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Issam Fares Institute for Public Policy and International Affairs
معهد عصام فارس للسياسات العامة والشؤون الدولية

Clean Energy Business Council
مجلس صناعات الطاقة النظيفة
Middle East & North Africa
الشرق الأوسط وشمال افريقيا

Building Blocks for Developing an ESCO Market in Lebanon

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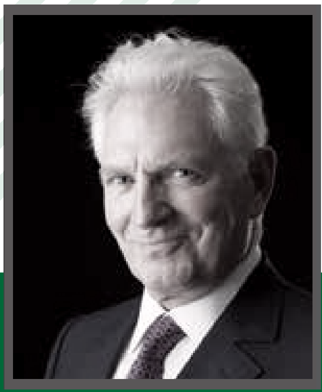

Dr. Nasser Saidi,
Chairman of the Clean Energy Business Council (CEBC)

The Clean Energy Business Council (CEBC) is pleased to collaborate with the Issam Fares Institute for Public Policy and International Affairs (IFI) in a strategic partnership aiming to promote the development of the clean energy & cleantech sector in the Middle East and North Africa (MENA) region. To this end, the CEBC aims to build strategic partnerships, working jointly with leading academic institutions like IFI, to bridge the gap between business, industry and academia, promote public-private partnerships and produce analytical and policy oriented research. Our report on "Building Blocks for Developing an ESCO Market in Lebanon" develops a series of practical technical, financial and policy recommendations focusing on improving energy efficiency in Lebanon. This paper is intended to serve as a reference for policymakers and the private sector on the needed policies and steps to build an Energy Services Company market in Lebanon. Energy Efficiency is the lowest hanging fruit for countries to achieve energy security and reduce their oil, gas and coal demand by reducing their overall energy demand. With the ongoing deep energy crisis in Lebanon, building an energy efficiency market is essential along with decreasing the technical and non-technical losses and increasing power generation capacity.

In the past years, power supply has become highly erratic, with public-provided, Electricité du Liban electricity increasingly replaced by expensive private diesel-powered generators that are a major source of pollution blanketing urban areas, with severe negative health impact. Lebanon has substantial, largely unexploited, renewable energy potential: hydro, wind and solar. Despite this potential, Lebanon has become extremely fossil fuel dependent with highly inefficient power supply, power stations beyond their technical and economic lifetime and a sector chracterised by waste, corruption and inefficiency. Improving energy efficiency and changing the energy mix towards renewables are first steps. Building an ESCO market should be an element in an inclusive energy policy within a more comprehensive economic policy and institutional reform framework.

Dr. Joseph Bahout,
Director of the Issam Fares Institute
of Public Policy and International Affairs (IFI)
at the American University of Beirut (AUB)

The Issam Fares Institute for Public Policy and International Affairs (IFI) at the American University of Beirut (AUB) is pleased to be launching this publication, the first as part of our partnership with the Clean Energy Business Council (CEBC) and its team in the UAE. In August 2021, IFI and CEBC signed a strategic Memorandum of Understanding (MoU), joining efforts to produce knowledge and undertake evidence-based research around critical topics in the MENA region's energy sector. This MoU constitutes a unique collaboration between CEBC – a sharing of CEBC's expertise, network in the region, and strategic leadership – alongside IFI's policy-oriented research and extensive work on the MENA region, specifically through IFI's Energy Policy and Security (EPS) Program.

Our first publication sets the basis for the development of an Energy Services Companies (ESCO) market in Lebanon in the coming years. While Lebanon's electricity sector is currently facing complete collapse, concurrently, the country is witnessing an unprecedented demand and growth in citizen-led initiatives to install solar energy systems, with the aim of avoiding blackouts. Companies, small and medium enterprises (SMEs), and entrepreneurs are striving to create new niche markets to accompany this growth. Accordingly, this piece identifies the building blocks for this market and analyzes best practices and trends specifically in the MENA region, focusing on the experiences of the UAE, Saudi Arabia, Morocco, and Oman. It also dives into the nascent ESCO market in Lebanon through an examination of current legal and institutional frameworks, and concludes by proposing concrete recommendations at the policy, technical, and financial levels.

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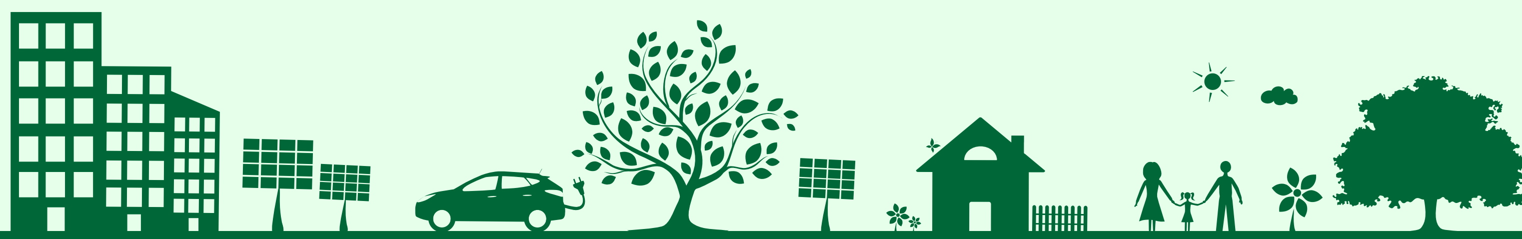

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INTRODUCTION

Global electricity demand has been rising steadily, which has resulted in an increase in fossil fuel generation. The International Energy Agency (IEA) reports a 5% increase in electricity demand in 2021, primarily met by fossil fuels (IEA, 2021). The increase in greenhouse gas (GHG) emissions in recent years triggered many countries to adopt policies and strategies that reduce energy wastage and improve energy efficiency on both the demand and supply sides. Energy demand is only set to increase even further, due to population and economic growth. In fact, global energy demand is forecast to increase 47% in the next 30 years (Gordon et al., 2021).

Several MENA states (e.g., Saudi Arabia) have some of the highest energy consumption rates per GDP globally (CEBC, 2021); in part due to high energy subsidies. Energy efficiency is central to tackling climate change and to meeting climate action goals. Energy efficiency is low-hanging fruit for the MENA region, especially since it is one of the alternatives available to reducing consumption and GHG emissions in existing buildings.

With climate action rising to the top of global policymakers' agendas and the projected rise in global energy demand, it is essential to adopt more sustainable practices and energy efficiency.

Energy practitioners have often stated that energy is desired not for its own sake, but for the services that it produces, like water heating, cooling, lighting, and cooking. An Energy Service Company (ESCO) is a company that provides comprehensive energy solutions to its customers, which includes but is not limited to auditing, redesigning, and implementing changes that enable the customer to consume less energy while still performing the same tasks. The reduction in energy consumption rates results in energy-related cost reductions, for which clients often employ ESCOs for their services, even if they are not driven to be more 'sustainable' per se. Additionally, ESCOs also provide energy infrastructure outsourcing, energy supply, financing, and risk management (Badi, 2021).

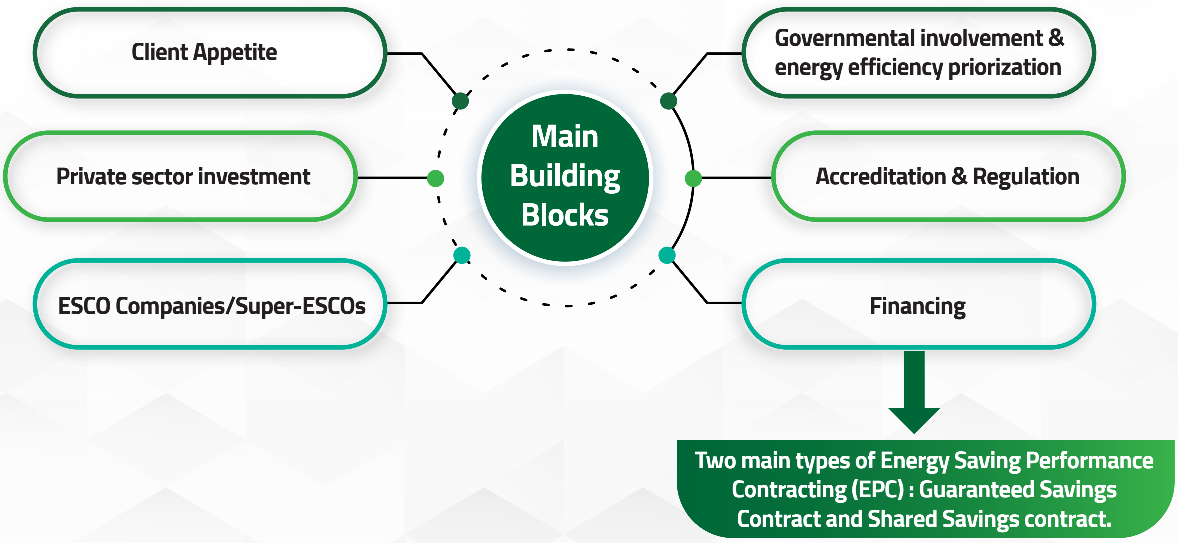
Performance contracting is what distinguishes ESCOs from standard energy companies. In some cases, ESCO projects do not provide a return on investments, rather, ESCO pays the Capital Expenditure (CAPEX) difference, thus providing clients with an energy and cost-saving mechanism (Boza-Kiss et al., 2015). In other cases, ESCOs provide a return on investment through guaranteed savings arrangements.

This paper aims to set the basis for the development of an ESCO market in Lebanon in the coming years. This is done by identifying building blocks and analyzing best practices and trends, both at the international level, and specifically the MENA region, focusing on the UAE, Saudi Arabia, Morocco, and Oman. It also dives into the nascent ESCO market in Lebanon, through the dissection of the current legal and institutional frameworks, before proposing concrete recommendations at the policy, technical, and financial levels.

Building Blocks of an ESCO Market

An overview of the main building blocks of an ESCO market are presented in Figure 1.

Figure 1
Main Building Blocks of an ESCO Market



Finance

An ESCO generates energy savings by implementing and retrofitting energy efficiency projects. The financing of these activities may either be covered by ESCO or the client. There are two main types of Energy Saving Performance Contracting (ESPC): Guaranteed Savings and Shared Savings.

The guaranteed savings model does not burden ESCO with the financing of the energy expenditures. Instead, the facility owner (client) covers all expenses, on the basis that the project savings are guaranteed by ESCO. The guaranteed savings model legally binds ESCO to generate energy savings. Therefore, although the client covers the cost of the project, ESCO is obliged to fulfil its duties in order to receive payment. In this case, ESCO receives payment for its engineering, design, implementation, and commissioning services.

Alternatively, in a shared savings contract, the client doesn't require a capital budget to retrofit and increase energy efficiency. ESCO covers all the expenses and is paid via the generated energy savings by receiving a share of the client's savings. However, for this contract to be feasible, ESCO must have enough capital budget to support the full implementation of the project. Budgeting for ESCOs usually comes from debt financing, and to a lesser extent, equity financing. ESCOs usually finance their activities via financial institutions, e.g., banks.

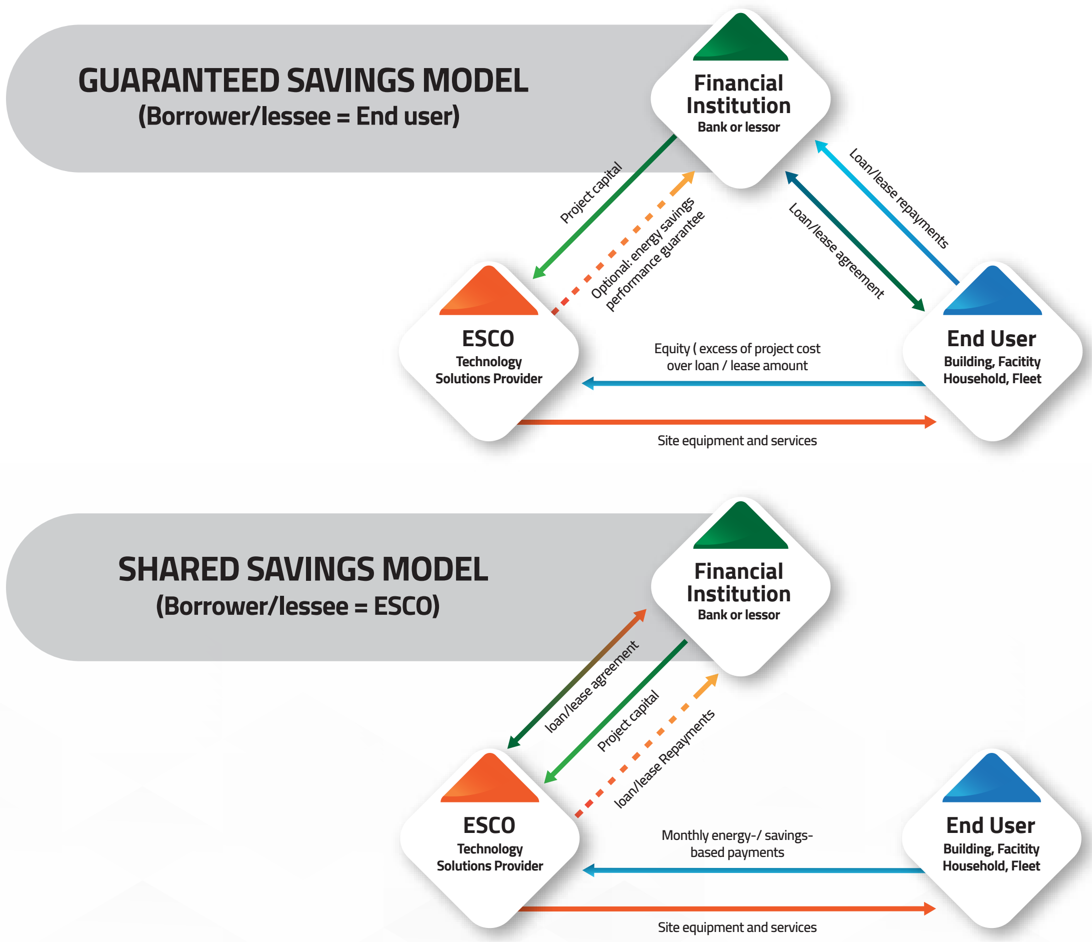
According to a survey conducted by Clean Energy Business Council (CEBC), ESCOs operating in the UAE used guaranteed savings contracts for 68% of their projects, compared to only 16% that used a shared savings contract (CEBC, 2021). Research indicates that guaranteed savings contracts are more prevalent in more economically developed countries. In the case of the UAE, Super ESCOs fund many of the operational ESCO projects, which is one of the reasons why guaranteed savings contracts are more widely used. Additionally, guaranteed savings models are used in countries where there is an established banking structure (IEA, 2018). At the same time, if lending is not feasible for an ESCO, they may use the guaranteed savings contracts, so that the client can instead finance the project.

As mentioned earlier, ESCOs financing is usually done by third-party entities. These include:

- financing marketplace: Energy Performance Certificate (EPC) projects are financed by large institutional lenders that offer very competitive rates and terms and have made billions of dollars of financing available.
- financing vehicles
- tax-exempt lease purchase agreements
- state or local government leasing pools
- state or local government bonds
- revolving loan pools
- Power Purchase Agreements (PPA)

A 2019 ESCO survey conducted by the CEBC, found that most respondents (71%) invested up to six million AED to develop their capabilities. Fourteen percent of respondents had investments exceeding 12 million AED in projects (CEBC, 2019). To sustain their business activities, the majority of the surveyed ESCOs (90%) required an annual project revenue of more than six million AED.

Figure 2
Two Common ESCO Business Models Showing the Sourcing of Debt Finance



Government and Energy Efficiency Prioritization

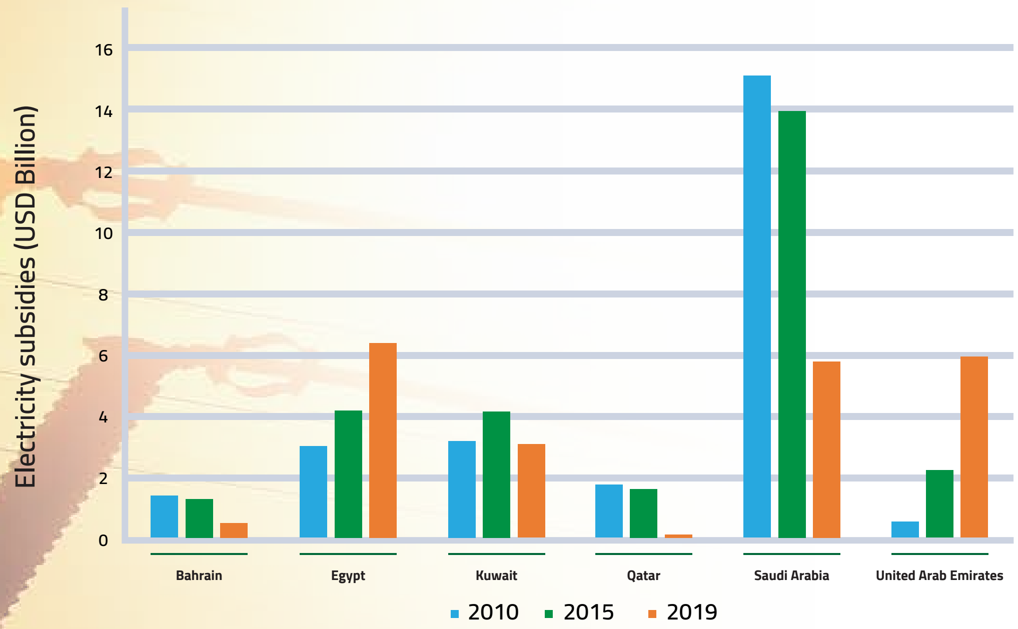
In recent years, MENA states have been ramping up their renewable energy capacity and generation. The MENA region is home to some of the world's largest solar plants, and while this is certainly a step closer to transitioning to a clean economy, there are 'steps' missing from the transition. The Paris Agreement states that addressing energy efficiency and renewable energy needs to occur in an integrated and comprehensive approach; doing so is crucial to achieving net-zero emissions However, despite MENA states' efforts in building new renewable energy plants, energy efficiency has received considerably less attention, even though it is 'low-hanging fruit' and more accessible to implement than other approaches. Developing renewable energy without implementing energy efficiency efforts is akin to "filling a leaking tank with water from a desalination plant" (ESCWA, 2019).

Although MENA states have taken steps to reform their energy policies and begun to place energy efficiency at the heart of their energy programs, these efforts are not translating into large-scale action.

The MENA region has immense untapped potential concerning implementing energy efficiency, which can positively impact both resource-exporting states and energy importing states.

CEBC's white paper on "Energy Efficiency Status and Outlook in the MENA region" found that MENA countries accounted for 50% of global pre-tax energy subsidies, as shown in Figure 3 (CEBC, 2021). An overreliance on energy subsidies can negatively impact the development of renewable energy and energy efficiency markets. Therefore, it is crucial to ensure that governments realign their focus and ensure that in building up their renewable energy efforts, they also target the 'low-hanging fruit' that is energy efficiency. CEBC's white paper found that only a handful of Arab countries introduced reforms to their energy subsidies; the report found that Lebanon's tariffs have been identified as one of the hurdles to energy efficiency improvement that has remained unchanged since the 1990s (CEBC, 2021).

Figure 3
Electricity Subsidies for Selected MENA Countries for 2010, 2015, and 2019



Source: CEBC, 2021.

Accreditation and Regulation

The role of governments and institutions is crucial to a well-developed ESCO market. Governments need to ensure that energy programs are revised, to place energy efficiency as a top priority, and introduce feasible targets that demonstrate results and garner the support of other stakeholders. The government essentially provides an enabling environment for ESCOs to flourish. To achieve a successful ESCO market and improve energy efficiency in the region, governments must reform energy policies and foster a more supportive environment that enables new ESCOs to emerge and allows existing ESCOs to take on more projects.

Accreditation is important, as it provides recognition to qualified ESCOs, making ESCOs credentials seem more tangible and hence more trustworthy to the market it serves, and it mitigates the clients' perception of risk when dealing with an ESCO. Especially since the value of the ESCO is not tangible and will not be realized until the client goes through the long journey of energy auditing and project implementation.

The accreditation process is usually government-led and differs from country to country, and, in some cases, it even varies from city to city. The ESCO accreditation process is an integral component to developing the ESCO market. Accreditation enables ESCOs to gain legitimacy from both clients and financial bodies, provides ESCOs with security against unfair competition from non-accredited companies, and promotes energy auditing services (Singapore NEA, 2020). To qualify as an ESCO, entities need to undergo an accreditation process to ensure that they can provide energy efficiency services.

The criteria to become accredited as an ESCO generally looks at the entity's financial, business, and technical capabilities. One requirement in all ESCO accreditation criteria is entities must have at least one energy efficiency assessor.

While ESCO accreditation criteria may differ from country to country, some overlaps exist. For instance, entities in China, Dubai, India, Canada, and Singapore must have undertaken multiple projects before becoming accredited as an ESCO (Langlois & Unruh, 2021). These projects would pertain to energy audits or implementation. Singapore's ESCO accreditation scheme stipulates those entities must have completed at least six energy audits and two implementation projects to qualify as an ESCO (Singapore NEA, 2020). Demonstrating financial strength is a requirement that appears in most ESCO accreditation schemes; this means an entity must be able to show it has the available capital, does not have outstanding payments to clients, and has kept its books up to date. It also means ESCO is capable of fulfilling its obligations in terms of Bank Guarantees, in case the savings were not materialized.

In Dubai, the Regulatory and Supervisory Bureau (RSB) has an accreditation process that examines entities' financial status, energy-savings projects, track-record, and staff's capabilities and qualifications. Dubai and Singapore both require entities to own auditing equipment and to meet government safety requirements, whereas China and the US do not stipulate these requirements in their accreditation criteria.

After receiving accreditation, ESCOs are required to renew their accreditation, to ensure that they still meet the initial criteria. The accreditation period and renewal process are country-specific.

Private Sector Investment and Interest

More streamlined collaboration between different stakeholders is key to the expansion of any market, and the development of the ESCO market is no exception. The private sector is a key player in the development of the ESCO market, whether as a financier or client, therefore, there is an interest for the private sector to take a more active role in maturing the market through public-private partnerships[1] whenever possible. Private banks and lending institutions; venture capital firms; equity funds; strategic partners (e.g., utilities and engineering firms); leasing companies; and equipment manufacturers are all private sector stakeholders that should take on a more active role in the development of the ESCO market.

China and the US have the largest ESCO markets worldwide. In 2017, China's ESCO market grew by 11% to 16.8 billion USD, and currently China has the fastest growing ESCO market globally (CEBC, 2019). It is worth noting that China's ESCO revenues are dominated by the private sector. Evidence from China's ESCO market illustrates how private sector investment and interest can significantly drive growth and expansion of the ESCO market. In contrast, the US ESCO market is dominated by the public sector. Despite the US ESCO market's growth in recent years, it is characterized by consistent yet slow growth, which focuses on public and institutional facilities. China's case illustrates the necessity of greater private sector involvement, not only for market expansion but also for more efficiency in ESCO project implementation. In a worldwide study on ESCO markets, one emerging trend in more economically developed countries (MEDC) found the public sector takes on a more active role in the financing of ESCOs; whereas, in less economically developed countries (LEDC), the private sector is the major financier. This is because, in MEDCs, the state and institutional capabilities are greater and better equipped to undertake the role as the main financier of ESCO activities.

Presence of ESCO Companies and the Role of Super ESCOs

By comparing the ESCO markets in the US, China, and Europe, the MENA ESCO is still relatively nascent. However, in recent years, MENA governments have taken active steps to accelerate the development of the energy efficiency market by creating government bodies that assist in regulating the industry, developing projects, and market education.

A Super ESCO is a government entity that facilitates and regulates the relationship between private sector ESCOs and clients, in addition to acting as the central host for all public tenders aiming to enhance energy performance in government-owned buildings. Super ESCOs have been instrumental in addressing barriers to the development of the ESCO market. This is evidenced in the case of the UAE and countries outside the MENA region. Super ESCOs were initially developed in the 1990s as a potential solution to address limitations of EPC contracts, ESCOs lack of capabilities, and lack of project financing. Super ESCOs were essentially introduced to enable EPCs to reach their full potential (Econoler, 2020).

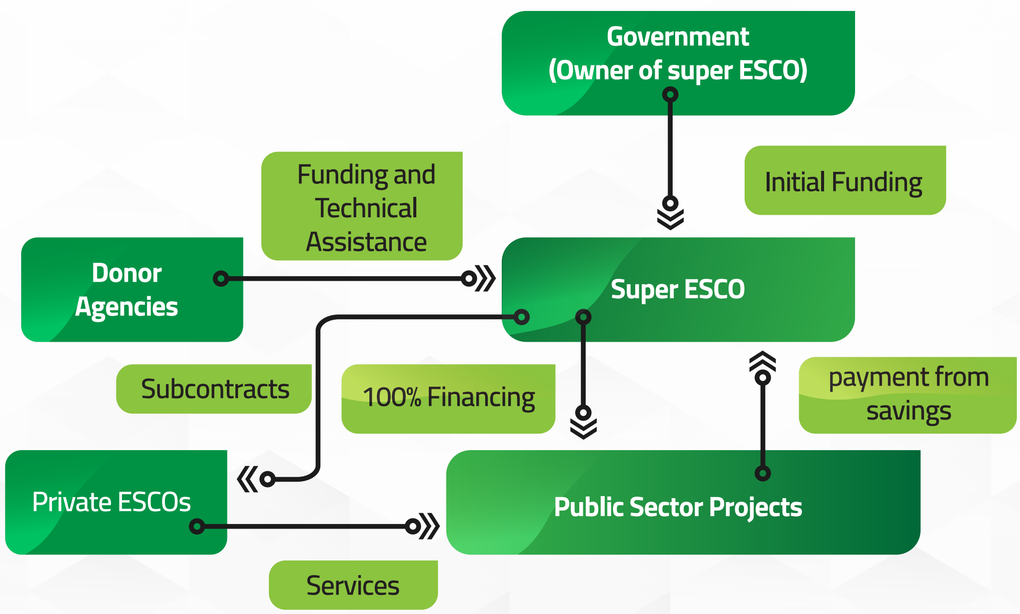
[1] A Public-Private Partnership (PPP) is a long-term agreement between private companies and governments for public services and assets to use private sector resources, expertise, and efficiency. For example, a PPP, under Law No. 48, sets the legal framework for private sector investment in infrastructure ratified in Lebanon in 2017 (DRI & SKLInternational, 2019). However, the PPP law has never been implemented in Lebanon.

Super ESCOs are integral to the development of ESCO markets because they have more capabilities than ESCOs, can identify business opportunities for EPCs, and can implement bundled projects, thereby reducing technical risks and facilitating financing (Econoler, 2020). Currently Super ESCOs only exist in the UAE, Saudi Arabia, and more recently Morocco.

The MENA region is quite fragmented in terms of ESCO market development across the different states. For example, Dubai houses the largest number of ESCOs in the region, which, in turn, enables more projects to be implemented, as opposed to Egypt, which has a far lower ESCO presence and project implementation levels (CEBC, 2021). The US market is often referenced as the most comprehensive ESCO market with more than 50 national ESCO companies implementing projects across the country.

To facilitate the growth of the ESCO market, more robust policies need to be introduced placing energy efficiency at the epicenter of energy-related policies. As discussed, Super ESCOs can facilitate the growth of the ESCO market, and assist existing ESCOs in implementing more projects; therefore, it is essential to consider introducing these government-backed entities in areas where there are technical barriers that impede the ability of ESCOs to undertake more projects. Additionally, since Super ESCOs are backed by the government, they tend to reduce the perceived risks to investors. Private investment is integral to the development of the ESCO market, and the existence of Super ESCOs can lower perceived risks and increase project financing.

Figure 4
Typical Set Up for a Public Super ESCO Scheme



Note. Source: ESCWA, 2019.

Client Appetite

One of the main impediments to ESCO market-growth is a lack of willingness from clients (CEBC, 2019). ESCOs are important instruments to attain target energy efficiency levels. However, for ESCOs to be able to implement more projects and meet the target energy efficiency levels, clients must first be aware of the opportunities offered to them by ESCOs and understand the value of employing ESCOs. Lack of awareness among building owners regarding the benefits of employing ESCO services is a major roadblock to the growth of the ESCO market.

A standardized ESCO contract could impact client appetite as it provides clarity and transparency. Educating building owners on the benefits of employing more energy-efficient services, especially with regards to their reduced costs, will boost client willingness as well. Incentivizing energy-efficient buildings could greatly impact client willingness, and the expansion of the ESCO market overall (CEBC, 2019).

Moreover, in CEBC's 2021 ESCO survey, when respondents were asked about their level of willingness to fund ESCO project implementation, the majority showed signs of willingness, while only 26% of respondents stated they were not willing. Further, 16% of companies were willing to fund projects less than three million AED/SAR, and 16% were willing to fund projects exceeding 50 million AED/SAR. With the expansion of ESCOs across the region, client willingness will also increase, and vice versa.

Expenditure saving is the main driver for clients' interest in taking on energy efficiency projects. Incorporating energy efficiency, lowering their energy consumption levels, and while conducting the same tasks, the building owners can cut down their expenses in a manner that is sustainable in the long run. Facility modernization is also a driver for increasing clients' appetite and interest in seeking ESCO services, as facilities turn to EPCs to finance their building structural and maintenance improvements.

Investment Needs and Financial Impact (Long-Term Savings, etc.)

As previously stated, the majority of ESCOs enter guaranteed savings contracts for their projects (68%), because the majority of the contracts are funded by Super ESCOs (CEBC, 2021). Further, the respondents in CEBC's ESCO survey stated they needed an annual revenue of more than 20 million AED to ensure business continuity. When asked about their level of willingness to fund ESCO projects, the majority displayed high interest, with 16% expressing willing to fund projects exceeding 50 million AED.

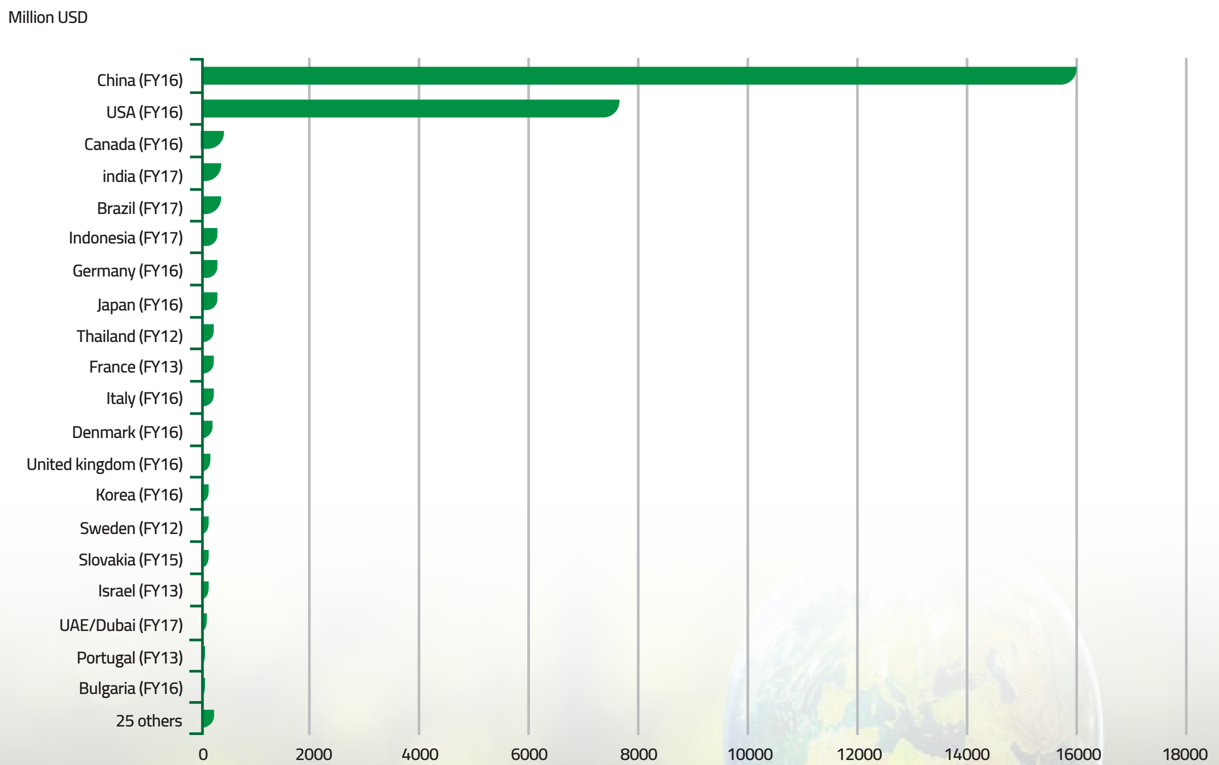
The Etihad Super ESCO projects have had immense financial impact on clients' long-term savings. Since 2017, the Etihad Super ESCO has generated savings of 130.46 million AED for 7,763 facilities. The first phase of the Dubai Airport project that Etihad undertook in 2019 covered four buildings and generated 23% in savings, resulting in 29.9 million AED saved (Etihad Energy Services, 2021b). Additionally, Etihad's Seven Tides project in 2019, which covered 22 buildings, resulted in 7.3 million AED in savings (Etihad Energy Services, 2021b).

ESCO Markets in China and the US

Currently, the two largest ESCO markets are in China and the US. The two ESCO markets' growth trajectories differ. While the ESCO market in China is dominated by the private sector, the ESCO market in the US is dominated by the public sector. In China, the state's policy incentives have driven up ESCO engagement in the private sector. Alternatively, in the US, ESCOs primarily focus on the public sector, as public sector asset owners can obtain debt on favorable terms, thereby enabling them to finance ESCO contracts (IEA, 2018).

Figure 5 reflects the breakdown of ESCO revenue by country. The difference in the growth of the ESCO market is mainly attributed to notable differences in the definition of energy performance contract (EPC), the policies ESCOs are subject to, and technical capabilities (IEA, 2018) between countries and regions, among other factors.

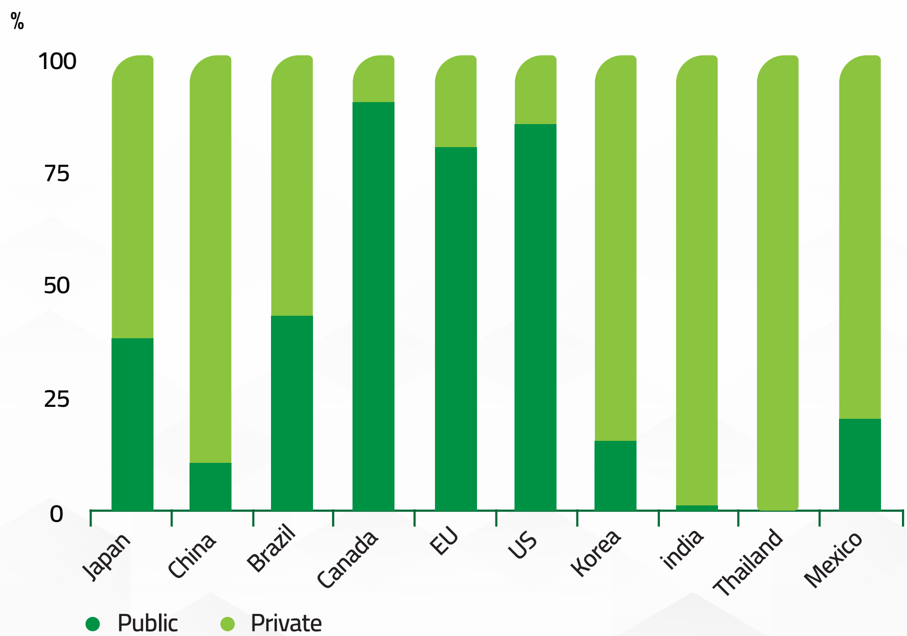
Figure 5
Breakdown of ESCO Revenue by Country (IEA, 2018)



Barriers to implementing ESCO projects in the public sector, fall into three categories: awareness, budgeting, and contracting. In this case, ESCOs take the lead on raising awareness campaigns and marketing to emphasize the importance of energy efficiency, along with offering incentives and tailored financial schemes with standard contracts to encourage the public sector to head towards contracting with ESCOs. When it comes to implementing energy efficiency projects in the private sector, the barriers include awareness, standardization, and finance. Hence, in order to overcome these barriers, ESCOs tend to follow the same awareness strategy campaigns to emphasize the importance of their services, and to explain, through financing mechanisms, how to create competition that leads to better, standardized practices. Figure 6 shows ESCO revenue in both public and private sectors in different countries.

Government policy greatly affects differences in the ESCO market, which is a key driver of ESCO activity and can influence whether ESCO projects are carried out privately or publicly. For example, in China, policy incentives have driven ESCO engagement in the private sector, while government procurement policies have been a barrier in ESCO market development in the public sector. On the other hand, in North America, ESCO activity in the public sector has boomed as public sector asset owners are able to access favorable loans can be used to finance ESCO contracts (IEA, 2018).

Figure 6
ESCO Revenues: Public vs Private Sector (IEA, 2018)



In several nations, the establishment of substantial ESCO markets has emerged from a combination or package of basic ESCO models through dedicated finance, enabling policies, regulatory actions, and rising public sector demand, as shown in Figure 7.

Simpler models combined with legislative support and dedicated financing boost markets in South Africa (utility-based standard offer program), Armenia (SUPER ESCO providing energy service agreements), India (Super ESCO, accreditation scheme, and deemed savings), and China (aggressive energy efficiency policy, public pilot ESCOs, and equipment leasing) (Hofer et al., 2016).

Figure 7
Successful International ESCO Markets in Developed Areas (Hofer et al., 2016)

COUNTRY	INITIATION	MARKET SIZE (2012/13)	CHARACTERISTICS AND SUCCESS FACTORS
China	1998	• 2,339 registered companies • 1,472 ESCOs with EPCs • Size: US$8.25 billion • Potential: US$14.5 billion	• World Bank support to demonstrate or pilot ESCO models • Focus on industry and single energy efficiency technologies • Primarily guaranteed savings • ESCO accreditation scheme and aggressive energy efficiency policy
India	1995	• 114 ESCOs accredited • Size: US$140 million • Potential: US$2.8 billion	• Strong ESCO accreditation scheme • Focus on public sector and industry • Creation of super ESCO • Market dominated by a few large ESCOs
Thailand	1999	• 45 ESCOs registered • 10 ESCOs with EPCs • Size: US$100–200 million • Potential: US$500 million	• Government funding support (dedicated ESCO fund) • Focus on industry, hospitals, and government buildings • Guaranteed and shared savings
South Africa	2004	• 500 ESCOs registered (only 50 active) • Potential: US$1 billion	• Growth driven by Eskom Standard Offer Program • Focus on industry and buildings • ESCO accreditation scheme (ESKOM)
Czech Republic	1994	• 20 ESCOs with EPC-type contracts • 150–200 EPC projects implemented • (US$120 million since the 1990s) Size: US$11–23 million • Potential: US$110–560 million	• Active ESCO companies, facilitators, and procurement advisors • Availability of standard documents • Commercial banks started investing in ESCO projects • Focus on public sector • Common use of guaranteed savings

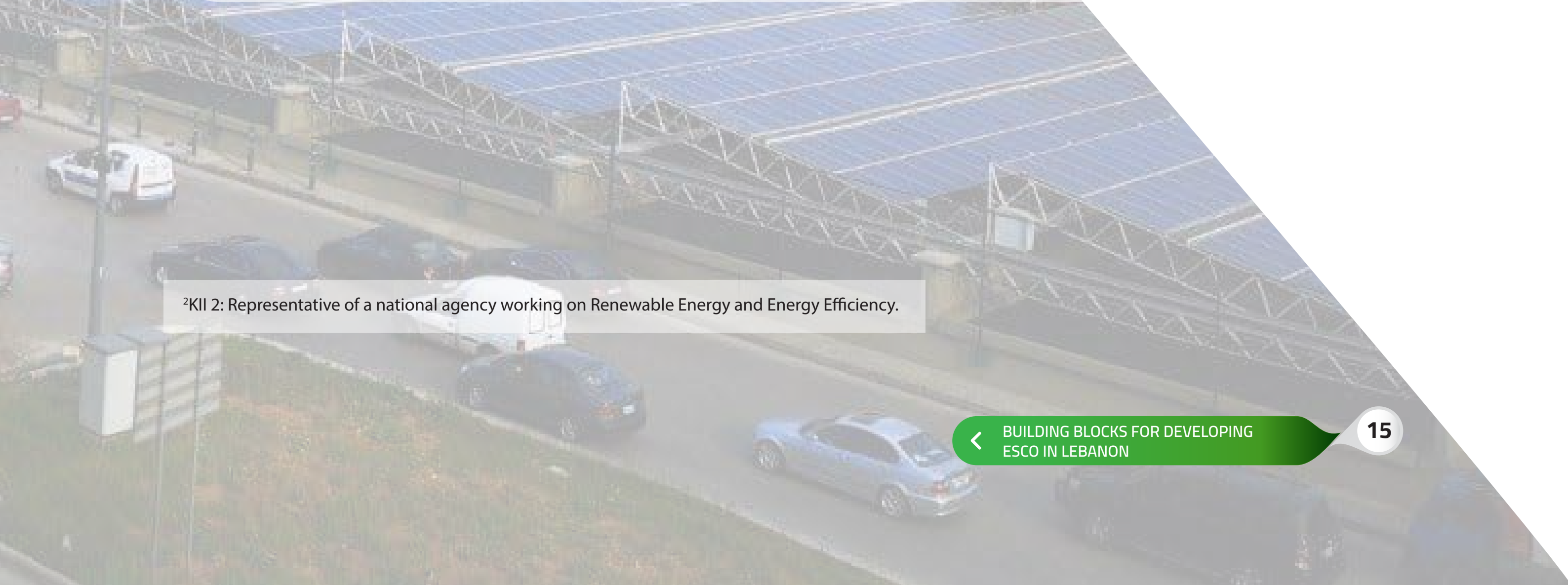
ESCO Market in Lebanon

Enabling Environment Prerequisites

Lebanon is currently dealing with several crises, including health, social, financial, banking, and economic that have caused a complete meltdown in basic public services, an erosion of trust, and damage to public confidence. The financial crisis has caused a shortage in foreign currency and imposed informal capital controls. The energy sector is one of the most impacted sectors, due to a high reliance in the country on fossil fuels for power generation (diesel oil and heavy fuel). Dwindling foreign currency reserves threaten fuel supply, hindering the capacity to operate both private generators and Electricité du Liban (EDL). Furthermore, Banque du Liban (BDL), the Lebanese Central Bank, has been unable to supply the needed foreign currency for fuel imports. Enhancing the power sector requires secure, sustainable, affordable, and cleaner energy for the country's residents, as well as the development and ratification of a policy to increase the sector's resilience (Ayat et al., 2021). ESCO in the Lebanese market is still in its early stages of development and establishment, especially in lieu of limited financial resources, the absence of a legal framework, and nonenforcement of existing laws[2].

Lebanon currently lacks the enabling environment for a well-established ESCO market. A World Bank (2019) case study of the regulatory performance of the country across different indicators shows that Lebanon almost always scores lower than the MENA average, which highlights the gap in Lebanon's economy. The case study assessed the economy of different countries based on several indicators. The scoring system used to assess each indicator ranges from zero to one hundred; where zero indicates the worst and one hundred indicates the best performance. The average score of the Lebanese economy was then compared to other MENA region average scores. Of the 190 countries assessed, Lebanon ranked 142nd in ease of doing business, 146th in starting a business, 140th in protecting minority investors, 113th in paying taxes, and 151st in resolving insolvency. These results show that, besides the regulatory and legal framework needed to kick-off an ESCO market, macro-economic stability that opens the doors for financial, banking, and monetary reforms are a prerequisite to strengthening Lebanon's economy and allow ESCO companies to grow and develop their businesses.

Figure 8 lists the challenges that are addressed by the ESCO market to attain energy efficiency.



[2]KII 2: Representative of a national agency working on Renewable Energy and Energy Efficiency.

Figure 8

How Barriers Are Addressed by ESCOs to Achieve Energy Efficiency (Hofer et al., 2016)

Socio-Economic and Political Hurdles

Lebanon has been witnessing one of the worst economic crises in history (World Bank, 2021). The Lebanese economy has collapsed by 40% over the last two years and its currency has lost over 90% of its value. A formerly middle-income country has become poor, almost overnight (Daniels, 2021).

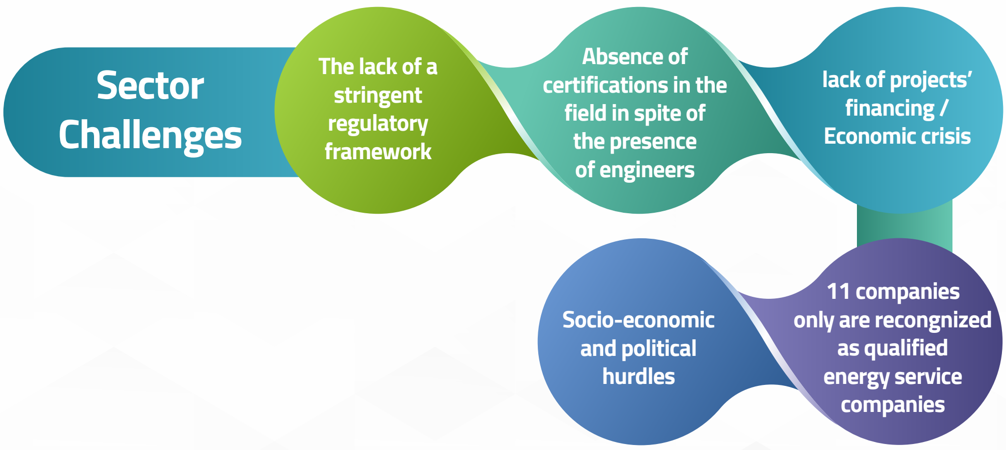
At the center of these economic, fiscal, and social challenges lies Lebanon's power sector, as the national public utility, Electricité du Liban (EDL), has been unable to meet electricity demand for more than two decades. This has meant long hours of power outages, especially through peak demand periods, and has been exacerbated during the crisis, reaching around 20 hours of complete blackouts.

The failings of the power sector originate from deep-rooted political and economic challenges (Ahmad et al., 2022). Lebanon's power sector has been particularly prone to corruption, dysfunction, and operational inefficiency, and impacts Lebanese livelihoods. The sector is seen as a platform to maintain a clientelist system by distributing benefits to politicians and those close to them (Ahmad et. al, 2020).

Existing Legal and Policy Framework

Literature on the ESCO market in Lebanon is limited as the ESCO market is still in its early stages of development. Furthermore, this state of play highlights the importance of introducing an ESCO market in the Lebanese energy sector. Interviews with Key Informant Interviewees (KII) were conducted as part of this research to understand the current state of the ESCO market and the needed steps for its growth moving forward. Major gaps focused on the lack of both a stringent regulatory framework and project financing, and the absence of certifications in the field, in spite of the presence of engineers, as presented in Figure 9.

Figure 9
The Sector Challenges in Lebanon



The sections below will dive into the Lebanese local context and map the current players working on the ESCO market to identify implementable areas of intervention.

Energy Efficiency

The World Bank (2009) suggests the importance of implementing ESCO projects in Lebanon in the "Energy Efficiency Study in Lebanon" report, which reflects on Lebanon's situation in 2009 and advises on the future energy market for the country. In 2009, energy efficiency projects were focused on projects that aimed at reducing fuel power plants and develop natural gas power plants and shift to solar water heaters (SWH).

The report showed the electricity bill represents 78% of the total energy bill of the country, while still having blackouts. This means aiming for an ESCO initiative could be a strategic turning point to reduce blackouts, along with promoting efficient energy use and upgrading the national grid to support the integration of renewable energies, along with other critical reforms. Moreover, the report sheds light on Lebanon's 2004 commitment to reduce energy imports and develop local energy, but until 2019 only 9% of the electricity was generated by hydroelectric power stations, while 71% were still dependent on fossil fuels.

On the other hand, Lebanon's National Energy Efficiency Action Plan (NEEAP) highlighted on the process of qualification for energy service companies in Lebanon. NEEAP supports the market, promotes investments in energy efficiency services, and helps local/international stakeholders to identify companies providing these services. The companies are categorized by specialty, so either ESCO qualified companies or qualified energy audit companies. ESCO qualified companies include the ones that provide energy efficiency improvement services and implementation, while energy audit companies specialize in energy management services.

According to the 2020 National Contribution Update, Lebanon aims to generate 11-16.5% of its heating needs and 18-30% of its electricity production from renewable sources by 2030 (UNFCCC, 2020). Higher temperatures means rising cooling demand, with corresponding power consumption increasing by 1.8% for every 1°C rise in temperature and 5.8% for a 3°C increase in temperature (Ministry of Foreign Affairs Netherlands, 2018).

To this day, several initiatives have been rolled out towards achieving energy efficiency in Lebanon. Some of them are presented in Figure 10 and Table 1.

Figure 10
Energy Sector Initiatives in Lebanon

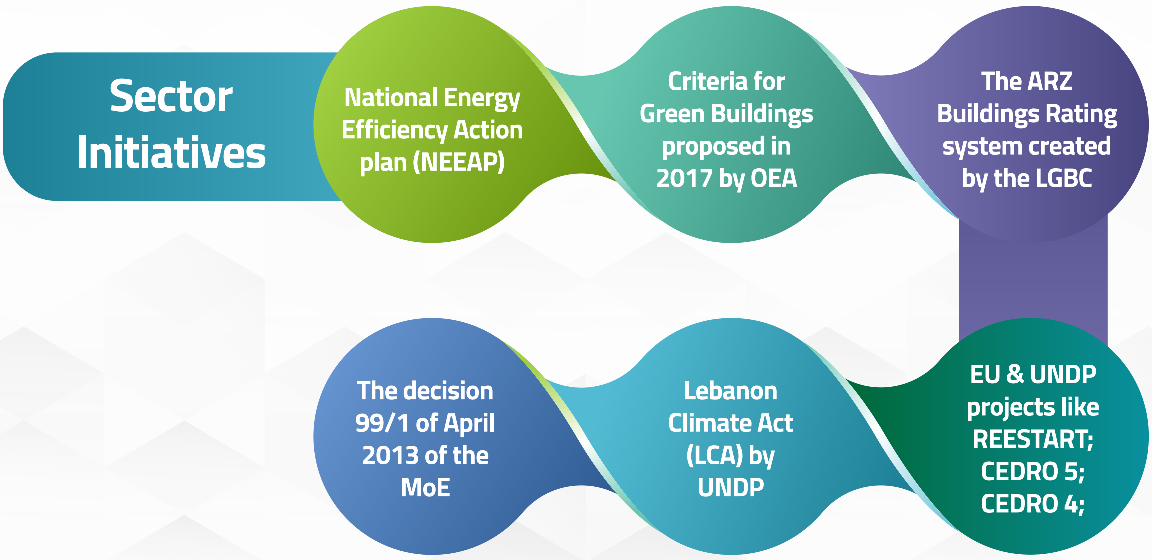


Table 1
Energy Initiatives in Lebanon

PROJECT NAME	FUNDER AND PARTNERS	GOAL
REESTART: Lebanese Green Energy Companies Challenges and Opportunities (UNDP& ICU, 2020)	• Funded by the European Union (EU) • Partner: UNDP CEDRO 5 project	The purpose of this project was to conduct a market survey of 184 businesses and companies dealing in renewable energy and energy efficiency. The survey results gave a clear overview of the market status and allowed the development of a roadmap to remove obstacles to Renewable Energy (RE) and Energy Efficiency (EE) progress and promote cleaner technologies.
CEDRO5: Country Entrepreneurship for Distributed Renewable Opportunities. (2019, still ongoing) (UNDP, 2021a)	Funded by the European Union (EU) and the UNDP	The goal of this project is to assist the Lebanese Government in achieving its Nationally Determined Contribution (NDCs) goals for EE and RE. It also supports Lebanon in strengthening growth for small and medium enterprises (SMEs) and creating new employment opportunities.
The Small Decentralized Renewable Energy Power Generation Project. (Started in 2014, still ongoing) (UNDP, 2021b)	• Funded by: The Global Environment Facility (GEF) • Executed by MoEW and LCEC • Implemented by UNDP	The target of this project is to minimize the GHG emissions by diffusing decentralized RE-based power generation.
CEDRO 4: The 24-village initiative—Sustainable Energy for Lebanese Villages and Communities (UNDP & CEDRO, 2018)	• Funded by the European Union (EU) and the UNDP • Partners: LCEC, MoEW and EDL	The goal of this project is to equip any given Lebanese village with a RE system.

PROJECT NAME	FUNDER AND PARTNERS	GOAL
The decision 99/1 of April 2013 of the Minister of Environment (MOE &UNDP, 2021)	Ministry of Environment (MoE)	The project encourages the private sector (industrial, institutional, and commercial enterprises) to rigorously communicate to the Ministry of Environment their GHG emissions and related activity data. In return, the companies will receive certificates signed by the minister.
Lebanon Climate Act (LCA),(MOE &UNDP, 2021)	Green Mind, UNDP and Central Bank	Enterprises that will join the LCA are going to manifest their continuous involvement in climate action. Each enterprise will develop actions to minimize its carbon and environmental footprint, develop more sustainable communities and businesses to fight climate change, use cleaner energy, and increase low carbon investments.

Building Sector

One of the goals of this paper is to analyze the current potential for the development of the ESCO market in the Lebanese building sector. Due to global concerns about climate change, various initiatives and efforts have been undertaken to protect and promote sustainable living environments for the next generations. In Lebanon's case, the increasing awareness of ecologically responsible and climate responsive architectural design and building construction has been limited to academics and a few construction and design experts. For this reason, the Order of Engineers and Architects (OEA) issued a set of recommentations in 2017 setting criteria for green buildings, listing reference codes and standards that should be applied to all projects. The enforcement of these criteria would promote friendly, sustainable design and planning, with additional requirements for large-scale projects (OEA, 2017). Some of the criteria developed are presented in Table 2, while others include the incorporation of energy metering; heat recovery; insulation and ducts; energy saving design features for escalators and elevators; acoustic performance; thermal comfort; incorporation of green roofs; recycling of demolished materials and rubble; and efficient natural daylight and ventilation.

Table 2
Some of the Criteria Developed for Green Buildings

SOME OF THE CRITERIA DEVELOPED FOR GREEN BUILDINGS

CRITERIA	DETAIL
BUILDING ENVELOPE	In compliance with "Thermal Standard for building in Lebanon" issued in 2005 by the Ministry of Public Works and Transport (MPWT) and the Directorate General of Urbanism (DGU).
ENERGY EFFICIENCY	Air conditioning, fuel boilers, and water chilling packages integrated in houses must comply with minimum energy efficiency test procedures and requirements.
SOLAR ENERGY	Excessive external lighting and thermal solar water heating system.
WATER USE EFFICIENCY	Drain recovery condensation: this system needs to recover around 80% of the total condensate. The water will be used for irrigation only, not human consumption.
RAIN WATER HARVESTING	A minimum of 25% of rain water must be collected from external non-accessible terrace areas and roofs. This rain water is stored in assigned water tanks.

Three different environmental factors determine sustainability: waste management, energy, and water; social health and safety; and better-quality economic services, lower prices, and efficiency (The Lebanon Brief, 2013).

A "green building" is defined by the World Green Building Council as being efficient in terms of natural resource usage: 40% lower on water bills, and 20-50% savings in energy consumption. It must generate less waste, and offer a healthier environment for residents. To assess the performance in the sustainability conception of buildings, many countries have developed their own International Green Building Certification like the Building Research Establishment Environment Method (BREEAM) in the United Kingdom and the Leadership in Energy and Environment Design (LEED) in the United States. In Lebanon, to adopt and support sustainable building methods, the Lebanon Green Building Council (LGBC) in partnership with the International Finance Corporation (IFC) created the ARZ building certification (The Lebanon Brief, 2013).

The ARZ rating system for existing commercial buildings was developed to rate the level of water and energy consumption, the impact on the natural environment, and the health, well-being, and comfort in living areas. Furthermore, it encourages facility managers and building owners to achieve higher certification to appeal to selective clients. It enumerates energy consumption levels, procedures, techniques, and technologies that LGBC targets in green buildings (LGBC, 2021a). An example of other certification scoring systems is presented in Table 3.

Table 3
Examples of Different Certification Scoring Systems (Karkour, 2014)

BREEAM		LEED	
Pass	30%	Certified	40 POINTS
Good	45%	Silver	50 POINTS
Very Good	55%	Gold	60 POINTS
Excellent	70%	Platinum	80 POINTS
Outstanding	85%		

Every new building registered or committed to one of the existing International Green Building Certification is considered as compliant to "the Criteria for Green Buildings in Lebanon" (OEA, 2017). Some examples of certified buildings in Lebanon are presented in Table 4.

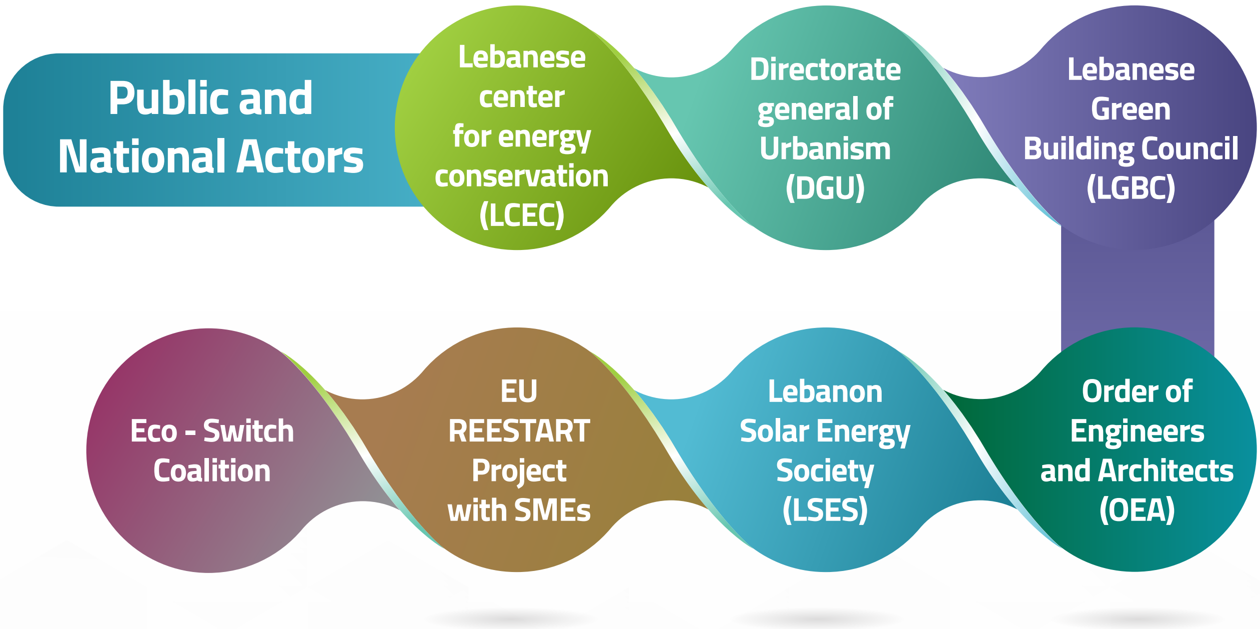
Table 4
Examples of Certified Buildings in Lebanon (Karkour, 2014;The Lebanon Brief, 2013)

BREEAM CERTIFICATION	BUILDING
1st BREEAM	Casa Batroun (Renovated Old House)
ARZ CERTIFICATION	**BUILDING**
1st Arz Bronze	Casa Batroun (Renovated Old House)
Arz Bronze	Beta Engineering office, February 2013
Arz Bronze	WaterFront City Offices, WFC, Dbayeh, March 2015
Arz Bronze	Order of Engineers & Architects, OEA Beirut, September 2016
Arz Certified	Reuters, Beirut Central District, January 2016
LEED CERTIFICATION	**BUILDING**
1stLeed Gold	International College Elementary School (Educational)
2ndLeed Gold	Beirut City Center Mall (Commercial)
Leed	Beirut Terraces (Residential)
Leed	Verdun Heights (Residential)
Leed	Beirut Harbor in in Saifi (Offices)
Leed	Palladium (Offices)
Leed	Zaytouna Bay (Restaurants)

Institutional Mapping (Private/Public/CSOs)

Several public and national agencies and organizations presented in Figure 11 have the capacity to intervene in promoting renewable energy and energy efficiency in Lebanon.

Figure 11
Public and National Actors



The Lebanese Center for Energy Conservation (LCEC). The Lebanese Center for Energy Conservation (LCEC) is the national energy agency in Lebanon responsible for developing energy efficiency and renewable energy initiatives. LCEC is a non-profit organization within the Lebanese Ministry of Energy and Water that helps support sustainable energy transition within the country, along with setting the criteria for ESCO qualified companies in Lebanon (LCEC, 2020).

The Directorate General of Urbanism (DGU). The Director General administers the Directorate General of Urbanism (DGU), which is composed of two departments: Regional Offices and Central Administration. Before submitting to the Council of Ministers, any master plan has to be cleared or approved by the Higher Council of Urban Planning (HCUP) (UN-Habitat, 2013), which is headed by The Ministry of Public Works and Transport (MPWT) (ESCWA, 2020). HCUP, a consultative entity founded in 1983, is in charge of rural and urban planning matters. Its members include the Ministry of the Environment (MoE), MPWT, Ministry of the Interior (MoIM) and other entities like the Order of Engineers and Architects and the Council for Development and Reconstruction (CDR) (UoB & IoE, 2012).

According to Decree 10490, the DGU has several responsibilities:

- Determines the best conditions for land use planning (LUP) and ensures project integration within neighborhoods from a socio-economic, environmental, infrastructural, architectural, and aesthetic approach (UoB & IoE, 2012).
- Develops master plans for cities and villages and defines land use based on social, economic, and demographic conditions of the areas. This is done through the cooperation of technical offices, municipalities, and the DGU.
- Monitors the implementation of plans with the cooperation of districts, governorates, ministries, union of municipalities, and municipalities. As for the developed master plans, the DGU has to report to and request approval from HCUP.
- Assists municipalities in developing needed studies for municipal projects and supervises their implementation.
- Supervises and follows up on the work of its units and technical offices in the districts, provinces, and regions. The role of the unit is to provide land, sorting, and building permits (UN-Habitat, 2013).

The Ministry of Public Works.

The work of the ministry is restricted to set specifications and design procedures. Within its mandate, the ministry has to:

- Develop a training plan for internal employees.
- Inspect walls, sewage systems, and bridges.
- Conduct feasibility studies (including risk assessments) for road networks (including bridges and tunnels) as well as administrative and government facilities.
- Evaluate the relevance of road networks to urban growth, taking present and future economic development plans into consideration.
- Develop rules for all stages of the lifetime of administrative and governmental buildings and road networks.
- Create terms of reference and technical requirements for all duties involving administrative and governmental facilities, including auditing and inspection.

- Create terms of reference and technical requirements for all duties linked to road network development and design as well as inspection and auditing.
- Create technical design analysis for administrative and governmental buildings.
- Create technical design analysis for sewage, bridges, and road networks.
- Conduct laboratory testing to identify the integrity of administrative and governmental buildings (Government of Lebanon et al., 2010).

The Order of Engineers and Architects (OEA). The Order of Engineers and Architects (OEA) was established in 1951. Its main purpose is to regulate the engineering profession through two branches located in Tripoli and Beirut. It is the only official regulator and reference for licensed experts to work as engineers in Lebanon (OEA, 2021) with around 11,000 registered members at the Tripoli branch and 50,000 at the Beirut branch (MoE et al., 2020). The OEA ensures the improvement of the engineering profession, and has an advantageous impact on Lebanese construction, development, and social factors (OEA, 2021).

The OEA has the authority to refuse construction permits whenever there is no compliance with technical norms. Construction drawings like structural, electrical, mechanical, and architectural drawings are reviewed by the Order's technical unit. Geotechnical reports are requested by the OEA in order to estimate and evaluate the land's bearing capacity. Furthermore, the OEA suggests amendments to regulations and laws for urban planning and its heads are members of HCUP (MoE et al., 2020).

The building code consists of text, figures, and specifications that rigorously structure and outline what is permitted and what is prohibited in an urban area, and what is architecturally legal or not. The present Lebanese building code was ratified in 1940 and is based on the French code, However, the code has been amended many times since:1954, 1971, 1983, and 1992. Decree no.148 of September 16,1983, was replaced in 2004 by the Lebanese Construction Law (646). The implementation decree was ratified in 2005 and revised in 2007 (Mourad, 2018).

Many initiatives and drafts have been developed to update the actual building code and integrate new challenges in terms of energy efficiency and renewable energy but none have been adopted.

Private Actors and International Organizations. Several private agencies and organizations have the capacity to intervene in promoting renewable energy and energy efficiency in Lebanon.

The qualification criteria for ESCO companies in Lebanon are based on different sections that reflect on employees' qualifications, the company's experience and track record in the sector, services provided by the company, financial revenues of the company, client's review, company's exposure, and lastly whether the company is a member of the World Energy Council.

Table 5 lists the companies that fulfil the different criteria set by the LCEC and are recognized as qualified energy service companies in May 2020, valid for one year (LCEC, 2020).

Table 5
ESCO Qualified Companies in Lebanon (LCEC, 2020)

COMPANY	QUALIFIED ESCO
Beta Engineering	✓
Earth Technologies	✓
Eco Consulting	✓
Energy Efficiency Group (EEG)	✓
Free Renewable Electric Energy (FREE)	✓
Green Essence	✓
METACS	✓
OTB	✓
Phoenix Energy	✓
Smart Age	✓
SMG-Energy/Enexys	✓

Civil Society Organizations (CSO). Several civil society organizations have the capacity to intervene in promoting renewable energy and energy efficiency in Lebanon.

The Lebanon Green Building Council. (LGBC) is a non-profit organization issuing recommendations on sustainable construction. The LGBC seeks to deliver accreditations to constructions that adhere to environmental guidelines, and to reorganize the processes through which communities and buildings are developed to enhance the quality of life of its residents. Its adherents promote sustainable structures, allowing efficient design and execution of constructed areas, and savings on natural resources for the benefit of future generations. In order to reach the purpose of sustainability, the LGBC identifies and promotes approaches, procedures, and solutions for the planning, design, and construction of new buildings or important renovation of existing buildings. It targets the creation of eco-friendly living areas, resource saving, and economic living spaces that improve the comfort and health of the residents. The LGBC has developed "The Greening Building code"[3] and "The Lebanese Energy Efficient HVAC Equipment Standard" in partnership with USAID in 2011 (LGBC et al., 2011), and it also aims to attain sustainability through its own certification system, the ARZ building rating. Furthermore, it develops and promotes design practices, educational programs, and industry standards focusing on environmental matters. It also conducts educational and research activities in schools and universities and promotes green building legislation and practices (LGBC, 2021b).

According to an interview with LGBC, UNDP Energy and Environment program–CEDRO 5 project, in partnership with LGBC, are working on ARZ2.0. The project is called: "Promoting Innovation and Entrepreneurship in Support of Lebanon's Clean Energy Transition." ARZ Green Building Rating System ARZ 2.0 is an updated version of ARZ 1.0 BRS, currently being developed to become a fully Web-Based Rating System for New and Existing buildings. ARZ 2.0 was prepared and coordinated by different teams, composed by several professional specialists during the last 27 months.It is almost finished and needs several tests and training sessions before its official launch, expected for 2022.

*The Eco-Switch Coalition.*The Eco-Switch coalition is a partnership of well-established companies, NGOs, and institutions that was set-up to encourage Lebanese eco-entrepreneurs. It aims to assist local green entrepreneurs to grow and expand their positive environmental impact by supporting them through numerous mechanisms, according to their needs (Switchmed, 2020).

*The Lebanese Solar Energy Society (LSES).*The Lebanese Solar Energy Society (LSES) is a non-profit organization whose main purpose is for Lebanon to be run entirely by renewable energy (RE). It develops trainings and educational programs in RE; raises RE awareness among the public; participates in seminars, exhibitions, and scientific activities in line with its objectives; presents proposals and draft laws to promote the solar energy market; and operates a platform for individuals and experts who support RE (Ghantous, 2019).

[3]https://lebanon-gbc.org/greening-building-law/

Renewable Energy and Energy Efficiency for Sustainable Energy (REESTART). REESTART is a project funded by the European Union (EU) that aims to improve accessibility to the ESCO market and expand its network; to provide medium or small companies with the REESTART ESCO list; and allow them to select an energy service company to facilitate and ensure future collaboration in the energy sector. REESTART's goals include the enhancement of ESCOs, the private sector, and investments in alternative energy resources to adopt sustainable and effective energy policies. It creates new job opportunities and promotes innovation and entrepreneurship to support a clean energy transition for Lebanon. Furthermore, it improves investment levels in EE and RE by establishing an environment for ESCOs to operate and expand (EU, 2020).

ESCO Markets in the MENA Region

The MENA ESCO market is still quite nascent in comparison to the ESCO markets in the US, China, and Europe. The UAE, specifically Dubai, houses the most developed ESCO market in the MENA region. One characteristic that perhaps differentiates some of the MENA-based ESCO markets is the existence of Super ESCOs.

The MENA region's energy efficiency performance is still behind other regions. Despite recent energy subsidy reductions introduced by certain MENA states, subsidies are still quite high in comparison to other parts of the world, which impedes the progress of energy efficiency. Still, the MENA region has great potential for energy efficiency projects and the development of a vibrant ESCO market. CEBC's "Energy Efficiency Status and Outlook" white paper found that commercial and government buildings in the MENA region accounts for roughly 27% of the electricity and 7% of the total consumption (CEBC, 2021). Most commercial buildings in the region are prime candidates for energy savings and performance improvements. Given that there is a need for the implementation of energy efficiency, it is important to develop the ESCO market in the region and ensure it is well-equipped to tackle the high-energy consumption and wasteful use of energy.

UAE

A 2021 CEBC ESCO survey found that 88% of survey respondents operated as an ESCO in Dubai; this indicates that Dubai serves as the MENA region's ESCO hub.

In 2013, Dubai launched the Etihad Energy Services Super ESCO program, the first of its kind in the MENA region. In 2014, Etihad ESCO had already generated 4.5 million AED in cumulative investments, 4.4 million kWh in energy savings and 2.2 MIG in water savings. In 2017, the Etihad Super ESCO generated 452 million AED in cumulative investments, achieved 194 million kWh energy savings and 132 MIG in water savings (Econoler, 2020).

The increase in cumulative investments, annual energy, and water savings demonstrates the progress of the Super ESCO, and the level of impact it has as it matures. This serves as a success story, as it indicates how impactful Super ESCOs are in advancing energy efficiency in the MENA region.

The Abu Dhabi Water and Electricity Authority (ADWEA) launched its Tarsheed program in 2016 to promote the efficient use of energy and launched the Kafa'ati program in March 2017, a program dedicated to improving the efficiency of existing buildings. These programs initially focused on government-owned buildings but have expanded to privately owned buildings as of 2019. Also in 2019, Tarsheed delivered an energy savings project that led to a 28% reduction in energy consumption.

Additionally, the Abu Dhabi Energy Services LLC (ADES) is a Super ESCO that was established in 2020. ADES has committed to an agreement with the UAE Ministry of Education to retrofit more than 200 schools in Abu Dhabi (CEBC, 2021). ADES currently covers 3,000 government-owned buildings in Abu Dhabi and aims at generating savings of 2.7 TWh electricity and 9 million cubic meters of water by 2030 in Abu Dhabi.

Although the UAE does have the most developed ESCO market in the region, ESCOs still face challenges in implementing projects. CEBC conducted interviews with ESCOs in the UAE in 2019. When asked about the major challenges they face, the ESCOs cited a lack of willingness from clients. Further, in CEBC's 2021 ESCO market survey, lack of awareness and support from decision makers was cited as a major challenge to their organization's success. Figure 12 demonstrates the structure of Super ESCOs and how they operate, while Figure 13 highlights the challenges hindering the growth of the ESCO market in the region.

Figure 12
Etihad Super ESCO Set Up

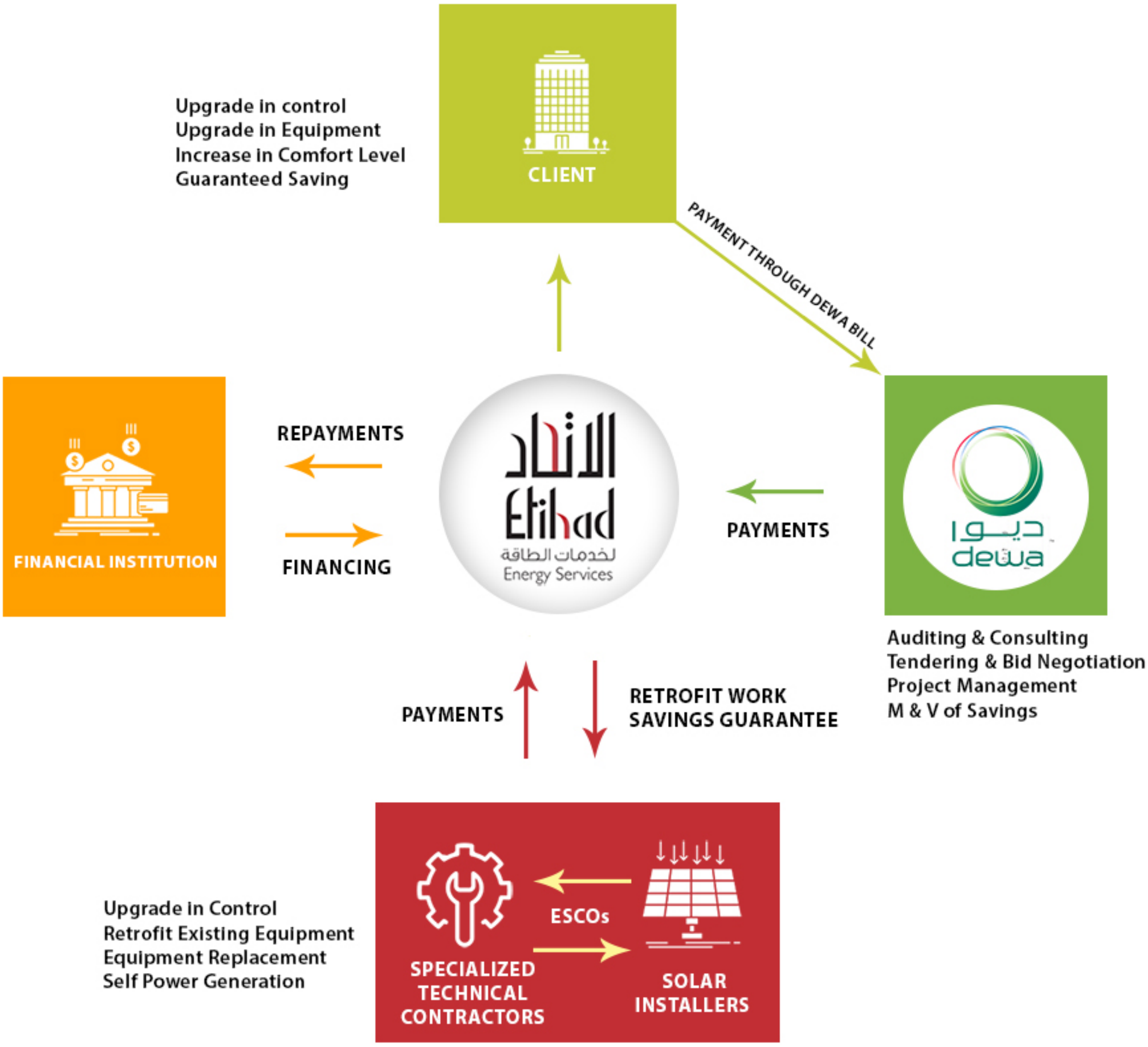
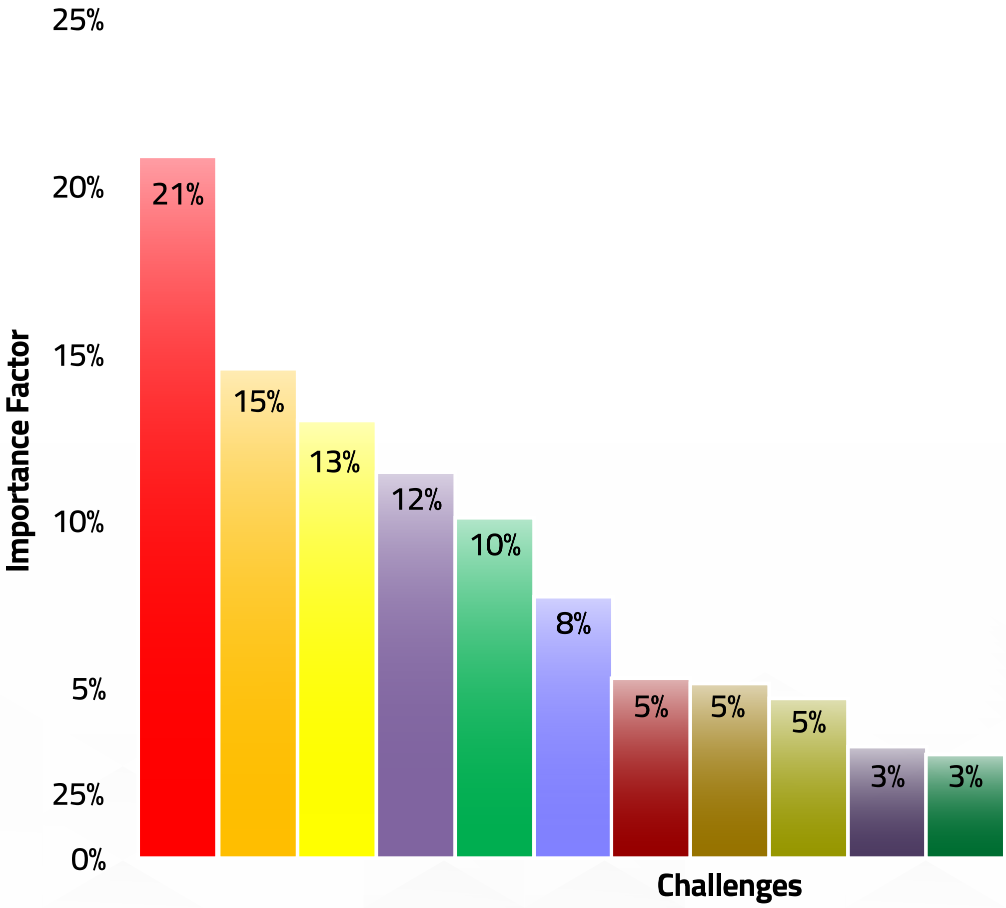


Figure 13
ESCO Market Growth Challenges in the Region

What are the major stumbling blocks for the growth of the ESCO market in the region?



Note.Source: CEBC ESCO Market Survey 2020-2021.

- Not enough ESCO tenders
- lack of awareness / support of decision makers
- Lack of budget
- Lack of sense of urgency
- Weak policies or Regulations
- Complexity of ESCO Contracts
- Lack of knowhow within procurement
- Confusion in the market
- Lack of project funding
- Lack of willingness to commit for long term
- Lack of internal coordination

KSA

The abundance of energy resources in Saudi Arabia has resulted in immense economic growth and development. At the same time, this has resulted in Saudi Arabia becoming one of the world's most inefficient energy economies with high-energy intensity (Ouda et al., 2017). The Saudi Energy Efficiency Center (SEEC) was established to tackle these issues, promote energy efficiency, and gather stakeholders from the private and public sectors to meet Saudi's energy efficiency targets. As part of its effort to promote energy efficiency, the SEEC launched the Saudi Energy Efficiency Program (SEEP), which works to improve energy efficiency in buildings, industry, and transport sectors (Ouda et al., 2017).

In formulating energy efficiency targets and goals at the national level, it is crucial to ensure that these are coupled with the establishment of specialist organizations. Specialist organizations such as the SEEC provide public and private entities with guidance and insights that enable them to meet national goals and targets within their own establishments. Further, the SEEP has been working to develop a general measurement and verification (M&V) capability within Saudi Arabia, which is pivotal to developing the ESCO market and the adoption of EPCs.

The establishment of organizations, such as SEEP, demonstrates the country's efforts in promoting energy efficiency and the growth of the ESCO market. This is especially important in countries with a younger ESCO market, as it provides the necessary guidelines and assistance to ensure the market's growth.

Saudi Arabia's first Super ESCO, Tarshid, was established in 2017 and was funded by the Saudi Public Investment Fund (PIF). Tarshid was mandated to retrofit all government buildings in Saudi Arabia to lower energy consumption. Tarshid's mandate includes around 70% of the energy efficiency projects in Saudi Arabia, which is estimated to be a market of approximately 11 billion USD (Lütken & Zhu, 2020). Since its inception, Tarshid has implemented a multitude of energy efficiency projects in Saudi Arabia. In 2020, Tarshid began retrofitting ministry buildings in Riyadh; this project would abate 3,700 tonnes of CO_2 emissions (Oommen, 2020). Additionally, Tarshid has also completed the first phases of retrofitting streetlights in numerous cities in Saudi Arabia. The replacement of energy inefficient streetlights in Makkah alone is projected to result in energy savings of about 70% (MEP, 2021).

Morocco

The Société d'Investissement Energetique (SIE) is the energy efficiency financing arm of the Moroccan government, which was tasked with developing the energy efficiency market in Morocco.

The SIE found that ESCOs and the implementation of EPCs would significantly impact the development of energy efficiency in Morocco. The SIE and the Ministry of Energy, Mines, Water, and the Environment worked with Econoler (International Consulting Firm with experience in EE and RE) and GIZ (German Society For International Cooperation) to implement EPCs in public buildings through ESCOs (Econoler, 2020). To accomplish this, the parties developed EPCs that were specially adapted to Morocco, conducted sessions on Engineering, procurement, and construction (EPCs), developed business plans to create public ESCOs, etc. This demonstrates how crucial it is to ensure that EPCs are adapted to the context in which they are used. Morocco has been expanding its ESCO market and promoting energy efficiency; it is one of the few MENA countries to have a Super ESCO. Although the ESCO market in Morocco is considerably smaller than the ESCO markets in the UAE and Saudi Arabia, it does have the potential to grow in the future, especially with increased support from the government.

Morocco has received financial assistance from the UAE and Saudi Arabia to contribute to the Moroccan Energy Fund (Kleissl, 2018). In cases of less economically developed countries in the MENA region, which may face increased impediments due to the lack of available financing to support their ESCO markets, financial assistance from abroad can make a substantial difference.

In 2020, the SIE was transformed into Morocco's first Super ESCO; this was done to facilitate the financing of energy efficiency projects in public buildings and assist ESCOs in overcoming barriers that they face in the market.

Oman

Due to high fossil fuel subsidies, Oman has one of the lowest electricity prices in the MENA; this has resulted in a lack of sufficient incentive for energy efficiency investments and initiatives. Oman's primary energy consumption is projected to grow fourfold by 2025, compared to 2011 levels (Econoler, 2020). The industrial sector is the largest consumer of energy.

However, to tackle the growing energy consumption and lack of energy inefficiency, the government has taken steps to develop its ESCO market. The Omani government tasked ESCOs with carrying out energy audits on government buildings; this effort would include 70% of government buildings subjected to the Cost Reflective Tariff (CRT) until 2025 (CEBC, 2021).

During the OQ Energy Efficiency conference (2021), the Under-Secretary of the Ministry of Energy and Minerals, Engineer Salim Nasser Al Aufi, emphasized the potential of ESCOs to promote energy efficiency and showed the Sultanate's willingness to develop its ESCO market further.

The ESCO market in Oman is much smaller and less developed than the ESCO markets in Saudi Arabia and the UAE. The lack of sufficient policy incentives that necessitate energy efficiency in Oman impact the pace at which its ESCO market grows.

Recommendations and Way Forward

Policy Level

- Prioritize energy efficiency at the policy level as a crucial pillar to expanding the ESCO market.
- As evidenced by the UAE and KSA, government involvement in the ESCO market can push for greater results in energy efficiency levels. It is therefore important for other MENA governments, including Lebanon, to take a more active role in setting out policies and laws that can drive up ESCO activities in their respective states.
- Set ambitious, but achievable, energy efficiency targets to incentivize energy efficiency.
- Ratify the draft Energy Conservation Law, which will promote the reduction and efficiency in energy use in the residential, commercial, and industrials sectors of Lebanon, targeting both behavioral changes and a more efficient stock of appliances and equipment.
- Identify a regulatory body in charge of introducing energy audit guidelines, certifications and accreditations of ESCOs, training and capacity building, and provision of transparency measures to ESCO contracts[4].
- Reform electricity tariffs' subsidies to further incentivize more energy efficiency projects by ESCOs.
- Assess the energy-intensive sectors, and enable the environment for the integration and employment of ESCO tools to address them.
- Engage the public sector through the introduction of awareness campaigns that encourage the implementation of ESCO services. This is especially important in the case of Lebanon, given the current fuel and electricity shortages. Awareness campaigns need to communicate to the public the economic benefits of energy efficiency measures.

[4] was proposed by a key informant interviewee (KII)

Financial Level

- As seen in other developing countries outside the MENA region (e.g., China), the private sector plays a crucial role in guiding the ESCO market to maturity. Thus, combining public and private financing through Public Private Partnerships (PPPs) will play a key role in the development of the ESCO market.

- Introduce Super ESCOs to impact the growth of the ESCO market and enable existing ESCOs to operate more efficiently. Super ESCOs are powerful instruments to expand the ESCO market, as seen in GCC countries (specifically the UAE). They can assist ESCOs in less economically developed countries to overcome financial and technical barriers.

- Use equity funds and joint venture transactions to enable public funding and private-sector capital flows into ESCO projects and to accelerate the growth of the ESCO market.

Technical Level

- In EPCs, introduce measurement and verification (M&V) schemes and country-specific guides5 to determine the energy, water, and cost savings that would be delivered from the installation of efficiency measures, such as the International Performance Measurement and Verification Protocol (IPMVP).

- Introduce workshops on EPCs and develop business plans for ESCOs to support thegrowth of the ESCO market, especially in contexts where the ESCO market is experiencing slow growth (as seen in Morocco).

[5] The role of M&V is to quantify the energy and cost savings that would result from the changes implemented in energy-consuming systems.

Conclusion

Despite the progress that the MENA region has seen in recent years, with regards to its implementation of more energy efficiency initiatives and its efforts to building up its renewables portfolio, more work needs to be done. Although several MENA states have integrated energy efficiency into their energy policies, the region still lacks large-scale actions, which have resulted in policies not being translated into visible results. ESCOs are pivotal to implementing energy efficiency in the region; however, due to the barriers they experience and the nascency of the market, they face serious impediments. Energy efficiency is 'low-hanging fruit,' and ESCOs play a vital role in reducing emissions. Thus, governments and the private sector need to ensure that there are concerted efforts towards maturing the ESCO market in their respective regions.

At the local level, Lebanon's electricity shortages and surging energy prices indicates the urgency of energy reforms and energy efficiency. With more MENA states committing to reach net-zero emissions targets, it is crucial to ensure that energy efficiency is implemented on a large-scale level in Lebanon. Currently, several entities in the country aim to kickstart a developed ESCO market. In order to ensure that these efforts are successful, all stakeholders must collaborate and assist in these efforts through holistic and innovative approaches to achieve energy efficient goals. Incorporating lessons learned from countries with more mature ESCO markets (e.g., China, US, and other MENA countries) could help propel the country towards its sustainable goals.

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