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The role of Super ESCOs in upscaling energy efficiency in the Arab Region

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Abstract

The paper develops the arguments for upscaling energy efficiency (EE) in the Arab region, stating that this upscaling needs to become a strategic pillar of the energy systems that are being developed in the region. It highlights the many benefits that such upscaling can have on the economic, environmental and social levels. The paper also reviews the policy and institutional frameworks that are required for up scaling EE in the region, and the existing challenges that need to be addressed.

The important role of Energy Services Companies (ESCOs) in implementing EE programmes is discussed by presenting, through the international experience, the main ESCO models that have been implemented, and the major lessons learned. A brief assessment of the development of the ESCOs market in the Arab region is also presented, showing that despite the important role that ESCOs can play in implementing EE programmes, this market did not quite materialize in the region, as well as other regions with similar energy services market conditions[1], in spite of the many attempts that were made to activate it over the last two decades.

The paper shows that Super ESCOs can be an effective instrument for stimulating and developing the ESCOs market in the region and overcoming many of the challenges facing the upscale of EE in Arab countries. Super ESCOs can be an efficient vehicle for channelling public funds in support of EE programmes, but also other demand-side management solutions such as RE systems at the energy end-users' levels, and implementing these programmes in the region, in a win-win framework for all relevant stakeholders. Super ESCOs can provide the needed support for local SMEs operating as ESCOs in their respective countries, develop their capacities, create market opportunities for them, and monitor the quality assurance of their interventions, therefore raising the confidence level of end use consumers and financiers dealing with ESCOs and EE investments. The propositions are based on a discussion of the Super ESCOs international experience, as well as initial experiences in the Arab region, and their potential development. Sketches for typical Super ESCOs settings and structures, suitable for the region, are also proposed.

[1] ESCO Market Report for Non-European Countries 2013, Report EUR 26886 EN, 2014
https://iet.jrc.ec.europa.eu/energyefficiency/sites/energyefficiency/files/reqno_jrc91689_ld-na-26886-en-n.pdf

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1 Introduction

For more than two decades, the Arab region has experienced very little improvement in energy efficiency (EE), as was noted in the Arab Region progress in sustainable energy of the Global Tracking Frameworks[2]. In fact, energy intensity, a proxy used to measure energy efficiency, has hardly improved over the last 25 years in this region, while the rest of the world has shown steady decline in energy intensity. This is mainly due to the following: on one hand, the relatively low end-users 'energy prices, providing little incentives to households and the private sector to invest in EE, and on the other hand the lack of ambitious EE policies, implementation programmes and institutional frameworks based on a clear strategy to make EE one of the strategic pillars in shaping the considered energy systems in the Arab region in the past decade. This situation is corroborated by a recent report assessing the enabling environment for investment in sustainable energy in over 100 countries. The report on "Regulatory Indicators for Sustainable Energy (RISE)" [3], tracked a set of indicators on policy and institutional frameworks through a scoring system, for 27 relevant indicators. The scores obtained by the fourteen Arab countries, which were considered in this report, showed that only one Arab country had policy frameworks indicating that its government has given some priority to EE. Eight countries needed to make significant improvements in their EE policy environment and five countries had significant gaps in that respect.

This weak policy and institutional framework induced a quasi-paralysis of the EE services market in most countries in the Arab region. And, in most of these countries, current EE activities and efforts are focusing on developing programmes and policies that can only have a significant impact in the long term, if appropriate enforcement mechanisms are developed and implemented, such as energy performance codes for new buildings and minimum energy performance standards (MEPs) and energy efficiency (EE) labelling for appliances, pilot or demonstration EE projects, and a number of energy audits in the building and industrial sectors, etc. Institutional capacity and responsive regulatory frameworks are not well developed in most countries in the region, which reduces the chances of success of whatever EE policies that were developed. The lack of significant energy efficiency progress is so important that deeper systemic actions are required to advance EE.

Limited efforts are being made to create a suitable environment to tap into the immediate opportunities for energy efficiency (EE) actions in the different economic sectors, and particularly the demand side, such as building, industrial and public transport sectors, with EE actions targeting the existing stocks of buildings, industrial facilities and public transportation fleets and systems. Global experience shows that successfully tapping into this important potential, would benefit national budgets, productivity, end use consumers and the environment, and would largely contribute to significant progress towards reaching the countries' energy security and sustainable development goals and meeting climate change commitments. Indeed, there is an urgent need to operate a change of scale in achieving EE in these existing stocks, whether in the public or the private sectors.

One of the major instruments that allowed many developed, and some developing, countries in other regions of the world to operate this change of scale are Energy Services Companies (ESCOs). ESCOs can deliver/implement EE at the required scale, combining global financial resources with technical and programme implementation expertise. But except for one or two countries, the ESCO market in the Arab region is either inexistent, or very limited.

This paper looks at the situation of the ESCO market in the region in the light of international experiences. Furthermore, it argues that because of the prevailing conditions in the region with respect to EE services and the constraints that ESCOs face, Super ESCOs can be expected to be a viable instrument to sustainably deliver a change of magnitude in the EE services activities in the region and induce the creation of thriving new private sector ESCO markets or a vigorous revival of existing ones.

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[2] Arab Region Progress in Sustainable Energy - Global Tracking Framework Regional Report, E/ESCWA/SDPD/2017/2, 2017, https://www.unescwa.org/publications/gtf-regional-report-arab-region-progress-sustainable-energy

[3] Regulatory Indicators for Sustainable Energy (RISE)- 2018 Report (2017 indicators), http://documents.worldbank.org/curated/en/553071544206394642/pdf/132782-replacement-PUBLIC-RiseReport-HighRes.pdf

The first chapter discusses the need for upscaling EE in the Arab Region, presents the various benefits associated with this goal and the existing challenges facing the necessary actions.

The second chapter discusses the role of ESCOs in implementing EE programmes and activities and presents the different business models used by ESCOs to carry out their activities. The chapter also go over the lessons learned from the international experiences of ESCOs and those emerging from the review of the limited ESCOs market development in the Arab region.

The third chapter is dedicated to presenting Super ESCOs as a powerful instrument to overcome the barriers to ESCOs markets and to scaling up EE in the Arab Region. And the last chapter proposes a typical framework and structure for Super ESCOs in Arab countries and provides some concluding remarks and indications about the way forward.

2 The need for scaling up energy efficiency in the Arab Region

Energy consumption in the region has been steadily increasing over the last three decades, both in terms of electrical and primary energy consumption. Current trends indicate that this will continue over the next decade, driven by population growth, economic development, expanding middle class incomes and rapid urbanization. Moreover, there is no sign that GDP growth is increasing at greater rates, which suggests the absence of a foreseen decoupling between energy and GDP growth and a decline in energy productivity. Indeed, "*the efficiencies associated with the production, distribution and end use of energy compare very poorly with international benchmarks. This situation is due to technological gaps and behavioural deficiencies, aggravated by the lack of adequate policies and economic incentives for promoting more sustainable energy consumption patterns*"[4].

As a result of this combination of circumstances, there is a substantial potential of energy reserves that could be mobilized by promoting and implementing large scale EE programmes, and end-use consumer applications of renewable energy (RE), to considerably reduce the significant energy inefficiencies that are prevailing across all demand side sectors in the region: "*The Middle East, despite having comparatively little industry, which globally is the largest consumer of energy of any end use sector, is the least energy efficient emerging region*"[5] In fact, the reduced energy demand resulting from these EE efforts could free up a considerable amount of resources that could be considered an additional source of energy supply in the region. Simultaneously advancing renewable energy with energy efficiency evolves a low-carbon distributed energy supply system. Importantly this integration avoids wasting the new renewable energy in old losses and inefficiencies. Moreover, the Paris agreement considers that addressing EE and RE in an integrated comprehensive approach is essential for maximum carbon emission reduction. In fact, *for an economy to invest in renewable energy without making the necessary energy efficiency efforts/investments, is like filling a leaking tank with water from a new desalination plant!*

This will allow net energy importing countries to reduce their energy dependence, and for most of them, to provide benefits at fiscal level and relieve their national budgets from the burden of associated energy subsidies. Net energy exporting countries will be able to reduce their domestic energy consumption and increase their exporting capacities, or their strategic energy reserves for the future. However, only a substantial, and rapid, scale up of EE in the Arab region can allow the swift mobilization of these energy reserves.

It should also be noted that scaling up of EE in the Arab region would allow the Arab countries to meet their commitments with regard to the Agenda 2030[6], principally with respect to Sustainable Development Goal 7 (SDG7) and SEforALL goals, but also with respect to many other SDGs associated with sustainable energy. And given the urgency of scaling up EE in the Arab region, Arab countries are encouraged to even

[4] Analysis of Energy Policy Trends in the Arab Region
https://www.unescwa.org/sites/www.unescwa.org/files/publications/files/l1500568.pdf

[5] Springborg, Robert (2014).*The Energy Revolution's Impacts on the Arab World.* MEI Policy Focus, 10 June. Available from: http://www.mei.edu/content/article/energy-revolution%E2%80%99s-impacts-arab-world

[6] Transforming our world: the 2030 Agenda for Sustainable Development, UN Resolution A/RES/70/1, adopted by the General Assembly on 25 September 2015

adopt a more ambitious target for EE than what SDG7 stipulates. Indeed, target SDG 7.3 (and SEforALL) calls for doubling the global rate of improvement in energy efficiency. However, to stop the present energy "haemorrhage" and harvest all the direct benefits and co-benefits associated with EE will require much grander ambitions and achievements than doubling the present rate of improvement in EE in the region by 2030. Indeed, this will require accelerating the adoption of EE improvements across the various economic sectors to make up for the low EE performance of the Arab region during the last three decades.

2.1 EE is not yet an important pillar of energy systems in Arab countries

It is clear that Arab countries have much to gain by considering focused strategies, and associated policies, institutional frameworks and implementation instruments, to decouple necessary socio-economic development from unchecked energy resource utilization. Many Arab countries started in recent years to consider EE as an important component of their national energy programmes, but in most cases, these intentions have yet to materialize in a mature process.

More than ten Arab countries established their first National Energy Efficiency Action Plans (NEEAP), within a framework developed by the League of Arab States (LAS)[7], including national targets for reducing energy consumption at the end-user's levels. The LAS framework calls upon Arab countries to commit to developing, monitoring, evaluating and updating these plans every three years. Additional Arab countries are following suit and starting to develop their own national plans as well.

Furthermore, many countries in the region are developing policies and regulatory frameworks and setting up institutional and implementation instruments to promote EE at the national level. However, very few are setting up quantitative long-term goals for the contribution of EE in their energy landscape. Indeed, all of the sixteen Arab countries that submitted their Intended Nationally Determined Contributions (INDCs)[8] mentioned EE as an important mean to be used in their mitigation efforts. Yet, to this date, only half of these countries registered their first Nationally Determined Contributions (NDCs)[9], confirming their intentions, and only three[10] of these countries included quantitative targets for their EE efforts to be achieved by 2030.

This situation indicates that in most Arab countries, although the need for EE is recognized by decision makers, it has not yet been raised to the level of strategic priority it deserves in becoming the "first fuel". Accordingly, the human resources and financial means that such a strategic choice requires are not being sufficiently deployed. Furthermore, scaling up EE deployment faces many challenges and barriers, despite the multiple benefits that can be associated with this important pillar of any sustainable energy system.

2.2 Various benefits of scaling up EE for Arab countries

A study by the International Energy Agency (IEA) showed that EE is a key resource for economic and social development across all economies[11]. Termed as the "First Fuel" by IEA, a multitude of benefits and co-benefits are associated with EE, beyond the reduction in energy consumption and the associated positive impacts on the local and global environment. These various benefits involve a variety of stakeholders and can be grouped in five themes: "*enhancing the sustainability of the energy system, economic development, social development, environmental sustainability and increasing prosperity*".

For Arab countries, these multiple benefits include in particular:

- ✓ ***Enhanced macroeconomic development*** through direct and indirect impacts on economic activity, job creation, better trade balance, increased competitiveness and lower energy costs.

[7] Arab Ministerial Council for Electricity approved during the twenty sixth meeting of its executive bureau on 23/11/2010; resolution number 195, an "Arab Guideline for Improving Electricity Efficiency and Rationalize its Consumption at the End User"

[8] http://www4.unfccc.int/submissions/indc/Submission%20Pages/submissions.aspx

[9] http://www4.unfccc.int/ndcregistry/Pages/All.aspx

[10] Algeria, Morocco and Tunisia announced in their NDCs clear targets of reduction of the energy consumption by 2030: 9% reduction for Algeria, 15% for Morocco and 30% for Tunisia.

[11] Capturing the Multiple Benefits of Energy Efficiency, IEA 2015, https://www.iea.org/publications/freepublications/publication/Captur_the_MultiplBenef_ofEnergyEficiency.pdf

- ✓ ***Healthier public budgets***, mainly by reducing the national expenditure on energy, cutting the share of public expenditure devoted to cover end-users' energy' subsidies, in net energy importing countries, or reducing the lost economic opportunities associated with locally retailing energy below international energy prices, in net energy exporting countries. But also generating additional fiscal revenues associated with the economic activities induced by energy efficiency deployment.
- ✓ ***Improved industrial productivity***, by reducing operational costs, thus enhancing competitiveness and profitability, and sometimes even improving product quality. Some EE measures can also improve the working environment, providing higher labour productivity.
- ✓ ***Better health and well-being***, by improving EE in new and existing buildings, substantial reductions in energy requirements can be achieved for providing space comfort conditions, therefore allowing to generalize improved occupants' health and well-being in residential and institutional buildings, including schools, hospitals, nursing homes, etc.
- ✓ ***Upstream benefits to power and water utilities*** from investments in end users' consumption patterns

The IEA report on Capturing the Multiple Benefits from Energy Efficiency outlines in detail each of these outcome areas.

For many Arab countries, additional benefits can also be achieved:

- ✓ ***Increased access to energy services***, by making available the displaced power capacity and saved energy, through EE, to supply more people, or improve the energy supply reliability for the current beneficiaries, through the existing energy infrastructure.
- ✓ ***Improved affordability of energy services / poverty alleviation***, by reducing the energy requirements associated with the different energy services, EE allows them to become more affordable, particularly for vulnerable fractions of the population. Moreover, EE would be, in that respect, one of most effective accompanying measures for any programme to phase out end-users' energy prices subsidies.
- ✓ ***Reduced local pollution***, by reducing energy requirements, both at the end use and energy supply sides, EE will contribute to lowering pollutants emissions and other energy associated environmental impacts, with no prejudice to economic growth.

2.3 Policy frameworks and Institutional instruments for scaling up EE in Arab countries

Implementing EE requires an enabling environment, including policy frameworks and institutional instruments, that promotes EE programmes and mobilizes the required human and financial resources. Ramping up EE investments requires specific implementation instruments that can intervene rapidly and effectively on a large-scale basis to deploy EE programmes and measures over a large number of beneficiaries. The EE instruments would normally be based on an existing well-developed EE policy framework and institutional apparatus, to extend their prerogatives in a way that allows a more accelerated deployment of EE solutions over large fringes of the relevant economic branches.

A sound EE policy development framework requires a thorough assessment of the energy intensive economic sectors and particular branches, and the associated potential of EE improvement opportunities, their costs and benefits, and developing appropriate EE programs that addresses the barriers to their implementation at an appropriate pace and scale that is capable of tapping into the multiple co-benefits of EE for the region.

Upscaling EE requires that actions be supported by the combination of at least four main pillars:

- *Setting up ambitious, yet realistic, EE targets that are chronologically well defined*
- *Developing and enforcing appropriate and evolving EE policies, institutional capacities, regulations and standards*
- *Mobilizing fiscal policies, financial resources and providing the right doses of incentives for EE programmes and measures*
- *Designing and applying appropriate implementation instruments and schemes for EE programmes and measures, along with their institutional frameworks*

Furthermore, the process of upscaling EE can only be fulfilled if a suitable Evaluation, Monitoring & Verification (EM&V) system is implemented to monitor the EE savings results versus the EE targets, validate the cost-effectiveness of the EE programmes and improve their delivery and results.

2.4 Key challenges for Scaling up EE programs in the Arab Region

Many EE policy options have been recognized/identified for the Arab region and there is a clear consensus about the real urgency to further develop such policy options and implement associated large-scale EE programmes in the region. However, many challenges need to be addressed in order to tap into these large EE potentials, and converting them into investments and tangible energy savings and fully profit from the multiple benefits associated with such activities.

The main challenges in the Arab countries can be identified as follows, as was largely acknowledged by a panel of energy experts from the region[12] and discussed in a previous ESCWA publication[13].

- ***Challenges related to institutional and policy frameworks****:*
  - ✓ *poor policy implementation and institutional frameworks for EE in many countries in the region,* turning eventual EE targets into meek wish lists. This situation can only be reversed by making EE a national priority and mobilizing the required resources necessary for building strong and effective policy implementation frameworks through robust institutions that can promote and support EE.
  - ✓ *limited capacity for enforcing regulatory policies, such as building energy performance codes or vehicle fuel economy standards.* In fact, many countries have developed a significant set of regulatory EE policies and standards but did not put in place the required instruments and resources to enforce these regulations. This situation requires the development and implementation of effective and sustainable systems, including clear processes, for enforcing EE regulations and standards.
  - ✓ *Weak institutional governance, lack of awareness about the benefits of EE, limited capacities and lack of effective coordination between public institutions* can also make the previous two handicaps even more challenging.
- ***Challenges related to end-user energy price distortions:*** Low costs to domestic end users of conventional energy resources in Arab region make demand side and renewable alternatives much less economically viable than in other countries and can in most countries in the region eliminate any economic incentive, at the end-user level, for implementing EE measures. Most of these low end-users' energy prices are the result of implicit or explicit energy subsidies, which are becoming severe burdens to public budgets as well. Governments should seriously consider deviating a good portion of these subsidies, in an economically viable scheme, to provide financial incentives to EE programs. In recent years, price reforms have gradually been taking shape in the region thereby creating in some countries more opportunities for EE.
- ***Challenges related to difficulties in financing EE measures:*** While many EE measures are low cost, other measures are more capital intensive, or strategic investments, and often require important upfront capital costs, particularly when retrofitting existing non-energy performing installations or replacing energy inefficient equipment by high energy performance plants. This requires access to affordable financing from financing parties that often are not familiar with EE. Also, many states in the region lack adequate resources to invest in energy related infrastructures. Making EE a national priority, and mobilizing public resources to support EE targets, by developing national EE implementation programs, should help in creating an enabling environment for investments in EE. The creation of

[12] Energy Efficiency Policies for the SEMED-Arab Region, An Energy Efficiency Experts' Roundtable Report http://www.iea.org/media/workshops/2013/semedmenaroundtable/SEMEDArabRegionalEEPRWorkshopReportfinalOctober2014forwebAG.pdf

[13] Analysis of Energy Policy Trends in the Arab Region https://www.unescwa.org/sites/www.unescwa.org/files/publications/files/l1500568.pdf

dedicated credit lines, with possible contribution of international financing parties, is a good example of an enabling process.[14]

- ***Challenges related to the limited role played by the private sector in promoting EE:*** This is due to the low private sector capacity for identifying, developing and implementing energy efficiency projects that are economically attractive for their businesses, and the perceived risks. The development of a viable market for Energy Services Companies (ESCOs) would create a network of knowledgeable businesses that can carry out the various implementation phases of EE programs and provide the necessary guarantees for their impacts, and in some cases financing as well. However, this is only possible in the presence of an enabling policy and institutional environment, or other exceptional arrangements that would support the ESCO market transformation.
- ***Challenges related to insufficient information about EE and lack of related technical skills and supporting institutions,*** this situation is due to the diversity of EE measures that are suitable to different energy end-use sectors, and the associated requirements in terms of information and skills. This lack of structured and reliable information at the consumer level, and sometimes at the energy service sectors players, can decimate the credibility of an eventual EE program. The lack of accredited equipment testing laboratories can make these challenges even more complicated. Overcoming this situation requires appropriate capacity building programs, and formal training cursus, sanctioned by formal diplomas or accreditation attestations, combined with the implementation of an effective policy and institutional framework and the development of a viable market for energy services.

The above barriers occur in synergy requiring that all of them be simultaneously addressed.

3 The role of Energy Services Companies (ESCOs) in implementing EE programmes

As introduced in the previous chapter, Energy Services Companies (ESCOs) can play a major role in meeting many of the challenges facing the implementation of EE programs in the Arab region. Because ESCOs provide integrated institutional, technical and finance capabilities for energy efficiency related services, they are considered a key instrument for implementing successful large-scale EE programs targeting the existing stocks of buildings, facilities or other energy services system. So, what are ESCOs and how do they operate?

According to UN terminology, an "***ESCO** is a firm which provides a range of energy efficiency and financing services and guarantees that the specified results will be achieved under an energy performance contract*"[15].

A more elaborate definition is provided in the European Union (EU) Directive on Energy End-Use Efficiency and Energy Services (Energy Services Directive) [EU 2006][16], defining an **ESCO as** "*a natural or legal person that delivers energy services and/or other energy efficiency improvement measures in a user's facility or premises, and accepts some degree of **financial risk** in so doing. The payment for the services delivered is based (either wholly or in part) on the achievement of energy efficiency improvements and on the meeting of the other agreed performance criteria*". The directive also defines an *'energy service'* as **"***the physical benefit, utility or good derived from a combination of energy with energy efficient technology and/or with action, which may include the operations, maintenance and control necessary to deliver the service, which is delivered on the basis of a contract and in normal circumstances has proven to lead to verifiable and measurable or estimable energy efficiency improvement and/or primary energy savings*".

A similar definition for ESCOs is provided by the USA Department of Energy, stating that "*Energy service companies (ESCOs) develop, design, build, and fund projects that save energy, reduce energy costs, and*

[14] A review of EE credit lines is provided in World Bank – ESMAP Live Wire 2014/11. "Designing Credit Lines for Energy Efficiency," by Ashok Sarkar, Jonathan Sinton, and Joeri de Wit. http://hdl.handle.net/10986/18410

[15] UN Terminology, https://cms.unov.org/UNTERM/Display/Record/UNOG/NA/3271600b-b56c-4a77-a0d4-940873ff7016

[16] Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on Energy End-Use Efficiency and Energy Services and repealing Council Directive 93/76/EEC, Official Journal of the European Union - 27.4.2006, EN, L114/64 http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32006L0032&from=en

decrease operations and maintenance costs at their customers' facilities. In general, ESCOs act as project developers for a comprehensive range of energy conservation measures and assume the technical and performance risks associated with a project. ESCOs are distinguished from other firms that offer energy-efficiency improvements in that they use the performance-based contracting methodology. When an ESCO implements a project, the company's compensation is directly linked to the actual energy cost savings."[17]

In fact, an ESCO is a business entity that delivers a set of energy integrated solutions to a customer's project, covering its entire life cycle (from planning to operation & maintenance) using a multidisciplinary support (technical, economic, financial, organizational and legal aspects). This integrated approach is key to ESCOs' ability to break through some of the barriers identified above.

Indeed, an ESCO's role include developing a project for a set of EE measures and solutions, based on an assessment of the energy performance of a client's targeted building, facility, or other energy services system. The ESCO provides, or arranges, for the upfront financing of the required investment for the developed EE project, and accepts that payments, in return for its role and provided services, be secured through a share of the achieved energy savings, via an Energy Performance Contract (EPC) or a Third-Party Financing (TPF) arrangement. This arrangement will also specify the type and conditions of energy savings monitoring, measurements and verification that ESCOs are required to perform for the EE project.

3.1 The different ESCO Business models for implementing EE projects

There are different ESCO business models, but all are set up to insure the following in the context of implementing EE projects[18]:

- ✓ Offering a complete range of EE implementation services
- ✓ Offering or arranging financing of EE implementation services (often 100%) under the framework of "shared savings" or "guaranteed savings" contracts
- ✓ Guaranteeing specific performance for the entire project, based on a level of energy and/or cost savings; Energy Performance Contracts (EPC).
- ✓ Receiving payments for the provided services on the basis of demonstrated satisfaction of the performance guarantees (under the "Energy Performance Contract")
- ✓ Taking most of the technical, financial, and maintenance risks associated with the project

All ESCOs' business models have in common to make the implementation of turn-key EE projects without any upfront capital investment provided by the client (End-user). The client's responsibility is repaying the investment, made or arranged by the ESCO, under a special contract, through a share of monetized energy savings accrued due to the EE measures.

The following three ESCO business models represent the most current ESCOs' settings[19]: "Shared Savings" (Figure 1), "Guaranteed Savings" (Figure 2) and "Chauffage" (Figure 3) The three figures, provide schematic presentations for the generic set-ups and financial models of these ESCO's business models.

- In a ***Shared-Savings*** business model, or EPC contractual agreement, the following set-up applies:
  - ➢ The ESCO arranges for the financing of the total upfront capital cost of the EE project's investment (and is fully responsible for repayment of the contracted loan in case it borrows from lenders).
  - ➢ The client pays the ESCO an agreed percentage of the achieved energy costs savings resulting from the EE project.
  - ➢ This amount, which in some cases can be an agreed upon fixed amount, should be large enough to allow the ESCO to cover the amount due to the lenders to repay the project's investment and other costs associated with the project, including M&V costs, risk and profit margins.

[17] ESCO web page of U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy web site, https://energy.gov/eere/femp/energy-service-companies-0

[18] Super ESCOs are not covered in this section and will be discussed in Chapter 4.

[19] IFC - Energy Service Company Market Analysis, June 2011 http://www.ifc.org/wps/wcm/connect/dbaaf8804aabab1c978dd79e0dc67fc6/IFC+EE+ESCOS+Market+Analysis.pdf?MOD=AJPERES

- The client, the energy-end user benefiting from the EE project, has no direct contractual commitment to the financier of the project, and only the ESCO has this contractual responsibility.

- In a ***Guaranteed Savings*** business model, or EPC contractual agreement, the following set-up applies:
  - The ESCO helps the client in securing the financing of the total upfront capital cost of the EE project's investment, but the client is fully responsible for reimbursing the contracted loan to the lender.
  - The client repays the loan and pays the ESCO an agreed percentage of the achieved energy costs savings resulting from the EE project to cover the ESCO' costs associated with the project, including M&V costs and any benefits for the ESCO.
  - The ESCO guarantees a minimum amount of energy costs savings that is usually equal to the financing reimbursement amount and pays the client for any underperformance of the EE project.
  - The ESCO implementing the EE project, has no direct contractual commitment to the financier of the project, and only the client has this contractual responsibility.

  This option may best suit clients that need to retain control of their assets.

- In a "***Chauffage" (integrated solutions)*** business model, or EPC contractual agreement, a more complex set-up applies, resulting in a higher value-added approach:
  - In this model, the ESCO offers energy services (i.e. space air conditioning, industrial utilities such as compressed air, etc.) at a specified unit price per energy source to be consumed or per other measurable criteria (space square footage, units of industrial utilities, etc.) through a supply and demand contract.
  - The ESCO owns the energy services facility, implements the EE project(s) and manages all supply and demand efficiencies.
  - The ESCO arranges for any required financing to implement the EE project(s) investment(s) and is fully responsible for reimbursing the contracted loan(s).

This model is derived from an earlier French contracting arrangement termed "contrat d'exploitation de chauffage", origin of the wording "Chauffage" for this form of EPC. This contractual agreement was used for providing energy services by a private company to a public institution or a private operator (owner of real estate properties, etc.). In the former French concept, up to three elements made up the contract: Energy supply (P1), Maintenance (P2) and Total guarantee; covering equipment replacement at the end of its respective life (P3).

Table 1 provides a summary of the main features of the Energy Performance Contracting (EPC) Models associated with the 3 ESCOs business models discussed above.

Table1 - Main features of the EPC Models associated with the 3 main ESCOs business models

Business Model / EPC type	Investment/Loan is on whose balance sheet?	Who takes the Performance Risks?	Is the financing project specific?
Shared Savings	ESCO	ESCO	Yes
Guaranteed Savings	Client / Customer	ESCO	Yes
"Chauffage"	ESCO	ESCO	No

All ESCO business models discussed above can substantially contribute to addressing the following three challenges that were identified in the previous chapter:

- ✓ Challenges related to financing EE measures, since ESCOs will be a knowledgeable interlocutor for financing institutions that can provide the required funds for high upfront capital costs, since ESCOs can guarantee the economic impacts of the respective EE projects. They can also be the perfect partners for any special fund set up to improve energy sustainability in the country.

- ✓ Challenges related to the limited role played by the private sector, since ESCOs can carry out, in the necessary knowledgeable manner, the different tasks associated with EE projects on behalf of the institutions hosting these EE projects.
- ✓ Challenges related to insufficient information and lack of related technical skills and supporting institutions, these challenges can be met by the creation of a network of competent ESCOs, allowing the development of a sizeable market that can lead the upscaling efforts of EE projects and programmes.

However, the ESCOs market can only fully develop if the first two challenges that were presented in the previous chapter are addressed, namely the policy and institutional frameworks and the energy price distortions at the end-users' levels.

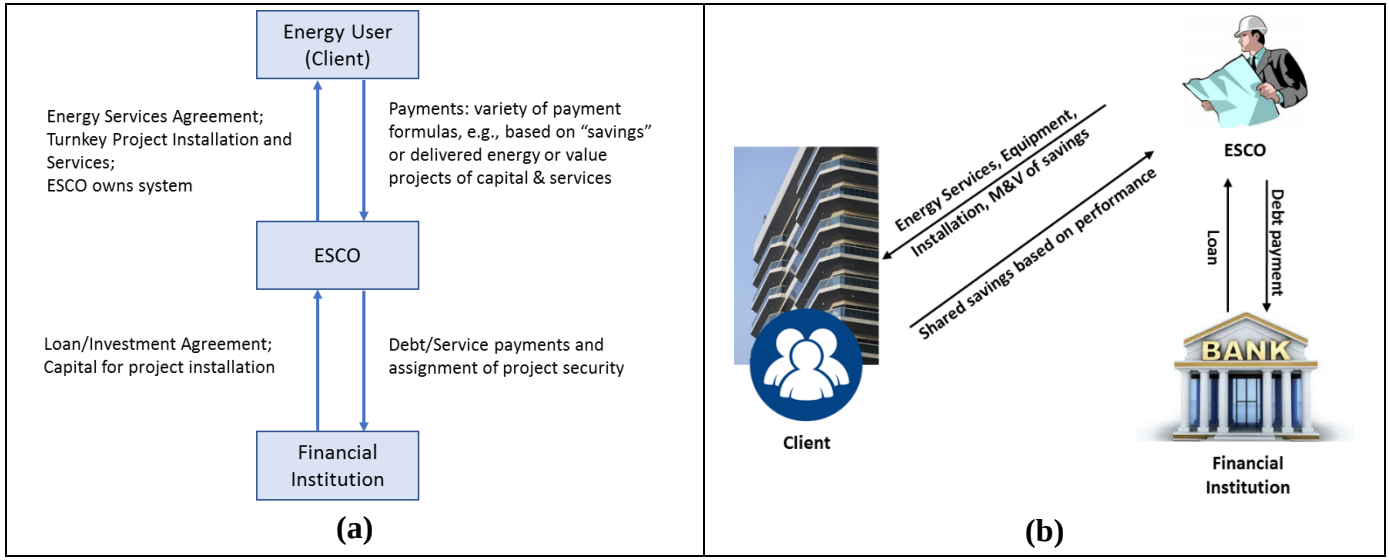

Figure 1 - Shared Savings ESCO Business Model: (a) Generic set up (b) financial model

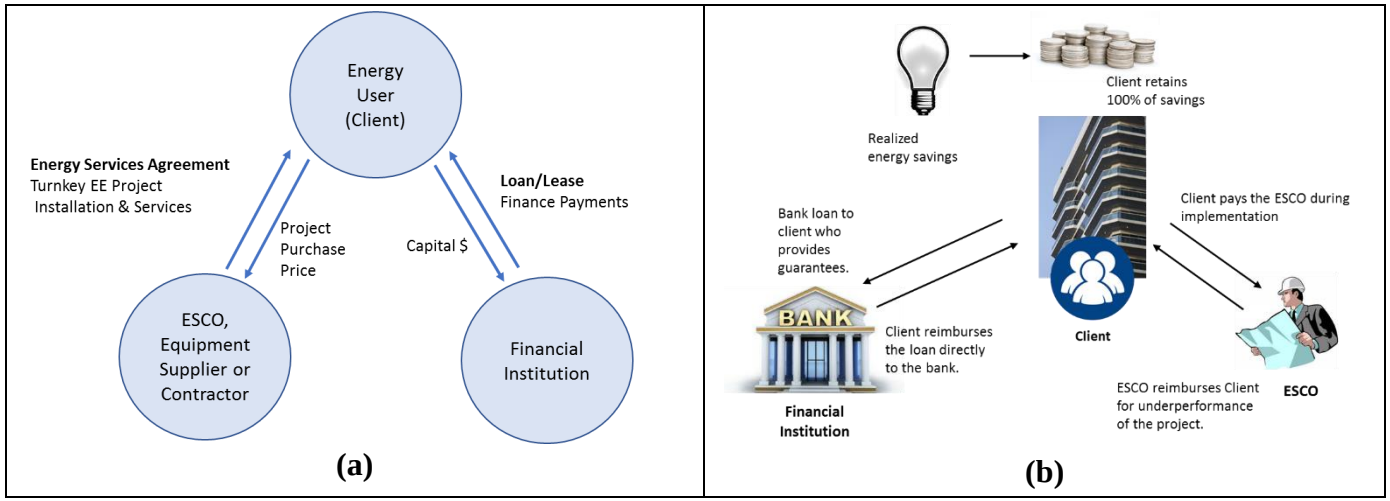

Figure 2 - Guaranteed Savings ESCO Business Model: (a) Generic set up (b) financial model

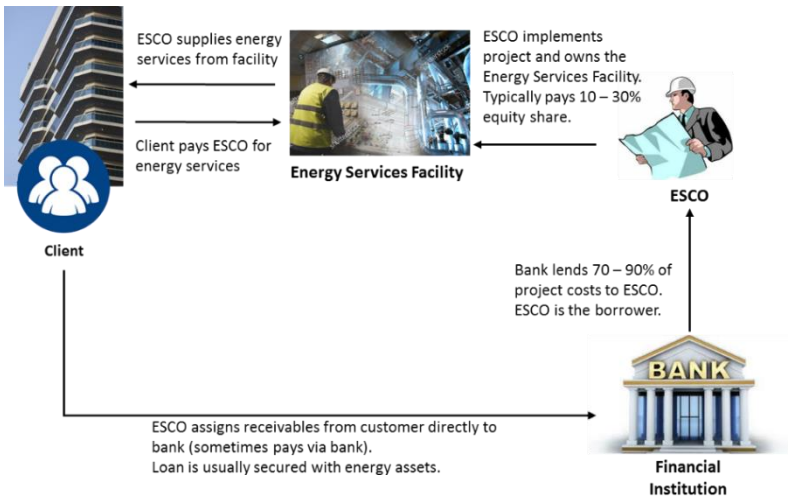

Figure 3 – "Chauffage" ESCO Business Financial Model

3.2 The international experience of ESCOs development: Lessons learned

The first recorded appearance of ESCOs was in the early 1970s in the USA. Early ESCOs activities took place in Europe and Asia in the 1980s and 1990s and started emerging in a limited manner in few developing countries in the 2000s[20]. The international experience, as reported and analysed in many publications, allows the following observations.

- ***The ESCO market has been broadly developing worldwide***, and ESCOs became a central player in the implementation of EE projects and programmes, particularly in the building sector. In fact, ESCO businesses have grown to become an important and distinct market. In 2017, the total global turnover of this market was USD 28.6 billion, an 8% growth rate with respect to previous year. China is the largest market, with over 600,000 people employed, USD 16.8 billion of revenues (a growth of 11% in 2017). In the same year, ESCO revenues were USD 7.5 billion in the United States, more than doubling over the past ten years. ESCO revenues were USD 3.0 billion in the European Union (EU). Figure 4 shows the distribution of ESCO revenues throughout the world for 2017 by region, and Figure 5 shows, for the same year, the distribution of ESCO revenues per end uses across a number of countries in the world[21].

[20] "The effect of ESCOs on energy use" [*Energy Policy 51 (2012) 558–568*]: http://ac.els-cdn.com/S0301421512007501/1-s2.0-S0301421512007501-main.pdf?_tid=dc07de90-d8c8-11e6-8503-00000aacb35f&acdnat=1484226967_aa46b6efee48d7904f3d4092fd3af42a

[21] Energy Efficiency Market Report 2018 – IEA, https://webstore.iea.org/download/direct/2369?fileName=Market_Report_Series_Energy_Efficiency_2018.pdf

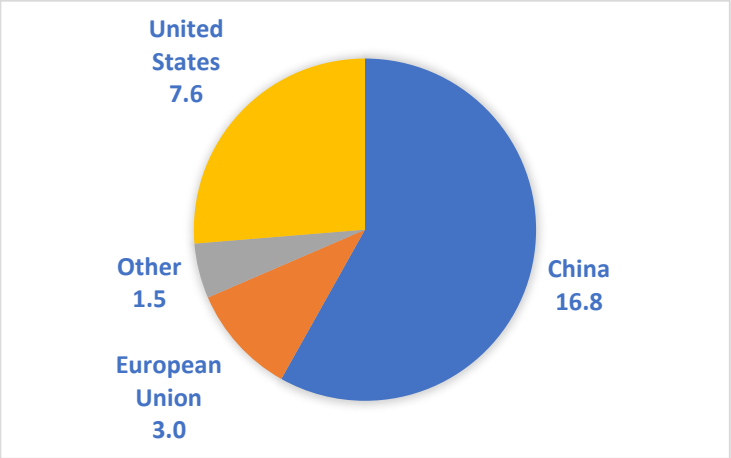

Figure 4 - ESCO Revenue by Region in 2017 (USD Billion)

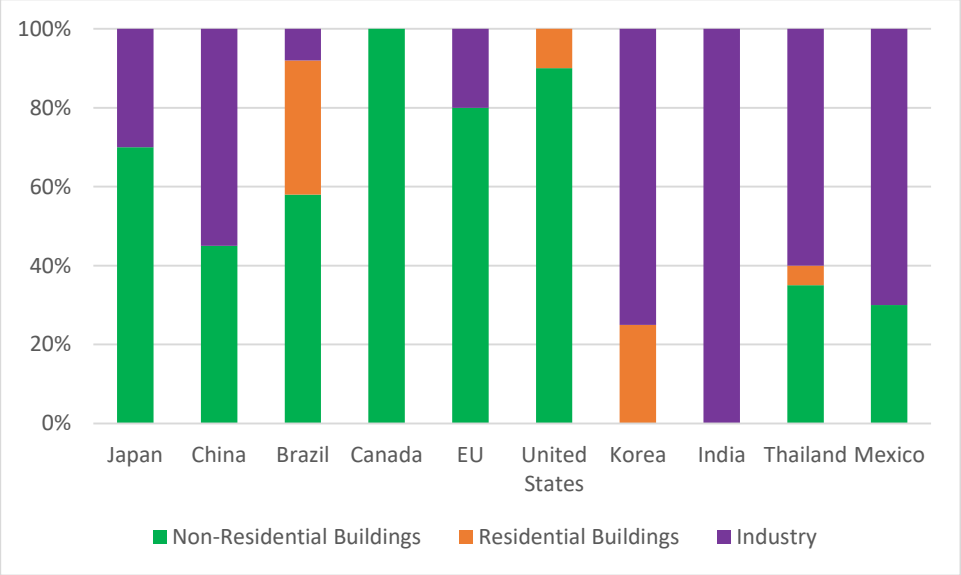

Figure 5 - ESCO Revenues by sector across the world

- ***The development of the ESCO markets can have a substantial impact on energy use***, an empirical investigation of this effect, using a dynamic IPAT model and a panel data set of 94 countries over the period 1981 to 2007, concluded that ESCOs can be responsible for achieving substantial energy savings if adequate policies are in place. These savings, due to ESCOs activities, can exceed 20% of the reference base energy consumption[22].
- ***An adequate enabling environment is required for ESCOs' activities to result in positive impacts***, a recent investigation[23], looked at this impact among developing countries, using a transparent and data-driven statistical methodology, the synthetic control method (SCM), to investigate the empirical effect of the ESCOs' activities on the total energy use in thirteen developing countries. Only four of these countries (none were Arab countries) showed a strong impact of ESCOs on energy savings. The study

[22] "The effect of ESCOs on energy use" [*Energy Policy 51 (2012) 558–568*]: http://ac.els-cdn.com/S0301421512007501/1-s2.0-S0301421512007501-main.pdf?_tid=dc07de90-d8c8-11e6-8503-00000aacb35f&acdnat=1484226967_aa46b6efee48d7904f3d4092fd3af42a

[23] "The Effect of Energy Service Companies on Energy Use in Selected Developing Countries: A Synthetic Control Approach" [*International Journal of Energy Economics and Policy, 2016, 6(2), 335-348*] https://www.econjournals.com/index.php/ijeep/article/viewFile/2126/1447

concluded that ESCOs can be an effective way to increase both energy efficiency and energy savings, and that the absence or weakness of an ESCO industry might result in a failure to achieve energy savings. However, for ESCOs to play this important role in developing countries, they require an adequate enabling environment, including removing energy pricing distortions, making ESCOs better known, raising consciousness about environmental concerns, and resolving the issues related to lack of financing, lack of government support and incompatible legal and regulatory frameworks, and receiving support from international organizations to address all these issues with the policy makers.

- ***Four important conditions are necessary for initiating the development of a successful ESCO market: Government support, Mature ESCO industry, Strategic focus and Financial access.*** An analysis of the success factors for the ESCO market[24] in several countries, concluded that initiating a successful ESCO market requires (1) a strong initial government support providing access to public facilities, (2) specific programs led by the government, or another national or international party, to support the development of a mature ESCO industry, (3) a strategic industry focus favouring an initial focus on projects with minimal business risks, such as public lighting, schools and other non-complex public buildings, before diversifying to more complex portfolios, (4) facilitating access to financing from local financial institutions by offering government guarantees or other international financial institution's sovereign guarantee funds.

Current market trends for ESCOs are showing very active dynamics throughout the world, indicating that ESCO markets will continue to grow in countries where they are already well established, and that new economic operators are getting interested in these markets. The IEA Energy Efficiency Market Report[25]. provides the following assessment about the present and future development of the market for EE services.

- ✓ ***EE market will continue to grow in the coming years, with increasing mergers and acquisitions of ESCOs taking place***. Utilities, technology providers and energy equipment manufacturers are stepping into the market. Many existing energy utilities in the IEA countries are expanding their businesses and developing the provision of energy services to expand their revenues. Furthermore, more than 50% of the acquisitions in recent years were initiated by companies that were not part of the EE services market. Furthermore, utilities, worldwide, are setting up demand-side EE programmes, with proven economic benefits to both utilities and end-users. More than USD 11 billion per year were recently spent on such programmes, as summarized in Table 2.
- ✓ ***Improved and new business models and energy service packages are being boosted by technological development.*** Current development of remote monitoring, control and data processing, contributing to further growth of the energy efficiency services market and the development of new technologies, and innovative energy services solutions. In fact, these new technologies allow a better prediction and delivering of energy savings, which is the core of the EE services business. These technological advances also result in higher credibility for ESCOs, which has been shown to be an important factor in the development and sustainability of ESCO markets[26].
- ✓ ***Policies are a key factor in shaping the ESCO markets and can provide, with the appropriate dose of financial backing/incentives, an important boost for their maturation.*** As it has already been stated, policy frameworks are, and will be, at the heart of the development and sustainability of the ESCO markets. They also influence the size and nature of the market's business models and contracts' arrangements. They also shape the direct financial support provided to these markets. Indeed, concessional financing and tax incentives stimulated significant growth of the Chinese ESCO market. The focus on public building by the ESCO market in the USA was prompted by the presidential

[24] IFC - Energy Service Company Market Analysis, June 2011 http://www.ifc.org/wps/wcm/connect/dbaaf8804aabab1c978dd79e0dc67fc6/IFC+EE+ESCOS+Market+Analysis.pdf?MOD=AJPERES

[25] Energy Efficiency Market Report 2016 – IEA, https://www.iea.org/eemr16/files/medium-term-energy-efficiency-2016_WEB.PDF

[26] IFC - Energy Service Company Market Analysis, June 2011 http://www.ifc.org/wps/wcm/connect/dbaaf8804aabab1c978dd79e0dc67fc6/IFC+EE+ESCOS+Market+Analysis.pdf?MOD=AJPERES

memorandum and executive order issued by the previous administration which provided incentives to ESCOs. In India, the trend has been somewhat different with public bulk procurement of LED bulbs, LED street lights and other appliances led by the public "Super ESCO" (EESL). Governments also play a key role in expanding the EE services market, and are responsible for its evolution, through the adoption and deployment of effective EE policies.

Table 2 - Spending on Energy Efficiency Programmes by Utilities

Country/region	Year	Costs (USD millions/year)
United States	2014	6,038
Ontario (Canada)	2014	364
Australia*	2014/15	143
European Union**	Depending on member state	4,339
Brazil	2015	191
China	2015	448
Korea	2015	98
Uruguay	2016	3
South Africa	2008	44

* In the case of Australia, cost data were available only for New South Wales and the Australian Capital Territory. In order to estimate the total expenditure for Australia's four EEOs the expenditure for Victoria has been calculated by applying figures from the scheme in New South Wales, and the estimate for Southern Australia is based on figures for the Australian Capital Territory.

**The expenditure estimate for the whole of the European Union is based on average cost data for Austria, Denmark, France, Italy and the United Kingdom.

Note: This table includes utilities, distributors, and retail and government entities, all programme types (energy efficiency capacity auctions, energy efficiency auctions, energy efficiency resource standards and obligations), all types of fuels for which efficiency is mandated. For the United States, the figures include only spending through energy efficiency resource standards; they do not include other energy efficiency programmes, even if utilities are involved in delivery or funding.

Source: Energy Efficiency Market Report 2016[27].

✓ ***Diverse potential financing sources of energy efficiency services exist and include traditional sources of capital***. The scale of financing that is needed for EE services require suitable mechanisms that can provide a soft and affordable cost for the financing needed to implement EE programmes and services. Existing climate finance can meet some of these needs, particularly in emerging countries. However, the engagement of capital markets can only be induced by the growth in bankable and tradable EE services commodities through ESCOs. Capital markets can play a potentially important role in financing EE services, particularly through asset-backed security (ABS) and green bonds. In fact, investors are showing strong interest in "green" bonds, which often have a large component of EE services. Green bonds grew to USD 42 billion in 2015, with EE attracting the second-largest investment (20%) after renewable energy (46%). Recent trends in standardization and climate finance may prompt further growth.

[27] Energy Efficiency Market Report 2016 – IEA, https://www.iea.org/eemr16/files/medium-term-energy-efficiency-2016_WEB.PDF

3.3 The development of the ESCOs market in the Arab region: Lessons learned

For the last two decades, many efforts were made in the Arab region to promote EE, including some attempts to develop ESCO markets, as a main instrument to support the implementation of national energy efficiency programs. Some Arab countries are more advanced in this process than others. However most of these programs have yet to take off at scale, despite the establishment of national EE targets and/or plans for EE in some cases, and the presence of specialized agencies to support these processes in many other countries[28]. In most cases, only few short-lived good experiences and successful pilot projects, without durable follow-on effects, were reported in the region.

ESCOs as potential active actors in implementing EE services in the Arab region is an option that has been considered in many countries, and several programmes took place as early as 1991, with international support, to help in developing an ESCO market in some Arab countries. Table 3 presents the status of the development of the ESCO markets in seven Arab countries based on available information in the literature. As can be seen, the only really flourishing ESCO market is in the UAE where it has been developing in recent years, thanks to the boosting operated by the Super ESCO "Etihad Energy services" created in 2013 by the public utility Dubai Electricity and Water Authority (DEWA). ESCO markets in other Arab countries, at this point, are either small or inexistent despite their historical presence in their respective countries.

Table 3 - ESCO Market Size and Status for selected Arab Countries As of 2013

Country	Date Establishment of first ESCO	Number of operating ESCOs	Market Size [Million USD]	ESCO Market trend
Egypt	Prior to 1996(a)	no exact information(b)	No Information	On the ground
Jordan	1991	11	No Information	Slow growth
Lebanon	2002	2 - 3	0.2	Growing at a slower rate
Morocco	1992	3 - 4 (c)	No Information	No change
Tunisia	2005	10 (d)	16	Continuous growth
Saudi Arabia	Recently	5	No Information (e)	On the ground
UAE	Recently	3 - 4 (f)	600 (g)	Expected rapid growth

(a) An international survey of the energy service company (ESCO) industry: [*Energy Policy 33(5):691-704 · February 2005*], https://www.researchgate.net/publication/223694066_An_international_survey_of_the_energy_service_company_ESCO_industry

(b) Number of operating ESCOs were 14 in 2002, according to the previous source

(c) 2012 figures

(d) 4 are effectively active, according to recent reports

(e) Potential size of EE market in KSA, USD 320 million/year

(f) 2013 figures for national ESCOs / Total of 18 Accredited ESCOs as of 18 January 2017, http://www.rsbdubai.gov.ae/esco/list-of-accredited-escos/

(g) Total market size to 2030 for the building sector alone

Source:

Compiled from ESCO Market Report for Non-European Countries 2013, https://iet.jrc.ec.europa.eu/energyefficiency/sites/energyefficiency/files/reqno_jrc91689_ld-na-26886-en-n.pdf

(Additional sources indicated in footnotes)

[28] Delivering Energy Efficiency in the Middle East and North Africa, World Bank (2016), p.9 http://documents.banquemondiale.org/curated/fr/642001476342367832/pdf/109023-WP-P148222-PUBLIC-DeliveringEEinMENAMayEN.pdf

Table 4 presents a summary of the challenges facing the ESCO markets in the seven countries indicated in Table 3 and discussed above. It also identifies some of the potential key drivers expected to have an important impact on the development of the ESCOs market in some of these countries, or possible breakthrough points taking place in other ones.

- ***Challenges that were identified are clearly related to the three types of challenges discussed in section 3.1 above***, and include, among others:
  - ✓ Lack of dedicated legislative framework for the ESCO business;
  - ✓ Absence of regulatory framework for energy services for public sector / complicated and inadequate procedures for public procurement;
  - ✓ Highly subsided energy prices;
  - ✓ Lack of access to finance by ESCOs due to the lack of understanding of ESCOs businesses by commercial banks and subsequent perceived risks about dealing with EE investments;
  - ✓ Lack of awareness, by end user consumers, of ESCOs capabilities resulting in perceived business and technical risks, as well as a lack of trust, when dealing with ESCOs
- ***In five of the seven Arab countries***, namely; Egypt, Jordan, Lebanon, Morocco and Saudi Arabia, the following measures are being undertaken that could facilitate the development of the ESCO markets, if they are properly implemented.
  - ✓ Creation of an EE agency or similar implementing institutional framework;
  - ✓ Development of legislation for supporting ESCOs and EPC based EE implementation;
  - ✓ Creation of a dedicated EE Fund, EE Revolving funds or EE credit lines in domestic financial institutions;
  - ✓ Energy tariff reforms and rationalization of subsidies;
  - ✓ Increased awareness amongst end user consumers and promoting the benefits of working with ESCOs
  - ✓ Implementation of energy polices and EE targets: such as through NEEAPs;
  - ✓ Capacity building of ESCOs;
- ***In the remaining two countries***, namely; Tunisia and the United Arab Emirates, the following additional drivers are expected to make an important impact on scaling up the development of the ESCOs Market.
  - ✓ New regulation adopted for ESCOs (including measures, such as the accreditation of ESCOs, standardization of model EPC contracts, protocol for M&V of energy savings, other tools and templates, etc.)
  - ✓ Capacity building of ESCOs for shared and guaranteed savings EPC model-based implementation;
  - ✓ Increased awareness-raising activities for promotion of benefits of EE project implemented using the ESCO approach;
  - ✓ Simplifying the EE -based public procurement procedures and systems;
  - ✓ Providing financial incentives for projects such as in Etihad Super ESCO in UAE;

The finding discussed above are corroborated by the recent examination of the policy; regulatory and institutional frame works for sustainable energy in fourteen Arab countries included in the analysis for 111 countries in the report on "Regulatory Indicators for Sustainable Energy (RISE)" 29. The method uses a scoring system to assess countries' policy and regulatory support and readiness for each of the three pillars of sustainable energy—access to modern energy services, energy efficiency, and renewable energy. The scoring system for EE uses 13 comprehensive EE indicators, to assess the status of the policy and institutional environment of EE in these countries and attributes a score ranging from 0 to 100 for each of the 13 indicators and calculates an overall score for EE as well.

[29] Regulatory Indicators for Sustainable Energy (RISE), http://documents.worldbank.org/curated/en/553071544206394642/pdf/132782-replacement-PUBLIC-RiseReport-HighRes.pdf

Table 5 provides a summary result of these scores for the 14 Arab countries (The table shows that most Arab countries already have in place national targets and/or plans for EE, and most also have specialized agencies authorized to carry them out. However, only one Arab country had policy frameworks indicating that its government has given some priority to EE. nine countries needed to make significant improvements in their EE policy environment and four countries had important gaps in that respect. Furthermore, when considering the different EE policy indicators, ten out the twelve indicators, including all indicators related to providing an enabling environment for ESCOs market, reflects an EE policy framework that is weak or requiring significant strengthening for at least 8 of the 14 countries (highlighted zone in Table 5).

Table 5- Scores Obtained by 14 Arab countries for each EE policy indicator
Number of countries for each range of scores

Energy Efficiency Policy Indicators	Score ≤ 33	33 <Score < 67	Score ≥ 67
1. National energy efficiency planning	0	2	12
2. Energy efficiency entities	2	1	11
3. Information provided to consumers about electricity usage	0	12	2
4. Energy efficiency incentives from electricity rate structures	0	7	7
5. Mandates and incentives: Industrial and Commercial End users	7	5	2
6. Mandates and incentives: Public sector	4	4	6
7. Mandates and incentives: Utilities	8	3	3
8. Financing mechanisms for energy efficiency	7	3	4
9. Minimum energy performance standards	7	7	0
10. Energy labeling systems	5	6	3
11. Building energy codes	6	4	4
12. Transport	12	2	0
13. Carbon pricing and monitoring	9	4	1
Overall EE indicator	**4**	**9**	**1**

Score ≥ 67: Many or most elements of a strong policy framework to support indicator(s) are in place.

33 < Score <67: Significant opportunities exist to strengthen the policy framework

Score ≤33: Few or no elements of a supportive policy framework have been enacted

Source: Compiled from results published on RISE web site (Scores used in the RISE 2017 Report [WB 2018]), scores downloaded from https://rise.esmap.org/scores on 8 Mars 2019

Based on the international experience, lessons learnt from the limited ESCOs experiences in the Arab countries, and the limited development of enabling EE policies and institutional frameworks, it appears that there is a long way to achieve a large scale, viable ESCO market in Arab countries as we have seen developing in North America, Europe, Australia, China, Korea and Japan. A much stronger and structured government support, on a sustainable basis is required to create a set of enabling conditions that can make investment in EE measures and programmes a more financially attractive proposition and that can allow the ESCO market to develop at scale. One of the emerging alternatives to addressing the barriers to ESCO market development in a few countries is the framework of "Super ESCO" which is a public entity, or public-private-partnership (PPP), that can support and stimulate the scale up of ESCO market development and help channel the government support to energy efficiency market transformation. In this region, UAE's Etihad ESCO has demonstrated the viability of the Super ESCO model and more recently, Saudi Arabia has also retained this approach to support its EE programmes.

Table 4 - ESCOs Market Development in selected Arab Countries
Existing Barriers to ESCO Development and Key drivers expected to turn the changes around or Possible Breakthrough Points

EGYPT	JORDAN	LEBANON	MOROCCO	SAUDI ARABIA	TUNISIA	United ARAB EMIRATES
Existing Barriers to ESCO Development						
✓ Lack of legislative support for ESCOs / Lack of legislative framework to promote EE. ✓ Lack of appropriate methods for finance ✓ Procurement rules very rigid / Not adequate for EE ✓ Low consumers energy prices / No end users' incentives for EE ✓ No specialized body (EE agency) to coordinate/ promote EE activities ✓ Lack of reliable data / information on energy end use ✓ Lack of mandatory EE building codes, benchmarking for industries; etc. ✓ Lack of awareness about ESCOs in relevant sectors	✓ Lack of appropriate ESCO legislation; ✓ Difficulty to access funds at affordable rates and terms; ✓ Low awareness of the benefits of ESCOs; ✓ Lack of database for energy consumption and thus, difficulty in setting up baseline consumptions;	✓ Lack of dedicated legislative framework for the ESCO business; ✓ Lack of financial products by commercial banks for ESCOs; ✓ Complex and inflexible public procurement rules; ✓ Lack of awareness about the benefits of EE projects implemented on ESCO concept. ✓ Highly subsided energy prices;	✓ Lack of appropriate forms for finance; ✓ Perceived business and technical risk ✓ Absence of regulatory framework for energy services for public sector / complicated & inadequate procedures for public procurement; ✓ Low awareness about ESCOs and about the benefits of implementation of EE projects based on the ESCO concept; ✓ Low trust in ESCOs.	✓ Lack of appropriate forms for finance. ✓ Lack of legislative support for ESCOs ✓ Procurement rules are very complex and inflexible. ✓ ESCO projects contractual agreements incompatible with national contract. regulations and definitions; ✓ Low trust from clients; ✓ Low consumers Energy prices / No end user incentive for EE ✓ Lack of reliable energy consumption data; ✓ Low awareness of benefit of EE and of EPC; ✓ Lack of expertize and knowhow for ESCO.	✓ Lack of appropriate forms for finance; ✓ Low trust from clients; ✓ Perceived business and technical risk; ✓ Aversion to outsource energy management; ✓ Lack of reliable energy consumption data; ✓ Procurement rules are very complex and inflexible	✓ Lack of appropriate financing for larger ESCO projects – Should be improved with Etihad ESCO involvement; ✓ Lack of awareness about third-party financing options; ✓ Lack of demonstration projects in public sector –should be removed through implementation of 2 retrofit projects by Etihad ESCO ✓ Lack of knowledge & awareness about ESCOs –should be removed through trainings & workshops. ✓ Lack of trust from potential clients, no confidence in calculated energy savings by ESCOs;

EGYPT	JORDAN	LEBANON	MOROCCO	SAUDI ARABIA	TUNISIA	United ARAB EMIRATES
[1]: Possible Breakthrough Points / [2]: Key drivers that are expected to make an important impact on the development of the ESCOs Market						
[1] ✓ Development of legislation for ESCO; ✓ Creation of an EE Fund; ✓ Creation of an EE agency or similar implementing body; ✓ -Increased awareness raising activity for promotion of benefits of EE project and of ESCO concept	**[1]** ✓ Effective legislation for EE and ESCO; ✓ RE&EE Fund; ✓ Rigorous implementation of the first NEEAP; ✓ Capacity building of ESCO for EPC; ✓ Increased awareness raising activity for promotion of benefits of EE project implemented on ESCO concept	**[1]** ✓ Development of legislation for EE and ESCO; ✓ Adaptation of public procurement rules; ✓ Implementation of energy polices: NEEAP and Policy Paper for electricity; ✓ Capacity building of ESCOs; ✓ Increased awareness raising activity to promote the benefits of the ESCO concept;	**[1]** ✓ Development of ESCO legislation; ✓ State financial and fiscal incentives; ✓ Implementation of state energy strategies and polices (NEEAP); ✓ Creation of a revolving RE&EE Fund; ✓ Simplifying the public procurement procedure; ✓ Awareness raising activities for promotion of ESCO results achieved in industry;	**[1]** ✓ Effective legislation for EE and ESCOs; ✓ Capacity building of ESCO for EPC; ✓ Tariffs restructuring; ✓ Increased awareness raising activity for promotion of benefits of EE project implemented on ESCO concept;	**[2]** ✓ State financial and fiscal incentives; ✓ Implementation of state strategies and polices (NEEAP); ✓ Creation of a revolving RE&EE Fund; ✓ Simplifying the public procurement procedure; ✓ Awareness raising activities for promotion of ESCO results achieved in industry;	**[2]** ✓ New regulation for ESCOs to be adopted (*) (including measures, such as the accreditation of ESCOs, model contracts, protocol for M&V of energy savings) ✓ Financial incentives for projects through Etihad ESCO and leveraging private funding; ✓ Capacity building of ESCOs for EPC; ✓ Awareness raising activity for the promotion of the ESCO concept.

Source: Compiled from "ESCO Market Report for Non-European Countries 2013", https://iet.jrc.ec.europa.eu/energyefficiency/sites/energyefficiency/files/reqno_jrc91689_ld-na-26886-en-n.pdf

(*) From 14 March 2016, ESCO Accreditation by the Dubai Regulatory and Supervisory Bureau is mandatory for ESCOs wishing to participate in Etihad ESCO tenders. This is subject to a 6-month compliance period to allow ESCOs to seek accreditation. After 14 September 2016, non-accredited ESCOs will not be accepted to participate in Etihad ESCO tenders." (http://www.etihadesco.ae/tenders/)

4 Super ESCOs as an instrument to overcome the barriers to ESCOs markets and scaling up EE in the Arab Region

As outlined in the previous sections, the lessons learned from the ESCOs experience in Arab countries showed that there are serious challenges that have prevented this market to take off, along with the upscaling of EE services that these economic operators can make possible. Indeed, except for the UAE where a Super ESCO was created to lead the market and channel public funds to a network of duly accredited private sector ESCOs to implement nationally defined EE programmes, the ESCOs market created in the region has continued to remain limited in terms of size, human resources and financial capacities.

An enabling policy and institutional framework is required to provide an environment where ESCOs can operate with clear and transparent business rules that fully recognize their economic activity, their responsibilities and their rights. Addressing the energy price distortions will make investments in EE services a financially attractive activity for ESCOs and end users. Other enabling and supporting conditions are also required to insure sustainability for the ESCO market.

Based on the UAE experience, and experiences in some other countries throughout the world, Super ESCOs is one of the emerging, yet reliable, instruments that can rapidly address these challenges, and allow an acceleration of financing and implementing of EE services and programmes, provided there is a strong political will at the highest levels to make EE one of the pillars of the country's energy system. So, what are Super ESCOs? How can these entities address the identified challenges at an accelerated pace? And what roles can they play in the stimulation of ESCO markets?

It is important to note that the Super ESCO concept presented in this paper is not the Super ESCO concept introduced by E. Vine et al[30], where Super ESCOs refer to energy service companies (ESCOs) that in addition to providing energy services, supply gas and/or electricity to their clients.

4.1 The different Super ESCOs models

Although the concept of Super ESCOs has been around since the 1990s, there are a limited number of active and successful Super ESCO experiences, and associated models, throughout the world. However, these experiences have in common a concept where the government creates an entity that acts as a public ESCO to conduct EE programs in public sector facilities (and in some cases, residential sector) through the mobilisation and support of private ESCOs. Limaye et al[31] defined a Super ESCO as "*an entity that is established by the Government and functions as an ESCO for the public-sector market (hospitals, schools, municipalities, government buildings, and other public facilities); and also supports capacity development and project development activities of existing private sector ESCOs including helping create new ESCOs"*. The author further suggests that "*Government capitalizes the Super ESCO with sufficient funds to undertake public sector ESPC projects and to leverage commercial financing. A primary function of the Super ESCO is to facilitate access to project financing by developing relationships with local or international financial institutions.*" [ESPC: Energy Services Performance Contract]

Super ESCOs are intended to address two main issues: Accelerating EE programmes, primarily in the public sector, and inducing the development of a mesh of private ESCOs, many of them SMEs, or reinvigorating an existing one, by facilitating access to EE projects and their financing. They are set up in a configuration that, eventually, allows to lift most of the barriers that ESCOs are facing when dealing with EE improvement projects such as public facilities (schools, hospitals, offices), street lighting, municipal water and sewage pumping systems, where energy services markets have traditionally faced multiple barriers. Super ESCOs are setup to allow the following:

- ✓ Easy access to public sector facilities

[30] E. Vine, *, H. Nakagamib and C. Murakoshi, "The evolution of the US energy service company (ESCO) industry: from ESCO to Super ESCO", Energy 24 (1999) 479–492, https://www.sciencedirect.com/science/article/pii/S0360544299000092

[31] Limaye, D.R. & Limaye, E.S., "Scaling up energy efficiency: the case for a Super ESCO", Energy Efficiency (2011) 4: 133. doi:10.1007/s12053-011-9119-5,

- ✓ Proper access to tailored, and affordable, project financing
- ✓ A sizeable reduction of transaction costs for small projects through bundling a number of them
- ✓ Standardization of EPC and M&V templates, improving the contractual frameworks and reliability of the EE projects implementation process
- ✓ De-risking and risk sharing through an intermediary role, thereby making ESCOs and end-users consumers more comfortable to work with each other

Because of the size and quality of human and financial resources that Super ESCOs can potentially mobilize in a reasonable amount of time, these entities are in a position to work across the entire value-chains required to implement EE projects at scale. Super ESCOs can design large national-level EE programs, accredit private ESCOs to implement them and guarantee the results of these programmes, thereby reducing the risks perceived by end users and financiers when dealing with ESCOs. Having government support enables the Super ESCOs to recruit, and train, and find highly qualified human resources to run/manage the technical and financial systems that make the bulk of the Super ESCOs' set up and ensure that programmes are successfully implemented in collaboration with ESCOs and consumers. Some of these resources can easily be dedicated or directed to build the capacities of Private ESCOs and to help execute the programmes. The actions by Super ESCOs in the EE ecosystem, particularly in the case of public sector EE projects, contributes to addressing effectively the technical barriers that were discussed in earlier sections, and helps pave the road for scaling up the ESCO market in the future. Indeed, in an ESCO market that did not take off yet, which is composed of a collection of small ESCOs operating in an ambiguous EE business environment, as it is mainly the case in the Arab region, it is very difficult to mobilize the adequate human and capital resources the way a Super ESCO can.

Figure 6 presents a typical Super ESCO institutional structure. In this model, the government sets up the publicly-owned Super ESCO entity and provides the initial funding. International donors and development institutions may provide additional funding and technical assistance to the Super ESCO to support the scaling up of the implementation of the national EE programmes, mainly targeting, initially, the public sector. The Super ESCO designs and develops the EE programmes, bundles them if required and procures ESCO services through subcontracts with prequalified private ESCOs to implement the projects included in these programmes. The Super ESCO covers the total financing requirements of these EE projects, and recuperates the monetized savings associated with the energy savings resulting from the EE projects for a certain period of time, to pay for the EE projects' investments.

In this set up, the Super ESCO defines the necessary works' packages and/or programme components to be completed. The super ESCO then subcontracts these components, or packages, to smaller private ESCOs, or specialized contractors, based on a competitive process to complete the needed work. It signs an Energy Performance Contract (EPC) with a public facility owner, usually without competition, to complete one, or several, EE programme(s) or project(s). The key elements of guaranteed performance in these EPCs between the Super ESCO and the public facility owner are reflected in the sub-contracts between the Super ESCO and the ESCOs, which also rely on a set of standardized EPCs.

Other potential models of Super ESCOs may be developed as a private, an NGO, or as a public–private partnership (PPP) entity. These types of set ups, particularly the PPP, may be more suitable for targeting scaling up EE programmes in the private sector.

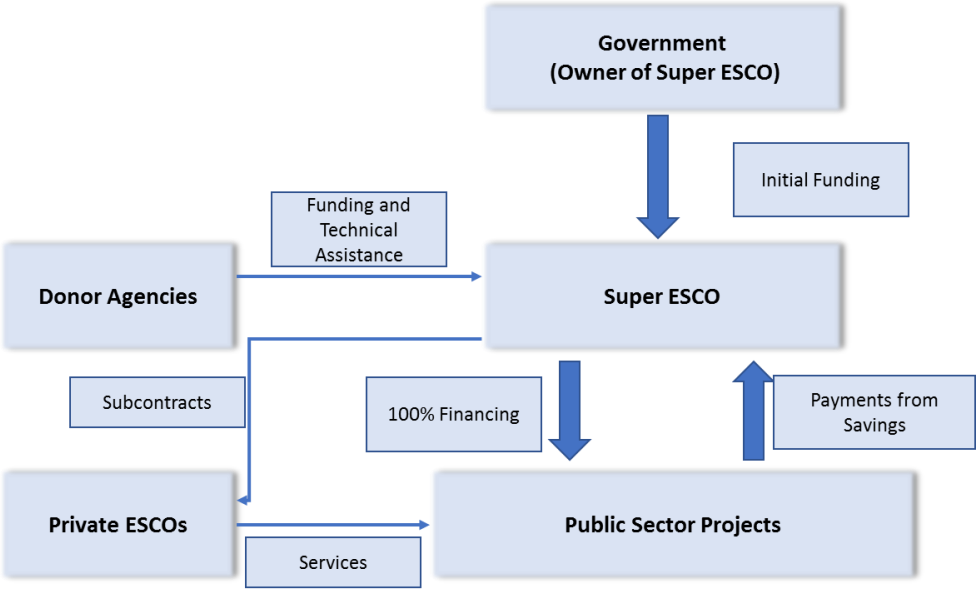

Fig.6 - Typical Set Up for a Public Super ESCO Scheme

Source: Adapted from "Options for Financing Energy Efficiency in Public Buildings: Kosovo, Georgia and Turkey, power point presentation by the World Bank", https://www.energy-community.org/portal/page/portal/ENC_HOME/DOCS/4176387/34612BB9F46D619CE053C92FA8C0FDA6.pdf

4.2 The international experience of Super ESCOs development: Lessons learned

The Belgian FEDESCO is the first known Super ESCO that was created. It was established in 2005 as a public ESCO to "*study and implement energy efficiency projects in 1800 Belgian federal public buildings, of which about 2/3 is owned by the Belgian federal state and 1/3 is being rented from private building owners. The company started with a capital of EUR 1.5 million, later extended to EUR 6.5 million*". The company had initially a financing capacity, as a third-party investor, of EUR 5 million, that was rapidly increased to EUR 10 million, to reach EUR100 million in 2009. In that year, a target to reduce public buildings' GHG emissions by 22% was set.

Starting in 2007, FEDESCO had exclusive rights to work with the federal administrations on EE services. This initiated a solid collaboration with the federal Building Agency, which is considered the public buildings owner and manager[32].

FEDESCO started with implementing a "separate contractor" model to implement "transversal measures" with a strong focus on building equipment, lighting, co-generation and roof insulation. It also launched a campaign targeting building occupants to improve their energy consumption-related behaviour. In 2008, the government assigned a secondary mission to FEDESCO to disseminate roof top solar PV technologies in public buildings, for a budget of EUR 1.5 million.

The separate contractor-based model was used by FEDESCO from 2005 to 2014, to invest EUR 27.4 million in the EE services business, including EUR 2 million in studies and engineering. However, starting from 2011, an alternative parallel model using an innovative EPC contracting, called smart-EPC was implemented, combining facilities and equipment maintenance with energy & comfort performance contracting. This smart-EPC sets up a performance-based contracting for maintenance, comfort satisfaction for building occupants and energy consumption. Different suitable tools and instruments were developed to carry out this particular EPC contracting, where FEDESCO acts as facilitator, with the Building Agency as public tendering body.

In 2011, FEDESCO created a "Knowledge centre" department to provide EPC facilitation services to non-federal public authorities and assisted many of them to initiate several EE projects.

In 2015, FEDESCO was integrated into the Building Agency.

[32] http://citynvest.eu/content/fedesco-4

The second important Super ESCO experience is the India Energy Efficiency Services Limited (EESL), founded in 2010 by the Government of India. EESL *"is a joint venture of four National Public-Sector institutions: NTPC Limited [India's largest energy conglomerate], Power Finance Corporation Limited, Rural Electrification Corporation Limited and POWERGRID Corporation of India Limited, set up under the Ministry of Power, Government of India"*

This Super ESCO is implementing the largest EE portfolios in the world, including the world's largest EE programmes for street light replacement, zero-subsidy domestic LED bulb dissemination, and Agricultural Demand Side Management programmes[33]. The implementation of the EESL' EE programmes have saved India over 35 GWh of energy per year, and substantially reduced its carbon footprint and peak energy demand. Investments in EE equipment, appliances and services amounted to this date to INR 43 billion (about USD 670 million).

EESL is presently a very large Super ESCO, with a turnover of USD 300 million per year (2016), estimated to grow to USD 1.5 billion per year by 2020.

Furthermore, EESL acts as the resource centre for EE services *"capacity building for State Distribution Companies (DISCOMs), Energy Regulatory Commissions (ERCs), State Development Authorities (SDAs), upcoming ESCOs, financial institutions, etc."*. EESL also leads EE research and training activities. In addition, it spearheads the deployment of technical and financial consultants to identify opportunities in solar energy, water supply, and energy in transportation and domestic consumption in India. EESL is presently active in many segments of the EE services and renewable energy businesses, in the public and private sectors[34].

These activities allowed EESL to constitute a very diversified portfolio, and to induce a significant market transformation through a large array of nationwide EE scale up programmes, including the following[3536]:

- ✓ The UJALA–LED bulb programme; which allowed the distribution, by EESL, of over 300 million LED bulbs in 3 years. During the same period, the private sector sold 400 million LED bulbs, indicating that a real market transformation took place with LEDs becoming the most preferred lighting source in the country. The programme aims to distribute 770 million LED bulbs by March 2019 across 100 cities, allowing an estimated saving of 105 million MWh and a reduction of peak load by 20,000 MW.
- ✓ Street Lights programme (SNLP); which allowed the replacement of over 7 million street lights as of date, benefitting over 500 Urban Local Bodies, resulting in an average annual-averaged saving of over 4,765 kWh per day and an avoided electrical capacity of over 790 MW. The programme aims to complete the replacement of all 14 million street lights by 2019 and achieve additional operational savings through a web-based monitoring and control system.
- ✓ Fans/LED Tubes, with over 800,000 energy efficient ceiling fans and 2.2 million LED tubes distributed.
- ✓ AgDSM; an Agriculture Demand Side Management EE programme to replace agricultural pump sets. To date, over 1.1 million agriculture pumps signed
- ✓ Municipal Water/Sewage Pumps EE programme; with over150 cities energy audit work started
- ✓ Buildings EE programme; agreements with large government facility owners already signed to cover more than 2000 buildings.
- ✓ Super-Efficient Air Conditioners; programme initiated to disseminate future-ready technologies, with a 3-years warranty, in residential and non-residential, buildings. Initial order placed for 100,000ACs.

Other programmes target the dissemination of Solar Street Lights, Solar Study Lamps, Solar Agriculture Pumps and the development of E-Mobility.

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[33] EESL web site, https://www.eeslindia.org/

[34] https://economictimes.indiatimes.com/topic/EESL

[35] EESL-Success-Story-Scaling-Up-Energy-Efficiency-An-Indian-Experience: https://d2oc0ihd6a5bt.cloudfront.net/wp-content/uploads/sites/837/2017/06/04-Success-Story-Scaling-Up-Energy-Efficiency-An-Indian-Experience.pdf

[36] EESL SLNP dashboard, http://www.eeslindia.org/content/raj/eesl/en/map.html, accessed 13 December 2018

The business model that EESL uses contributed to the success of its programmes and is based on the following schemes:

- Pay-As-You-Save (PAYS) model, with no up-front cost. The payment for the EE measures is provided from the savings, using a performance-based Service Level Agreements (SLAs), and On-Bill-Payment for appliances and Performance Contract (PC) for institutions over periods of 2-10 years. As shown in Figure 7, EESL has been able to mitigate up-front financing risks for its customers by making the entire up-front capital investment, through PAYS under an on-bill financing approach (Option 2 in figure 7) or a direct up-front payment by the consumer (Option 1 in figure 7).
- In case of PC, repayments include all costs, including a reasonable level of profit for the EESL, and are set as annuities over a defined number of years. Similar models are used for the supply of energy efficient equipment and appliances.
- Seeking economy of scale through bundling, using transparent bulk procurement procedures.
- Implementing projects as turnkey operations, so that the clients are not required to deal with the details of the EE project implementation design and works.
- Insuring high visibility to the EE impacts by providing real time monitoring of the energy performance through online dashboards.

The UJALA–LED bulb programme resulted in a Levelized cost of saved kWh that is about half of the cost of generated kWh from a coal power plant in India. Furthermore, the programme induced an increase in India's share in the global LED market from 0.1% to 12%, with a domestic penetration rate increasing from 0.4% to 10%. The annual domestic production increased from approximately 3 million LED bulbs (2013) to 62 million in 2015. Finally, the process of executing the UJALA programme created an estimated 60,000 new jobs.

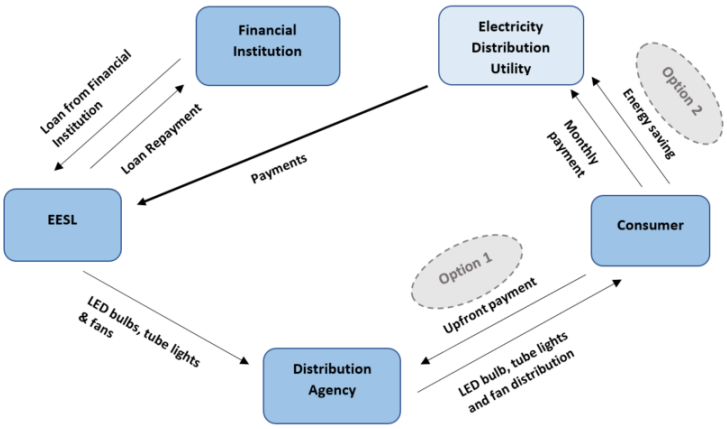

Fig.7 - Operating Model of EESL's UJALA Program (for LED bulbs and Tube Lights and Energy Efficient Ceiling Fans)[37]

However, as shown in Figure 7, EESL works as a public ESCO directly with consumers. Thus far, EESL has not been able to induce any sizeable active market development of private ESCOs in India, and some echoes seem to indicate that EESL have set itself as a very large public-sector monopoly of energy efficiency services, crowding out the private ESCOs. EESL's success as a full-service Super ESCO will be determined by its future role in being able to facilitate the increased participation of private sector ESCOs through the EESL programs of implementing EE in the public facilities. Recently, the World Bank

[37] From World Bank- ESMAP Live Wire "Transforming Energy Efficiency Markets Transformation in Developing Countries: The Emerging Possibilities of Super ESCOs" by Ashok Sarkar and Sarah Moin, forthcoming (2018).

has approved a $220 million loan that aims to help EESL develop sustainable business models using private ESCOs.[38]

Other institutional frameworks that are similar to a Super ESCO model were either implemented or only conceptualized in Brazil[39], China[40] and the Philippines[41]. In the case of China, the Province of Guangdong established an Energy Efficiency Power Plant, based on the concept of a "virtual power plant" under a project financed by the Asian Development Bank (ADB). The municipal government established the Efficiency Power Plant Project Management Office to handle overall implementation of the energy efficiency programme, and the project established a special single-purpose trust fund managed by a financial intermediary, the Guangdong Finance Trust Company. The fund was set up as a revolving fund to secure funding of additional EE projects as loans are paid over. Upon completion of Tranche 1 (2008-2011), the EE subprojects created an efficiency power plant capacity, i.e. a reduction of electrical peak loads, of 130 megawatts, and an energy saving of 651GWh per year. The estimated total project cost is USD 50 million (which infers a cost of installed electrical capacity of less than USD 385 per kW). The ADB loan amounted to USD 35 million.

In the case of the Philippines, the EC2 corporation, a Public Sector-owned Super ESCO type entity that was planned to be established in the context of a national energy efficiency development programme financed by ADB[42], was suspended during the implementation of the project[43]. However, it is interesting to consider this business model, since it can be deemed as one of the most comprehensive and full service Super ESCO business models, in terms of its operating schemes and functions. Indeed, the proposed Philippine business model clearly indicates all the roles discussed previously that ideal, full service Super ESCOs were intended for. Its public-sector role as a market accelerator for EE services and as an instrument for reinforcing the private ESCO businesses is clearly indicated, by building the capacities of these private ESCOs and providing them access to financing and to EE customers.

In this business model, the Super ESCO also acts as a guarantor of the EE services market by providing training and accreditation to private ESCOs, typical contractual documents, performance monitoring and benchmarking. It also carries out the EE services business development tasks, product development and associated research.

[38] World Bank. 2018. India Energy Efficiency Scale-up Program. Washington, DC: World Bank. http://www.worldbank.org/en/news/press-release/2018/05/17/usd300-million-world-bank-operation-help-scale-up-india-energy-efficiency-program

[39] Alternative Market Frameworks for ESCO Finance: Designing instruments and institutional strategies for financing energy efficiency products in Brazil, http://www.inee.org.br/down_loads/escos/IIEC.Fin_pdf.pdf

[40] A Virtual Power Plant that Creates Real Energy: http://development.asia/case-study/virtual-power-plant-creates-real-energy

[41] Limaye, D.R. & Limaye, E.S., "Scaling up energy efficiency: the case for a Super ESCO", Energy Efficiency (2011) 4: 133. doi:10.1007/s12053-011-9119-5,

[42] Proposed Loan and Administration of Grant Republic of the Philippines: Philippine Energy Efficiency Project: https://www.adb.org/sites/default/files/project-document/67368/42001-phi-rrp.pdf

[43] Philippine Energy Efficiency Project-Completion Report: https://www.adb.org/sites/default/files/project-document/161212/42001-013-pcr.pdf

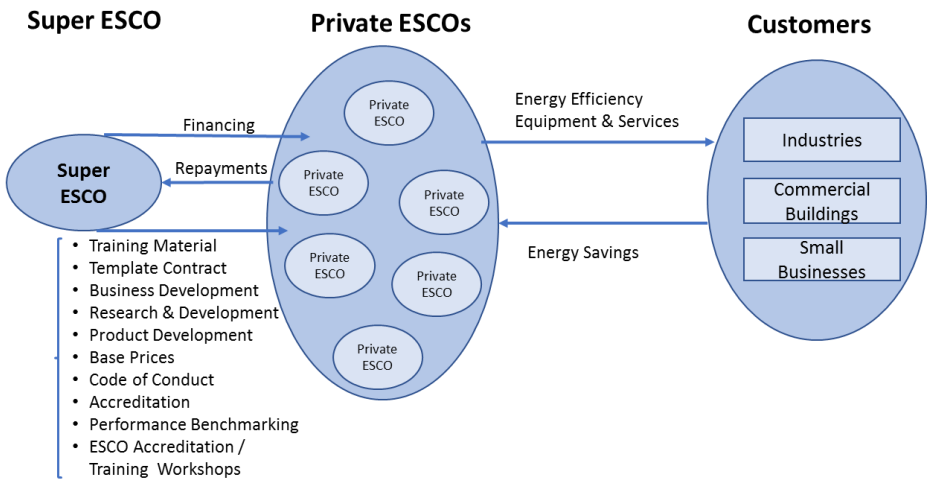

Fig.8 –Business Model for a Public Sector Super ESCO with extended features

Source: Based on a business model advised for a Super ESCO that was planned in the Philippines EE Project[44]

The international experiences discussed in this section show that Super ESCOs could be effective instruments in scaling up implementation of EE services, particularly in promoting public sector EE improvements, along with promoting the role of private ESCOs and developing ESCO markets in countries where such markets are small or inexistent. Super ESCO experiences, albeit limited, demonstrates that this innovative institutional model can provide one of the most rapid paths to implement national EE programmes at scale and can help overcome many, if not most, of the EE market transformation barriers that were identified in most Arab countries in the previous analyses. It is indeed proven to be a reliable approach for quickly benefiting from the multiple benefits of EE presented earlier, including augmenting, albeit virtually, the country's installed electrical capacity and providing virtual electrical energy at a lower cost than conventional power plants. To set up a Super ESCO as a "virtual power plant", the government needs to embrace a political decision-making EE a strategic component of the country's energy system, to define a legal framework for the Super ESCO and ESCO business, to define the Super ESCO model and mobilize the required human and financial resources to create it and operate it.

The next section examines the potential for developing the Super ESCO model in Arab countries and presents the Etihad experience as the only successfully- operating Super ESCO in the Arab region.

4.3 Potential development of Super ESCOs in the Arab region

When examining the potential for developing the Super ESCO model in the Arab region, it is important to recognize that in most Arab countries, EE programmes are more economically interesting for governments (national budgets) than for end users. It helps Governments in energy security by either saving on energy imports or expanding energy exports, reduce their fiscal burden of paying for energy subsidies, and also helps them meet their global climate change commitments. Additional benefits such as increased employment opportunities, increased competitiveness of domestic industry, etc. makes the case of EE even stronger. Indeed, as discussed previously the low energy prices at the end-user levels in most Arab countries are still the major challenge to the development of EE services markets, since it makes most EE measures, except for some efficient lighting projects, financially unattractive for the end users or investors. And this seems to be the case, despite the enormous EE potential in the Arab region, as reported in the World Bank study mentioned earlier, which estimated the potential for energy savings from energy efficiency at 21 percent of projected total primary energy supply in Middle East and North African countries by 2025.[45]

[44] Limaye, D.R. & Limaye, E.S., "Scaling up energy efficiency: the case for a Super ESCO", Energy Efficiency (2011) 4: 133. doi:10.1007/s12053-011-9119-5,

[45] . Delivering Energy Efficiency in the Middle East and North Africa, World Bank (2016), p.9 http://documents.banquemondiale.org/curated/fr/642001476342367832/pdf/109023-WP-P148222-PUBLIC-DeliveringEEinMENAMayEN.pdf (In this study, the reported figures only include the Arab countries of the MENA region) -

In fact, the low energy prices are either due to government subsidies in most Arab countries that are net energy importers, or due to the alignment of the prices to production costs in most countries in the region that are net energy exporters. In both situations, national budgets are losing financial resources, either by spending them on subsidies, or by missing the opportunity of exporting a large share of the locally consumed energy at much higher prices than the ones applied to local end users. ESCOs and Super-ESCOs, can be the platforms that the Government can underpin to scale up EE programmes, by making EE measures more accessible, therefore reducing the wastage of financial resources associated with subsidies or missed export opportunities. This endeavour can start with EE programmes targeting the buildings and facilities in the public sector, street lighting, water pumping etc, where the economic gains to the national budget are immediate and straightforward. It can then be extended to cover the private sector through a smart diversion of energy subsidies from end-users' energy prices to a public funding system that will allow to leverage investments in EE in such a way that these investments become economically attractive for end-users, as well as provide a good return on investment for the national budget. This approach was used by Tunisia through the Tunisian National Fund for Energy Conservation (FNME) to subsidize RE and EE programmes and measures in the private sector. The assessment of these state contributions showed that for the period 2005-2011, the fund contributed TND 102 million, resulting in a reduction of the subsidies budget of TND 450 million, and the national energy bill of TND 750 million[46]. This indicates a leverage factor close to 4.5 in terms of reduction of government subsidies, and a leverage factor close to 7.5 in terms of reduction of the national energy bill. The success of this fund that was managed by the National Energy Conservation Agency (ANME), led the government to restructure the fund and expand it into the National Fund for Energy Transition[47], which is intended to channel the government contribution, and other national and international financial resources, to the transition to a more sustainable energy system. However, the Tunisian government is considering different avenues, including the creation of a Super ESCO, for managing the new fund, because the more important size of the new fund and the need to accelerate the pace of implementation of the various sustainable energy programmes require different instruments that are beyond ANME's mandate and/or capabilities.

In the case of Tunisia, as well as other net energy importing countries in the region, public, or PPP set ups, of Super ESCOs can be used to channel public funds into nationally designed EE programs in an efficient way, by rapidly concentrating the adequate human and financial resources into very competent structures. These structures can use one of the extended Super ESCO business models discussed above, to design national EE-upscaling programmes, build capacities of existing private ESCOs and specialized contractors, set up an accreditation system for private ESCOs, enforce typical EE performance contractual documents and design and implement performance monitoring and benchmarking procedures. These Super ESCOs will also have the necessary resources to lead the EE services business development efforts in the country and carry out product development tasks and associated research work.

The Super ESCOs would subcontract the implementation works of the EE programmes and measures that it designs, as well as certain monitoring components, to accredited private ESCOs and specialized contractors. This approach will allow a rapid stimulation of the EE and ESCOs markets and would help the countries to scale up their EE programmes, turning the Super ESCOs into very effective virtual power plants, and valuable instruments to achieve the energy related sustainable goals of the 2030 UN Agenda and SEforALL goals. Indeed, the Super ESCOs would dedicate their efforts to designing and managing the national EE programs, providing the quality assurance and monitoring the implementation of EE, while mobilizing a network of private ESCOs and specialized contractors, mostly SME structures, to carry out the implementation of the works with full access to the required financial resources.

The arguments developed above are also valid for net energy exporting countries in the region that are supplying energy to their local end-users at rates that are well below the international energy prices and

[46] Tunis : Le FNME, pierre angulaire de la maîtrise de l'énergie : https://africanmanager.com/tunis-le-fnme-pierre-angulaire-de-la-maitrise-de-l%C2%92energie/

[47] Decree N°983/ 2017 dated 26 July 2017: https://docs.google.com/viewer?url=http%3A%2F%2Fwww.legislation.tn%2Fsites%2Fdefault%2Ffiles%2Ffraction-journal-officiel%2F2017%2F2017F%2F071%2FTf20179833.pdf

coping with the problem of fast growing domestic energy consumption, particularly in the buildings sector and areas such as air conditioning and lighting in public facilities.

Two of these net energy exporting countries have already set up Super ESCO schemes; namely the *Etihad Energy Services Company* in the United Arab Emirates[48] several years ago, with a business model fairly similar to the Filipino super ESCO model presented in the previous section, and very recently, the new *Super ESCO affiliated to the Public Investment Fund (PIF)* in the Kingdom of Saudi Arabia [49], called Tarshid (National Energy Services Company) with a business model, that promotes the implementation of public building and street lighting EE projects through shared and guaranteed savings EPCs with private sector ESCOs.

The Etihad Energy Services Company (abbreviated as Etihad ESCO) was established in 2013, this Super ESCO is 100% owned by the Dubai Electricity and Water Authority (DEWA) under the leadership of the Dubai Supreme Council of Energy (DSCE). Etihad ESCO is mandated to target 30,000 existing buildings, operating as a Super ESCO on a commercial basis with a goal to generate 1.7 TWh of energy savings and reduce CO2 emissions by 1M tons by 2030. The estimated annual savings, by 2030, amounts to USD 270 million[50].

The business model of the Etihad Super ESCO is to develop projects, bundle them, contract with accredited private ESCOs, to undertake the work on a guaranteed energy performance contract, and to source and arrange the capital, as shown in Figure 9. It targets government and other organizations with large property portfolios and acts as an effective facilitator between building owners, ESCOs and Financial Institutions, in order to remove the market barriers. These activities are carried out within an ESCO market operational framework based on (1) An ESCO Accreditation Scheme, (2) Standard Contracts for Energy Performance Contracting, (3) Measurement & Verification Guidelines and (4) A dispute resolution mechanism.

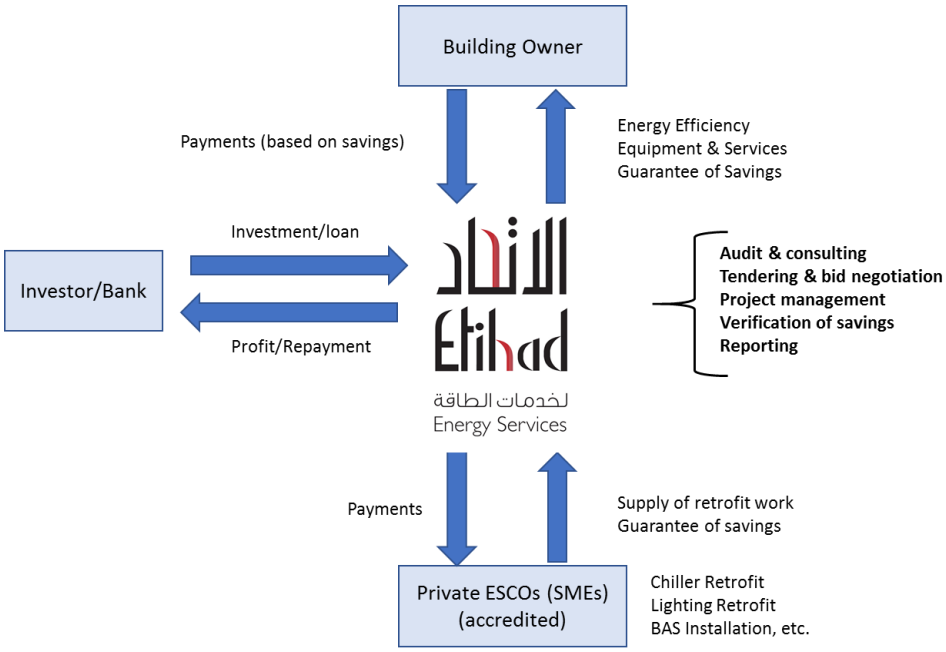

Fig.9 – Schematic business model of ETIHAD Super ESCO Set up

[48]Etihad Energy Services: http://www.etihadesco.ae/

[49]Saudi's PIF sets up energy service firm Super Esco:
http://english.alarabiya.net/en/business/energy/2017/10/18/Saudi-s-PIF-sets-up-energy-service-firm-Super-Esco.html

[50] Etihad ESCO, The Implementation of a Super ESCO in Dubai, Asian Clean Energy Forum 2016 (June 2016)
https://d2oc0ihd6a5bt.cloudfront.net/wp-content/uploads/sites/837/2016/04/2ND-Normand-Michaud-Etihad_ESCO_Presentation_20160608.pdf

Up to 2016, the Etihad Super ESCO has implemented several projects including[51]:

- ✓ A 16 AED million (USD 4.36 million) project for DEWA in seven buildings including 55 EE measures covering lighting, cooling and ventilation. The project achieved a reduction in energy consumption of 31% amounting to 5 GWh per year and an annual saving of 2.6 AED million (USD 0.71 million). The measures also induced a significant improvement in comfort conditions in the Head Quarter building.
- ✓ A 21 AED million (USD 5.7 million) project to replace lighting in power stations with LED lighting, resulting in a reduction of energy consumption for lighting by 68% and an annual saving of 6 AED million (USD 1.6 million) per year. The new lighting also produced better working conditions. This is part of an overall 37 AED million (USD 10 million) investment across the DEWA estate, including power stations and offices.
- ✓ Etihad Super ESCO also signed a number of MoUs that should eventually lead to EE services projects, including with the Dubai International Finance Centre, the Dubai Airport Free-zone Authority and the Wasl Asset Management Group
- ✓ Moreover, Etihad Super ESCO announced in November 2015 the world's first building retrofit project funded through Islamic financing. The project is located in the Jebel Ali Free Zone and this was expected to be the largest retrofit to date in the Arab region, covering 157 buildings. Projected savings are estimated to total 26 GWh of electricity and 200 million imperial gallons of water per year amounting to 22 AED million (USD 6 million) of annual savings. Capital cost is estimated at 64 AED million (USD17.4 million). The funding is provided through the National Bonds Corporation.

Despite its relatively young age, Etihad ESCO manged to accelerate the pace of EE projects implementation in the UAE through a clear mandate, and a well-functioning and successful business model. It started with high visibility projects such as the DEWA buildings and power stations and managed to achieve a successful up-scaling of EE measures. This set up the pace for other important projects that were implemented subsequently, showing that the Super ESCO solution, when properly developed and implemented, is very effective in bringing about significant upscaling of EE projects in a relatively short period of time.

The mandate of Etihad ESCO includes the creation of a market of private ESCOs based on the "Energy Performance Contracting" (EPC) model, and through an ESCO accreditation process. It was required to focus initially on governmental buildings, then on the private sector. The reduction of transaction costs, and economy of scale, are achieved by bundling a number of similar measures over a large number of buildings, which also contributes to the upscaling of the EE measures. The approach seeks to establish a good commercial basis for the projects with attractive returns on investments. Etihad ESCO also helps in arranging financing for projects when needed.

With respect to the EE projects, Etihad ESCO prequalifies the buildings based on owners' portfolios, organize the tendering on their behalf and arrange for the financing of the project if deemed necessary. During the contract execution phase, it follows up the projects' implementation by the contracted ESCO and continues with the follow up during the guarantee period.

Etihad provides this comprehensive support of EE projects, while acting as a facilitator for the work of the private ESCOs, without competing with them and trying to be their substitute on the market, allowing a rapid upscaling of the EE services projects and subsequent substantial growth of the ESCOs market.

Saudi Arabia's Public Investment Fund (PIF) announced in October 2017[52] that it had set up a new national energy service company (Tarshid) which works as a Super ESCO, to help increase EE in government buildings and public facilities. The Saudi Arabia's energy efficiency market has an estimated value of USD 11.20 billion (SAR 42 billion).

In 2017, a royal decree was issued requiring all government entities to contract Tarshid on an exclusive basis in order to achieve energy savings across public buildings and facilities.

[51] Energy efficiency – learning from Dubai (March 2016): http://www.onlyelevenpercent.com/energy-efficiency-learning-from-dubai/

[52] Saudi's PIF sets up energy service firm Super Esco: http://english.alarabiya.net/en/business/energy/2017/10/18/Saudi-s-PIF-sets-up-energy-service-firm-Super-Esco.html

Tarshid has started with a capitalization of SAR 1.9 billion, which will fund and manage the EE retrofit of government and public buildings, street lighting etc.

5 Concluding remarks and way forward

This paper shows that Super ESCOs can largely contribute to the scaling up of EE projects and services in the Arab region and is emerging as one of the most reliable instruments to support EE market transformation through private sector ESCO market development. Moreover, if the concept receives strong political support, and is well designed to meet the specific conditions of the respective country, while involving all relevant stakeholders, it can in a very short time-frame lead to the following achievements:

- ✓ Address EE services issues in the public sector and overcome the barriers that private sector ESCOs face when trying to implement EE services projects in this sector. This will stimulate the development of a large number of EE services projects in the public sector improving its energy efficiency and, by example, induce an upscaling of the EE services projects in the private sector.
- ✓ Built the capacity, by providing training and technical assistance, of private sector ESCOs and increase their level of competence and hands-on experience by involving them, through EE performance contracting, in the implementation process of the designed EE programmes and projects.
- ✓ Develop standard contracting models and related templates for agreements such as EPCs, typical practices and guidelines, as well as energy savings measurement and verification (M&V) procedures, for both public and private sector EE projects. This will contribute to organizing and improving the credibility of the ESCO market and lowering transaction costs and delays.
- ✓ Create financing facilities and develop suitable instruments to allow easy access to project financing to facilitate the engagement of private sector ESCOs in the implementation process of EE services projects and allow them access to project financing.
- ✓ Leverage funds from local, and international, commercial financial institutions and international donor agencies to create an energy efficiency funding facility in the country, in addition to seed funds provided by the government. This will create a platform for long-term sustainable financing instruments for EE projects
- ✓ Improve the level of knowledge and awareness of energy end-users, as well as their level of confidence in the potential of EE projects to stimulate the demand for EE services products and projects.

5.1 Typical Super ESCOs settings and structures for the Arab region:

The discussions introduced in this paper shows that the Super ESCO concept proves to be one of the most effective approaches for rapidly engaging Arab countries in major implementation efforts to achieve the highly needed scale up of EE programmes to move to more sustainable, and *affordable*, energy systems. These efforts will allow them to meet their sustainable development goals and climate change commitments.

The *basic* Super ESCO model that can be retained by all countries in the Arab region, with some variations specific to each country, could be based on the definition and mandate presented in the proceedings of the China-ASEAN EE knowledge Exchange Workshop held in China in 2014 [53]. It advocates a comprehensive mandate for the Super ESCO as follows "*A Super ESCO is an entity set up by the government to function as an ESCO for the public-sector market, while also providing capacity development, project development, and project financing services to the private ESCOs. As a public institution, the Super ESCO is in a unique position to access financing and public-sector market opportunities. The government could also capitalize the Super ESCO with sufficient funds to leverage commercial financing and international donor funding. Because the Super ESCO is also well-positioned for public sector business opportunities, it can effectively*

[53] Proceedings of the China-ASEAN EE knowledge Exchange Workshop (ESMAP 2014); co-organized by the World Bank and China's National Development and Reform Commission (NRDC) and National Energy Conservation Centre (NECC) https://www.esmap.org/sites/esmap.org/files/DocumentLibrary/ESMAP_EECI_China_Energy_Efficiency_Proceedings_ASEAN.pdf

assist smaller, private ESCOs to overcome barriers related to market access, project financing, or capacity building". The World Bank also argues that: *"The advantage of this Super ESCO model is that the Super ESCO itself can achieve its business objectives while assisting smaller and medium sized ESCOs to grow and gain market share, thus expanding energy conservation efforts".*

This approach has all the success factors, including the creation of profitable conditions for all stakeholders: Governments will be able to reduce the volume of energy subsidies or lost opportunities of exporting energy at much higher prices, end-users will get a reduction in their energy consumption and hence a reduction in their energy bills and an EE services and ESCO market can take off to contribute to the progress of the countries in their sustainable development efforts.

It is important to also note that the Super ESCO, acting as a virtual power plant, has shown to be the most cost-effective way to avoid the needs for building additional power capacities and power generation, which most Arab countries are facing. With electric peak loads expected to increase by a minimum of 46% (Bahrain and Qatar) to a maximum of 125%(Oman) between 2017 and 2027 with the need for electrical generation increasing during the same period by the same order of magnitude (a minimum of 37% in the UAE to a maximum of 128% in Oman)[54]. Furthermore, these "virtual power plants" could provide relief to governments from the burden of solely facing the massive investments required for the additional power capacity, and their associated operating costs, since the EE investments are largely supported by the end-users, to their advantage, as well as the totality of their eventual operating costs. Actually, planned investments in the power sector in the MENA region, for the period 2017-2021, are estimated to total USD 207 billion[55], with Arab countries representing over 80% of that total amount. Investments made through ESCOs would be a cost-effective way of improving capital productivity.

The Super ESCO approach allows the government contributions to be sized to just allow the right dose of leverage to support the investments in EE in such a way that these investments become economically attractive for the end-users, and at the same time provide a good return on investment for the national budget.

Moving forward, it is proposed that the organizational structure of the Super ESCO be set up in a format that is compatible with similar commercially oriented public structures, in particular the public utilities, in the respective countries. The Super ESCO would be capitalized from public funds, and, for its operation, it should seek substantial contributions from international green financing and donations. In the case of a PPP, capitalization would also include the private sector finance.

An important element of the Super ESCO's operating priorities should be to design and set up programmes to implement, on a large scale, based on immediate, simple and proven EE actions, but also demand-side RE solutions, that can be applied to large segments of the building stock and households, public facilities, or industrial sub-sectors. Such approaches would result in considerably lower transaction costs and would enable a rapid scaling up of investments across EE services, and demand-side RE solutions, in the country. This bundling exercise would be based on identifying families of EE measures, that can be integrated to demand-side RE solutions, that are applicable in many sets of buildings or industrial facilities, which can be branded by building types or industrial branches, as a result of energy audits conducted in representative facilities of the considered stocks of buildings or industrial facilities. The designed programmes would aim to generalize the identified single proven EE measures, and integrated demand-side RE solutions, individually or as a package, to the targeted EE services potential stocks.

[54] Based on published figures in the Statistical Bulletin of the Arab Union of Electricity, 25th issue - 2016

[55] MENA energy investment outlook - cautious optimism, APICORP Energy Research, Vol. 02 No. 05 — Special report | February/March 2017: http://www.apicorp-arabia.com/Research/EnergyReseach/2017/APICORP-Energy-Research_V02_N05_special_report-2017-.pdf

Box: A proposed generic Super ESCO organizational set up

A generic organizational structure of the Super ESCO would include two solid and properly staffed main divisions: A very competent projects financing and administration division and a just as competent projects development and implementation division. These two divisions would work hand in hand to design and concretize the EE upscaling programmes, participate in the capacity building and accreditation of the private ESCOs, make the necessary contacts with the targeted buildings and facilities, prepare bidding documents and standard energy performance contracts, and proceed with the implementation and monitoring of the EE projects.

The projects development and implementation division can be organized into departments according to sectorial specialization, as required by the targeted sectors and the development of the volume of their EE projects. A dedicated department would cover the building sector, with possible sub departments covering the residential and non-residential activities, a dedicated department covering the industrial sector and another one the transport sector, with possible horizontal cooperation between these departments on projects requiring multi-sectorial interventions.

The Super ESCO would be under the guidance and management of a Board of Directors, including representatives of the main stakeholders involved in the development, hosting, financing and supervision of the EE services activities in the country.

5.2 Concluding remarks:

Super ESCOs can have very positive impacts on the improvement of energy efficiency in both public and private sectors. In countries where ESCO markets are inexistent, or not very active, Super ESCOs can help to rapidly produce a significant transformation of the scale of these markets. Indeed, their set up, and mandate, allow them to overcome most of the barriers facing the private sector ESCOs, and the DSM energy services market in general. In particular they can have the following impacts:

- ✓ Super ESCOs can conduct "marketing campaigns" to raise the awareness and interest of public and agencies and private institutions in EE services and projects
- ✓ Super ESCOs offer tailored financing mechanisms, allowing public agencies and private institutions to avoid budgeting issues related to their assigned Capital Expenditure vs. Operating Expenditure for the public sector, and competing with budgets set for running their core business in the case of the private sector. This allows both the public agencies and private institutions an easy access to financing.
- ✓ Super ESCOs coffer standard contracting arrangements, customized for public agencies, that can overcome problems associated with existing procurement regulations that are not suitable for Energy Performance Contracting, and remedy the limited capacity of public agencies in that respect.
- ✓ Super ESCOs would prepare the EE projects' developments using its highly qualified resources, overcoming the weaknesses that most private ESCOs have in that respect, because of their limited resources for project development. This would increase the credibility of the EE services market.
- ✓ Super ESCOs would provide technical assistance to local financial institutions on EE projects and help them develop new financial mechanisms and products to overcome the lack of familiarity of local financial institutions with financing EE services' projects. They can also develop with the financial institutions risk management products to mitigate negative perceptions that these institutions have about financing EE services projects.
- ✓ Super ESCOs would develop standardized and formal measurement and verification procedures and protocols to assess the energy and financial benefits of the EE services projects.

A publicly owned Super ESCO would probably be the likely solution when the intention is only to address scaling up EE implementation in the public sector, however a PPP-Super ESCO, addressing both the public and private sectors, would be highly recommended for net energy importing countries in the Arab region that cannot rapidly implement drastic energy end-users price reforms. Public facilities can be ordered to proceed with the implementation of EE programmes, and demand-side RE solutions, through the Super ESCO scheme. Furthermore, private economic operators, particularly in the non-residential sectors, would

also be required to proceed with the implementation of EE programmes, and demand-side RE solutions, through the Super ESCO scheme, as well, if they wanted to keep paying subsidized energy prices. The same tactics can also be applied in net energy exporting countries.

In most of the limited Super ESCO experiences, public utilities played the major role in the creation and capitalisation of these special EE services companies, as was the case with EESL in India and Etihad in the UAE. However, it is highly recommended that other stakeholders be involved, in similar extent, so that EE projects are considered in all their encompassing dimensions and with respect to all energy sources' end uses, and not just electrical end uses, which seem to be the focus when utilities' influence is not balanced by the weight of other stakeholders.

Finally, it could be argued that the role of Super ESCOs can be played by national EE and / or RE agencies, as they have been doing in some countries in the region, through setting up Project Management Units for some pilot projects, or demand-side management (DSM) energy services business initiations. However, the mandate of these institutions should focus on developing DSM policies, evaluating technologies, conducting pilot programs, setting up national targets and goals, and planning for their future achievements, etc. The nature of this mandate, in addition to requiring a full dedication of these agencies to its associated tasks, involves an organisational setup that is not suitable for the business models needed for the implementation of EE programmes, or demand-side RE solutions, at scale and going way beyond the stage of pilot projects. This endeavour entails very different business models, with adequate human and financial resources, that allow a dedicated focus on getting large scale uptake of EE programmes, and demand-side RE solutions, in a commercial set up that can deal with the technical, financial and organisational requirements, in an environment where conventional energy services businesses are not viable. And that's exactly what Super-ESCOs are set up to offer.

Once established and operating in each country in the region, the concept of Super ESCO could eventually be extended to sub-regional levels, where several countries in the region would consider a model that can allow them to better address common EE, and demand-side RE, issues across their countries and reach higher levels of financing capabilities. But this would require many preparatory steps, including a functioning framework for transparent and working economic exchanges.

Finally, like the rest of the world, Arab countries are engaged in implementing the 2030 Agenda for Sustainable Development and fulfilling global climate commitments. They each need to institute economic means of implementing the energy related sustainable development goals (SDGs) to deliver the social, economic and environmental gains of SDGs, for their own citizens, as well as reduce their carbon footprints and associated climate impacts.

Super ESCOs seems to be one of the most suitable interventions, that if implemented properly, can effectively overcome the combined constraints, on energy efficiency and demand-side renewable energy, of the region's weak institutional capacity, fragile sustainable energy policies and lack of energy cost-reflective price signals. These prevailing conditions in the region make Super ESCOs the most capable tool for Arab countries to deliver on SDG7 and other energy related SDGs.