation is roughly 5.5 kWh/m<sup>2</sup> per day,

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<sup>20</sup> Promoting Energy Efficiency Investments for Climate Change Mitigation and Sustainable Development. Case Studies of Policy Reforms and Regulatory Frameworks, Chapter 4.3, <http://www.unece.org/fileadmin/DAM/energy/se/pdfs/gee21/projects/others/ECA.pdf>

with approximately 3,000 sunshine hours annually, providing good potential for solar thermal and photovoltaic exploitation. Wind speeds average 2.5 m/s at 10 m above the ground. Seven areas have been identified as viable for off-grid wind power generation. There is a high potential for biomass-based energy as Zambia's woodlands and forests are estimated to cover about 50 million hectares or 66% of country's total land area. Zambia also has geothermal energy potential, although it has not been examined in great detail.

Some specific case studies done for Zambia show how the replacement of conventional energy sources with renewables can improve economic situation in households. For instance, through the replacement of charcoal and charcoal braziers with bioethanol use in cook stoves can enable people to gain access to modern clean energy source as they also get economically empowered through participation in the value chain of the bioethanol industry. In particular, as much as 50 to 60% of the cost of producing a liter of bioethanol is attributed to feedstock production. This is the minimum size of the economy that would be possessed by people in rural areas, who would start participating in feedstock production and supply to bioethanol refineries. Thus energy efficiency improvements are expected to be in form of using improved cook stoves by switching from inefficient biomass (wood, charcoal, *etc.*) based cooking to electricity and bioethanol by rural communities. The greenhouse gas emission reductions<sup>21</sup> are expected to be in form of reduced use of charcoal, fossil fuels and deforestation.

The Government of Zambia has done a number of steps towards improving the internal energy situation and developing a comprehensive energy policy. Thus, the Ministry of Energy and Water Development has developed a long-term Energy Strategy (2009-2030) focusing on electricity, petroleum, and renewable energy. In addition, there are plans for the formulation of a renewable energy strategy with focus on solar energy, small hydropower, crops, and biomass. The Energy Sector Advisory Group – a committee formed under the Ministry of Energy and Water Development – contains representatives from ministries and Governmental authorities, development agencies, and commercial enterprises. Its purpose is to encourage harmonization between all sectors of the economy in terms of energy policy, and provide an informed opinion on energy matters to policy-makers.

The Government has also elaborated the National Development Plan (NDP), which among others covers energy issues. Programme goals under the NDP include: implementing a cost-effective electricity tariff regime; introducing an appropriate cost-effective renewable energy feed-in tariffs; promoting the use of biogas for cooking, lighting and electricity generation; and developing a Biomass Energy Strategy, to improve sustainability and effectiveness of biomass supply.

The Global Village Energy Partnership (GVEP), in association with the Department of Energy, and the Ministry of Energy and Water Development, works on developing a mechanism to increase access to reliable, affordable, and environmentally sustainable energy services as a means of enhancing economic and social development.

Zambian National Energy Policy 2008 sets out a number of policy measures specifically for renewable energy. The objectives of these policy measures include investigation of renewable energy potentials; strengthening of the institutional framework for renewable energy research and development; and the provision of financial and fiscal mechanisms for stimulation of renewable energy technologies deployment.

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<sup>21</sup> According to some estimates, under business-as-usual scenario, the GHG emissions due to charcoal use for cooking by 1,126,662 households in Zambia would be about 140 thousand tons by 2030. By introducing charcoal substitution with bioethanol, the emissions would drop down to about 10 thousand tons.

Despite relatively strong institutional framework that Zambia has developed for strengthening its energy efficiency and renewable energy policy, the reality shows that strong institutional aspect of policy reforms is a necessary but not sufficient condition for a success. Therefore, in order to achieve the benchmark and establish firm grounds for energy policy implementation, Zambia also has to focus both on economic and socio-political aspects of energy policy reform.

It should be recognized that one of the major bottlenecks in introducing renewable energy and energy efficiency technologies in a country, which is mostly composed of rural areas, relate to communities' level of income. However the case study on replacement of charcoal and charcoal braziers with bioethanol in cook stoves has clearly indicated that once such measure is implemented it brings a direct benefit to households. Therefore the Government policy and planning should focus on initial support for introduction and promotion of renewable energy and energy efficiency technologies among local communities through awareness raising campaigns and information sharing.

To lower the cost of energy production, economic policy measures should include introducing incentives such as lowering import duties for foreign energy efficiency and renewable energy equipment and technologies, as well as supporting and promoting local manufacturing of equipment. Additionally the Government should use the State budget funds or create favourable environment for attracting private investment for R&D aimed at improving energy production and consumption efficiencies.

The Government of Zambia should prioritize specific renewable energy and energy efficiency projects, which are able to involve the poor in the value chain as this would raise affordability by the poor, thus meaningfully promoting their access to modern clean energies and participation in economic development on sustainable basis. To attract investment, Government should also remove operational barriers often encountered in energy efficiency and renewable energy programmes and projects.

Additionally, on the economic and financial policy side the Government of Zambia should provide environment for establishing funds to support development of energy efficiency and renewable energy industries through incentivizing local and foreign investors, banks and other financial institutions to invest in energy efficiency and renewable energy projects. This can be done through simplifying the rules and establishing clear and accountable laws relating to investors' activity on the territory of Zambia.

The Government should also encourage interregional and international collaboration among national and foreign experts with the purpose to reduce the costs of R&D through information and best practices sharing. Also the Government may consider developing sectorial databases, which can help to monitor progress of renewable energy and energy efficiency projects implementation.

To deal with the issue of limited awareness and lack of experience in energy efficiency project development and implementation, the Government of Zambia should promote energy awareness and dissemination of useful information on energy efficiency measures through establishing a wide-scale awareness raising programmes on the national and local levels with the purpose of training specialists working in energy efficiency and renewable energy field.

## **Chapter 7: Comparative analysis of reviewed case studies regarding their current status with respect to the established benchmark**

The analysis of the case studies has shown that all considered countries are dealing with energy efficiency issues to some extent. However, the maturity level of energy efficiency policy varies from country to country and from region to region. Some countries have significantly moved forward towards establishing energy efficient structure of the economy through creating necessary conditions, such as developing institutional base, introducing appropriate laws and regulations, creating financial incentives for attracting investments from national and international sources as well as introducing social policies conducive to increasing energy efficiency and energy savings among general public. At the same time, other countries fail significantly to meet conditions of achieving the benchmark level.

Before going to comparative analysis of energy efficiency policies, programmes and projects in individual project countries, some features common to the majority of project countries should be highlighted. Thus, widely indicated low energy efficiency rates and high pollution levels in the project countries are essentially the results of utilization of outdated technologies. This stems from a lack of investment devoted to upgrade the existing technologies and equipment and introduction of new energy efficiency technologies. Insufficient investment therefore is another obstacle towards overcoming the challenge of high energy intensity of production and inefficient consumption of energy sources.

Another common feature is that most of considered countries lack competitive market forces in energy sector, as it is often vertically integrated and monopolized by Governments or public sector. Due to this fact, energy prices are usually subsidized, and therefore do not fully reflect the actual costs. Moreover, Governments' monopoly in the energy sector usually means that financing of new energy efficiency projects is challenging, since State budget is often not sufficient to back up important projects.

Furthermore, unlike economies with mature energy efficiency markets, most of the project countries do not have appropriate framework to support development of a sustainable energy efficiency market. For example, there is a lack of national authorities (or they have no sufficient experience) that are responsible for prioritizing, planning and establishing appropriate policy and regulatory frameworks to ensure affordable access to energy efficiency technologies and services. Additionally, there is an insufficiency or even absence of interactions and communications among Government structures and other potential participants in energy efficiency policy development and implementation, such as energy companies, producers of energy-efficient equipment, financial institutions, R&D companies, and final consumers.

Despite these challenges, the efforts to increase energy efficiency of many project countries should not be disregarded. The general trend in last few decades is that more and more developing countries pay considerable attention to integrating energy efficiency objectives into the general State energy policy. Case studies analysed in current report demonstrate concrete experience of the project countries in implementing energy efficiency projects and measures.

It should be noted, that there is no country that has been singled out as the one that has already paved a way towards established benchmark on all fronts at an equal degree. Some countries made more progress in creating favourable institutional structure through introducing specific reforms in energy policy, reducing administrative barriers, and/or

creating specific national agencies responsible for implementing energy efficiency policy objectives. Other countries give priorities to economic and financial policy side, introducing financial incentives for investors who are capable and willing to finance national energy efficiency projects. Other Governments considered social aspects in their policies as a leading force for changing public behaviour and consumption choices when energy efficiency is an ultimate objective.

More in particular, through the Energy Savings in the Building Sector project, **Azerbaijan** has made a progress towards improving the regulatory base for implementing its energy efficiency objectives. Thus, by supporting development and enforcement of energy efficiency-related regulatory base in building sector, introducing building standards and codes, as well as promoting regional harmonization of policies and regulatory practices in energy efficiency field, Azerbaijan raised its potential of achieving the benchmark. Strong regulatory framework for implementing energy efficiency policy has been also created by the Ministry of Electricity and Water of **Kuwait**. More in particular, the MEW has enforced minimum requirements for efficient energy use in buildings. Additionally, the national energy efficiency retrofit programme that considers the entire existing building stock is expected to lead to significant economic and environmental benefits for Kuwait. The Government of **Zambia** has also developed the National Development Plan, which goals include establishing a regulatory framework conducive to implementation of energy efficiency measures through, among others, implementing a cost-effective electricity tariff regime.

**Tajikistan's** experience has shown how the introduction of legislative base can facilitate energy efficiency investments in the country. The Government Resolution of 2 November 2011 "On approval of the Programme on efficient use and conservation of power resources 2012-2016" has promoted the inflow of considerable investments in energy efficiency that have increased more than three-fold and reached almost 3.5% of national GDP with public funding from all sources amounting to at least 30% of total investment costs. Energy Conservation Promotion Act, adopted in **Thailand**, has also proved to be a successful legal instrument for energy efficiency policy implementation. The Act has been successfully promoting energy conservation, energy efficiency, and renewable energy development policies. Moreover, this Act facilitated creation of the Energy Conservation Promotion Fund that provides financial support to Governmental agencies, State enterprises, non-Governmental organizations, individuals, and businesses that wish to implement measures to increase energy efficiency. Also on the legal side in 2010 the Government of **Morocco** introduced the Renewable Energy Law, which has been fostering and promoting renewable energy and regulating commercialization and export of renewable energy.

**Armenia** has been successful in creating a favourable climate for foreign direct investments through reduction of commercial risks and administrative barriers. As a result of UNDP and GEF project that targeted municipal heating in Avan district in Yerevan, Armenia was able to attract multimillion investments in its heat supply sector and therefore considerably improved its energy efficiency indicators. **China** can be considered as one of the leaders among the project countries in terms of the set of energy efficiency policies it has introduced in the recent years, which had a remarkable impact on increasing energy efficiency. During the 11<sup>th</sup> Five-Year Plan period, the country introduced several new energy efficiency mechanisms such as contract energy management, energy efficiency benchmarking, demand side management and energy conservation voluntary agreements. Relevant financial institutions, investment organizations, research institutions and advisory bodies also participated in implementing industrial energy efficiency policy, which helped to overcome obstacles that enterprises faced in technical consulting, project implementation, investment and financing. This full-fledged approach towards energy efficiency policy allowed multi-million inflows of investments into China's energy efficiency projects. **Tunisia** has also made a

good progress in establishing a strong financial base for energy efficiency projects implementation. Its National Energy Conservation Fund provides a financial support in form of investment subsidies for energy efficiency and renewable energy projects. Commercial banks also provide financial support to industries, which are willing to increase their energy efficiency indicators. The financial incentives come in form of credit lines on very advantageous conditions in terms of interest rates, maturity periods, and grace periods.

**Belarus** has made considerable achievements on the institutional side of energy efficiency policy. Thus, since the adoption of its Energy Programme Belarus has developed and introduced several energy efficiency strategy and policy documents as well as undertook a huge number of programmes and action plans. New institutional structure has been significantly facilitating the implementation of the programmes and projects aimed at reduction of energy intensity and improvement of energy efficiency on both supply and demand sides. Following its incentives of becoming an EU member State, **Montenegro** has also done a remarkable progress towards increasing its institutional capacity and strengthening its legal base for energy efficiency policy implementation. Thus Montenegro became a Contracting party of the Energy Community Treaty in 2005, under which Montenegro committed to follow the EU energy policy and harmonize its energy related legislative and regulatory system with the EU directives. Moreover, in order to fulfill its commitments Montenegro adopted Energy Efficiency Strategy and Energy Development Strategy by 2025. The need of institutional policy reform in the field of energy efficiency has been also acknowledged and addressed by the Government of **Egypt**. Policy reforms and measures include promotion and development of public transport, fuel switching to cleaner fuels, upgrading of vehicles fleet, development of transport infrastructure, traffic management, vehicles emission testing and engine tuning. More specific projects that proved to be able to attract energy efficiency investments and become bankable are: the Greater Cairo Region Old Vehicles Scrapping and Recycling Programme; use of Compressed Natural Gas as a fuel for vehicles, and development and construction of Cairo Metro. **Tunisian** Government has also created a strong institutional base for energy efficiency policy. It is represented by the National Agency for Energy Conservation, which main goal is to assist public authorities to define energy efficiency policy in the industrial sector and ensure its implementation. It also supports project developers and different stakeholders, whose goal is to increase the adoption by Tunisian companies of energy efficiency technologies and energy management with consequent increased productivity and competitiveness. **Morocco** has also made a number of steps towards achieving its energy efficiency goals. Most of the attention has also been paid to the institutional aspect. Thus, Morocco has already designated the National Agency for the Promotion of Renewable Energy and Energy Conservation to oversee its energy efficiency programmes. As in most of the project countries, the strongest aspect of the overall policy set-up of **South Africa** is the institutional structure. The South African National Energy Efficiency Agency is responsible for implementation of demand side management and energy efficiency projects in the country. Appraisal of **Zambian** energy efficiency policy can also emphasize its achievements in establishing institutional background for future project implementation. Thus, Zambian Energy Sector Advisory Group is aimed at encouraging harmonization between all sectors of the economy in terms of energy policy, and providing informed opinions on energy matters to national policy-makers. The project countries representatives from the Latin America, **Brazil and Uruguay**, are more focusing on renewable energy policy development. Even though the presented projects are still at the stage of development, it should be highlighted that their Governments have been paying considerable attention to elaborating the institutional basis for future projects. **Georgia** has also been developing a strong institutional aspect of its energy efficiency policy reform through committing on a municipal level to



implementation of energy management policy, and introducing Sustainable Energy Action Plans that envisage specific energy efficiency measures and define energy saving potential.

In its efforts to increase energy efficiency, **Croatia** has been paying significant attention to raising awareness and changing attitude towards energy efficiency in a large part of the society through information campaigns, outreach activities and free energy efficiency advisory services, targeting primarily on the residential sector. More than 5,500 public authority officers, energy experts, including auditors, were trained to implement energy efficiency policy measures. **Georgia** has also been implementing measures aimed at raising public awareness in the area of energy efficiency. They aimed at educating general public on energy efficiency potential for mitigation of global and local environmental, social and economic problems. **South African** National Energy Efficiency Agency also deals with the issues of awareness raising and training in energy efficiency and promotion of cooperation with other energy-related agencies and institutions. **Uruguayan** achievements in implementing its energy efficiency policy also have a socio-political character, and include energy rating label campaigns, topical training and education for energy experts and general public.

The table below summarizes the achieved results of each project country on three policy fronts stipulated by the benchmark established in Chapter 1 of the report. The color of the circles reflects the maturity level of a specific policy area in particular country. Green color means that the policy has been elaborated and implemented at a sufficient degree, and the country should be able to secure successful outcomes of its energy efficiency policy implementation in that policy area. Yellow color means that even though some actions have been already taken on this policy front, there is still a lack of initiatives and other undertakings, thus more work has to be put in place to guarantee the expected results. Red color means that the country has not implemented any significant policy measure in a given policy area. Therefore, the country has to undertake the whole range of actions, starting from strategic planning towards actual projects and policy measures implementation.

	Benchmark Components		
Country	Legal, Institutional, Regulatory Incentives	Economic and Financial Incentives	Socio-Political Incentives
Armenia	●	●	●
Azerbaijan	●	●	●
Belarus	●	●	●
Croatia	●	●	●
Georgia	●	●	●
Montenegro	●	●	●
China	●	●	●
Tajikistan	●	●	●
Thailand	●	●	●
Egypt	●	●	●
Kuwait	●	●	●
Tunisia	●	●	●
Brazil	●	●	●
Uruguay	●	●	●
Morocco	●	●	●
South Africa	●	●	●
Zambia	●	●	●

- - Sufficient level
- - Basic level
- - Insufficient level

It can be concluded from the above that most of the project countries have started to implement energy efficiency policy. However, the scope and the degree of maturity of these policies are different in various countries. While some countries have been more successful on the path towards achieving the benchmark, working on all or most of the aspects of energy efficiency policy, others are focusing on one particular aspect. It is obvious from the analysis, that to date the institutional facet of energy efficiency policy draws most attention in the majority of countries, as most of them have already established dedicated agencies and committees that are aimed at dealing with energy efficiency policy and strategy elaboration. Some countries have gone further, establishing financial mechanisms for investing into energy efficiency projects as well as promoting social policy, raising capacity and knowledge of energy experts and general public through dedicated trainings and programmes.

Thus, even though certain results have been achieved already, more work needs to be done in order to ensure implementation of successful energy efficiency policies in the project countries. The next Chapter will make specific recommendations addressed to all the project countries on how to progress in all energy efficiency policy areas, and therefore move closer to the established benchmark.

## Chapter 8: Conclusions and Recommendations

This Chapter summarizes the main analytical output and conclusions made while analyzing individual case studies. It also provides a summary of recommendations related to enhancement of energy efficiency investments in project participating countries, based on recommendations given in specific-country sections. Additionally, this Chapter provides recommendations regarding the collaborative measures that UN RCs should undertake to catalyze new energy efficiency investments in the regions.

### Section 8.1: Recommendations related to enhancement of energy efficiency investments in participating countries

The analysis of case studies provided by the project countries has shown that barriers to the development of energy efficiency vary from one country to another, as well as regionally. However, the main barriers that are present in almost all project countries include institutional, legislative and regulatory barriers; lack of economic incentives, existing fossil fuel subsidies that together with artificially low energy tariffs inhibit energy prices to reflect actual costs, and therefore reduce the incentives of the households to save energy. Other barriers include lack of local capacity in preparing project proposals up to market standards and according to financiers' requirements; lack of interest and knowledge in the banking community regarding the opportunities for financing energy efficiency projects; and lack of awareness among businesses about the benefits of implementing energy efficiency measures. Additionally, insufficient practice of information dissemination on availability of energy efficiency technologies, and on benefits and opportunities of their use to general public, Government officials and policy makers as well as investors and service providers is observed.

The benchmark established in Chapter 1 of the report defines that in order to increase energy efficiency investments each country should deal with existing barriers cumulatively. Only actions taken simultaneously on institutional, legal, regulatory, economic, financial and socio-political levels may ensure successful creation and promotion of favourable environment for national and international investors to perform their activities in individual project country.

To achieve the benchmark and thus energy efficiency goals, Governments should first and foremost create a stable and well-functioning institutional basis for development and implementation of their energy efficiency policies. For that Governments should undertake policy reforms that would integrate energy efficiency policy into the overall energy policy of the State. In this regard, policy-makers should perform detailed analysis of overall energy situation in the country and as a result elaborate a strategy, prioritise the needs and establish clear objectives regarding energy efficiency aspects of the State energy policy. When the goals are set it is crucial to create appropriate institutions in form of, for instance, State-led energy conservation and efficiency agencies, departments and committees under ministerial control, which would be responsible and accountable for implementing Government's energy efficiency objectives. Tailored trainings and workshops should be organized for Government officials and senior policy-makers working in the field of energy efficiency with the purpose of their capacity building. Governments should also generate and encourage consultations and dialogue inside and among Governmental agencies working in the field of energy efficiency with the purpose of experience sharing and facilitation of deliberated decision-making that take into account all policy aspects. Furthermore, Governments should encourage and strengthen regional and sub-regional cooperation with

the purpose to learn and identify socio-economic benefits of energy efficiency and translate this into market potential of energy efficient products and initiatives.

On the legal side Governments should enforce the existing energy-related laws and regulations, as well as introduce new laws and by-laws to facilitate and, where feasible, make mandatory energy efficiency and energy saving technology use. Besides energy-related laws as such, the Governments should enforce and, if missing, introduce investment laws that would create more favourable environment for national and international investors. Where national investments are limited, Government should pay a particular attention to introducing investment-related laws that would encourage international investors to finance energy efficiency projects and programmes.

With regards to regulatory facet the Governments should ensure transparent, regularly updated and stable administrative and authorization procedures for new energy efficiency and energy saving projects. To reduce administrative burden for project developers, the Governments should consider establishing one single responsible authority, which can set clear and integrated guidelines for authorization procedures for projects. Once energy efficiency project is implemented, Governments should ensure enforcement of practices of mandatory energy audits with systemic procedures of monitoring and verification. Well-specified regulatory system based on clear standards and codes, as well as on harmonized policies and regulatory practices in energy efficiency field would bring significant economic and environmental benefits.

Economic and financial aspects also play a crucial role in promoting energy efficiency policy and attracting investments for energy efficiency projects. From the analysis of case studies it can be concluded that one of the barriers to involvement of private capital into energy efficiency market is a large State involvement or sometimes full State monopoly of energy companies. Thus in order to alleviate a conflict of interests between company profitability and pursuit of political interests through socially popular pricing policies as well as to make energy market more competitive and therefore to attract private capital, able to invest into new energy efficiency projects and technologies, Governments may consider decreasing their shares and influence on the energy market and energy producing companies.

Furthermore, Governments should aim at decreasing subsidies for fossil fuels so that consumer prices reflect true energy costs. Government should also aim at introducing energy tariffs, which fully recover costs, and therefore increase profitability of energy efficiency projects and raise investors' interest. It is also recommended that energy tariffs take into account environmental costs and therefore create incentives for a behavioral change of final consumers.

Since one of the major barriers to the development and implementation of energy efficiency investment projects is often related to non-availability of low-cost and long-term adapted financing, it is crucial to undertake programmes that support setting up of such financial mechanisms within the economy. The Governments should encourage banks to give a preferential treatment to energy efficiency project investors. This can be done in form of loans with, for instance, low interest rates and/or interest-free periods at the start of loan term. Such preferential loans can be delivered through public-private partnerships where the Government provides a financial support to the bank, which in turn offers a preferential interest rate to its customers. The Governments may also provide financial support in form of Government subsidies for energy efficiency technologies use, tax exemptions and customs waivers for imported parts and components needed for production of energy efficient equipment.

When national funds are limited or not available, the Governments should create and enforce favourable climate for foreign investors, by ensuring non-discriminative conditions for their activities as compared to conditions provided to national investors.

As a shortage of qualified personnel is observed in the countries of all UN RCs in both public and private sectors, it is crucial to build a critical mass of policy analysts, economic managers and engineers, who are able to manage all aspects of energy efficiency development in the countries of all RCs. There is a crucial need to build capacities in designing, developing, manufacturing, installing and maintaining energy efficiency technologies as well as adequate energy efficiency policy formulation for their successful use.

Additionally, certain efforts should be made to build capacity for development of energy efficiency investment projects. This is about training experts and linking them by various channels of communication (primarily through Internet), information transfer and distance learning. Training courses should put an emphasis on financial engineering and business planning. Workshops on energy efficiency business development should be organised as well. Other tailored trainings and workshops should be organised for local bank staff in countries where there is still a need for capacity building. It is also necessary for Governments to increase efforts to educate, train and inform general public on energy efficiency benefits and practices.

Last but not least, it should be highlighted that while implementing their energy efficiency policies all the Governments should take advantage of international experience and best practices available in the field of energy efficiency development. Therefore, the Governments should make a priority towards cooperation with the UN agencies such as UNDP, UNEP (United Nations Environmental Programme), UN RCs as well as international donors, which are able to provide advice and support in the area of energy efficiency.

## Section 8.2: Recommendations of collaborative measures that UN RCs can undertake to catalyze new energy efficiency investments in the regions

According to the High-level Political Forum of the Economic and Social Council, the role of regional dimensions in contributing to sustainable development is important.<sup>22</sup> Therefore the United Nations Regional Commissions should take steps to accelerate their roles in promoting sustainable development in the field of energy among their member States. Through the regular global meetings of the UN RCs with the involvement of other relevant entities, major groups and other relevant stakeholders, the UN RCs should promote a system-wide collaboration in the area of energy and energy efficiency with a coherent and consistent approach to make up for the absence of a single entity in the UN system with primary responsibility for energy matters.

Through their cooperation the UN RCs should assist member States to build and strengthen their capacity to implement effective regulations and policies, to establish market-based mechanisms, business models and investment tools with regards to energy efficiency. To achieve this goal the UN RCs should make a strong commitment to facilitate transfer of knowledge, best practices and expertise among their members, avoiding duplication and waste of financial and human resources. That would enable member States to optimize use of resources, create synergies and build partnerships among national, regional and international experts, and catalyze the increase of private capital flows into energy efficiency investments.

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<sup>22</sup> Paragraph 31 of the Ministerial Declaration of the 2014 High-level Segment of the Economic and Social Council and the High-level Political Forum Convened under the Auspices of the Council, 9 July 2014

In more practical terms, it is recommended for each UN RC to establish dedicated intergovernmental principal subsidiary bodies composed of efficiency experts and decision makers with sufficient secretariat support. Thus, each UN RC should have a strong institutional structure that supports energy efficiency market formation activities in their member States. It is important to note that some UN RCs already have such structures in place. For example, the UNECE Committee on Sustainable Energy is a good example of an intergovernmental body that serves as a platform for developing and implementing wide range of energy projects and programmes, including in the field of energy efficiency. It brings together energy experts representing Governments, private sector, financial institutions, NGOs and many other stakeholders promoting and fostering international cooperation in the field of energy. More in particular, under the umbrella of this Committee and through dedicated EE projects and programmes experts from the UNECE member States can exchange their experiences on energy efficiency market formation initiatives, learn lessons and look for solutions to address energy efficiency issues in their countries. The ECLAC has also initiated setting up of a similar forum for cooperation among its member States. Specifically, it has established Regional Policy Dialog on energy efficiency in Latin America and the Caribbean region, which main objective is to strengthen institutional, technical and regulatory capacity of Latin American and Caribbean countries to implement national energy efficiency programs. The ESCAP has established an Ad Hoc Expert Group on End Use Energy Efficiency towards promotion of a Sustainable Energy Future within its Environment and Development Division.

Based on this experience all five UN RCs should strengthen or establish an institutional structure that is conducive to development of energy efficiency market formation through inclusion in their organizational structure an energy efficiency specific task force or committee that will assist their member States to carry out energy efficiency projects and programmes.

Assuming that such institutional structure is established or re-enforced in each UN RCs, these new entities should cooperate closely to analyse all globally existing energy efficiency programmes with purpose to single out best practices in terms of capacity building, energy policy reforms and investment project finance. Common priorities and synergies among all five Regional Commissions should be established with a view to developing a global strategy for promoting energy efficiency policies and facilitation of energy efficiency investments in their member States.

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# ANALYSIS OF NATIONAL CASE STUDIES ON POLICY REFORMS TO PROMOTE ENERGY EFFICIENCY INVESTMENTS

This publication is prepared in the framework of the United Nations Development Account project “Promoting Energy Efficiency Investments for Climate Change Mitigation and Sustainable Development”, which is implemented jointly by all five UN Regional Commissions with UNECE as the lead agency. It aims to identify existing barriers to energy efficiency policy implementation and to provide recommendations to the policy makers that would assist them in development and implementation of policy reforms that can support market formation and foster favourable climate for investments in energy efficiency. The publication develops a benchmark that should serve as a reference point for policy makers and energy experts working in the field of energy efficiency. This benchmark is a synthesis of policy incentives that should be in place in order to stimulate and ensure successful energy efficiency policy outcomes. The desired policies are divided into three groups: 1) legal, institutional and regulatory; 2) economic and financial; and 3) socio-political. A set of these policies in place at a sufficient degree in a particular country is a basis for successful formulation and implementation of energy efficiency policies and related projects.

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