POLICY BRIEF

Best Practices for the Implementation of Sustainable Energy Action Plans

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Shared Prosperity Dignified Life

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Introduction

The Arab region is a large and diverse region that shares a rich geography known for its natural resource wealth as well as its climate vulnerability.[1] It is home to some 400 million people,[2] stretching from the Atlantic coast of North Africa in the West to the Straits of Hormuz in the East, and includes some of the world's wealthiest as well as some of the world's poorest nations.

Ensuring access to affordable, reliable, sustainable and modern energy for all (Sustainable Development Goal 7 (SDG 7)) is a key condition for reducing inequalities, poverty eradication, advances in health and education, sustainable economic growth, and the principle of "leaving no one behind". Economic and socio-economic opportunities include local market creation by new technologies and standards, such as energy access, local job creation, and cross-linkages to other core sectors such as

1. UN ESCWA 2017a; 2017b; 2019a; 2019b.
2. World Bank (2019).

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water management and agricultural development; as well as environmental protection, the fight against indoor and outdoor air pollution and climate action.

Making sustainable energy part of Arab countries' policy agenda requires far more systematic efforts than has been the case in the past. Most Arab countries remain exceptionally reliant on fossil fuels, with a highly limited role played by clean energy alternatives, in particular renewable energy; while the region also lags behind other region's progress in energy efficiency. In the Arab LDCs, energy access remains incomplete, severely obstructing socio-economic progress.

At the same time, sustainable energy also entails vast opportunities in a region endowed with significant human, economic and technological resources. This Policy Brief provides a very brief synopsis over the Arab region's recent years' progress in sustainable energy. It starts of by an overview of the role of energy in Arab countries' economies, followed by a summary of progress in recent years in three main areas that are linked to SDG 7, sustainable energy for all as part of the global Agenda 2030. It then examines specifically some of the progress made in the area of renewable energy, followed by key recommendations and policy guidelines.


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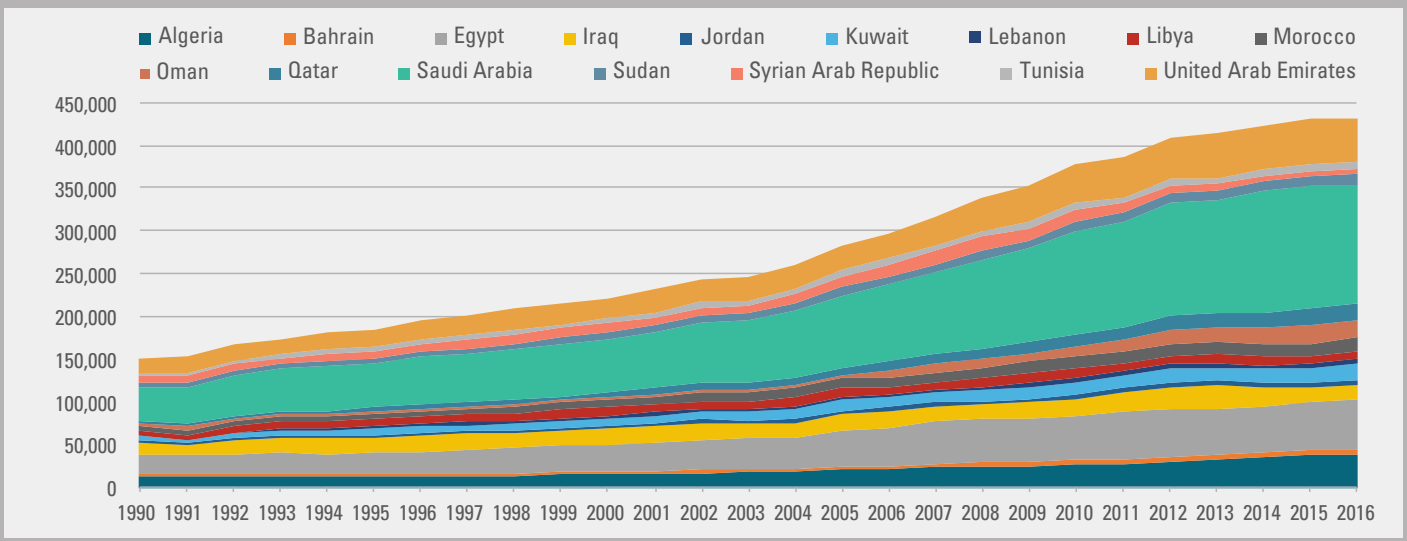
Background: Energy in Arab Economies

The Arab region is a rapidly growing market for energy. Over the past 25 years, regional primary energy consumption tripled, from around 150,000 ktoe in 1990 to around 435,000 ktoe by 2016 (Figure 1). The GCC economies – all of them fossil fuel producers with a concentration of energy-intensive industrialisation strategies since the 1980s – have seen particularly fast demand growth. In the GCC states alone, total energy consumption quadrupled since 1990, with smaller Gulf states such as Qatar, the UAE, Bahrain and Oman having seen particularly fast growth in consumption of between 5 and 12% per annum.[3]

3. UN ESCWA (2019b).

Figure 1. Historical total final energy consumption in the Arab region by country (ktoe), 1990-2015



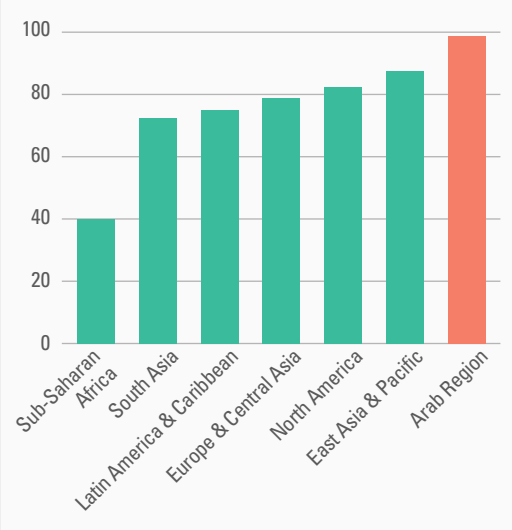
Source: IEA (2019), "World energy balances", IEA World Energy Statistics and Balances (database).

Population growth, economic and industrial expansion and rising living standards have all been contributing to the Arab region's rise in energy consumption. With some of the region's members counting to the world's most wealthiest states on a per capita basis,[4] and most others being middle income countries, demand for energy is further set to grow over the coming decades, resulting in a further rise in regional energy consumption throughout the period up to 2030.[5]

Fossil fuels have historically been vitally important in the Arab region's energy mix. More than 95% of regional energy supply is derived from oil and natural gas, making the Arab region the most fossil fuel-dependent region in the world (Figure 2). Oil has historically played a key role as a key natural resource asset in a number of Arab countries in the Gulf and the Maghreb, making it both the most important export product and a key fuel on domestic energy markets throughout the region. Natural gas is a second, increasingly important energy resource besides oil, whose production, consumption – particularly in Arab countries' power sectors – and import have risen sharply in recent decades.

Arab countries hold some of the world's most important conventional energy resources, accounting combined for over 40% of globally traded oil alone.[6] Yet, fossil fuel resources are unevenly distributed between Arab countries. The GCC economies, Algeria, Egypt, Iraq and Yemen are net exporters of energy, although all of them also import energy such as transport fuel and, in some cases, natural gas. Other countries such as Jordan, Lebanon, Morocco, Sudan, Syria and Tunisia net importers whose domestic energy mix has historically been more diversified, though it remains heavily dependent on imported fossil fuels.[7]

Figure 2. Fossil fuel energy consumption (% of total primary energy supply) by world region, 2014



Source: World Bank (2018e)

4. World Bank (2019).
5. The IEA uses the Middle East as the basis for their consumption growth projections. Ref IEA WEO.
6 OPEC data, 2018.
7 Sudan is an exception, as the secession of the South in 2011 removed previous oil resources from the Northern part.

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Table 1. Energy balances in the Arab region, 2017

	Oil production (ktoe)	Natural gas produciton (ktoe)	Net oil and gas exports (ktoe)	Share in world oil production	Share in world natural gas production
Maghreb					
Algeria	70,953	81,833	-75,909	2%	3%
Libya	46,371	7,433	-44,886	1%	0%
Morocco	4	62	963	0%	0%
Tunisia	2,119	2,139	2,242	0%	0%
Mashreq					
Egypt	32,153	42,876	1,132	1%	1%
Iraq	231,469	7,094	-191,070	5%	0%
Jordan	0	83	6,278	0%	0%
Lebanon	0	0	0	0%	0%
State of Palestine	n/a	n/a	n/a	n/a	n/a
Syrian Arab Republic	1,041	2,998	4,933	0%	0%
GCC					
Bahrain	10,390	12,047	3,386	0%	0%
Kuwait	148,226	13,970	-99,910	3%	0%
Oman	48,881	28,997	-48,406	1%	1%
Qatar	75,425	149,787	-156,928	2%	5%
Saudi Arabia	568,727	78,009	-353,804	13%	2%
United Arab Emirates	178,985	50,263	-111,366	4%	2%
Arab LDCs					
Mauritania	n/a	n/a	n/a	n/a	n/a
Sudan	5,069	0	413	0%	0%
Yemen	1,049	517	-	0%	0%

Notes: Oil prodction includes crude, NGL and feedstocks.
Source: IEA (2019b)

The fiscal costs of rising energy imports are high, in particular since domestic energy prices in many Arab countries have historically been unreflective of movements in international import costs.[8] Relatively high and rising oil prices during the 2000s up to the early 2010s have since triggered a series of reform efforts throughout Arab countries, including in oil and gas exporting countries. Policy changes have included efforts to adjust domestic energy pricing frameworks and to integrate some elements of energy efficiency regulation into an increasing number of Arab countries' domestic energy sector policy frameworks.[9] More recently, increased policy focus has arisen around the promotion of a more diversified range of energy sources, boosting the profile of renewable energy in particular.[10]

8 Fattouh, B. and L. El-Katiri (2012).
9 E.g. James (2014); UN ESCWA (2017e); Sdralevich et al. (2014); Verme (2016).
10 E.g. IRENA (2019a); UN ESCWA (2017c); UN ESCWA (2018a, b, c, d); World Bank (2016).

Arab oil and gas exporters have been part of this transition, as their economies have significant opportunities to gain from a more sustainable use of energy within their domestic markets. Producers such as Iraq, Kuwait, Libya and Qatar relying for over 80% of their government revenues on fossil fuel export earnings, a proportion that has barely changed over the past decades.[11] Fossil fuels diverted from international to domestic markets in producing states result in a fiscal opportunity cost that could be minimised through a more efficient use of energy – which historically received little priority – and greater reliance on renewable energy, which has grown increasingly cost-effective in recent years (see also further discussion below).[12]

Arab Region Progress on SDG 7

Box 1. Sustainable Development Goal (SDG) 7

"Ensure access to affordable, reliable, sustainable and modern energy for all"

7.1 By 2030, ensure universal access to affordable, reliable and modern energy services

7.2 By 2030, increase substantially the share of renewable energy in the global energy mix

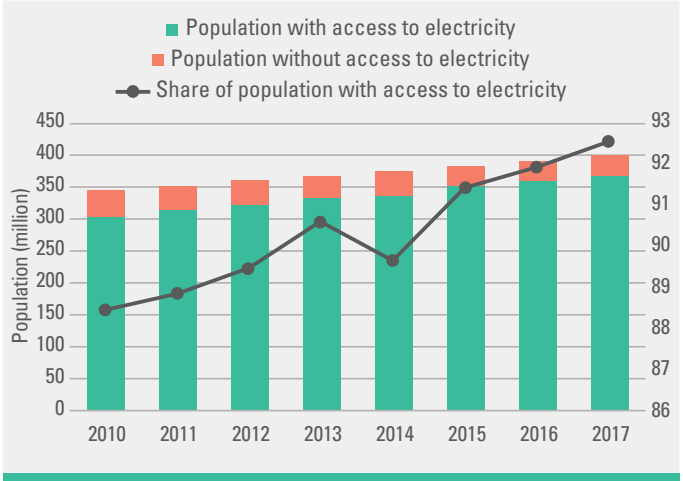
7.3 By 2030, double the global rate of improvement in energy efficiency

Progress on sustainable energy (SDG 7) differs significantly across the region in reflection of vast socio-economic and geographic differences. While some of the region's countries are amongst the wealthiest nations on a per capita basis, and striving to improve the productivity of their vast energy resources, Arab LDCs have yet to achieve universal access to modern energy. SDG 7 tracks progress in sustainable energy across three main targets: for (i) access to modern energy – electricity and clean cooking fuels and technologies (CFTs); (ii) renewable energy; and (iii) energy efficiency (Box 1).[13] The remainder of this section outlines the region's overall status across these targets.

Energy access

Access to energy overall is one of the brightest spots in the Arab region's sustainable development agenda.[14] The Arab region's electrification rate stood at 92.5% in 2017, slightly up from 88.4% in 2010, making it the most electrified regional group of countries in the developing world. Highly urbanised populations in all but the Arab LDCs, the availability of low priced modern fuels and electricity and considerable efforts by most Arab countries since the 1950s to expand their utility sector infrastructure account to a large extent for this success. By 2017, electrification access was virtually universal in all but three Arab countries.

Figure 3. Progress in population with electricity access in the Arab region from 2010 to 2017 (millions of people and share of population with access to electricity)



Source: World Bank

11 UN ESCWA (2019b); IMF (2017a, b).
12 IRENA (2017, 2019a).
13 For a background, please see https://trackingsdg7.esmap.org/about-us.
14 Access to electricity and to CFTs is the standard current measure for progress in energy access under the inter-institutional tracking framework for SDG 7, Tracking SDG 7. For a background, please see https://trackingsdg7.esmap.org/about-us.

Figure 4. Electrification rates in the Arab region, 2000 - 2017 (%)

Source: World Bank

Encouragingly, the decline of the region's access deficit has further been accelerating in recent years as several countries managed to close their access gap to achieve virtually universal access. In the same year, 14 out of 19 countries had access rates for clean cooking fuels and technologies (CFTs) above 95%, reflecting, among other factors, widespread access to electricity and Liquefied Petroleum Gas (LPG) for cooking in most urban and many rural households.

The Arab region's population without access to electricity fell from about 40 million in 2010 to around 30 million in 2017. Over 90% of the Arab region's access deficit for electricity, and over 95% for CFTs in 2017 remained concentrated in the three Arab LDCs: Sudan, Yemen and Mauritania. Sudan accounts for the largest population access deficit in the Arab region with almost 18 million people without formal access to electricity. The rest of the region's access deficit is found in Libya and Syria, both conflict-torn countries, with Libya never recovering its 100% electricity access rate since 2000. Libya, Syria and Mauritania are the only three countries in which more people lacked access to electricity in 2017 than in 2010.

Rural populations are disproportionally more affected by missing energy access. 88% of Arab LDCs' urban, but only around 50% of their rural populations had access to electricity in 2017. Many initiatives aimed at increasing electricity access in Arab countries have hence focused on rural areas (see Box 2). In Yemen, 98% of the urban population have access to electricity, versus 69% in rural areas. In Sudan and Mauritania, these numbers are 82% for urban access, versus 43% rural access in Sudan and no access at all for rural populations in Mauritania. Access distribution for clean cooking fuels and technologies (CFTs) such as LPG and improved cooking stoves is comparable.

Conflict and instability has had a highly detrimental impact on modern energy access in the region. Instability in Syria, Iraq, Yemen and Libya have yielded above 6 million refugees by 2017, as well as some 11 million internally displaced persons, and led to the destruction of significant parts of national and local energy sector infrastructure as well as disruptions to fuel supply routes (see Box 3 for an example from Yemen). Living conditions and energy access of who remain in many cases provisional and likely not reflected in our current data.

Conflict-affected countries Libya and official data for Syria saw declining rates of electricity access over the tracking period, reflecting large-scale destruction of infrastructure that will likely challenge the countries' efforts in providing universal access to electricity to all citizens for many more years to come. Reduced access to electricity has furthermore increased the demand for liquid fuels in countries like Iraq, Libya, Syria and Yemen, leading to shortages and surging prices that have placed even liquid fuels out of many households' budget, even where actual fuel supplies have not been interrupted as a result of conflict.

Box 2. Experience in rural electrification in the Arab region

A number of Arab countries have achieved substantial progress in recent decades in increasing rural access to electricity. While most countries have managed to close their access gap in rural and remote areas during the 2000s (e.g. Algeria, Jordan, Morocco), progress in the LDCs (illustrated by Mauritania) has been slow. Nonetheless, regional experience various schemes can prove successful if actively promoted by national governments.

Unlike other energy access deficit countries, **Algeria** has not faced a structural rural energy access gap, but does feature off-grid areas in remote geographical locations that would not be cost-effective to connect to the national grid. For this reason, the country has long been using mini-grids to supply off-grid areas in rural and desert regions. Increasingly, hybrid systems using PV and wind generators are being integrated into these systems to save fuel costs and harvest significant local renewable energy resource potential.[1] Increased use of hybrid systems builds on experience from the 2000s when the Algerian government successfully introduced solar-hybrid systems into existing diesel-fuelled generation systems in isolated areas, such as its southern provinces of Adrar, Illizi, Tindouf and Tamanrasset.[2]

Jordan launched a rural PV electrification programme in 2002, aimed at improving both access to electricity and the quality of life for rural electricity users. The programme has been one of the earliest in the region to use renewable energy resources, primarily solar PV panels, reflecting lessons learnt from earlier experience with rural electrification programmes based on diesel-powered self-generators. Many rural communities welcomed the introduction of cleaner and supposedly low-maintenance PV generators which additionally required none of the running costs associated with diesel fuel.[3]

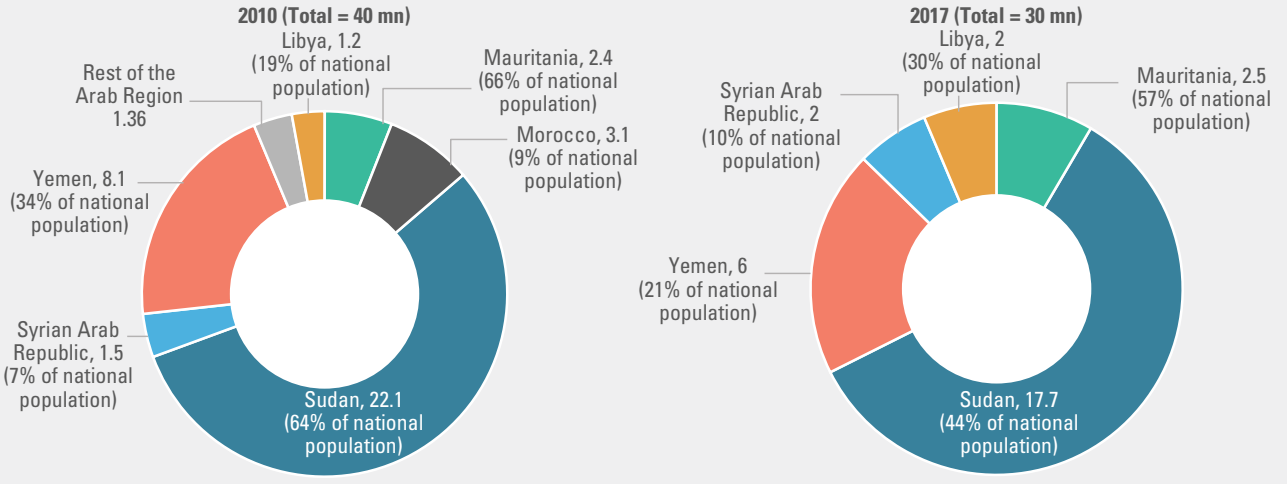
Morocco's Programme d'Électrification Rurale Global (PERG) was launched in 1996, when rural electrification rates were estimated as low as 18%. PERG identified villages lacking electricity access across the country, classifying them into different categories based on whether or not their connection to the main grid was financially viable. Areas that could not be connected cost-effectively to the national grid were assessed for the viability of other, local solutions including PV generators, small hydro-turbines, wind turbines, diesel generators and hybrid systems, taking into consideration the potential village market size, geographical proximity and local geographical and climatic factors that would favour specific technologies. Over a period of 15 years, more than 35,000 villages, including some 1.9 million rural households, were electrified, driving up rural electrification rates to 97% by 2009.[4]

In **Mauritania**, numerous aid and development projects have been targeting mini-grid provision in rural areas for many years. Most mini-grids operate on the basis of diesel generators, but there has also been recent experience with renewables-based systems. The first renewable-energy-based mini-grids were tried out in the mid-1990s under the Alyzés programme (initiated by the United Nations Development Programme (UNDP)/Global Environment Facility), wind-based turbines. Non-governmental organizations (NGOs) and national agencies (Agence de promotion de l'accès universel aux services (APAUS) and Agence de Développement de l'Electrification Rurale (ADER) have been promoting the development of renewable-energy-based mini-grids on a similar model, but based on solar energy. A joint project, PERUB (Programme d'électrification rurale dans la région du Brakna), of the Groupe de Recherche et d'Echange Technologique (GRET) and APAUS, funded by the European Union (EU) Energy Facility (EF), installed 24 solar-based MFP projects between 2008 and 2011, then 24 solar platforms were installed as part of a joint UNDP/United States Agency for International Development (USAID)/APAUS project, six solar platforms by APAUS and 100 additional solar platforms between 2011 and 2015 under the ERUDI (Projet d'électrification rurale décentralisée interrégionale en Mauritanie) project. While this series of primarily aid-driven development initiatives has shown success in providing rural access to electricity, they remain ad hoc projects that still need to be scaled up into systematic policies, requiring sustainable infrastructure and financial mechanisms in place in the coming years.[5]

Source: UN ESCWA (2017c)

1 Saheb-Koussa et al. (2011).
2 Stambouli (2011).
3 Al-Soud (2004), p. 593.
4 AFD (2013).
5 UNDP (2014).

Figure 5. The Arab region's electrification access-deficit in population numbers, 2010 and 2017



Source: World Bank

Box 3. Energy access in conflict-torn Yemen

Yemen has among the lowest energy access in the Arab region, with access to electricity standing at around 79%, and access to CFTs hovering around 63% in 2017. While these rates represent a net improvement compared to the 2000s, access rates have once again declined as a result of conflict and instability since the beginning of this decade. Current data available likely overestimates energy access, as the country has experienced considerable damage to infrastructure and conflict-induced fuel shortages.

By mid-2017 at the time of the World Bank's Yemen Dynamic Damage and Needs Assessment Phase II, public utility services had effectively collapsed, leaving six out of the 10 cities surveyed without electricity, and rural areas at pre-conflict electricity access rates of only 53 percent.[1] Fuel shortages have also led to spiking prices for liquid fuels, further reducing the quality of fuel used in the absence of affordable alternatives to liquid fuels, with many women having reportedly resorted to cooking with plastic, which releases severely harmful chemicals.[2]

Besides effects on the health of those cooking with these fuels, this situation has also had a highly detrimental effect on many households' budgets, children's ability to attend school, the functionality of basic health services, public security and the ability of businesses and industries to operate – thus reinforcing a negative spiral of conflict and socio-economic deprivation.

Source: ESCWA Tracking SDG7: Energy Progress Report 2019, Arab Region

1 World Bank (2018a).
2 World Bank (2018a).

Electricity service quality and affordability

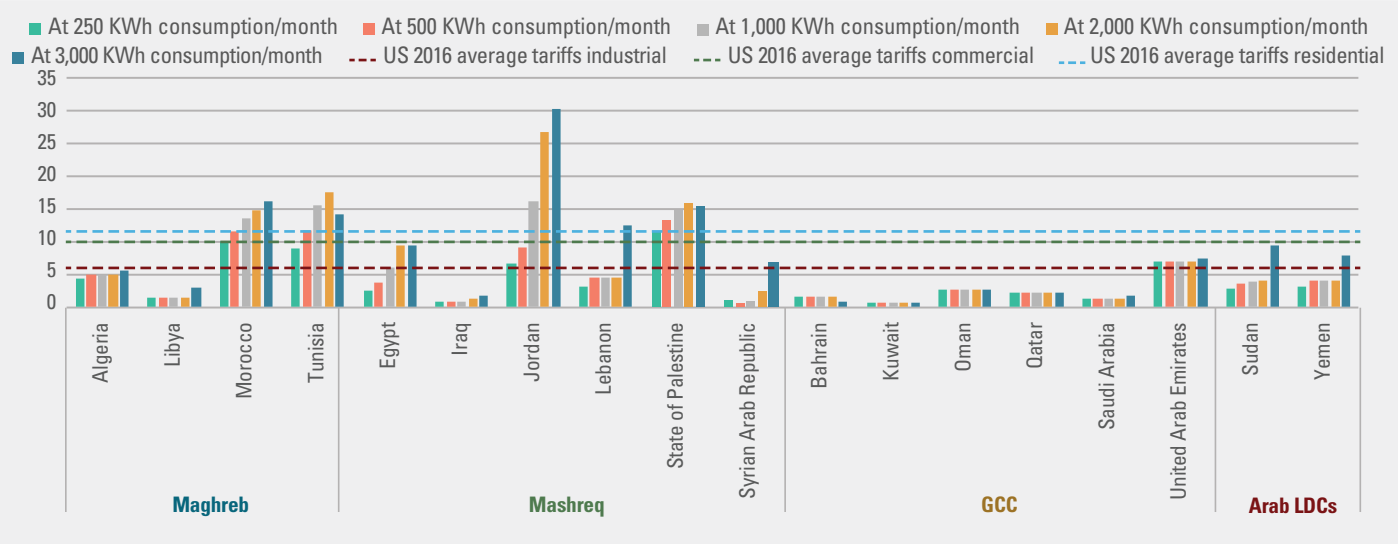
While access to electricity is today near-universal in most Arab countries outside Arab LDCs, the quality and cost of service varies significantly across countries. In most recent years, planned and unplanned service disruptions due to insufficient generation capacity and transmission infrastructure have been of particular concern in conflict-affected countries Iraq, Libya, Syria, the occupied Palestinian territory, Yemen; but also in neighbouring countries Jordan and in particular Lebanon. Lebanon having itself suffered from chronic utility sector problems long preceding the conflict in Syria saw these problems exacerbated by the dramatic increase in electricity demand by more than a million Syrian refugees who fled to Lebanon during the tracking period.[15]

In conflict-torn Syria, average electricity services last for around 4-6 hours per day;[16] in the occupied Palestinian territory, electricity is supplied on average for eight hours per day.[17] Irregular electricity supply is of grave concern for the functioning of basic health services, education, an economic activity, making it a top priority to address electricity provision as a precondition for post-conflict reconstruction and the building of sustainable peace and security in affected Arab countries.

Electricity prices vary across the Arab region, affecting real as opposed to statistical access. Jordanians, Moroccans, Palestinians and Tunisians pay on average

15 E.g. Wright (2018); McDowall (2019).
16 UN ESCWA (2019c).
17 UN ESCWA (2019c).

Figure 6. Average domestic electricity tariffs in the Arab region (US$ Cents/KWh/Month), 2016



Notes: Data for Mauritania not available.
Source: AUPTDE (2016)

more than twenty times the average bill in the Arab region's lowest cost country, Kuwait, while average incomes are also far below those found in the Arab region's lowest price electricity markets. Domestic energy price reform in a number of Arab countries in most recent years has further increased the financial burden on lower and middle income households in particular, affecting disposable household income and, as a result, de facto access to modern energy. Lagging parallel progress in the area of energy efficiency regulation, and existing, poorly insulated building stock and inefficient vehicles implies final consumers in many cases face rising energy and utility bills without the ability to meaningfully adjust consumption behaviour.

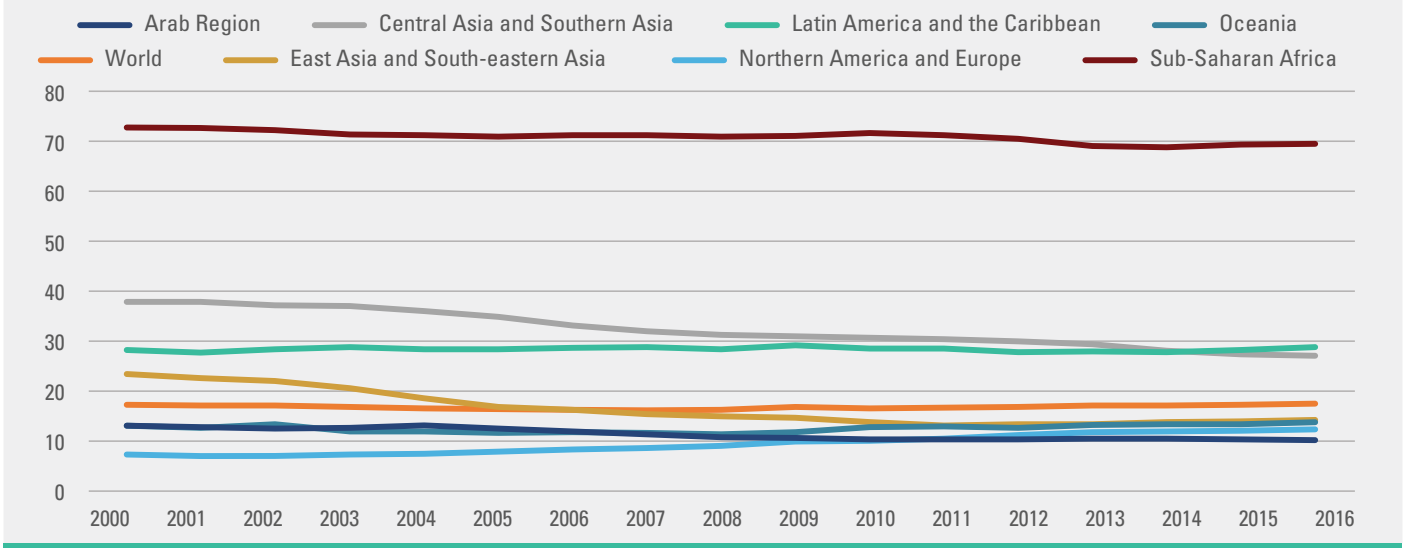
Many off-grid solutions such as mini-grids that offer access to remote settlements similarly remain disproportionally expensive, affecting rural access rates. Frequent service disruptions from the national grid also increases de facto household and businesses' electricity costs because of high levels of reliance on more expensive backup generators, as is widespread practice in Lebanon and Iraq.[18]

Renewable energy

Progress in the deployment of modern renewable energy has been far more modest than regional inroads in energy access, although recent years have been

18 IEA (2019).

Figure 7. Renewable energy share in total final energy consumption (%), 2000-2016



Source: IEA (2018), World Energy Balances; Energy Balances, UN Statistics Division (2018)

Figure 8. Total Arab renewable energy consumption by country, 2016

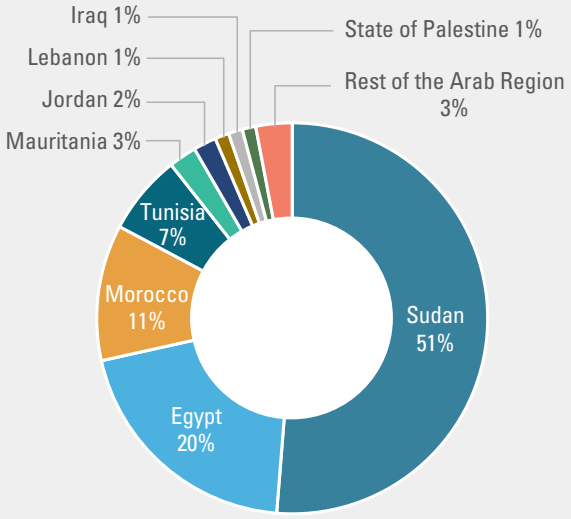
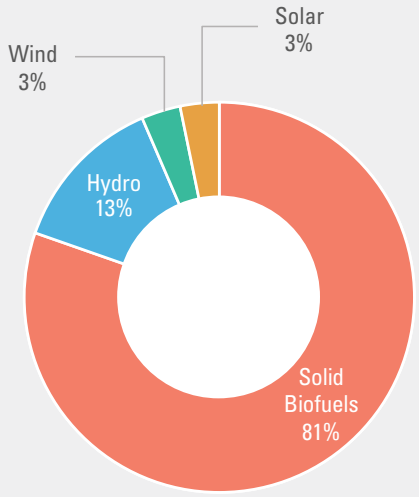


Figure 9. Renewable energy consumption by type of fuel in the Arab region, 2016

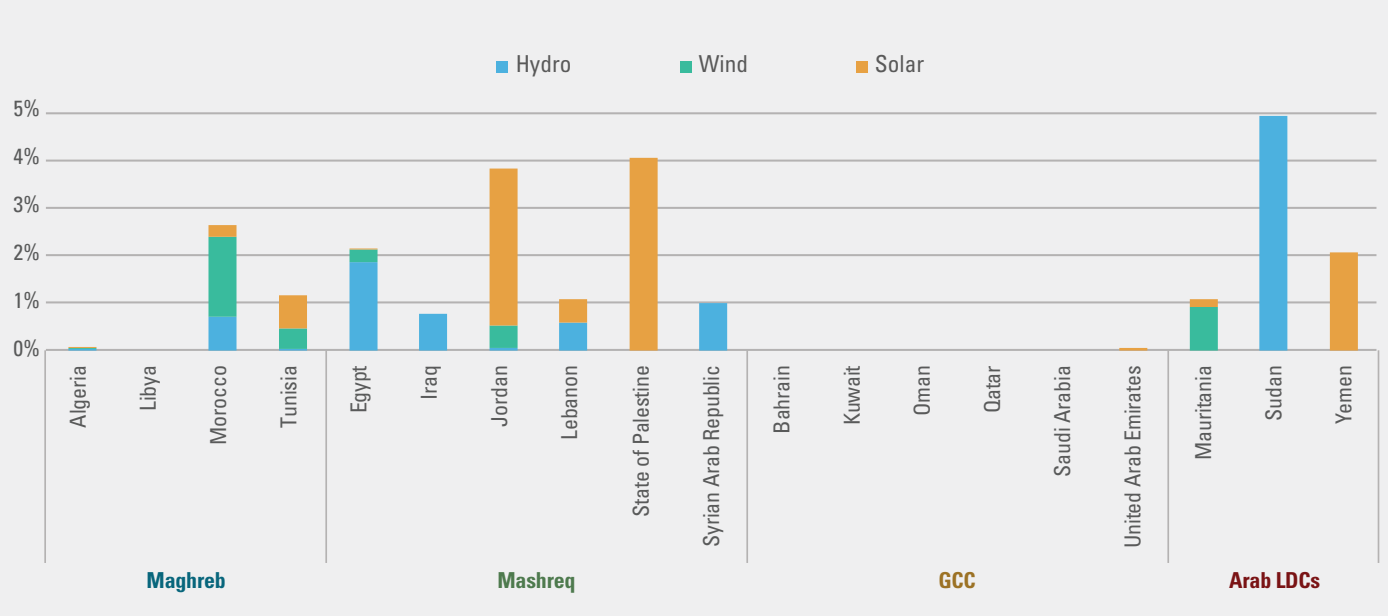


Source: IEA (2018), World Energy Balances; Energy Balances, UN Statistics Division (2018)

encouraging. The share of renewable energy in total final energy consumption has been in slow decline in the Arab region (Figure 7), a historical long-term trend that reflects the high share of traditional biofuel in the region's renewable energy mix. Falling consumption of traditional biomass in favour of more modern, higher quality liquid fuels and electricity in Arab LDCs and parts of North Africa account for virtually all of this trend, indicating a net welfare benefit despite falling overall renewable energy consumption. Three countries—Egypt, Morocco and the Sudan—account for over 85% of the region's total consumption of solid biofuel; Sudan alone consumes 59% (Figure 8).

The share of renewable energy has been plateauing at around 10.2% of the Arab region's total final energy consumption since 2010, declined by another 11% between 2014-2016. Other, more modern forms of renewable energy such as solar and wind power have historically played a limited role in the Arab region. Hydro power forms an exception, but its deployment is limited in geographical scope, as is its potential for expansion given many important hydro-resources are already being utilised. In consequence, encouraging yet slow growth in the deployment of modern renewable energy technologies in the region has not yet been sufficient to halt the region's overall trend of falling renewable energy consumption.

Figure 10. Renewable energy share in TFEC by technology (excluding solid biofuel), 2016



Source: IEA (2018), World Energy Balances; Energy Balances, UN Statistics Division (2018)

Against the backdrop of relatively long-lasting resistance of Arab energy markets to embrace modern renewable energy, the recent surge in deployment is a significant development, despite comparably small numbers. In 2016, solar, wind and hydro power accounted for 19% of the region's total renewable energy consumption, with slow but consistent growth since the 2000s.

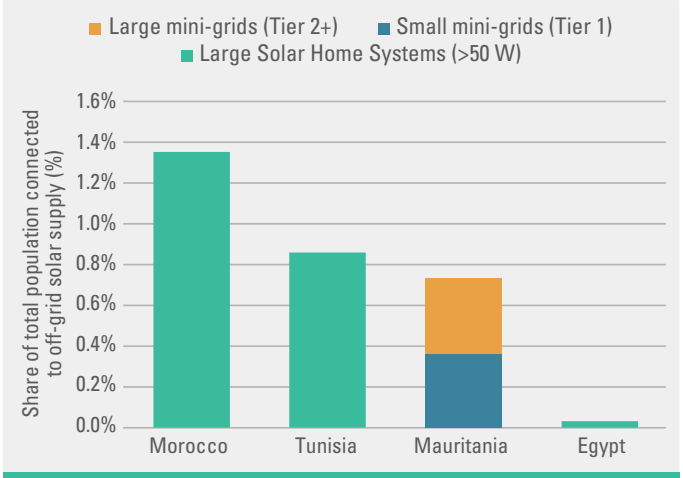
Very few Arab countries rely on renewable energy for a substantial share of their final energy consumption. Excluding solid biofuel consumption, the highest shares of renewable energy consumption as part of the national energy mix are found in Sudan, the Occupied Palestinian Territories, Jordan and Morocco, based on a mix of hydro, solar and wind resources (Figure 10). If solid biofuel is included, renewable energy contributes above 10% of the national energy mix in Mauritania, Morocco, the occupied Palestinian territories, Sudan and Tunisia. Nine Arab countries – including all GCC countries – consumed no or negligible amounts of renewables, basing their energy mix virtually entirely on fossil fuels.

The residential sector remains the most dominant end-user of renewable energy. In 2016, it accounted for over 80% of total renewable energy consumption, owing to the large proportion of solid biofuel used for cooking and lighting, in particular in Arab LDCs. Only 18% of the Arab region's renewable energy consumption is accounted for by electricity generation, once again reflecting limited systematic deployment of renewable energy beyond hydropower in a limited number of Arab countries. Renewable energy has not yet made its way into the transport sector's energy mix in any Arab country, with minor exceptions such as pilot schemes using biofuel.[19]

Distributed electricity generation using renewable energy technologies have grown quickly in the Arab region owing to their large contribution to off-grid electrification. With much of the Arab region's remaining access deficit being concentrated in rural areas, off-grid options such as mini grids and self-generation have become a lifeline for many rural communities that are too scattered or remote to be economically connected to the national grid. The rapidly falling cost of stand-alone solar power systems vis-à-vis diesel-powered generators, but also compared with grid-based electricity in some countries has further helped create economic and environmentally sustainable options to use renewables energy-based self-generation for lighting, water heating, and other small-scale uses of electricity.[20]

Morocco, Tunisia, Mauritania and Egypt have successfully been using off-grid solar systems for rural communities (Figure 11) while Libya and Yemen also report increased use of self-generation technology in response to conflict-induced service disruptions.[21] Jordan, Lebanon and Palestine have also seen rapid growth in self-generation in urban areas owing to fast-improving economies of solar PV panels for household use – in Jordan's case aided by direct government incentive schemes (see Box 4 for a case study of Jordan).

Figure 11. Arab countries with highest off-grid access rate (Tier 1 and above)



Source: IRENA (2019c)

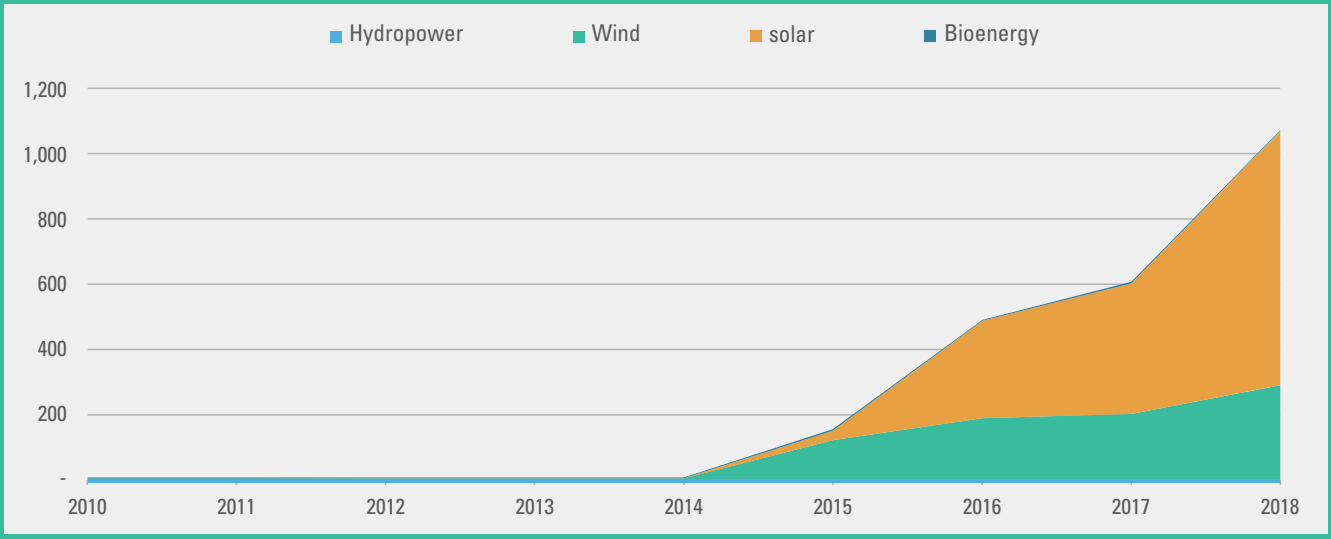
19 Warshay et al. (2016); IRENA et al. (2013); SBRC (2018).
20 IRENA (2019b).
21 UN ESCWA (2019c)

Box 4. Increasing use of distributed solar systems in Jordan

Jordan has seen rapid growth in distributed solar-energy consumption in recent years, turning the country into the Arab region's largest consumer of solar energy in 2016.[1] The fast adoption of solar technology by households and small businesses follows both general policy aimed at increasing the use of renewable energy in Jordan and specific legislation aimed at incentivizing private users to invest in self-generation technology. Jordan has created these incentives with the aim of diversifying its energy mix and reducing reliance on costly energy imports, which supply over 95% of its domestic energy needs. While more than 95% of Jordan's TFEC rests on fossil fuels, Jordan's

1 Data from SDG 7 data pot

Figure 12. Evolution of renewables-based electricity-generation capacity in Jordan (MW), 2010–2018



Source: IRENA (2019c)

electricity-generation capacity from renewable energy grew more than 200% per year over the tracking period 2014–2017, with further fast growth in 2017-2018.[2] Most of this growth has come on the back of increased solar power-generation capacity,[3] with distributed electricity systems contributing significantly.

In 2015, the Government launched the National Energy Strategy (NES) 2015-2025 under Jordan Vision 2025, which aims, inter alia, to raise the share of national energy consumption met from local energy supply from 2% to 40% by 2025, with an 11% renewable energy target for 2025.[4] The NES follows the 2012 Renewable Energy and Energy Efficiency Law (REEL), which opened up the market for private energy-generation linked to the national grid.[5]

In addition, Jordan introduced an electricity wheeling mechanism through a directive issued in 2015 pursuant to Article 7/B/3 and Article 9/B from the General Electricity Law No. 64 of 2002. This mechanism allows private users to install a renewable energy system, for the purpose, as well as selling surplus electricity to the grid. Jordan had previously launched the region's first feed in tariff) system in December 2012, which provides the basis for feed-in systems.[6]

Specifically, to support small-scale, rooftop electricity generation, Jordan introduced a series of measures aimed at incentivizing private solar and other renewables-based systems:

A net-metering scheme for self-generation using renewable energy systems. Jordan's 2012 Directive Governing the Sale of Electrical Energy Generated from Renewable Energy Systems related to Art. 10/B of REEL No. 13 allows consumers to install, use and connect renewable energy systems based on solar, wind, bio-energy, geothermal, and small hydro installations to the grid with fixed purchase prices for excess power.[7]

A tax-incentive regime. In order to make green technology financially more attractive, Jordan has, since 2013, exempted systems equipment for renewable energy sources and energy efficiency from customs duties and sales tax, with further legislation (By-law No. 13 of 2015) since 2015 reinforcing this decision.[8]

Compulsory solar water-heater installation. The same by-law (Art 10) has made it compulsory since 2013 to use SWH systems for buildings with an area of 250 m2 or more; apartments with an area of 150 m2 or more; offices with an area of 100 m2 or more, and in commercial buildings.[9]

2 CAGR calculated based on IRENA (2019c).
3 IRENA (2019c).
4 UN ESCWA (2018c).
5 UN ESCWA (2019c).
6 UN ESCWA (2019c).
7 UN ESCWA (2019c; 2018c).
8 UN ESCWA (2018c).
9 UN ESCWA (2018c).

In addition to private households, the Jordanian Government also opened small solar plants at the Syrian refugee camps of Zaatari and Azraq in 2017 that provide several tens of thousands of people with free and clean electricity.[10] According to the Ministry of Energy and Mineral Resources, the total installed capacity in operation in December 2018 was 360 MW from distributed solar systems (net-metering and wheeling).[11]

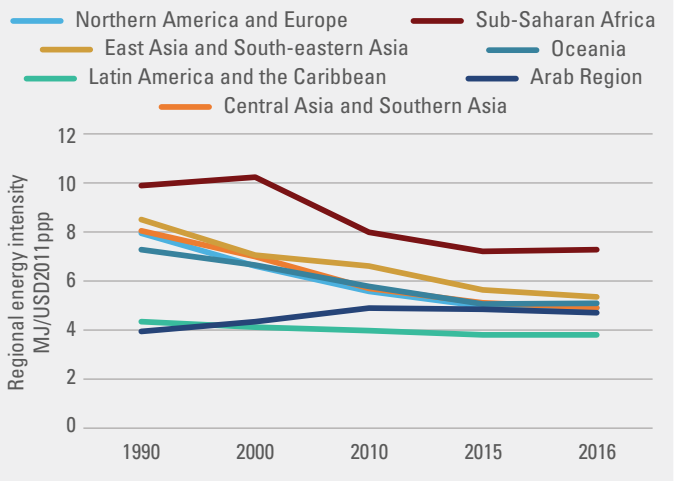
10 Taha (2018).
11 UN ESCWA (2019c).

Energy efficiency

The Arab region is not on track with global energy efficiency targets. Regional energy intensity rose during the 1990s—contrary to most other regions of the world — and has only started to decline slowly since the beginning of the 2010s. In 2016, aggregate regional energy intensity stood at around 4.7 MJ/USDPPP2011 , a decline of around 3% over the six-year period. The Arab region has the second lowest regional energy intensity rate in global comparison, largely an artefact of its fuel mix based on widespread efficient use of gas. Nonetheless, lacking progress in implementing energy efficiency as a strategic policy priority implies past modest decline in regional energy intensity rates stays far behind potential, and is not enough to help the region maximize the productive use of its energy resources.

Regional aggregate scores also conceal substantial cross-regional differences in energy intensity dynamics. Within the Arab region there is a clear distinction between the GCC countries where the aggregate average of the energy intensity peaked at

Figure 13. World regional energy intensity trends, 1990 - 2016



Source: IEA (2018), World Energy Balances; Energy Balances, UN Statistics Division (2018); World Bank, World Development Indicators

6.0 MJ/USD2011ppp in 2010 and moved to 5.5 MJ/USD2011ppp over the past six years, and the other three regions which have converged over the past 10 years to 3.9–4.1 MJ/USD2011ppp , below the Arab region average of 4.7 MJ/USD2011ppp. The Maghreb as a subregional aggregate has seen slightly rising rates of energy intensity since the 1990s, with a slight decline over the tracking period. Less extensive oil and gas resources have enabled exports and supported increasingly urbanized economies. Industrial productivity has increased and a shift to service-structure economies has been observed, albeit with a remaining important share of agriculture in Morocco and Tunisia in particular.

The Mashreq has seen a slight decline in energy intensity rates in recent years, albeit with individual country exceptions. Conflict and instability have had a strong influence on energy intensity in Iraq and Syria, as well as some of their neighbours. Arab LDCs have converged at energy intensities of around 4 MJ/USD. With Mauritania and Sudan being largely agrarian economies, industrial activity serves domestic or regional markets but is limited in exports. Both Sudan and Yemen struggle with geopolitical conflict and all three countries face numerous constraints in energy access and services—a key limitation to development and increasingly linked to provision of safe water and food.

Overall energy intensity in the GCC has been rising since the 1990s, albeit with a gradual decline in more recent years. Individual countries have driven the regional trend, with Kuwait, Oman, Saudi Arabia and United Arab Emirates undergoing long-term growth in their energy-intensity rates since the 1990s, although from lower starting points. Bahrain and Qatar's energy intensity is far above the rest of the GCC, though with a downward trend. GCC economies are characterized by their carbon-intensive extractive industries, often with global competitiveness and global export of indigenous oil and gas products, and services. Most have developed downstream value-added poducts

in derived petroleum products and metal processing. High levels of terrestrial water scarcity on the Arabian Peninsula have been driving significant investment in high-efficiency integrated power water systems. (see Box 5 on trends in energy efficiency policy).

There are some signs that economic activity is starting to decouple from energy use. Few countries in the region have continued their general trend to increasing energy use as they develop. Primary energy growth in the industrialized GCC countries started to stall, or slightly reverse from 2014 as less energy-intensive economic activities have been developed. This is probably due in part to the fall of global oil prices from a record annual average price in 2014 (Brent average annual prices: USD 98 in 2014, USD 53 in 2015, USD 45 in 2016), stimulating new economic and budget approaches in oil-exporting countries.

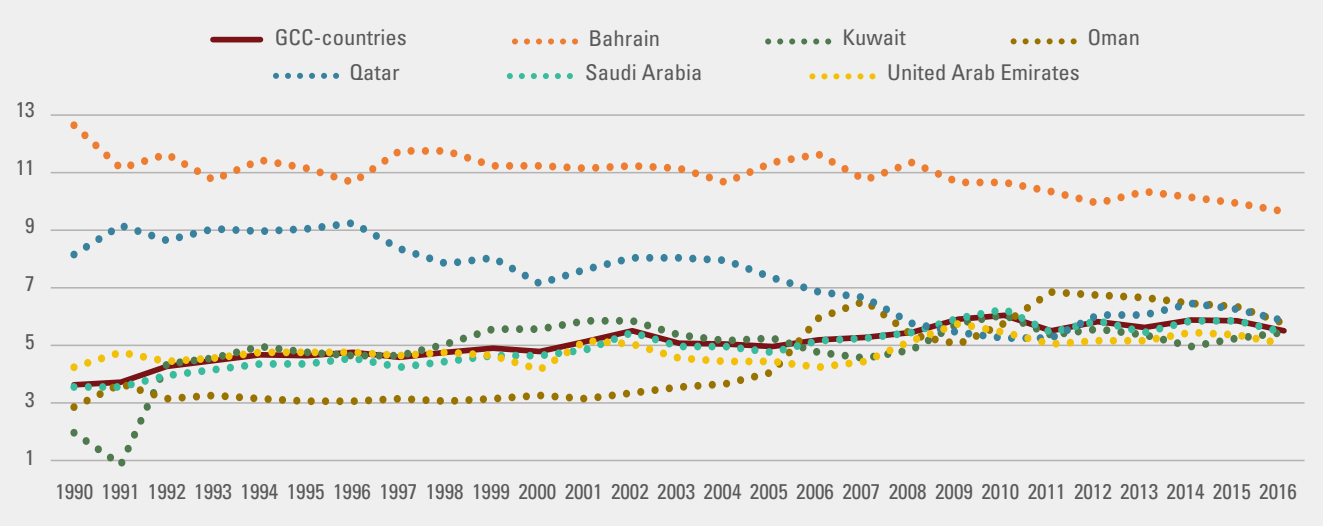
The progress for energy efficiency is often tentative. Most countries in the Arab region still need to transpose energy efficiency ambition and plans into largely implemented measures and measurable energy efficiency progress. Some substantive new policies have emerged, offering evidence that well-designed, implemented policies achieve results (see Box below). Arab countries that are starting to build implementation substance to their energy-efficiency policies will experience a lag as policies take some time to influence investment, operations and behaviour. Robust programmes of policies tend to embed consistent changes trends in energy use and increased value. Whether this change can be sustained remains to be seen, but countries with effective energy-efficiency policies do tend to generate consistent energy-intensity improvement trends that flow on to stall energy-use growth.

Box 5. Energy efficiency policies in the GCC countries

Countries such as Kuwait, Oman and the UAE have in recent years demonstrated considerable focus on energy-efficiency improvements throughout their economies and have been working on subsequent strategies. Saudi Arabia, the GCC's largest energy market, for instance has in recent years expanded its policies on energy efficiency significantly, including in areas such as standards for air-conditioning units, labelling for consumer appliances and fuel-economy standards for new personal vehicles.[1] Other GCC members such as Qatar and the United Arab Emirates engaged in energy-efficiency (EE) programmes, including substantial new initiatives (labelling and minimum energy performance standards (MEPS), EE financing programmes, among others).

In January 2014 the Saudi government confiscated 40,000 non-compliant air conditioners.[2] Since 2014, the United Arab Emirates Etihad energy service company (ESCO) funded 200 million dirham (AED) in 2,500 building energy

Figure 14. Energy intensity in Gulf Cooperation Council countries



Source: World Energy Balances IEA (2018); Energy Balances, UN Statistics Division (2018); World Bank, World Development Indicators

1 IEA (2015a), p. 199
2 ESA (2014).

efficiency retrofits (AED 180 million in 2016)[3] The per capita consumption of electric power in Qatar was 15,307 kWh per year in 2014. This consumption was reduced by 18% during the "Tarsheed" rationalization programme period (2012–2016).[4]

Qatar and the UAE both have also comprehensive national energy strategies integrated into their economic long-term plans. Qatar's National Development Strategy 2011–2016 towards Qatar National Vision 2030 covers controls and incentives for water and conservation "in place of today's fragmented system of laws and regulations",[5] including new, green building standards.[6] The challenge here is undoubtedly the rigidity of ensuing legislation and enforcement thereof. In the UAE, Abu Dhabi's Economic Vision 2030 and Dubai's Integrated Energy Strategy 2030 are dedicated plans that include demand-and-supply policies and focus on the development of sustainable ways of providing energy to the next generation. Abu Dhabi's Estedama scheme is one of the GCC's first systems of classifying buildings by their level of efficiency, with separate requirements for public and private new constructions.

Source: UN ESCWA (2017c), SDG7 Tracking Report 2019

3 DEWA (2019).
4 State of Qatar (2018).
5 General Secretariat for Development Planning (2011), p. 21.
6 General Secretariat for Development Planning (2011).

Conflict-affected countries' energy intensity levels are substantially higher than those of neighbouring countries, and fluctuate considerably over time. Iraq, Libya, Palestine and Syria experienced significant disturbances to their economic activities during the period under study, due to the ongoing geopolitical conflict in this region. Conflict-induced effects on energy intensity include damage to key energy infrastructure including power plants, T&D infrastructure, dams, and conflict-driven constraints to operation and maintenance. This also impacts the region, with neighbouring Lebanon and Jordan each handling large influxes of refugees.

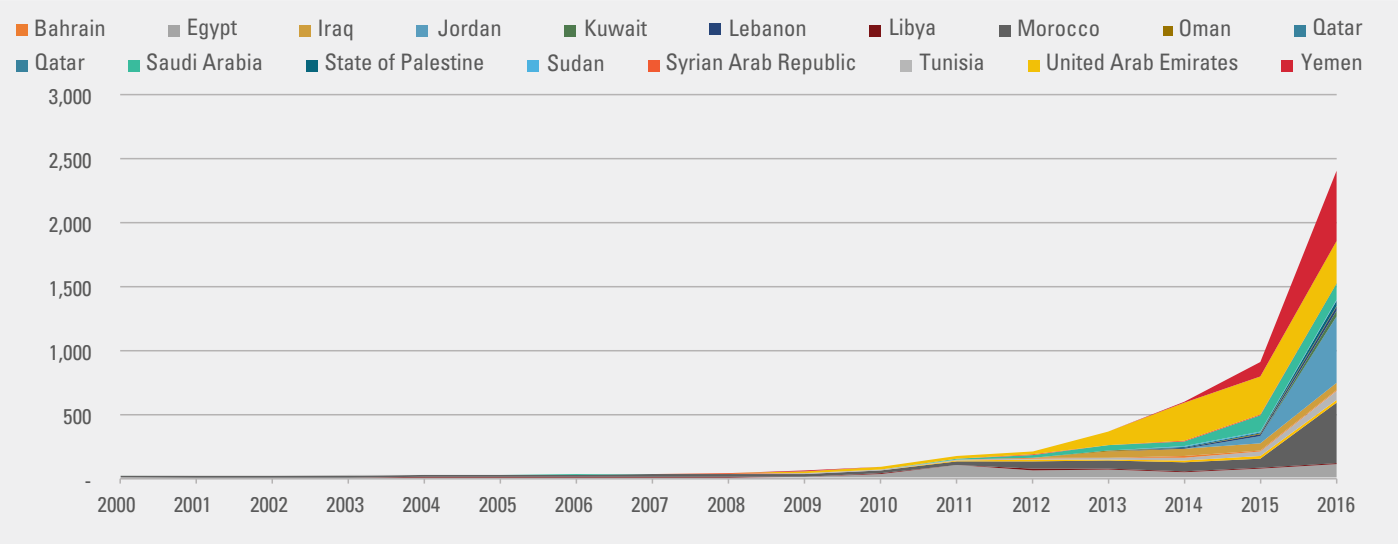
Agriculture and services have seen the deepest fall in energy intensity in the Arab region since 2010. By contrast, the industrial and residential sectors' energy intensity has slightly increased. These trends have been observed across all Arab countries, except for Egypt, Iraq, Morocco and Jordan who also had their industrial sector energy intensity improve. Most of the improvement in energy intensity is probably due to the changes in the economy structure, moving towards more energy productive activities.

Renewable energy announced targets, national policies, projects and upcoming capacities

The Arab region has historically been slow in deploying modern renewable energy such as wind and solar energy, and modern biomass use. The region's rich potential for solar energy, and in some country cases wind power, has in recent years gained encouraging prominence in a number of Arab countries' energy policy planning however.[22] Falling costs for renewable technologies that have rendered renewables increasingly cost-competitive vis-à-vis fossil fuels has considerably increased the relevance of renewable energy solutions to policy planning in a number of Arab countries. Individual, scene-setting utility-size projects in a number of Arab countries have been elemental in demonstrating the increasing cost-competitiveness of

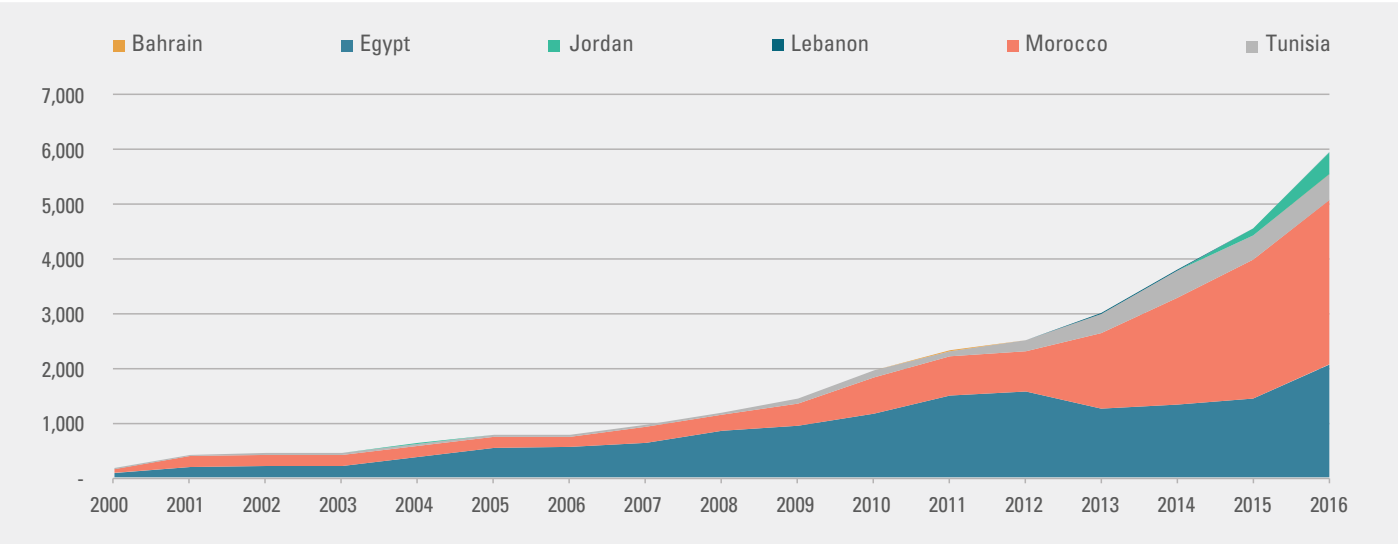
22 IRENA (2018); ESCWA Tracking SDG7 report.

Figure 15. Electricity generation from solar energy in the Arab region (GWh), 2000 - 2016



Source: IRENA (2018)

Figure 16. Electricity generation from wind energy in the Arab region (GWh), 2000 - 2016



Source: IRENA (2018)

wind and solar technologies (see discussion below). Added benefits that are seen increasingly valuable among governments in the region include contributions to national efforts to participate in global climate mitigation, and economic value creation through local job creation.[23]

Recent years have seen significant additions to renewable energy deployment and energy generation in the region, a development that has been mirrored by increased policy focus on the development of national targets for renewable energy enshrined in many recent national economic long-term strategies.[24] The largest supply additions between 2015 and 2017 have come online in Jordan, followed by Algeria, Morocco, Egypt and the UAE, with smaller additions in Mauritania, Saudi Arabia and Tunisia.[25] Much of this has been driven by a number of large-scale projects that have begun operations since the mid-2010s, but also some distributed uses of solar PV in countries like Jordan and Yemen (see Figure 15 and Figure 16).

23 IRENA (2019a) & other RE MENA texts.
24 IRENA (2016b); IRENA (2019a).
25 ESCWA Tracking SDG7 report.

Table 2. Renewable electricity generation capacity installed in the Arab region, 2017

	Wind	PV	CSP	Renewable Hydro	Other	Total Renewables	
	MW	MW	MW	MW	MW	MW	%
Algeria	10	400	25	228		663	3%
Bahrain	1	5				6	0.2%
Egypt	750	169	20	2851	67	3857	9%
Iraq		37		2274		2311	9%
Jordan	198	396		12	4	610	14%
Kuwait	10	31				41	0%
Lebanon	3	26		253	2	284	9%
Libya		5				5	0%
Mauritania	34	85		48		167	n/a
Morocco	1017	26	180	1306	1	2530	29%
Oman		8				8	0.1%
State of Palestine		35				35	23%
Qatar		5			38	43	0.4%
Saudi Arabia	3	89				92	0.2%
Sudan		13		1928	190	2131	60%
Syrian Arab Republic	1	1		1571	7	1580	16%
Tunisia	245	47		66		358	7%
United Arab Emirates	1	255	100		1	357	1%
Yemen		400				400	26%
Total	2273	2033	325	10537	310	15478	6%

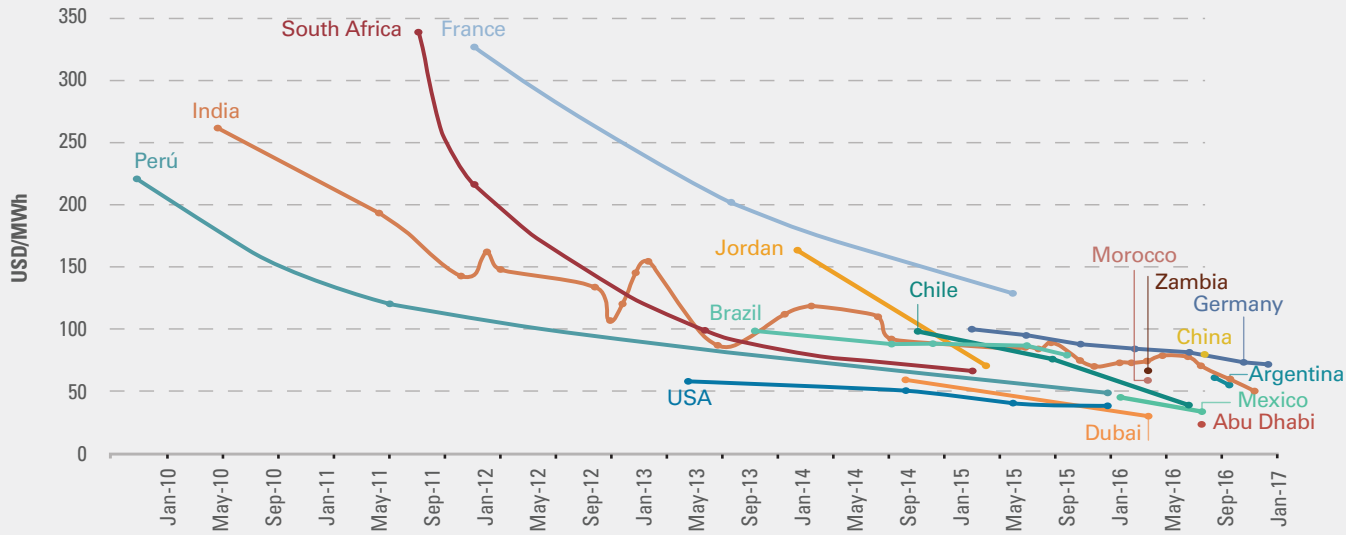
Source: IRENA (2019c), AUPTDE, Authors

The increased use of distributed solar PV applications in some Arab countries highlights the diverse way in which renewable energy can help Arab countries secure energy access. Yemen and the occupied Palestinian Territories – both affected by political conflict and limited central electricity generation capacity – have seen a surge in solar PV-based distributed generation in recent years, as have Jordan and Lebanon. This trend reflects the rapidly growing role of self-generation in providing households and businesses in countries where electricity from the national grid is either insecure or expensive, and where self-generation hence makes considerable financial sense. In the Palestinian territories, solar-powered self-generation of electricity is besides the economic imperative also an act to reduce dependence on imported Israeli electricity, and therefore Palestinian energy independence.[26] The Palestinian Energy Authority (PEA) published targets in 2012 to generate about 10% of total domestic electricity production and 5% of the total expected consumption using renewable energy sources by 2020.

Consecutive auctions rounds for utility-scale projects in the UAE and Saudi Arabia scored world record low price bids for solar PV and CSP technology in 2016, 2017 and 2018 have helped demonstrate the enormous economic potential of solar energy for large scale power generation. In both countries, solar PV is now cost-competitive with all other conventional fuels,

26 ESCWA seminar report.

Figure 17. Evolution of average auction prices for solar PV internationally, January 2010-February 2017



Notes: Prices are averages. On the rare occasion when multiple auctions occurred within the same month, the average price of those auctions is shown. In case of ambiguity regarding the auction's date, the date when the winning bids were selected and announced was taken as the main reference.

Sources: Based on data from BNEF (2016 a, b,c), ANEEL (2016), BnetzA (2017a), Bridge to India (2017a), Coordinador Eléctrico Nacional (2016), Eberhard and Kåberger (2016), Elizondo-Azuela, Barroso et al. (2014), IFC (2016), Mahapatra (2016 a,b), MINEM (2016a, b), MNRE (2010), MNRE (2012), Ola (2016), Osinergmin (2016), Santiago and Sinclair (2017a, b), Shahan (2016).

Source: IRENA (2017)

substantially strengthening their business case here and elsewhere in the region[27]. Morocco, Egypt, Tunisia and Jordan have also been investing separately into wind power, which owing to excellent local resources has helped generate low-cost electricity.[28 29] These increasingly compelling economic arguments in favour of renewable energy should help boost the role of renewable energy technologies in some regional countries' energy mix.

Most Arab countries by now have national renewable energy targets that reflect the growing importance of renewable energy technologies to national energy planning across the region. Increased cost-competitiveness, along with the increased value of renewable energy technologies in areas such as energy independence, natural resource management and climate policy has been reflected in ambitious renewable energy targets set by countries such as Egypt, Jordan, Morocco, Saudi Arabia and the UAE. For instance, the Egyptian government's Sustainable Energy Strategy to 2035 confirms the country's target stated in 2009 of 20% of Egypt's electricity generation from renewable sources by 2022, with more recent plans for renewable energy to contribute 42% of electricity generation by 2025.[30] Morocco plans to increase the share of renewables including hydro-power in its energy mix to 42% by 2020, then rising to 52% (around 10 GW) by 2030.[31] Endowed with some of the Arab regions best solar as well as excellent wind resources, Jordan launched its new National Green Growth Plan in early 2018, aiming to scale-up renewables to 10 percent of the total energy mix by 2020.[32]

Among the GCC countries, which were among the last Arab countries to open their markets to renewable energy, some have in recent years pushed ahead with ambitious renewable energy targets. The UAE, so far the GCC's most dynamic renewable energy sector, recently launched its first federal "Energy Strategy 2050" that aims to increase the share of clean energy in the country's electricity generation capacity to 50% by 2050.[33] IRENA in 2019 estimated potential capacity additions in the GCC, excluding most recent plans by Saudi Arabia, to amount to around 7 GW by the early 2020s.[34] In early 2019, Saudi Arabia separately announced ambitious plans for

27 IRENA (2019a).
28 APICORP (2018).
29 The National, 2 April 2017.
30 Bloomberg, 18 December 2017.
31 Le Matin, 28 February 2018.
32 Ministry of Water and Irrigation (2015).
33 UAE Government (2018).
34 IRENA (2019a).

60 GW of solar and wind generation capacity by 2030 in a bid to diversify its energy mix, which would make it one of the Arab region's largest producer of renewable energy-powered electricity.[35]

Key recommendations and policy advice

Increased deployment of utility-scale and distributed renewable energy projects, and electrification of market segments such as water heating, cooking and eventually transport should further boost the role of renewable energy in Arab countries over the coming decades. In Arab LDCs, development policies will be closely tied to progress in the area of electrification and household access to CFTs. Energy efficiency will play a key role in boosting the productivity of energy being used, ensuring limited resources are being utilised to their maximum potential rather than wasted. With the market opportunity for modern energy technologies growing each year, it will be down to Arab governments to offer the right enabling framework for the spread of sustainable energy solutions throughout their economies, empowering industries, the private sector and citizens to drive the Arab region's energy transition.

This is by far not an easy task, as many Arab countries also face institutional and financial constraints. Typically these constraints are compounded by the presence of significant socio-economic as well as environmental challenges, from social and economic equity and access to opportunities to the negative effect of climate change, which require careful policymaking able to reconcile seemingly competing priorities. Transitioning from past energy models in the Arab region entails a reconsideration of existing energy market structures, including long-lasting pricing structures and market incentives, and decision-making priorities and, in many cases, mindsets. In Arab LDCs, a core challenge remains closing the energy access gap to start with. Managing the dual goals of tangible short-term results and sustainable energy development in the long-term will hence become an ever-growing challenge for the region and its vastly different economies.

Formal politics in many countries by now acknowledge the importance of sustainable energy market management – from the provision to safe, clean and affordable energy to the need to the need for more effective demand side management, the implementation of energy efficiency measures, and the imperative to protect the climate and environment while safeguarding energy access. Yet, much of the necessary policy making, including supporting institutional capacity and frameworks, and effective laws to help implement ambitious targets remain in many cases in the making. These challenges are in many cases compounded by the absence of a popularized culture of natural resource conservation and environmental protection, and by the intrinsic politicization of policy discourse on energy-related matters.

Building institutional capacity

Ensuring sustainable energy becomes an integral part of Arab governments' policymaking beyond headline targets and green visions involves the profound rethinking of institutional setups and capacity building to support genuine national efforts. Designing and implementing effective sustainable energy policies presents special challenges because of the complexity and cross-cutting nature of energy policy. This challenge is compounded by existing institutional weaknesses, lack of adequately skilled staff, as well as institutional structures that have not traditionally evolved to accommodate one-stop national planning for matters related to energy access, energy efficiency, domestic energy supply side management and climate policies. The result are often ambitious national development targets that fail to be supported by sufficient market-oriented policies and, in some cases, by weak enforcement of existing law.

Arab countries differ significantly in their institutional setup, underlying human resources and the effectivity of national institutions. Both from regional, and international

35 Renewables Now (2019).

experience in best practice, a number of key elements can be identified that help national institutional capacity building to support progress in sustainable energy. These elements include:

- **Clear institutional mandates** that to ensure institutions can actually do the work they are tasked with, including collecting data, evaluating current policy, providing policy recommendations, implementing and monitoring policies and, where necessary, sanctioning non-compliance.

- **Institutional credibility**, through transparency, effective enforcement of policies as well as approachability of national institutions to citizen-level feedback and complaints. Many existing policies and regulations in Arab countries, in areas such as rural development, and building and appliance regulations for minimum efficiency standards for instance, suffer from lacking implementation and compliance.[36]

- **Professionalisation of public sector labour** force through skills-based recruitment and investment in human capacity through the education sector and in-house training. Many Arab labour markets and education systems still struggle with the effective management of human skills and resources as an asset, including job-specific training and human-resource management inside jobs that would fundamentally strengthen institutional capacity as a whole.[37]

- **Empowered local governing institutions**, that are able to implement and support localized projects such as rural electrification programmes, local rooftop solar-panel programmes, FITs, urban and rural public transport design, and general urban and rural infrastructure development.[38]

- **Effective inter-institutional communication** between government departments, but also between public institutions and the private sector, for instance in areas such as data collection, and consultation in the process of law-making.

Experience in the area of energy-subsidy reform in the region has demonstrated the central role played by credible institutions in determining the success or otherwise of relevant government reform across the Arab region.[39]

Integrating SDG 7 with other SDGs

One of the most obvious development goals that are closely interrelated with the sustainable energy action agenda is climate action (SDG 13). The Arab region is highly vulnerable to future effects of climate change. Characterized by its unique geography with some of the largest and harshest desert lands, the region has in the recent past experienced an intensification of already frequent droughts, and further reduced rainfall threatens further degradation and desertification. This threatens the livelihood of millions through the intense effect of climate change on the availability of arable land (SDG 15), drinking water (SDG 6), live in oceans (SDG 14), and the more frequent occurrence of extreme weather conditions and natural disasters.[40] These prospects are all the more concerning in a region in which freshwater scarcity, population growth, urbanization, conflict and changing migration patterns already place increased pressures on human settlements and ecosystems (SDGs 8, 9, 10, 11, 12).[41]

SDG 7 is also a critical enabler of progress across other SDGs. Building sustainable energy and water systems that empower all members of Arab societies to access health services and education (SDGs 3 and 4). In both cases, women and girls benefit in their own right (SDG 5), as they are often traditionally responsible for securing water and biomass for cooking and washing, which, in turn, affects their ability to attend school or engage in paid work (SDGs 5, 8, 10); while they are also disproportionally exposed to indoor air pollution from poor quality cooking fuels (SDG 3). Studies from Yemen illustrate this.[42] Increasing the efficiency of energy use across sectors and boosting the use of cleaner fuels such as renewable energy is integral to decoupling economic growth from environmental degradation (SDG 8) and ensuring sustainable consumption and production patterns (SDG 12).[43]

36 UN ESCWA (2017c).
37 UN ESCWA (2016).
38 UN ESCWA (2017c); IRENA (2016).
39 Inchauste and Victor (2017); Sdralevich et al. (2014)
40 UN ESCWA et al. (2017).
41 UN ESCWA et al. (2017).
42 E.g. World Bank (2005); Whitehead (2015); See also Clancy and Skutsch (undated); Ramani and Heijndermans (2003).
43 See also UN ESCWA (2017d).

Arab countries need to better integrate sustainable energy as a fundamental element of national development policies. This includes integrated energy sector management; directly linking policy goals across sectors such as energy, transport, and urban planning; as well as elevating topics such as natural resource management, air and environmental protection along with more inclusive ways to ensure energy is used and produced sustainably to matters of explicit national interest. For Arab LDCs, it is important that sustainable development goals become part of the countries' own socioeconomic development plans and are sound investments in social and economic development, not just additional cost burdens to government budgets.

Stand-alone solar-power systems also hold significant potential to help restore electricity access in conflict-affected countries. The State of Palestine and Yemen demonstrate the enormous market potential for solar self-generation, stand-alone systems that have proved to be cost-effective and practical in situations where central states are defunct and/or central grids are working with limited capacity. This is a most encouraging recent development, with substantial potential to help build more resilient societies and economies in conflict-torn countries in dire need to re-establish minimal public services and living conditions, and to reinvigorate basic business activity. Supporting the adoption of stand-alone solar-power systems in public buildings such as schools and medical facilities, in SMEs and households, should hence take priority in developing project financing and policy design aimed at restoring peace and stability in a number of Arab countries.

Offering effective market incentives

The Arab region consists of a diverse set of countries with different national contexts, including in the case of energy. Formulating appropriate policies and creating a wider business-friendly environment in which markets, rather than individual government-directed projects drive structural change is one of the most fundamental challenges of all Arab countries. This includes the right mix within each national context of positive incentives, and effective, enforceable regulation, for instance in the areas of clean energy and energy efficiency. Effective government policy minimizes the costs and maximises wider social and more immediate private benefits through cost savings to private energy users and the public, more competitive national industries and improved standards of living.

Missing regulatory frameworks that enforce an element of energy efficiency is a continuingly large disincentive factor in many Arab economies. Because current market incentives are often insufficient to promote energy efficiency, building institutional capacity to design and implement effective policies is fundamentally important to support national goals for progress in sustainable energy (see also discussion above). Individual Arab countries' progress in areas such as building and vehicle efficiency, labelling and information management, and an increasing range of initiatives around sustainable transport such as better public transport networks and alternative fuel vehicles all demonstrate that appropriate policies are effective in influencing consumer choice while saving money to both private users and public finances.

Energy price reform that has been progressing in the Arab region is likely to play an important enabling role for more sustainable energy consumption and production patterns. Lack of cost-reflective energy prices is a major disincentive to energy efficiency and distributed renewables (end-user applications, small-scale, grid-connected power stations). At the time of writing, energy subsidies remain a feature in many Arab energy markets for different user groups, although their size has been falling along with reform progress in some countries, coupled to fluctuating shadow prices on international markets.[44] At the same time, changing energy prices also entail many socio-economic challenges, including the protection of energy access by low and middle income households as well as businesses and industries. Integrating energy planning into wider socio-economic development planning will help governments design policies in an inclusive way, for instance by coupling energy price reform to improved other social safety nets, and the redirection of subsidies to investment in more energy efficient technologies.

In Arab LDCs, the promotion of improved cookstoves and access to electricity is itself a major step of progress not only toward a more sustainable use of energy, but toward a large range of socio-economic development goals that rest on access to modern energy.

Strengthening communication and access to information

Information and communication are critical enabling factors to progress in sustainable energy in the Arab region. Access to information plays a pivotal role in

44 IMF (2015); ESCWA, 2019.

government and business decisions to invest and favour one technology over another; for governments in designing appropriate policies; and for final consumers in decision-making that guides their own consumption behaviour and willingness to invest in new technology. Some key elements include:

- **Data and statistical information**, both quantitative and qualitative. Arab countries have large data deficits that are evident in a number of international initiatives that track international data, such as the Tracking Progress in SDG 7 initiative.[45] Governments, businesses, and society would benefit from improved data collection and transparency of data. This is a call for proactive efforts to improve governments' ability to collect, monitor and disseminate qualitative and quantitative data, social indicators, population and household-income statistics and survey material as much as consumption and production patterns of different types of energy, secure energy access and environmental indicators, including the protection of precious land and water resources, species protection and loss, urban and ambient air pollution, waste disposal, water usage and withdrawal, among others.

- **Strengthened capacity in research and development (R&D)**. In many Arab countries, national capacity for R&D and critical analysis to support government decisions and the private sector is not yet sufficiently available. The politicisation of data and information, and constraints to the freedom of media in many cases complicate effective national research and dissemination of information additionally.

- **Effective government communication**. Effective government communication and strategy-making include intragovernmental communication and coordination from the early stage of designing new policies, as well as clear communication with the public. At its most effective, government communication not only includes information, but also consultation that leads to more effective implementation of laws, and the improvement of existing legislation. Government communication can also include an effective, credible and accessible system of standardised labelling and publicly visible public product quality monitoring, helping consumers making informed decisions when buying products and technology.

Developing appropriate financial tools to ensure access

Cost remains the single most important obstacle to the widespread adoption of sustainable energy solutions, from energy efficiency to renewable energy and, in the case of Arab LDCs, energy access to begin with. Frequently, this is the case even though available technology solutions would result in net financial savings to households, businesses and the government in the medium- to long-term, in addition to a wide range of other benefits ranging from improved quality of life to prospects for wider economic growth, job creation, and environmental protection.

Arab financial markets – as elsewhere in the world – have in many cases not yet been able to offer sufficient, appropriate financial products to help consumers chose sustainable energy technology as an investment. Moreover, not all technologies are suitable for profit-making from credit, implying some financial assistance will need to be offered or supported by agencies other than banks, for instance in the case of electrification and the promotion of CFTs. The complexity of financing solutions to sustainable energy implies each country will need to explore own needs and financing options.

Channelling appropriate finance into sustainable energy requires dedicated efforts in the areas of development finance, and local financial products, banking finance development, and the provision of information to private users. The bankability of many sustainable energy projects will also depend on the availability of information, a reminder of the separate importance of improving data access and information in Arab countries. Arab LDCs in particular struggle with their goal of ensuring universal energy access and require assistance in this process. Developing affordable, scalable solutions that help local communities drive their own progress are pivotally important in helping universalize energy access.

Access to finance also remains a critical enabler of universal access to CFTs and increasing access to electricity in deficit countries. Cooking stoves, fuel and the majority of stand-alone electricity generators including solar systems and solar water heaters, are bought on a cash basis. For many low-income households, the substantial initial investment in new technology remains a financial challenge, rendering access to CFTs and electricity solutions in the absence

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of available microfinance unaffordable.[46] Market mechanisms that increase the amount of microfinance available to these users would provide an important tool to help step up access by those households which are currently unable to afford better technologies. This includes finance for the initial stand-alone electricity system (e.g. solar panels and their installation); the initial cost of connecting to a local mini-grid; or the initial cost of a cleaner stove.

Affordability of solar off-grid systems remains an issue for poor households, making effective policies to encourage access to credit facilities essential to increasing the uptake of distributed solutions. This means that, despite important progress in the use of off-grid systems in countries including Jordan, the State of Palestine and Yemen, markets still fail in making these technologies mass products accessible to low- and lower-middle income households.[47] Effective policy design to help markets deploy off-grid solar systems in greater numbers will need to include suitable financing mechanisms including at the micro-level and facilities that target households with no formal access to banking. National governments, as well as international lending bodies and development aid donors, can all engage in the provision of suitable financing tools, most critically in microfinance.

Finance for conventional energy systems needs to be re-directed to mobilize sustainable energy technologies. Both energy efficiency and renewable energy work best when implemented on the demand side along with electricity and water-conservation efforts. This is also important for those countries that need to re-build utility systems after conflicts, where utility policies need to enable new lower cost and more resilient power systems with distributed energy efficiency and renewable energy. Targeted development aid, loans and other forms of financial support by international financing bodies and bilateral sources can significantly help countries build sustainable infrastructure rather than focusing them on short-term solutions.

Enabling private finance through effective market regulation and the use of tools such as Super-ESCOs can be critical in helping countries mobilize resources but require institution-building and a credible regulatory and financial framework. Some countries have also opened the utility sector to private co-investors for new power and desalination projects, against the background of the region's longstanding history of public utility provision at subsidized cost. Public–private partnerships are also becoming an increasingly attractive solution for Arab countries aiming to do both – attract private finance for sustainable-energy projects, while retaining a public hand in energy projects.

Ongoing reform efforts across Arab countries of their domestic energy sectors, including energy price reform holds potential to redistribute government expenditure from universal energy subsidies to investments that support sustainable energy. Examples of alternative financing routes include subsidies for energy efficiency retrofits, new building insulation and industry retrofits; tax exemptions and other incentives for energy efficient and renewable energy technology; and, in countries with incomplete access to electricity and CFTs, connection subsidies and the distribution of subsidised, improved cooking stoves. Governments can also support the provision of financial products through public and private banks, for example by subsidising loan interest rates, and by encouraging banks to offer appropriate financing options including microfinance.

Strengthening civil societies

Civil society can play an important catalyst role for changing government regulations aimed at improving environmental sustainability and consumer welfare significantly. Largely non-existent in the Arab region, due to a combination of prohibitive legislation and lack of favourable political culture, civil society institutions such as consumer interest groups and environmental societies could form part of those driving the agenda behind gradual policy and regulatory change. This includes a mandate for consumer groups and the media to flag up issues of concern in the areas of transport, energy efficiency and the greater use of renewable energy, in addition to protection of the environment and a reduction of waste of water and general resources in the economy.

While many legislative decisions, such as changes to energy prices, are seemingly unpopular; upgraded efficiency legislation would likely find valuable supporters in civil society institutions that are able to communicate costs and benefits of the business-as-usual case to their constituencies far more credibly than government institutions. Using these channels more effectively requires considerable change in the way governments in the Arab region engage with their citizens, including personal freedom of speech and of

46 World Bank (2018a).
47 E.g. Huenteler et al. (2017).

the press and the depoliticization of criticism of existing policy practice, in particular in the areas of energy, the environment and natural resource use.

The wide range of socio-economic development experiences across the Arab region implies there cannot be a "silver bullet" solution that applies equally to each Arab country. Rather, this brief highlighted some of the avenues intervention whose application can be fostered and targeted around different countries' needs.

It is clear by now that the provision of sustainable, clean, modern and affordable energy is not a luxury consideration, but a fundamental prerequisite for socio-economic development across the Arab region. This is a call for policymakers, industries, businesses and civil societies to make sustainable energy part of the mainstream discourse about future growth and socio-human progress; and for more Arab champions who demonstrate the close interlink between sustainable energy and its arising economic opportunities.

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