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WORKING PAPER

Integrated Renewable Energy Policies in the Rural Areas of ESCWA Region

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Glossary

ANME	Agence Nationale pour la Maîtrise de l'Energie (National Agency for Energy Conservation), Tunisia
BP	Best practices
CFL	Compact Fluorescent Lamp
CSP	Concentrating Solar Power
DSM	Demand side management
EE&RE	Energy Efficiency and Renewable Energy
ESCWA	Economic and Social Commission for Western Asia
FiT	Feed-In Tariffs
LAS	League of Arab States
GDP	Gross domestic product
GEF	Global Environment Facility
GHG	Greenhouse gases
IEA	International Energy Agency
MENA	Middle East and North Africa
M&E	Monitoring and Evaluation
MENA	Middle East and North Africa
MEPS	Minimum Energy Performance Standards
MSP	Mediterranean Solar Plan
PV	Photovoltaic
PWMSP	Paving the Way for the Mediterranean Solar Plan
NES	National energy strategy
NEEAP	National Energy Efficiency Action Plan
NREAP	National Renewable Energy Action Plan
OME	Observatoire Méditerranéen de l'Energie
RCREEE	Regional Center for Renewable Energy and Energy Efficiency
S&L	Standards and labels
SEP	Sustainable energy policies
SWH	Solar water heater
TPES	Total primary energy supply
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme

Executive Summary

Renewable energy policies in the rural areas of ESCWA: *Slow deploymentowing to structural barriers that new policies are tackling*

ESCWA countries[1] face multiple socioeconomic (demographic, poverty) and energy challenges (rapid increase of energy demand, costly fossil fuel dependency and subsidies, lack of access to reliable electricity, low technical and economic efficiency), which are even more pressing in rural areas which account for 43% of population. Such high share of rural areas calls for specific analysis and public policies. Also, energy prices are artificially low as the result of generalized and costly universal consumption subsidies combined with medium to high non-payment rates. Those socio-economic and energy features and risks have created structural and interlinked barriers for balanced energy policies as well as for energy efficiency and renewable energy (EE&RE) deployment, especially in rural areas.

To respond to these challenges and barriers, often turning in vicious circles, most ESCWA countries have developed ambitious Sustainable Energy Policies (SEPs) largely based on RE targets and for various countries also enforcing a NEEAP using a template adopted regionally. Investments on RE electricity, mostly centralised and to supply urban areas have significantly increased since 2007. Also, electrification has rapidly increased as over half of ESCWA countries reached a rate of electrification above 98% while the effective access to services may remain problematic for poor customers, especially in rural areas.

Integrated socio-economic and renewable energy policies in rural areas: *foreffective EE&RE deployment*

While the existing national rural and energy/RE policies are needed to prepare conditions for RE deployment, they have proven not to be enough to overcome those structural and multi-sectoral barriers, in particular in rural areas. While EE&RE action plans are key implementing tools, they generally lack to overcome those structural barriers if socio-economic and energy conditions for EE&RE investment are not yet met.

Historical policy analysis and international experience in transition in developing economies point out that integrated national socio-economic and energy strategies and reforms have the potential to overcome such structural barriers. In a more holistic approach, thorough and sustained socio-economic reforms, in particular to set strong administrations, a reliable statistical system and adequate governance standards enable to design, enforce and monitor multi-sectoral socio-economic development strategies.

A crucial and delicate socio-economic reform is to progressively reduce and phase out the costly and little efficient universal energy subsidies, which are a major barrier for EE&RE deployment, and also fiscally, economically and socially unsustainable. For social and political reasons, such subsidies need to be replaced by a targeted safety net, in particular individualised cash support and EE measures as insulation and class “A” equipment as well as lifeline or “block” electricity and gas tariffs (low rates for small users in the first tranche of consumption).

To enforce cross-sectoral policies and territorial approach in rural areas, an attractive option would be local development agencies, as focal points for main infrastructure sectors (water, waste, energy, local transport).

[1] 17 Arab countries in Western Asia: Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Palestine, Qatar, Saudi Arabia, The Sudan, The Syrian Arab Republic, Tunisia, The United Arab Emirates and Yemen.

Within such socio-economic development strategy, the national **energy strategy** sets a long-term vision, general and detailed qualitative and quantitativeobjectives, priorities and implementation schemes for the entire field and sector. It includes the institutional organization, mostly the pair between each energy ministry and its agencies and relies on action plans (e.g. NEEAP, NREAP) and a set of legal, financial and tax incentives, market take-off programmes and communication implementation tools

Introduction

α) Report context and objectives

This paper has been prepared within the ESCWA project*Climate Change Mitigation for Poverty Alleviation in the Arab Region*whose objective is to *"build the capacity of policymakers, civil society and the private sector in the field of renewable energy technologies in order to enhance energy security and improve energy services in poor rural areas. The project further to raise awareness promotes the use of renewable energies in ESCWA member countries. The project directly addresses the issue of integration of energy and climate change mitigation programmes into poverty reduction strategies through the preparation of delivery-orientated renewable energy projects that cater to the poor*".

This paper is a background contribution for the ESCWA regional conference organized with the RCREEE and Moroccan Ministry of Energy, Mining, Environment and Wateron *Renewable Energy and Sustainable Development in the Rural Areas of ESCWA Region* to be held on 26-28 November 2013 in Rabat, Morocco. This policy paper aims at assessing and reviewing the existing renewable energy policies in the rural areas of the ESCWA Region as well as providing policy recommendations both at national level and regional cooperation level.

β) Main issues/problematic

ESCWA countries[2] face multiple socioeconomic challenges, ranging from pressing demography, scarce arable land and water resources, generating structural poverty, social inequalities and unemployment. Owing to the lack of reliable basic services as transport, energy (especially electricity), education and health services, those issues are exacerbated in most rural areas which actually **account in average for 43% of population and 38% land use**(World Bank, 2012). Thus, this high share of rural areas in ESCWA countries calls for specific analysis and public policies to take it into account.

Energy is an essential socioeconomic development tool and converts into a strong constraint when scarce, unreliable or overpriced. MENA subsoil is rich in hydrocarbons even unequally distributed between countries. The subsequent large oil and natural gas supply combined with low fossil fuels and electricity prices (through universal subsidies) have made fossil fuels accounting forover 96% for the Middle East (IEA, 2011) of primary supply as well as contribute to inflate energy demand (e. g. +89% between 2000 and 2011). This soaring consumption is also driven by increasing population, further economic activity and development, in particular industries, and urbanisation. In addition, relatively ageing and little efficient/productive energy infrastructure and energy consuming equipment and appliances as well as low consumer awareness on energy efficiency (EE) generate high energy losses (at least 15% for electricity in the Middle East) (IEA, 2011) and high intensity energy (toe or kWh/ unit of GDP). This translates in high and increasing air, soil and water pollution and thus increasing health expenses and loss of biodiversity.

Those energy features combined with higher oil prices and the global financial crisis have increased the vulnerability and dependence to hydrocarbons of most ESCWA countries both net energy importers and exporters. In particular, both the investment needs in new infrastructure in priority in large urban areas and universal subsidies to cover uncontrolled demand are an increasing heavy burden for state budgets. Rural areas generally remain neglected in terms of investment and maintenance resulting in lower and more unreliable energy services.

If the ESCWA region is well endowed in hydrocarbons, it is also high for renewable energy (RE), in particular solar (for electricity and heat) and wind. This huge RE potential, especially solar is well

[2] 17 Arab countries in Western Asia: Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Palestine, Qatar, Saudi Arabia, The Sudan, The Syrian Arab Republic, Tunisia, The United Arab Emirates and Yemen.

distributed all over the region and within each country, in particular in rural areas for the technologies which request large surfaces (medium-large PV systems, CSP, wind farms). Furthermore, over the last years, those RE technologies have continued to gain in efficiency, economics and reliability.

Thus, almost all ESCWA countries have announced objectives to exploit their RE potential to diversify their energy supply and secure supply at more stable prices, develop domestic industries and services for job and value creation as well as reduce environmental impacts of energy supply and use. Further to importers (e.g. Morocco) several, oil exporters also consider RE as valuable option to cover growing domestic needs and thus maintain or increase oil and gas exports.

If RE targets are set, policies to initiate such radical transition to a higher use of RE are under design and not fully yet in place and effective. This is even more the case in rural areas facing further poverty and energy poverty.

Also, RE share in the Middle East primary energy supply remains marginal (1%) (IEA, 2011) and even lower for electricity. While, the average electrification rate is high at the exception of the poorest countries (Sudan, Yemen), nearly 36 million people, mostly in rural areas, do not have yet an access to modern energy services. Renewable energy in this region has an obvious potential to play a major role in improving energy access and reducing poverty, particularly in rural and remote areas. Nevertheless, energy in rural areas is often associated to electrification of households, which is indeed an important dimension but by far not the most quantitatively and qualitatively important in the ESCWA region. Also, households in various countries use traditional biomass and energy use in agriculture (water irrigation, transport) and business is critical.

χ) Methodology; Focus & Perspectives

In terms of sectoral scope, considering the high share (and weight of rural areas in total population and land use (43% and 38%, respectively) (World Bank, 2012), national global and sectoral policies have an impact on rural areas. Thus, overall and sectoral policies (e.g. social, transport, energy…etc.) need to include rural areas, which also share common issues and challenges with urban areas. At the contrary, only rural (or urban) policies can hardly be really adequate to effectively address global/national socioeconomic issues.Thus, national public policies (e.g. infrastructure) need to include and incorporate a rural dimension while specific sectoral actions can focus on rural development and related issues.

Based on diagnostic, this paper identifies best practices already developed and implemented and discusses the policy options to effectively deploy EE&RE, outlining the benefit of an integrated approach encompassing overall socioeconomic strategies (with focus on targeted social and energy support) as well as global energy strategies, starting with EE, pricing within a strong policy, institutional and regulatory framework

The paper is made of three chapters:

1. **Diagnostic** of Renewable Energy policies in the Rural Areas of ESCWA Region with assessment of energy policy, institutional and socio-economic barriers and perspectives. It includes an identification of policy **best practices** in ESCWA Region that have proved successful to contribute to the penetration of RE (and also EE) in the Rural Areas of ESCWA Region. A focus is made on alternatives (targeted support schemes) to universal energy subsidies.
2. **Integrated Renewable Energy policies** in the rural areas of ESCWA Region: based on an initial diagnostic and relevant Best Practices
3. **Conclusions and recommendations**to the main national and regional stakeholders active on RE policies in rural areas in order to facilitate the penetration of RE in ESCWA Region rural areas.

The paper mostly relies on a broad scope of existing and validated reports, studies and analysis, including developed by the author of this paper.

I. Diagnostic ofRenewable Energy Policies in theRural Areas of ESCWA

This chapter provides a detailed assessment of rural areas of the ESCWA region in relation with energy, focusing on renewable energy. It encompasses energy features of the rural areas focusing on renewable energy (RE) situation, including related barriers, policies and best practices.

A. Energy and Renewable Energy in Rural ESCWA Region

1. Regional socio-economic characteristics and trends

Overall

The majority of the ESCWA countries experienced solid economic growth over the last decade, allowing a certain improvement in living standards (improvement in health and primary education services, reduction in illiteracy). The impact of the global crisis after 2008 was less severe than in other regions of the world that are more dependent on international trade. Nevertheless, the impacts of the crisis and the dramatic increase in food and energy prices accentuated financial, budgetary and social imbalances, in particular high unemployment among the urban population and youth, including graduates.

Even if the incidence of absolute poverty is in general relatively low, vulnerability is high because large and increasing shares of the population live on incomes close to the poverty line as population under the USD 2 (PPP) a day threshold reach 29%[3] (MEDPRO, 2013).

The Millennium Development Goals report outlines that since 1990 poverty has decreased in all regions except for the ESCWA Region (including Egypt, Lebanon, Syria, Jordan and Palestine) (United Nations, 2010). Actually, poverty has increased in the region with a high share of population close to the poverty threshold. Thus, even small income falls and/or small increases of basic goods prices can push them into poverty.

In link with poverty and unequal revenue distribution, ESCWA countries suffer from structural unemployment (officially ranging from 9 to 13% but alternative estimations indicate 20 to 30%), especially affecting women (14%) and young people (22%), even with sustained economic growth. The main reasons include a rapid demographic increase associated with a young population, a relatively inefficient education system and the domination of economic sectors with limited job creation capacities and high volatility (e.g. retail trade, real estate and the financial sector). Since 2008, the global economic and financial crisis has further increased unemployment, which is also combined with high informal employment (Pearce and Mohamadieh, 2009).

[3] Algeria: 23.6%, Egypt: 18.5%, Jordan: 3.5%, Morocco: 14%, Tunisia: 13%, Turkey: 2% (World Bank, 2010; Arab Statistics, 2010).

Rural areas

While ESCWA rural areas largely share national socio-economic features described above, they also have specific characteristics, including accentuated poverty and underdevelopment. A primary explanation includes rural areas' isolation, lower productivity (larger share of population for limited means and resources), geographical and organizational fragmentation and a lower priority for public policies and investment than urban areas.

It is noticeable that rural areas in ESCWA region account for a high share of population (43%), employment (37%) and land use (38%)[4]. In poorer countries (Sudan, Yemen) this share is much higher while in more developed countries, rural areas retain a significant weight (Tunisia).

The access to secondary and graduate studies remains limited in rural areas because of poverty and geographical distance. Thus, the level of education of "traditional" farmers (also older than the average) is generally low.

Rural unemployment is generally combined with underemployment (low qualifications, part-time or seasonal jobs) and lower wages as well as a prevailing informal economy. Thus, rural underdevelopment and underemployment are fuelling migration to urban areas, which are not able to absorb both increasing rural and urban labour force, fuelling chronic poverty in inflated suburbs and slums. A challenge is thus to create conditions for activity and job development in rural areas to limit migration to urban areas.

Around 70% of poor in the ESCWA region live in rural areas. Rural poverty is concentrated in the following social groups: households headed by women, farm labourers and the landless. It is also concentrated incountries as Sudan and Yemen, in defined regions, such as Upper Egypt and two regions in Iraq, the mountains and steppes plains of Morocco and north-west Tunisia (WB, 2012).

Rural economy, in particular small farmers, is little integrated into national and monetary circuits, in particular regarding access to credit. The informal sector retains a significant share of activity and revenues. Lower education levels, poverty, lack of guarantees of rural population largely prevent traditional banks to promote credit and provide adapted loans to households and small businesses. Micro-credit remains generally marginal.

Usually, agriculture ministries define most policies for rural areas even if their original mandate lies on agriculture supply. However spatial and regional development as well as natural resource exploitation requires coordination with other public policies in particular for infrastructure (water, transport) and social services (health, education…etc.). Thus, rural areas generally suffer from a relative institutional vacuum and lack of policy coordination.

Irrigation accounts for 85% of ESCWA's water use as traditional irrigation techniques are still dominant. Withdrawals (from wells) represent two-thirds of renewable water resources (OECD: 8%). Thus, water security and availability largely depends on how agriculture uses water.

2. Energy situation

Thorough the ESCWA region, a growing population, rapid urbanisation, increased living standards, economic and industrial development have continuously inflated energy demand (+5-10% annually),[5] that is mostly covered by fossil fuels, principally supplied within the region. Thus, they put a high pressure on infrastructure needs, necessitating large new investments and sustained maintenance.

[4]For OECD countries: 75% of the land and around 25% of the population.

[5]With a 7% annual increase, capacity has to double every 10 years.

Such continuous and rapid energy demand's increase is aggravated by low efficiency in both supply and demand as well as artificially low domestic energy prices as the result of generalised and costly consumption subsidies combined with medium to high non-payment rates. As a result of below-cost recovery tariffs for electricity, current customer electricity prices in most ESCWA countries are well below generation costs relying on fossil fuels[6] (see graphs in Annex 1). Oil product prices are also distorted by high universal price consumption subsidies that are a heavy burden on public finances.

Despite those consumption subsidies and large investment (in large urban areas and rural regions), remains the issue of effective access to modern energy services especially electricity: 20% energy poverty and more due to unreliable supply (accidental or rotating black outs)

Thus, ESCWA countries' energy challenges are ample, and include risks on security of supply, costly fossil fuel dependency and subsidies, and limited economic and environmental sustainability. Those socio-economic and energy features have generated structural and interlinked barriers for balanced energy policies and energy efficiency and renewable energy (EE&RE) deployment.

Patterns of energy supply and consumption in ESCWA countries strongly affect the main macro-economic parameters, including fiscal balances and poverty trends. The volatility of global energy commodity prices and their relatively high levels in recent years constitute a burden on the finances of many net importing countries, both at the government level (via costs of running universal consumption subsidies) and utility level. This also affects energy exporting countries.

(a) Energy balance and indicators

Overall

A critical issue in ESCWA is a chronic lack of available and reliable energy data as methodologies vary between countries with few complying with international standards (IEA/Eurostat/UNECE) in particular to prepare an energy balance, an essential tool. Also only few direct energy sectoral consumption surveys exist in ESCWA countries. Only Tunisia and more recently Morocco have carried out such surveys to identify the patterns and evolution of energy consumption. Thus, their energy balance result more in line with international standards.

Also, the share of the informal economy can be significant as well as the illegal trade of oil products. Those limit the possibility to obtain reliable and disaggregated consumption data by sector, region and uses and thus relevant and reliable indicators.

Based on existing data and estimations, ESCWA countries' energy balances share low sustainability and high risks characteristics with associated indicators (based on energy balance and sectoral data):

- Consumption per capita: broad amplitude from 0.30 (Yemen) to 12.8 toe/cap./ per year (Qatar)(IEA,2011)
- Dominant fossil fuels-96% (oil, gas and coal for power generation and direct uses, oil for transport)
- Sectoral imbalances: residential being the largest consuming, followed by transport
- Uses: basic (lighting, fridges) and comfort (air conditioning)
- Low efficiency of supply (e.g. power generation: 30%), transport (around 20% of electricity transmission and distribution losses)
- High national and sectoral energy intensities, with high energy bills compared to revenues
- Dependency: fossil fuel imports for NOIC also exports with oil curse/syndrome
- Marginal RE penetration (3%) in particular in power generation (1%).

[6] In particular due to low prices (Egypt: 2 c€/kWh, Algeria: 3.5c€/kWh, Morocco: 6.5c€/kWh, Tunisia: 9c€/kWh) and distribution losses (mostly-non-payment) (Algeria: 20-25%, Egypt: 20-25%, Lebanon: 40%); average inland wind generation cost is at around 6€c/kWh (without transport and distribution cost).

Overall, the MENA region accounted in 2010 for a Total Primary Energy Supply (TPES)of around 800 Mtoe or almost 15% higher than 2007. Oil and gas make 95.5% of the energy mix of the Middle East, followed by coal and RE, including hydropower (3%), at the same level as 2007) mostly hydropower and wind power for electricity generation and traditional biomass for cooking and heating. In the final energy, oil and gas account for 85% of total, electricity 13.5%, coal 0.3% and RE (in direct use) 0.1%.

Similarly, power generation amounted to 1,200 TWh in 2011, or a 20% increase compared to 2008 and remains dominated by natural gas (60%), oil (37%) followed by hydropower (2.5%) while new RE is still marginal (1%) but in rapid increase thanks to wind and PV.

Rural areas

It appears that the availability and reliability of energy data in rural areas appeara more acute problem owing to an absence or insufficient of geographical or sectoral data collection that can hardly be compensated by estimations or other similar countries pattern.

Owing to lower incomes, less capital intensive activities and equipment rate (e.g. AC), the share of ESCWA rural areas in total energy consumption is generally much less than urban areas (with higher energy consumption per capita) and thus lower than its share in population. Energy usein rural areas follows similar patterns as in rural areas and even accentuated notably in terms of energy services availability. Indeed, even when rural areas are electrified, the effective access to services is constrained by energy poverty and unreliability of supply.

For electrification, substantial progress and achievements have been made as over half of ESCWA countries having reached rate of electrification above 98% (see table below). Nevertheless, some low income countries as Sudan and Yemen can only supply electricity a fraction of their population and often unreliably. Electrification has been carried out through grid extension or off-grid facilities for isolated areas mostly using diesel generators and increasingly PV for its higher performance and decreased cost.

Table 1: Electrification rate in MENA

		Electrification Rate (%)		Rural Electrification Rate (%)
		2005	2010	2010
NOEC	Algeria	98.1	99.3	97.9
	Bahrain	99.0	99.4	94.7
	Egypt	98.0	99.6	99.3
	Iran	97.3	98.4	94.5
	Iraq	15.0	98.0	94.1
	Kuwait	100.0	100.0	100.0
	Libya	97.0	99.8	99.1
	Oman	95.5	98.0	92.9
	Qatar	70.5	98.7	68.8
	Saudi Arabia	96.7	99.0	94.4
	Syria	90.0	92.7	83.5
	UAE	91.9	100.0	100.0
	Yemen	36.2	39.6	23.1
NOIC	Djibouti	n/a	50.0	n/a
	Israel	96.6	99.7	96.3
	Jordan	99.9	99.4	98.7
	Lebanon	99.9	99.9	99.2
	Malta	n/a	n/a	n/a
	Morocco	85.1	98.9	97.4
	Palestinian Territories	n/a	n/a	n/a
	Tunisia	98.9	99.5	98.5

Source: MENA Renewables Status Report, REN21, 2013

Based on some existing statistics and estimations, energy consumption in ESCWA rural areas follows the following breakdown by:

- uses: cooking, space heating, transport, water pumping (up to 8% of Jordan electricity consumption) lighting, drying;
- sectors: residential appears to be the largest energy consuming sectorfollowed by transport and agriculture[7].

Residential

According to samples and estimations, households would account for around 70% of ESCWA rural areas energy consumption (estimated between 0.35 and 1 toe per yearand household in South Mediterranean countries; EU:1.6). If cooking, lighting and water heating have the largest share, space heating and above all space cooling are rapidly increasing. Thus, if traditional fuels (fuel wood and biomass) continue to take a large share in the household energy consumption, LPG (for cooking and water heating) and electricity (for air conditioning/ cooling) are in rapid increase. The facility of transport and use of LPG have facilitated this higher share.For electricity, the share of residential is lower: 44% as average in ESCWA region in 2010, with a broad range: 28% in Tunisia and 66% in Yemen.

The share of traditional biomass is high as almost 20% of the region's population rely for cooking and heating on non-commercial fuels like wood, dung, and agricultural wastes, particularly in Sudan and Yemen but also in Algeria, Egypt, Morocco and Syria. Nevertheless, supply remains informal, and its use is little efficient (high losses in traditional stoves and ovens), that also generates high indoor and outdoor pollution.

Agriculture

Energy consumed by the agriculture in most ESCWA countries remains modest compared to OECD countries but increasing owing to the development of mechanized irrigation (water pumping[8] and distribution), tractors and chemicals of which fertilizers have a high energy content. Other new techniques as greenhouses need more ventilation and cooling than heating, also increasing the summer electricity peak demand. High subsidies for LPG have developed its exponential and disproportionate use in agriculture, especially for water pumping (e.g. Morocco).

Food processing/Agro-industries

As agro-industries still remain relatively underdeveloped in the region (products are generally sold in bulk), most food processing (e.g. crop drying) is performed by peasants on site or in small local units (e.g. olive oil). Thus, energy consumed by this sector appears modest.

Rural transport

Few and little detailed and reliable data exist on energy consumption for passenger and freight transport in ESCWA rural areas. Nevertheless, it appears a significant and increasing consuming sector.

Desalination

Similarly, there is insufficient information on desalination of sea water for rural areas and its related energy consumption. Actually, desalination generally produces drinking water (not for irrigation owing to its high cost).

[7] No reliable data available for rural areas. In average, over the MENA region, transport and industry are the largest energy consuming sectors with both 28% (IEA, 2011) of total final energy consumption followed by residential with 18% (electricity: 44% in 2010), services (5%) and agriculture (2%).

[8] Pump capacity of 0.5-1 kW for a well at 20 m depth and a daily consumption of 5-10 kWh.

On the **energy supply side** including RE, the share of rural areas in total varies a lot within the ESCWA countries. Generally, centralized electricity systems set up generation facilities near resources (hydrocarbons and hydropower) that are connected by large transmission lines to the main consuming urban areas. Also, decentralised units (PV, diesel groups) are also used, in particular for off-grid electrification in rural areas.

(b) Energy poverty

Energy poverty describes a lack or an inadequate access of households and public services to sufficient energy for lighting, cooking, cooling and space heating. It includes both access to modern energy forms as electricity forlighting or LPG for cooking that are safer, cleaner and more efficient than most traditional fuels and equipment (kerosene lamps). It also includes the effective access to these services (full time supply). Also, an effective access to sustainable modern energy services for all households plays a crucial role to achieve the Millennium Development Goals.

Also, the effective access to electricity services appears lower as poor households lack cash reserves (low and volatile income) for the access costs (full electricity connection fees of up to USD 600), monthly energy service expenses and cost of the equipment (e.g. refrigerator). In addition, effective services are sometimes not fully available (rural areas: low population densities and lower revenues, urban areas: lack of infrastructure in slums) and interrupted (electricity black-outs in Algeria, Egypt or Lebanon and other countries during summer peak).

In 2002, about 65 million people (or 40% of total) in the ESCWA region had no access to electricity, and an additional 60 million were severely under supplied in both urban and rural areas. Thanks to ample electrification programmes, an estimated 36 million people, mostly in rural areas, remain yet without an access to modern energy services.Estimations for 2009 (IEA, 2011) indicate a significant drop at 21 million for the Middle East region but reliable and consolidated data still lack.

For instance, energy poverty in Yemen is widespread especially in rural areas with almost halfof the population without access to electricity and an unreliable supply for the others that also impactbusinesses.Energy poverty is then a serious issue for Yemenwhile it is anatural gas and oil exporter.

B. Renewable EnergyPotential, Barriers and Policies

1. Renewable energy potential and benefits

(a) Renewable energy potential

The ESCWA region is endowed with a very high RE technical potential, mostly solar (4-8 kWh/m2/y vs. 4 kWh/m2/y in Germany) and wind (8-10 m/s) that is estimated to no less than 45% of the world's potential for renewable energy. Solar and wind are geographically well distributed, including in densely populated areas for PV.

RE can cover almost all energy uses especially rural: cooking, lighting andwater heating except transport. Various estimates of the RE technical potential have been prepared in most countries (seeTable 2 below). In addition, real progress has been made quite recently with the preparation of RE atlases (generally solar and wind) based on modern technologies (satellite, local wind measurement) that provide a detailed and qualitative assessment of the potential.

Table 2:Technical RE potential in theArab region

TABLE 1 - SOLAR, WIND AND BIOMASS ENERGY RESOURCES IN SOME ARAB COUNTRIES

Country	Global Solar Radiation $kWh/m^2/day$	Wind energy m/s	Biomass and fuelwood, (mtoe/year)	Hydropower Installed Capacities (MW)
Algeria	5-7	2.8-4.1	1.66	274
Bahrain	5-8	5-6	0.14	-
Djibouti	4-6	4-5	-	-
Egypt	5-9	4-10	3.9	8520
Iraq	5-6	-	6.3	2620
Jordan	5-7	5.5-7.5	0.74	7
Kuwait	5-8	5-5.6	0.37	-
Lebanon	4-6	3-5	0.59	283.1
Libya	5-7	3-6	0.127	-
Mauritania	6	6-7	0.107	61
Morocco	5-7	5-8	4.8	1205
Oman	5-6	4-6	0.47	-
Palestine	4-6	3-5	0.015	-
Qatar	5-6	5-7	0.07	-
Saudi Arabia	6-8	4.5-6.5	3.0	-
Somalia	6-9	5-7	0.35	-
Sudan	5-8	5-6.5	3.9	1553
Syrian Arab Republic	5-6	4.5-11	1.24	1505
Tunisia	5-7	5-6	0.18	66
United Arab Emirates	5-6	3.5- 4.5	0.33	-
Yemen Republic	4-6	4-6.6	3.5	-

Source: UNESCO, 2009

Nevertheless, the methodologies for RE potential estimationsare not necessarily harmonized and the effective economic potential is much lower owing principally to artificially low prices of fossil fuels and electricity.

Rural areas

Rural areas benefit of an even easier access to RE potential resources (solar, biomass, wind…) thanks to better and cheaper access to land (e.g. desert or semi-desert areas) and space (PV and SWH on roofs). Compared to urban areas, land in rural areas is in average at least 5 times cheaper (up to 10 or 15 times) with easier and quicker authorisation procedures. Also surfaces available are much bigger and often with distance from neighborhood.

In addition, the access to natural resources and raw materials (agriculture waste, biomass...etc.) is much easier.Also, RE atlases that have been prepared in various countries as Morocco, Jordan can

identify the most valuable production sites, especially for wind farms provided there is an access to infrastructure (e.g. road to bring and maintain equipment, adequate grid).

On the negative side, the density and quality of infrastructure in rural areas (beginning with electric grid) and services are generally much lower than in cities. Also, rural markets are smaller and fragmented.

(b) Renewable energy benefits

Overall

The deployment of RE has the potential to generate a wide range of significant benefits on the following fields:

- Energy: enhanced energy security (less supply risks and increased supply and geographical diversification), reduced import and fossil fuel dependence and price volatility, contribution to satisfy existing and new energy demand, and thus improve energy access. Also for the energy sector, in particular electric, modern RE represents the opportunity to develop a more decentralized and balanced system with distributed generation nearer to consumption centres with less transmission losses. Also local RE reduces tension on the transmission network and reinforces distribution network at lower cost than standard increased capacity;
- Socio-economic: generate manufacturing and service opportunities, added value and decentralized and medium-high qualified jobs, regional development (for facilities installed in disadvantaged areas), reduced energy consumption subsidies and fossil fuel subsidies, in particular over the time considering RE long-term cost advantages and very low or negative externalities. Potential to export renewable electricity as well as oil and gas instead of being consumed domestically;
- Environment: reduction of pollutant and greenhouse gas emissions and thus reduced health and environmental impacts.

When combined with EE improvements, those benefits are higher and more durable.

Rural areas

RE in rural areas offers the double dividend of rural/regional development and reduction of poverty as well as of energy poverty. Indeed, RE as EE is a major tool for energy access, especially the electrification of isolated rural areas through grid and off-grid systems.

Furthermore, the recent development of competitive and reliable SWH and PV roof-top kits greatly facilitate their accessibility for a much wider range of customers and needs, and thus creating further local opportunities, activities and jobs for installation and maintenance.

For off-grid rural electrification, RE, generally PV, replace diesel generators that require a regular and increasingly costly supply of fuel and maintenance, are short-lived and generate pollution. With the combined increase of performance and reduced cost, PV offers since the last 5 years an efficient, simple to install and maintain that last longer and cheaper than diesel generators.

As energy is a crucial socio-economic development tool, clean energy services delivered to individuals and communities generate local and durable social, economic, and environmental benefits. The challenge is also how to make RE affordable to low-income rural households given their high upfront capital cost.

2. Current renewable energy use

Overall

With renewable energy (RE), including hydropower covers only 3% of ESCWA primary energy supply, the region uses only a minor fraction of its RE potential and much below other regions (world average: 13%, Latin America: 31%, Asia without China: 27%).

For electricity generation (to grid/off grid, centralized/decentralized), RE's share is even lower with only 1%. In direct uses (solar water heating and biomass combustion for cooking, drying, space heating and biofuel) RE accounts for a larger share thanks to traditional biomass (e.g. biomass, mostly agriculture wastes in Tunisia account for around 13% of total primary supply.

Nevertheless, those data on RE use remain largely estimated as there is great lack of statistical surveys on both conventional RE as biomass (woodfire, agricultural waste, biogas, etc.) as the new photovoltaic or solar thermal.

For electricity generation, wind power capacity has rapidly increased (by a factor 4 between 2005 and 2010) to reach 1,100 MW in 2012, mostly in Egypt, Morocco and Tunisia andbeing the first non-hydropower RE.This technology has benefited from an increased performance and reliability while its cost has decreased, making it one of the most competitive power generation technology (grid parity with fossil fuels reached). A project pipeline worth4,736 MW (under development or study, REN 21) up to 10,600 MW by 2020 (PWMSP, also envisaged or planned)by 2020 is under development even in a relatively limited number of countries.

Solar PV follows a similar take-off path while more recent and increasingly decentralized with an increase of 111% annually of installed capacity between 2008 and 2010 to reach 380 MW in 2012, including 22 MW in UAE (twice as 2010), 15 MW in Egypt, Morocco, Jordan and Tunisia, 7 MW in Saudi Arabia. The recent approval of net metering schemes in Jordan (PV grid parity) and Tunisia have further boosted markets.

Also, large concentrating solar power (CSP) plantsthatfullyrely on solar power (after several hybrid gas-solar units) have been commissioned(UAE), beingoperative in Morocco, Egypt and Algeria. Meanwhile, Saudi Arabia Announced in 2012, its solar plan aims to put into servicearound 41 GW of installed capacity by 2032.

The project pipeline for solar (PV and CSP) is estimated at 2,347 MW (under development or study, REN 21) up to 3,900 MW in PV and 4,000 MW for CSP by 2020 (for Southern Mediterranean, PWMSP).

Overall, at mid-2013, the total project pipeline in RE power generation was worth 7,500 MW(REN 21) and up to 18,500 MW by 2020[9] (PWMSP) to be compared with the existing total capacity of 107 GW that is expected to reach 270 GW by 2020. In 2012, investment reached USD2.9 billion (with Morocco accounting for two-thirds of this total), 40% higher than in 2011.

For water heating, SWH is a simple, proven and cost-effective technology that competes well with fossil fuels boilers and electrical heaters when energy price is less subsidized. It also reduces electric peak demand and subsidies. In Palestine, SWHpenetration rate reaches over 65% with1.6 million m2, the equivalent of 1,100 MWe capacity (a high share of supply capacity). In Tunisia, the PROSOL integrated programme (for households and services) has managed to bring the installed capacity from 120,000 m2 in 2004 to 320,000 m2 in 2008, the equivalent of 390 MWe capacity (10% of total capacity). The Tunisian Government builds on the success of the PROSOL with the ProsolElec project (PV) targeting 15 MW.

[9] Including Egypt (6,810 MW) and Morocco (4,020 MW), or almost 60% of total pipeline.

In highly subsidized and exporting countries, SWH remain marginal as pay back is too long.

Overall, total installed SWH capacity account for about 9 million square meters (m²) of collector, the equivalent of 6,300 MWtwith a high potential of expansion thorough the region thanks to successful promotional packaged schemes as PROSOL and PROMASOL (Programme de Développement du MarchéMarocain des Chauffe-eau Solaires) programmes in Tunisia and Morocco, respectively.

Table 3: SWH installed capacity in MENA countries

Table 3. Solar Water Heating Installed Capacity in the MENA Countries

		Total Capacity (MW_{th})	Total Collector Area (m^2)
NOEC	Algeria (2012)	0.21	300
	Egypt (2012)	525.0	750,000
	Libya (2012)	0.021	30
	Syria (2010)	420.0	600,000
NOIC	Israel	2,917.8	4,168,245
	Jordan (2012)	350.0	500,000
	Lebanon (2012)	245.0	350,000
	Malta (2011)	35.952	51,360
	Morocco (2012)	245.0	350,000
	Palestinian Territories (2012)	1,120.0	1,600,000
	Tunisia (2012)	437.5	625,000

Sources: See Endnote 29 for this section.

Source: MENA Renewables Status Report, REN21, 2013

For other direct uses of RE as biomass, mostly agriculture residues, situations differ a lot within the region with high share in rural countries (Sudan).

Rural areas

In rural areas, the lack of reliable and comprehensive energy data (as no specific rural surveys exist in the region) is even higher for RE supply and consumption. Such limited data, studies and experience constraint the analysis of the current RE use and potential.

To notice that Tunisia reports a significant share of biomass, mostly agriculture waste (13% of total energy supply) thanks to direct consumption surveys and estimations.

Nevertheless, various studies have explored the possible use of RE in multiple uses and sectors in rural areas as detailed in Annex 2.

3. Policy barriers for renewable energy

Overall

The above socio-economic and energy features in ESCWA countries have generated structural and cross-sectoral obstacles for balanced energy policies as well as for energy efficiency and renewable energy (EE&RE) deployment. Those barriers are also socio-economic, thus much beyond the energy field, and vary within the region in intensity and complexity. They are detailed in Table 4 below and are associated with risks ranging from political risks to investment ones.

Table 4: Existing socio-economic & energy barriers and risks for RE

Items	**Prevailing situation/ Features**	**Risks***	**Impacts/Barriers***	
			Energy	RE
1. Socio-economic				
Economics	Moderate to rapid GDP growth Commercial deficit Large share of informal economy Currency volatility and depreciation/devaluation	Investment risks: market risks, currency risks, client risk	Large new infrastructure requirements Contribute to deficit (equipment and energy imports)	Priority to energy supply side S&L measures can hardly influence grey/black sectors
Financial	Medium to high budget deficit and public debt Credit to business and households underdeveloped **Lack of access to finance** for medium-long-term investments	Financial risks	Constrains public funding Limits financing of energy investment	Limits financing of EE&RE investment
Social	Poverty and inequalities affect a large part of households Moderate to rapid demographic growth Unemployment affects an important share of workforce, especially youth Public education system little efficient **High universal price subsidies** (with high budgetary costs)	Country risks**	Generate energy poverty Not able to reduce energy poverty	Lack of access to energy services reduces EE rationale and potential Discourage rationale use of energy, EE&RE investments
Political	Volatility of institutions and state	Political and country risks**	Strong disincentives for investment, in particular medium to long-term	

	Public governance			
2. Energy				
Awareness and information	Limited awareness and information on energy and RE technologies and potential of decision-makers, stakeholders (architects, developers), energy investors and customers Lack of knowledge and experience on RE of decision-makers, energy investors, installers/maintenance. Lack of qualified RE policy-makers, commercial and technical personnel. **Insufficient reliable and available RE data** and information transfer.	Investment risks	-	Slow or prevent RE policies adoption and project investment
Energy policy and planning	EP and planning remain generally limited to principles, insufficiently structured and effective as lacking tools (data, forecasts…etc.) and means to enforce and M&E Lack of policy coherence for energy and other related policies Conflicting objectives andinterests among energy policy-makers with high influence of fuel lobby	Market risks Investment risks	Inertia and limited impacts of EP on energy sector and demand/customers	SEP remain isolated and marginal
Regulatory and legislative framework	Lack of adapted and **stable regulatory and legislative framework** for energy and RE investment Only few RE specific laws	Lack of profitability Investment risks	Regulatory uncertainties reduce investment attraction Reduces energy company capacities to	Regulatory uncertainties act as investment disincentives Discourage rationale use of energy and EE&RE

	Vertical regulation with limited role and action of independent regulators (when existing) on SE **Artificially low energy prices (universal subsidies)** below operating costs Cos of environmental externalities of fossil fuels not integrated in energy costs		maintain and invest Inflate demand, waste and creates shortage	investments
Energy sector	Dominant public energy monopolies under relatively weak regulation and ownership/shareholding management (corporate governance issues) Dominant and subsidised (both supply and demand) fossil fuels Lack of trained staff on RE project development and operation Monopolistic energy market (no guaranty toaccess grid and no fair feed-in tariffs for independent RE power producers)	market risks	Investment decisions may lack economic and financial assessment and overall coordination.	Demand side and losses reduction investment are largely neglected despite effectiveness and low cost to control demand growth
Infrastructure	High generation and T&D electricity losses and limited incentives to reduce them High transaction costs due to small to medium scale investments	Lack of profitability for energy sellers	Losses reduce producers revenues and resources for proper maintenance	

Demand	In rapid expansion as result of economic and demographic growths, prices and outdated EE standards	Require high level of investment at expense of other needs	Constant pressure on existing infrastructure for new investment and maintenance especially by peak electricity demand	
Institutions	Administrations, companies and professional associations for renewable energy remain powerless compared to fossil fuels counterparts.			
Ministries (for energy)	Cumulate broad role and functions in energy policy as well as of regulator and management of public monopolies with potential conflict of interests SEP role generally limited to principles, lacking tools and means to enforce it and M&E Unclear ministerial responsibilities and insufficient or inadequate local branches Lack of staff and specific expertise on RE		Limited leadership capacities to design, implement and monitor EP which remain fragmented or lacking effectiveness	
Agencies (for EE&RE, regulators, statistical offices, R&D…etc.)	Generally energy agencies are under-developed, staffed and lacking clear mandate and assignments RE mandate not explicit or clear Incomplete or insufficient coordination between government agencies		Agencies notably for statistics can hardly fulfil mandate to enforce EP and action plans	EE&RE agency role and actions remain marginal
RE investment	High upfront investment cost Normal taxes on investment and custom taxes on imported equipment			

	High transaction costs due to the small-scale and technologies not largely used Absence or inadequate RE certification scheme			

Sources: PWMSP, OECD (2013)

* Risks: the prospect to suffer a danger or a threat, and thus harm or loss.

Impacts/Barriers: strong effect on someone or something/obstacles for EE&RE deployment.

** Country risks: refers to the risks of undertaking transactions, investing or holding assets in a country. Sources of risk include political, economic, or regulatory instability as taxation, repatriation of profits, nationalization or currency stability

A major barrier both on the energy and fiscal sides are the universal subsidies as described in the box below.

Box 1: Consumption and fossil fuel subsidies: a major barrier for RE investment

The use of universal energy subsidies is extensive in ESCWA countries with the initial objective to enhance access to modern energy and reduce poverty. They include both consumption and supply sides. On customer side, universal final price consumption subsidies (guaranteed energy price reductions accessible to all customers) account for the largest share of subsidies and are mostly used for LPG (used for cooking and heating by households), diesel (local transport and agriculture), natural gas and electricity (general and agriculture).

Furthermore, the 2007/2008 and 2009/2011 oil price increases have successively further increase the gap between those artificially low prices and markets prices, leading to further budget deficits in net-importer countries. Also, for most countries the size of fuel subsidies has been notably higher than those to food (300-600 USD/capita/year).

Two countries are among the 25 largest users of energy subsidies in 2010: Egypt (6th; total energy subsidies: USD 20 billion or 11.9% of GDP, 250 USD/capita) and Algeria (12th; total energy subsidies: USD 10 billion or 6.6% of GDP, 300 USD/capita) (IEA, 2010).

While universal final price consumption subsidies have proven largely inefficient to reduce or limit poverty as 80% benefit the largest consumers, in particular the richest groups of the population as well as large companies or multinationals, they are also appears very unfair as being financed by all customers, including the poorest, through the state budget. For a high and unsustainable financial and fiscal burden, on average only 20% of all energy subsidies (and 8% of fossil fuel subsidies) go to the poor.

However, such price subsidy schemes appear to be quite inefficient at addressing poverty because on average only 20% of all energy subsidies (and 8% of fossil fuel subsidies) go to the poor, while most benefits profit the wealthy groups who consume more energy. Both energy consumption and fossil fuels subsidies create a significant cost gap preventing RE to compete beyond all barriers. Also, the subsidy schemes place heavy burdens on ESCWA countries' state budgets, especially since the 2007-08 oil price surge that led to energy subsidies further increasing their share in total government expenditure. This growing pressure on state budgets appears to be unsustainable, in particular in Egypt, Lebanon and Syria (where subsidies account for more than 15% of total budgetary expenses). Furthermore, by distorting price signals, universal price subsidies act as a strong disincentive to a more rational and efficient use of energy and investment in the energy sector, including in renewable energy.

Effective tariff (including T&D losses) are below the generating costs of mature renewable energy technologies (such as wind).

Sources: MEDPRO, PWMSP, UNDP

Table 5: Energy subsidies in southern and eastern Mediterranean countries (SEMCs) (2010 or most recent available data)

	Share of residential sector in final energy consumption (in %, 2009)	Subsidy mechanism (universal energy price subsidy individual support)	Level of subsidy: total/ per fuel (in % of final price)	Main energy subsidies (in USD bn)	Total subsidies (% of GDP/state budget)	Subsidies (USD) per capita	Financing scheme	Overall efficiency to reduce poverty
Algeria	33%	Universal consumption price subsidy	Total: 59.8%/electricity: 35%	Fuels (8.5), natural gas (NA), electricity (2.1)	6.6/-	372	Indirect (state company deficit are covered by the state)	Limited
Morocco	22%	Universal consumption price subsidy	LPG: 250%, diesel: 66%, gasoline: 35%, fuel oil: 91%, electricity: NA	Total: 4.8 (2011)	5%/20%		Specific fund (CGC)	Limited (42% of subsidies benefit to rich household and enterprises)
Tunisia	31%	Universal consumption price subsidy	LPG: 144%, diesel: 37%, gasoline: 19%, fuel oil: 64%, natural gas: 86%, electricity:44%	1.1 (2007), 2.2 (2010)	5%/15%		Specific fund	Limited
Egypt	22%	Universal consumption price subsidy	Total: 55.6%/LPG/ 90%, diesel: 75%, natural gas: 80%, electricity: 10%	Fuels (14.1), natural gas (2.4), electricity (3.8)	11.9%/15 % (2010)	297	State budget	Limited (only 13% of the subsidy go to 20% poorest)
Iraq	25%	Universal consumption price subsidy	64.3%	Total: 22.2	NA	722	NA	
Jordan	21%	Individual support and universal consumption price subsidy	NA	NA	2%		Specific fund	Improved*
Lebanon	36%	Universal consumption price subsidy	Electricity/ NA	NA	4% GDP/17% budget, only electricity		State budget	Limited

Libya	14%	Universal consumption price subsidy	76.9%	Total: 3.1	NA	487	NA	
Kuwait	16%	Universal consumption price subsidy	87.8%	Total: 11.1	NA	3,730	NA	
Palestine	60%	Universal consumption price subsidy	NA	NA	NA		State budget	Limited
Qatar	6%	Universal consumption price subsidy	78.6%	Total: 6		3,622		
Saudi Arabia	9%	Universal consumption price subsidy	79.5%	Total: 60.9	NA	2,291	NA	
Syria	16%	Universal consumption price subsidy	NA	NA	NA	NA	NA	
UAE	5%	Universal consumption price subsidy	69.1%	Total: 21.8	NA	4,172	NA	

Notes: fuels mostly consist of LPG and diesel. Social tariffs (lifeline rate) for low purchasing power users are used in several SEMCs (Egypt, Jordan, Morocco, Tunisia).

* Jordan:a detailed evaluation of the new individual support scheme is not yet available but appears to be much more effective than the previous universal price subsidy (only 7% of the subsidy used to benefit the 25% poorest households) even if partially reintroduced in 2011.

Source: MEPDRO, 2013 (based on IEA, IMF, World Bank, national statistics.)

Rural areas

The deployment of RE in rural areas face in a more acute way the above described overall complex and interlinked set of barriers. In particular, the rural areas' socio-economic and energy features, especially fragmentation and isolation, high spread of poverty and higher transport distance first reduce the size of potential markets for RE markets as well as make more make difficult RE investment. Also, there is a lack of experience on RE deployment and specialized SMEs, distant and little coordinated public policies and institutions in particular for energy. Thus, RE investment in rural areas suffer from tougher obstacles and higher risks.

At the same time, RE, in particular PV has increasingly proven be an effective and least-cost tool for the electrification of remote and dispersed rural areas thanks to off-grid solutions (generally individual PV). In particular, Morocco has increased electrification of such isolated areas by a proactive programme, PERG,that increased the coverage of rural population from 14% in 1990 to 97.4% in 2010[10] (and national electrification rate from 85% in 2005 to 98.9% in 2010). Also, where rural energy consumers have low demand (lighting, basic food cooling) renewable energy systems can suitable and cost-effective applications. Also, technological improvements have madelarger PV and SWH systems (200 W-5 kW) and wind (500 kW-50 MW) more accessible for small to medium decentralized facilities.

4. Renewable energypolicies landscape

(a) Domestic/national strategies

Energy Policy and RE policy targets

To respond to these above described challenges and barriers, often turning in vicious circles, most ESCWA countries have established specific broad and ambitious Sustainable Energy Policies (SEPs) that primarily rely on RE targets now set in all 16 countries (5 in 2007), as listed in Table 4 below. In synergy, Demand side management (DSM) and EE are generally associated with the objective to limit or curb the rapidly increasing energy demand and associated investment needs in new energy infrastructure. This is also a condition to provide a higher share for RE in the energy mix.

Nevertheless, the definition and basis of those objectives (e.g. RE output in % of total electricity generation or % of final energy consumption) and timelines are not harmonized within the region making comparisons and benchmarking somehow difficult. Also intermediate objectives are generally not available making problematic an effective M&E. In addition, the quality and convergence of energy statistics remain an issue over the region.

[10]With an average of around 75% of rural households connected through individual meters.

Table 6: National EE&RE targets in ESCWA countries

Country	National EE targets and target dates	Existing non-hydropower RE capacity (MWe) and share in electricity mix (%)	National RE targets* and target dates
Algeria	-	34 MW (2012) of wh. 30 MW CSP (ISCC plant Hassi Rmel, 150 MW) 0.1% of electricity mix (2009)	15% of total electricity (or 2,700 MW in RE) by 2020, 40% by 2030. Solar: 12,000 MW (PV: 2,800 MW; CSP: 7,200 MW), wind 2,000 MW). In addition a capacity of 10,000 MW reserved for electricity exports.
Bahrain	-	5 MW (PV)	5% by 2020
Egypt	5% energy consumption savings by 2015	570 MW (2012) of wh. 550 MW wind and 20 MW CSP (ISCC plant Kuraymat, 140 MW) 1% of electricity mix (2009)	20% of total electricity by 2020 including 7.2 GW wind and 1.2 GW of solar.
Jordan	Improve total energy efficiency by 20 % by 2020	13 MW (2012) including 10 MW biogas, 1.5MW PV &1.5MW wind 0.1% of electricity mix (2009)	7% of primary energy by 2015 and 10% by 2020 by 600 MW from wind power, 600 MW from solar power and 30–50 MW from waste. A net-metering programme with a target PV capacity of 3 MW since 2013. Penetration rate of SWH to increase from 12% to 30% in 2020.
Lebanon	Improve total EE by 5 % by 2015	Micro PV (150 kW) and wind generation 0.1% of electricity mix (2009)	12% of electricity and thermal energy by 2020 Target of 100,000m^2 of SWH by 2020
Libya	-	Several PV installations 0.1% of electricity mix (2009)	3% ofinstalled power generation in 2015, 7% by 2020 and 10% by 2025 corresponding to 1,050 MW by 2020 and 2,200 MW by 2025 (of which 1,000 MW wind, 800 MW PV and 400 MW CSP and 450 MW of SWH).
Iraq	-	0	2% by 2016
Kuwait	-	0	5% by 2020, 10% by 2030
Morocco	12% energy savings by 2020	287 MW of wind farms, several PV installations, 20 MW CSP (ISCC plant AinBeniMathar - 450 MW) 3% of electricity mix (2009)	42% of total installed capacity by 2020 including 2,000 MW solar, 2,000 MW wind and 2,000 MW hydropower
Oman	-	0	10% by 2020
Palestine	-	Several PV installations (50 kW) 0.1% of electricity mix (2009)	5% of electricity generation by 2020 or a total of 130 MW (34MW PV, 20 MW CSP, 17 MW wind, 18 MW waste and 3 MW biomass).
Qatar	NA	NA	2% (solar) by 2020
Saudi Arabia	-	7 MW PV	10% of electricity supply by 2032 25% of electricity by 2032 CSP: 25,000 MW, Solar PV: 16,000 MW, and Wind: 9,000 MW.
Sudan	-	1,600 MW (2032)	-
Tunisia	24% primary energy savings by 2016 and 40% by 2030	260 MW (2012) of wh. 250 MW wind, 2 MW PV and biogas 1% of electricity mix (2009)	16% of total power generation capacity by 2016, 40% by 2030.
UAE	-	PV: 22 MW CSP: 100 MW (Shams1)	Dubai: 5% of electricity by 2030, Abu Dhabi: 7% of electricity by 2020
Yemen	-	-	15% of electricity by 2025

* In % of total installed electricity generation (if not specified)

Sources: national sources, PWMSP.

Those targets would translate to add over the period up to 2020 a capacity of non-hydro renewable energy of 50 GW and 107 GW by 2030 (only + 1.7GW in 2011).

RE strategies

Within ESCWA region, national RE strategies appear at various stages of advancement while a new dynamic has emerged over the last 5 years as several ESCWA member countries have developed effective and innovative RE strategies. In the Arab Mediterranean countries, the adoption of a specific regional objective for RE within the MSP has fostered initiatives, illustrated by several "solar plans "(Egypt, Morocco, Tunisia). For instance, the Tunisian Solar Plan (2010) detailed 11 projects with a capacity of about 514 MW (330 MW wind, 105 MW CSP and 80 MW PV) estimated to 1.4 billion Euros. Its revised version (2012) indicates a 2020 target of 4.2 GW (wind: 3 GW, PV: 0.9 GW, CSP: 0.3 GW) for an objective of 20% share in the power mix.

Also several countries adopted a NEEAP whose template was developed by RCREEE (see details in section below) also included RE, in synergy. Also RCREEE is also developing specific NREAP that will further develop and consolidate. Those plans generally set detailed priorities by RE technology and timelines, coordinate ongoing and future programmes, initiatives and projects within administrations and stakeholders. Thus, they constitute a major reference for RE deployment and support institutions and tools (cf. table 5 below). By early 2013, each ESCAW country has adopted at least one renewable energy measure/tool, such as RE investment law, fiscal incentives, feed-in tariffs (FITs), net metering or RE funds.

Table 7: Heating and cooling support policies in MENA countries

Table 11. Heating and Cooling Support Policies in the MENA Countries

● National Level
○ State Level

		SWH Targets	Regulatory Policies		Fiscal Incentives					Educational incentives			
			Building regulation/code	Equipment standards	Capital grant subsidy	Operation grant subsidy	Tax incentive	Lowering/exemption of customs duties	Soft loan and loan guarantee	Technical assistance	Labelling	Training programme	Awareness raising programme
NOEC	Algeria	✓			●								
	Egypt		●	●	●	●		●					
	Libya	✓											
	Syria	✓		●	●				●				
	UAE (Dubai)	✓	○	○								○	○
	Yemen	✓											
NOIC	Israel		●	●									
	Jordan	✓	●	●			●	●					
	Lebanon	✓	●	●	●				●				
	Morocco	✓	●	●	●		●				●		●
	Palestinian Territories			●									
	Tunisia	✓	●	●	●		●	●	●	●	●	●	●

Source: See Endnote 32 for this section.

Source: MENA Renewables Status Report, REN21, 2013

Table 8: EE&RE Institutional organisation inMENA Countries

Country	EE&RE Dpt at Energy ministry	Energy unit at statistical office	Independent energy regulator	EE&RE agency	National electricity company in charge of RE	R&D agency
Algeria	EE&RE units at MEM	ONS	CREG (2005)	APRUE (EE) (1988) Commissariat for RE (*planned*) NEAL (SWH)	Sonelgaz	CDER
Bahrain	Electricity and Water Authority (Electricity and Water Conservation Directorate (EWCD)	NA	Electricity & Water Authority	EWCD	-	-
Egypt	EE unit at MEE	CAPMAS	ERA (2001)	RE: NREA (1986) EE: EEU (2008)	-	RE: NREA
Jordan	EE&RE units at MEMR	DOS	ERC (2005)	NERC (for some items)	-	NERC (1999)
Lebanon	-	ACS	-	LCEC	EDL	
Libya	-	**BoS**	-	REAoL (2012)	-	CSERS (solar)
Iraq	Ministry of Electricity	NA		-	-	-
Kuwait	Ministry of Electricity and Water	NA		-	-	Kuwait Institute for Scientific Research
Morocco	EE&RE unit at MEMEE	DS	*Planned* (2014)	ADEREE, MASEN (2009)	ONEE (wind)	IRESEN (2011)
Oman	Public Authority for Electricity and Water (PAEW)	NA	Authority for Electricity Regulation		-	-
Palestine	PEA (1995)	PCBS	PERC (2012)	PEC	-	
Qatar	Ministry of Energy & Industry	NA		Council for Environment & Natural Reserves	Electricity & Water Corporation (Kahramaa)	-
Saudi Arabia	Ministry of Water and Electricity	NA	Electricity and Cogeneration Regulatory Authority (ECRA)	Saudi Center for Energy Efficiency King Abdullah City for Atomic and Renewable Energy	-	King Abdulaziz City for Science and Technology (KACST)

				(K•A•CARE)		
Sudan	Directorate for Renewable and Alternative Energy at Ministry of Water and Electricity	NA	-	-	-	-
Tunisia	EE&RE units at MIT	INS Observatoire National de l'Energie	-	ANME (1984)	STEG	CRTEN
UAE	Ministry of Energy	NA	Abu Dhabi Water and Electricity Authority (ADWEA)	-	-	MASDAR
Yemen	Ministry Of Electricity And Energy	NA	-	-	-	-

Sources: PWMSP, ESCWA, RCREEE, World Bank, Reegle

Renewable energy policies in rural areas

Being in their initial stage, most national RE strategies in the ESCWA region do not include yet a geographical and decentralized (regional and local) approach and thus do not include a specific rural component.

Actually, the main focus and development of RE in rural areas has been on rural electrification mostly through off-grid solutions. Also, those rural electrification programmes are generally developed on a centralised way (national power company) and publicly financed (users pay only a fraction of the initial/up-front investment). Thus, this centralised and focused RE deployment in specific rural communities has generally failed to initiatea local transfer of practical know-how on RE and generate local initiatives and providers (installers).

Box 2: P**olicy best practices for RE deployment in Arab Mediterranean Countries (AMCs)**

The regional project PWMSP (2010-2013) aimed to support on the ground AMCs to formulate and implement Sustainable Energy Policies (SEP). One of its activities, on SEP included the preparation of National Road Maps for SEPs. Each report prepared by a team of AMC and EU experts identified a selection of best practices (BP) for SEP developed by AMCs in the Maghreb and Mashrek sub-regions. The most significant and high-potential best practices for replication in the region are the following along those three main policy spans (energy strategies, institutions and instruments):

1. Energy policy
    a. National energy strategy (Egypt, Morocco, Jordan)
    b. EE&RE action plans: NEEAP (Egypt, Jordan, Lebanon, Tunisia), NREAP (Tunisia)
    c. M&E: indicators (Tunisia)
2. Institutional set-up and organisation
    a. Overall decentralized and specialized institutional setting (Egypt/NREA, Morocco[11])
    b. Ministry: creation of specific EE&RE departments (Algeria, Morocco)
    c. Specialised agencies: EE&RE (Tunisia, Lebanon, Morocco), statistics (Jordan, Morocco, Tunisia)
    d. Independent energy regulators (Algeria, Egypt, Jordan)
    e. Inter-institutional coordination (Morocco, Tunisia)
3. Instruments
    a. Legal framework (EE&RE law in Jordan, RE law in Morocco)
    b. Support schemes (financing, tax cuts, almost free lands for projects, PV net metering…etc): (Jordan, Tunisia, Egypt)
    c. Development integrated programmes: PROSOL SWH market development in Tunisia (see graph below)
    d. Communication& promotion by EE&RE agencies: Tunisia, Lebanon.

Source: PWMSP

[11]Network of specific agencies in particular MASEN, in charge of competitive bidding and financing, and SIE (direct investment and ESCo development).

Those multiple best practices for RE deployment developed and implemented over the last 5 years indicate the rapid development of capacities, expertise and experience of administrations and stakeholders through the region with a step increase to medium to large RE electricity investment either realized or in preparation.

Best practices specific to rural areas in the ESCWA Region mostly include rural electrification. Morocco has achieved impressive results as increasing thenational electrification rate from 85% in 2005 to 98.9% in 2010. The programme cost was covered by ONEE with state subsidies and is largely sustainable as consumers cover through individual meters.

(b) Regional energy and rural cooperation

In support to the formulation and enforcement of national SEP with focus on RE, international and regional cooperation has developed, especially over the last 5 yearsmultiple initiatives with the objectives notably to enhance awareness on RE, reinforce national capacity building and ownership through exchange of experience and BP on RE deployment. A selection of most significant institutional initiatives includes:

- Donor and international
  - EU-ENPI/EuroMed Energy with regional cooperation projects
  - IFIs: WB, EBRD (SEMED EE policy dialogue)
  - Global RE initiatives: IRENA, REN21
  - Bilateral.

- Regional
  - Arab region: ESCWA, LAS, the Regional Centre for Renewable Energy and Energy Efficiency (RCREEE)[12], ECA, UNDP offices
  - Maghreb/UMA: COMELEC (Maghreb Electricity Committee), MENAREC (RE regional conferences), Task Force MEDREG-IMME
  - Horizontal: MEDENER (EE&RE agencies), Plan Bleu/UNEP, OME, Mediterranean Renewable Energy Centre (MEDREC), Mediterranean Institute of Renewable Energy (IMEDER).

Among South-South initiatives, two are particularly noticeable:

- the Abu-Dhabi Declarations on Energy and Environment (2001 and 2003): a landmark and policy reference notably in suggesting to integrate economic and energy strategies;
- Arab Initiative for Sustainable Development (SDIAR): prepared within World Summit on Sustainable Development (WSSD), consists in a global and multi-sectoral approach of sustainable development that includes for energy the promotion of cleaner and more efficient technologies.

Beyond those two horizontal initiatives, the Arab guidelines for EE developed by LAS and Arab ministers for electricity, provide a keypolicy framework including the design of a common standard of NEEAP that plays an important role in policy formulation and implementation for EE and also for RE. A similar template is under preparation for NREAP.

[12]Within South-South cooperation, RCREEE since 2008 has developed a broad and complementary set of joint regional activities of particular relevance notably in terms of adaptation to regional socio-economic context contributing to build a strong ownership as well as building high-level expertise at regional level.

Also SHAMCI[13], a regionalquality certification scheme for SWH developed by RCREEE together with the Arabian Industrial Development and Mining Organization (AIDMO) and the Arab Ministerial Council of Electricity (AMEC) is a concrete illustration of regional cooperation. Already Tunis, Egypt, and Jordan are keen to enforce the label that has high potential to foster market by enhancing quality and reliability of panels as well as economies of scale for further local production.

Nevertheless, as in other regions and despite efforts there is a lack of coordination/synergies between those initiatives especially between international and trans-regional. Also activities remain generally limited on RE in rural areas beyond rural electrification.

[13]www.rcreee.org/projects/2012/11/21/solar-heating-arab-mark-and-certification-initiative/

II. Integrated Socio-Economic andRenewable Energy Policies in Rural Areas

While the existing national rural and energy/RE policies are needed to prepare conditions for RE deployment, they have proven not to be enough to overcome structural and multi-sectoral barriers to RE deployment, in particular in rural areas. Such RE policies and measures can hardly been disconnected from the overall socio-economic context and policies, rural development as well as other energy policies.

Historical policy analysis and international experience in transition in developing economies point out that national socio-economic and energy strategies and reforms need to be integrated (UNESCO, 2010)and their action plans and responsible institutions coordinated according to common priorities. Considering those strong synergies, integrated strategies, including for rural developmenthave the potential to better contribute to overcome such structural barriers to the effective deployment of EE&RE in ESCWA countries. Overall, ESCWA countries need to address those structural barriers in a more systematic way especially non-energy issues that only structural reforms are able to tackle.

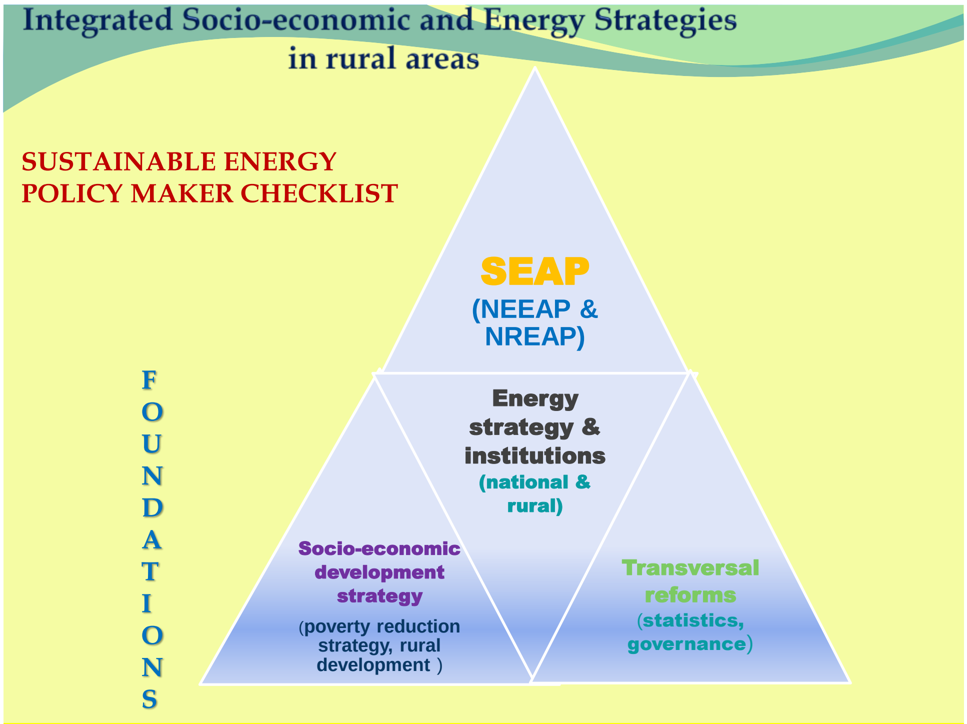
In this paper'sconclusions, a selection of integrated policyapproaches and measures at technical, regulatory and socio-economic levels is proposed both to national authorities and international/bilateral energy donors.

A. Overall Socio-Economic Strategies and Coordination

In order to address the identified trans-sectoral and interlinked socio-economic and energy barriers to balanced EP and to EE&RE deployment, in particular in rural areas, a transversaland coordinated socio-economic strategy is a critical foundation. Such national medium to long-term strategy has the proven potential to durably enhance synergies and coherence of various public socio-economic policies, including in rural areas as well as develop a systematic and effective response to those barriers for EE&RE deployment-see chart below.

Also,overall and sectoral policies in particular social and energy need to include rural areas, which also share common issues and challenges with urban areas. At the contrary, only rural (or urban) policies can hardly be really adequate to effectively address global/national socioeconomic issues.

Figure 1: Integrated socio-economic and energy strategies



Sources:PWMSP (2013a), author

1. **National and long-term socio-economic development strategies**

(a) Overall

Comprehensive socio-economic development strategies, focused on priority public policies and high potential economic sectors, backed by strong political will and capacity building are powerful tools to enhance socio-economic performance and standards of ESCWA countries. Overall, a socio-economic long-term development strategy constitutesa crucial pillar for structural reforms (in particular on social subsidies) that will facilitate the enforcement ofSustainable energy policies (SEP), notably in rural areas.

This strategy generally prepared at an inter-ministerial level with the eventual support of specialized administrations (e.g. planning/strategic studies)consists in setting an overall and multi-sectoral medium to long-term vision and path for economic, social and human development. It generally includes priority public policies (e.g. education, R&D, infrastructure) and high potential and value-added sectors (e.g. from food processing to IT, tourism or ‘green’ economy). Such coordinated and articulated road map aims to durably structure and articulate national socio-economic development as well as key reforms and orientations. It should also emerge as the reference for the country decision-makers, economic actors and population for at least at 10-15 years and should remain above short-term considerations and interests.

The design and evaluation process would also include an open and true dialogue and consultation with key stakeholders and civil society (think tanks and NGOs) to ensure ownership and feedback on the strategy.

The Abu-Dhabi Declaration on Energy and Environment (2003) already outlines the need to formulate, develop and implement “national strategies and policies for socio-economic development” that should also integrate national energy strategy.

Designing and enforcing socio-economic development strategy imply to progressively engage and enforce thorough and sustained economic and social transversal reforms. These transversal structural reforms should at first build and reinforce a solid and more balanced socio-economic framework that

has proved essential in other regions (Central Europe and Baltic States in 1990s) and Tunisia, Jordan, and more recently Morocco among the most advanced ESCWA countries. Those reforms' implementation relies on a set of laws and regulations. Reform priorities generally include:

- Setting strong national **administrations** for socio-economic development (e.g. national economic and social ministries and their agencies, including statistical office). Coordination between national and local institutions is crucial. Also, think-tanks and academics can eventually provide support to administrations' activities, especially on strategy, forecasts and M&E(e.g.decentralized and specialized institutional setting for energy in Morocco);
- Developing a reliable **socio-economic statistical** and information system(including database and indicators) in line with international standards (Eurostat and UN and economic tools (e.g. forecast, investment simulation) in order to facilitate policy design and M&E as well as assist investment decisions (e.g. Tunisian energy balances and EE&RE indicators);
- Enhancing public administration **governance** to notably enhanceits accountability to the public. Independent evaluations would regularly assess progress and fields for improvements. Also, the enforcement of the rule of law by an independent judiciary appears as a cornerstone reform. Specific anti-bribery action plans can complement the approach on this key item.

(b) Poverty reduction strategy: how to replace universal consumption subsidies by targeted support

In ESCWA countries, acrucial and delicate socio-economic reform is to progressively reduce and phase out universal energy subsidies (energy products sold to all customers at administrated prices below costs), which prove largely inefficient to reduce both poverty and energy poverty as they mostly benefit to largest and wealthiest consumers. Also, universal energy subsidies are a major impediment to a more rational and efficient use of energy and investment in the energy sector, especially in renewable energy. Furthermore, the continuous increase of international oil prices have further increased commercial and budgetary deficits resulting in heavy and increasingly unsustainable burdens for all customers and public budgets at the expense of socio-economic development.

Based on a diagnostic, national poverty reduction strategies (developed in Poverty Reduction Strategy Papers (PRSP)) need to be developed to address social imbalances. Any removal of universal subsidies must in parallel be accompanied by other forms of direct social welfare, in order to prevent increasing the incidence of poverty, and to avoid severing the poorest people's access to energy. Poverty alleviation strategies rely on specific social tools and mechanisms such as individualised support in the form of direct income transfers. Such social safety net requires a reliable database of poor households and individual administrative follow-up carried out by a specific public agency (e.g. Jordan National Aid Fund). Also block/social or lifeline tariffs (low rates for small and poor users for their first tranche of consumption) for water, electricity and gas are effective tools and are already in place in Egypt, Morocco, Jordan, Lebanon and Tunisia.

Obviously, the issue of the replacement of universal energy subsidies is sensitive especially in the current turbulent political context and difficult social and economic situation. There have been various attempts in the region to reform the fiscally, economically and socially unsustainable universal scheme (especially with the increase of international commodity prices), but they were generally insufficiently prepared and generated social refusal and public unrest.

Actually, Jordan has since 2005 launched an overall process to partially phase out the universal consumption price subsidies and instead put in place a targeted support and "block" electricity tariffs that significantly enhanced the subsidy scheme cost-effectiveness and efficiency (see details in the following box).

RCREEE is preparingfive countries case studies (EGY, JOR, LYB, MAR, TUN) with the double objective to assess the extension of energy subsidies and possible alternatives.

Box 3:Jordan’s targeted social support experience and best practices

Between 2005 and 2010, Jordan gradually phased out the universal consumption energy price subsidies with oil product prices liberalized (except for LPG) and automatic fuel price adjustment mechanism. In parallel, the government established a social safety net for the most vulnerable households, comprising:

a. An individualized cash assistance in the winter (households below USD 1,100/year) and social assistance: monthly aid of USD 40 per family member with maximum of USD 250 managed by the Jordan National Aid Fund)
b. Lifeline (or “block”) electricity tariff (also possible for NG and water) (1st tranches of consumption at special low rates for small and poor users with 3 tranches up to >500 kWh/month with a multiplication factor of 2.6)
c. Increase of civil servant salaries (~ 60% of population)

According to various evaluations, not only this targeted support proved more effective to address poverty and energy poverty but also more cost-effective (estimated around 50% cheaper as the share of energy subsidies dropped from5% in 2005 down to 2% in 2010).

Direct support generally takes the form of direct income transfers and lifeline tariffs (special low rates for small and poor users) for water and electricity. Such social safety net requires an extensive data collection of poor households to develop a reliable database of poor households, raising the issue of data confidentiality and non-use for other purposes. It also requires individual administrative mechanisms with high transparency and accountability carried out by a specific public agency (e.g. Jordan National Aid Fund) and /or local recognised NGOs with effective M&E procedures. It implies that social policy moves from primary reliance on in-kind subsidies to cash transfers provided that governance is improved to avoid misuses.

Short-term cash support can be complemented by structural measures such as basic energy efficiency measures(e.g. flat insulation, low consumption Class A appliances) that durably reduce at the source the level of consumption (with rapid payback at market prices) and thus the cash subsidy. Also, lifeline or “block” tariffs (special low rates for small and poor users) for water, electricity and gas are effective tools already in place in Morocco, Tunisia, Egypt, Lebanon and Jordan. In parallel, a progressive and scheduled phasing out of the inefficient universal price subsidies and cross-subsidies complements the subsidy reform.

As outlined by various studies and best practices, direct support has proved to be more effective to reduce the loss in real income due to higher commodity prices than universal price subsidies and cross-subsidies. Besides, such well-targeted direct safety nets are more cost-effective, thus reducing the burden on government finances (it also becomes possible to increase the level of support to the poorer households while reducing the global envelope) and have more durable effects. Its monitoring and evaluation is easier. They have also the advantage of involving in persona the households, enhancing the ownership and establishing a channel of information and advice on related topics (education, health). It implies that social policy moves from primary reliance on in-kind subsidies to cash transfers provided that governance is improved to avoid misuses.

Thus, policy-makers need to take into account both economic and social constraints (including transaction costs) and the potential political consequences. Based on various success and experiences the reforms of the subsidy schemes should intend to follow several main principles including:

- Soundly based: direct subsidies should be justified by a thorough study of the associated costs and benefits. Also, they should not conflict with other instruments and goals;
- Well-targeted: direct support should be directed and limited to a clearly defined group within the most vulnerable on an individual basis;
- Practical: the overall amount of a subsidy should be affordable for the state budget and the administrative cost transparent and reasonable;
- Transparent: information and broad communication on the total subsidy funds and target groups should be disclosed;
- Limited in time with regular evaluations to avoid consumers and producers becoming overly dependent

on this support, to limit opportunist behaviours and avoid costs spiralling out of control.

Sources: PWMSP, UNDP, MEDPRO (2013)

2. Coordinated and cross-sectoral public policies in rural areas

National public policies, including in rural areas are generally sectoral (agriculture, water) rather than geographical. They are completed by transversal regional development policy that intends to bring more balance between regions/areas. While such sectoral approach at national level is necessary to develop adequate and in depth policies and measures, it appears to face growing constraints in rural areas, notably because of local specificities, underdeveloped or inadequately structured local administrations and lack of synergies between sectoral policies and between administrations. This results in a relative disconnection between the national and local administrations and problematic implementation of national policies at local level.

Actually, rural development policies and even more for RE deployment require continuous co-ordination and interactions across multiple sectors, across various administrations and levels of government as well as between public and private actors. Thus, increasingly public policies, especially with rural dominance (water) move towardsa cross-sectoral and territorial approach:

- At national level with integrated and more co-ordinated policies (e.g. waste/water, fuels/air quality);
- At local/rural level with territorial focus integrating various sectoral policies, including regional/local cross-sectoral planning, implementation and M&E;
- An investment focus notably to ensure public services and gods rather than universal subsidies.

Most advanced countries shift from a sectoral to a territorial and cross-sectoral policy. It includes to move from a traditional approach relying on subsidies to declining or low productive sectors to an integrated approach based on focused strategic investment to develop rural area's most productive and promising activities including beyond the usual economic sectors, local specificities (natural areas, cultural) or local products (traditional or labeled). The goal is to generate through local ownership new and more balanced productive activitieswith competitive and durable advantages.This integration that could include decentralized energy planning can enhance conditions and foster synergies for RE deployment in rural areas.

Increasing the share ofRE has also the potential to be a vibrant illustration of this cross-sectoral approach in rural areas. For instance, the following sectoral policies can integrate energy and RE in particular on the following items:

Regional and ruraldevelopment

- Adopt regional and local development planning, including local Agenda 21 and EE&RE component
- Study the use of RE in renovated and new infrastructure
- Administrations facilities using bioclimatic principles and RE technologies

Agriculture

- Encouraging sustainable agricultural practices as natural fertilizer that is a by-product of biogas digestors
- Develop sustainable channels for agriculture waste (e.g. olive bone as biomass)
- Natural transformation processes as crop solardrying
- Facilities using bioclimatic principles and RE technologies

Water

- Awareness campaigns towards rural householdsand peasants on sustainable and energy water consumption
- Integrated water resources management approach
- Identify EE&RE potential along water cycle especially pumping (replace diesel pumps of wells and irrigation by PV), reduce distribution losses (8% of electricity in Jordan), study mini hydropower

Environment

- Waste recycling
- Air, soil and water quality

Education and health

- Programmes for education and eradication of illiteracy including a sustainability component, taking into consideration enhancing the technical education particularly in the field of RE
- Facilities using bioclimatic principles and RE technologies

Tourism

- Local facilities using bioclimatic principles and RE technologies
- Visit to RE sites (social economy).

3.Decentralisedinstitutions: backbone of local development agencies

Traditional hierarchical administrative structures (central ministries up to local district offices) are likely to be inadequate for cross-sectoral policies in a territorial approach. The formulation and enforcement of coordinated and cross-sectoral public policies in rural areas imply a new and innovative local institutional set-up, organization and functioning.

A major challenge is then to identify an institutional set up for rural development. While local rural governments have a good proximity to citizens, peasants and local businesses, they often lack implementation tools.A crucial move is to ensure an effective and flexible decentralisation of local administrations with adequate structure, means and skills to ensure a cross-sectoral implementation of public policies.Institutional set up in rural areas also needs to be near the field. Also, to maximise cross-sectoral exchange and development, both local governments and agencies need to better integrate transversality. Various experiences in Egypt, Morocco and Tunisia have indicated that some degree of deconcentration and decentralization combined with strong leadership from local authorities has the potential to enhance institutions for rural development.

Thus, to enforce in the field cross-sectoral policies and at the same time ensure that local administrations are most relevant, cost-effective and efficient, an attractive option appears to be **local development agencies.** By covering the main infrastructure sectors (water, waste, energy, local transport) with the mandate to foster sustainable socio-economic development, be reference and focal points with clear and strong coordination role in the implementation of those policies as well asprovide information/advices for both households and businesses, animation of initiatives, support project development (especially for pilots) andassistfund-raising. On energy and RE, a local developmentagencywould also fulfil the role of local energy agency (as branch of the national EE&RE) and also covers three other infrastructure sectors (water, waste, local transport).

Such local agencies would need a close and updated knowledge of the local context, issues and stakeholders over a coherent zone. They would preferably be integrated within a national support network and would cumulate functions of local investment agency in all merchant sectors and information/advice centre. Local development agencies' means would gather existing administrations and resources and would define its focus and priorities in function of the local specificities and needs, and evolution.

In line with a cross-sectoral approach and as local focus, local development agencies wouldrely on partnerships notably between national and local administrations and local administrations, academic/administration, banks and public/private actors, in particular to foster local socially oriented energy enterprises (e.g. rural local RE developers and electricity cooperatives).

It would be relevant to further analysethe institutional needs and evaluate institutional experiences for RE deployment in rural areas in the region as "Maison de l'Energie" in Morocco.

B. Integrated Energy &Renewable Energy Strategies

Within and in parallel to socio-economic reforms and development strategy (in particular and individualised social safety net), energy policies, including on demand side and RE can be further developed. Indeed, only with a more balanced regulatory framework especially for energy prices, energy efficiency and renewable energy can become more attractive for private and public investment.

Within the socio-economic development strategy, the national energy policies' purpose is to set the country main goals for this sector and detail how, by whom and when they should be achieved. Thus, they include the energy strategy itself and its implementation tools (e.g. NEEAP, NREAP) as well as the institutional organization and responsibilities.

1. Energy strategy: an articulated foundation

The national **energy strategy** sets a long-term vision, general and detailed objectives, priorities and implementation schemes for the entire field and sector. It should be comprehensive (covering all energy supply side sub-sectors as well as demand), coherent and in synergy with other public policies (climate, transport, regional, social, etc.) and converging with other countries' energy strategies. A balanced strategy relies at least on three pillars: energy security and access, a functioning energy market with level playing field and energy sector restructuring (e.g. corporate governance and unbundling of monopoly activities).

National strategies, covering both urban and rural areas, may rely on at least **four pillars** (WWF, 2010; IEA, 2008):

1) **Energy security and access:** a significant potential exists in ESCWA countries to diversify fuels, sources and suppliers; put in place emergency energy crisis management (combination of contingency plans and fuel stocks); finalise rural electrification and promote sustainable biomass. Within targeted social support schemes, increase access to energy services for the poor, combining lifeline/social tariffs for electricity and LPG (when relevant) and targeted subsidies poor households combined with incentives for energy efficient energy equipment (A, A+ class) and basic insulation of buildings.

2) **Energy efficiency:**Improve energy efficiency both S&D needs to be a core policy priority to progressively reduce energy demand increase that requires investment needs and

decouple it from economic development. Based on detailed assessment of EE potential, systematic and coordinated NEEAP (see below) have proven to be effective policy tools.

3) **Functioning energy market** (through structural and regulatory reforms): within a clear, effective and stable legislative and regulatory energy framework, independent regulators should progressively set energy end-use and transport tariffs towards full cost-recovery, in parallel with the improvement in security and quality of supply. Anyhow, phasing out of universal price subsidies and cross-subsidies would need to be gradual with clear time horizon (e.g. annual 5% price adjustment over a 5-10 years period) and complemented by an individual support system. The pricing policy should aim to both enable the poor to access to energy services and to energy tariffs that reflect its real costs (including investment and maintenance, and progressively externalities, for example, health and environmental expenses).For EE&RE investment, the goal is to set a clear and stable regulatory framework, including transparent permitting procedures, non-discriminatory grid and effective market access for RE through efficient incentives or support schemes.

4) **Energy sector restructuring:** governments and their administrations face the challenge to improve both enhance economic efficiency and corporate governance of energy companies, mostly monopolies and their accountability andtransparencytowards public authorities and clients.The adoption and introduction of clear governance standards and procedures is to contribute to reinforce management capacities and social dialogue. Other structural reforms are to transfer natural monopoly functions to special state-owned entities (e.g. transmission system operator (TSO) owning and operating the electric and gas grids) and ease technical barriers in particulartransmission and distribution losses both technical and commercial, bottlenecks on national grid and interconnection to connect planned RE capacity.

The effective enforcement of national energy strategy relies on a broad scope of instruments, in particular legislative and regulatory. Also, sectoral action plans as for EE&RE play a crucial role.

2. EE&RE Action plans: critical tools

The effective, operational and detailed implementation of the national energy strategy objectives, including EE&RE targets need to primarily rely on NEEAP and NREAP (also titled solar plans). Those two cornerstone policy tools play thus a pivotal (between the strategy and the field, energy producers and consumers) and crucial role in the EE&RE deployment. NEEAP and NREAP are generally (and preferably) designed by the central ministries (possibly with the eventual support of other administrations or think-tanks) in line with the national energy strategy and based on a set of preliminary assessment and studies (e.g. EE&RE potential, identification of barriers).

A detailed analysis of the potential of each sector, including agriculture and agro-industries (not necessarily rural areas per se) and transversally help to identify the most cost-effective and concrete priority measures and actions as well as set specific, Specific, Measurable, Achievable, Relevant, Time-Oriented (SMART) short to long-term overall energy savings and RE output targets, including in rural areas. Those targets need to rely on accurate and accessible data and information (see below) provided by surveys (e.g. on energy demand, RE installations) and can be indicative or mandatory.

NEEAPs and NREAPs should clearly set in detail how, by whom, when the assigned policy objectives and priorities will be reached. Thus, they detail the initial situation and issues, possible options, and set the selected approach, mechanisms, tools, responsibilities, resources and implementation calendar with performance indicators for also M&E.

The ministry then tasks an implementing agency (generally the EE&RE agency) to enforce NEEAP and NREAP. This can be combined with inter-institutional working groups gathering both

administrations and stakeholders to support the plan implementation. These groups may be organised around targeted sectors (e.g. industry, households), region/areas, programmes (e.g. public lighting, standards and labels) and topics (regulation, indicators) at national or local levels. Regular M&E is carried out by the ministries and/or independent body.

3. Energy Statistics and Tools

The autonomous and dynamic design, implementation and monitoring of robust and comprehensive national energy strategies need to rely on reliable, relevant and easily available set of data and indicators.

A solid statistical system (in particular energy balances, price database and indicators) in line with international standards (Eurostat, IEA) is needed at all policy stages. Within the overall socio-economic statistical system, reliable and accessible energy statistics are crucial for the design, enforcement and in particular for Monitoring & Evaluation (M&E) of the national energy strategy as well as its action plans (including on price regulation and EE&RE). They prove also decisive for investment and customer behaviours and decisions.

Reliable energy statistics and indicators facilitate the strategy to set and follow global and sectoral qualitative and quantitative objectives and targets(including for EE&RE) from 3-5 years and up to 15-20 years.

The most relevant energy statistics include energy balances, price database and EE indicators that are also needed to develop economic tools and economic tools (e.g. demand forecast, least-cost plan or simulation of RE investment impacts (e.g. Med-IMPACT software[14]) for policy and investment decisions. While most ESCWA countries have continuously made progress towards international energy statistics standards (Eurostat and IEA), further work is needed in both data collection (especially on energy end-use and decentralised RE to identify potentials and assess deployment) and dissemination. Since 1996, MEDSTAT Energy[15](I, II and III), the EU funded regional statistical capacity building programme has been providing support to national institutions, mostly statistical offices and energy ministries. Also, RCREEE together with Plan Bleu has developed an overall framework on EE indicators[16]. MEDENER plans to develop four national pilot projects on EE indicators.

Nevertheless, very few data and indicators are available on energy use and supply in ESCWA rural areas.

4. Institutional set-up

As for socio-economic development strategies, the institutional organization and coordination are crucial to set, enforce and M&E national energy strategies. In particular, this requires a coherent set-up and coordination between adequately staffed and financed energy administrations that include:

- Central energy ministries which generally set (with the parliament in some countries), the long-term vision, ensure leadership and coordination. Specific bodies can provide support on specific items as strategy development and forecasting development (e.g. Tunisia: Institut d'Etudes Stratégiques (IES), Egypt: Organization of Energy Planning (OEP);

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[14]developed by ADETEF-www.med-impact.com

[15]http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/MEDSTAT_programme, www.enpi-info.eu/mainmed.php?id=305&id_type=10

[16] www.rcreee.org/projects/2012/11/25/energy-efficiency-indicators/

- Specialized national agencies, including statistical office, energy agency (with a central role in EE&RE deployment), and R&D agency that are tasked by the ministries to implement strategy and AP in their respective fields;
- Independent energy regulators: with the priority mission to enforce the regulatory framework;
- Other institutions as academics, research centres and think-tank networks have the potential to back and support administrations' activities, also within regional networks.

The pair between each energy ministry and its agencies forms the core of the institutional organization and requires continuous interactions. As regards inter-institution coordination, most ESCWA countries have put in place various schemes (SEC in Egypt gathering ministers, sectoral working groups). In particular the coordination and synergies of the pair Ministry-Agencies (on a centralized or decentralized format) are of particular importance at each strategy stage.

As presented above, a network of **local development agencies** with a broad mandate to support local planning, infrastructure and development initiatives in selected sectors and act as decentralized local energy agencies (advise energy customers and public administrations, provide training, support EE&RE project development and fund-raising, etc.).

Building strong capacities (with adequate expertise and staff) within solid public administrations (national energy and environment ministries and their agencies, including statistical offices, EE&RE agencies and regulators) is determinant for energy reforms and EE&RE deployment, in particular in rural areas. Also, more experienced and structured administrations can better design and implement EE&RE action plans.

Another critical institutional reform is to separate the State function of public policy (by the energy ministry) from regulation and policy enforcement (by independent agencies for EE&RE and regulation), and management of the public energy sector (state participation agency or ministry of finance). This separation aims to limit conflicts of interests and political interference into energy sector operations. Actually, the creation of an independent regulator with adequate power and resources appears as critical step also to monitor the conditions and investment framework for EE&RE.

In South Mediterranean region, the regional project PWMSP carried out detailed diagnostic of national SEP and provided (indicative) policy recommendations towards integrated energy & RE strategies as summarized in the box below.

Box 4: Summary of mainPWMSP energy policy recommendations in South Mediterranean

- **Strategy**
  - Formulate/revise and formally adopt a national energy strategy (all AMCs) with broad and effective consultation with stakeholders and civil society
  - Set and implement a National Energy Efficiency Action Plan (NEEAP) and a National Renewable Energy Action Plan (NREAP) (all exc. TUN) (preferably according to the common regional template[17]
  - M&E: set procedures and indicators (all AMCs) based on solid & harmonised MEDSTAT statistical system (energy balance) for effective Monitoring and Evaluation (M&E)
- **Institutions**
  - **Ministries (**leadership and overall coordination**):** set solid EE&RE unit at central energy ministries (EGY, LEB, LYB, PAL)
  - **Regulator:** establish independent regulatory body for electricity and fossil fuels (MOR,

[17]developed by the League of Arab States (LAS) and the Regional Center for Renewable Energy and Energy Efficiency (RCREEE).

TUN, LEB, LYB)

- **EE&RE agency:** create a national EE agency (EGY, LYB, PAL) and strengthen existing EE&RE agency (ALG, EGY, JOR, LEB, MOR) in line with NEEAP and NREAP
- Other implementing agencies (statistical offices, R&D): ensure resources to fulfill their mandate
- Ensure a close **inter-institutional coordination** and consultation with stakeholders

- **Policy instruments**
  - Adopt and enforce a **legal framework** covering all aspects of EE&RE policy, regulation, investment and operation (ALG, MOR, EGY, LYB JOR, PAL)
  - Enforce in priority most effective and cost-effective tools such as **Standards and Labels** (S&L) for appliances and buildings
  - Adopt targeted support schemes (e.g. net metering, EE&RE funds-(all AMCs except JOR & TUN) and **take-off packaged programmes** (e.g. PROSOL for SWH and PV) (all AMCs except TUN)
  - Carry out communication and dissemination campaigns (all AMCs).

Source:PWMSP (2013a), 8 national Sustainable Energy Policy Road Maps[18]

C. Regional Cooperation and Integrated Financing

1. Cooperation: a high potential

On the challenging process to enhance rural development and a more sustainable energy system,ESWCA countries havedeveloped cooperation with neighbouring and other countries mostly through regional initiatives notably developed by ESWCA, LAS, RCREEE and donors. National and local actors can thus exchange on experiences and know-howand thus, not only learn from other countries sustainable policy design, enforcement and M&E in a similar context but also provides lessons (on successes and failures) from their own experiences. Such regional energy and rural policy cooperation has a strong potential to reinforce the national expertise and experience, and thus contribute to energy reforms and further EE&RE deployment.

More specifically on RE deployment in ESWCA rural areas, cooperation appears limited to electrification while other key aspects as RE use in other rural areas are only partially covered. Also, the development of territorial and cross-sectoral policies in rural areas remains to be discussed in more details at regional level. Thus, regional cooperation will gain in relevance and benefits to further develop exchanges on energy and rural policies and directly associate the local authorities.

An associated objective is to enhance convergence of energy and EE&RE policies, harmonization of regulation and define a common external policy on EE&RE (ECA, 2013).

2. Targeted regional financing

While significant progress has been made with national financing schemes for sustainable energy and rural development, either general or specific (e.g. EE&RE funds in TUN, MAR, JOR), national private financing (investors and banks) remain very limited as EE&RE is perceived as too risky, not mature and small. Thus, most financing of EE&RE is provided by IFIs (loans, grants) and ODA (grants).

[18] www.pavingtheway-msp.eu/index.php?option=com_downloads&task=category&cid=11&Itemid=56

Considering the potential economies of scale, especially for small markets, regional financing mechanisms appear relevant. Already for large energy infrastructure, IFIs as EIB and the regional InfraMed Infrastructure[19] provide adapted loans, generally in hard currencies.

Thus, adapted regional financial tools for EE&RE and infrastructure, including in rural areas to co-finance small to medium investmentsas well as EE&RE SMEs (consultancy/engineering, manufacturing, installation/maintenance, developers) can foster their deployment. Their integration and impact will be facilitated by the existence of take-off packaged (or turn-key) programmes (e.g. PROSOL). Also, micro-credit schemes, especially in poor and rural areas are powerful financial vehicles to reach poor beneficiaries with high security. Regional financing schemes can also favour local socially oriented energy enterprises (e.g. rural RE developers and electricity cooperatives) that have proven more effective to provide consumers with affordable, cleaner energy services with durable effects.

The practicalities and framework of such regional financial scheme remain to be discussed and agreed within the region. Based on the InfraMed Infrastructure experience, a transitional option may be to establish a joint EuroMed SE fund associating national funds (when existing: SIE in MOR, EE&RE funds in JOR and TUN) with IFIs (EBRD, EIB) towards a regional Arab Med financing scheme with the possible support of GCC countries through their sovereign funds.

[19]Created in 2010 by Caisse des Dépôts (CDC-France), Cassa Depositi e Prestiti (CDP-Italy), the European Investment Bank (EIB), Caisse de Dépôt et de Gestion (CDG-Morocco) and EFG Hermes (Egypt)

III. Conclusions & Recommendations

A. CONCLUSIONS

The deployment of RE in ESCWA rural areas is heavily constrained by structural and interlinked socio-economic and energy barriers.Also, a centralized approach of the energy system, in particular electric does not fit well withrural customer's needs that are more local and decentralized, and infrastructure weaker.

At the same time, over the last five years, most Arab countries have extensivelydeveloped and enhanced their SEP, in particular through strategy and EE&RE action plans, institutional development and tool levels,developing multiple best practices (BP) even if effective impacts not fully inrural areas cities.

While EE&RE action plans are key implementing tools, they lack to overcome those structural barriers if socio-economic and energy conditions for EE&RE investment are not yet met.

Based on historical policy analysis and international experience EE&RE action plans are key tools but generally lack strength and scope to overcome those structural barriers if socio-economic and energy conditions for EE&RE investment are not yet met. In a more holistic approach, national socio-economic and energy strategies and reforms need to be integrated and their action plans and responsible institutions coordinated according to common priorities. Such integrated strategies, including for rural development have the potential to better contribute to overcome such structural barriers to the effective deployment of EE&RE in ESCWA countries. Overall, ESCWA countries need to address those structural barriers in a more systematic way especially non-energy issues that only structural reforms are able to tackle in order to create the conditions for EE&RE investment.

Such integrated socio-economic and energy/climate strategies build onthe following policy & regulatory foundations:

1. Socio-economic reforms (institutions, statistics, governance) and strategies
2. Poverty strategy: targeted/individualised safety net (cash support and EEmeasures as class "A" equipment)
3. Energy & climate strategy: a reference document with long-term goals and priorities with a EE focusbacked by reliable statistics and economic tools (demand forecasts, least cost plan)
4. Institutions: critical mass of expertise and resources at ministries and implementing agencies inc. local development agencies
5. Regulatory reforms: towards cost-reflective energy tariffs, energy sector restructuring
6. SE Action Plans (SEAP) covering all sectors and energieswith priorities on decentralized RE in rural areas asSWH and PV net metering.

The regional energy cooperation has also dramatically improved, acting as a catalyst. Initiatives in particular South-South cooperationas ESCWA, LAS, RCREEE, IRENA, MEDENER, AFED have gained in scope and depth. Beyond policy platforms and joint projects, these joint efforts have also conducted to adopt important frameworks as the Abu-Dhabi Declaration and Arab EE Guidelines.

B. RECOMMENDATIONS

Based on regional best practices and international experience, **a set of policy recommendations is proposedto foster integrated socioeconomic, rural and renewable energy strategiesthat include the following policy priorities:**

1) Durably and effectively reduce poverty in rural areas;
2) Enhance access of rural households and SMEs to modern, cleaner and affordable energy services;
3) Foster EE on both supply and demand, and the share of cleaner fossil fuels (natural gas) and RE.

To ESWCA governments and administrations

Within an i**ntegrated socioeconomic, rural and energy policy** approach (cf. policy check-listin Annex):

Recommendation 1 (R1.) Enhancereliability, relevance and harmonization of socioeconomic, rural and energy **data**(with priority on **energy balances** and **energy prices & tariffs) and indicators**, towards international standards (UN, IEA, Eurostat)notably by consolidating and extending the MEDSTAT work, experienceand outputs in AMCs on socioeconomic sectors as energy.

R2. Formulate, implement and evaluate integrated national:

- **Socioeconomic strategies**with focus on poverty alleviation through **targeted (individualized) subsidies based on best practices and pilot implementation**
- **Energy strategies** with priority on energy efficiency, especially on demand and losses reduction.

Both **strategies**need to take into account specificities and needs of **rural areas** where implementation can benefit from more **territorial and cross-sectoral approach**. To ensure a higher relevance and ownership, the **strategy** formulation needs to consult and involve all stakeholders, in particular civil society.

R3.Within the energy strategy, develop and implementEE&RE action plans (following the regional RCREES/LAS template**)**with close M&E, and priority to:

- Effective energy access for poor rural households, agriculture and agro-industrieswith priority to cost-effective tools as **EE regulation: S&L**for the most energy consuming appliances **and building codes**;
- The following decentralized RE in rural areas: **SWH, PV net metering** andefficient biomass or LPG stoves,preferably deployed through **take-off packaged**(turn-key) programmes (e.g. PROSOL for SWH and PV)and **regional certification**(SHAMCI for SWH).

R4. Give priority to**institutional** setup and development with integrated capacity building:

- **National:** ensure a solid pair Ministry/implementing agencies in particular nationalEE&RE agencies, and an overall coordination
- **Locally**: consider an integrated/cross-sectoral scheme possibly with **local development agencies**(to provide information/advices, support project development & fund-raising) in charge of fostering both rural development and infrastructure inc. RE.

To ESWCA Local authorities

R5. Within **EE&RE action plans** implementation:

- Analyse the potential co-benefits from enhancing EE and introduce renewable energy systems
- Learn from other rural district examples, but fit them to local circumstances;
- Develop exchange and cooperation with other local counterparts nationally and neighbouring countries to maximize exchange of information and best practices;

To ESWCA governments and administrations, regional stakeholders and donors

R6.Foster and consolidate intra & inter-regional cooperation on socioeconomic, rural and energy policiesnotably through:

- **Regional policy dialogue platform/forum**and activitiesto share and exchange information, experiences, know-how and best practices on Sustainable Energy as well as coordination mechanismsin particular between public administrations (national and local) towards regional policy and regulatory convergence;
- **Joint activities**: bilaterally,via focal specialized centres for sustainable energy(e.g. RCREEE) and networks (e.g. MEDENER, MEDAREC) (inc. within the subregions of Maghreb, Mashrek and Gulf) on:
  - EE&RE deployment and industrialisation, infrastructures (grid interconnection), equipment trade;
  - M&E: Policy reviews (already initiated with RCREEE's EE&RE Index) and other tools (energy prices, indicators);
  - Consultation and joint work on energy and EE&RE policies and regulation harmonization and convergence, and common external policy on EE&RE;
  - Compliance to international and regional treaties, conventions and agreements.

Ensure an adequate level of transparency and coordination of regional cooperation and a continuous dialogue and consultations with civil society.

R7. Back**governments and local authorities**in developing national energy **strategies** integrated with socioeconomic strategies and programmes,and**institutional** setup and developmentthrough:

- Training, capacity building (bilateral, regional);
- Technical assistance (bilateral, regional);
- Expert secondment, institutional twinning;
- Technology and know-how transfer;
- Fund-raising and project proposal development;
- Policy reviews (bilateral, regional)[20].

R8. Support the development of a **regional financial scheme**(e.g. facility, credit line) and focal **financial centre**for:

- Rural households and SMEs' investment on EE&RE in liaison with take-off packaged mechanisms;
- Development of EE&RE SMEs (consultancy/engineering, manufacturing, installation/maintenance, developers), including socialenterprises (e.g. rural RE developers and electricity cooperatives).

R9. Support **academic and think tank** works on socioeconomic, rural and renewable energy policies through a specific regional support scheme/facility, scholarships, exchanges/internships within an overall**R&D**programmeand coordination.

[20]"Regular Review of Energy Efficiency Policies of Jordan" (Energy Charter Secretariat, 2010), on-going IEA energy policy review of Morocco.

ANNEXES

Annex 1. End-use electricity prices and bills, RE generation costs and country performance

Annex 2. RE developments in MENA

Annex 3. Various applications of solar energy

Annex 4: National socio-economic and energy strategies and institutional organization in Mediterranean Partners Countries

Annex 5. Sustainable Energy Policy Maker Checklist: Key steps and milestones

Annex 1. End-use electricity prices and bills, RE generation costs and country performance

Figure A1. Average electricity tariffs for households in 2008(Source: CIDOB (2011))

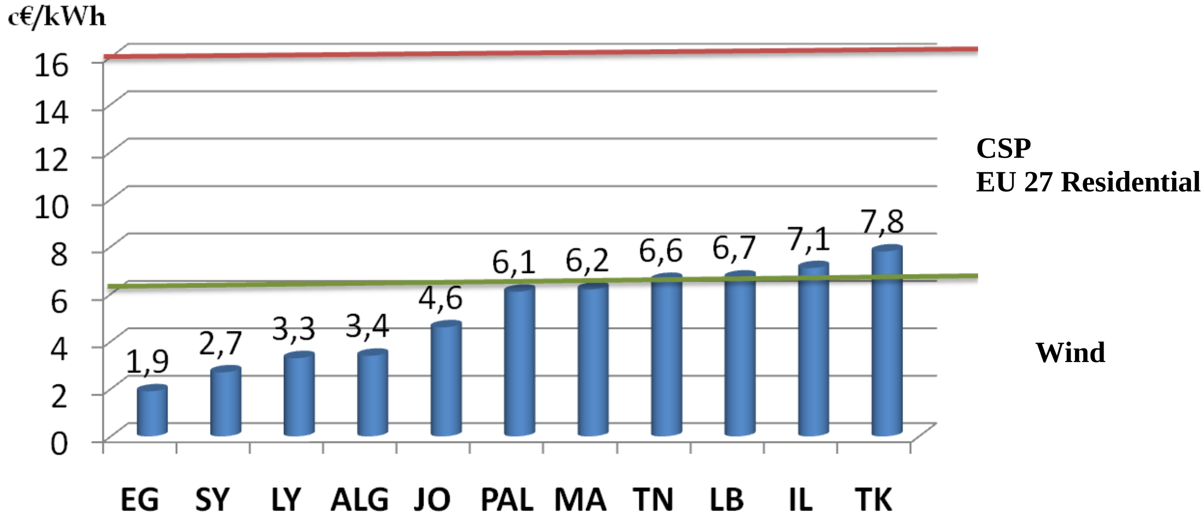


*Figure A2.Average monthly electricity household bill (in kWh/month) (*Source: *MEDENER/ADEME, 2012)*

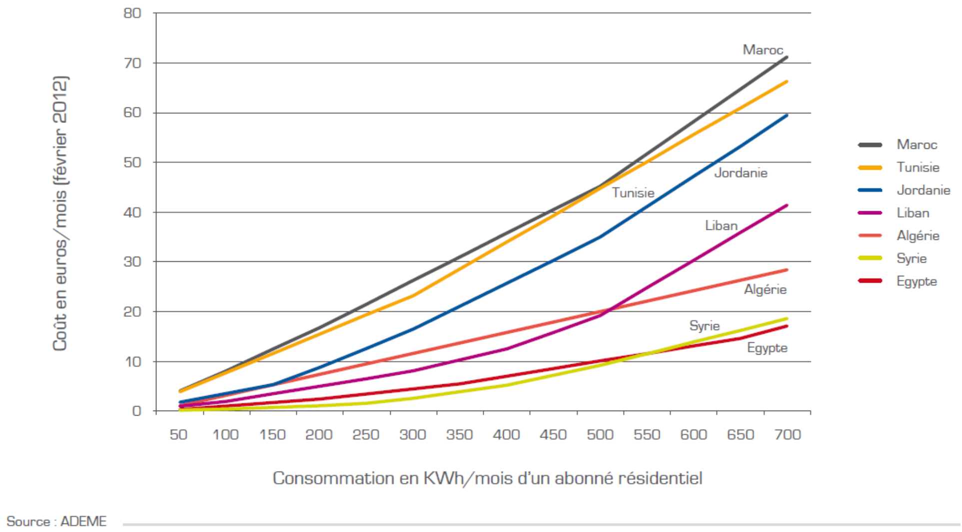
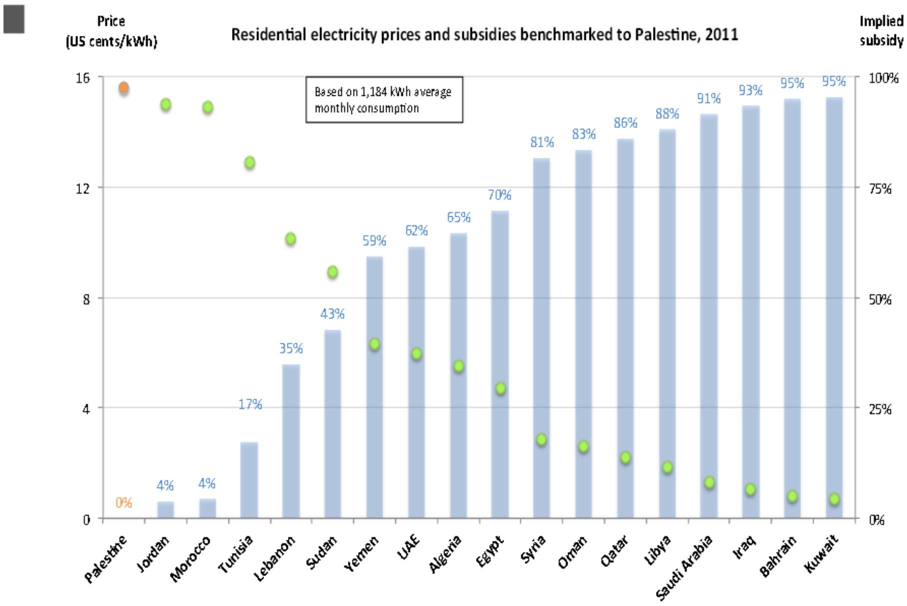


Figure A3 Residential electricity prices and subsidies benchmarked to Palestine, 2011 (Source: RCREEE, 2013)



Annex 2. RE developments in MENA

Figure A4.

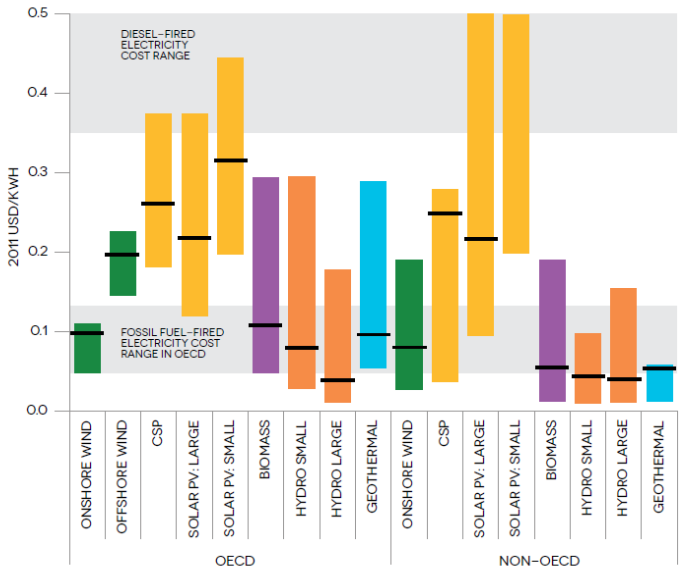


FIGURE 4.16 LEVELIZED COSTS OF POWER GENERATION, 2012

SOURCE: IRENA 2013B

NOTE: LEVELIZED COST REPRESENTS THE PER KILOWATT-HOUR COST OF BUILDING AND OPERATING A GENERATING PLANT OVER AN ASSUMED FINANCIAL LIFE AND DUTY CYCLE. WHILE LEVELIZED COSTS ARE A CONVENIENT SUMMARY MEASURE OF THE OVERALL COMPETITIVENESS OF DIFFERENT GENERATING TECHNOLOGIES, THE MEASURE DOES NOT COVER THE OVERALL SYSTEM COSTS. THE FULL COST OF INTRODUCING DIFFERENT GENERATION OPTIONS (ESPECIALLY VARIABLE) DEPEND ON THE SPECIFIC CONDITIONS OF THE SYSTEM; FOR EXAMPLE, THE EXTENT TO WHICH VARIABLE SOURCES MATCH THE DEMAND PROFILE AND COMPLEMENT THE MIX OF EXISTING SOURCES AND TECHNOLOGIES.

Figure A5.

ANNEX 3. Country performance

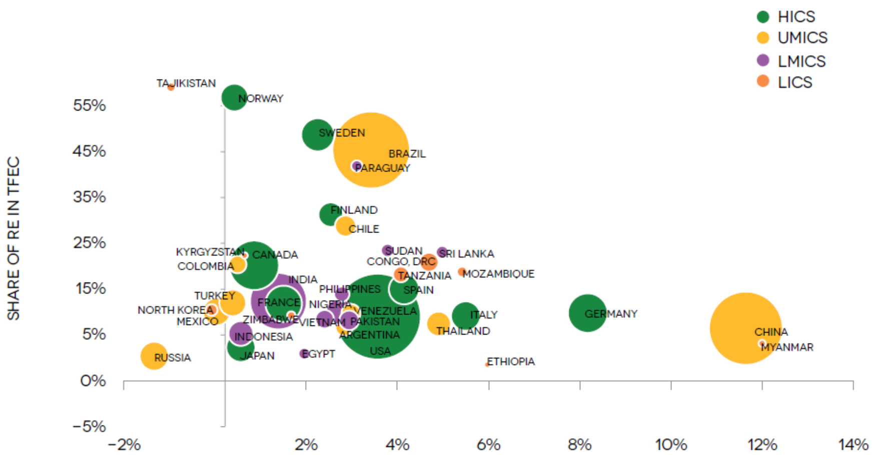


FIGURE A3.1 SHARE OF RENEWABLE ENERGY (EXCLUDING TRADITIONAL USE OF BIOMASS) IN COUNTRY TFEC AND CAGR, 1990–2010

SOURCE: AUTHORS' ANALYSIS BASED ON IEA 2012D.

Source: MENA Renewables Status Report, REN21, 2013

Annex 3. Various applications of solar energy

Source: UNEP/BMZ

What is solar energy used for?	Where is it used?	Which solar technologies are used?	Which secondary technologies are used? (where applicable)
Heating water	y Homes	y Glazed flat plate collectors y Batch collectors y Vacuum tube collectors	y Heat exchanger y Hot water tank
	y Commercial	y Liquid-based collectors	y Heat exchanger y Medium-large water tank
	y Agriculture	y Glazed flat plate collectors y Unglazed flat plate collectors	y Heat exchanger y Medium-large water tank
	y Aquaculture	y Unglazed flat plate collectors	y Medium-large water tank
Heating - Swimming Pools	y Outdoor pools	y Unglazed flat plate collectors	
	y Indoor pools	y Glazed flat plate collectors	y Heat exchanger
Heating - Ventilation Air	y All building types	y all Air-based collectors	y By-pass dampers y Make-up air handling units
Heating - Buildings	y Homes/ Commercial	y Advanced windows y Transparent insulation	y Appropriate building materials y Building design
		y Trombe wall	
		y Liquid-based collectors with home heating system	y Heat exchanger y Advanced thermal storage
	y Community-wide	y Liquid-based collectors y large-scale arrays	y Seasonal thermal storage y District heating network
	y Greenhouses	y Transparent insulation	
Cooling - Buildings	y Commercial	y Vacuum tube collectors y Glazed flat plate collectors	y Cooling cycles - various
Daylighting - Buildings	y Homes & Commercial	y Advanced windows y Transparent insulation	y Building design
Crop Drying	y Agricultural	y all Air-based collectors	
Electricity Generation - Off Grid	y Cottages / Seasonal homes	y Photovoltaics – small arrays	y Batteries y Power Invertors y Small wind turbines or microhydro
	y Power for remote equipment	y Photovoltaics – small-medium arrays	
Electricity Generation -Distributed Power	y All building types	y Photovoltaics – building integrated medium-scale arrays	y Power Invertors
	y Remote communities	y Photovoltaics – medium-scale arrays in a hybrid system	y combined with diesel generators on local grid
	y Electric Utilities	y Photovoltaics - large-scale arrays	y Power Invertors y Sun trackers
		y Power tower y Parabolic trough	y Steam turbine y High temperature thermal storage
Detoxifying - Water	y Industrial / Municipal	y Photocatalysts for oxidation	y UV lamps for backup
		y Thermal catalysts for oxidation with concentrating collectors	
Detoxifying - Air	y Commercial / Homes	y Photocatalysts for oxidation	y UV lamps for backup
Cooking food & H2O treatment	y Homes	y Solar cookers	

Annex4: National socio-economic and energy strategies and institutional organization in Mediterranean Partners Countries

Legend

The 'Red Light' indicates a basic level of progress

The 'Amber Light' indicates an advanced level of progress

The 'Yellow Light' indicates a level between advanced and mature

The 'Green Light' indicates a mature level of progress

	Socio-economic development		**Energy Strategy**					**Institutional organisation**					**EE&RE instruments**			
Country	*National socio-economic strategy**	*Poverty Reduction Strategy Paper* (PRSP)/ individualised subsidy schemes*	*NES**	*NEEAP**	*NREAP**	*EE&RE targets***	*M&E*	*EE&RE Dpt at Energy ministry*	*Energy unit at statistical office*	*Independent energy regulator*	*EE&RE agency*	*R&D agency*	*EE/RE law*	*EE S&L*	*Programmes*	*Communication*
Algeria	-	-/-	-	Under preparation(1)	-(1)	EE: - RE: 15% by 2020	Basic	EE&RE units at MEM	ONS	CREG (2005)	APRUE (EE) (1988) Commissariat for RE (*planned*)	CDER	EE: 1999 RE: 2004	Labels (2009)	Various (EE&RE)	Limited
Egypt	-	PRSP /-	2008 (needs revision)	2012 (under implementation)	Solar Plan (2011) Master Plan (planned)	EE: 5% by 2015 RE: 20% by 2020	Limited	EE unit at MEE	CAPMAS	ERA (2001)	RE: NREA (1986) EE: EEU (2008)	RE: NREA	-	5 appliances (voluntary)	**Limited (CFL)**	**Limited/fragmented**
Jordan	-	PRSP/Individualized support scheme from 2005	2007 (needs revision)	2012 (under implementation)	-	EE: 20% by 2020 RE: 10% by 2020	Intermediate	EE&RE units at MEMR	DOS	ERC (2005)	NERC (for some items)	NERC (1999)	EE&RE law (2012)	Under preparation	Various (EE&RE)	Limited
Lebanon	-	-/-	2010 (for electricity; needs revision)	2011 (under implementation)	NEEAP partly covers RE	EE: 5% by 2015 RE: 12% by 2020	Limited	-	ACS	-	LCEC	-	Electricity Law (2002)	4 appliances (not compulsory)	Various (EE&RE)	Targeted

	Socio-economic development		**Energy Strategy**					**Institutional organisation**					**EE&RE instruments**			
Country	*National socio-economic strategy**	*Poverty Reduction Strategy Paper* (PRSP)/ individualised subsidy schemes*	*NES**	*NEEAP**	*NREAP**	*EE&RE targets***	*M&E*	*EE&RE Dpt at Energy ministry*	*Energy unit at statistical office*	*Independent energy regulator*	*EE&RE agency*	*R&D agency*	*EE/RE law*	*EE S&L*	*Programmes*	*Communication*
Libya	-	-/-	Under development	Under preparation	Under approval	EE: - RE: 7% (of power mix)by 2020	Basic	-	**BoS**	-	REAoL (2012)	CSERS (solar)	-	-	RE	-
Morocco	-	PRSP /-	2008 (needs revision)	-	Solar Plan (2009)	EE: 12% by 2020 RE: 42% by 2020 (capacity)	Intermediate	EE&RE unit at MEMEE	DS	*Planned* (2014)	ADEREE, MASEN (2009)	IRESEN (2011)	EE&RE laws (2012)	Under preparation	Various (EE&RE)	Various
Palestine	-	-/-	2008 (needs revision)	2011 (basic, under implementation)	-	EE: RE: 16% by 2020	Basic	PEA (1995)	PCBS	PERC (2012)	PEC	PEC	Electricity Law	-	PV	-
Tunisia	2011	*PRSP /-*	2008 (needs revision)	Ongoing revision	Solar Plan (2012, under implementation)	EE: 24% by 2016 RE: 16% by 2016 (capacity)	Advanced	EE&RE units at MIT	INS Observatoire National de l'Energie	-	ANME (1984)	CRTE (2005)	Various since 1985 (RE investment considered)	5 appliances (compulsory)	Multiple (EE&RE)	Advanced & broad

* Existence of formal endorsed document ** In primary energy supply except if mentioned otherwise
(1) Overall EE&RE programme adopted for 2011-2020
Source: PWMSP, 2013 based on national submissions

Annex 5. Sustainable Energy Policy Maker Checklist: Key steps and milestones

SUSTAINABLE ENERGY POLICY MAKER CHECKLIST: Key steps and milestones

V.2

Country

Date

Reference	Action	Responsibility	Desired Outcome	Advancement (Not considered, planned, under preparation, under approval)	Approved (m/y)	Achieved (m/y)
1	**Set national long-term strategies**	Government, Parliament				
1.1	Socio-economic development (inc. for rural areas)		Solid long-term vision, objectives and priorities for socio-economic development			
1.2	Energy & climate change (CC)		Solid long-term vision, objectives and priorities for energy			
1.3	Consultation with stakeholders & civil society		Gather feedback and gain endorsement			
1.4	M&E		Set clear and effective M&E tools and procedures			
2	**Structural transversal reforms**	Government, Parliament				
2.1	Governance of public administration and state-owned companies		Improved institutional transparency and efficiency			
2.2	PSRP and individualised subsidy schemes		Targeted, effective and cost-effective social tools (replacing universal price subsidies)			
2.3	Separation of State powers on energy (policy, enforcement and operation of companies)		Limit conflicts of interests and political interference			
3	**Statistical and information system**	Statistical offices, ministries	Reliable, relevant and accessible data, indicators and tools			
3.1	*Socio-economic data and indicators*					
3.2	*Energy*					
3.2.1	Data collection tools (inc. surveys on energy sector and end-use sectors)					
3.2.2	Data: energy balances, energy flows and price database					
3.2.3	Indicators: security of supply, market, EE&RE					
3.2.4	Economic tools: demand forecast, least-cost plan					
4	**Institutional organisation**	Ministries and their executive agencies	Effective, relevant and administrations			
4.1	National administrations (ministries, agencies) for socio-economic development		Design strategy, regulation and action plans, monitor and			
4.2	Energy & CC ministries		coordinate agency work			
4.3	*Energy Agencies*		Enforce regulation/action plans on behalf of ministries			
4.3.1	Statistical office		Collect, process and disseminate energy data, indicators			
4.3.1	Regulatory body		Enforce primary regulation (inc. on pricing) and set secondary regulation, monitor market and grid			
4.3.1	EE&RE agency (national & local branches)		Enforce EE&RE action plans, inc. on communication			
4.3.1	Loca/rural development agencies					
4.3.1	Financing body		Facilitate or provide investment financing			
4.3.1	R&D agency		Develop and manage R&D programmes			
4.4	*Capacity building*		Respond to institution and staff training and capacity development			
4.5	*Inter-administration coordination*		Ensure synergies within energy institutions and other sectors			
5	**National Energy/CC Action Plans for**	Ministries and their executive agencies	Detail and precise strategy implementation			
5.1	Regulation (inc. prices)		Set priorities and schedule (inc. on price reforms)			
5.2	ES restructuring (inc. monopoly unbundling)		Contribute to enhance company performance			
5.3	SEP		Set detailed objectives, timetable and responsibilities			
5.3.1	NEEAP		Enhance EE technologies' deployment and behaviours			
5.3.2	NREAP		Enhance RE technologies' deployment			
5.4	CC strategy/National Communication on Climate Change-UNFCCC		Set detailed objectives, timetable and responsibilities			
5.5	M&E		Set clear and effective M&E tools and procedures for the AP			
6.	**EE&RE Policy Instruments**	Ministries and their executive agencies				
6.1	Legal (legislation, laws, regulation, decrees…etc.)		Set legislative, legal and regulatory rules and procedures			□
6.2	EE/RE S&L (MEPS, certification, labeling), building codes		Set common and relevant mandatory standards and labeling (customer information)			
6.3	Support schemes (fiscal break, grant, audit,+D102 etc.)		Effective incentives to stimulate new markets			
6.4	Market take-off programmes (integrated technical and financing support)		Attract new suppliers and customers			
6.5	Financial tools (ESCo/EnPC, guarantees, funds…etc.)		Facilitate investment financing			
6.6	Communication (dissemination & promotion)		Enhanced decision-maker and customer awareness and information			

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