Economic and Social Commission for Western Asia

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INSTITUTIONAL FRAMEWORKS FOR MANAGING SELECTED ENERGY SUBSECTORS IN ARAB COUNTRIES

Fact Sheet

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Economic and Social Commission for Western Asia

Institutional Frameworks for Managing Selected Energy Subsectors in Arab Countries

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Introduction

The outcome document of the 2012 United Nations Conference on Sustainable Development (Rio+20), The Future We Want, stresses the importance of providing sustainable modern energy services to meet basic human needs in developing countries, particularly for the poor. It highlights the need for Governments to adopt policies to foster investment in cleaner energy technologies, while expanding the share of renewable energy and applying energy efficiency measures. It also refers to the Secretary-General's Sustainable Energy for All initiative, which focuses on improving access to energy, boosting energy efficiency and increasing the use of renewable energies by 2030. These issues have also been reflected in the United Nations post-2015 development agenda. The resulting Sustainable Development Goals (SDGs) include a goal on ensuring "ensuring access to affordable, reliable, sustainable and modern energy for all", on which the Economic and Social Commission for Western Asia (ESCWA) is leading consultations in the Arab region.

Achieving the above-mentioned goals requires well structured institutions to help ensure sound energy management. Upon the request of the Arab Ministerial Council for Electricity of the League of Arab States, ESCWA conducted a survey on institutional frameworks for managing the power sector in the Arab countries.

This fact sheet aims to shed light on the institutional structure of selected energy subsectors, namely electricity, energy efficiency and renewable energy, the related policy and governance measures, and decision-making mechanisms in the Arab countries. It also looks at planning, efficiency and renewable energy issues, the degree of independence of regulatory bodies where they exist and State-sector reform. It reviews the main features of utilities implementing short-, medium- and long-term goals to secure energy needs; the matter of electrical interconnection, which is a key to regional cooperation and integration; and the work of regional and international energy bodies.

The fact sheet concludes with a set of outcomes, where possible suggesting mechanisms that would help States to improve their institutions.

Good governance of the electricity sector begins with the modernization of its institutional framework

1. Profile of the Institutions Responsible for Managing the Energy Sector

Algeria

Institutional structure of the electricity sector: The Ministry of Energy is responsible for the energy sector and mining. It plays the lead role in implementing energy and electricity policy, legislation and regulations, and directs institutional mechanisms for attracting investment. The Department of Electricity and Gas and the Department of New and Renewable Energy and Energy Efficiency operate under the Ministry. Several agencies are involved in decision-making, namely the Electricity and Gas Regulatory Commission (CREG), six electricity production companies and a distribution company, the Electricity Transmission Management Network (GRTE), which manages electricity transport infrastructure, and the electrical power system operator. A new company was formed in 2012 to promote the use of renewable energy in remote regions.

Institutional framework for energy efficiency: The National Agency for the Promotion and Rationalization of Energy Use (APRUE) was created in 1985 to implement the National Energy Efficiency Programme (PNME) and develop partnerships in the areas of energy efficiency and renewable energy. The National Energy Efficiency Fund (FNME) was established in 2000 to support the activities of APRUE and the Intersectoral Energy Management Council (CIME) was set up in 2005 as a consultative and a coordinating body of PNME.[1]

Institutional framework for renewable energy: The Renewable Energy Development Centre (CDER) is the main advisory body to the Government on the matter. It is involved in several renewable energy projects, developing capacity and transferring technology in partnership with international research institutes and companies. The Solar Equipment Development Unit works to promote the use of solar energy and tests solar energy equipment.

Electricity regulatory authority: CREG was established in 2002 as a competition and transparency regulator for the electricity sector.

Bahrain

Institutional structure of the electricity sector: The Ministry of Electricity and Water is responsible for planning, supervision and decision-making in the electricity and water sectors. The Electricity and Water Authority (EWA) is responsible for providing reliable and quality supply of electricity and water for sustainable development. The power sector has largely been privatized and 80 per cent of the country's electricity is provided by independent power producers (IPPs).

Institutional structure for energy efficiency: Energy efficiency matters are dealt with by the Electricity and Water Authority.[2]

Institutional framework for renewable energy: Renewable energy matters are dealt with by the Electricity and Water Authority.[3]

Electricity regulatory authority: There is no electricity regulatory authority.

Egypt

Institutional structure of the electricity sector: The Supreme Council of Energy (SCE), established in 1979 and reformed in 2006, is headed by the Prime Minister and plays an active role in national energy planning. The Ministry of Electricity and Renewable Energy is responsible for planning, policy, and electricity generation, transmission and distribution.

- The Egyptian Electricity Holding Company (EEHC), which was established in 1976 and transformed into a holding company in 2000, operates six production companies, a transmission company and nine distribution companies;

- The Hydropower Projects Execution Authority designs and builds hydroelectric power plants;

- The Nuclear Power Plants Authority has, to date, studied potential sites and plant types, and prepared tender documents, bidding and negotiation for construction of the country's first nuclear power plant;

- The Atomic Energy Authority conducts research into the peaceful application of atomic energy in areas such as medicine and agriculture, radiation technology and the control of radiation levels, regulatory procedures and training.

- The Nuclear Materials Authority has the task of looking at the processing and management of nuclear fuel materials.

Institutional framework for energy efficiency: A special unit[4] has been set up under the Cabinet to coordinate and implement energy efficiency policy and measures.

Institutional framework for renewable energy: The New and Renewable Energy Authority (NREA) was established in 1986 under the Ministry of Electricity and Renewable Energy to promote renewable energy technologies, in particular for the generation of electricity on a commercial scale. It certifies renewable energy products, performs energy efficiency tests on home appliances and implements projects, alone or in cooperation with other bodies, including other Governments and foreign authorities. The country aims to cover 20 per cent of its electricity needs with renewable energy sources, including 12 per cent through wind energy, by 2020.

Electricity regulatory authority: The Electric Utility and Consumer Protection Regulatory Agency (EgyptERA), established in 1997, issues licenses to build and manage infrastructure for electric power generation, transmission, distribution and sale. It regulates the electricity sector to ensure the provision of legally compliant and high quality electrical services; publishes information, reports and recommendations to make electricity companies and consumers aware of their rights and responsibilities; and investigates consumer complaints in order to protect their interests and settle disputes.

Iraq

Institutional structure of the electricity sector: Three main departments in the Ministry of Electricity report to the Minister: the Electric Energy Production Office, the Electric Energy Transmission Office and the Electric Energy Distribution Office. Five directorates are made up of separate divisions responsible for electricity generation, transmission, distribution and new projects. Those divisions are further subdivided by region or task. The electricity sector is a vertically integrated monopoly without independent regulation. The Ministry itself is responsible for policy, oversight and planning.[5]

Institutional framework for energy efficiency: Energy efficiency activities fall within the purview of the Ministry of Electricity. There is no legal framework for energy efficiency measures but voluntary reference specifications for buildings are used. There are no minimum energy performance standards for household appliances.

Institutional framework for renewable energy: In 2010, the Ministry of Electricity created a renewable energy and environment unit. The Ministry of Science and Technology runs a renewable energy research department. There is no legal provision for the private generation of renewable energy with the possibility of feeding surplus electricity to the grid.

Electricity regulatory authority: There is no electricity regulatory authority.

Jordan

Institutional structure of the electricity sector: The Ministry of Energy and Mineral Resources is responsible for energy policy.

Institutional framework for energy efficiency: The semi-public National Energy Research Center was established in 2000 to promote energy efficiency.

Institutional framework for renewable energy: The Ministry of Energy and Mineral Resources and National Energy Research Council have the task of developing renewable energy technology, and the Ministry of Planning and International Cooperation is responsible for securing external technical assistance.

Electricity regulatory authority: The Energy and Minerals Regulatory Commission (http://erc.gov.jo) has a legal personality with financial and administrative independence. It acts as the legal successor of the Electricity Regulatory Commission, Jordan Nuclear Regulatory Commission and Natural Resources Authority, in accordance with Act No. 17/2014 on restructuring institutions and governmental organizations.

Kuwait

Institutional structure of the electricity sector: The Ministry of Electricity and Water (www.mew.gov.kw) manages all aspects of electricity and water supply, including electricity transmission and distribution and the operation and maintenance of power plants, and the relevant planning. The Ministry is also responsible for training and project implementation.

Institutional framework for energy efficiency: The Ministry and the Kuwait National Petroleum Company work together on the energy efficiency strategy. The Kuwait Institute for Scientific Research is responsible for implementing the national energy efficiency technologies programme through its Energy and Building Research Center.

Institutional framework for renewable energy: Renewable energy projects are carried out by research institutions and national universities.

Electricity regulatory authority: The Ministry of Electricity and Water is the central regulatory body for water and electricity supply.

Lebanon

Institutional structure of the electricity sector: The Ministry of Energy and Water directs policy, supervises compliance with laws and regulations, and is responsible for developing and implementing energy projects. Local authorities enforce laws adopted by the Council of Ministers. Electricity of Lebanon (EDL), a public company, is responsible for the generation, transmission and distribution of electricity. Hydroelectric power plants owned by the Litani River Authority, concessions for hydroelectric power plants such as Nahr Ibrahim and Al Bared, and distribution concessions in Zahle, Jbeil, Aley and Bhamdoun also contribute.[6]

Institutional framework for energy efficiency: The Lebanese Center for Energy Conservation (LCEC, www.lcecp.org.lb), established in 2002 in a joint project by the Ministry of Energy and Water and the United Nations Development Programme (UNDP), addresses end-use energy conservation.

Institutional framework for renewable energy: LCEC, working under the Ministry, plays the lead role in developing renewable energy.

Electricity regulatory authority: Law 462 of 2002 provides for the establishment of an electricity regulator, but to date that provision has not been acted upon.[7]

Libya

Institutional structure of the electricity sector: The Ministry of Electricity was set up by the transitional Government. It is unclear whether the Energy Council, which before the revolution directed energy policy and strategy, is still functioning. The General Electricity Company of Libya is the State-owned company responsible for electricity generation, transmission and distribution.[8]

Institutional framework for energy efficiency: There is no clear assignment of responsibility for energy efficiency matters.

Institutional framework for renewable energy: The Renewable Energy Authority of Libya (REAOL), linked to the Ministry of Electricity, was set up in 2007 as a management, research and planning agency. Its target is for renewables to account for 10 per cent of the energy mix by 2020. The Centre for Solar Energy Research and Studies conducts research on solar and wind power.

Electricity regulatory authority: The Energy Council was responsible for regulating the sector prior to the uprisings.

Morocco

Institutional structure of the electricity sector: The Ministry of Energy, Mining, Water and the Environment (MEMEE) is responsible for ensuring national energy security. The Directorate for Electricity and Renewable Energy has divisions for electrical equipment and rural electrification, distribution and electricity markets, renewable energy and nuclear safety.[9] The National Office of Electricity and Drinking Water is responsible for electricity distribution where there is no private concession. It manages its own power stations and is the only buyer of electricity from IPPs.

Institutional framework for energy efficiency: The National Agency for the Development of Renewable Energy and Energy Efficiency (ADEREE) was set up in 2009 to implement the national energy efficiency programme.

Institutional framework for renewable energy: Under its National Programme for the Development of Renewable Energy and Energy Efficiency, Morocco aims to boost the share of renewable energy to 20 per cent of national electricity supply and 42 per cent of total installed capacity.[10]

- ADEREE aims to develop the use of renewable energy, establish training and consultancy services, raise awareness, and develop certification and monitoring of renewable energy projects.

- The Moroccan Solar and Wind Energy Association (AMISOLE) was founded in 1987 as an umbrella organization representing the interests of 40 companies and individuals working with renewable energy.

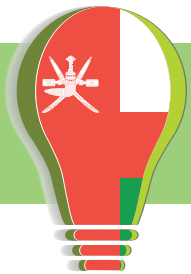
- The Moroccan Solar Energy Agency (MASEN) was established in 2009 and is the leading body involved in efforts to achieve 2000 megawatts (MW) in solar energy capacity by 2020.[11]

- The Energy Investment Company (SIE) was established in 2009 to fund renewable energy and energy efficiency projects.

- The Solar and New Energy Research Institute (IRESEN) was set up in 2011 to conduct and assess research projects.

Electricity regulatory authority: There is no agency for electricity regulation.

Oman



Institutional structure of the electricity sector: The Ministry for Electricity and Water is responsible for planning and supervision of the water and electricity sectors. Companies are regulated by the Authority for Electricity Regulation pursuant to the Sector Law promulgated by Royal Decree 78/2004. The main licence-holding company runs nine generation/desalination companies, one power and water procurement company, three transmission/dispatch companies and five distribution/supply companies. In addition, 13 licensed electricity companies, 11 licence-exempt companies and the Ministry of Defence are engaged in generation and distribution activities.

Institutional framework for energy efficiency: There is no energy efficiency authority.

Institutional framework for renewable energy: The Public Authority for Electricity and Water establishes policies to promote renewable energy technologies.

Electricity regulatory authority: The Authority for Electricity Regulation is responsible for ensuring that licensees and exemption-holders comply with sector codes and regulations.

Palestine

Institutional structure of the electricity sector: The Palestinian Energy Authority (PEA) was established in 1994 as an independent institution responsible for policy formulation, system development, generation, transmission, distribution, rural electrification, regional interconnection, energy conservation and non-commercial research. The Palestine Power Generating Company (PPGC) is a public company under the laws of Palestine with a remit to satisfy electricity needs in the West Bank.

Institutional framework for energy efficiency: The Palestinian Energy and Environment Research Center (PEC) was established in 1993 as the main energy efficiency research and development institution. It was affiliated to PEA in 2007.

Institutional framework for renewable energy: PEC is also responsible for renewable energy initiatives.

Electricity regulatory authority: The Palestinian Electricity Regulatory Council (PERC), established in 2010, sets tariffs, regulates the sector and reports to PEA.

Qatar

Institutional structure of the electricity sector: The Ministry of Energy and Industry carries out planning and follow-up in the electricity and water sectors, as well as sustainable energy projects. The Qatar General Electricity and Water Corporation (Kahramaa) is responsible for electricity generation, transmission and distribution. In partnership with international and national firms, it installs and operates electrical power plants.

Institutional framework for energy efficiency: Kahramaa, Qatar Petroleum and the Qatar Foundation are working together to establish an energy efficiency road map, implement related projects, raise awareness and build capacity.

Institutional framework for renewable energy: Kahramaa has a renewable energy unit and Qatar Petroleum is also working in that field. The Qatar Environment and Energy Research Institute (QEERI) was launched in 2011 to assess and develop solutions for critical energy and environmental challenges. Energy City Qatar incorporates solar energy in its development programme.

Electricity regulatory authority: There is no designated regulatory body.

Saudi Arabia

Institutional structure of the electricity sector: The Ministry of Water and Electricity is responsible for planning and has carried out several major projects. The Saudi Electricity Company incorporates 10 electrical companies and runs public electricity projects. In 2001, an electrical services organization was set up to ensure reliable provision of electricity.

Institutional framework for energy efficiency: A national energy conservation programme was set up at the Energy Research Institute of the King Abdulaziz City for Science and Technology (KACST). In 2010, the programme became the Saudi Energy Efficiency Center in 2010.

Institutional framework for renewable energy: The Energy Research Institute, the Center of Research Excellence in Renewable Energy at the King Fahd University of Petroleum and Minerals, and King Abdullah City for Atomic and Renewable Energy (KACARE) conduct research into renewable energy technologies in coordination with the relevant authorities, including the Ministry of Water and Electricity.

Electricity regulatory authority: The Electricity and Cogeneration Regulatory Authority (ECRA) is financially and administratively independent. It regulates the electricity and water desalination industry to ensure the provision of high quality services at reasonable prices.

Sudan

Institutional structure of the electricity sector: The Ministry of Water Resources and Electricity runs energy policy and conducts energy and environmental studies. The National Electricity Corporation (NEC) is responsible for electricity generation, transmission and distribution.[12] Regions not covered by the utility's grid rely on small, privately owned, diesel-fired generators. NEC transmits electricity through two interconnected grids, the Blue Nile Grid and Western Grid, which cover only a small portion of the country.

Institutional framework for energy efficiency: There is no energy efficiency authority or legal framework for related measures.[13] Responsibility for promoting energy efficiency lies with the government-run Electricity Regulatory Authority (ERA). There are no mandatory energy efficiency regulations for buildings or minimum energy performance standards for household appliances.

Institutional framework for renewable energy: The Renewable Energy Directorate of the Ministry of Water Resources and Electricity is responsible for promoting related technologies.[14] Energy efficiency and renewable energy research and projects are coordinated by the Ministry of Science and Technology. The Energy Research Institute and the Forestry Research Institute are working on biomass energy technologies.

Electricity regulatory authority: ERA oversees electricity production, transmission, distribution and consumption and works as an independent interface between electricity producers and consumers.[15]

Syrian Arab Republic

Institutional structure of the electricity sector: The Ministry of Electricity sets policy in the sector, including with regard to tariffs and reform.[16] The two main generating and distribution companies controlled by the Ministry are the Public Establishment for Electricity Generation and Transmission (PEEGT) and Public Establishment for Distribution and Exploitation of Electrical Energy (PEDEEE).[17]

Institutional framework for energy efficiency: In 2003, the National Energy Research Centre (NERC) was established to meet energy security objectives by obliging major energy users (industrial or commercial) to reduce consumption and promoting performance-based energy efficiency contracts.

Institutional framework for renewable energy: NERC also promotes the use of renewable energy. A number of government bodies have carried out renewable energy projects.[18]

Electricity regulatory authority: There is no regulatory body.

Tunisia

Institutional structure of the electricity sector: Under the Ministry of Industry, Energy and Mining, the Directorate-General of Energy is responsible for infrastructure planning and implementing national energy policy. Within the Ministry, there is a department of electricity, gas and energy efficiency to coordinate energy policy. The Ministry supervises the Tunisian Company for Electricity and Gas (STEG), which takes care of power generation and the transport and distribution of electricity and gas.[19]

Institutional framework for energy efficiency: The National Agency for Energy Conservation (ANME) was established in 2004 to design and implement national energy conservation programmes and the legal and regulatory framework for energy conservation and efficiency. It manages the National Energy Conservation Fund (FNME), and hence financial incentives for sustainable energy use, and works to encourage investment in the energy sector.

Institutional framework for renewable energy: ANME also conducts activities related to renewable energy.

Electricity regulatory authority: The Directorate-General of Energy regulates the sector.

United Arab Emirates

Institutional structure of the electricity sector: The Ministry of Energy is responsible for the sustainable development of petroleum, mineral and water resources and electricity. There are four power authorities: the Abu Dhabi Water and Electricity Company (ADWEC); the Dubai Electricity and Water Authority (DEWA); the Sharjah Electricity and Water Authority (SEWA); and the Federal Electricity and Water Authority (FEWA), which covers the four northern emirates of Ajman, Umm al-Qaiwain, Fujairah and Ras al-Khaimah. The electricity sector runs on a single-buyer model and all generators sell their output to ADWEC, which sells on to the distribution companies. The Electricity Transmission Company (TRANSCO) transmits electricity to distribution networks run by two companies (Al Ain Distribution Company and Abu Dhabi Distribution Company) that supply electricity to end customers. The Federal Authority for Nuclear Regulation (FANR) is an independent entity charged with overseeing regulation of the nuclear energy sector. The Emirates Nuclear Energy Corporation (ENEC) was set up by the Nuclear Energy Program Implementation Organization (NEPIO).

Institutional framework for energy efficiency: There is no energy efficiency body.

Institutional framework for renewable energy: The United Arab Emirates are investing in renewable energy technology, notably through the Masdar initiative. Masdar is a subsidiary of Abu Dhabi's State-owned Mubadala Development Company and is focused on becoming a leader in the development of renewable energy.

Electricity regulatory authority: The Regulation and Supervision Bureau is the independent regulatory body for the water, wastewater and electricity sectors in Abu Dhabi.

Yemen

Institutional structure of the electricity sector: The electricity sector in Yemen is supervised by the Ministry of Electricity and Energy and managed by the Public Electricity Corporation (PEC), which takes care of electricity generation, transmission and distribution, and by the Rural Electrification Authority (REA). Their tasks are set forth in legislation on electricity supply passed in 2009, under the provisions of which a council headed by the Minister for Electricity has been established with a coordinating role. Most electricity generation capacity is State-owned; the rest is operated mainly by a British company that sells electricity at high prices to PEC.

Institutional framework for energy efficiency: Energy efficiency matters are handled by the Renewable Energy Department in the Ministry of Electricity and Energy.[20]

Institutional framework for renewable energy: The Renewable Energy Department was established in 2002 to promote and support renewable energy projects.[21] In 2009, it was expanded and reorganized into separate departments for solar and wind energy. The population of Yemen is largely decentralized, ruling out central power grids to cover the whole country but making for an appropriate environment in which to introduce small-scale renewable energy applications, energy efficiency measures and a home-appliance labelling system.

Electricity regulatory authority: Although provided for in legislation passed in 2009, there is no independent electricity regulatory authority. A management committee for such a body was designated but has yet to begin work.

2. Regional Entities
(Ranked in ascending order of the year in which they were established)

Maghreb Electricity Committee

In 1974, Algeria, Libya, Mauritania, Morocco and Tunisia agreed to establish the Maghreb Electricity Committee (*Comité Maghrebin de l'Eléctricité*, COMELEC), which includes State-owned electricity companies in the five Maghreb countries. In 1989, it was decided that COMELEC should coordinate efforts to build an interconnected power system in the Maghreb countries.

Arab Union of Electricity

The Arab Union of Electricity (AUE) was established in 1987 by a group of Arab electrical companies in order to improve power production, develop the electricity sector in the Arab region and coordinate the activities of member countries. The Union is based in Amman and has 19 member countries: Algeria, Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Oman, Palestine, Mauritania, Morocco, Qatar, Saudi Arabia, the Syrian Arab Republic, the Sudan, Tunisia, the United Arab Emirates and Yemen.

Mediterranean Energy Observatory

The Mediterranean Energy Observatory (*Observatoire Méditerranéen de l'Energie,* OME) is a non-profit association created in 1988. It consists of 32 leading Mediterranean energy companies from 14 countries, including Egypt and Lebanon. Located in Nanterre, France, it aims to enhance cooperation between major energy companies in the Mediterranean region.

Mediterranean Electricity Network

The Mediterranean Electricity Network (MEDELEC) was founded in 1992 to bring together electricity associations in the Mediterranean basin for dialogue, reflection and regional coordination.

Arab Ministerial Council of Electricity

The Arab Ministerial Council for Electricity (AMCE) was established in 1994 under the League of Arab States. It has an expert technical committee for electricity and another for renewable energy and energy efficiency. ESCWA has observer status in AMCE.

ESCWA Committee on Energy

The ESCWA Committee on Energy was established in 1995. It is composed of official energy specialists from ESCWA member States. Its main tasks are: priority setting and medium-term planning in the field of energy; monitoring progress in member States; and following-up on international and regional conferences.

Gulf Cooperation Council Interconnection Authority

The GCC Interconnection Authority (GCCIA) is a joint stock company based in Dammam, Saudi Arabia. The dispatch centre is also in Saudi Arabia. The project links the transmission networks of six Gulf States in a unified grid via overhead lines and submarine cables.

Mediterranean Energy Regulators

Mediterranean Energy Regulators (MedReg) is an association of energy regulators established in 2007 with 24 member countries including: Algeria, Egypt, Jordan, Libya, Morocco, Palestine and Tunisia. MedReg promotes a transparent and harmonized regulatory framework in the Mediterranean, market integration and infrastructure investments, consumer protection and enhanced energy cooperation. Its ultimate objective is the creation of a

Mediterranean energy community based on a bottom-up approach. The institution is supported by the European Commission and the Council of European Energy Regulators (CEER).

Regional Center for Renewable Energy and Energy Efficiency

The Regional Center for Renewable Energy and Energy Efficiency (RCREEE) is an independent regional think tank based in Cairo that promotes renewable energy sources and energy efficiency. It disseminates policy recommendations and provides a regional platform for exchange on policy and technological questions. The center was set up in 2008 on the basis of the Cairo Declaration and today has 16 member States (13 of which are member States of ESCWA): Algeria, Bahrain, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Palestine, the Sudan, the Syrian Arab Republic, Tunisia and Yemen.

International Renewable Energy Agency

The founding of the International Renewable Energy Agency (IRENA) in Bonn, Germany, in 2009 is considered a milestone on the road to acceptance of renewable energy. At the founding conference, 75 States signed the Agency's statute. Its mission is to promote the adoption and sustainable use of all forms of renewable energy. Member States pledge to increase the use of renewable energy in their national programmes and to promote, domestically and through international cooperation, the transition to a sustainable and secure energy supply. IRENA aims to become the leading international centre of excellence for renewable energy. Its headquarters are in Abu Dhabi; affiliated offices for innovation and liaison are in Bonn.

Connecting Arab electrical grids and establishing a regional control centre are two prerequisites for a common Arab electricity market

3. Electrical Interconnections

Interconnecting the electric power grids of Arab countries has many advantages. Because peak consumption periods differ from one country to another, loads exchange obviates the need to build more power plants and lowers operating costs by reducing the need for standby capacity to meet fluctuations in demand. With interconnected grids, new generating projects can be erected in the most economically attractive sites and the level of pollution in the region can be lowered. Figure I shows various grid interconnection links in the Arab region.

Projects to interconnect the Egyptian grid with those of Saudi Arabia and the Sudan are respectively in the tendering and feasibility study phases.

Interconnection infrastructure in some areas requires upgrading. While various national power networks are interconnected, the region as a whole is not. Table 1 provides an overview of existing and planned interconnection projects.

Figure I(a). Eight-country interconnection project

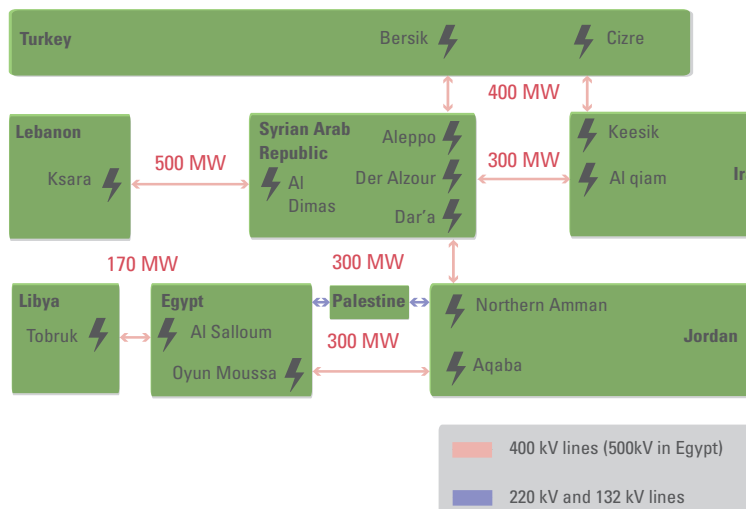
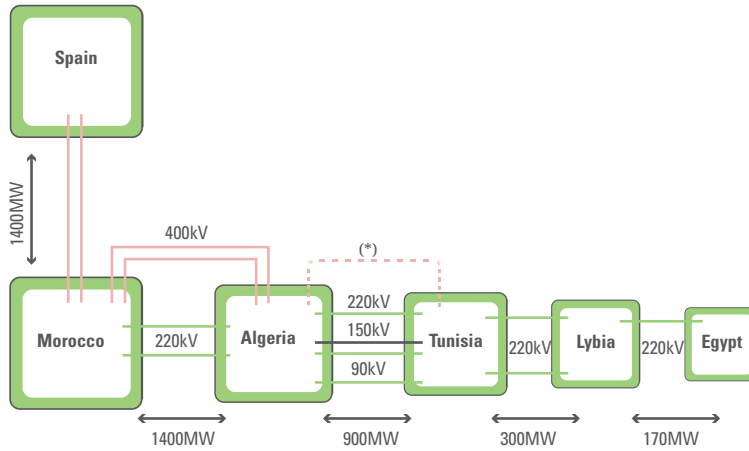
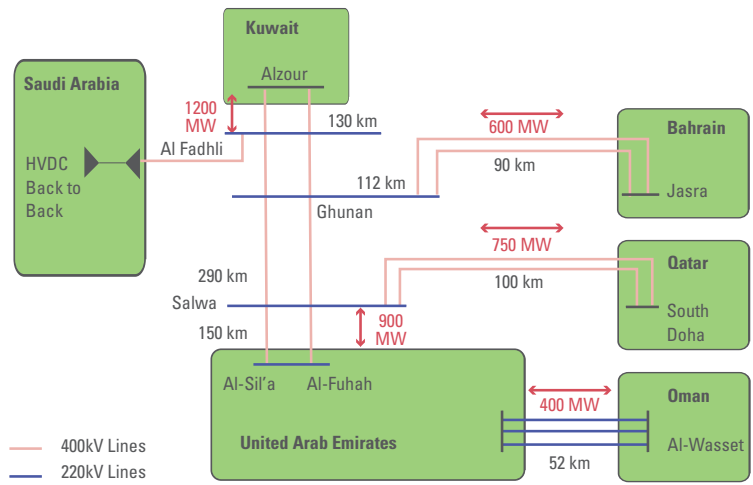


Figure I(b). Maghreb interconnection



(*) 400kV line working now on 225kV

Figure I(c). Gcc interconnection



Abbreviations: HVDC, high-voltage direct current; kV, kilovolts; km, kilometre; MW, megawatts; UAE, United Arab Emirates.

Source: Arab Fund for Economic and Social Development. Available from www.arabfund.org/default.aspx?pageId=454.

The recent joint Study on the Arab Electricity Integration Institutional and Regulatory Framework produced by the League of Arab States and the World Bank[22] highlighted that, although electrical interconnections exist, trade among Arab countries has been minimal at less than 2 per cent of capacity. It is estimated that demand for electricity in Arab countries will increase by 84 per cent by 2020. That would require an additional 135 gigawatts (GW) of generating capacity (or around 102 GW with regional integration) and infrastructure investment of around 450 billion United States dollars. The study proposed a long-term objective of harmonizing development of national and subregional markets during a multi-year transition period and promoting regional electricity integration in order to ensure that supplies are sustainable, reliable and secure, and to foster competition.

The Pan-Arab Interconnection and Energy Trade Study, financed by the Arab Fund for Economic and Social Development, was completed in 2014 with a view to assessing the best electrical and natural gas trade scenario for Arab countries in order to minimize the total cost of electricity generation during the period 2012-2030.[23]

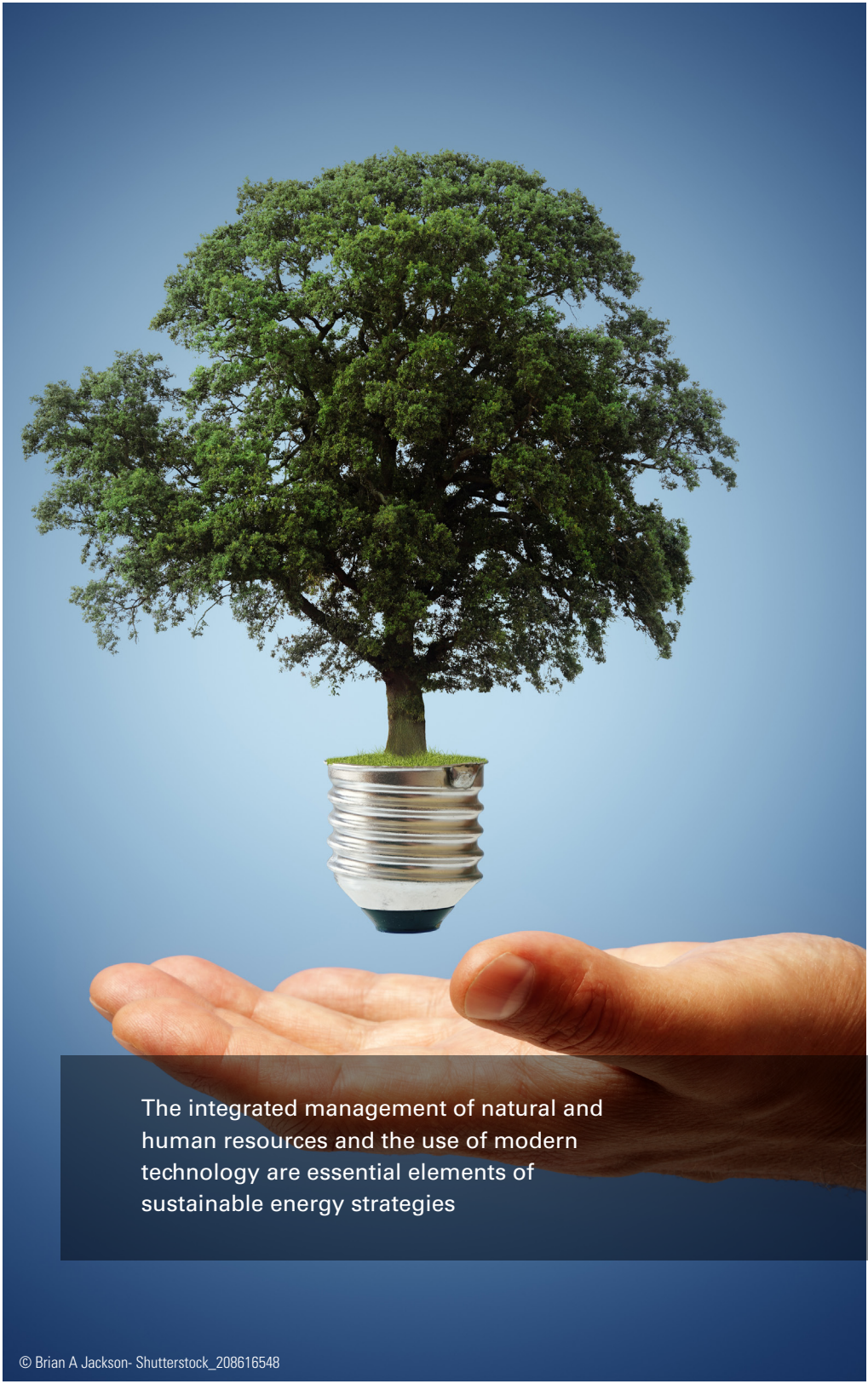
Table 1. Overview of interconnections between Arab countries

Country	Linked country	Existing interconnector (status)	Planned
Algeria	Tunisia Morocco	90 kV, 150 kV, 220 kV (operational) 400 kV, ready since 2008 on Algerian side 225 kV, 400 kV (operational), both within Maghreb countries interconnection project	Tunisia: Upgrade the existing 225 kV line to 400 kV Algeria: 400 kV (feasibility study ready)
Bahrain	Saudi Arabia	400 kV (operational) Saudi Arabia connected to Kuwait, Qatar and the United Arab Emirates The United Arab Emirates are connected to Oman on 220 kV	-
Egypt	Jordan, Libya, Palestine	400 kV (operational) 220 kV (operational) Feeder line	Saudi Arabia: 500 kV, (tendering phase) Sudan: 220 kV (feasibility study phase)

Country	Linked country	Existing interconnector (status)	Planned
Iraq	Syrian Arab Republic Turkey	400 kV, ready on Iraqi side since 2010 400 kV (operational in remote areas of Iraq) Part of the eight-country interconnection project	Turkey: 400 kV (tendering phase)
Jordan	Egypt Syrian Arab Republic	400 kV (operational) 230 kV, 400 kV (operational) Part of the eight-country interconnection project	Palestine
Kuwait	Saudi Arabia	400 kV (operational), Saudi Arabia connected to Bahrain, Qatar and the United Arab Emirates The United Arab Emirates are connected to Oman on 220 kV	-
Lebanon	Syrian Arab Republic	400 kV (operational, part of the eight-country interconnection project)	-
Libya	Egypt Tunisia	220 kV (operational) 220 kV (not working due to technical issues)	Algeria: 400 kV (feasibility study ready)
Morocco	Algeria Spain	225 kV, 400 kV (operational) 400 kV (operational)	Spain: 400 kV (feasibility study ongoing)
Oman	United Arab Emirates	220 kV (operational), the United Arab Emirates are connected to other GCC countries (Saudi Arabia, Kuwait, Bahrain, and Qatar) on 400 kV	-
Palestine	Egypt	Supply by feeder line	Jordan
Qatar	Saudi Arabia	400 kV (operational), Saudi Arabia connected to Kuwait, Bahrain and the United Arab Emirates The United Arab Emirates are connected to Oman on 220 kV	-

Country	Linked country	Existing interconnector (status)	Planned
Saudi arabia	Bahrain Kuwait Qatar United Arab Emirates	400 kV (operational) 400 kV (operational) 400 kV (operational) 400 kV (operational, the United Arab Emirates are connected to Oman on 220 kV) Part of GCC interconnection project	Egypt: 500 kV (tendering phase) Yemen
Sudan	-	-	Egypt: 220 or 500 kV (feasibility study)
Syrian arab republic	Lebanon Jordan Turkey	400 kV (operational) 230 kV, 400 kV (operational) 400 kV (operational) Part of the eight-country interconnection project	Iraq: 400 kV
Tunisia	Algeria Libya	90 kV, 150 kV, 220 kV (operational) 400 kV, ready since 2008 on Algerian side 220 kV (not working due to technical issues)	Algeria: Upgrade the existing 225 kV line to 400 kV
United arab emirates	Saudi Arabia Oman	400 kV (operational) 220 kV (operational) Part of the GCC interconnection: Saudi Arabia connected to Bahrain, Qatar and Kuwait.	None
Yemen			Saudi Arabia: 400 kV

Source: League of Arab States, Arab Interconnection Projects Update Report (April 2013).



The integrated management of natural and human resources and the use of modern technology are essential elements of sustainable energy strategies

4. Outcomes

The electricity sector institutional framework is complete in countries such as Algeria, Egypt, Morocco, Oman, Saudi Arabia, Tunisia and the United Arab Emirates. In others it is incomplete, undergoing reform and/or not working properly (table 2 summarizes the state of reform country by country).

The decision maker in most member countries is the Ministry of Electricity, which is responsible for strategy, planning and setting national targets. The legal framework governing energy efficiency on the supply and demand sides is still not developed. Energy efficiency and renewable energy initiatives are often supervised by units in the Ministry of Electricity and research institutions and universities.

Although in some countries considerable institutional advances have been made with regard to energy management and regulatory authorities, existing policies have not been fully implemented. More must be done to strengthen institutions. Renewable energy and energy efficiency projects are being developed on a large scale in Algeria, Egypt, Morocco, Tunisia and the United Arab Emirates.

In other countries, institutions and regulations are being developed, but no agency has been designated to plan and supervise energy efficiency plans. Projects are carried out only as pilot or demonstrative schemes, mostly in cooperation with or with the assistance of international companies or organizations such as UNDP. Regulations should be strengthened and agencies must be appointed to implement energy efficient measures. Flexible funding mechanisms should be considered in order to broaden the application of energy efficient measures and the use of renewable energy, particularly in rural and remote areas.

Independence and transparency in regulatory bodies is needed in order to free up the electricity sector and encourage private investment in infrastructure. The electricity sector in countries such as Iraq and Yemen is being restructured.

In many Arab countries, water and other sectors such as mining, the environment or industry are bundled with electricity in the one ministry or authority. In Gulf countries, many thermal plants are cogeneration power plants in which waste heat is used for thermal sea water desalination. In those countries, the links between electricity and water institutions should be clarified and costed separately. In some countries, energy issues are addressed as a package. In Morocco, ambitious plans in the area of renewable energy are carried out under the Ministry of Energy, Mining, Water and Environment. All energy, water and environment issues are combined under one umbrella. In Egypt and Libya, renewable energy is expected to play an important role in the energy mix and falls within the purview of the Ministry of Electricity (figure II).

Regional institutions are invited to actively facilitate knowledge transfer and the exchange of expertise and lessons learned, disseminate all know-how related to electricity sector reform and foster energy efficiency and the use of renewable energy. That would help not only to make the electricity sector more efficient in individual countries but contribute to regional integration.

Figure II. Electricity and energy entities in Arab countries

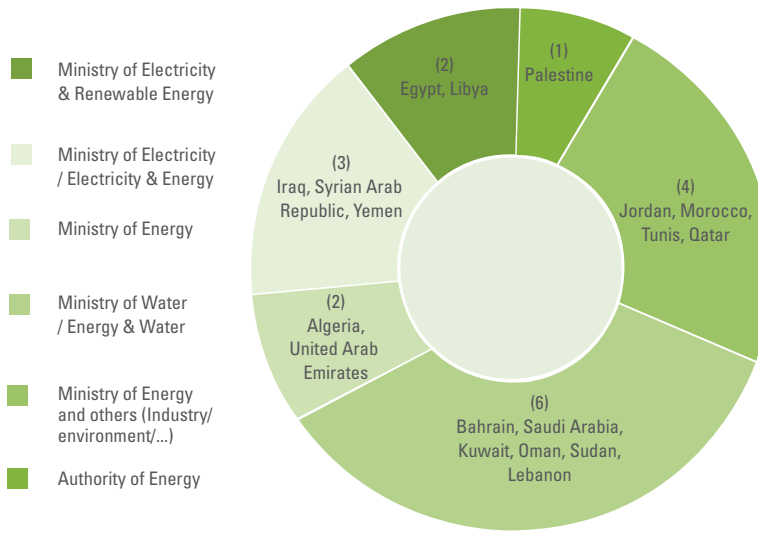


Table 2. Electricity sector developments in the arab countries

Country	Electricity sector reform strategy/plans/ policy (unbundling/ restructuring/ privatization)	Current status (done/ ongoing/ Planned/ NA)	Estimated time frame	Remarks
Algeria	National renewable energy and energy efficiency programme adopted in 2011. There are plans to install renewable energy capacity of up to 22 GW.	Ongoing	2030	
Bahrain	Reforms implemented.	Done	Implemented	
Egypt	Reform begun in 2000 implemented.	Done	Implemented	Electricity regulatory authority needs to be independent.
Iraq	Reforms and a renewable energy action plan, with a target of 400 MW capacity by 2017, are being implemented.	NA	NA	Funding of energy efficiency projects by the Ministry of Electricity.
Jordan	Energy efficiency strategy implemented in 2005 (target of 10 per cent of electricity demand met by renewable energy sources by 2020).	Ongoing	2020	
Kuwait	Reforms implemented.	Done	Implemented	

Country	Electricity sector reform strategy/plans/ policy (unbundling/ restructuring/ privatization)	Current status (done/ ongoing/ Planned/ NA)	Estimated time frame	Remarks
Lebanon	Electricity policy paper launched in June 2010 as part of national plan to upgrade the sector (10 strategic initiatives, three of which concern renewable energy and energy efficiency). National energy efficiency action plan of February 2012 includes 14 initiatives (four of which concern energy efficiency and six renewable energy). The target is to meet 12 per cent of electricity demand with renewable energy by 2020. Act No. 462 (2002) on the regulation and privatization of the electricity sector.	Ongoing	2020	
Libya	A plan to restructure the sector was launched in 2007. There is a renewable energy road map for the period up to 2030.	Ongoing Planned	2025/2030	
Morocco	National energy strategy adopted in January 2013 (target 6 000 MW of electricity generated from renewable energy sources by 2020: 2 000 MW solar, 2 000 MW wind, 2 000 hydroelectric power). Energy efficiency target of 12 per cent reduction in energy use by 2020 and 15 per cent reduction by 2030.	Ongoing	2030	

Country	Electricity sector reform strategy/plans/ policy (unbundling/ restructuring/ privatization)	Current status (done/ ongoing/ Planned/ NA)	Estimated time frame	Remarks
Oman	Reforms implemented.	Done	Implemented	
Palestine	Letter of sector policy (LSP). National Energy Strategy. Palestinian Solar Initiative (5 per cent of total electricity consumption). Strategies for renewable energy (target of 25 per cent of energy mix to come from renewable energy by 2020) and strategy for rationalization of energy use.	Ongoing Planned Planned	2020	
Qatar	Reforms implemented.	Done	Implemented	
Saudi Arabia	Reforms implemented.	Done	Implemented	
Sudan	Reforms planned. National electrification to reach 80 per cent of the country and connect all states to the national grid by 2031. A feasibility study for interconnection with Egypt. Energy efficiency target of 15 per cent saving on total demand by 2020. Plans to provide 1567 MW or 13.6 per cent of electricity from renewable energy (including hydro-electric) sources 2031.	NA	NA	Electricity regulatory authority needs to be independent. There is no funding mechanism for energy efficiency or renewable energy. An energy efficiency action plan was launched in 2011.

Country	Electricity sector reform strategy/plans/ policy (unbundling/ restructuring/ privatization)	Current status (done/ ongoing/ Planned/ NA)	Estimated time frame	Remarks
Syrian Arab Republic	National master plan, under which renewable energy sources should provide 10 per cent of demand in 2020).	NA	2015/2020	
Tunisia	National action plan for renewable energy development in Tunisia with targets of 20 per cent by 2020 and 30 per cent by 2030. Renewable energy production targets by 2030 are: 1755 MW solar energy and 1510 MW wind power.	Ongoing (Tunisian solar plan underway since 2009)	2030	FNME is financially involved in developing the market.
United Arab Emirates	Reforms implemented.	Done	Implemented	
Yemen	Reforms being implemented since 2009.	Ongoing	NA	ERA should be activated.

Note: NA indicates that updated information or data are not available.

Endnotes

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