



ESCWA

United Nations Economic and Social Commission for Western Asia

RE Projects in the Arab countries and their Socio-Economic Impacts'

“ Integration of Renewable Energies with Power Grids”

تكامل الطاقات المتجددة مع شبكات الكهرباء

16 April 2014, Tunis

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UN-ESCWA



ESCWA Member countries



Members:

- | | |
|-----------|----------------------|
| Bahrain | Oman |
| Egypt | Qatar |
| Iraq | Saudi Arabia |
| Jordan | Sudan |
| Kuwait | Syrian Arab Republic |
| Lebanon | Tunisia |
| Libya | United Arab Emirates |
| Morocco | Yemen |
| Palestine | |

Map no. 3978 Rev.12 UNITED NATIONS

August 2012

Note: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.



ESCWA Member countries are classified into 3 groups

1. Producers and Exporters of Hydrocarbons:

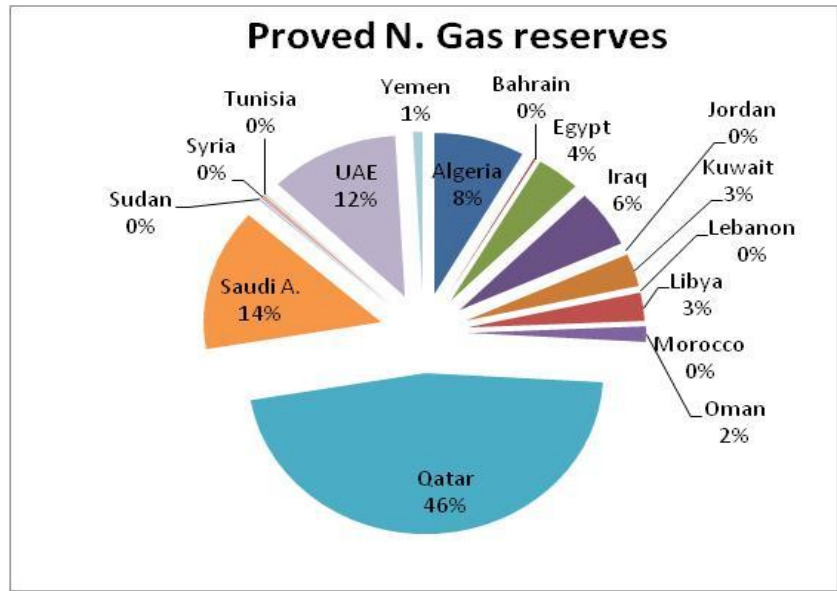
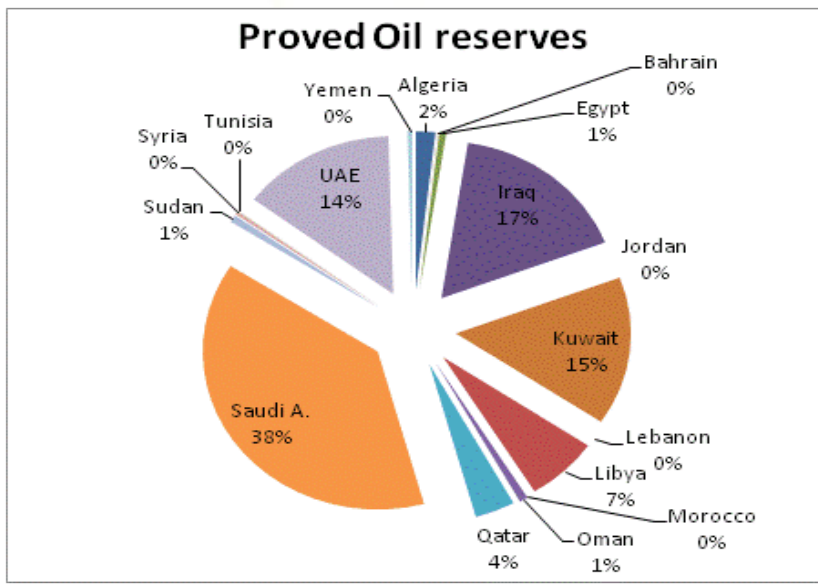
Iraq, Kuwait, Libya, Qatar, Saudi Arabia, UAE

2. Importers of hydrocarbons:

Jordan, Lebanon, Morocco, Palestine, Sudan,

3. Countries switched from Exporters to Net Importers:

Tunisia, Egypt, Syria, Yemen, Oman

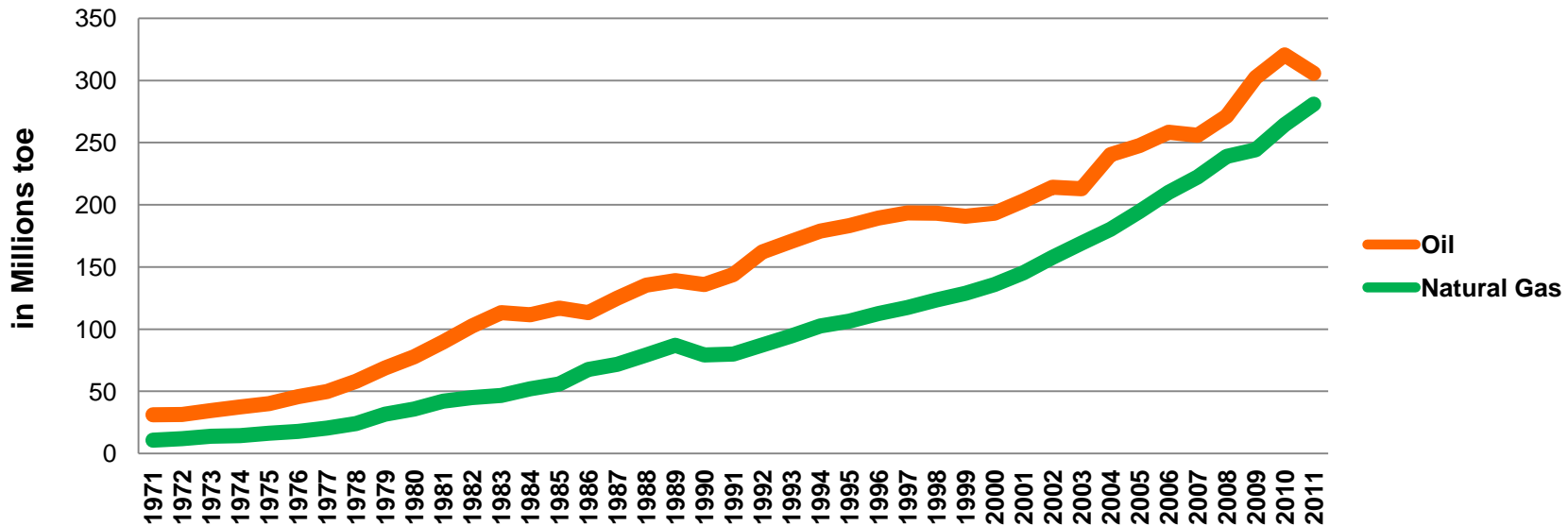


Profile of Energy Sector in ESCWA MCs



- Energy Consumption from Hydrocarbon resources is significantly increasing with poor level of energy efficiency.

Arab Energy Consumption (1971-2011)



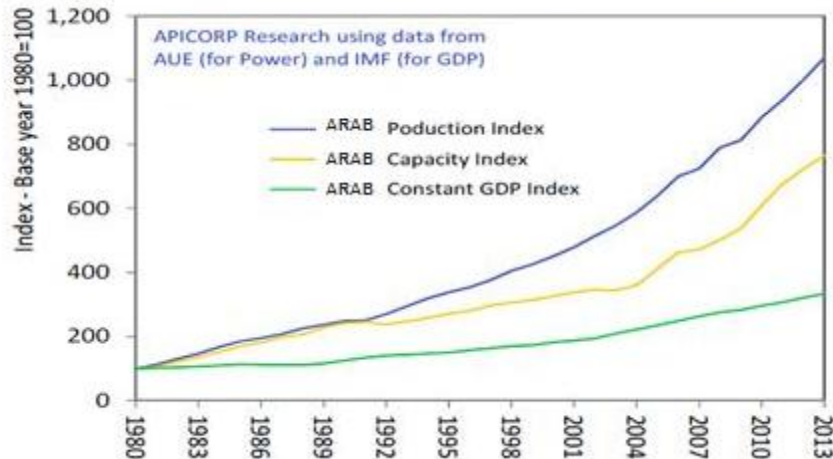
➤ In the coming years, some countries in our region will suffer from the inability to meet the growing electricity demand, which is estimated to increase by 115% by 2020.

Characteristics of Energy Sector in ESCWA MCs

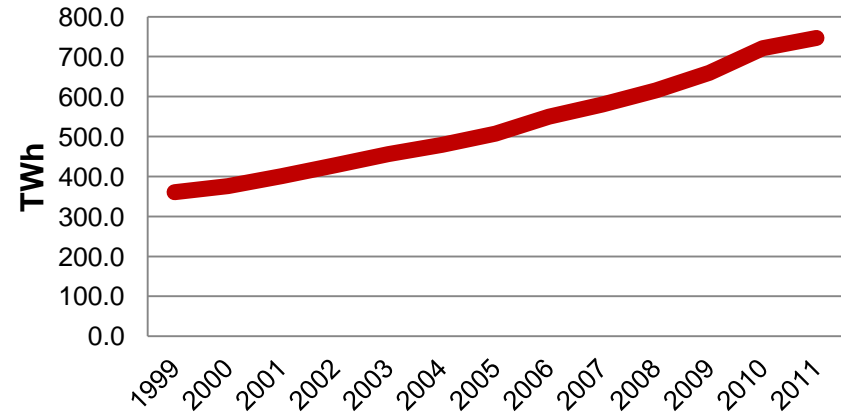


- ❖ Oil & Gas Exports Represent more than 65% (to 90%) from total exports for GCC Countries & Yemen & Iraq.
- ❖ Electricity Tariffs and Oil & Gas Products are subsidized.
- ❖ 40% of the total Primary Energy is consumed in Electricity Sector (of wh. 96% are from Oil & Gas).
- ❖ Due considerations have been given to secure sustainable energy supplies.

Evolution of ARAB Key Macro Power Indexes



Arab Total Electricity Consumption



ARAB Power Gen Capacity and Investment, 2015-19

	<i>2013* installed capacity (GW)</i>	<i>2013* electricity production (TWh)</i>	<i>Medium- term annual growth (%)</i>	<i>2015-19 capacity addition (GW)</i>	<i>2015-19 capital requirements (G\$)</i>
Maghreb ¹	34.3	141.0	8.1	17.7	21.3
Mashreq ²	68.3	321.6	9.5	42.9	55.8
GCC ³	121.8	529.7	8.7	68.5	75.9
Rest of Arab world ⁴	4.4	14.3	6.3	1.7	2.2
Arab Countries	228.8	1006.6	8.3	130.8	155.2

¹ Maghreb: Algeria, Libya, Mauritania, Morocco and Tunisia.

² Mashreq: Egypt, Iraq, Jordan, Lebanon, PT and Syria.

³ GCC: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the UAE.

⁴ Rest of Arab world includes Sudan (N&S) and Yemen, but excludes Comoros, Djibouti and Somalia for lack of data.

Characteristics of Energy Sector in ESCWA MCs



ARAB Total Power Sector Investment, 2015-19 (in \$billion)

(\$ billion)	Generation (G)	Transmission (T)	Distribution (D)	Total (T,D)	Total (G, T, D)
Maghreb ¹	21.3	4.6	14.1	18.7	40.0
Mashreq ²	55.8	10.8	25.5	36.3	92.1
GCC ³	75.9	15.5	29.6	45.1	121.0
Rest of Arab world ⁴	2.2	0.4	0.7	1.1	3.3
Arab Countries	155.2	31.3	69.9	101.2	256.4

The total sector investment of \$256bn, 60% in generation capacity and the remaining 40% in T&D.

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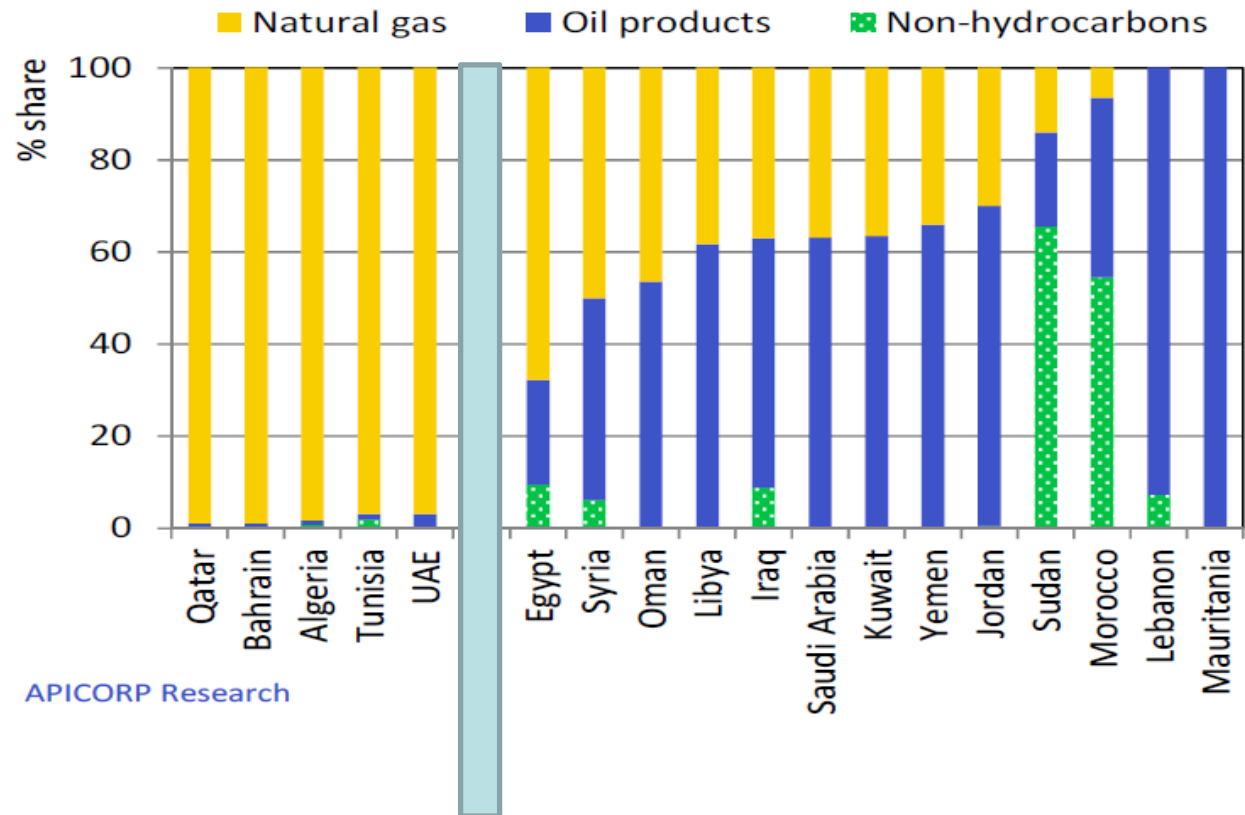
⁴ Rest of Arab world includes Sudan (N&S) and Yemen, but excludes Comoros, Djibouti and Somalia for lack of data.

Characteristics of Energy Sector in ESCWA MCs



ARAB ELECTRICITY GENERATION by FUELS, 2013

In 2012, 55% in Arab world of output was generated using Gas & 40% Oil, 5% from non-hydrocarbons, mainly hydro (Sudan) & coal (Morocco), not to mention the still negligible solar & wind.

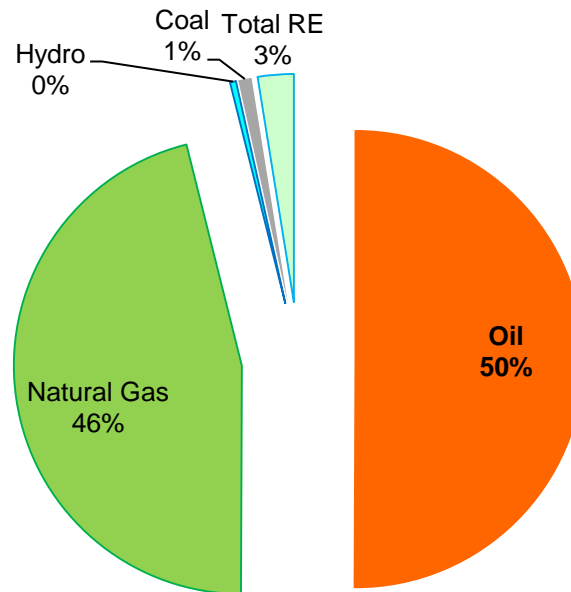


- ❖ Arab's power generation consumption has shifted from oil to Natural gas resource, which has significantly increases with time

Characteristics of Energy Sector in ESCWA MCs



- ❖ Energy conservation is essential, because hydrocarbon resources are finite.
- ❖ Investment in RE applications is important to supplement fuel supplies for domestic markets, and diversify away from dependence on oil and gas for reducing the region's long-term vulnerability to shifts in international demand.
- Increasing the share of RE particularly for domestic consumption can increase the life of the region's reserve therefore, more oil and natural gas will be available for exporting.



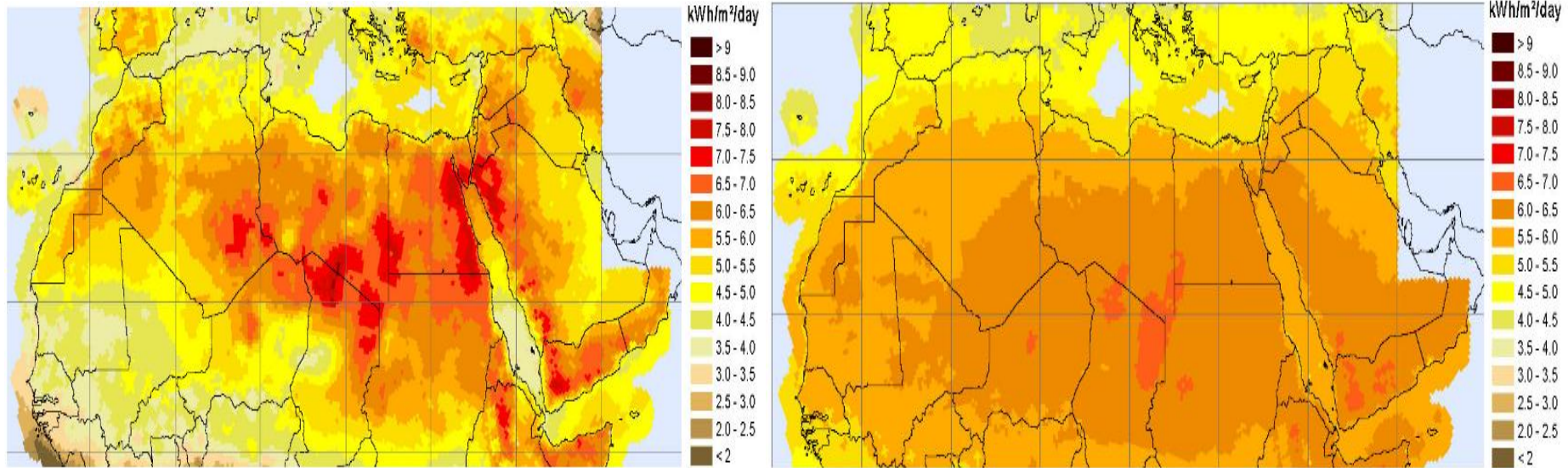
Arab Primary Energy Cons. by Source (2011)

Solar and Wind Energy Resources in the Arab Region



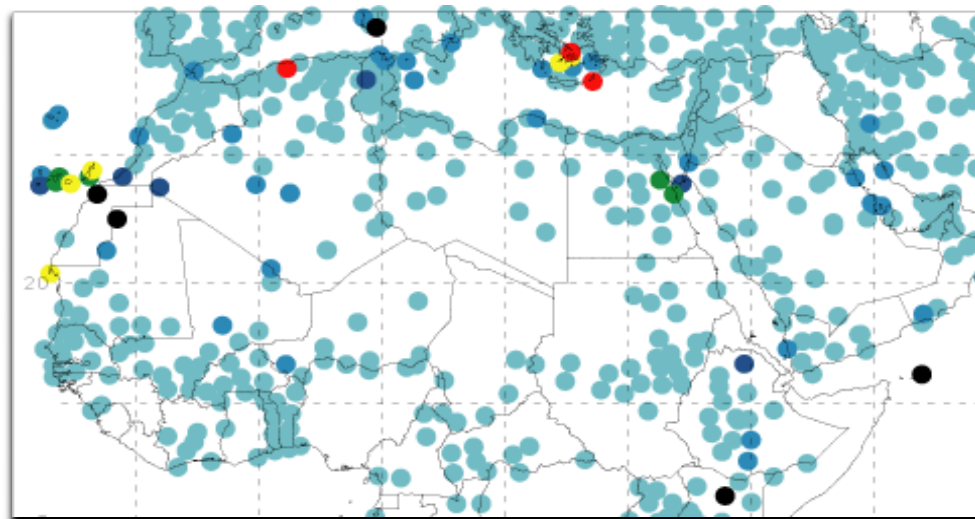
Direct & Global Solar Radiation

Source: www.nrel.gov/gis/images/swera/africa/



Wind classes at 80 m

- 1 ($V < 5.9$ m/s)
- 2 ($5.9 \leq V < 6.9$ m/s)
- 3 ($6.9 \leq V < 7.5$ m/s)
- 4 ($7.5 \leq V < 8.1$ m/s)
- 5 ($8.1 \leq V < 8.6$ m/s)
- 6 ($8.6 \leq V < 9.4$ m/s)
- 7 ($V \geq 9.4$ m/s)



Source: www.geni.org/globalenergy/library/renewable-energy-resources/world/middle-east/middleeast/index.shtml

Renewable Energy in the Arab Region



- The RE in the Arab region has evolved rapidly in recent years with a diverse range of countries announcing projects and policies.
- 16 of the 22 Arab countries had enacted at least one RE enabling policy, such as feed-in tariffs, fiscal incentives, and public financing, and 20 countries now have policy targets, up from 5 in 2007.
- New investment in the Arab countries totaled 1.9 b\$ in 2012, a 6 fold increase compared to 2004.
- Saudi Arabia, UAE, Egypt, Algeria, Morocco and Tunisia, in particular, have developed policy frameworks to stimulate local manufacturing and innovation.

The Arab countries RE market is far from having reached its full potential. Presently, it has been noticed promising signs towards developing RE utilization through pipeline projects and political commitments.

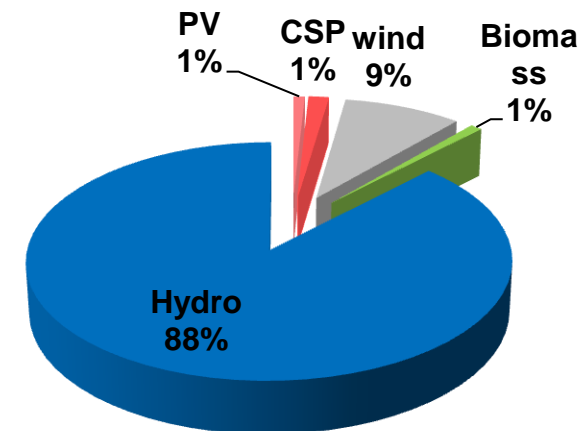
RE Capacities & Existing Policies in the Arab Countries



Table 1. Installed RE Capacity in The Arab Countries (2013)

Country/ Energy (MW)	Solar		Wind	Biomass and Waste	Geothermal	Hydro	Total
	PV	CSP					
Algeria	7.1	25	0	0	0	228	260
Egypt	15	20	550	0	0	2800	3385
Iraq	3.5	0	0	0	0	1864	1867
Libya	4.8	0	0	0	0	0	4.8
Syria	0.8	0	0	0	0	1151	1151
Djibouti	1.4	0	0	0	0	0	1.4
Jordan	1.6	0.0	1.4	3.5	0	10	16.5
Lebanon	1	0.0	0.5	0	0	282	283
Morocco	15	20	291	0	0	1745	2071
Palastine	1	0	0	0	0	0.0	1
Tunisia	4	0	154	0	0	66	224
Sudan	2	0	0	55.5	0	1590	1647
Yemen	1.5	0	0	0	0	0	1.5
Bahrain	5	0	0.5	0	0	0	5.5
Kuwait	1.8	0	0	0	0	0	1.8
Oman	0.7	0	0	0	0	0	0.7
Qatar	1.2	0	0	40	0	0	41
KSA	7	0	0	0	0	0	7
UAE	22.5	100	0	3.0	0	0	125
Total Arab Countries	95	165	997	102	0	9736	11097

RE Installed Capacity in the Arab Countries (2013)



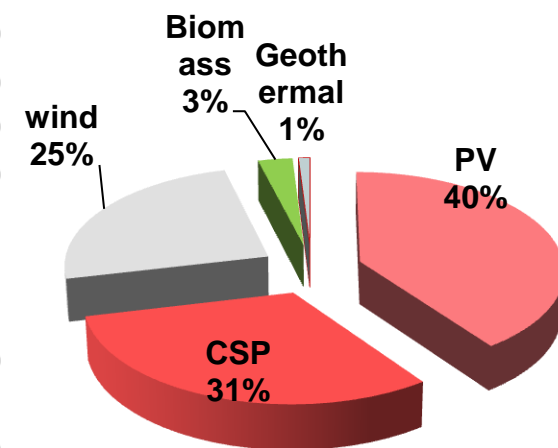
Future RE Capacities in the Arab Countries



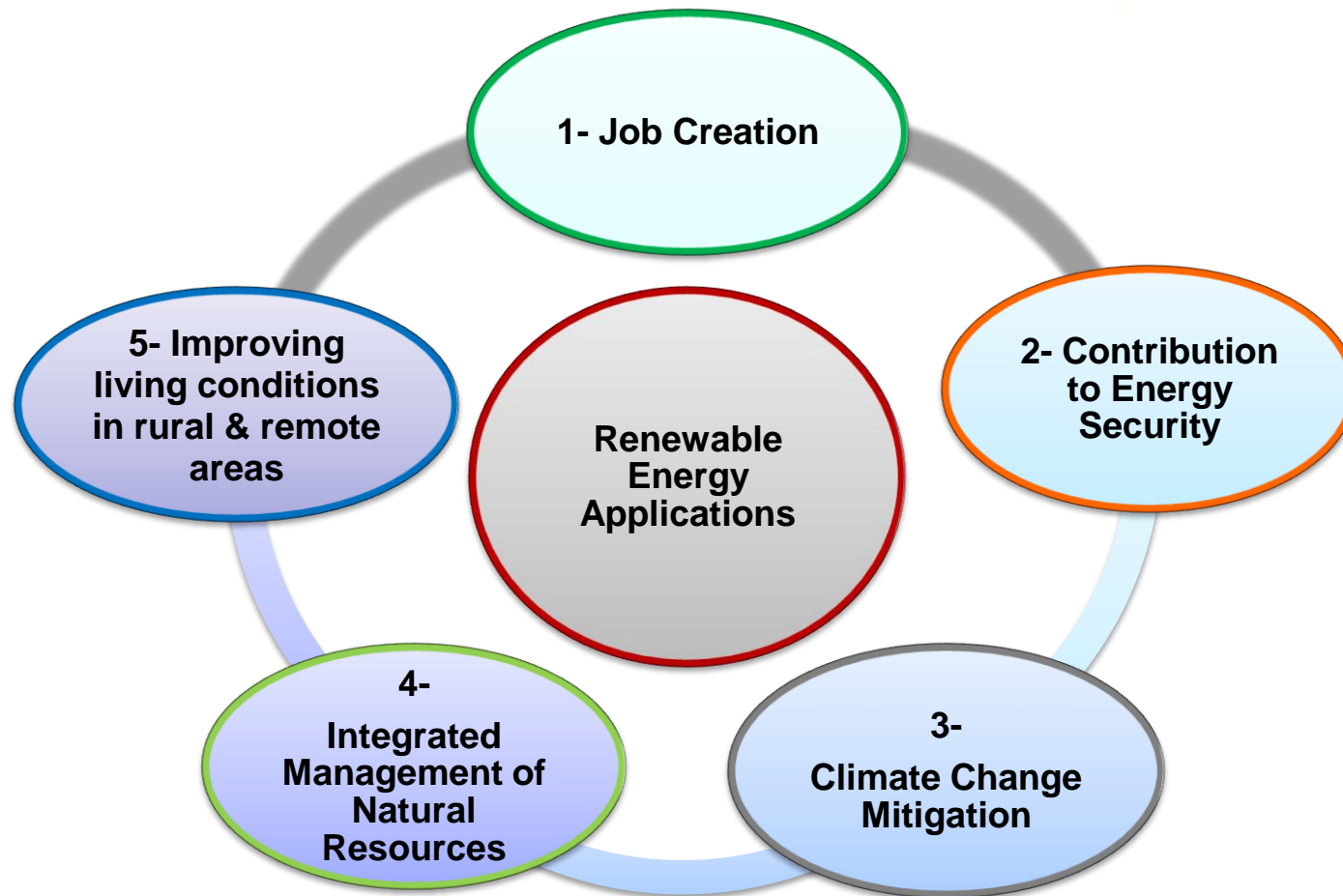
Table 2. RE Future Targets in the Arab countries (2020-2032)

Countries/ Energy (MW)	Solar			Wind	Biomass and Waste	Geothermal	Total	Target's Year
	PV	CSP	Total solar					
Algeria	2800	7200	10000	2000			12000	2030
Egypt	220	1100	1320	7200			8520	2020
Iraq	240	80	320	80			400	2016
Libya	844	375	1219	1000			2219	2025
Syria	1100	50	1150	1500	260		2910	2025
Djibouti								
Jordan	304	1350	1654	980			2634	2020
Lebanon	0	0	0	100	25		125	2020
Morocco	1550	450	2000	2020			4020	2020
Palestine	45	20	65	44	21		130	2020
Tunisia	1500	500	2000	1700	40		3740	2030
Sudan	250	50	300	320	230		850	
Yemen	4	100	104	400	6	200	710	2025
Bahrain								
Kuwait	3500	1100	4600	3100			7700	2030
Oman			427				427	
Qatar			640				640	2020
KSA	16000	25000	41000	9000	3000	1000	54000	2032
UAE			1700				1700	2030
Total Arab Countries	47857	37375	68499	29444	3582	1200	101025	

RE Future Targets in the Arab Countries (2020-2032)



Socio Economic Benefits of RE Applications Deployment in the Arab countries .



→ ...Provided they are supported by an enabling policy environment.

RE Facts and Job Creation Worldwide



Table 3. Estimated RE Jobs Worldwide (thousands).

Technologies	Global	China	EU	Brazil	United States	Germany	Spain	India
Biomass	753	266	274		152	57	39	58
Bio-fuels	1,379	24	109	804	217	23	4	35
Biogas	266	90	71			50	1	85
Geothermal	180		51		35	14	0.3	
Hydropower (small)	109		24		8	7	2	12
Solar PV	1360	300	312		90	88	12	112
CSP	37		36		17	2	18	
Solar heating/cooling	892	800	32		12	11	1	41
Wind Power	753	267	270	29	81	118	28	48
Total	5729	1747	1179	833	612	370	105	391

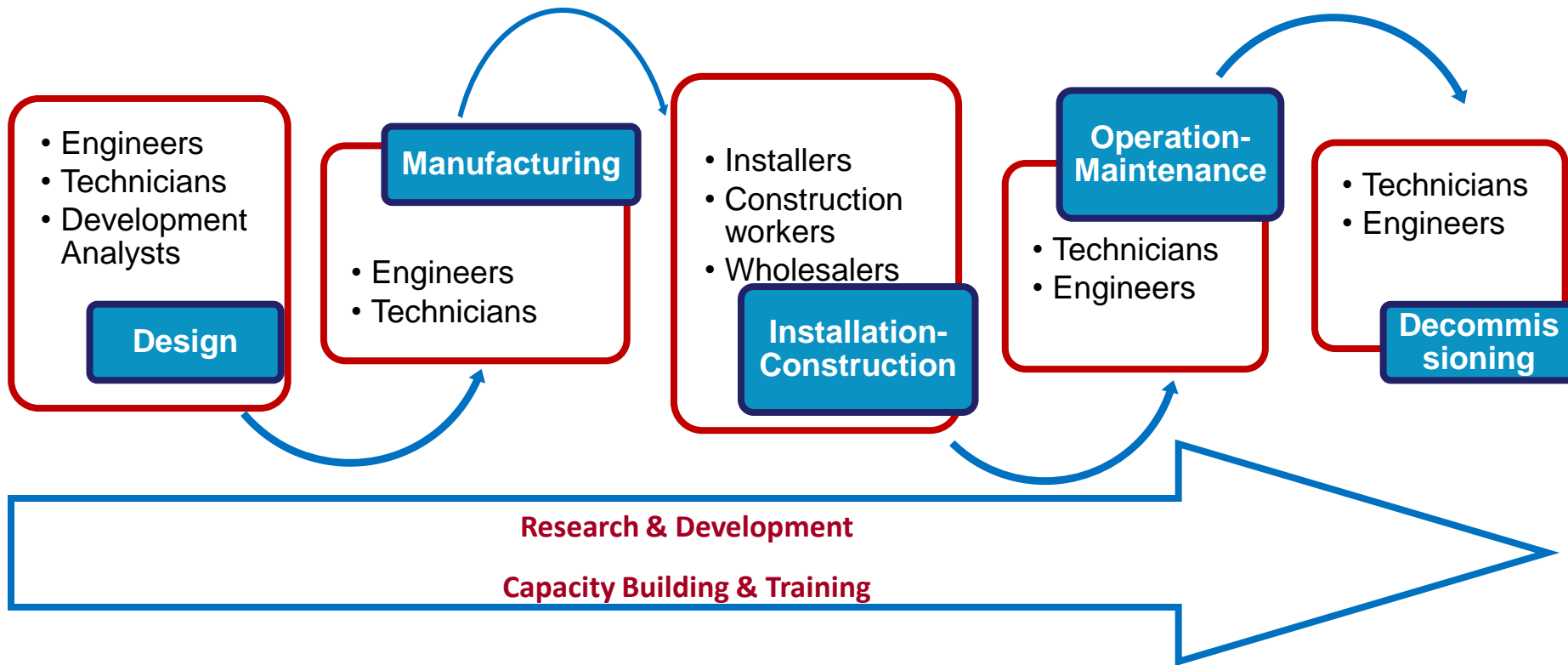
IRENA, 2013.

An estimated 5.7 million people work directly or indirectly in the renewable energy sector based on a wide range of studies from the period 2009-2012.

Jobs across the RE Value Chain Cycle



- Economic diversification and job creation is a potential key benefit of investment in RE technologies.
 - Demand for PV or wind power can lead to significant job creation through installation and maintenance activities.

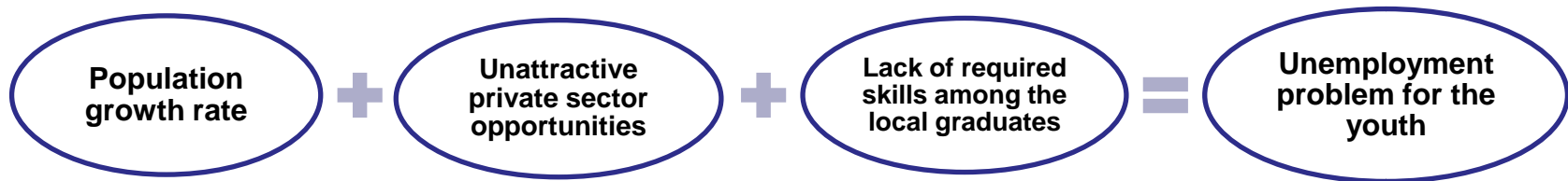


The Drivers for RE Applications (cont'd)



Socio-economic & Demographic Dynamics

- The participation of young people in the economic life did not exceed 40% during past decade (53.6% for males and 19.5% for females).
 - More than 30 % of Arab youth are unemployed compared to the global average of 15 %..
 - More than 50 million jobs by 2020 need to be created, mostly for young educated people.

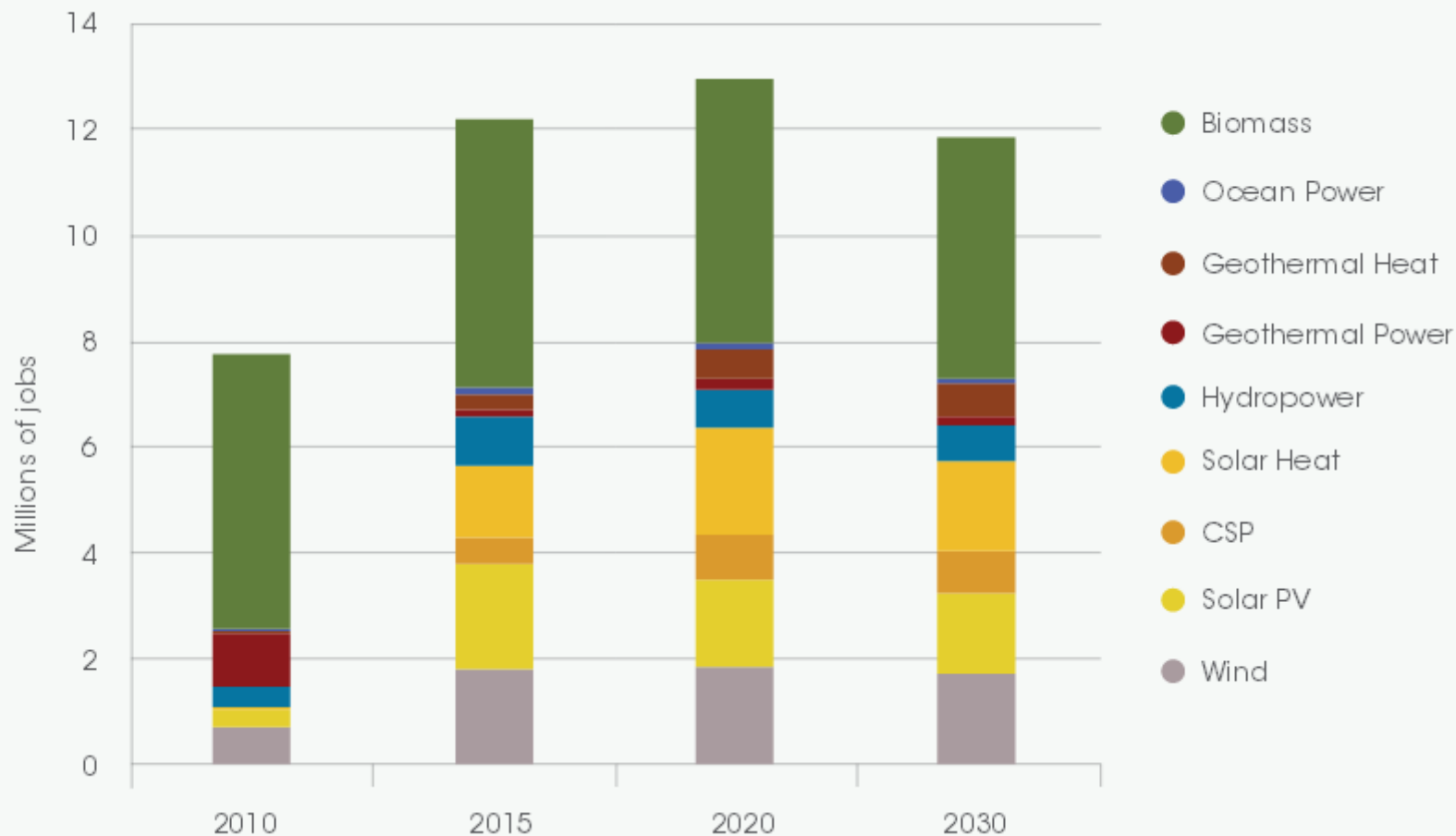


❖ RE has potentials for job creation in the energy sector, particularly for young people

RE Facts and Job Creation Worldwide



Figure 1. Global Direct Renewable Energy Employment (2010, Projections 2015, 2020, & 2030).



IRENA, 2013.

Unemployment in Arab countries



Country	Population estimation, 2011 (millions)	Estimated unemployment rate, 2010 (percentage of labour force)	Estimated unemployment rate, 2010 (percentage of labour force)	Estimated unemployment rate among women, 2010	Estimated number of unemployed, 2010 (thousands)
Algeria	36	9.8	---	19.1	1 100
Bahrain	1.3	3.7	3.7	4.1	5
Comoros	0.8	20	---	---	60
Djibouti	0.9	59	---	---	150
Egypt	82.5	11.9	---	22.7	3 183
Iraq	33	15.4	---	19.6	1 298.8
Jordan	6.2	12.9	---	21.2	1 763
Kuwait	2.8	5.9	5.9	3.1	173
Lebanon	4.3	6.4	---	10.4	108
Libya	6.4	18.2	---	18	298.5
Mauritania	3.5	31.2	---	44	510
Morocco	32.3	8.9	---	10.2	1 028
Oman	2.9	6.7	---	---	70.7
Palestine	1.9	0.5	2.3	2.7	5.8
Qatar	0.8	20	---	---	60
Saudi Arabia	28.1	5.4	10.5	15	463
Somalia	9.6	34.7	---	---	1 727.6
Sudan	34.3	20.7	---	---	2 700
Syria	20.8	14.9	---	37.1	866.3
Tunisia	10.7	18.9	---	28.2	738.4
UAE	7.9	4.3	14	10.8	232
Yemen	24.8	18	---	41	900
Total	354.8				17 638.5

17.6 Million of unemployed (2010) in Arab countries.

Population 355 Million (2011)

Estimated unemployment % of labour force between 9% and 34%

Estimated RE Job Creation in the Arab countries



Estimated Job Creation in Arab Countries

Country	Total solar	Es. JC		Wind	EJC		Biomass	Es.JC		Total Es.JC
	(MW)	Mf,Ct,I	O,Mt	(MW)	Mf,Ct,I	O,Mt	(MW)	Mf,Ct,I	O,Mt	
Algeria	10000	60000	30000	2000	400	800	0	0	0	91200
Egypt	1,320	7920	3960	7200	1440	2880	0	0	0	16200
Iraq	320	1920	960	80	16	32	0	0	0	2928
Libya	1219	7314	3657	1000	200	400	0	0	0	11571
Syria	1150	6900	3450	1500	300	600	260	104	366	11721
Djibouti	0	0	0	0	0	0	0	0	0	0
Jordan	1654	9924	4962	980	196	392	0	0	0	15474
Lebanon	0	0	0	100	20	40	25	10	35	105
Morocco	2000	12000	6000	2020	404	808	0	0	0	19212
Palastine	65	390	195	44	8.8	18	21	8.4	29	649
Tunisia	2000	12000	6000	1700	340	680	40	16	56	19092
Sudan	300	1800	900	320	64	128	230	92	324	3308
Bahrain	0	0	0	0	0	0	0	0	0	0
Kuwait	4600	27600	13800	3100	620	1240	0	0	0	43260
Oman	427	2562	1281	0	0	0	0	0	0	3843
Qatar	640	3840	1920	0	0	0	0	0	0	5760
(KSA)	41000	246000	123000	9000	1800	3600	3000	1200	4230	379830
UAE	1700	10200	5100	0	0	0	0	0	0	15300
Yemen	104	624	312	400	80	160	6	2.4	8	1187
Total Arab Countries	68499	410994	205497	29444	5889	11778	3,582	1433	5051	640641

Based on Tunisian employment factors, and ILO Global Estimate of Forced Labor data.

RE Contributes to Improve Living Conditions in Rural & Remote Areas



Morocco



Ground water, Morocco

RE Application- Photos Speak up

Increase
knowledge
COM



Egypt



PV system, a remote village
Egypt

28/10/2009

Security and activity
by night Egypt



Egypt
Health care center, a remote community,

Thank you

elandaloussi@un.org



**Photo : Shams-1
First Collector Installed**

**100 MW in Shams-1 started
operation in 2013 in UAE**