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UN Development Account project on Promoting Renewable Energy Investments for Climate Change Mitigation and Sustainable Development

CASE STUDIES ON POLICY REFORMS TO PROMOTE RENEWABLE ENERGY

SYNTHESIS REPORT

Final Draft

Preface

This synthesis report was prepared for the Energy Section of the Sustainable Development Policies Division (SDPD), United Nations Economic and Social Commission for Western Asia (UN ESCWA) within the framework of the United Nations Development Account (UNDA) project Promoting Renewable Energy Investments for Climate Change Mitigation and Sustainable Development. The project focused on capacity-building for policymakers and project developers in order to promote investments in renewable energy projects. The project was led by UN ESCWA and implemented in partnership with the United Nations Economic Commission for Europe (UNECE).

The UNDA project included case studies of the experience of renewable energy policy reforms in selected countries from each of the two regional commissions. Four countries were selected from each regional commission: Jordan, Lebanon, Morocco and the United Arab Emirates from UN ESCWA Member States; and Georgia, Kazakhstan, Serbia and Ukraine from UNECE Member States.

The present report provides a synthesis of the eight reports and was prepared by Mr Joseph Al Assad (PhD), Associate Professor at the USEK University, Lebanon. He is currently serving at the Ministry of Energy and Water as a senior advisor in renewable energy and energy efficiency. He has been leading a number of related initiatives, including the preparation of the Lebanese Renewable Energy Strategy, the National Renewable Energy Action Plan and the Lebanese Energy Statistics Review. The following experts helped review and finalize the document: Ms. Radia Sedaoui, Chief of the Energy Section and Mr. Mongi Bida, First Economic Affairs Officer - Sustainable Development Policies Division at UN ESCWA in Beirut.

Executive summary

Many developing countries, and countries with economies in transition, have set ambitious goals to increase the contribution of renewable energy (RE) in their energy mix to improve their energy security and to move towards more sustainable sources of energy. Many of these countries, however, still lack a proper regulatory and institutional environment that is favourable to promoting the financing of RE investments.

This report presents a synthesis of eight case-study reports developed within the scope of a UNDA project Promoting Renewable Energy Investments for Climate Change Mitigation and Sustainable Development implemented by the United Nations Economic and Social Commission for Western Asia (UN ESCWA) in partnership with the United Nations Economic Commission for Europe (UNECE). Four UN ESCWA members, representing the main UN ESCWA sub-regions were studied and four UNECE members, representing the main sub-regions of UNECE for this UNDA project. The UN ESCWA member countries were Morocco (Maghreb sub-region), Jordan and Lebanon (Mashreq sub-region) and the United Arab Emirates (Gulf Cooperation Council (GCC) sub-region). The UNECE member countries were Kazakhstan (Central Asia), Georgia (Caucasus), Serbia (south-eastern Europe) and Ukraine (eastern Europe).

The report presents a comparative analysis of each group of four countries, providing for each regional commission the status of RE policies in the studied countries and the similarities and differences that were identified. The analysis covers a wide range of samples of the type of RE policies that are being developed in various developing countries and countries in transition, showing those that are effective in providing favourable environments for RE investors in the different contexts.

The last part of the report presents a set of lessons learned from the development of the policies within the countries studied. The lessons learned can be articulated along the following key strategic axis and important aspects that must be considered:

- Energy security;
- Water-food-energy nexus;
- Good governance of the electricity sector;
- Clear targets for RE contribution;
- Appropriate administrative and legal frameworks;
- Adequacy of grid capabilities;
- Availability of financing mechanisms;
- Public awareness and social impacts;
- Commitment to global goals.

Based on the above axis and aspects, the report concludes with a set of recommendations that can be deduced from the eight case studies. The recommendations are provided within the following four categories:

- General RE policies;
- Legal and administrative frameworks;
- Technical aspects;
- Financing mechanisms.

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Abbreviations

A	ampere
ADWEA	Abu Dhabi Water and Electricity Authority (UAE)
BAU	business-as-usual (scenario)
BDL	Banque du Liban (Central Bank of Lebanon)
BIPV	building-integrated photovoltaics
BRSS	Beirut River Solar Snake (demonstration project)
BTU	British thermal unit
CHP	combined heat and power
COP	Conference of the Parties (UNFCCC)
CPV	concentrated photovoltaic
CSP	concentrated solar power
DECC	Directorate of Energy and Climate Change (UAE)
EC	European Commission
EDL	Electricité du Liban
EE	energy efficiency
EIB	European Investment Bank
EMRC	Electricity and Minerals Regulatory Commission (Jordan)
EnC	Energy Community
EPC	energy performance contract
ESCO	energy service company
EU	European Union
G	giga (1,000,000,000)
GCal	gigacalorie
GCC	Gulf Cooperation Council
GDP	gross domestic product
GEF	Global Environment Facility
GHG	greenhouse gas
GHI	global horizontal irradiance
GWh	gigawatt-hour
GWth	gigawatt thermal
HPP	hydropower plant
ICA	International Copper Association
IEA	International Energy Agency
INDC	Intended Nationally Determined Contribution (UNFCCC)
IPP	independent power producers
IRENA	International Renewable Energy Agency
J	joule
k	kilo (1,000)
K	Kelvin
kV	kiloVolt
kWh	kilowatt-hour
kWp	kilowatt peak
Ktoe	kilotons of oil equivalent
$ktCO_2eq$	kilotons of carbon dioxide equivalent
LCEC	Lebanese Centre for Energy Conservation
LCOE	levelized cost of wind power
LG	liquid gas
LPG	liquid petroleum gas
LRA	Litani River Authority

LRF	Lebanon Recovery Fund
M	mega (1,000,000)
MBtu	million British thermal units
MEMR	Ministry of Mineral and Energy Resources (Jordan)
MENA	Middle East and North Africa (region)
MEPS	Minimum Energy Performance Standards
Mtoe	million tons of oil equivalent
$MtCO_2eq$	million tons of carbon dioxide equivalent
MW	megawatt
MWh	megawatt-hour
MWp	megawatt peak
NAMA	Nationally Appropriate Mitigation Action
NEEAP	National Energy Efficiency Action Plan
NEEREA	National Energy Efficiency and Renewable Energy Action
NREAP	National Renewable Energy Action Plan
O&M	operation and maintenance
ONEE	National Office for Electricity and Potable Water (Morocco)
pJ	picojoule (one picojoule is equal to one trillionth of one joule)
PP	power plant
PPP	public-private partnership
PPA	power purchase agreement
PV	photovoltaic
R&D	research and development
RCREEE	Regional Centre for Renewable Energy and Energy Efficiency
RE	renewable energy
RFP	request for proposal
SCADA	supervisory, control and data acquisition
SHPP	small hydropower plant
SPP	solar power plant
SWH	solar water heater/heating
t	ton(s)
T	tera (1,000,000,000,000)
teCO_2	ton equivalent of CO_2
TFEC	total final energy consumption
TWh	terawatt hour(s)
toe	tons of oil equivalent
TPP	thermal power plant
UAE	United Arab Emirates
UAH	Ukrainian hryvnia
UNDA	United Nations Development Account
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UN ESCWA	United Nations Economic and Social Commission for Western Asia
UNFCCC	United Nations Framework Convention on Climate Change
US$	US dollar
V	volt
VA	volt-ampere
VAR	volt-ampere reactive
VAT	value added tax
W	watt

WB	World Bank
Wh	watt-hour
Wp	watt peak
WPP	wind-power plant

Introduction

UN ESCWA, in cooperation with UNECE, has been implementing a UNDA project titled "Promoting Renewable Energy Investments for Climate Change Mitigation and Sustainable Development".
The objective of the project is to "strengthen the capacities of government officials, national financial institutions and national energy experts and project developers, which are involved in renewable energy (RE) in selected developing countries and countries with economies in transition in the UN ESCWA region and UNECE region, to attract investments in renewable energy projects as a means of sustainable development and climate change mitigation".[1]

The UNDA project included case studies on the experience of policy reforms in selected countries from each of the two RCs. A total of eight countries were targeted (four from each RC): the UN ESCWA member countries, representing the main sub-regions, and the UNECE member countries representing the main UNECE sub-regions for this UNDA. The UN ESCWA member countries were Morocco (Maghreb sub-region), Jordan and Lebanon (Mashreq sub-region) and the United Arab Emirates (GCC sub-region). The UNECE member countries were Kazakhstan (Central Asia), Georgia (Caucasus), Serbia (south-eastern Europe) and Ukraine (eastern Europe).

This report presents a synthesis document of all the eight reports developed for the above-mentioned countries. The document starts with a general introduction, followed by Part 1, which presents a comparative analysis for the UN ESCWA countries. Part 2 presents the same analysis for the UNECE countries. Part 3 summarizes the lessons learned from the case studies carried out in both regions, and provides practical recommendations, based on typical national contexts, that can provide a framework for developing/improving successful RE policies at national levels. It also includes recommendations regarding support mechanisms that can be developed at the regional level.

[1] UNDA project document : https://www.un.org/development/desa/da/individual-project-view-public/?project_id=1218&_wpnonce=acc0e2c45f

Part 1. UN ESCWA case studies

This section presents the case studies of the four countries targeted within the UN ESCWA region. The main purpose of the case studies was to develop country reports on policies that had helped in transforming, totally or partially, the RE market in the country under consideration. The report needed to show how RE policies contributed to the promotion of RE investment projects and helped them become more viable economically, i.e. improving their bankability and helping them have better access to financing. Each country report needed to clearly reflect the practical experience in the case study and the countries' specificities in that regard. Each country report also included an overview of the country's geopolitical context, its energy situation and its RE potential.
The structure of the comparative analysis presented for the four countries is similar to the structure of the country reports. The first section begins by comparing the energy sector in each of the four countries, the second section compares the available RE resources and their corresponding potential, while explaining the assessment methodology used to estimate that potential. Section 3 considers current and prior policies, specialized financing mechanisms and the suitability of present policies to meet strategies and targets. The fourth section presents a comparison between the situation in the different countries before the studied policies that are assessed in section 5 from the economic and environmental points of view. Section six presents the different considerations within the policy design itself to conclude in section 7 with the challenges that can be encountered through the implementation of these policies in each of the countries.
The four countries considered for the UN ESCWA region case studies are Jordan, Lebanon, Morocco and the United Arab Emirates (UAE).

1.1 Energy sector characteristics

1.1.1 Primary energy supply

The countries that were considered for the UN ESCWA case studies are quite diversified in terms of their primary energy supply. While the UAE is considered one of the major hydrocarbon reserve-holders and exporters in the world, Morocco has no known oil or gas reserves and Lebanon is looking at different prospects of oil and gas explorations in the Mediterranean Sea beyond its shores.
Both Lebanon and Morocco depend highly on primary energy imports, with the former importing approximately 96.8% of its energy needs and he latter 93.6%. This reflects highly on their energy security and gives renewable energies a different dimension in these countries, where they would play a major role on the level of energy security. As for the UAE, it was classified in 2015 as the eighth largest oil producer and 14th gas producer in the world. Moreover, the UAE also imported gas from Qatar through the Dolphin pipeline at a rate of 2 US$ per million British thermal units (MBtu), complementing its needs for gas.

Table 1: Total final energy consumption in the selected UN ESCWA countries in 2015

UAE[2]	Lebanon[3]	Morocco[4]	Jordan[5]
53,156 ktoe	4,884 ktoe	14,951 ktoe	5,548 ktoe

A large difference can be noticed in the total final energy consumption (TFEC) of each of the countries in 2015: in the UAE it was 53,156 thousand tonnes of oil equivalent (ktoe), in Morocco around 14,951 ktoe and in Jordan 5,548 ktoe, whereas for Lebanon, it amounted to 4,884 ktoe. It

[2] https://www.iea.org/statistics/statisticssearch/report/?country=UAE&product=balances&year=2015

[3] https://www.iea.org/statistics/statisticssearch/report/?country=LEBANON&product=balances&year=2015

[4] https://www.iea.org/statistics/statisticssearch/report/?country=MOROCCO&product=balances&year=2015

[5] https://www.iea.org/statistics/statisticssearch/report/?country=JORDAN&product=balances&year=2015

should be noted that data are more easily accessible in Morocco and UAE than in Lebanon, where it is difficult to find a complete dataset for primary energy for years other than 2010, which was considered the baseline year for both the National Energy Efficiency Action Plan (NEEAP) and National Renewable Energy Action Plan (NREAP).
As for the energy mix in these countries, Morocco is setting highly challenging targets in terms of renewable energies to help diversify its energy mix, hence reducing the share of oil products from 54.5% in 2014 to 46.1% in 2025. As for Lebanon, the main shares of primary energy consumption come from fuel oil, gasoline and gasoil that are mostly consumed for electricity production or within the transport sector. Finally, for UAE, most of the primary energy comes from natural gas and oil products and are essentially consumed by the industry, transport and building sectors.
Finally, Jordan has two main challenges regarding its energy situation: the growing energy demand on the one hand and the very limited domestic resources to fulfil this demand on the other hand. In 2015, the local production of energy – including crude oil, natural gas and renewable energy – was 305 ktoe, which was enough to cover only about 4% of energy consumption. Limited domestic resources meant that Jordan had to import 7,656 ktoe of energy to meet its demands, meaning that the cost of the energy consumed amounts to as much as 17% of its gross domestic product (GDP).

1.1.2 Characteristics of the electricity sector

The countries that were covered by the UN ESCWA case studies are widely diversified in terms of the characteristics of their electricity sectors. Lebanon is struggling to satisfy the increasing demand for electricity, especially with the arrival of more than 1.5 million Syrian refugees, and Morocco is looking to diversify its energy mix with the aim of lowering its dependence on external energy resources and thereby increasing its energy security. As for the UAE, the priorities are different where the infrastructure is highly advanced. In fact, both Abu Dhabi and Dubai are trying to fully install digital electricity meters. Abu Dhabi has already installed 506,000 meters representing 90% of the total of installed meters, whereas Dubai has already installed 300,000 meters. This well-developed smart grid in the UAE helps to integrate renewable energies and presents an advantage for the whole sector. The Moroccan grid has already integrated a large number of large-scale RE projects.
In terms of existing capacities, Morocco's total installed power generation capacity was 8,160 MW in 2015. This consisted of 5,412 MW (66%) of thermal power stations, 1,770 MW (22%) of hydropower, including 464 MW of hydro pumped storage; wind and solar generation plants provided the remaining 977 MW (12%). In the case of UAE, the total installed capacity is 28,829 MW. Moreover, UAE is moving proactively to incorporate clean power generation technologies in its energy mix, including both renewables and non-renewables, as well as nuclear power and clean coal. Finally, numbers in Lebanon are comparably lower where the installed capacity of thermal power plants (TPPs) is 2038 MW but the actual capacity is 1,685 MW. Thermal capacity represents 86.5% of installed capacity and 88.7% of effective capacity, whereas installed capacity in the case of hydroelectric power plants (HPPs) is 274, while in 2010 it was effectively 192 MW. Moreover, in 2010, the Lebanese public utility, Electricité du Liban (EDL), imported electricity from both the Syrian Arab Republic and Egypt in the amount of 107.4 GWh.
As for the electricity consumption in each of the four countries, Table 2 provides some key electricity figures for the four countries.

Table 2: Characteristics of the electricity sector in the selected UN ESCWA countries (2015)

	UAE	Lebanon	Morocco	Jordan
Installed capacity (MW)	28,829	2,312	8,159	4,266

Electricity consumption (GWh) in 2015	111,076[6]	18,664[7]	29,939[8]	16,127[9]

1.1.3 Energy demand characteristics

Primary energy demand in Morocco is expected to continue the rapid growth it has experienced in the last decade. The main underlying factors are economic and industrial development, demographic growth, improved access to electricity (from 22% in 1996 to 99.15% in 2015) and the diffusion of household appliances. In a baseline scenario with no energy efficiency policy, energy demand is expected to be around 42.600 million tons of oil equivalent (Mtoe) by 2030, growing at a rate of 4.3%. In the energy efficiency scenario, energy demand is expected to be around 33.8 Mtoe, which corresponds to a growth rate of 3.3%. Electricity demand has grown fast, at an average annual rate of around 6.5%, between 2005 and 2015 to reach 34,413 GWh. According to the National Office for Electricity and Potable Water (ONEE), future electricity consumption will grow at an average rate of 5.5% and could reach 45 TWh by 2020, 58 TWh by 2025 and 74 TWh by 2030.

In the UAE, the residential and commercial sectors are the biggest consumers. In general, UAE has more installed capacity than needed. According to the International Renewable Energy Agency (IRENA), the projected growth in power capacity between 2010 and 2020 is expected to be 6.2% per year and 4.2% per year between 2020 and 2030.

In Lebanon, the lack of data obliged the developers of NREAP to rely on estimations to evaluate the final energy consumption for 2010, considered as the baseline. Because of the lack of data, it is difficult to judge the evolution of primary energy in Lebanon. On the other hand, the electricity reform paper stated that, until 2010, the increase in demand was estimated at 7% in terms of electric energy. However, the second NEEAP for 2016–2020 set a target to lower that demand by 2020 to around 5.81%. Based on data provided by EDL the peak load increased from 1,984 MW in 2006 to 3,088 MW in 2014, also with an average increase of approximately 7%.

Concerning Jordan, demand for primary energy will continue to increase by an expected 5% between 2007 and 2020 as presented in the corresponding case study.

Table 3. Energy demand increase in the four selected UN ESCWA countries[10]

	UAE	Lebanon	Morocco	Jordan
Primary energy demand increase	5.5% (calculated)	7% (estimated)	3.3%	5%
Electricity demand increase	6%	7% (2010)	6.5%	Not applicable

1.1.4 Energy intensity

In order to be able to compare the selected countries, the website of the International Energy Agency (IEA) was considered as a reference for Table 4.

Table 4. Energy intensity in the selected UN ESCWA countries

	UAE[11]	Lebanon[12]	Morocco[13]	Jordan[14]

[6] https://www.iea.org/statistics/statisticssearch/report/?country=UAE&product=electricityandheat&year=2015

[7] https://www.iea.org/statistics/statisticssearch/report/?country=LEBANON&product=electricityandheat&year=2015

[8] https://www.iea.org/statistics/statisticssearch/report/?country=MOROCCO&product=electricityandheat&year=2015

[9] https://www.iea.org/statistics/statisticssearch/report/?year=2015&country=JORDAN&product=ElectricityandHeat

[10] Based on the individual case-studies: https://www.unescwa.org/events/enabling-policies-promote-financing-renewable-energy

[11] https://www.iea.org/statistics/statisticssearch/report/?country=UAE&product=indicators&year=2015

[12] https://www.iea.org/statistics/statisticssearch/report/?country=LEBANON&product=indicators&year=2015

[13] https://www.iea.org/statistics/statisticssearch/report/?country=MOROCCO&product=indicators&year=2015

[14] https://www.iea.org/statistics/statisticssearch/report/?country=JORDAN&product=indicators&year=2015

Primary energy intensity (ktoe/2010 US$)	0.2	0.19	0.17	0.29
Total primary energy supply/population (toe/capita)	8	1.31	0.56	1.14

1.2 Renewable energy potential

Table 5 shows a summary of the reported RE potential in Lebanon and Morocco. No similar figures were reported for Jordan or the UAE. The figures for Lebanon and Morocco correspond to technically achievable potential, but do not seem to be based on a similar set of assumptions, which explains some of the differences in the order of magnitude between the two countries.

Table 5. Renewable energy: technical potential in the selected UN ESCWA countries

	Lebanon	Morocco
Wind	5,408 MW	327,000 MW
PV farms	87,600 MW	10,830,000 MW
Distributed photovoltaic	170 MW	
Concentrated solar power	8,065 MW	8,828,000 MW
Hydro	368 MW	23 MW (potential additional resources)
Solar water heater	1,105 GWh	
Geothermal	109 GWh	
Biomass	606.5 GWh	

1.3 Current and prior policy status

1.3.1 Energy strategy and targets

All four countries officially announced targets in terms of the share of renewable energy within their mix. It is to be noted that Morocco announced its target in terms of installed capacity and not energy generation.

In fact, UAE 2021, which was developed in 2010, sets a new path and a national agenda. Through this agenda, the UAE central Government gave clear signals to each emirate regarding the importance of adopting clean energy strategies and developing the related policies. Abu Dhabi announced in 2009 that 7% of power capacity would be from renewables by 2020. Dubai followed by announcing various RE targets, including 7% of solar power by 2020 and 25% of solar power by 2030. In the beginning of 2017, the implementation of the "Dubai Clean Energy Strategy 2050" was launched aiming to provide 75% of its energy through clean energy sources by 2050. Solar and other renewable technologies, especially storage, are advancing fast and can eventually lead to newer RE targets and energy mix in the future. Table 6 shows clean power generation targets set by UAE, Abu Dhabi and Dubai. In addition, Abu Dhabi and Dubai have set electrical peak load reduction targets, which will rely on photovoltaic (PV) rooftops and building-integrated photovoltaics (BIPV).

Table 6. Power generation: announced targets in the UAE

	2020	2021	2030	2050
UAE		24 % of clean energy of total energy mix		
Abu Dhabi	7% renewables (solar), 19% nuclear			
Dubai	7% renewables		25% renewables (solar), 7% nuclear	75 % of energy generated will be from clean sources

Because of Morocco's reliance on imports for most of its energy needs, the Government developed a National Energy Strategy setting clear and precise objectives. This strategy covers four main strands: optimize the fuel mix in the electricity sector; accelerate the development of energy from renewable sources, especially wind, solar and hydropower; make energy efficiency a national priority and promotegreater regional integration. The New Energy Roadmap, announced at COP21 (Paris, 2015) bolstered this ambition to a target of 52% renewable energy in 2030, of which 12% is hydro, 20% is solar and 20% is wind generation.

In the case of Lebanon, during COP15 (Copenhagen, 2009), the Lebanese Government launched a commitment to have 12% of renewable energy in 2020. In 2010, the Lebanese Government strengthened and clarified this vision in their *Policy Paper for the Electricity Sector* (Bassil, 2010) by stating that the target was to reach "12% of the electric and thermal supply" not just "12% of Lebanon's needs". This was further refined in The National Renewable Energy Action Plan for the Republic of Lebanon, where a clear path was set towards the 2020 target of 12%, which corresponds to 767 ktoe of RE.

In the case of Jordan, the only available official document related to renewable energy policy is the National Energy Strategy for the period 2015–2025 (Ministry of Energy and Mineral Resources, approved by the Government of Jordan in August 2016, which is basically a revision of the Master Strategy for the Energy Sector (2007–2020) issued in December 2007. The prime aims of the strategy are: achieving energy security and sustainable supply; increasing the share of indigenous sources in the national energy mix; reducing dependence on imported energy; and reducing the energy bill and its burden on the economy.

1.3.2 Current renewable energy policies and institutional framework

Renewable energy plans and targets must be backed by clear policies and by national institutions and regulatory bodies.

In the UAE, each emirate sets its own policies and regulations. Both the emirates of Dubai and Abu Dhabi have established specialized agencies for renewable energies. Other emirates are still lacking such institutions and rely essentially on national agencies.

At the national level, UAE has been the most active GCC country in establishing specialized institutions to promote RE. In addition to the Ministry of Energy, which oversees strategic energy decisions, a separate unit, the Directorate of Energy and Climate Change (DECC), was established in 2010 within the Ministry of Foreign Affairs. In addition to its active role at the international level (climate change negotiations and monitoring, interface with relevant international agencies, etc.), DECC also played an important role in the development of sustainable energy.

Regarding tariff policies for electricity from RE, Abu Dhabi and Dubai are currently implementing auction mechanisms that follow the IPP-PPA model (independent power producers (IPP), contracted through power purchase agreements (PPA)) and moving away from the engineering, procurement and construction (EPC) model. This policy has proved successful through several world record prices for RE, especially for PV and CSP.

In Morocco, RE targets are articulated around two ambitious programmes: the Moroccan Solar Plan (Noor) aiming to reach 2,000 MW of installed solar power capacity (PV and CSP) by 2020 and approximately 4,800 MW by 2030, and the Moroccan Integrated Wind Programme, aiming to achieve 2,000 MW of installed wind power capacity by 2020 and up to 5,000 MW by 2030.
In order to promote RE deployment, Morocco has adopted three main pillars of action: the promulgation of actual regulations and laws to favour RE expansion for electricity generation; establishment of institutions with the capacity to manage, supervise and promote RE projects; and the implementation of projects and major financial investments to build the required RE facilities.
The Government has also demonstrated its commitment in the past few years by establishing a series of public agencies and institutions which were set up to better organize and structure the promotion of renewable energy development. These include:

- The Agency for the Development of Renewable Energies and Energy Efficiency **(**ADEREE**)**, which is responsible for the development of energy-management policies. The tasks of ADEREE include the development and realization of national and regional plans for renewable energy and energy efficiency;
- The Moroccan Agency for Solar Energy **(**MASEN**),** which is a State corporation with public funding, established in November 2009. It is jointly owned, in equal proportions, by the Moroccan Government, the Hassan II Fund for Economic and Social Development, ONEE and the Energy Investments Corporation. MASEN has recently been assigned to be in charge of the realization of all RE projects in Morocco;
- The Energy Investments Corporation (Société d'Investissements Energétiques **(**SIE), founded in 2010 as an investment fund for the energy sector in Morocco in order to facilitate diversification of energy resources, promotion of renewable energy and energy efficiency. It is a public investment company established by the Moroccan Government to manage the Energy Development Fund with a capital of 1 billion Moroccan dirham (MAD) (100 million US$);
- The Research Institute for Solar Energy and New Energy was founded in 2009 to promote research, development and innovation of RE technologies around the country. It conducts and finances specific research projects and promotes the building of a network among researchers, projects and universities to strengthen knowledge capacity around renewable and low-carbon technologies.

In Lebanon, the Ministry of Energy and Water is the main stakeholder of the energy field. The Lebanese Centre for Energy Conservation (LCEC) plays the role of national energy agency. As such, it is the technical arm of the Ministry in all issues related to energy efficiency, renewable energy and green buildings.
LCEC offers expertise and support to the Government of Lebanon to develop and implement national strategies with respect to sustainable energy issues. Other important stakeholders are also involved, including EDL, the public utility which is the main final offtaker of electricity generated from renewable energy. EDL would have to handle the distribution of the electricity from RE and associated grid requirements.
In Jordan, the institutional framework includes the following:

- The Ministry of Energy and Mineral Resources, which is responsible for the comprehensive planning process of the sector and for setting the general plans of the energy sector and ensuring their implementation;
- The National Energy Research Centre, part of the Royal Scientific Society, was established in Amman for the purposes of research, development, training in the fields of new and renewable energies and raising the standards of energy use in the different sectors;

- The Energy and Minerals Regulatory Commission, a governmental body that is considered the legal successor of the Electricity Regulatory Commission, the Jordan Nuclear Regulatory Commission and the Natural Resources Authority in relation to its regulatory tasks.

1.3.3 Renewable energy policy and institutional reforms being introduced/considered

Two major sets of reforms introduced in UAE will have an impact on future RE policies. The first set of reforms, introduced in 2016, will have an indirect impact on the promotion of RE and includes a major overhaul of the UAE federal Government, where a Ministry of Climate Change and Environment was established to tackle climate change and environmental challenges. The second component of this set is the newly established Council of Scientists charged to review the national policy on science and technology and will oversee research and development in advancing science and technology in UAE, including the sustainable energy sector.

The second set of reforms was introduced in Abu Dhabi where the Government has established the Energy Authority, which will include representatives of all government entities involved with domestic energy issues (major energy producers and consumers, etc.) for collective strategic policymaking and regulations. The new entity will facilitate the coordination, collaboration and sharing of information among all related stakeholders at both national and emirate levels, which can have a direct impact on RE adoption and integration in UAE.

In Morocco, several reforms took place during 2015 and 2016. A new national regulator for the electricity sector was established (Autorité nationale de régulation du secteur de l'électricité, (ANRE)). The main mission of ANRE is to ensure the good functioning of the free market for electricity generated from renewable sources and regulate the access of self-producers to the national electricity transmission grid under current regulations. ANRE will also carry out many regulatory attributions related to grid access.

During the same period, a new law reinforced the role of MASEN with respect to reaching the new national RE targets expected by 2030, making it the sole public implementation agency for all RE projects.

Another law allowed better conditions for self-production, from all generation sources, by permitting self-producers, with global capacity of more than 300 MW, access to the national grid and selling the surplus production exclusively to ONEE, through a pre-signed agreement.

In terms of financing, Morocco adopted an innovative financial mechanism based on the project finance model within the framework of public-private partnership (PPP). Financial arrangements combine domestic and foreign public and private funds and refer to concessional and non-concessional financing mechanisms as part of multilateral and bilateral cooperation. This model was crucial in reducing the risk of large-scale projects, thus securing the financing thereof.

In Lebanon, the first NEEAP adopted in 2011, that included initiatives both for renewable energies and for energy efficiency, was split into two separate documents: one for renewables (NREAP) and one for energy efficiency (NEEAP) for the period 2016–2020. This was done based on the recommendation of the League of Arab States and by adopting the templates developed for each of the two documents within the framework of the Arab Renewable Energy Framework.

Finally, in Jordan, all the work is currently being done under the single-buyer model. The Electricity and Minerals Regulatory Commission (EMRC) plays the major role in determining both bulk and retail tariffs under the single-buyer model. In order to strengthen transparency with stakeholders in the RE sector and facilitate licensing procedures, EMRC is keen on revising, amending, and modifying the terms of the existing RE project-licensing forms. It has announced a call for tender for the services of an international consultant to study the development and implementation of wheeling charges and to review standard transmission-connected generation licenses and standard distribution-connected renewable energy generation licenses in addition to the development of standard procedures for license applications.

In addition to this revision, the licenses are to be amended to comply with current trends in Jordan, after having identified possible gaps or topics not clearly specified in the law, as well as points having general references and needing a more detailed approach. One of the main objectives of the

expert's mission is to encourage renewable energy producers to develop new RE units in line with the law.

1.3.4 Specialized financing mechanisms

In the UAE, no known specialized financing mechanisms have been developed, apart from the IPP-PPA scheme. However, the scale of the projects announced is helping UAE set world records in terms of PPA prices of kWh generated by renewables, especially in the case of solar PV and concentrated solar power (CSP).

Morocco created two financial incentive programmes before the adoption of its National Strategy. The first focused on a PPP set-up to provide the rural population with solar PV systems to produce off-grid electricity. The second programme (EnergiPro) encouraged energy-intensive industrial groups to produce their own renewable electricity up to a maximum of 10 MW of installed capacity. The current incentive schemes for a private sector contribution to RE include EnergiPro that was extended to allow up to 50 MW of installed capacity. Competitive bidding contracts and, finally, as part of the Rural Electrification Programme, PV home solar systems have been deployed in areas remote from the electrical grid.

For large-scale renewable energy projects, one of the main success factors was the innovative financial mechanism adopted within the bidding process. In fact, the Moroccan approach is based on the project finance model within the framework of PPP. Financial arrangements combine domestic and foreign public and private funds and refer to concessional and non-concessional financing mechanisms as part of multilateral and bilateral cooperation. This model was crucial in de-risking large-scale projects, thus securing the financing thereof.

Also, Morocco offers sector-specific incentives for the promotion of its domestic solar industry. They include:

- Benefits stemming from free-zone status granted to export-oriented RE solar industries conceding up to 30% of sales realized in the local market;
- Investment grants funded through the 400 million MAD **(**about US$ 48 million) channelled through the Energy Development Fund;
- Support for training and hiring through the "Agence Nationale de Promotion de l'Emploi et des Compétences; ANAPEC (National Agency for the Promotion of Employment and Skills)"

, .

Aside from these incentives, customized for investments in the renewable energy sector, other incentives also exist, especially for those larger than 200 million MAD (€19 million). These incentives address access to land (20% reduction in the cost of acquisition), infrastructure, training, as well as VAT exemption for three years and the exemption of customs duties for three years.[15]

In addition to producing power, this wind programme aims to promote Morocco's wind industry, to constitute a high-level expertise base and to strengthen research and development (R&D) at the national level in order to master this technological sector which offers strong potential for furthering Morocco's economic development.

The first NEEAP for Lebanon in 2010 introduced 14 initiatives related to renewable energy and energy efficiency combined. Without any doubt, the most successful initiative was initiative 11 that introduced the National Energy Efficiency and Renewable Energy Action or NEEREA.

NEEREA was created in collaboration with the Central Bank of Lebanon (BdL) in order to provide the private sector with long-term loans at low interest rates for any type of renewable energy or energy efficiency project. It is dedicated to supporting the financing of new and existing environmental projects, including energy efficiency and renewable energy implementations.

The only green financing mechanism in the Arab region is NEEREA (Lebanon), that has a loan ceiling of US$ 20 million per project and is offered at an interest rate of around 0.6% for periods

[15] AMDI (Moroccan Investment Development Agency): http://www.invest.gov.ma/

that should not exceed 14 years, including a grace period of between six months and four years. These loans are provided through any of the Lebanese commercial banks to directly reach the end user.
The European Union also contributed by offering a grant to small or medium-sized enterprises over a share of the investment cost of maximum US$ 5 million. This share varies between 15% for non-subsidized sectors and 5% for subsidized sectors, with a ceiling of US$ 750,000 for the former and US$ 250,000 for the latter.
The Central Bank of Lebanon has issued several circulars to ensure the consistency of NEEREA among all Lebanese commercial banks. As per the Intermediate Circular 236, Lebanese commercial banks can free some of their required reserves at BdL to finance NEEREA projects. After Circular 236, the sustainability of the NEEREA financing mechanism was secured by several periodic circulars such as 313, 318 and 346.
Moreover, BdL signed an agreement with the Italian Ministry of Environment, Land and Sea, whose purpose is to support energy saving and efficiency investments in Lebanon, including investments in renewable energy, implemented by or involving Italian small and medium-sized enterprises. A grant will be given for all projects having not less than 60% of their value coming from Italian products and financed through the NEEREA loan in all economic sectors except the residential one. The grant share does not exceed 10% of the value of the NEEREA loan with a ceiling of US$ 2,000,000 for the loan.
NEEREA is witnessing a rapid growth and a wide acceptance from the public, despite the barriers and instabilities in the energy sector. Although there are policies tackling energy issues, the policies and regulations still lack enforcement and implementation on the ground and some of them are outdated, hence the private sector's lack of trust in the Lebanese Government. In addition, most of the fossil fuel prices are highly subsidized, which is pushing the private sector to rely on diesel-based generators to satisfy its energy needs, instead of encouraging them to invest in RE projects. Despite all these barriers, NEEREA loans are becoming a booming trend in the Lebanese banking sector, where more than 480 projects worth more than US$ 400 million were financed until April 2016.
Moreover, in 2011, net-metering was introduced in Lebanon through a decision from the board of EDL that was approved by the Ministry of Energy and Water (MEW), knowing that the efforts to develop net-metering started during March 2010 with the involvement of EDL technical and legal teams, MEW advisers, the United Nations Development Programme (UNDP) Country Energy Efficiency and Renewable Energy Demonstration Project for the Recovery of Lebanon and the LCEC team.

Finally, the Jordan Renewable Energy and Energy Efficiency Fund, set up by the Renewable Energy and Energy Efficiency Law, was launched in 2013 by MEMR. The Fund provides grants for energy projects and guarantees investors' funding requirements. The wheeling regulations were issued by the Energy and Mineral Regulatory Commission (EMRC) designed to enable and regulate off-site renewable energy production and on-site consumption by private offtakers. Moreover, in December 2012, EMRC announced the introduction of a feed-in-tariff (FIT) system for net-metering, which is designed to reduce energy demand and allow the sale of surplus energy generated back to the national grid. This is the first FIT to be implemented in the Middle East. A reference pricelist record used to calculate a ceiling for purchase prices for electricity from RE sources. These prices will be applicable to the winning bidders of the direct proposals for RE projects and, if they install a fully Jordanian origin facility, the tariff can be increased by 15%. Finally, a net-metering scheme for small RE rooftop systems with fixed purchase prices for excess power was established.

1.3.5 Suitability of current renewable energy policies and institutional framework to meet announced strategies and targets

In the UAE, at the emirate level, the Masdar Company in Abu Dhabi, worked with the Regulation and Supervision Bureau (RSB) and the Abu Dhabi Water and Electricity Authority (ADWEA) to

facilitate the grid integration of both the 10 MW solar PV plant in Masdar City and the Shams 1,100 MW CSP Plant. The lessons learned, and experience gained from the two plants will accelerate the integration of future RE projects into the grid. Similarly, the Dubai Supreme Council of Energy, working with RSB and ADWEA, facilitated the building and integration of 13 MW PV power into the grid. The lessons learned from these existing RE policies and institutional frameworks will help meet the announced targets especially with the pace of announcing new projects. By 2020, a clearer picture will emerge which will show the real success of existing RE policies and related institutional frameworks.

In Morocco, one of the most important steps of RE policy development was the introduction of a law that was promulgated in 2010 designed to promote and liberalize the RE sector. This law allows electricity to be produced and exported by any private producer as long as RE sources are utilized. Through this policy, the Moroccan Government opened up the energy market by facilitating new entries and by supporting independent RE producers. Present RE policy, however, needs to be completed by an appropriate framework aiming to facilitate small and medium-sized RE investments.

In Lebanon, the target that was set in 2009 – 12% of renewable energy – was very ambitious, especially as it was set in the NREAP on the primary-energy level. Achieving such a target will require clear and supporting legal and institutional frameworks, which are still lacking in Lebanon. Moreover, the national target was not clear before the publication of NREAP 2016–2020 and most renewable energy policies were annexed to other types of policies in the electricity reform paper or in the first NEEAP 2011–2015.

Additionally, the only possibilities for interconnection between RE projects and EDL's national grid were very limited either in terms of size or in terms of clarity of the connection requirements. In fact, the absence of an EDL grid code is also one of the obstacles facing the development of renewable energies.

Finally, Jordan is unique in the Middle East in that there is a policy in place which requires the Government to cover the cost of grid connection for developers. Jordan's almost complete dependence on imported fossil fuels has significantly altered the discourse on renewable energy. Jordan has witnessed accelerated growth in the exploitation of RE resources, namely wind and solar, as embodied by the achievements accomplished during 2016. These achievements were the result of continuous efforts which enabled all the difficulties and challenges to be met through the Government's adoption of supporting policies to encourage investment in in RE projects. By adopting the necessary laws and legislations, the Government created a successful investment environment with a high return, aiming at accelerating the growth of the RE sector to comply with the comprehensive national strategy of the energy sector.

New regulations and the lower inherent risk in solar projects are likely to lead to more investor confidence and raise the bankability of projects. Nonetheless, fossil fuels look likely to remain the baseload energy supplier for the foreseeable future. At a high level, the energy sector's key challenges remain the resilience of the sector through its exposure to external price fluctuations and the economic consequences thereof, which is recognized in Vision 2025.

1.4 Economic, environmental and policy analysis

1.4.1 Overall impact of the policy

With its clear vision for economic transformation of the country, the UAE became a hub for renewable energies with several bids achieving world record prices. This attracted many RE-related international companies to establish offices in UAE in partnership with local companies. Two major RE associations were created: the Middle East Solar Association, established in 2009, and the Emirates Solar Industry Association, established in 2012. Moreover, Masdar City included a high-tech cluster of energy companies collaborating with both the Masdar Company and Masdar Institute to advance the adoption of RE technology in UAE and the wider region.

All the above associations and Masdar Company are playing a crucial role in developing the RE market. By signing a PPA-IPP to build and operate a solar plant, the Government guarantees payment for the energy produced. This, in turn, encourages financial institutions to invest in RE

projects. Shams 1 plant was a good example of a successful PPA-IPP model. All IPPs in UAE are mostly owned by the Government (60% in case of Shams 1) and this is an additional incentive for the financial sector.
The size of projects implemented and planned in Morocco, together with their challenging targets, helped attract large RE companies, as well as large investments from investors and financial institutions to create high dynamism on different levels within the country.
Morocco succeeded in becoming one of the world's leading countries in large-scale RE projects. This was possible due to the commitment of the Government, expressed through challenging RE goals, combined with its ambition to export renewable energy to Europe, profiting from its geographical proximity and existing electrical connection.
In Lebanon, the implementation of the NREAP is having various impacts on the electric sector. Two promulgated laws will allow the private sector to generate electricity for the first time in Lebanon with the initial IPP licenses being issued by the Government for three wind farms. Implementing the NREAP, which calls for the deployment of 931.8 MW of RE power generation projects and 1 million m^2 of solar water heater (SWH) collectors, will open the door to large-scale RE projects in Lebanon and will draw significant investments from the private sector, both nationally and internationally. Many companies will have to be created locally with some existing businesses shifting to RE.

Jordan has profited from its abundant RE potential to lower its dependency on energy imports, especially because RE technologies are not complex, require less operating and maintenance (O&M) costs and are inherently more environmentally friendly than conventional energy sources.

1.4.2 Economic impacts of the policy

Since 2006, many RE companies have been established in UAE, leading to direct job creation. Many supporting businesses were also created around the RE industry which resulted in indirect job creation.
This gave UAE an advantage in building the private sector and human capital knowledge and expertise in the RE sector which will expand its operation to other countries in the region and beyond.
Masdar Company has become an international brand and has many RE projects with other international partners in many countries around the globe.
In Morocco, investing and promoting renewable energies offered major benefits to the local economy as infrastructure investments are localized and much of the revenue remains within the regional domain, rather than flowing out to pay for imported fuel resources.
According to a study by the Ministry of Energy and Mines, the job-creation potential of the RE sector in Morocco is estimated at over 23,000 jobs in 2020. Furthermore, the study estimates that the minimum training needs in RE by 2020 to be 4,300 technicians, 4,800 skilled workers and 1,300 engineers.
In this context, Morocco set up three training institutes specializing in renewable energy and energy efficiency trades: Instituts de Formation aux Métiers des Energies Renouvelables et de l'Efficacité Energétique). The outposts for these institutes are set up in the three cities hosting Morocco's principal investments in solar and wind programs (Oujda, Ouarzazate and Tangier).
In Lebanon, the first impact that the development of such an RE market could be estimated by comparing the levelized cost of electricity (LCOE) of each of the renewable energies considered with the LCOE of electricity generation by EDL, reported by MEW as approximately 20.2 US cents/kWh.
It can therefore be concluded that all the RE technologies studied have an LCOE lower than the actual cost of electricity production by EDL, especially when comparing RE systems with hybrid electrical systems, including diesel generators, and where the real electricity generation cost is around 35 US cents/kWh – an indicative price provided by MEW for private generators.

All this will make savings for the Lebanese economy, with the direct cumulative savings being approximately US$ 319 million.
More explicitly, RE installations will induce a market with a size of investments between US$ 1,603 and US$ 3,166 million, which will surely create many direct and indirect job opportunities.

Jordan profits directly from renewable energies by the lowering of its imported energy bill. Furthermore, the national strategy estimates jobs created by only installing, maintaining and running RE facilities to be around 3,000 by 2020. In addition to direct job creation in RE industry, unrelated local business will benefit from increased household and commercial incomes. Also, increasing renewable electricity production would reduce the need to spend money on importing oil and natural gas.

1.4.3 Environmental impact of the policy

Figure 1 shows the potential CO_2 emission reductions from the various clean energy technologies proposed for the energy mix in the power sector in UAE. The contribution of RE to these emission reductions is forecast to be approximately 2,426,221 ktoe in 2020 and 5,594,538 ktoe in 2030. .

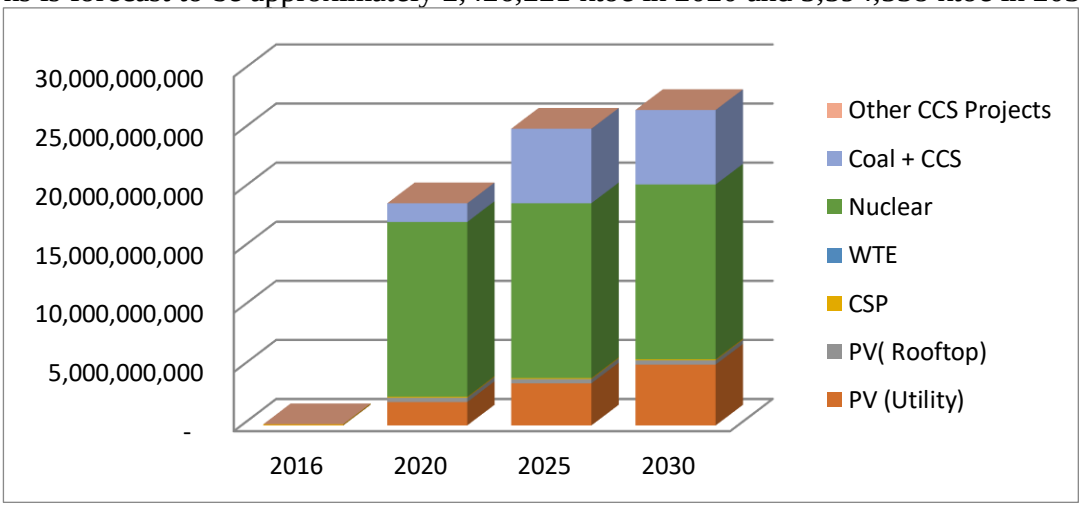

Figure 1. Potential CO_2 emission (tCo_2/kWh) reduction from clean energy deployment in UAE

According to IRENA, RE plans could result in an approximately 5% reduction in water withdrawal and consumption. A negative impact of RE deployment, however, would be the increase in the use of water for cleaning PV panels and CSP mirrors due to dust and humidity. This could be solved by finding more sustainable technical solutions.
In Morocco, electricity remains the main source of CO_2 emissions compared to other sectors. The wind, hydro and solar development programmes will help reduce greenhouse gas (GHG) emissions significantly by 2020 and 2030.
Based on RE targets, the share of renewable energy generation will rise from 8% in 2012 to 30% in 2030 and the CO_2 emission per electricity generation will register a continued decrease of 26.5% between 2012 and 2030.

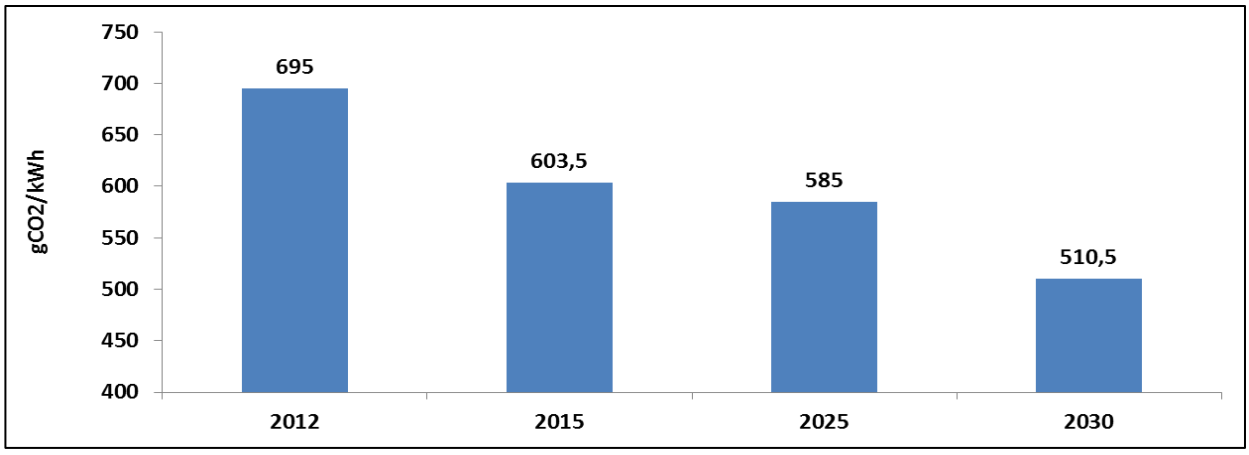

Figure 2. Future evolution of CO_2 emissions per kWh from electricity generation in Morocco

In Lebanon, in the case of full application of the NREAP, a reduction of more than 2,206 $ktCO_2eq$/year of equivalent GHG emissions will be reached, helping to lower Lebanon's contribution from 19,603 $ktCO_2eq$/year to 17,397 $ktCO_2eq$/year (a reduction of about 11%).

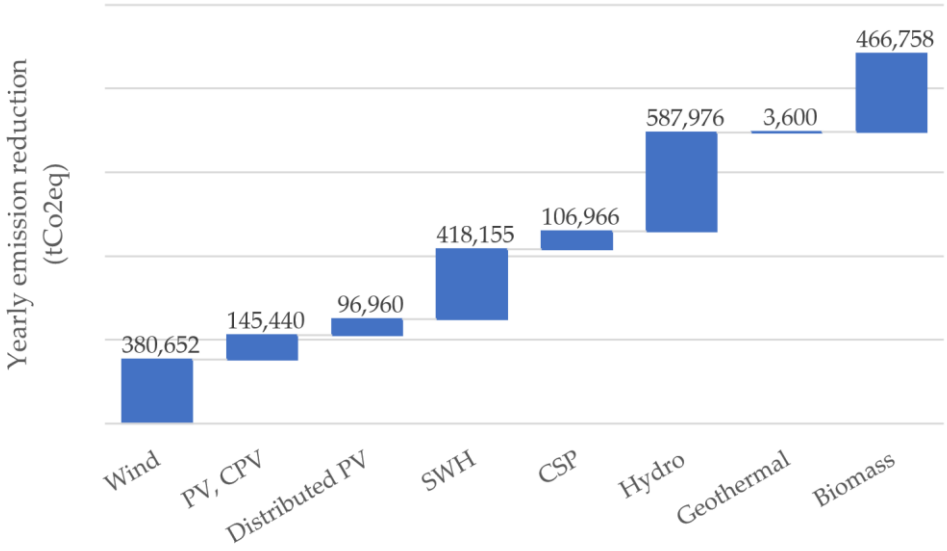

Figure 3: Yearly emission reduction for each of the RE technologies in Lebanon

In Jordan, the expected total reduction of GHG emissions in 2020 as a result of RE for power generation and direct application, would be about 1.85 $MtCO_2eq$, which is about 4.5% of the predicted emissions in that year as calculated in Jordan's Intended Nationally Determined Contribution (INDC) report. The estimated accumulated reduction, as a result of power generation, during the period 2016–2025 would be around 16 $MtCO_2eq$ and approximately 4.5 $MtCO_2eq$ due to using RE sources in direct applications, such as water and space heating (Figure 4).

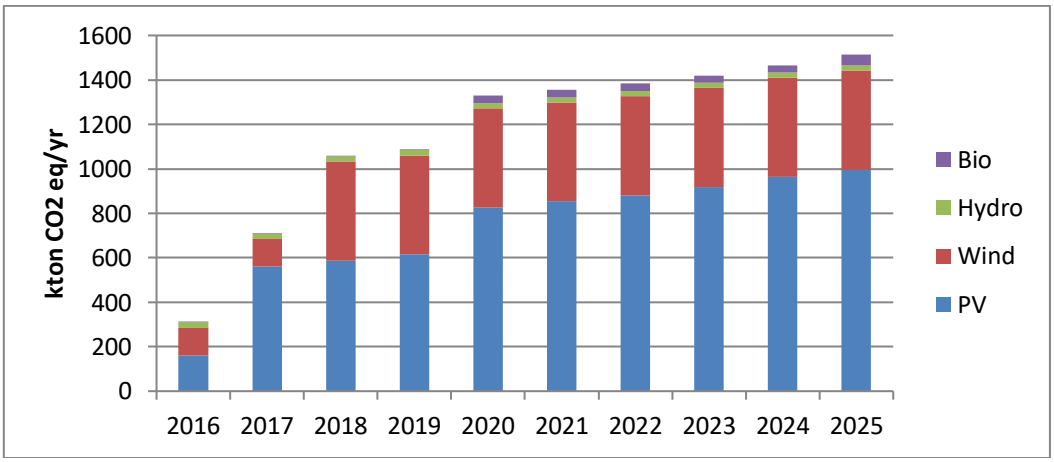

Figure 4. Predicted annual rate of reduction of greenhouse-gas emissions in Jordan

1.5 Policy design considerations

Several factors are encouraging the adoption of a renewable energy policy in the UAE:

- Economic and population growth results in increased demands for energy and water. This means that more fossil-fuel resources will have to be diverted for local consumption instead of exporting them for income purposes;
- The UAE has become a net importer of natural gas, which is the main source of fuel for the power sector for the production of both electricity and water, which affects the energy security of the country;

- Dubai with its Plan 2021 and Integrated Energy Strategy 2030, took similar RE initiatives but they were driven mainly by finding sustainable energy sources for its power sector because oil and gas production in Dubai is non-existent and the fuel needed is bought in the open market;
- UAE developed its Vision 2021, which is in line with both the Abu Dhabi and Dubai visions. The country has played an important role in promoting RE at the global level since 2008;
- The submission included the INDC of UAE, whereby the country will pursue a portfolio of actions, including an increase of clean energy of up to 24% of the total energy mix by 2021.

The main factors that are driving Morocco to set up RE policies and institutional framework are:

- **Increasing energy demand:** energy needs are expected to double by 2020 and to triple by 2030 under the business-as-usual (BAU) scenario;
- **Energy import dependence**: Morocco is highly dependent on imported hydrocarbons and needs to find a solution to increase its energy security;
- **Energy price fluctuations:** electricity prices in Morocco are below-average costs of production and transmission, which create a significant financial burden on the national budget;
- **Increasing CO_2 emissions**: national energy consumption is still highly dominated by fossil fuels. As a consequence, total CO_2 emissions are anticipated to closely follow the rising energy demand and increase substantially in the mid to long term.
- **High potential of renewable energy throughout the territory;**
- **The geographical location** of Morocco that allows it to play a key role in energy exchanges at Mediterranean level
- the set-up and design of RE programmes and the transparency of the tendering process by setting an inter-ministerial committee to supervise the process;
- The success in building up strong and effective partnerships between different stakeholders participating in the programmes;
- The set-up of innovative and effective business models of RE projects that help to attract private investors and then increase competition in the tenders;
- Establishment of a transparent and adequate long-term agenda for planned projects;
- Setting-up a local content requirement, which is supported by a long-term policy framework that ensures stable and predictable local and regional demand. An ambitious commitment within its INDC which is to reduce its greenhouse gas emissions by **32% by 2030** compared to BAU-projected emissions. With regard to adaptation, Morocco already made significant efforts during the period 2005–2010, devoting 64% of all climate-related expenditure to adaptation**.**

In Lebanon, efforts for the development of a complete strategy for renewable energies began in 2009, soon after the announcement of the 12% target for 2020. This was driven by a set of factors that can be summarized as follows:

- The geopolitical situation of the region constituted a supplementary motivation when imports of electricity from Egypt and Syrian Arab Republic became very unstable following the situation in those countries. This led to an increased need for secured endogenous energy resources to cope with all these variations;

- The problem of displaced Syrians that was putting great pressure on the electricity sector that was already suffering;
- Oil and gas exploration witnessed several delays, adding to the instabilities in the sector.
- Lebanon presented its INDC in a situation of development challenges, including, among other issues, a lack of security due to regional turmoil and a high level of poverty. As submitted to COP21 in Paris in December 2015, the Lebanese mitigation targets were an unconditional emission reduction of 15% and a conditional reduction of 30% compared to the BAU scenario in 2030.

Jordan has a strong competitive advantage, due to its high RE resource potential. The main driving factors to scale up investment in renewable energy and shape the policy design and institutional framework are the following challenges:

- **Increasing energy demand**: Jordan is facing a high energy demand growth rate, much higher than its economic growth. According to the National Energy Strategy (NES), the growth in energy demand is continuous at 5.5% and demand will double by 2025;
- **Energy import dependence:** the country has long been overwhelmingly reliant on energy imports to meet the bulk of its primary energy needs;
- **International energy price fluctuations**: the fluctuation of oil prices and Jordan's dependency on unstable foreign energy resources is directly impacting electricity prices for both the public and private sectors;
- **Increasing GHG emissions**: Electrical power generation in Jordan relies predominantly on fossil fuels with a significant impact on the environment through harmful GHGs such as CO_2 and NOx;
- **INDC**: Jordan determines to reduce its GHG emissions by 14% by 2030. The conditional and unconditional GHG reduction outcome target aims to reduce Jordan's GHGs by at least 12.5% and at maximum 1.5%, respectively, by 2030 compared to the BAU scenario levels;
- **Geopolitical situation:** regional volatility has affected gas supplies from Egypt and scuttled a planned pipeline to Iraq, forcing Jordan to substitute the relatively cheap gas with much more expensive diesel and heavy fuel oil;
- **Access to energy services:** because many sites are isolated and located far away from the national electric grid to which it cannot be connected in the near future, the access of low-income, rural consumers to essential electricity has influenced the adoption of RE projects to improve energy-service security in these areas.

1.6 Challenges facing the implementation of renewable energy projects

1.6.1 Economics and financial challenges

The main economic challenges in the UAE can be summarized as follows:

- The economic crisis in 2008 in UAE slowed down the RE momentum that was created in 2006 with the Masdar initiative;
- The drop in oil prices put some restraints on fiscal budgets and the fact that income tax does not exist in UAE could limit incentives and mechanisms for RE policies;
- The high upfront cost and long payback period for RE projects, combined with the additional cleaning cost for PV modules and CSP mirrors due to dust and humidity, may discourage investors;
- The high subsidies for fossil fuel can slow the full deployment of renewable energies;

- The hidden costs of renewable energies in the energy sector, other than just the PPA, should include grid connection, managing the smart grid for RE intermittencies, and operating and maintaining fossil-fuel backup plants.

In Morocco, the economic challenges presented in the case study can be summarized as follows:

- Lack of accessible financial support for small-scale projects able to facilitate private consumers to install RE technologies, where most of the financing is directed to large-scale projects;
- Economic viability affected also by high initial capital costs due to lack of confident financial support and high-risk perception related to RE.

In Lebanon, the economic challenges can be outlined as follows:

- Unlike Morocco, no financing mechanisms were adopted for large-scale RE projects, such as PPA;
- The problem of bankability of EDL: for any investor or lender, EDL is a company in deficit that will be the main customer for all large-scale RE projects. This can be a factor to be included in the risk study of the whole investment and will surely affect the final price;
- The political instability in the country that is directly affecting the development of markets and the economical bankability of the projects;
- Some RE components are being considered by tax authorities as luxury components, thereby increasing their customs fees without any clear and precise rule.

In Jordan, economic challenges facing the deployment of renewable energies are the following:

- Land-licensing conversion from agricultural to industrial in wheeling projects is very costly, driving investors away and making investment procedures more tedious;
- The grid is saturated in most areas and grid integration is a challenge.

The electricity is subsidized for low-consumption customers in Jordan and the Government is going to face a major problem of facing the National Electric Power Company's deficit once high electricity-consuming entities choose wheeling.

1.6.2 Market challenges

Market challenges in the UAE are essentially caused by three main factors:

- The lack of a wholesale competitive market, even though utilities are connected by transmission lines;
- The RE sector in UAE is mostly controlled by foreign companies through the value chain of the industry. Currently, most of the foreign companies have local partners but it is important to ensure that knowledge is transferred to local companies;
- Commercial and bankruptcy laws, in addition to strict immigration and residency laws, hinder new investors from seeking business opportunities in UAE.

In Morocco, the market challenges can be summarized as follows:

- The relatively low market penetration of RE compared to well-established fossil-fuel options still negatively affects the competitiveness of RE;
- Lack of businesses, entrepreneurs, trained or skilled workers and specialized industries which can promote and expand the market and outreach of RE technologies;

- Externalities such as environmental pollution and climate-change costs, health costs, impacts on energy security, etc., are not internalized by the market and are not evaluated in the cost analysis.

Lebanon's market has proved itself as being able to cope with any new products but still faces challenges when it comes to renewable energies:

- The rapid growth of the number of PV suppliers had a downside related to the difficulty of monitoring the quality of service and products offered by new installers;
- As with UAE, most parts of the renewable energy system are imported from outside Lebanon, which usually induces delays in the shipment of products and components that may reflect badly on the whole value chain.

1.6.3 Political, institutional/governance, regulatory and administrative challenges

In the case of UAE, these challenges can be outlined as follows:

- Some 80% of the population in UAE are expatriates, who are considered to be transient, whereas the housing sector is controlled by nationals. There are, therefore, no incentives for locals or expatriates to integrate RE solutions in buildings;
- Decision-making is made at the government level without the coordination or collaboration of the private sector, research and development institutions or NGOs;
- There is no clear vision for RE strategy for the whole country. Hence, there are no CO_2 emission reduction targets set at the national level;
- Income tax does not exist. This limits the incentives and mechanisms that can be used for RE adoption, especially for off-grid uses;
- At emirate level, Dubai and Abu Dhabi have created the right institutions for RE policies but the other five emirates, which are less resourceful, would need more attention from the federal Government;
- There are no economic, social or environmental studies of the direct and indirect negative impacts of fossil fuel in the energy sector.

In Morocco, the challenges can be outlined as follows:

- Many laws that were introduced to promote renewable energy are still presenting issues;
- Focus is only on large-scale projects rather than stimulating the development of more community based, bottom-up energy initiatives;
- The decree for RE connection to low voltage has not yet been approved;
- The lack of coordination, cooperation and synergetic collaboration between the various stakeholders, political groups and ministries does not help in forming a common strategic vision for the promotion of renewable energy.

Institutional barriers existing in the power sector in Lebanon can be summarized as follows:

- Outdated legal framework for power networks and utilities;
- Monopoly of EDL on the generation, transmission and distribution sectors, limiting the possibility of RE integration;

- Ageing staff and administration of EDL, most of whose staff is recruited without taking into consideration the development of renewable energies in Lebanon;
- There is no directorate or department within EDL's hierarchy dedicated to planning, integration or monitoring of RE on the national grid;
- Political instability and frequent changes in the constituents of the Government: strategies and decisions to restructure the power sector are lost in the political turmoil and the ever-changing governance and alliances of political parties;
- Lack of awareness of decision makers and local authorities towards renewable and alternative technology that can play a supporting role in social and economic development.

In Jordan, the main challenges can be described as follows:

- Insufficient coordination among different public entities resulting in a lengthy delay in the completion of rounds one and two of the direct proposal process;
- Grid-capacity issues;
- Lack of coordination between the public and private sectors and efforts to create synergies between the two sectors for more effective and sustainable development;
- Easy and clear access to information and data for investors, researchers, consultants and private homeowners, especially data concerning upcoming policies and processes that different administrative and regulatory institutions are following;
- There is not enough support by policy monitoring and evaluation to improve the effectiveness of the SWH obligation;
- There are no further regulations or policies enforcing quality standards or system sizes for Jordan's April 2013 bylaw on solar water-heating;
- In the domestic sector, licensing and permits are taking more time than expected and, after the permit is given, the connection point to the transformer on the medium-voltage grid might change, which leads the project to be connected to another transformer, creating additional, unaccounted costs;
- Grid-impact studies are taking more time than usual and are a barrier for renewable energy companies working in the domestic market;
- Inspections and licensing are not consistent and it can take more time to connect to the grid, creating frustration for the end user, as well as the companies installing the systems;
- The Government is not an active user of renewable energy in its own facilities and infrastructure.

1.6.4 Cultural, behavioural and educational challenges

In the UAE, cultural and behavioural challenges can be summarized as follows:

- Lack of awareness, together with a lack of willingness, as mentioned above, caused by the majority of the population being expatriates;
- Overestimation of associated risks, especially for off-grid applications;
- Subsidies in electricity tend to limit the enthusiasm of consumers for renewable energy. On this level, Lebanon still faces challenges that limit the development of renewable energies.
- Culturally, because of the various instabilities Lebanon has endured throughout its history, the Lebanese people are hesitant about large investments;

- On the educational level, most specialized engineers have recently graduated and do not have the experience to design or operate large-scale projects;
- Vocational training is still missing in specialized fields of each of the RE technologies.

In Jordan, these challenges can be outlined as follows:

- Limited awareness in Jordan about the concept of green business;
- Population growth, coupled with unsustainable consumption and production patterns;
- There is a lack of innovation-oriented research in the educational sector.

1.6.5 Technical/technological challenges

In the UAE, the technical and technological challenges can be resumed as follows:

- Baseload power concerns in intermittencies of solar power and high cost of storage, especially for thermal solar;
- Connection of solar power will result in additional grid-connection lines and further complexity within the management and control of the grid.

As in the UAE and all over the world, there are still major technical issues related to the intermittent nature of renewable energies such as wind and solar in Morocco, which can be summarized as follows:

- Ensuring the reliability of supply, especially in the case of high contributions from intermittent sources;
- A lack of cross-sectoral approaches that include the heating/cooling and transport sectors.

As for Lebanon, major technical problems facing the implementation of renewable energies can be outlined as follows:

- The absence of a grid code that is adapted to the Lebanese situation and that would allow protection of both the national grid and RE projects from possible instabilities;
- Lack of development of certain technologies such as geothermal or biomass briquetting;
- Grid congestion remains a major constraint for the development of renewables in Lebanon.

In Jordan, technical challenges still face the full deployment of renewable energies, which can be summed up as follows:

- A grid-capacity constraint has resulted in project delays or cancellation of a few rounds of expression of interest for new solar- or wind-energy projects;
- A dilemma facing the development of renewables in Jordan resides in the availability of lands within population centres, whereas most projects developed in rural areas are being cancelled because the power generated cannot be consumed within the network's geographic coverage.

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Part 2. UNECE case studies

This section presents the case studies of the four countries considered within the UNECE region. The structure of the comparative analysis presented for the four UNECE Member countries is similar to the structure of that for the four UN ESCWA Member countries but with some variations due to differences in the structure of the individual reports.
Similarly, the main purpose of the UNECE case studies was to develop country reports on policies that have helped in transforming, totally or partially, the renewable energy market in each country. The report aimed to show how the RE policies contributed to the promotion of RE investment projects and helped them become more viable economically by improving their bankability and helping them have a better access to financing. Each country report also aimed to clearly reflect practical experience in the case study and reflect the countries' specificities in that regard.
The four countries considered for the UNECE region case studies are: Georgia, Kazakhstan, Serbia and Ukraine.

2.1 Energy sector characteristics

The four UNECE Member countries considered each share common traits in terms of the characteristics of their energy sector while retaining some specific features.
In fact, Georgia, Kazakhstan and Ukraine were part of the Soviet Union and Serbia was part of Yugoslavia, both of which were communist regimes until the early 1990s. Their shared history of communism is reflected in their energy sectors, where most had State-owned electricity operators in all subsectors of the field. Each had an energy sector developed in the communist era, which relied essentially on the cheapest local resources.
Moreover, all of them had good energy resources, especially in terms of oil and coal reserves, with some of them also having large hydro resources, notably Georgia.
Being also all relatively cold countries, water- and space-heating is an important consumer of energy, using non-electrical sources. This is why the energy policies developed in these countries address both thermal and electrical energy end uses when considering their energy future. This is in contrast to all UN ESCWA Member countries, where space-heating is required only in a few locations, in a much less extreme context.
Serbia has diverse energy supplies. Energy generation relies largely on lignite reserves which are estimated at 820,676 ktoe[16] (excluding reserves in Kosovo and Metohija). Serbia produces a small amount of natural gas domestically (387 million m³ in 2010), which covers about 16% of its total gas demand, while the rest is imported, mainly from the Russian Federation through Hungary (1,967 million m³ in 2010). Serbia also produces oil from domestic sources, covering about 31.5% of the total oil supply (2.7 Mt in 2010).

[16] 3.1 billion tons of lignite calculated based on the conversion factor provided by the United Nations Statistics Division (https://unstats.un.org/unsd/energy/balance/conversion.htm)

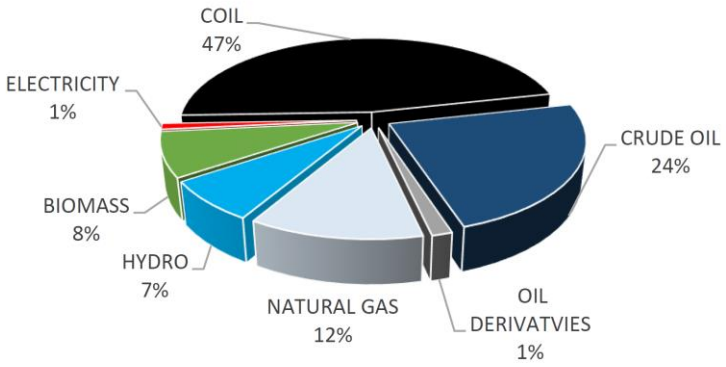

Figure 5. Share of different energy sources in gross inland consumption for Serbia (2014)

Total installed power generation capacity was 7,124 MW in 2010. This comprised 3,936 MW lignite-fired thermal power plants, 353 MW combined heat and power (CHP) plants and 2,835 MW hydropower plants.

The electricity sector of Serbia was unbundled in 2005: independent transmission system and market operator; and a vertically integrated public utility. Both are fully State-owned companies. The electricity market of Serbia is formally open for all non-household customers, who can freely choose their electricity suppliers. In practical terms, this remains a theoretical possibility, since low regulated tariffs for electricity supplied by the public utility company restrict new market entrants. Some 76% of households in Serbia use coal, wood and electrical energy for individual household heating. District heating systems with a total installed capacity of 6.6 GWth are located in 58 cities and municipalities and serve 24% of households. Most district heating plants have heat-only boilers fuelled by natural gas with the ability to switch to heavy fuel oil, lignite and brown coal. Currently, the main fuel source for district heating is natural gas (50.4%), followed by heavy fuel oil (26.5%) and coal (23%), while biomass use is negligible (0.1%).

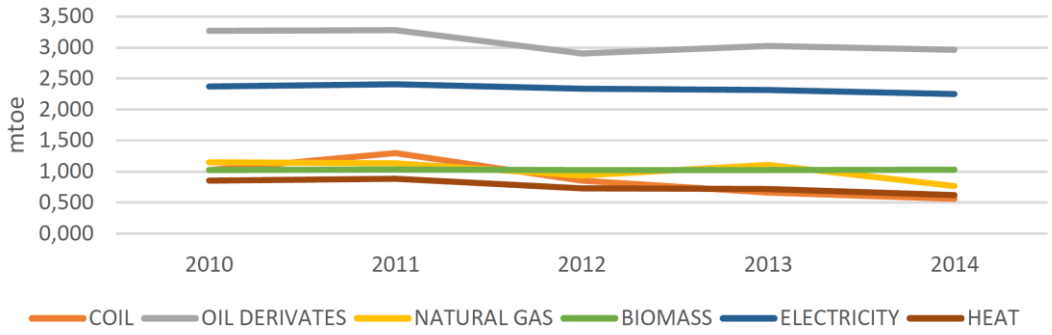

Figure 6. Share of different energy sources in total final energy consumption in Serbia (2014)

In Ukraine, energy accounts for 8.3% of household expenditure (with a potential to double, in view of current tariff reforms). It also accounts for 30% of imports and over 77% of total GHG emissions (309 Mt CO_2eq in 2012).

Moreover, energy intensity is very high, and Ukraine holds the seventh position out of more than 160 countries in terms of carbon intensity.

Finally, the energy sector is highly dependent on energy imports, while domestic fossil fuel production continues to decline, leading to low-level energy security and the risk of a total collapse of the energy systems.

In 2015, imports of natural gas were the lowest during the entire period of Ukraine's independence: 16.5 billion m^3 (compared to 52.6 billion m^3 in 2008). Only 37% of imported natural gas in 2015 came from the Russian Federation and the remainder came from EU countries via the reversing mechanism.

Output of oil is also decreasing, due to the depletion of oil deposits. Out of six existing oil-processing plants, only two are still operational, producing not more than 20% of oil products consumed in Ukraine.
For instance, in 2015, coal-mining decreased by 38.8% compared to 2014; coking-coal output decreased by 49.8% and steam-coal output by 35.3%. Due to this decline in domestic coal-mining, Ukraine had to import coal, mainly from Kazakhstan, the Russian Federation, South Africa and the USA.
The main electricity producers rely on nuclear and thermal power plants. The installed capacities of 15 units in all four nuclear power plants in Ukraine is 13,835 GW. Since 2011, Ukraine became fully dependent on the Russian Federation in primary nuclear technology. However, since 2011, Ukraine has been working to formally overcome this dependence by cooperating with Westinghouse (USA) and Skoda (Czech Republic, with informal affiliation to Russian companies). In 2013, power losses reached 20.7 TWh, which is about half of household consumption[17]. Overall efficiency of power plants in Ukraine is 35.2%, whereas, in the EU, average efficiency is 43.6%.
In 2015, electricity output from wind-power plants (WPPs) contributed to a 30% share of all electricity from renewable energies. The solar share was 53%, the remainder were biomass (7%) and small hydro (10%).

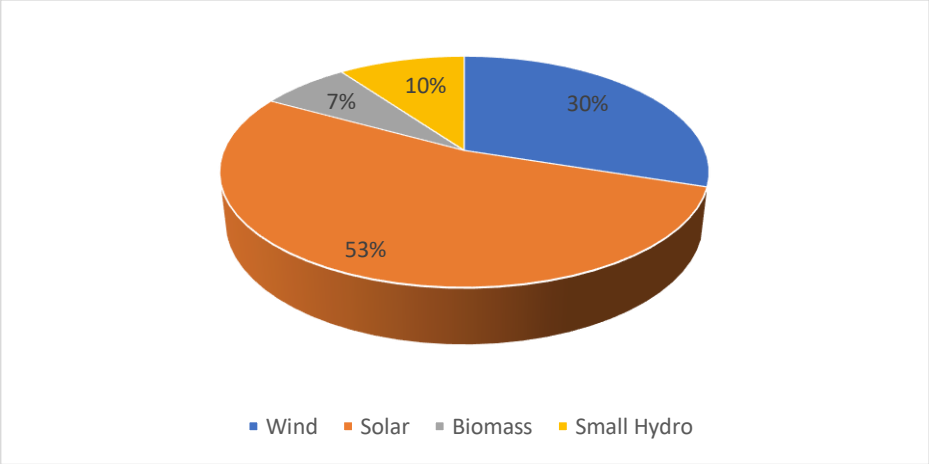

Figure 7. Shares of renewable energies in Ukraine (2015)

At the beginning of 2016, installed capacities[18] of WPPs was 426 MW, SPP 453 MW and biomass-fired PP 31 MW. Overall installed capacities of the renewable energy sector by the end of 2015 was 1.03 GW, producing 1,347.4 GWh of electricity.
Presently, Ukraine is implementing numerous reforms in the energy sector, aimed at reducing natural gas consumption and increasing energy efficiency. However, the country continues to be dependent on imported natural gas, nuclear fuel and steam coal, primarily from the Russian Federation. Ongoing instabilities within the country are preventing Ukraine from further developing its own energy resources.
The power generation sector of Georgia consists of seasonal regulation and run of river hydropower and TPPs operating on natural gas and coal as well, with a total installed capacity of 3,720 MW. A total of 67 operational HPPs with 2,800 MW total installed capacity generates approximately 80% of total electricity generation in the country and the remaining 20% is generated from TPPs. An additional 421 MW installed capacity was expected to be operational (20 MW from the SPP and the rest from HPPs) by the end of 2016.
Moreover, there are four gas-fired TPPs and one coal-fired TPP with total installed capacity of 924.4 MW. These include a recently commissioned 231.2 MW combined cycle power plant and

[17] Savitsky, O., 2016: Towards the Energy Transition in Ukraine. Finding pathways to energy independence and carbon-neutral power sector. Marion Doenhoff Working Paper 2016.

[18] Territories, controlled by the Ukrainian Government

two old power plants totalling 270 MW running with an efficiency of 34% and scheduled to be decommissioned by 2020. Finally, in order to promote utilization of local resources and enhance energy security, the Government of Georgia supports the construction of a 150 MW coal-fired TPP that will be equipped with clean-coal technologies.

In terms of electricity generation, according to the electricity balance of Georgia, the annual electricity generation reached 10.8 TWh in 2015. A share of electricity generated by TPPs has reached 21.4% of the total generation, while the share of HPPs constituted 78.6%.
In 2015, electricity generation increased by 4.3% compared to 2014 and by 7.4% compared to 2013. In recent years, Georgia has experienced a considerable increase in electricity generation with an average annual increase of 4.2% between 2006 and 2015, which is due mainly to the commissioning of new HPPs.
On the other hand, electricity consumption is increasing; in 2015, it increased by 2.1% compared to the previous year and by 7.1% compared to 2013. Furthermore, the average annual increase of electricity consumption amounted to 3.2%.
For such purposes, the Government of Georgia facilitates investment projects to construct new generation stations, along with the development of the energy infrastructure.
Recent energy projects which are under construction and licensing stages are mostly HPPs, amounting to 1,646 MW of installed capacity with an expected total annual electricity generation of 5,476 GWh[19].
In total, there are 110 renewable energy projects whose total installed capacity is estimated to be 4,668 GW with 18,485 GWh electricity generation, which also include projects for the utilization of wind, solar and biomass (waste).
However, high capital costs of other RES compared to hydro resources and the problem of grid access still obstruct their large-scale implementation in Georgia.
In terms of institutional set-up, the Georgian energy sector consists of several major stakeholders. The Ministry of Energy is an entity which implements energy policy, monitors the sector and facilitates investment projects. The Georgian National Energy and Water Supply Regulatory Commission is the independent regulator of the sector, which sets the tariffs and their methodology, establishes rules on licensing and standards and resolves relations between customers and companies. The Electricity System Commercial Operator is an energy market operator, which is in charge of balancing market, emergency import/export and is a reserve capacity trader. The other key players of the sector are also the companies in the fields of generation, transmission and distribution.
Kazakhstan has an aggregate installed capacity of 992.7 MW. A total of 18 power stations provide electricity of which 70% is generated by coal-fired stations, 14.6% by hydropower, 10.6% by gas-fired and 4.9% by oil-fired facilities.

[19] http://energy.gov.ge/projects/pdf/pages/Ongoing%20Investment%20Projects%201426%20eng.pdf

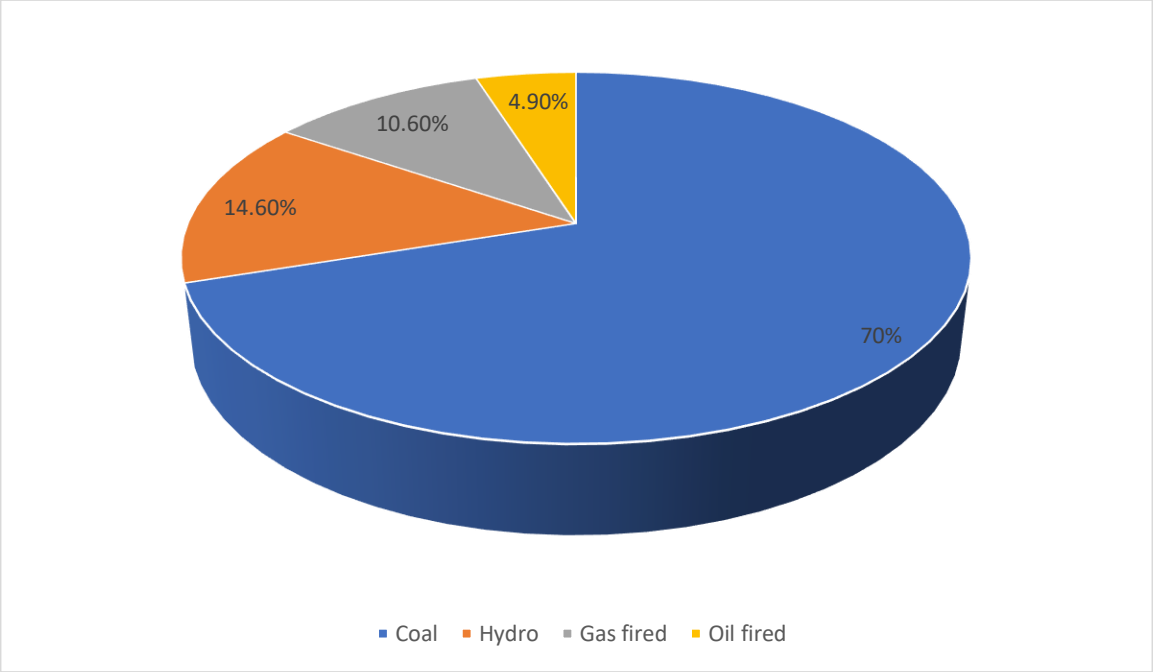

Figure 8. Electricity generation profile in Kazakhstan

The electricity sector in Kazakhstan relies on traditional means of electricity generation, essentially coal and hydro. Most of these (coal) are highly pollutant and are being decommissioned around the world for environmental reasons. Hence, for Kazakhstan to transform its electricity sector it should look to more sustainable and modern techniques of electricity generation.

1.7 Renewable energy potential

All four UNECE countries studied had good levels of renewable energy usage, essentially hydroelectric sources used for electricity generation and biomass used for heating. All four countries had very good resources, as will be shown in this section, in terms of renewable energies, namely hydro, wind and biomass, while solar is at a lower level.
In Serbia, the RES sector, except hydroenergy, is in an early phase of development. Estimated total RES potential, which is technically available, amounts to 5.65 Mtoe per year. Of this potential, 1.054 Mtoe of biomass and 909 ktoe of hydroenergy are already in use (Table 7 and Figure 9). Moreover, Figure 10 shows the remaining unused potential of the different renewable energy resources in Serbia, which amounts to 3.47 Mtoe.

Table 7. Overview of technically usable potential of renewable energy sources in Serbia

RES type	Available technical potential in use (Mtoe/year)	Unused available technical potential (Mtoe/year)	Total available technical potential (mtoe/year)
BIOMASS	1.054	2.394	3.448
Agricultural biomass	0.033	1.637	1.67
Parts of agricultural species	0.033	0.99	1.023
Parts in fruit growing, viniculture and fruit-processing	-	0.605	0.605
Liquid manure	-	0.042	0.042
Wood (forest) biomass	1.021	0.509	1.53
Biodegradable waste	0	0.248	0.248
Municipal waste	0	0.205	0.205

Other	0	0.043	0.043
HYDROENERGY	0.909	0.770	1.679
Up to 10 MW	0.004	0.151	0.155
From 10 MW to 30 MW	0.020	0.102	0.122
Over 30 MW	0.885	0.517	1.402
WIND ENERGY	≈0	0.103	0.103
SOLAR ENERGY	≈0	0.240	0.240
For electricity	≈0	0.046	0.046
For heat energy	≈0	0.194	0.194
GEOTHERMAL	≈0	0.1	0.180
For electricity generation	≈0	≈0	≈0
For heat energy	0.005	0.175	0.180
Total from all RES	1.968	3.682	5.65

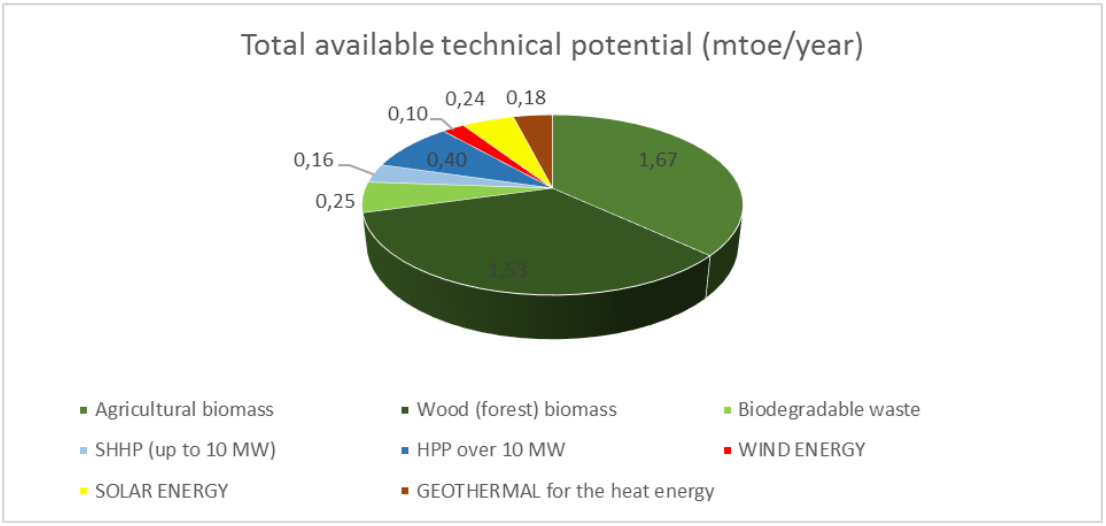

Figure 9. Total available technical potential (Mtoe/year) in Serbia

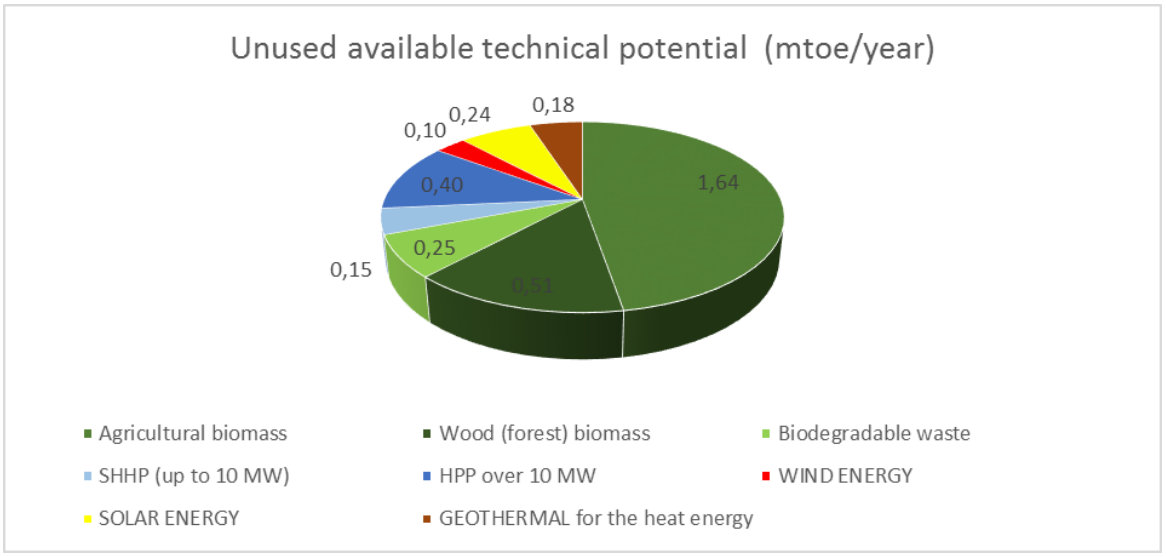

Figure 10. Total unused available technical potential (Mtoe/year) in Serbia

In Ukraine,, biomass and biogas use have significant potential for heat and electricity production due to abundant residues in agriculture, favourable climatic conditions, availability of agricultural land, relatively inexpensive labour power and abundant, untreated, solid-waste landfills. Biomass

can substitute some 10–20 billion m^3 of natural gas annually: at the end of 2015, bioenergy was substituting around 3 billion m^3 of natural gas per year. The most promising now are cogeneration and biomass-fired CHPs projects, especially those related to sugar refineries, farms and sunflower-processing plants, where biogas is a result of methane digestion.
Biomass potential is far from been deployed. For instance, there are only seven large biogas plants in Ukraine. In fact, according to IRENA estimates, less than 5% of agribusiness-derived biogas potential is used in Ukraine. The situation may change for the better, however, with upcoming unbundling in the municipal sector so that heat from biomass could gain access to heat networks. According to the State Agency on Energy Efficiency and Energy Saving of Ukraine estimates, economically justified bioenergy potential is more than 800 pJ/year – which is equal to a quarter of Ukraine's total energy consumption. Half the potential energy accounts for energy production from agricultural waste and wood biomass. The other half is energy derived from energy crops and biogas.

In Georgia, it is recognized that hydroenergy is the dominant source of electricity generation. Nevertheless, it is estimated that only about 20% of hydro potential is currently utilized. According to the Ministry of Energy, a potential installed capacity of green-field hydropower plant projects is estimated to be equivalent to 15,000 MW with an annual generation potential of 50 TWh per year. Other renewable energy sources, such as solar, wind and geothermal sources also have considerable economic potential. The average annual electricity generation from wind in Georgia is estimated to be 4 TWh with an installed capacity of 1,450 MW[20] and a total annual solar energy potential of 108 MW[21].
As for geothermal resources, hydrogeological studies show that geothermal water reserves reach 250 million m^3 per year and an average temperature of geothermal waters ranges from 30 °C to 110 °C in more than 250 natural and artificial water channels, while the total potential amount to be withdrawn is 160,000 m^3 per 24 hours.
Biomass is a considerable renewable resource for the country where the share of biomass, mostly firewood, accounts for the major part of primary energy consumption.
It was estimated that effective utilization of RES in Georgia could result in the production of an additional 20 TWh in the near future, which would save about 7 Mt of conventional fuels.
In the case study of Kazakhstan, no comprehensive estimation of renewable energy potential was provided.

1.8 Current and prior policy status

As mentioned earlier on, all four countries have a communist background, when energy policies were developed based on the needs of the whole of the Soviet Union and Yugoslavia and with relatively ageing power infrastructure.

Moreover, the general policy trends focused on consuming the cheapest domestic energy resources available, without taking renewable energies into consideration more specifically. This fact played a significant role with hydro resources being widely available and having a good share of the energy mix.

On the other hand, with most of these countries being members of the Energy Community (EnC), all of them, except Kazakhstan, had set their targets and had prepared their NREAP in accordance with the recommendations of the European Commission.

In Serbia, a demanding and binding goal of achieving a 27% share of RES in GFEC in 2020 was set.

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[20] Ministry of Energy of Georgia

[21] Ministry of Energy of Georgia

Moreover, the NREAP, adopted by Serbia in June 2013, was submitted to the EnC secretariat at the European Commission.
Serbia decided to continue with the application of FIT, due to the lack of a rapid development of projects and progress in this field, and in order to more easily implement RES policy through the incentive mechanism.

A package of bylaws governing the system of incentives in the sector of producing electricity from renewable sources was adopted on 15 June 2016.

Finally, in 2015, the Serbian Assembly adopted the new Energy Sector Development Strategy for the period until 2025 with projections until 2030. This Strategy is based basically on the EU Energy Road Map, that is, on the Serbian commitment to EnC (EU) in connection with fulfilling its obligations to increase the share of RES, increase energy efficiency, reduce GHG emissions and those concerning environmental protection and mitigation of climate change.

Ukraine has signed several strategic international documents, defining its development paths and has thus elaborated appropriate internal legislations. These strategic documents include:

- The treaty establishing the Energy Community (signed by Ukraine in 2005);
- The Association Agreement between Ukraine, on the one hand, and the European Union, the European Atomic Energy Community and their Member States, on the other hand (signed in 2014);
- Energy Strategy of Ukraine until 2030 (signed in 2013);
- National Renewable Energy Action Plan (signed in 2014);
- The Strategy for Sustainable Development of Ukraine until 2020 (signed in 2015).

The Law of Ukraine on "the Electric Power Industry" adopted FIT in 2009. After 2019 and 2024, these FIT rates will be reduced from the baseline value of 20% and 30%, respectively. Since the adoption of the FIT mechanism, the number of entities profiting from it has grown sharply, solar farms and SHPs.
In accordance with NREAP, Ukraine committed itself to obtaining 11% of energy from renewables in its energy balance by 2020. To reach this target, about 700 MW of new renewable energy-generating capacities need to be installed annually.
The system of financial incentives to promote RES use, other than FIT, includes reduced taxes for renewable energy companies, income tax exemption and exemption from import duties when importing certain types of RES equipment.
In 2015, a new law amendment was adopted which declared:

- FIT for electricity, produced from biomass (12.39 eurocents/kWh);
- Elimination of previously existing local content requirement;
- Remuneration in the form of surcharges for FIT for entities using Ukrainian components in the design and manufacture/construction of energy objects.

The energy sector of Georgia has been largely shaped since 2003, after implementing a series of reforms. The priority of these reforms was to enhance the legal and regulatory framework for business and deregulation, which caused strong economic growth and solved many problems of the energy sector in the early 2000s.
Since 2006, the laws have been amended several times in order for them to currently incorporate some EU principles. The last amendment of the law encourages small-scale renewable energy

utilization to some extent but, until there is a special law on renewable energy resources, large-scale renewable energy deployment will remain complicated[22].
In 2006, the first energy policy document "Main directions of the State energy policy of Georgia" – was adopted, under which, utilization of the country's local, indigenous RES became one of the major factors for developing the energy sector. The key priority of the first energy policy document was full satisfaction of the demand for electricity by the maximum possible utilization of local hydropower resources, initially with the help of imports, and, eventually, by substituting them with thermal generation. Alternative energy sources such as wind, solar and geothermal would also be developed. Although, "Main directions of the State energy policy of Georgia" was amended by a new energy policy, adopted in June 2015, the key policy directions have not changed significantly. The aim of the new energy policy is to elaborate a long-term, comprehensive State vision, which will later become the basis for the development of short-, medium- and long-term strategies for 2030, with special implications for the utilization of Georgia's renewable energy resources.

Despite the existing regulations and plan, Georgia still lacks a law on renewable energy and a strategy that would cover the entire legal framework for effective utilization of all kinds of renewable energy resources. Nor are there any renewable energy targets.

Within the framework of the Concept of Transition of the Republic of Kazakhstan to Sustainable Development adopted in 2006 for the period 2007–2024, it was stated that Kazakhstan's sustainable economic development would be achieved by supporting an ecologically effective production of energy, including the use of renewable sources and secondary raw materials.

In order to ensure the rational use of natural resources and solve problems of environmental pollution, the uncontrolled import of outdated and "dirty" technologies and inefficient use of renewable resources, the Head of the State, in his annual address to the nation delivered on 27 February 2007, emphasized the need to formulate and establish the legislative base of the country in the field of ecologically clean sources of power production.

The current Law on "Energy Saving" (approved in 1997) aimed to support the use of renewable energy at the stage of developing energy and environmental programmes. In accordance with this legislation, renewable energy was recognized as the priority for developing the power industry and solving environmental problems. However, the mechanisms for the implementation of this law were not detailed, due to the lack of further development of its base subordinate legislation.

1.9 Economic, environmental and policy analysis

Corresponding studies presented the impact of the policies studied from different points of view, while the Serbian reports studied impacts on both the electrical and heating sectors. The Ukrainian study focuses more on the impact of adopting biomass and biogas production without separating the impacts on the electrical and heating sectors. In the case of Kazakhstan, the study presents the specific impact of a precise wind project without generalizing such an impact on the national level.

As stated earlier, the impact of implementing the policy studied in Serbia was presented for each of the two directly affected sectors: electricity and heating.

[22] According to the last amendment to the law on electricity and natural gas, installations of up to 100 kW capacity are able to sell their surplus electricity to the grid at a price defined by the Georgian National Energy and Water Supply Regulatory Commission.

- On the level of the electricity sector, despite the completely open market, existing laws still position the publicly owned company as a form of monopoly under the direct control of the Government, representing one of the obstacles to strengthening the private electricity sector in general, and in particular in the RES segment. Moreover, the Government is expected to continue protecting the monopoly of this company because of its large number of employees. Still, under pressure of the commitments of the country towards the EnC, as well as recognizing the strategic importance of renewable energies, this company has founded a new component tasked with the development of new power plants using RES. This model can be expected to produce good results, because each of the parties is directly interested in project implementation. In addition to the reduction of GHG emissions due to reduced consumption, there is a decrease in the number of devastated areas, ash-holes and open-pit mines. This is particularly important, because nearly all open pits in Serbia are situated on high-quality first- and second-category land, already used for agricultural purposes.

- Temporary statuses were issued for approximately 500 MW in new wind farms, representing an investment of around €700 million (investors have applied for, and received, the status of temporary privileged producer for the rest of the available capacity for wind farms of 483 MW).
- These capacities are significant for Serbia for two important reasons: the first is a contribution to the gradual achievement of the goal of 27% share of RES in the Gross Final Energy Consumption (GFEC) by 2020, the other is ensuring other investors that Serbia is developing a stable climate for investments, and is a reliable partner for anyone wanting to invest in the field of RES.
- It is to be noted, that in Serbia, it is considered that electricity generated from RES will replace electricity generated from fossil fuels. It is clear that this will in practice lead to a reduction of the number of employees, knowing that renewable energy power plants require fewer people to operate them than traditional ones
- It is important to note that all district heating systems in Serbia are still owned by the company, under so-called public ownership, i.e. neither privatization nor the development of the heating energy market have occurred in this field.

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The Ministry of Mining and Energy in Serbia, started the project "Stimulating the use of renewable energy sources – development of the biomass market" in 2012. The project aims for the use of biomass in heating plants in order to produce heating energy or the cogeneration of heating and electricity. The approximate budget is €100 million, and the first phase would use €20 million of loans and €7 million in grants.

The Ministry of Mining and Energy, in cooperation with UNDP, initiated another project entitled "Development of the biomass market for energy production (2014–2018)", financed from the funds of the Global Environmental Facility and UNDP, to the amount of US$ 3.15 million. The goal of the project is to increase the share of renewable energy in the energy balance of Serbia.

In Ukraine, a 10% drop of GDP in 2015, combined with anticipated growth in the consumption of energy, leaves the country facing a challenge of decoupling. Promotion of renewable energy is one of the ways to attain this goal and minimize the adverse effects of economic growth on the environment.

- Increased use of biogas, obtained from sugar-producing and farming residue can contribute to fulfilling Ukraine's commitments in terms of a share of 11% RES in the energy balance by 2020.
- Agriculture-derived emissions in Ukraine grow: in 2014, agriculture, forestry and fishing contributed 2.4% of overall GHG emissions, whereas, in 2015, agriculture contributed to 2.7% of overall emissions (as much as the transport sector).
- The socioeconomic evaluation in Ukraine was studied in the case of biogas production only. This was done while assuming that, as a result of implementing such projects, partial substitution of the capacity of electricity and heat generation would be achieved.
- On the macroeconomic level, the implementation of biogas projects in Ukraine generally leads to positive macroeconomic effects, which will be fully manifest in the medium and long term starting 2018/2019. On the level of households, although domestic consumers are not directly involved in investment processes, the overall economic effects associated with a general increase of the efficiency of electricity and heat energy production, the substitution of some resources by others, and an intensification of investment processes indirectly influence the level of real household income.
- If biogas- or biomass-derived heat is even 10% cheaper than natural gas for households, these biogas projects become price competitive, making payback time shorter. This would constitute a winning situation for everybody: households would pay less for heat; Ukraine would purchase less natural gas from abroad, paying instead to local enterprises.

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In Georgia, the power sector is a major driver of the economy and impacts on social welfare are considerable. After dramatic policy reforms, during the last 10–12 years, the situation of the Georgian power sector has improved substantially.

- Major priorities were identified and advocated to develop hydropower resources, enlarge their capacity and ensure the stability of the power transmission system in order to have a power-transit role.
- The energy sector of Georgia became interesting, not only for investors but also for international financial institutions such as the European Bank for Reconstruction and Development, the European Investment Bank, the World Bank, the Asian Development Bank, Kreditanstalt für Wiederaufbau, etc.
- Since introducing new regulations, during 2013–2015 about 60 memorandums of understanding (MoU) were signed between the Ministry of Energy and investors. Among them is the MoU on implementation of the 280 MW installed capacity Nenskra HPP project, which will produce around 1.2 billion kWh. The total investment of the project is US$ 1 billion[23].
- According to the Ministry of Energy, 14 small and medium-sized HPPs have been constructed since 2012; overall investment to develop HPP projects is about US$ 295 million. Moreover, total investment in renewable energy projects that was expected to be commissioned by the end of 2016 was estimated at US$ 757 million[24].

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[23] Report on activities of the three years 2013–2015, Ministry of Energy; available in Georgian only: http://energy.gov.ge/projects/pdf/news/Energetikis%20Saministros%20Angarishi%202015ts%201238%20geo.pdf

[24] Ministry of Energy of Georgia

Between 2012 and 2015, US$ 500 million of foreign direct investment (FID) were implemented in the Georgian energy sector, which means that the second largest share (15%) of FID, was realized in the energy sector during that period.

- A total of 110 perspective renewable energy projects are planned to be implemented by 2025[25] leading to an investment of almost US$ 800 million in renewable energy development.
- Furthermore, in line with a 10-year network development plan, investments of an additional US$ 800 million are required to expand the electricity infrastructure and disseminate generated electricity.

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By declaring its interest in renewable energy, the Georgian Government attracted not only investors and financial institutions, but also gained the support of the governments of various countries and international donor organizations through grant facilities. The Japanese Government, for example, supported the solar utilization programme.

Thanks to the system of State supports measures currently implemented in Kazakhstan, there are 50 operating renewable energy facilities with a total capacity of 288.3 MW (hydropower, 139.8 MW; wind power, 90.8 MW; solar power, 57.3 MW; biogas plant, 0.35 MW), from which the majority of the facilities (28 units) with an aggregate capacity of 177 MW (total investments of KZT 58.5 billion ; i.e. about US$ 175 Million) were commissioned after the adoption of the law on renewable energy in 2009.

In 2015, the volume of electricity generated from RES amounted to 704 million kWh. The specific target indicators of renewable energy development and the steps to achieve them have been adopted. Since 2013, Kazakhstan has consistently implemented the concept of transition to a green economy, according to which, the share of RES in total energy production will reach 3% by 2020 and 10% by 2030.

According to the Register of power producers that use renewable energy sources, it is planned to put into operation about 53 renewable energy facilities with a total installed capacity of 1966.24 MW before the end of 2020, comprising:

- 23 wind farms having a capacity of 958.95 MW;
- 17 solar units having a capacity of 724.8 MW;
- 13 hydropower plants having a capacity of 282.49 MW.

The implementation of these measures will allow Kazakhstan to take its place among the leading countries promoting the development of green energy and will contribute to achieving the strategic objectives for transition to a green economy.

1.10 Policy design considerations

The policy-design considerations presented in all four reports had several similarities which may be explained by the fact that most of these policies were driven by the will of their respective countries to enter the European Union and hence to adopt the EC's energy directives in support of this process.
The most relevant directives were the recommendations of RES Directive 2009/28/EC, that were the basis for accepting the demanding objectives for 2020 or 2025. In order to ensure the achievement of mandatory objectives, the same Directive referred to the introduction of incentive measures for energy production from RES.

[25] List of on-going projects:
http://energy.gov.ge/projects/pdf/pages/Ongoing%20Investment%20Projects%201426%20eng.pdf

Every Member State should ensure that the share of the energy from renewable sources in the gross final energy consumption in 2020 is at least that established by the Directive.
Most of the countries studied opted for a system of incentives through FIT. This form of incentive was chosen because it provides investors with the highest degree of investment security and, according to EU Member State experiences, represents the most efficient means of stimulating the construction of new capacities.

Such a system proved to be very successful in Serbia, where it helped develop the renewable energy sector through the construction of some 174 renewable power plants.

Ukraine, on the other hand, had more specific considerations concerning the design of the policy itself, i.e. for biomass production. In Ukraine, FIT reduction for electricity produced from biogas and biomass is anticipated by the aforementioned draft Law on "electric energy market". According to existing legislation, the FIT for biomass and biogas was increased recently, making current FIT rates for biomass and biogas more reasonable. This recent increase of FIT rate was a step towards smaller electricity producers, which would help to increase the share of electricity from biomass, to effectively address wastes of cattle production, to revive poultry and cattle stock-raising in Ukraine, to boost wastewater treatment and to promote more rational use of land.

The situation in Georgia was somewhat different, as it already consumes a relatively high amount of energy from renewable energy resources, but increasing the proportion of renewable energy in the mix has not been precisely set in the energy policy. Despite the fact that existing policy and regulations promote the uptake of energy resources, it is not utilized by individual households or farmers on a large scale.

As for the introduction of more market-based support schemes in Georgia, such as feed-in premiums, it was judged not to be a supportive mechanism, since Georgia has not yet established transparent and well-functioning electricity trading systems. Based on the study, the most effective way to support deployment of renewable energy resources in Georgia, it is to elaborate primary legislation, more effective regulations and secondary legislation, in the form of a national renewable energy action plan.

1.11 Challenges facing the implementation of renewable energy projects

Many of the challenges facing the implementation of RE energy projects in the four UNECE Member countries are similar. These can be summarized under two essential categories:

- On the institutional level:
  - Lack of administrative capacity;
  - Small number of employees in government administration;
  - Lack of experience and general knowledge in the area of renewable energy, especially legal and contractual procedures;
  - Official or unofficial monopoly of the whole electricity sector or even parts of the sector in some of the countries studied, especially Serbia;
  - Lack of communication between the different stakeholders, increasing the administrative complexity of the procedures.
- On the financial level:
  - Lack of adequate incentives for the deployment of renewables;

- Insufficient legislative framework in the field of support to renewable energy development;
- No clear enforcement of environmental legislation;
- Relatively small size of renewable energy companies and their limited financial capacities;
- Most TPPs are old and have paid back their investments, which gives them very low production costs compared to RES, making these less competitive on the financial level.

Part 4. Conclusion

The development of sustainable energy systems is essential in implementing sustainable development strategies. The development of RE is one of the main targets of the United Nations Sustainable Development Goals (SDGs) as stated in SDG 7 of the 2030 Agenda for Sustainable Development that was adopted by the General Assembly in September 2015 (Resolution A/RES/70/1). It is also one of the three pillars of the UN SE4All decade. The two frameworks call for a stronger deployment of RE projects, and a higher contribution of RE sources to the countries' energy mix. Furthermore, economically viable RE solutions are becoming increasingly available, and countries around the globe have expressed their interest in adopting RE in power production and other sectors with high CO_2 emission levels.

Many developing countries, and countries with economies in transition, have set ambitious goals to increase the contribution of renewable energy in their energy mix to improve their energy security and to move towards more sustainable sources of energy, thus converging with the goals set by SDG 7 and SE4All.

However, many of these countries still lack a proper regulatory and institutional environment that is favourable to promoting the financing of RE investments. This situation deprives private investors of adequate institutional support to engage in developing and financing renewable energy projects. National authorities need to introduce policy reforms and create regulatory and institutional frameworks capable of supporting these investments.

The eight case-study reports present a wide range of examples of the type of RE policies that are being developed in various developing countries and countries in transition, show what type of policies are effective in providing favourable environments for RE investors, and demonstrate the positive impacts that RE projects are inducing at different levels.

The following sections provide a summary of lessons learned from these case studies and suggest some recommendations that can help in designing effective RE policies.

1.12 Lessons learned

- Setting clear targets for RE
    - Most of the countries studied have adopted a clear target for renewable energies within their energy mix;
    - Combined with the corresponding policies, this has helped them attract investors from the national level;
    - It also helped them compete in attracting international investors or even international donors or financing agencies.
- Commitment towards international community
    - This aspect is important for developing countries, especially when competing for international funds;
    - Most of the countries studied had submitted their Intended Nationally Determined or Nationally Determined Contributions (INDC or NDC), which would reflect some of their main driving policies for the development of renewable energies.
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- Energy security
    - Energy security plays a very important role towards adopting renewable energies;

    - This acquires a more important dimension within countries importing oil where relying on national resources will help these countries decrease their dependency on energy imports and will give their economies higher immunity against the fluctuation of oil prices.
- Water-food-energy nexus
    - This study showed two different interesting facets of the nexus:
    - For UN ESCWA countries, water scarcity was highlighted, especially in Jordan, Morocco and the UAE, considering its impact on the need for cleaning PV in these countries;
    - On the other hand, in the UNECE region, especially in Serbia and Ukraine, the competition for land between food and energy was encountered, especially concerning the use of agricultural land to grow energy crops.
- Economic aspect
    - This aspect of implementing renewables has been approached form different points of view:
    - Some countries, especially in the UN ESCWA region, see a good opportunity in terms of job creation, where the adoption of renewables will help create jobs, bring investments and dynamism to their economies;
    - On the other hand, and especially in some of the UNECE countries with a communist past, this aspect of job creation was approached differently; it was seen that renewable energies replacing traditional ones would put some of the people working in TPPs out of work because renewable power plants need fewer people to operate them.
- Liberalization of the electricity sector
    - This topic should be addressed very carefully, since one of the issues evoked in some of the case-studies was the unofficial monopoly under an official liberalization of the energy market through high direct or indirect incentives offered to the “public” company;
- Administrative and legal frameworks
    - This aspect was one of the success factors in Morocco and UAE and one of the challenges in Lebanon and Serbia;
    - Setting clear and stable administrative and legal frameworks is a must for the full deployment of renewable energies in any country.
- Grid capabilities
    - The need for grid expansion and gird stability was a common challenge that must be addressed in order to fully deploy renewables;
    - Some countries, like Jordan, took up that challenge on behalf of the Government, putting any prices of grid connection or expansion on the public sector whereas others left it to the developers of renewables to include them in their business plan, as in the case of Lebanon;
    - On that level, regional grid interconnections can play an important role, as in Morocco or UAE, helping thereby to reduce furthermore the cost of renewables.
- Financing mechanisms

- In most of the countries studied, renewable energies were not able to compete financially with thermal production and needed support from the government:
- This support was approached differently, depending on the specificity of each country or region;
- Most UNECE countries had adopted FIT, relying on the European experience;
- In the case of UN ESCWA, two countries had different important experiences;
- The success story of NEEREA in Lebanon can be considered as a model which could be replicated in other countries for financing small-scale projects;
- This can be complemented with the Moroccan experience with their financial model adopted for large-scale projects;
- The case study for Lebanon mentioned the lack of financing mechanisms for large-scale projects as one of the major barriers, whereas, in the case of Morocco, small-scale financing was mentioned as the barrier.

• Administrative procedures

- This is one of the challenges facing the engagement of the private sector in a relatively newly developed sector such as renewable energies;
- Improving communication between the different stakeholders and adopting one-stop shops can play an important role.

• Social aspect and awareness

- The positive impact of such a step was highlighted in all the countries studied with the social impact addressed in a more specific way for Georgia and Lebanon, especially where renewables will help reduce power shortages and have an even higher impact on the economy in an indirect way;
- Awareness plays a major role in achieving the full potential of renewables, especially on the level of household projects;
- More generally, the engagement of local authorities and the local community is a must when addressing renewable energy policies.

1.13 Recommendations regarding support mechanisms

The eight case studies presented several success stories and several failed policies. Based on the lessons learned from these, this final section provides a set of recommendation that were subdivided into four categories in order to better analyse them:

- General policy recommendations;
- Legal and administrative recommendations;
- Technical recommendations;
- Financing mechanism recommendations.

1.13.1 General policy recommendations

Setting clear and transparent targets

- Countries setting clear and transparent targets for renewables, together with their corresponding evaluation indicators, is a key factor in the successful deployment of their policies. These renewable energy policies and targets should be revised following a clear timeline in order to accommodate the fast pace of advancement of renewable energy technologies:

- *Motivation:* sending a clear message of commitment to the international community and to domestic investors;
- *Impact:* attracting investments and funds.

Develop and strengthen the renewable energy industrial sector

- Small and developing countries have not developed their own renewable energy industry to produce appropriate equipment and are usually obliged to import most of the technologies:
  - *Motivation:* profit from renewables along their value chains;
  - *Impact:* creating the maximum number of job opportunities and energizing the industrial sector.

Awareness-raising

- Great efforts should be exerted to raise general awareness about the necessity of using renewables on different levels, from the public at large to administrative bodies and finally the decision-makers:
  - *Motivation:* lobbying for the deployment of renewable energies;
  - *Impact:* development of decentralized renewable energy projects.

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Developing R&D

- Research reinforcement in the targeted countries can play a major role in the success of the implementation of renewables, especially when dealing with the different technical challenges involved:
  - *Motivation:* helping to resolve specific technical problems where solutions cannot usually be imported from another country;
  - *Impact*: completing the value chain of renewables by assuring transfer of knowledge and creation of adequately trained manpower.

Tax exemptions

- Adopting a clear and transparent custom fee to be applied to all renewable energy products and to reduce or even remove such fees whenever possible: such an incentive should not be in conflict with any aforementioned possibilities of local manufacturing:
  - *Motivation:* lowering capital expenditure of renewable energy projects;
  - *Impact:* motivating large- and small-scale projects.

Comprehensive approach

- Adopting a comprehensive approach towards the adoption of renewables in different sectors other than electricity production, especially those of heating, cooling, water desalination and transportation:
  - *Motivation:* commitment towards INDCs;
  - *Impact:* greater impact on CO_2 reduction.

1.13.2 Legal and administrative recommendations

Capacity-building

- Systematically strengthen and raise the capacities of all institutions and government agencies that are responsible for this area:
  - *Motivation:* training qualified workers, regulators and decision-makers;
  - *Impact:* improving the quality of the sector.

- Opening of the electricity market, abolition of State monopolies and introduction of unique rules of operation of the whole system;
    - When speaking of a type of project for developing countries which still have State-owned electricity companies, it is primarily recommended to support the use of renewable energy within those companies;
    - Making use of renewable energies mandatory in some of the fields such as the adoption of biogas by agribusiness companies;
    - Setting up adequate legal frameworks for the integration of renewables on different scales, both large and small.

1.13.3 Technical recommendations

- Proper assessment of RE potential in the various countries is based on a uniform set of criteria, where potential is evaluated for each technology as a resource potential, a technical potential, an economic potential and a market potential. Such assessment will allow setting ambitious, but realistic, short-, mid- and long-term targets, with the corresponding level of support;
- Reinforcement of national grids to allow for renewable energy integration, especially on the large-scale;
- Prioritized grid connection for renewable energy projects;
- Regional grid integration can help stabilize national grids against the intermittency of renewable energy sources;
- Adopting clear and comprehensive grid codes for the integration of small- and large-scale projects for each of the renewable energy resources;
- Motivating decentralized renewable energy projects which help reduce losses due to the transportation of energy, especially in grids where technical and non-technical losses are important;
- Adoption of smart grids that further help the integration of renewables;
- Setting up accurate forecasting tools of wind speed and solar radiation to reduce the intermittency impacts of renewable energy generation;
- Adoption of sizeable capacities of energy storage, especially hydro pumped storage and thermal storage;
- Preparation of the power systems to accommodate high shares of intermittent and variable renewable energy sources;
- Development of an overall grid load flow study, which would identify the critical areas and connection points available on the grid, to promote connections without penalizing some projects unduly.

1.13.4 Financing recommendations

- Providing specific guarantees for investors, especially in the case of small developing countries, which are typically in a process of financial consolidation, where the State guarantees are not an acceptable mechanism for protection; it is recommended that these problems are overcome with high-quality bankable PPAs;
- PPA models should be prepared in close cooperation with the different stakeholders, especially the developers themselves, the financing agencies and lenders and the responsible agencies;
- Stable and predictable legislation for FIT;

- Setting up suitable financial mechanisms for the integration of renewables on different scales, both large and small;
- More assurances are needed from utilities to guarantee buying the power offtake over the economic life of the installed RE power systems;
- Reducing or eliminating the fossil-fuel subsidies in the power sector and calculating the true social, economic and environmental costs (tangibles and intangibles) for using such fuel make RE more competitive;
- Adopting a clear timeline for the contract with renewable energy providers;
- Monitoring the net economic and social impact of policy measures (FITs, ceiling price), in order to prevent boom-bust cycles

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