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Saudi Energy Efficiency Center



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Final Evaluation Report

**National Energy Efficiency Program: Phase 2 (NEEP 2)
Saudi Arabia**

December, 2019

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Acronyms

APR – Annual Project Report
ASHRAE – American Society of Heating, Refrigerating and Air-Conditioning Engineers
CAFE – Corporate Average Fuel Economy
CEA – Certified Energy Auditor
CEM – Certified Energy Manager
CMVP – Certified Measurement and Verification Professional
DG – Director General
EE – Energy Efficiency
EI_{GDP} – Energy Intensity of GDP
EnMS – Energy Management Systems
ESCO – Energy Services Company
GASTAT – General Authority for Statistics
GBEE – Government Building Energy Efficiency
GDP – Gross Domestic Product
ICT – Information and Communication Technologies
IEA – International Energy Agency
KACST – King Abdul Aziz City for Science and Technology
KFUPM – King Fahd University of Petroleum and Minerals
KSA – Kingdom of Saudi Arabia
LCOW – Levelized Cost of Water
MoCI – Ministry of Commerce and Investment
M&E – Monitoring and Evaluation
MV&E – Monitoring, Verification and Enforcement
NEEP – National Energy Efficiency Programme
ProDoc – Project Document
RET – Renewable Energy Technologies
SASO – Saudi Standards, Metrology and Quality Organization
SEEC – Saudi Energy Efficiency Center
SEEP – Saudi Energy Efficiency Programme
SIDF – Saudi Industrial Development Fund
SQL – Structured Query Language
TIC – Technical Inspection and Control
TOE – Tonnes of Oil Equivalent
UNDP – United Nations Development Project
UP&DC – Urban Planning & District Cooling
USA – United States of America

Definitions

ESCO means a firm which provides services of design and construction of ECMs under an energy performance contract.

Energy Performance Contract means a contract between two or more parties where payment is based on achieving specified results, such as reductions in energy costs or payback of investment within a stated period.

NEEP is the project initiated in 2001 by the Government of KSA and UNDP. It stands for National Energy Efficiency Programme and is a capacity development programme for the King Abdul-Aziz City for Science and Technology (KACST). Its aim was to establish and support the development of the Saudi Energy Efficiency Centre (SEEC).

SEEC is the Saudi Energy Efficiency Center, established by the Council of Ministers Resolution No. 363 dated 1-11-2010. The Center aims at rationalizing the production and consumption of energy in order to increase efficiency in the Kingdom and unifying efforts in this field, whether governmental or non-governmental. In 13-12-2011 the Cabinet Decision No. 16 approved the organizational structure of the Center, as well as a detailed description of its functions and composition of the Administrative Committee. In March 2018 the Council of Ministers approved, through its resolution No. (353) the new organizational structure and mandate of the center.

SEEP – Saudi Energy Efficiency Programme is a comprehensive national program aiming to rationalize energy consumption and reduce overall economy's energy intensity growth.

1. Executive Summary

Major Findings

Throughout the project implementation period, SEEC continued its process of consolidation, as the independent entity managing Energy Efficiency (EE) at national level. The spin-off from King Abdul Aziz City for Science and Technology (KACST) was initiated in 2016. SEEC, with its more than 110 employees, has certain issues to resolve to be completely autonomous.

SEEC has created the Saudi EE Programme (SEEP), a comprehensive national program aiming to rationalize energy consumption and reduce overall economy's energy intensity growth. SEEP is composed of core measures (i.e., sector-specific EE programs) and flanking measures (i.e., measures established to provide the necessary support to ensure effectiveness and sustainability of the core measures). SEEP mobilized more than 150 professionals from more than 30 governmental entities and state-owned enterprises.

The expected outputs of the outcome 1 of NEEP 2 were only partially achieved. From the evaluation, it became evident that SEEC followed a strategy (which implementation resulted on the current SEEP), although this strategy was not made available and is not publicly accessible. It was also clear that SEEC had a methodic way to delineate, approve, revise and continually improve Action Plans. However, the Energy Conservation Law created under phase 1 of NEEP, was not further developed and the legislative process has not progressed during NEEP 2 implementation period.

The outcome 2 was achieved and even surpassed. SEEC made alterations on this outcome to include the capacity building of other target groups (e.g., students of several education level nation-wide). The EE related training and certification schemes chosen, derive from an internationally recognized organization. The choice is considered very good, due to the comprehensives of their curricula and the world-wide recognition that ensures the access of trainees to the global market and vice-versa. There is, however, room for improvement, i.e., more target groups to be addressed (e.g., in-service construction professionals; local financing institutions).

Regarding outcome 3, SEEC followed a different path than that described on the project document. The work done is considered very valid, meaningful and instrumental to operationalize the sector-specific EE programs that compose SEEP. The fact that outputs of outcome 2 are not as defined on the project document is seen as a misalignment of the project document with the mandate and needs of SEEC.

Regarding outcome 4, a remarkable investment has been done. SEEC has been developing communication campaigns for the several standards that are being set by Saudi Standards, Metrology and Quality Organization (SASO). The evaluation could not, however, have access to the tools that were developed to monitor the effectiveness or impact of said campaigns.

The project was responsible for the emerging of the public Energy Services Company (ESCO), Tarshid. Grounded on the knowledge transfer that was used to also develop the private sector market of ESCO's, Tarshid is well established and has already some iconic projects implemented in public buildings, such as, the SASO building, in which estimated energy savings of 30% are being publicized.

The Kingdom's energy intensity [TOE/GDP] had a very significant growth reduction during the implementation period of the NEEP 2. However, it was not possible to infer about the causal effect of NEEP 2 on this notable fact.

SEEC has been gaining importance, vis-à-vis, the management of EE at national level. Its mandate has been increased in 2018 and this will imply an increase in the structure, i.e., more employees to do the additional work. To resolve the lack of autonomy, referred above, there will also be the need to further increase SEEC's structure (i.e., human resources).

Lessons Learned

The fact that many other countries have developed their legislation of EE based on an overarching law, followed by secondary legislation and technical regulations, does not mean that the same or even better results cannot be achieved with a different approach. The KSA has used existing laws and regulations and has set EE standards for energy related products as a way to pragmatically regulate certain markets and ensure certain economy agents abide to minimum energy performance requirements.

SEEC's way of developing the EE Standards and Labelling program, resulted in an overall framework that ensures integrity of the regulated market. It is not only based on specifying minimum energy performance requirements (e.g., for building elements, home-appliances or cars). It also consists on a well-balanced structure that ensures:

- the verification of compliance, of the energy related products and market actors, with the rules;
- the enforcement of those rules in a way that exemplifies the consequences of not complying, which helps deterring market actors to be informed and comply with the standards.

It was found that there is no standard for thermal comfort in buildings, which results in having the air conditioning systems of the majority of the services and commercial buildings, operating with temperature set-points way below a reasonable temperature. Since EE and energy conservation is giving the first steps in the KSA, a strong effort of changing mentalities and practices should be envisaged. Although it was not quantified there is certainly a high potential for energy and energy cost savings on this particular energy conservation measure, through-out the Kingdom.

The fact that District Cooling is not progressing as desired, may be attributed to a less good choice of placement of the topic within SEEP. Energy efficient district cooling should be seen as a supply of final energy, hence, it should be placed on the Utilities Technical Team instead of on the Urban Planning

Technical Team. Furthermore, it was perceived that there is a limited vision of how district cooling can be implemented, i.e., the source of energy that can drive a district cooling plant. The integration of district cooling with the idea (present on Vision 2030) of expanding the utilization of natural gas, e.g., in urban grids, opens the opportunity to the utilization of trigeneration systems as an efficient way of supplying cooling effect, heat and power.

Recommendations – short-term

The top management of SEEC should resolve the issues related with lack of autonomy, increased responsibilities and brain-drain, either through a revised and adequate salary scale or through providing working conditions of excellence (including continual capacity building and exposure to relevant knowledge-transfer programs).

Consolidation of the regulations of the several EE programs. In other words, complete the SBC 601 and 602, continue the work of the energy management system associated with industry, develop and set the minimum energy performance requirements for heavy trucks, establish a mechanism to trigger the revision of stringency of the standards for energy related products, etc

Given the importance of updated and accurate energy and economic related data for national-level energy planning, SEEC should proactively propose to the Ministry responsible for energy the creation of an Energy Observatory, in partnership with the General Authority for Statistics.

Recommendations – mid-term

Initiate a process of utilizing the potential of energy and energy cost savings associated with highly cost-effective energy efficiency measures. Examples of these measures are: i) setting thermal comfort standards and have them integrated on the SBC 602; ii) promote, change mentality and award the choice of small and efficient cars.

Revise the placement of District Cooling on the SEEP teams and. District cooling (which is seen as a measure with high EE potential and very relevant to realize a Saudi Vision 2030 measure), should pass from the Urban Planning team to the Utilities team. In addition, under the Utilities Technical Team, carryout a national survey of thermal energy needs (heating or cooling) that could be supplied with efficient Cogeneration or Trigeneration systems, making use of the work done under the Urban Planning team (identification of zones where it is feasible to implement district cooling systems).

Initiate the development of a publicly accessible EE Strategy. The strategy should, desirably, be based on sector-specific baseline studies of energy consumption and on socio-economic analysis of the population and of the economy agents. In addition, the disaggregation of socio-economic agents would be done by using the International Standard Industrial Classification of All Economic Activities (ISIC). The strategy would encompass also a wide analysis of possibilities to overcome the commonly existing barrier: financing of energy efficiency.



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Build the capacity of economy agents directly related with financing. The idea is to bring into the Kingdom the knowledge about the differences of financing EE projects and financing normal assets. This line of action would include also the capacity building of the Ministry responsible for Finance on incentives related mechanisms.

Given the importance of water to the Saudi nation, make use of the existing links and synergies between relevant stakeholders (SEEC, MOMRA, SWECC) to explore more ways of ensuring that the nexus energy-water is considered in the future mandate of SEEC. The range of possibilities is vast: from end-use water efficiency (in all sectors of the economy) to high-efficiency water desalination plants, passing by the well managed water transportation and distribution.

Continually improve the qualifications and skills of professionals involved in activities having a direct impact on the energy consumption, energy efficiency and energy conservation.

2. Project Background and Context

The project

The NEEP 2 Project was developed to be a capacity development programme for the King Abdul-Aziz City for Science and Technology (KACST). The aim was to support the Saudi Energy Efficiency Centre (SEEC) to achieve the Kingdom's increasingly important goals for energy conservation.

As Saudi Arabia continued to diversify its economy beyond oil exports, energy consumption has grown in key sectors like buildings, heavy industry, water production and distribution and road transports.

With endogenous fossil energy reserves not guaranteeing the sustainability of future generations, a key focus of the Government and industry leaders has been to reduce the energy intensity growth through, policy, management and technology measures.

In the year 2012 SEEC has decided to establish the Saudi Energy Efficiency Programme (SEEP). In a way, SEEP is seen as the successor of the National Energy Efficiency Programme (NEEP). The enthusiastic leadership of SEEC and perhaps, a somewhat distinct vision of how the planning of Energy Efficiency (EE) at the national level should be conducted, resulted on the intention to create the SEEP. However, the NEEP, as the generator of the EE movement in the Kingdom of Saudi Arabia (KSA) and the creator of SEEC, continued to have its annual work plans, reports and financial reports. The NEEP continues to make sense, because, although SEEC has reached its institutional independence and the status of a competent authority in terms of Energy Efficiency (EE), it is not completely autonomous.

In this sense, it is difficult and probably not correct, to assume that the NEEP is now the SEEP or that the SEEP is the old NEEP. In this evaluation we will continue to distinguish one from the other, because it is envisaged that while SEEP will continue, the NEEP as a project supportive of SEEC's work, will end most likely in the next cycle.

The context

The text of the Vision 2030 discloses several situations for which EE is of utmost importance.

If KSA sets targets for renewable energy sources, in the form of a percentage of the global energy consumption, the targets will be achieved easier and with a lower cost, if the cost-effective EE potential is effectively utilized. When compared with alternative sources of producing final energy, that are put at the disposal of final customer at a free market price, EE is generally a cost-effective competitor (the cheapest energy is the one that is not consumed).

The diversification of sources of energy is part of the measures that economies have at their disposal to improve the security of supply. The recognition that natural gas will be part of the future energy mix opens an enormous potential for improvement, vis-à-vis, the cleaning and modernization of the energy sector. For example, burning natural gas on a, modernly built, tri-generation power plant in the middle

of a large city, for the purpose of supplying district cooling, heat (as needed) and electricity, would constitute an enormous gain in efficiency. Not only because the conversion process from primary energy to final energy is more efficient¹, but also because of the avoided losses associated with the electricity that is no longer necessary to transport, from long distances to that city.

The uptake of the EE potential in the KSA, should be handed over to the private sector. EE is also about giving new directions to the financial flows associated with the purchase of final energy. On a business-as-usual (BAU) scenario, it goes from final customer to utility. On a scenario where EE potential is being uptaken, the “energy costs” are going from final customer to an EE services provider (e.g., an ESCO) and from final customer to the utility (but with lower intensity than that of the BAU scenario). This redirection of financial flows represents an enormous potential of economy diversification. In particular, it is an area of activity with high added value but with low energy consumption, therefore contributes positively to the goal of reducing the economy’s energy intensity. Moreover and most importantly, it is an opportunity to create qualified employment opportunities.

The subsidization of energy has been always seen as a market barrier to the uptake of the EE potential in an economy. If energy is cheap why bother in saving it? The vision 2030, makes it very clear: attributing subsidies with no clear eligibility criteria is counterproductive and free market prices stimulate productivity and competitiveness within the economy agents. The Vision 2030, also allows perceiving an intention to carefully thought out incentives programs to rapidly transform certain markets (towards higher levels of efficiency) but without causing excessive financial erosion on the state’s budget.

Road transportation is one of the most significant energy uses (21% of energy consumed in KSA²) and perhaps one of the world’s least efficient ones due to the choice of cars. In the future, the speech should be: small is beautiful. In addition, improving the efficiency of urban roads and of public means of transportation is also part of the process of reducing energy intensity. But urban planning plays here a very important role – a well planned urban environment enables citizens to live without actually needing to use energy-related means of transportation. Walkability and cyclability (even if with e-bikes) should be mainstreamed on the Kingdom’s urban planning.

¹ Tri-generation plants can be as efficient as 85% on the process to convert primary energy into final energy.

² SEEC, November 2019

3. Evaluation Approach

According with the Terms of Reference (TOR) of this evaluation exercise, the evaluation criteria *efficiency* and *effectiveness*, are of prime importance but also *transparency* and *accountability*. Notwithstanding, the evaluation will take as its main guide, the OECD DAC criteria for Evaluations. These are:

- Relevance - Extent to which the activities have been guided to the priorities of the stakeholders
- Effectiveness – Extent to which the activities have attained their objectives
- Efficiency – Outputs in relation to the inputs
- Sustainability – Extent to which the benefits continue after project closure

Moreover, the TOR require that cross-cutting issues are also evaluated.

- Human rights – Extent to which “no one is left behind” regarding project benefits
- Gender equality – Extent to which the project design accounted for this aspect

Mainly through consultations to selected persons from the technical teams of the SEEP, there has been a tentative to obtain clarifications that would serve to complete the key analysis tools of the evaluation (evaluation matrix and changes from the baseline).

The annual project reports, the annual work plans and the annual financial reports are also important elements that were taken in consideration.

4. Evaluation Findings

4.1 Implementation

2012

The implementation of the NEEP 2 Project started with the approval of the respective project document in late 2011. The project was designed with 4 Outcomes and several outputs for each one. The annual project report of 2012 refers that additional outputs were defined in the course of the first year of the project. It was not brought to the knowledge of the evaluator, management alterations during 2012 to justify the alteration of the project course right on the first year of implementation. The annual project report of 2012 does not make clear to which Outcome do the new Outputs belong, or if it was foreseen the surging of a new outcome.

2013

In 2013, the first outcome of NEEP started to have two new outputs as replacement of the original ones. The first one, called support the implementation of National EE Strategy, presupposes that there is already an EE Strategy to be implemented. However, during the meetings and remote work an EE Strategy was not presented to the evaluator. Throughout the evaluation process, especially during the field missions, this topic was debated without any conclusive result; it appeared that there was some reservation in either, disclosing the existence of a documented EE Strategy or assuming that “navigation” was being done without any minimally elaborated guidance. The second output is called EE Standard and Labelling and is dedicated to deal with the certification and labelling of the EE of energy related products, for which SASO has already set standards.

The second outcome of NEEP started to have also a new output in 2013; this one, dedicated to build the capacity of relevant target groups from the public and private sectors. This new output seems to overlap with one output that came from the original project document (Direct Training for energy managers). Perhaps this was perceived by the project coordination also and in the following years only the new output was kept in implementation, as can be seen on Table 1.

The third and fourth outcomes of NEEP have maintained their original structure during the year of 2013, with two outputs each.

In 2013, a new Outcome surged. The annual work plan does not indicate a name for the outcome, just names for the respective outputs. The outcome 5 included two outputs, both related with the development of pilot projects in public buildings. Generally, public leadership programs target the public sector, which is one of the largest energy end users in any country. Effectively thought out EE pilot projects can create positive public opinion, providing an incentive to the private sector to follow the example of the public sector. The main objectives of demonstration pilots should be:

- to achieve a large energy saving on a significant installation
- to achieve a large public awareness due to iconic site and visibility

- to promote government intent to practice energy efficient initiatives in public sector installations

The government can also lead the procurement of energy efficient products in large quantities to lower per unit prices for private sector purchasers. Government procurements may also serve as incentives to attract suppliers of EE products for the KSA.

2014

In 2014, and on the following years, the structure of outcome 1 has been unchanged with two outputs. While the evaluation has seen significant progress on the second one (EE S&L), on the first one this was not the case. In fact, the annual project reports inclusively point out repetitions of the previous year not elucidating the reader about what exactly has been done regarding the elaboration of an energy conservation law, the definition of an EE Strategy for the Kingdom and about developing the respective action plans.

Regarding outcome 2, in 2014, the capacity development needs assessment gave place to the beginning of the capacity building of SEEC's staff. I.e., the former output was replaced by the latter one. SEEC continued to focus on the training of local trainers which happened since 2012 and is seen as very good. Likewise, it continued to focus on the capacity building of the relevant target groups. In fact, these two outputs have been ongoing throughout the years and until 2019. This reflects the internal (and correct) perception that EE is to be implemented by persons and that for it to happen, a continuous effort must be carried out so that people understand the benefits of EE (why they should be done) and the mechanics of EE improvements (how they should be done and verified).

Regarding outcome 3, in 2014, the output "Establishment of EEIS for Saudi Arabia" has been renamed to "Database of EEIS for Saudi Arabia". This output is still ongoing in 2019 and, as it will be explained in the following sections, is one of the great attributes of the SEEP, since it is the basis for simplifying and making the overall processes paperless and based on digital technology. It was also under this component that a new output was created in 2014. This was the establishment of an accreditation system, specifically developed for the licensing and accreditation of Energy Services Companies (ESCOs).

Regarding outcome 4, in 2014 there was new output called "Media plan to support spreading awareness". This was not on the original project document and somehow the justification for its existence is not fully convincing. Especially considering that the original output "National campaign for energy conservation", included similar activities. The aforementioned output, existed only in 2014 and the latter is still ongoing in 2019.

The outcome 5, in 2014, included only one output related with energy auditing on public buildings. It appears to be loosen from any other activity; its existence is not convincingly justified.

In 2014, another new outcome was generated within the NEEP. It is about the development of operational excellence within SEEC, although the outcome is also unnamed. In 2014 SEEC has initiated the establishment of its project management office, so that all projects born within SEEC follow the methodology recommended by the internationally recognized Project Management Institute. This is an

evidence that the SEEC top management wanted to make effective use of the investment done on its human capital and wanted to create a working environment that translates what SEEC is now – perhaps one of the best places to work in Saudi Arabia.

2015

As referred, outcome 1 of the NEEP has been kept unchanged in terms of outputs since 2013 until 2019. It is believed that SEEC has had a sort of strategy to develop SEEP but this was not disclosed during the evaluation.

The activities to achieve outcome 2 have been a consolidation of the previous years, with the same outputs as in 2014. According with the annual project reports, this was the last year in which there was an effort to identify and qualify trainers for the international certifications in CEM, CEA and CMVP, as well as other EE related areas. The project design and the project coordination (through adaptive management) did not reach all relevant target groups. For example, in-service professionals working on the construction sector were not reached by the NEEP 2. This is a shortcoming.

Regarding outcome 3, in 2015 the same outputs were being implemented and these have remained the same until 2019.

Regarding outcome 4, the project coordination decided to condense all activities in only one output. This happened from 2015 and until 2019. All awareness raising activities were grouped under the same output. It is not clear why the activities under the outcome 5, related with demonstration projects, were not included on this Outcome. In a way, disseminating the results of pilot/demo projects can constitute an effective way of raising awareness, e.g., to the benefits of EE.

The outcome 5 had activities related with Energy Auditing, according with the annual work plan and the annual project report. However, the description of the activities is not elucidative, and the evaluator could not find evidences of these activities.

The outcome 6, new as from 2014, continued its activities of establishing, within SEEC, the Project Management Office, through the enterprise excellence department.

2016

In 2016, all outputs indicated on the annual work plans were similar to those of 2015. Exception for this is the output related with energy auditing (under Outcome 5) that stopped existing. Therefore, the Outcome 6 (of 2015) passed being Outcome 5 (in 2016).

2017

2017, 2018 and 2019 were years in which there were no changes on the outputs of the project.

What is translated on the above paragraphs, can be observed in the Table 1, below. It is believed that, in such a project, there are good reasons for adaptations to the context and circumstances. These are generally better perceived by the coordination/management of the project rather than by the

evaluators (be it med-term or final evaluator). In this sense, there is not much criticism on the changes done to the project document.

It is relevant to state at this point, that the Outcome 3 contains outputs which description on the project document makes it be out of scope, vis-à-vis, SEEC's mandate. The elaboration of an information system to aggregate energy supply and demand data, extrapolates the clear mandate of SEEC which is to create and develop EE programs to uptake the EE potential at the national level.

Another critic to the project design is that, from the beginning, there was no imposition to have, within the implementing agency, a team specialized in Monitoring and Evaluation (M&E). Perhaps, if this was present from the beginning, some of the indicators chosen would have been defined in a different manner, in order for them to have the, so called, SMART³ characteristics. The only thing that was present was a line on the budget for M&E. Being a project of such a large duration (8 years), it is incomprehensible why there was no M&E being done in other instants of the project (e.g, every two years or on half-term).

As a final remark, the project document included very few aspects related with the consolidation of SEEC as an independent and competent authority that deals with EE aspects at the national level. If in 2019, it is observed that there are still areas that lack the adequate structure (e.g., HR and Finance), during the development of the project document in 2011, this should be even more evident. This is seen as the most probable cause for the intention to make a transition from NEEP to the SEEP.

³ SMART indicators refers to indicators that are Specific, Measurable, Achievable, Relevant and Time-bound

Table 1 - Outputs of NEEP 2 during the implementation period

	Outputs	Outputs	Outputs	Outputs	Outputs	Outputs	Outputs	Outputs
Outcomes	2012	2013	2014	2015	2016	2017	2018	2019
1. Energy Conservation Law, Strategy and Action Plans	Energy Conservation Law, National EE Strategy							
		Support the implementation of National EE Strategy	Support the implementation of National EE Strategy	Support the implementation of National EE Strategy	Support the implementation of National EE Strategy	Support the implementation of National EE Strategy	Support the implementation of National EE Strategy	Support the implementation of National EE Strategy
	EE Action plans – Key Sectors							
		EE Standard and Labelling	EE Standard and Labelling	EE Standard and Labelling	EE Standard and Labelling	EE Standard and Labelling	EE Standard and Labelling	EE Standard and Labelling
2. Capacity Development for Energy Managers and Leaders	Capacity needs assessment of training needs in SEEC and stakeholders	Capacity needs assessment of training needs in SEEC and stakeholders						
			Building capacity for SEEC staff	Building capacity for SEEC staff	Building capacity for SEEC staff	Building capacity for SEEC staff	Building capacity for SEEC staff	Building capacity for SEEC staff
	Training of Trainers in EE	Training of Trainers in EE	Training of Trainers in EE	Training of Trainers in EE				
	Direct Training for energy managers	Direct Training for energy managers						

		Building national capacity in EE	Building national capacity in EE	Building national capacity in EE	Building national capacity in EE	Building national capacity in EE	Building national capacity in EE	Building national capacity in EE
3. Energy Efficiency Information Systems (EEIS)	Comparative review of EEIS around the world	Comparative review of EEIS systems around the world						
	Establishment of EEIS for Saudi Arabia	Establishment of EEIS for Saudi Arabia	Database of EEIS for Saudi Arabia	Database of EEIS for Saudi Arabia	Database of EEIS for Saudi Arabia	Database of EEIS for Saudi Arabia	Database of EEIS for Saudi Arabia	Database of EEIS for Saudi Arabia
			Establishment of accreditation system	Establishment of accreditation system	Establishment of accreditation system	Establishment of accreditation system	Establishment of accreditation system	Establishment of accreditation system
4. Awareness Raising for Public and Industry	Baseline surveys and polling	Baseline surveys and polling						
	National campaign for energy conservation	National campaign for energy conservation	National campaign for energy conservation	National campaign for energy conservation	National campaign for energy conservation	National campaign for energy conservation	National campaign for energy conservation	National campaign for energy conservation
			Media plan to support spreading awareness					
5. Unnamed		Pilot project to improve energy efficiency						
		Energy Auditing study for facilities	Energy Auditing study for facilities	Energy Auditing study for facilities	Energy Auditing study for facilities			

						Enterprise Excellence ⁴	Enterprise Excellence ⁵	Enterprise Excellence ⁶
6. Unnamed			Establishment of Project Management Office					
				Enterprise Excellence	Enterprise Excellence			

⁴ Was in 2017 under Outcome 5: Operational Excellence

⁵ Was in 2018 under Outcome 5: Operational Excellence

⁶ Was in 2019 under Outcome 5: Operational Excellence

4.2 Project Overall: Relevance and Main Impressions

4.2.1 Relevance

From the meetings held during the evaluation field missions, the evaluator got the perception that the interviewees were not very knowledgeable about the NEEP project. In a way, SEEC staff with already some years of work experience (within SEEC) and SEEC staff with only a few years of working experience (within SEEC), have probably been conducted to think in terms of the SEEP and not in terms of the (original) NEEP. The NEEP 2 project has been losing its relevance due to the facts:

- SEEC and other SEEP partners have been progressing well on the process of capacity development of its staff;
- The Technical Teams (TTs) are apparently well equipped (intellectually and technically) and, most importantly, motivated to pursue the goal of SEEP.
- The coordination and leadership of the TTs has been effective, with a systematic gathering of information and reporting (from the TT to the SEEP Coordinator, on a weekly basis and from the SEEP Coordinator to the SEEC Executive Committee, on a monthly basis).
- SEEC and SEEP partners are producing results, although it is clear that EE in the KSA is still giving its first steps.

Only a few interviewees referred knowing well what NEEP is about. This could be seen as a good presage; gaining autonomy and not needing the “creator” is the desire of all leader. However, the annual project reports have repetitions of the same message and a significant part of the outputs of the original project document are yet to be concretized, hence, not knowing about NEEP also transpires that, other ways of strategizing national EE (and of implementing that strategy), is probably happening.

Notwithstanding, SEEC is not completely autonomous which prevents it to completely be released of UNDP’s aegis. The sudden loss of support from UNDP would severely put in cause the sustainability of the SEEC, since important support functions (related with finance and human resources) are currently being realized by UNDP.

4.2.2 Most Notable Project Results

- SEEC is the institution dealing with EE management at the national level. It was established in the 1st of November 2010 and became independent from KACST in 2016, with a well-defined mandate. Not being an original output of the project, SEEC’s structure and status as public institution, has benefitted from the NEEP 2 project. However, it was observed (and it is recognized by SEEC’s top management), that, in terms of autonomy, there are still some steps to give.
- SEEC has created the Saudi EE Programme (SEEP), which could be seen as the concretization of a national strategy for EE. To make SEEP operative, there are 13 technical teams, all of them

having persons from SEEC and from SEEP partnering institutions. The SEEP is based on a multi-year (3-years) action plan in which adaptive management is present. On the end of year 1 the plan is revised, and a new 3-years plan is drafted and approved. The SEEP action plans ends-up by being part of SEEC's action plans.

- SEEP mobilized more than 150 professionals from more than 30 governmental entities and state-owned enterprises. This is very good.
- SEEC has used/implemented Information Systems to handle, simplify and ensure effectiveness of certain national EE actions. Examples of this are:
 - Government Building Energy Efficiency (GBEE) – a platform for government entities to collect and analyze their buildings energy consumption data. Being developed on a Structured Query Language (SQL) database management system, allows the elaboration of tailored reports. It was not fully convincing that this database has been or will be used for improving the level of EE of buildings from the public sector.
 - Purchased samples system – a platform to securely store the data contained on the test reports of energy related products, purchased on the local sales points. This information system is for the use of the Technical Inspection and Control (TIC) Technical Team. Helps in the process of monitoring the compliance rates. The main users of it are MoCI and SASO, who input information of the several market Monitoring, Verification & Enforcement (MV&E) activities (e.g., market surveillance).
 - SL&S – is a platform to issue labels and certificates to all energy related products covered by the Saudi EE Standards. The information system has several privileges of access. Importers or manufacturers can input the required elements of products to be registered (which will be afterwards verified and validated by SASO). SASO and SEEC also have the possibility to interact with importers or manufacturers through the platform (e.g., to give authorization for a label to be printed and used).
 - SAUDI CAFE – is a platform to assist the process of having the market of road vehicles regulated, from the EE point of view. Likewise the SL&S, this information system allows interaction between importers and competent authorities.
 - Energy Reporting System (ERS) – a platform to collect data for the energy performance indicators of regulated intensive energy consumptions (i.e., large industries). On an annual basis all companies in the scope of the regulation must input required data.
 - ESCO portal – is a platform for ESCOs to apply for licenses. Data related with business activity is uploaded by applicants. Afterwards, SEEC and the ESCO committee verify and vote for eventual validation of each application.
- Since 2015, SEEP has organized an energy management framework for industrial plants that, currently, addresses three industrial sub-sectors representing 70% of the industry energy consumption (cement, petrochemicals and steel). Within this framework there has been the creation of the ICT-based Energy Reporting System (ERS). The ERS allows the compilation of data associated with energy performance indicators of these industries. Each plant has a focal point that liaises with SEEC (either through the online platform or by submitting excel spreadsheet). More than 180 production lines have been assessed, being 50-60 of cement and steel industry

and the remaining of petrochemical. Data is collected on an annual basis. There is an agreement with the Saudi Industrial Development Fund (SIDF) to provide soft loans for EE related projects. The SIDF is a financial wing of the Saudi government established in 1974, which was established to provide mid-term and long-term loans to the private industrial sector. What is publicly available from the SIDF reveals an already long-term experience of financing the industries in the KSA. However, regarding financing of EE projects, the SIDF does not publicize a single measure and this is an area where the KSA may obtain external support (i.e., technical assistance to build the capacity of financing institutions on the formulation of credit lines or financial products). The technical assistance should encompass ways of assessing the projects' merit and a methodology to monitor and evaluate the financial instrument). In 2018 the mandate of the department was enlarged so that the department would also focus on the feedstock materials for industries.

- According with the General Authority for Statistics (GASTAT) in KSA, in 2017, the total number of new building permits was 866797. The Saudi Building Code (SBC) chapters 601 and 602 were enacted in 2017 and are the regulations for energy performance of low-rise buildings (mainly residential) and commercial high-rise buildings, respectively. The application of the SBC, on the residential buildings, has the potential to reduce the specific consumption from 212 kWh/sqm*year to 150-160 kWh/sqm*year. The process for verifying and enforcing thermal insulation is based on SASO 2856/2014. SASO has been collaborating with the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) to obtain the energy performance requirements for building elements, considering the 3 climatic zones defined for Saudi Arabia. This reveals once more the aptitude of the technicians from SEEC and SEEP partners to obtain the necessary support/benchmarks to develop the regulatory frameworks in the KSA. This is very good. However, these standards are not yet added to (SBC 601 & SBC 602), which constitutes a minor shortcoming, considering that it is foreseen that they will be integrated in the near future. The SBC 601 & SBC 602 have a very significant increase of stringency for new constructions or major renovations, commenced after 2017. There seems to exist a very robust and well-coordinated verification and enforcement process. In general, the current process of verifying and enforcing for thermal insulation consists of four steps as follows:

- **Step 1 (Applying for new building permit)**

When the owner/ Engineering office applies for new building permit to Ministry of Municipal and Rural Affairs, he should provide the following:

- Saudi Electrical Company certificate (for new user).
- Filling a thermal insulation pledge form which states the commitment of the owner/ Engineering office to install the thermal insulation based on the given values in Saudi Building Code (The attached file has thermal insulation values for Saudi regions).

⁷ <https://www.stats.gov.sa/en/node>

- **Step 2 (Issuing new building permit)**
 - Sending copies for both of thermal insulation pledge form & building permit information to Saudi Electrical Company
 - **Step 3 (Notification for Visit)**
 - Saudi Electrical Company will send a letter to owner/ Engineering office to schedule three visits to verify thermal insulation for both of all walls, ceiling and windows.
 - **Step 4 (Issuing Building Completion Certificate)**

This step has two scenarios:

 - The first case scenario:
The owner did not install thermal insulation. As a result, the Saudi Electrical Company would notify him to visit Ministry of Municipal and Rural Affairs. Moreover, Ministry of Municipal and Rural Affairs will not issue building completion certificate for the owner
 - The second case scenario:
Both of Electrical Company and Ministry of Municipal and Rural Affairs will issue thermal insulation & building completion certificates respectively. Besides, the owner would get the electrical service.
- Under the Buildings Department of SEEC, there is the Technical Inspection and Control (TIC) Technical Team of SEEP. The TIC Technical Team has implemented multiple levels of control to ensure compliance of products and market actors to the existing EE standards. The monitoring, Verification & Enforcement (MV&E) mechanisms are a guarantee of integrity of this regulated market and ensure its competitiveness. The EE monitoring Authorities are: Ministry of Commerce and Investment (MoCI), SASO, SEEC and Saudi Customs. The SEEP has currently the market regulated for the following types of energy related products: air-conditioners, refrigerators, washing machines, lighting products, thermal insulation materials, electric motors, road vehicles and tires. The TIC includes the monitoring of compliance rates, which is very good because it allows learning with the process and correcting the causes of recidivist non-compliances. Although the in-depth by which the monitoring of compliance rates is done was not ascertained, said monitoring resulted in the following accumulated figures: 47000 visits to factories, warehouses and retail outlets; 6500 infractions detected; 87 non-compliant factories closed; 2.8 million of products re-exported; 2 million products confiscated; 1900 samples purchased and tested; 367000 products recycled. The results, if conveniently publicized or disseminated will certainly contribute to deterring conscious infractions.
 - The licensing process of ESCOs is defined, robust and well established. Currently there are more than 50 licensed companies. Moreover, the project has given support to the establishment of the National ESCO – Tarshid. Between 2012 and 2014, there was a feasibility study to determine the commercial attractiveness of this government owned company that would fund and manage retrofit projects in public buildings. In 2015, Tarshid was established and the first ESCO retrofit projects were initiated. Examples of this are the buildings of Saudi Standards and Metrology

- Organization (SASO), Ministry of Commerce and Investment (MCI) and Public Pension Agency (PPA). The local financing institutions should be prepared to analyze and to finance EE projects promoted by ESCO or by final customers (third-party financing). At the same time the local ESCOs and the final customers must be made aware of the concept of bankable EE projects.
- Since 2016, there are 12 universities offering courses with some component of EE and the number of enrolled students is 460. There are ongoing negotiations with more 5 universities and a target to reach 20 universities by 2021. Non-formal or professional education is also being promoted by SEEC with 3 certificate programs (CEA, CMVP and CEM); CIEP is under preparation. From 29 certification sessions conducted, 335 professionals were certified. There are 13 authorized trainers to proctor these international certification programs. The Center of Excellence in Energy Efficiency at King Fahd University of Petroleum and Minerals (KFUPM) has 20 students enrolled and 10 undergraduates on exchange with universities from the United States of America (USA). The SEEP has also engaged Vocational Training Colleges to ensure certain courses integrate EE on their curricula. Currently there are 12500 students enrolled in these courses, although more than 99% are Saudis. There should be a wide offer of qualification and certification programs for technicians (construction workers, installers of building elements, electricians, etc ...). These programs should not leave behind the professionals that are currently doing the jobs (expatriates). In this context, the government would ensure the existence and delivery of the trainings and the private sector (employers) would ensure (including payment) that the professionals working on their behalf would be trained and certified.
 - SEEC has been mandated to verify and enforce the compliance with the rules of Utility companies, such as SWCC, MARAFIQ and independent water and power producers. In 2018, SEEC's mandate has be increased to include the EE of water desalination. It would make sense that the EE of transport and distribution of water would also be on this team's mandate. Likewise, the district cooling, seen as an efficient form of energy supply, should be also in the mandate of the Utility Technical Team instead of being on the mandate of the Urban Planning and District Cooling (UP&DC) Technical Team.
 - Regulation on the Corporate Average Fuel Economy (CAFE) for cars and light trucks is enacted. The program is in operation and includes the labelling of the vehicles' EE. The program consists in a documental revision of certificates provided by vehicle manufacturers/importers. In 2017, the label had to be reformulated to accommodate one more category (excellent +). In 2018 a label for EV was developed. SASO is currently implementing a lab for future testing of vehicles.

4.2.3 Most Notable Concerns or Shortcomings

- The evaluation could not identify a documented and publicly accessible EE Strategy grounded on relevant elements of the Saudi economy or energy sector. This is a shortcoming because although SEEC may have defined a strategy, the NEEP partners (UNDP, for example) could not have access to it. It is believed that there was/is an EE strategy since the evaluation found that a consultancy company (BAIN) has been assisting SEEC on this aspect for the past 5 years.

- The Energy Conservation law has been drafted (during NEEP1) but it has not been enacted because, on one hand, it was said to be conflicting with other existing laws. On the other hand, it was considered preferable to use existing laws to derive from them, the necessary regulatory frameworks. It was therefore, considered unnecessary. While this may in practice result well, there is the risk of not considering aspects that could result in a further optimized situation. For example, the energy conservation law could include aspects related with Public Procurement or could authorize SEEC to participate on national energy planning or on the decision-making process about stipulation of energy prices and tariff structures. These two examples are not to be seen as the only ones, and they can affect significantly the EE at the national level.
- The two points above, which are missing, were main components of the first outcome of NEEP 2. This is a shortcoming.
- The autonomy of SEEC is not yet assured. The organization has structural deficiencies that impeded it to be operative without the support of UNDP. These are concerns that shall be addressed in the next cycle. Examples of the mentioned concerns are:
 - SEEC does not have a formal Director General (DG) since late 2017 – early 2018. This is a shortcoming. A number of changes have occurred in the recent past. Like an economy needs political stability, an organization like SEEC also needs to have a stable top management.
 - Finance department is very understaffed and lacking the basic conditions to assume its functions. This is a shortcoming. While it is understandable that SEEC has been pushing for the core departments to be operative and develop work and results, it is now time to acknowledge that external support should be replaced by autonomy. The next cycle of NEEP should focus on developing an exit strategy that ensures the successes obtained until now are sustained.
 - There is no internal audit function. This is seen as a minor shortcoming which results from the fact that almost all the Finance function of SEEC has been delivered by UNDP. The finance related external support includes the audit to the several payments and to the annual accounts. The next cycle of NEEP should focus on developing an exit strategy that ensures all the support functions, including financial control or internal audit are ensured (either as an internalized function or based on an outsource contract).
 - HR department is understaffed to assume all the HR Management functions of a structure such as that of SEEC. This is a shortcoming. The next cycle of NEEP should focus on developing an exit strategy that ensures all the support functions are assured and conveniently equipped with the appropriate level of resources.
- A database on energy supply and demand, forecasting and monitoring/evaluation of targets in key sectors like buildings, consumer appliances, heavy industry, transport, power supply, and water was not developed as it was referred on the project document. What was done, from the ICT point of view, was explained on section 3.2.2. It is extremely valuable and useful since it is instrumental and denotes that Saudi economy is based on digital. However, updated energy related information that might be useful for national energy planning, learning, dissemination, etc ..., continues to not be available. Notwithstanding, the fact that the project implementers

have not done it, is not seen as a shortcoming because, given the expected outputs of the project – Policies to mainstream energy efficiency into the national economy and development – and given the essence of the project – develop the capacity of the new Saudi EE Center –, the ICT tool described in the project document is considered to be out of the project’s scope. To reinforce this idea, it may be relevant to note that the evaluator observed, within the group of interviewees, a strong focus on the mandate and a straight discipline on not doing other things than improve the economy’s EE (e.g., though dedicated national energy management programs). Hence, instead of noting this gap as a shortcoming, the evaluator rather considers that this was an issue of project design. The described ICT tool may be useful but needs to be developed under the aegis of the right entity (e.g., Ministry responsible for Energy aspects).

- A concern that surged during the evaluation is related with the target groups that are supposed to have their capacity developed. While it is of course important to build the capacity of EE managers and leaders, from both, public and private sectors, there are other groups of professionals that have a direct and significative impact on the EE, e.g., of buildings, as well as on the actual cost-effectiveness of EE projects and on the persistence of energy savings. These are installers of energy related products (windows, air conditioners, thermal insulation, etc ...) and technicians (e.g., electricians). The design and management/coordination of the NEEP 2 did not take this in consideration. This should be considered for the next phase.
- Another target group that did not got the attention from the design or management/coordination point of view is the financing institutions. International experience shows that financing EE has been a problematic barrier for the uptake of EE potential. This should be considered for the next phase.
- The District Cooling concept has high EE potential but seems to be progressing very slowly in Saudi Arabia. There was not a convincing justification about why this topic was included on the Urban Planning and District Cooling Technical Team. This is a concern because it is believed that there is a high EE potential that is not being utilized. It would eventually make more sense to have it integrated on the Utilities Technical Team. In addition, there seems to exist a limited vision of how DC could be made available (i.e., with what source of energy could the system be driven).

4.3 Effectiveness of Project Activities by outcome

4.3.1 Legislation, Strategy and Action Plans

On this regard the project implementation has not demonstrated the achievement of all the outputs. The annual project reports repeatedly mention that the EE strategy is ongoing or will be developed in the next year. While it may be acceptable that Saudi Arabia can reduce the growth of energy intensity without an Energy Conservation Law, by making use of existing regulations and public entities’ functions and by ensuring an effective concerted action between relevant stakeholders, it is not comprehensible that there is no publicly available EE Strategy. Or if there is, it is on someone’s mind. Regardless of if there is or not an EE Strategy, it was not disclosed during the evaluation; hence it may be said that there

was a lost opportunity to infer about the existence of improvement opportunities of said strategy. For example, it was not possible to know if the reasoning being followed ensure that economy sectors with an important role in terms of diversification of economic activities are having the appropriate attention or support. Chances are that there is not an EE strategy or if there is, it was not shown. In practical terms, the evaluation considers this as a shortcoming of implementation.

The evaluation allowed having a perception of the consistency of the Technical Teams' work, as well as the effectiveness of the SEEP's coordination. These were indeed positive aspects of the evaluation. The majority of the Technical Teams appears to be equipped with the necessary competencies and skills and there is a very good discipline in terms of project monitoring and evaluation (although the definition of project indicators has room for improvement). SEEC's Executive Committee has a well-established way of defining, revising and updating the annual work plans. The SEEC's annual work plans include the SEEP's annual work plans. The SEEP is based on a multi-year (3-years) action plan in which adaptive management is present. On the end of year 1 the plan is revised, and a new 3-years plan is drafted and approved. SEEC's multi-year action plan is, in theory, developed and approved at the level of the Executive Committee of SEEC and, afterwards, taken for approval at the SEEC Board. Although in practice, this approval has been inexistent due to the lack of a formal DG of SEEC, the work is progressing well, the formalization of the DG appointment is foreseen to the end of 2019 and, on this first component of the project, the evaluation found that there are evidences of an effective management and coordination structure as well as a strong commitment from the government in improving the Kingdom's EE.

Overall, the project failed on the achievement of the results foreseen for outcome 1. There is no Energy Conservation Law and there is no publicly accessible EE Strategy. The evaluation concluded, however, that the project coordination and management rely on action plans that are revised and updated in an effective manner. The indicators have room for improvement, in order to be considered SMART⁸.

4.3.2 Capacity Building of SEEC and nation-wide Energy Managers and Leaders

The adoption of the international certificates of Certified Energy Manager (CEM), Certified Energy Auditor (CEA) and Certified Measurement and Verification Professional (CMVP) started in 2015. In that year, only the CEM was available and from the 36 candidates that have participated on the single session of that year, 17 have passed the examination.

In 2016, the three certifications were already available. There were three courses of CEM, two courses of CEA and one course of CMVP. From the 91 applicants to become CEM, 48 (53%) have passed the examination. From the 41 applicants to become CEA, 26 (63%) have passed the examination. From the 11 applicants to become CMVP, 4 (36%) have passed the examination. The information provided by SEEC, includes a total of professionals certified. This total is the sum of all partial summations. Since an

⁸ Specific, Measurable, Achievable, Relevant and Time-bound

individual may have participated in 1, 2 or 3 of the available certifications, the evaluation does not consider this summation relevant for the effectiveness assessment of the project's activities. This observation will be valid for all the subsequent years.

In 2017, there were five CEM courses, two CEA courses and one CMVP course. From the 79 applicants to CEM, 45 (57%) have passed the examination. From the 23 applicants to become CEA, 12 (52%) have passed the examination. From the 11 applicants to become CMVP, 6 (55%) have passed the examination.

In 2018, there were four CEM courses, two CEA courses and two CMVP courses. From the 107 applicants to CEM, 56 (52%) have passed the examination. From the 23 applicants to become CEA, 21 (91%) have passed the examination. From the 57 applicants to become CMVP, 33 (58%) have passed the examination.

In 2019, there were two CEM courses, one CEA course and two CMVP courses. From the 58 applicants to CEM, 29 (50%) have passed the examination. From the 27 applicants to become CEA, 13 (48%) have passed the examination. From the 39 applicants to become CMVP, 25 (64%) have passed the examination.

All in all, the establishment of these international certifications through the project, allowed the KSA to get, in five years: 195 CEMs; 72 CEAs; and 68 CMVP's. This is very good.

The courses chosen are considered very appropriate, from the technical point of view. Being international certifications bring additional added value, since it allows that Saudi professionals can make use of this certificate outside the Kingdom. In addition, it also allows that foreign people coming to live in the country may make use of their own certification. These certifications were issued to individuals working on the SEEP (on behalf of SEEC or other SEEP partners) and to individuals working on the private sector (on final energy consumers and on EE services companies).

For the process of capacity development of SEEC staff, the project has facilitated the access to other types of training. Examples of this are:

Table 2 - list of courses that SEEC has provided to their staff in 2012

Skills documentation & electronic automation & integrated archiving of documents	Energy Management and ISO 50001
MS Project Management 2010	Electrical requirement for energy conservation in Saudi building code.
Project Management Professional	Intensive Auditing training course
Total Quality Management	ON JOB Training for energy auditing
Analysis and design and construction of information systems supporting the administration	WB-KEMCO Knowledge Exchange on Energy Efficiency

Table 3 - list of courses that SEEC has provided to their staff in 2014

Time management	Training needs assessment
Innovative and creative thinking	Financial planning and budget preparation
Communication skills	Enabling policies for financing EE investment
Reports writing skills	Modern methods in measuring excellence performance in government
Advanced leadership and building teams	Network security
Interpersonal skills	EE policies and enablers
Teamwork enhancement	Project management professional
Strategy leaders	P3O foundation and practitioner certificate

Table 4 - list of courses that SEEC has provided to their staff in 2015

Leadership Masterclass	HVAC fundamentals
Strategic Thinking and Business Planning	Statistical Methods and Sampling for Labs and Inspection Bodies
Project Management Professional (PMP) Boot Camp	Professional Business Analysis
AC electrical Motors and Drives	Conference and Exhibition Organization Skills
Modern methods for data analysis and validation	MBA Training Course
ISO 50001 Energy management system standards	Risk Management Professional
Certification/Foundation Level Qualification in Human Resource (CIPD)	Total Quality Management
Modern Trends in the Control of Accounting Payments	Executive Secretary Skills
ITIL Foundation	Planning and Monitoring Skills
Advanced Network Security	Certified Knowledge Manager (CKM)
General English	Public Relations Strategies
Business English	Infographic Scenario Writing
Awareness Campaigns Planning	Social Media Role in Awareness Campaigns

Table 5 - list of courses that SEEC has provided to their staff in 2016

Certified Energy Manager (CEM)	Diesel Engine Technology
Certified Energy Auditor (CEA)	AC Electric Motors and Drives
Certified Measurement and Verification Professional (CMVP)	Green Buildings
Project Management Professional (PMP) Boot Camp.	ISO 50001 Energy management system standards
Project Planning and Monitoring.	Mastering Training Needs Analysis
Change Management.	Development of Managerial and Technical Skills for Training Specialists.
Leadership Strategy and Teamwork Building.	Managing and Measuring Training Learning and Development
Strategic Planning and Implementation	VM Ware
Data Analysis Techniques.	Network Security

Effective Skills for Successful Management	Professional Performance Development for Accounting and Financial Auditor
Advanced HVAC Design and Maintenance	Certificate in Performance Management and Performance Appraisals
Certified Human Resource Manager (CHRM)	Total Quality Management.
Certified Executive Personal Assistant	Balanced Score Cards of Training and Human Resource
Warehouse Inventory Skills	Legal Contracts Preparation.
Communication Skills	General English.
Public Relations Strategies	Key Performance Indicators Guidelines and Implementation
Social Media Role in Awareness Campaigns	ISO 20121 Sustainable Events Management
Awareness Campaigns Planning	E-Public Relations
Advanced Accounting	

In 2013, 2017 and 2018 the description of the trainings on the annual project reports is not so detailed, but there is a reference to the fact that each member staff of SEEC has participated in, at least, one professional development activity.

Having access to such a wide variety of trainings is not for all. There is unquestionably a commitment and a very good orientation from the top management of SEEC, to prepare the human capital of SEEC for the challenges ahead. Being able to retain this talent may also be a challenge that SEEC will face in the future.

The project has been quite effective in developing the capacity of SEEC staff as well as of nation-wide energy managers and leaders. As referred previously, the project coordination did not make the necessary adaptations to reach all relevant target groups. The time horizon of NEEP 2 is considered sufficient for a training program (eventually including certifications) addressing the in-service construction professionals (e.g., installers of windows and thermal insulation material, installers of air conditioners, electricians, etc ...). This is a shortcoming.

4.3.3 Preparation and establishment of EEIS

As referred previously, the activities performed in this component are not the same as described on the project document. The evaluation does not consider this as a shortcoming; it rather sees it as a misalignment between project design and SEEC's mandate. At the date of signature of project document (18-12-2011) the SEEC was already established, most likely, with a clear mandate. The Information System described in the project document extrapolates the scope of a national EE Center. It is something to be developed at the level of the Ministry responsible for energy aspects.

The work done so far to equip the technical teams of SEEP with the necessary ICT infrastructures appears to have been effective and into a certain extent, following a logical reasoning or even a strategy.

The six EE Information Systems (already mentioned) respond to the current needs of the SEEP and SEEC has demonstrated being able to, in a concerted action with SEEP partners, implement them in a way that the intended users (from public and private sectors) can make use of them.

4.3.4 Awareness raising for several sectors of the economy

The effectiveness of the awareness campaigns could not be fully assessed because the meetings held with the relevant persons from SEEC and SEEP, difficultly resulted on the delivery of evidences. For example, the evaluator did not have access to the results of surveys done before and after each campaign. He could not also have access to the survey itself. However, the description of the work done by the Awareness Technical Team, as well as the information contained on the annual financial reports, reveals that a strong effort has been done and there is a sort of communication strategy. The strategy indicated is simple – develop campaigns for the existing standards or for any innovation that results from SEEP (e.g., Letabqa).

4.3.5 Changes from the Baseline

The Changes from the Baseline is a tool that was developed to translate, in a simple manner, the changes that have occurred, vis-à-vis, the desired impact areas. This tool was filled in by the Project Manager and Project Coordinator and the results of it are in Annex 3.

4.4 Cost Effectiveness

The NEEP 2 project has been implemented under the modality of National Execution. Moreover, Saudi Arabia is not eligible to receive donations from the United Nations, given its economic status. This means that the funds used to implement the project's activities should be entirely from the government of Saudi Arabia. The next table resumes the annual expenditure of the project, since 2012 until 2019.

Table 6 - Expenditure of NEEP 2 as per the annual Combined Delivery Reports and Annual Work Plans

Year	Total Expenditure [USD]	Total budget [USD]
2012	2,982,695.16	2,373,586.00
2013	5,051,455.46	4,953,000.00
2014	10,345,175.83	10,968,956.67
2015	13,674,605.29	16,960,522.00
2016	15,863,073.94	17,000,000.00
2017	7,177,657.06	3,607,000.00
2018	19,144,068.58	23,000,000.00
2019	NA	33,666,666.67
Total⁹	74,238,731.30	112,529,731.00

⁹ Without FY2019

There are several discrepancies between what has been budgeted and what has actually been spent. The table contains on column 2, the total expenditure for each year. It is coloured in red or green to indicate if expenditure has been above or below the annual budget, respectively. The aim of this evaluation is not to make financial audit of the project and the project is not donor funded. Hence, this aspect will not be investigated further.

Table 7 - Expenditure of NEEP 2 by outcome as per the Annual Work Plans

	2012	2013	2014	2015	2016	2017	2018	2019	Total
Outcome 1	300,000	400,000	1,270,000	1,551,333	741,867	704,981	1,040,000	2,240,000	8,248,181
Outcome 2	550,000	850,000	600,000	456,667	1,056,667	649,454	1,580,725	1,780,725	7,524,238
Outcome 3	450,000	450,000	220,000	375,000	513,667	509,910	2,113,333	3,013,333	7,645,243
Outcome 4	450,000	550,000	6,958,333	1,094,4201	11,777,675	222,304	13,599,770	19,948,976	64,451,259
Outcome 5		1,050,000	100,000	225,000	240,000				1,615,000
Outcome 6			100,000	425,333	410,667	85,384	288,000	488,000	1,797,384
Total	1,750,000	3,300,000	9,248,333	13,977,534	14,740,541	2,172,033	18,621,829	27,471,035	91,281,305

For the outcome 1, of the NEEP 2 project, around 8.2 million USD were utilized. Given that the results of this component are far from being what was expected, the cost-effectiveness of this component is questionable or difficulty justifiable.

For the outcome 2, around 7.5 million USD were utilized. This is a component in which, from the evaluator's perspective, the project has done more. The results outlined previously, in combination with the perception of the readiness of SEEC (and SEEP partners) to manage EE at the national level, indicate that there is probably a good or very good cost-effectiveness on this component.

For the outcome 3, around 7.5 million USD were utilized. The six instruments created are considered very good and of paramount usefulness for the goal of SEEP. The project did not deliver the expected outputs, but as referred previously, in the scope of this evaluation, this is not a shortcoming; it is an issue of a less-good project design. Stepping back and looking at what SEEC (with SEEP partners) has developed, the cost-effectiveness of this component is considered good.

For the outcome 4, around 64.5 million USD were utilized. This gives an average of 8 million USD per year (and 252 USD/year*capita) in awareness raising. The evaluation could not ascertain about the effectiveness of the communication and awareness campaigns, but the numbers disclosed by the Project Manager and the line Manager of the Awareness technical team, indicate that, in fact, a very strong investment has been done on this field. The project coordination decided to create a new outcome that included pilot projects. The results of which could also constitute material to disseminate and to raise awareness. It is not understood why the outputs of this new outcome were not integrated on Outcome 4 of the NEEP 2 project. For the funds used, it would be reasonable to consider that besides the intangible energy savings that are expected to happen with the increased awareness of public in general, that there would be also tangible energy savings resulting from relevant and iconic EE

demonstration projects developed with the purpose of creating awareness but also generating significant amounts of energy savings. The cost-effectiveness of this component is therefore considered fair.

For the outcome 5, around 1.6 million USD were utilized. This component was about doing energy audits in certain public buildings and implementing the resulting energy performance improvement measures. The measures and their results are not conveniently documented, or they were not passed to the evaluator. With the information made available, the costs of this component are not convincingly justified and therefore, its cost effectiveness cannot be assessed properly.

For the outcome 6, around 1.8 million USD were utilized. This component is very much related with the consolidation of SEEC as the body in Saudi Arabia to deal with the EE management at the national level. It is a component that, from the evaluator's point of view, should have existed since the beginning of the project. In other words, the project design failed by not having a component dealing explicitly with the continual improvement of SEEC's processes and performance. Stepping back and looking at the potential that SEEC has to generate savings for the KSA, the costs are well justified and the cost-effectiveness of this component is considered good.

The evaluation could not obtain data associated with energy savings resulting from the SEEP. Therefore, it is not possible to make grounded estimations of the cost of the avoided Tonnes of Oil Equivalent (TOE). In fact, from the meetings held with several Technical Teams, the existence of methods to ascertain about the avoided energy consumption as a result of project activities was not demonstrated. This is a shortcoming for any EE project. In the future, SEEC should strive to obtain for each national EE program, a framework to deal with the estimation of avoided energy consumption and avoided green house gas emissions.

4.5 Impacts

4.5.1 Impacts, vis-à-vis, Project Objective

The impact of the project, regarding the reduction of energy intensity, is a complex subject. Firstly, one must take into account the meaning of energy intensity. Energy Intensity of GDP (El_{GDP}) is a ratio between the total primary energy consumption of an economy and the Gross Domestic Product (GDP) of that economy. Hence, if we see a chart of the El_{GDP} like the one below, we could immediately think that the country is on the right track in terms of EE. However, to have a lower El_{GDP} , we can have several combinations on the tendencies of both, primary energy consumption and GDP. In rigor, it is the rate of growth of primary energy consumption and GDP that will determine what happens with El_{GDP} . This is to say that the indicators should not be assessed alone.

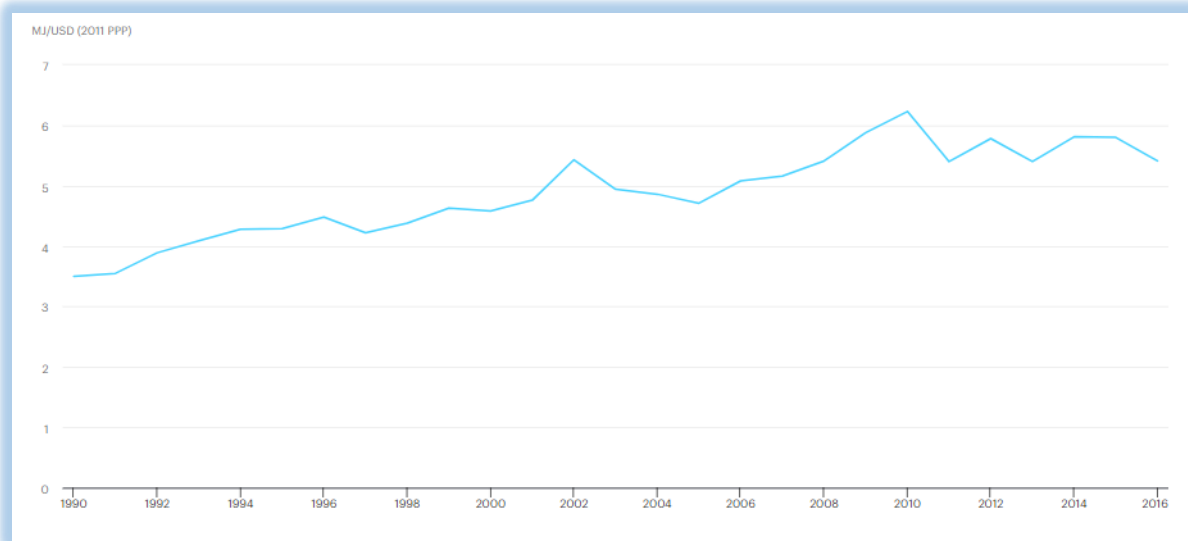


Figure 1 - Energy Intensity of GDP in Saudi Arabia [MJ/USD 2011 PPP] – 1990/2016 (Source: IEA)

In fact, the chart indicates that EI_{GDP} has somewhat stabilized, or, stopped growing, since 2011.

Analyzing in separate both components of EI_{GDP} , we have the following. The total primary energy supply for the period 2000-2017 is illustrated on the chart below.

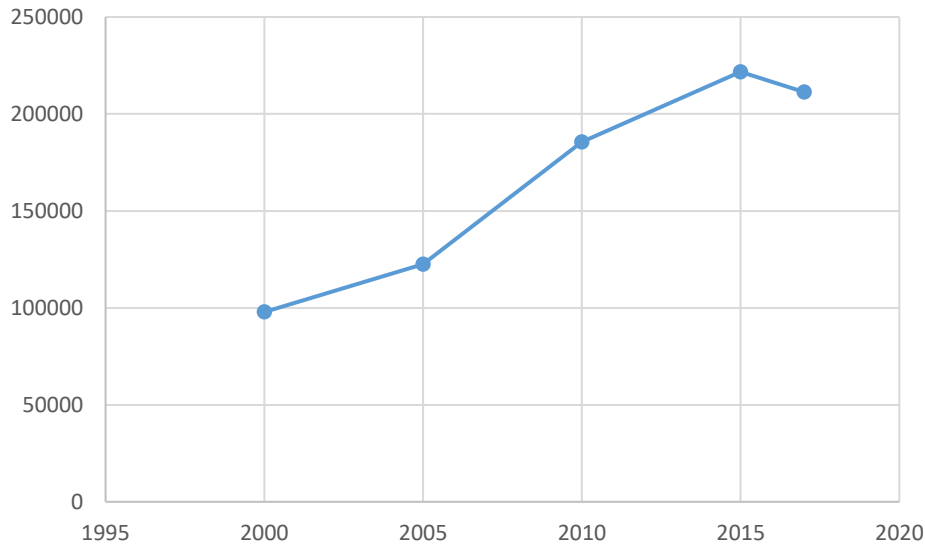


Figure 2 - Total primary energy supply, 2000-2017 (Source: International Energy Agency)

There is an inflexion on the year 2015, which is prolonged until 2017.

On the other hand, the real GDP (i.e., GDP at constant prices of 2010) for the period 2011-2018 has been growing steadily, as can be observed on Figure 3.

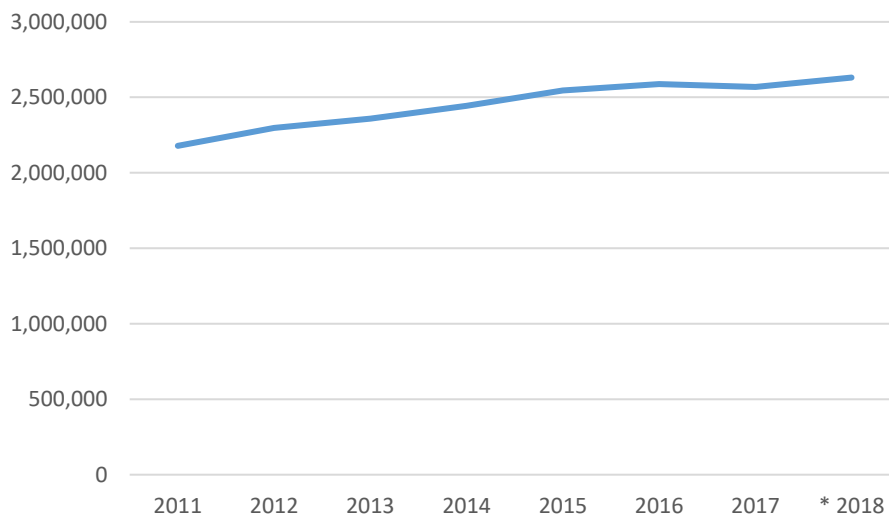


Figure 3 - Real GDP (million Saudi Arabia Rials), Source: GASTAT

While the tendency of the EI_{GDP} can be explained by the tendencies of both, primary energy consumption and GDP, the observed reduction of primary energy consumption may not mean that the Kingdom is using energy in a more efficient way. Since the structure of the economy of the KSA is changing (under diversification), the changes in structure may be: more low energy intensive activities with high value added to GDP. This is to say that the reduction of primary energy consumption from 2015 onwards, may or may not be a result of the SEEP. To have a clearer perception of this, a more in-depth study would be necessary; a study focusing on the growth of the contribution to GDP of the several economic activities and a study focusing on the energy intensity of each economic activity branch.

4.6 Sustainability

The sustainability of the measures put in place though the NEEP 2 appears to not be in risk. The meetings held during the field missions allowed perceiving that there is political commitment to improve the Kingdom's EE and that a meeting of the Board of SEEC was going to happen in the end of 2019. In this meeting important things would be discussed, such as the nomination of a DG for SEEC. Precautions must be taken, vis-à-vis, power interests. The national interests should be the motivating factor.

There are, however, certain concerns (already mentioned) related with the autonomy of SEEC. The next phase of NEEP should put a strong emphasis on the need to ensure that SEEC has all the necessary means to continue performing the expected role.

4.7 Gender, Environmental, and Social Aspects

There are few evidences about favouring or encouraging the access of women or any minority part of the community, to the trainings or any other project activity. However, the contrary was also not observed. The only references that were made in regard of these aspects were:

- SEEC has only men employees because, in the recent past (when SEEC was occupying another building) there were no physical conditions to have men and women working on the same place. The SEEC office was on two floors of a building and the disposition of the working places was mainly of the open-space type. In the future, SEEC could open job opportunities for women, either on the core technical teams or in the business support areas (HR, Finance, Procurement, IT).
- There are few women graduated in engineering or in areas relevant to EE development. Hence, the participation on trainings promoted by the project is mainly of men. There is however, no policy against participation of women on said trainings. The only issue is about creating conditions for the eventuality that women want to participate.
- There has been a communication campaign specifically targeting women on the context of housekeeping.
- With the possibility to have women driving cars in Saudi Arabia, an opportunity arises for the change on the choice of cars. Dedicated campaigns aiming to change mentality about the size of cars could target specifically women. Focusing on a well-chosen key message e.g., *Small is Beautiful*, the next generation of car buyers could make things different, in terms of specific energy consumption¹⁰ of road transportation means.

SEEC has achieved the status of ISO 50001 certified organization¹¹. This is very good because, denotes commitment from the top management to, on one hand, show that more than wanting that people outside SEEC do something to improve EE SEEC is also giving the example, and on the other hand, to care about the environmental impact of SEEC's activities.

4.8 Design, Intervention Logic and Indicators

The design of the NEEP 2 projects follows common practice in the sense that it is composed of several components, impact areas or outcomes, and, has several outputs or groups of activities that, in

¹⁰ kWh/Km*passenger

¹¹ See Annex 8.

combination, allow reaching the desired outcomes. The critiques to the project design are grouped in two different areas: i) relevance and completeness of the proposed activities; ii) adequacy of the indicators.

With exception of the EEIS as described on the project document, all activities seemed to be relevant. Even if not explained in a very comprehensive way, the EEIS proposed in the project document extrapolates the area of knowledge of Energy Efficiency and therefore it is understandably out of the scope of SEEC's mandate. The name itself does not match well with its description. The description of the Information System proposed on the project document is more of an energy observatory, that countries establish as a way to compile, store and publish energy related data that is useful for energy planning and for other aspects, such as, learning or make research. This does not mean that SEEC should not be called to participate on the development of such Information System. But the call and the initiative should depart from other entity (e.g., Ministry responsible for energy)

The project document did not mention almost nothing about the need or benefits to have the assistance of a M&E expert, assisting in continuous or on a regular basis. This would actually make sense to have existed during the design phase of the project, since it is found that some indicators do not follow the SMART criteria. I.e., either they are not measurable or they are not time-bound. The only reference to M&E seems to be an annual budget line of 20,000 USD that apparently has not been used during the whole period of 8 years. With the accumulated experience of supporting/implementing projects, not requesting the services of a M&E practitioner seems to be imprudent, given the level of investment done on this project. The next phase of NEEP should consider the support of a M&E expert from the beginning. This would constitute also a knowledge transfer or capacity building of the staff working for SEEC.

Regarding indicators, an example of a less-well thought out indicator can be seen in output 2 (**EE Action Plans – Key Sectors**). The baseline for this output is the following: **Labels for 3 appliances exist**. The performance indicator for verifying the success in achieving this output is: **Standards improved by 30% and draft action plan ready for building and transport sectors**. The indicator has several flaws when one tries to verify if it is a SMART indicator or not. The indicator is **not specific** – there has been the intention to mix two aspects on a single indicator. Moreover, there is no connection between the baseline object (labels) and the performance indicator (standards or action plans). The part of the indicator associated with the standards is ambiguous and **not measurable** – improving a standard in 30% means what exactly? Improving in comparison with what (the baseline speaks about existence of labels)? Regarding **achievability**, it is only possible to take conclusions about the part of the indicator that deals with action plans for building and transport sector, although this is also not well defined since there is no baseline for it. Regarding relevance, the part of the indicator related with improvement of standards seems to **not be relevant** to the output. The performance indicator is **not time-bound**. Time-bound means that there should be a timeframe linked to the indicator (such as the frequency with which data is collected/it is measured).



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The project would have benefited to have the performance key indicators properly developed and would have also benefitted to have the M&E expert providing a follow-up of project activities in order to properly assess progress on the performance indicators.

5. Conclusions, Lessons Learned, and Recommendations

It is believed that all the implicated parts of NEEP, SEEC and SEEP have learned from the processes of consolidating SEEC and developing EE programs at the national level. The SEEC and SEEP are direct results of NEEP 2, hence, it is clear that the current situation would not be the same without NEEP 2 project or without the support of UNDP. This observation from the evaluation was corroborated by the acting DG of SEEC. The evaluation found that the key success factors of the SEEP are:

- There is a culture of combined work and cooperation;
- There are very well-defined roles;
- There is leadership and commitment from top management;

These are three essential ingredients for the success of any organization. Despite of the rotativity of functions and the need to hire new persons (due to resignations), what could be observed is a consistent engagement of the persons involved. The technical aspects seem to have been addressed in a very good manner, with support on international best practices. The managerial aspects (establishment of SEEC and coordination of SEEP partners) seem to have been addressed in an excellent manner, also following international business management best practices. The difference between both, is that SEEC benefited from being an institution of a very rich country, hence, the financial resources has never been an issue; especially with the artifice of having UNDP ensuring the timely availability of funds to cover the expenses of the project. This does not mean that there was no merit on the establishment of SEEC. It means that the task was made easier because money was available. The engagement and coordination of stakeholders is probably the most notable achievement of this project. KSA made in around 10 years what other countries are not able to do in 20 or more years. With the finalization of the NEEP 2 cycle , it is time to reflect on these achievements and on the challenges that are still ahead.

Given the observation done on the beginning of the report, that NEEP was losing relevance and that interviewees seemed to see NEEP as something of the past, it is recommended that a next cycle of NEEP is designed and that it contains among other aspects, an exit strategy of NEEP that facilitates and ensures the sustainability of the measures put in place until now.

With the evaluation it was perceived that there are concerns and there were shortcomings during the implementation of NEEP 2. The following is a set of recommendations for UNDP and the NEEP partners. They were grouped in three areas: i) Management of SEEC; ii) Management and Coordination of SEEP; and iii) Capacity Development. Each group of recommendations is divided in terms of time horizon, i.e.:

- short-term measures (less than 3 months)
- mid-term measures (between 3 and 18 months)
- long-term measures (more than 18 months)

Whenever applicable, there will be, for each recommendation, an indication of the responsible person/department/technical team.

Management of SEEC

Short-term measures

- Ensure there is an appointed Director General. SEEC Staff must feel there is someone in control of the institution. Urgent meeting of the Board of SEEC to address this and other important aspects.
- Ensure the spin-off from KACST is finalized and that SEEC is able to adopt an appropriate salary scale (that ensures retention of all key and qualified staff) and career progression framework for its employees.
- Revise the training needs assessment as a result of the new expanded mandate. HR department to take action and prepare the integration of new staff to address the new areas of activity.

Mid-term measures

- Ensure all support areas of SEEC (e.g., Human Resources and Finance) have the necessary resources to allow SEEC become a completely autonomous institution. Besides the aspect of autonomy of the institution, it is also a motivational aspect for those working on these areas. SEEC Executive Committee to take action and liaise with UNDP.
- Development of a study, in the scope of the ISO 50001 certificate that SEEC has, to explore, with an appropriate M&V methodology, the effect on the buildings electricity consumption of changing the set points of air conditioning system. The exercise would be made with the facility management partner. The results to be used for a new communication campaign addressing office and services buildings as well as for inserting on relevant curriculums of courses that SEEC is promoting. The results could also be integrated on SBC 602, as the new standard for thermal comfort, and with the secondary objective of changing the figures with which the design of air conditioning systems is done.

Management and Coordination of SEEP

Short-term measures

- Integrate a M&E expert to ensure the Project Document of NEEP Phase 3 is completely aligned with SEEC's needs and to ensure that it contains the appropriate conditions for a proper monitoring and evaluation of project's progress.
- Ensure the GBEE database is being properly populated with the data for which it was designed and confirm that its potential, as an energy management tool, is being exploited. UNDP to recruit a short-term expert, specialized in energy management of buildings, to verify if GBEE potential is being properly utilized.
- Confirm that SBC 601 and 602 have the thermal insulation standards integrated. Buildings Technical Team to take action.

- Propose the development of the Saudi Energy Observatory to the Ministry responsible for Energy. SEEC Executive Committee or Board to take action. UNDP to recruit experts.
- Initiate the definition of a study to complement the work carried out by UP&DC Technical Team on technicalities (i.e., possible technologies, advantages and disadvantages) and regulatory aspects of DC plants. The idea is to convince that DC may be supplied on a cost-effective manner if the energy used to drive the refrigeration equipment is different than electricity (e.g., natural gas on a trigeneration system). The study could also complement the feasibility study of expanding a grid of natural gas in urban areas.
- The District Cooling component of the UP&DC Technical Team to pass to the Utilities Technical Team. The reasoning behind this is that District Cooling is seen, by the evaluator at least, as an efficient form of energy supply. DC based on trigeneration, using e.g., natural gas as main source of energy, can be a cost-effective measure in Saudi Arabia. The second good reason for this is that within the Utilities Technical Team there is already knowledge of the cogeneration concept. Doing this could accelerate the process of bringing to market the solution.
- Develop work with SEC so that the electricity bills start having EE hints that are relevant to the final customer to which they are issued. Awareness Technical Team to initiate the contacts with SEC and to select and prepare the materials.
- Initiate contacts and draft a sort of Memorandum of Understanding (MoU) between General Authority for Statistics and SEEC. The aim of the MoU is to engage GASTAT on the development of SEEP. During the evaluation of NEEP 2 the evaluator visited the GASTAT website and concluded that there are significant energy related contents and publications. In the future, a collaboration between GASTAT on SEEP could be a wise decision. The experience in executing surveys and on analyzing data could be utilized. The infrastructure to securely store information could be utilized. The experience in developing tailor-made publications of EE related data could be utilized. GASTAT could also be called to assist on the development of the Saudi Energy Observatory, mentioned above.

Mid-term measures

- Initiate the development of a publicly accessible EE Strategy, even if there was one developed with the support of Bain. The strategy, should not disregard what was done previously (and how it was done). But, desirably, should be based on sector-specific baseline studies of energy consumption and on socio-economic analysis of the population and of the economy agents. Ideally, the disaggregation of socio-economic agents would be done by using the International Standard Industrial Classification of All Economic Activities (ISIC).
- Ensure availability of man-power and expertise to be able to accomplish the new expanded mandate (Industry TT and Utility). SEEC Executive Committee to take action.
- Develop, under the Utilities Technical Team, a national survey of thermal energy needs (heating or cooling) that could be supplied with efficient Cogeneration or Trigenation systems.
- Verify if there is room for improvement of the enforcement framework for cogeneration plants. For clarifications on this point, please check the contents of the meeting notes with Utilities Technical Team.

- Hire experienced ESCO business professional to assist the ESCO Technical Team on the revision of M&V plans and further develop policy aspects. SEEC Executive Committee to approve, UNDP to support recruitment process.
- Hire road transportation EE expert (road heavy-duty vehicles). SEEC Executive Committee to approve, UNDP to support recruitment process.
- Initiate the definition of a study to make more evident the water-energy nexus. The idea is to convince that perhaps, including the EE of transportation and distribution of water on SEEC's mandate may result in a wise decision. The idea would also benefit from the already existing links (synergies) between supposedly relevant stakeholders (SEEC, MOMRA, SWECC).
- Develop study, promote internal research and perform benchmarks on methods to produce desalinated water. The methods currently used on the KSA are very energy intensive and there is a huge potential to generate energy savings in this area, as can be read on the meeting notes with Utilities Technical Team.
- Prepare training and certification program for technicians working on the construction and installation of energy related products (e.g., installers of AC, windows, thermal insulation). Capacity Development and Accreditation Technical Team to take action.
- Development of financing mechanisms that can have a catalytic effect on the adoption of efficient technologies and practices, all in line with Vision 2030, with a controlled erosion on the state budget
- Develop a sociological study to understand why in the future the speech, vis-à-vis, the size of the cars, can be: *small is beautiful*. The idea is to try proving if based on overall cost of ownership of a car, people, and, in particular, women, would be convinced that having a small car is a wise choice.
- Aligned with the results of the study proposed for the building that SEC occupies (mid-term measure proposed above – scope of SEEC's ISO 50001 certificate), develop pilot projects in several cities addressing a very well thought out and monitored EE project addressing the energy use air-conditioning. To reinforce the idea, the aim is not to replace equipment; the aim is to test different setpoints, inquire buildings' users and explore this as a source of energy and energy cost savings. It should have a proper M&V methodology based on IPMVP Option C.

Long-term measures

- Carryout a comparative study of the work done in KSA around the national EE programs and the work done in other countries. UNDP to assist on recruiting a team of consultants and on publishing the results.
- Integrate walkability and cyclability (e-bikes) in urban planning.

Capacity development (SEEC Staff, SEEP partners, public sector officials and private sector professionals)

Short-term measures

- Train and build the capacity of SEEC's Finance and HR departments as part of the exit strategy of the UNDP NEEP Project. UNDP to provide training to the Finance department on the accountancy and financial control/internal auditing of SEEC.
- Capacity building of Ministry of Finance on the development of financing mechanisms that can have a catalytic effect on the adoption of efficient technologies and practices with a controlled erosion on the state budget.

Mid-term measures

- Capacity building of financing institutions, such as the SIDF and local banks on EE lending and third-party financing of ESCO projects.
- Professional development and certification of in-service technicians working on the construction and installation of energy related products (e.g., installers of AC, windows, thermal insulation).
- Trainings in the scope of the ISO 50001:2018 referential, such as: i) implementation, maintenance and improvement of Energy Management Systems (EnMS); ii) internal auditors of EnMS; iii) external or third-party auditors of EnMS.
- Other trainings in the scope of the ISO 50000 family of standards, as per indication of SEEC top management.

Annexes

Annex 1. Evaluation Mission – Notes from meetings

Meeting n° 1 – UNDP

Mr. Asim Salah

Ms. Mayssam Tamim

Tiago Queiroz Santos

UNDP referred they are interested in receiving a report that is Results-oriented rather than one that focuses strictly on completion of the activities.

The report should identify and characterize well the successes and unsuccesses.

UNDP showed interest in receiving an alternative to the energy performance indicator utilized on the Country Program Document (CPD). The indicator in use is energy consumption per capita.

The main objective of the evaluation is the preparation of the next cycle of NEEP, if it is considered that it makes sense to exist.

Meeting n° 2 – NEEP National Project Manager

Mr. Asim Salah

Mr. Mohammed Shaya Alfuraydi (Project Manager)

Tiago Queiroz Santos

Saudi EE Center (SEEC) is the materialization of the NEEP 1 and 2. SEEC represents the instrument to put in place the Saudi EE Programme (SEEP). SEEC employs around 100+ persons, 50 of which are allocated to SEEP (even if not on a full-time basis). The SEEP in turn, has around 150 persons allocated (even if not on a full-time basis). From these 150, 50 are from SEEC and 100 are from the other 30 public entities.

SEEC has access to energy related data with a very good level of disaggregation. However, SEEC does not currently work directly with the General Authority for Statistics (GASTAT). By doing so, the SEEC could supply the GAS with relevant data to integrate statistic publications and could obtain from GAS relevant data to complement the energy planning work of SEEC (e.g., information to support the development of the residential energy efficiency baseline). The GSA has the means and experience to perform country level data collection. A special purpose survey could be carried out in order to serve as input for the national energy planning. The same could be said, vis-à-vis, the development of energy efficiency baselines by economic code of activity, an information that is generally necessary to properly strategize the energy planning of an economy or country. The Energy Efficiency Information Systems could consist on this also.

There is an apparent difficulty in getting access to the existing legislation. Namely the legislation referred to in Outcome 1 of the NEEP 2.

The NPM referred the existence of a portal (MERAS portal owned by minister responsible for commerce) that constitutes a one stop shop for business creation. Applicants wanting to create an EE Services Company have the chance to do all that is necessary through this portal, including obtaining a license from SEEC to be an ESCO. This kind of modernization is characterizing the way SEEP is impelling the creation of the EE environment.

During his presentation the PM highlighted an area with apparent less good development – Urban Planning and District Cooling. During the period 2012-2017 this technical team has developed general EE urban planning guidelines for new developments and aligned with all relevant stakeholders and signed MOU with the related government entities to integrate the EE urban planning guidelines into existing regulations (MOMRA, MOH, MOT, RDA, ECA, RCJY, etc.).

From his perspective the progress has been low and, vis-à-vis, district cooling, almost inexistent. There is thus, an opportunity that cannot be left unexplored. In new developments, the adoption of cooling district associated with decentralized high efficiency co-generation should be properly evaluated from the technical and economic points of view.

For the period 2018-2020, the technical team will be working with MOMRA to develop comprehensive EE guidelines for urban planning. The comprehensive guidelines differ from the general guidelines in the sense that the former is the update of the existing regulations with incorporation of the guidance of the latter.

Communication and Awareness is apparently done without a medium-long term strategy. It was referred that, however, the C&A measures are preceded by a dedicated survey to be compared with a post-measure survey, to infer about the campaign's impact. This is good.

7-11-2019

During the year of 2018, the link between NEEP and SEEP seemed to have been broken. Changes in the top management of the SEEP were pointed out as the probable causes for this less good phase of development.

While the role of the NEEP in the past was to assist in the formulation of a strategy to the management of EE in KSA, facilitation and backing up the inability of SEEC to mobilize resources for a more fast development, currently the role of the NEEP is mainly that of funding (i.e., enabling the financial flow of funds from government to the employees and services providers). In this regard, NEEP has been closing the gap between the budget approved – at the level of when SEEC was under KACST – and the current SEEC expenditure – old budget plus contribution of UNDP for additional staff (Engineers and graphic designers, etc ...).

It has come to the evaluator's knowledge that the SEEC budget for 2020 has not been approved yet, because there is a large difference between the previous budget (referenced to the period of time when

SEEC was under KACST) and the actual amount of expenditure (previous budget plus UNDP contribution to pay salaries of SEEC staff). If this is confirmed, there is a high risk of unsustainability of SEEC, in case: i) MoF does not approve SEEC's budget; or ii) UNDP stops backing up SEEC's expenditures.

The future role of the NEEP is still to be defined, but it is important to consider that the current status quo of the SEEP is not only associated with the contributions from NEEP. There has been a long-term agreement with a consultancy company that has been making significant contribution to NEEP. This consultancy has been there for the past 4-5 years with a taskforce of around 10-12 full time staff. On the final part of their contract (past 4-5 months) the taskforce has been reduced to 4-6 full-time staff. This consultancy has supported SEEP in developing the EE strategy for the Kingdom by conducting feasibility studies for the initiatives, technically analyze them based on international benchmarks and adapt them to the Saudi context after prioritizing these initiatives according to the expected savings and ensure that the required enablers are in place for execution. All that in collaboration with SEEP teams.

UNDP is experienced on the recruitment of international technical expertise and is experienced on the application of monitoring and evaluation good practices. Hence, UNDP's contribution may eventually pass by providing surgical technical assistance to the technical teams of the SEEP or providing (more frequent) expert advice for program monitoring and evaluation.

Another consultancy company has been assisting the Utilities technical team on the development of the baseline situation.

10-11-19

The procurement process for the SEEC follows somewhat the same rules that are applied for other governmental entities: above 300000 Rial, need to have competitive bid supported by 3 quotations; below 300000 Rial, it can be simple but it always requires the existence of a contract legally binding.

The renting of SEEC's building was discussed. The renting of the building is supported by the NEEP. The building is included on a compound that could benefit from having a central district cooling system. The compound and almost all buildings therein are of the Saudi Pensions Fund. The SEEP should foresee, significant research work to determine in what conditions would make sense to have mandatory district cooling systems in new developments with intensive cooling needs throughout the year. The concept of District Cooling (DC) also deserves being discussed and a vision from outside may reveal significant EE improvement when comparing with the concept of DC currently defended by the Urban Planning & District Cooling (UP&DC) Technical Team, which is to be fully supported on electricity driven chillers. The Vision 2030 indicates that Natural Gas (NG) is to be promoted. International experience has proved that the use of trigeneration, from burning NG is an efficient way of supplying useful energy to final consumers.

Meeting n° 3 – ESCO Technical Team

Mr. Sultan Almutairi

Mr. Mohammed Shaya Alfuraydi (Project Manager)

Mr. Tiago Queiroz Santos

The role of the Energy Services Companies (ESCO) TT, since its creation, has been:

- Provide support to Tarshid on the Measurement and Verification (M&V) of energy performance of efficiency projects in public buildings.
- Prepare and manage the scheme to license ESCOs at the national level.
- Assist on the promotion and dissemination of information about the ESCO business model to selected target audiences.

The scheme to license ESCOs follows well established requirements and contemplates 2 types of licensing: i) by company type; ii) by maturity of company. On the first one, the scheme considers 3 types of energy efficiency services companies: i) Audit Companies; ii) Energy Services Companies; and iii) Industrial Energy Audit Companies. On the second one, the scheme considers two levels of maturity: i) Full license; ii) Provisional license.

The licensing process is defined and well established. It involves the interaction with more than one public entity. The respective workflow is assured by digital way and includes a documental management system and bi-directional communication interface. Currently, there are about 50 licensed companies.

The TT is composed of six permanent staff plus two external consultants. From the six-permanent staff, four are employed at the SEEC, for more than 2 years, and all have an Engineering degree. Within these four, the ESCO TT has the competencies of CEA, CEM and CMVP¹², which of course is good to give credibility to the licensing scheme (the licensed ESCOs are required to have staff with these qualifications) and to the Monitoring, Verification and Enforcement (MV&E) processes. The other two are fresh graduates in Engineering and there is an intention to provide them with more specific qualifications. The ESCO TT has an annual plan for training which is taken for approval of SEEC and, in principle, is supported by the UNDP NEEP project.

The execution of the ESCO TT activities is authorized and overseen by a Committee. This committee is composed by elements from the following entities: ECRA, MOCI, KS University, SEEC, Ministry responsible for energy, General Secretariat of SEEC. The Committee has, inter alia, the role of voting the licensing of energy efficiency services companies.

The team has plans to involve the demand (potential private sector ESCO customers) and supply (ESCOs) sides of this emerging market.

¹² CEA – Certified Energy Auditor, CEM – Certified Energy Manager, CMVP – Certified Measurement and Verification Professional

When asked about the modality of energy performance contract (EPC) that is more commonly used or that is expected to be more commonly used in Saudi Arabia, the answer was Guaranteed Savings modality. It should be noticed that, under a guaranteed savings contract, the ESCO takes over the entire performance and design risk and may not be willing to assume also the credit risk. Consequently, guaranteed savings contracts rarely go along with third-party financing with ESCO borrowing. It is more usual to have the customers being financed directly by banks or any other type of financing institution. Moreover, the guaranteed savings scheme is likely to function properly only in countries with a well-established banking structure, having very good familiarity with project financing and sufficient technical expertise (i.e., within the banking sector), to understand energy-efficiency projects. The guaranteed savings concept is difficult to use when introducing the ESCO concept in developing markets because it requires customers to assume investment repayment risk (i.e., the credit risk). However, it fosters long-term growth of ESCO and finance industries: newly-established ESCOs with no credit history and limited own resources would be unable to invest in the project they recommend and may only enter the market on a situation where they guarantee the savings and the client secures the financing on its own.

It was not evident that the ESCO TT had intentions to involve the banking sector on its plans to involve the market players. Highlighting that there are several possible modalities of EPC, or ways of drafting the financial mechanism that will be used for EPC in the KSA, it is important to not forget that there may be the need to have the so called, third party financing, under which, either the customer of the ESCO borrows money from a financing institution. Therefore, it is also necessary to ensure that the financing sector in the KSA has its capacity built in terms of designing tailored financial products that are appropriate to finance EE projects. These financial products shall include ways to evaluate the technical risks of the EE project, as well as the credit risks of the borrower. In this sense, the ESCO TT team should not forget the concept of bankability of efficiency projects and ensure that all market actors become prepared to have bankable EE projects, if there is an intention to have the ESCO business model well developed in the KSA.

In terms of achievements, the ESCO department became more visible with the surging of the ESCO licensing scheme in 2016. The department is also responsible for the surging of the M&V guide (adapted to the KSA) and for the M&V Portal that allows agile interaction between Tarshid, Public sector entities and ESCO TT (who assists on the development and execution of the M&V Plans). The ESCO is currently negotiating the eventual outsourcing of legal advisory to assist in the revision of contractual aspects for future developments.

Meeting n° 4 – EE Capacity Development and Accreditation Technical Team

Mr. Bader Alajlan (Director)

Mr. Mohammed Shaya Alfuraydi (Project Manager)

Mr. Tiago Queiroz Santos

The Director of this department and team leader of the respective SEEP team, has been in the post for more than 2.5 years. Before was part of the staff of SEEC's Human Resources Department.

According to the Director's knowledge, EE training can be found in courses post-high school. For example, in Vocational Training Colleges, there are 12500 students enrolled every six months in courses having some kind of EE related input. At the university level, EE can be found on both bachelors and masters levels. There are 12 universities in which, since 2016, there have been courses containing EE-related components. The department is negotiating with more 5 universities and the objective is to attain 20 universities by 2021. The department has plans to expand EE knowledge transfer to lower levels of the educational system (high school and primary school).

In terms of non-formal education (or professional training), SEEC is accredited by the Association of Energy Engineers to deliver three professional training certifications: CEA, CEM and CMVP¹³. In the future they will also be willing to be accredited to deliver the CIEP¹⁴ training.

The department was able to make available, with the support of the UNDP NEEP project, 10 certified trainers to deliver trainings of the referred professional training programs. Currently, there are 195 CEMs; 72 CEAs; and 68 CMVP's.

The department delivers also a 3-days training program more generic on EE matters. It addresses EE and energy conservation in industry and buildings. This program has been delivered to around 100 persons per year.

Additionally, the department has initiated, in 2019, a program to train technicians and managers of the public sector on energy efficiency and management aspects. The future of this program will evolve to the utilities area.

When asked about training on organizational Energy Management Systems (EnMS), such as those proposed by the ISO 50001:2018, the Director referred that this was not yet discussed. EnMS are "a set of interrelated or interacting elements of an organization to establish policies and objectives and processes to achieve those objectives"¹⁵. Trainings in the scope of this could be for: i) implementation, maintenance and improvement of EnMS; ii) internal auditors of EnMS; iii) external or third-party auditors of EnMS. There were in 2018, 14 issued certificates (addressing 17 sites) of this international standard, very relevant for the industry and SME's sectors.

Besides the improvement opportunity referred above, the project could also look at ways to support entrepreneurs wanting to create their own business/job. The support that NEEP could provide, given its nature, would be in the form of a capacity building program dedicated to develop the skills of entrepreneurs on the fields of: market study, business plan development, corporate management, marketing, etc

¹³ CEA – Certified Energy Auditor, CEM – Certified Energy Manager, CMVP – Certified Measurement and Verification Professional.

¹⁴ Certified Industrial Energy Professional

¹⁵ Adapted from ISO 50001:2018

Finally, the interview ended with a question about what the key success factors of the SEEP are. The interviewee has indicated the following:

- There is a culture of combined work and cooperation;
- There are very well-defined roles;
- There is leadership and commitment from top management;

As a follow-up of the answer, there was one more question about the way top management of the SEEP acts. There is an executive committee that meets every month and that is composed of 18 persons of different entities and led by the Ministry of Energy.

This seems to be reflective of what in fact are the theoretical good conditions to have a successful programme, besides of the existence of funds to make things happen.

Meeting n° 5 – Utilities Technical Team

Field mission Day 2

Mr. Nasser Al Saeed

Mr. Mohammed Shaya Alfuraydi (Project Manager)

Mr. Tiago Queiroz Santos

Addressing EE at the level of Utilities by SEEP started in 2018. This was done by the decision 353 of 2018, of the council of Ministers. The new mandate includes:

- Power generation, transmission and distribution
- Water desalination

Currently, the department works on the preparation of the Policy for energy efficiency on the production of electricity and desalinated water, which is expected to be completed within the current year. The next milestone will be to have the policy for energy efficiency in the transmission and distribution of electricity in 2020.

It didn't become clear (nor the justification was convincing) the reason why the energy efficiency of water transmission and distribution were not considered to be on the same mandate. Water Transmission & Distribution (T&D) constitute certainly a significant energy use, and therefore, should not be left forgotten.

The entities responsible for water in KSA are:

- SWCC for transmission and distribution in all territory with exception of 2 industrial cities;
- MARAFIQ for transmission and distribution in 2 industrial cities;

- Independent water and power producers (sea water desalination¹⁶ via thermal processes | power constituting a by-product);
- SEEC to ensure EE on water desalination

The entities responsible for the Power generation in KSA are:

- SEC (stat owned company) – produces around 55% of the electricity in old and less efficient power plants;
- MARAFIQ – produces around 10% of the electricity for 2 industrial cities;
- Independent Power Producers – produce the remaining 35% in more modern and efficient power plants (due to the power purchase agreement they have priority of dispatch, which is good from the efficiency point of view).
- SEEC – ensures EE on power generation

Co-generation¹⁷ is present in the KSA mainly because of the need to desalinate sea water. Therefore, these units are placed in coastal areas. Sea water desalination by thermal process is, however, a process with low energy efficiency, especially if the heat is generated on purpose. I.e., if the heat would have origin in waste heat, the process could be highly efficient. But that is not the case in KSA. The interviewee reported the following values for the specific consumption of competitor technologies:

- Thermal process: 16-17 kWh/m³ of water (what is present in KSA)
- Reverse Osmosis: 4-5 kWh/m³ of water (state of the art)

This figure makes it evident that there is a strong influence of the component *energy*, on the Levelized Cost Of Water (LCOW).

From another source, the contribution of different techniques in the current water desalination market is as indicated on the following figure.

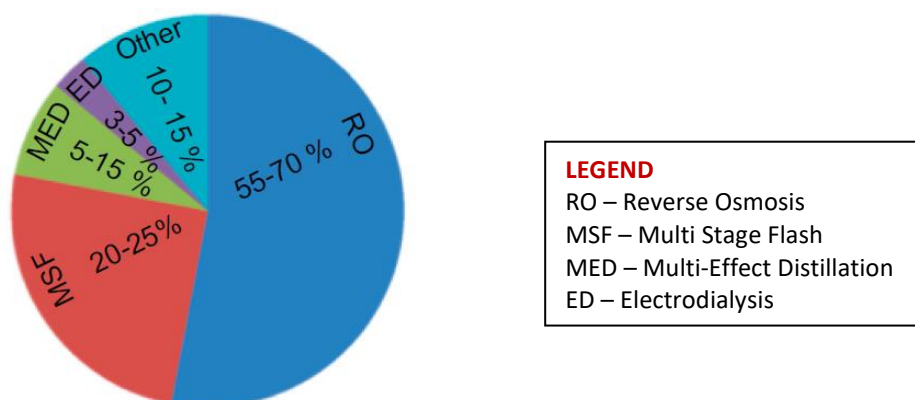


Figure 4 - Market shares of seawater desalination competitor technologies

¹⁶ Sea water desalination is necessary to cover the demand for human and industrial (and probably agricultural) consumption

¹⁷ Simultaneous production of heat and power in an integrated energy system.

The same source indicates the LCOW for two technologies:

- LCOW (MED) – 4.5-8.0 USD/m³
- LCOW (RO) – 1.7-3.0 USD/m³

The figures confirm that not only RO is more energy efficient but also is cheaper in the long run. However, if the LCOW using waste heat (i.e., free energy) is indicated, the scenario changes significantly.

- LCOW_{WH} – 0.98-1.45 USD/m³

Likewise, alternative sources of energy (e.g., waste heat or industrial-scale solar thermal energy) to produce desalinated water should be considered because, although the RO is the state-of-the-art in sea water desalination, desalination through thermal process can still be a more cost-effective and energy efficient solution for the KSA. Further research on this topic should be promoted to identify the combination of the most energy efficient and least cost way to produce water in the context of KSA.

When asked about the need for more power generation, the interviewee responded that it is a continuous process. The candidate technology or equipment must meet the SEEC's minimum energy performance requirements. The normal practice has been that of establishing Power Purchase Agreement (PPA) with Independent Power Producers (IPP). However, there seemed to exist a limited knowledge about the possibilities in terms of efficient supply of energy. One of the most significant energy uses in the KSA is cooling. It is required all year round in great part of the territory. There are several technologies available to produce the cooling effect. A form of producing cooling effect, relevant to this part of the conversation, is the utilization of absorption cooling or refrigerated water production units of absorption effect (aka, absorption chillers). Absorption chillers use as driving energy, heat. They use very little amount of electricity. These chillers can be associated with thermal power generation or to a source of waste heat, to form a type of co-generation. Depending on the scale, availability of space, pattern of use of the cooling effect, and other variables, this technology can also be interconnected with high-temperature solar thermal. Examples of the application of this technology can be found in similar contexts as those of KSA. For example, in commercial buildings of Qatar and in a football stadium, in Doha, where the 2022 FIFA World Cup will occur. The topic was superficially discussed, and the evaluator showed surprise about why the district cooling topic was under the urban planning technical team and not under the utilities technical team. In northern European countries it is normal to have co-generators (simultaneous supply of heat and power) embedded in the middle of cities. This is seen as efficient because: the power generated is consumed locally (no T&D losses), the technology for power generation is of high efficiency (modern gas-driven engines or turbines), the waste heat from power generation is used on the city's district heating network. The same (for cooling) could happen in the future developments of Saudi cities.

The way SEEC is planning to ensure EE on power generation is by stipulating EE targets that the operators will have to achieve. The main indicator used is the Heat Loss Rate. The EE targets will be based on the internal and external benchmarking work, currently being done. There will be correction factors to accommodate the operational context of the power generation units (e.g., extreme climate conditions for longer periods).

SEEC has disaggregated the power generation, including co-generation, by technology, type of equipment and fuel used. It was not clear, however, if the disaggregation would include for example, the age and state of condition of the installation – something that may influence the economic feasibility of achieving the EE targets. A data collection plan is under development. It will be consistent with the disaggregation done and the chosen energy performance indicator. They will be collecting data from the operators, on an annual basis, to monitor the operators' energy performance.

As a result of said monitoring activity, the operators will be asked to: i) conduct energy audits and identify energy performance improvement opportunities; ii) elaborate multi-annual action plans, for implementation of the EE measures.

The interviewee referred that this has been a participatory process. Several consultations have been promoted with the operators to perceive what may be the impact of this new policy.

The interviewee referred also that there are weekly meetings with the Utilities technical team of the SEEP (composed by Minister of Energy, ECRA, Ministry of Environment, Water and Agriculture and SASO).

Overall, the description of the work being done and planned, by this technical team, reveals, once more, that there is a clear definition of roles and that there is strong leadership of the SEEP.

Meeting n° 6 – Buildings Technical Team

Mr. Bashir Salman

Mr. Mohammed Shaya Alfuraydi (Project Manager)

Mr. Tiago Queiroz Santos

Mr. Bashir works on the SEEC since 2011. His working areas has been always buildings. He assists governmental organization on this area.

The Buildings core team of SEEP is composed of SASO (setting and approval of standards); ECRA; MOMRA; SEC; Ministry of Commerce; Customs. Apparently, the technical team of Technical Inspection and Control (TIC) is embedded on the Buildings core team. The reason for this is that around 90% of the aspects that are dealt by TIC are related to buildings.

The Saudi Building Code (SBC) chapters 601 and 602 were enacted in 2017 and they represent the regulations for energy performance of low-rise buildings (mainly residential) and commercial buildings, respectively. The application of the SBC has been happening on a progressive manner, i.e., in three phases: i) very large buildings; ii) medium-size buildings; and iii) low-rise (mainly residential) buildings. The goal of the team is that by 2022 all these 3 phases are concluded, i.e, there are conditions to properly regulate and enforce the rules of these chapters of SBC.

There has been in study in 2012 to determine the baseline of energy consumption on the residential sector. The figure that came out of this study was 212 kWh/m²*year. The interviewee mentioned that with the application of SBC 601 (which is strongly influenced by ASHRAE standard), there would exist the chance to reduce this annual energy consumption of a reference residential building to 150-160 kWh/m².

Questioned about the disaggregation of energy consumption by energy use on the residential sector (something that should make part of an energy baseline study), the interviewee referred that this is not existing. For example, from such a study it will be possible to know (with more or less accuracy, depending on the need for it) what is the proportion of energy used on the residential sector to prepare sanitary hot waters or for cooling. The interviewee, in consultation with one of his colleagues, mentioned that for producing hot water the figure would be around 4%. However, the interviewee mentioned that these figures come from estimations and that there is no knowledge-based data to confirm the figures.

The interviewee also mentioned another study carried out for, or on behalf of, ECRA. The study included the monitoring of electricity consumption in 1500 residential buildings, with meters capable of obtaining disaggregated electricity consumption by energy use. The evaluator will obtain more information about this pilot during the second mission.

Detailed energy consumption baseline studies have the potential to provide decision makers, information that is important for energy planning purposes. This kind of studies aim not only at obtaining the disaggregation of energy consumption by energy use (and we could be talking of electricity only), but also at obtaining raw information of what is in the field (number of equipment, age, energy performance, reasons for certain decision-taking, behavioral aspects including a gender perspective, etc ...). The studies can be done through detailed surveys (or questionnaires) or be done with the installation of sub-metering devices (i.e., meters that collect and log data of energy consumption). For this purpose, SEEC could liaise with the Statistics General Authority. Said studies and said partnership could result in the Kingdom having a more solid (i.e., evidence-based) basis of a certain socio-economic dimension, related with the energy efficiency of Saudi households and behavioral aspects of citizens.

Meeting n° 7 – Industry Technical Team

Mr. Turki Al Turki

Mr. Mohammed Shaya Alfuraydi (Project Manager)

Mr. Tiago Queiroz Santos

Mr. Turki is an Energy Efficiency expert. He works with SEEC since 2013 on aspects related with industry and since 2017 is manager of the industry department.

In 2013 there were only 3 FTE (i.e., from SEEC payroll) and progressively, the department grew to the current situation of 10 FTE. In 2015, a person has joined with the aim of assisting the department on the specificities of the cement industry, but after some time left. In 2018 a person has joined to assist on the establishment of the ISO 50001 Saudi accreditation committee. In 2018, the KSA had 14 issued certificates (addressing 17 sites) of this international standard, very relevant for the industry and SME's sectors. SEEC, wanting to lead by example is one of the entities to which a certificate was issued.

The work that the department has been doing is that of creating an overarching knowledge platform, with associated information system(s), to allow having a solid vision of energy-related key performance indicators of the most important (GDP most contributing) industries. More than 180 production lines have been assessed, being 50-60 of cement and steel industry and the remaining of petrochemical. The department has been receiving assistance from an external consultancy company; the assistance is fundamentally the elaboration of key performance indicators of the several petrochemical industries and the supply of benchmark (i.e., values of KPI from petrochemical industries from other parts of the world).

Moreover, the department has the mandate to stipulate energy related targets for the industries as well as other economic activities that fall on the department's scope of work. The objective is that the department will have the role of Monitoring, Verification and Enforcement (MV&E) of the rules of a national energy management system addressing industry.

The stipulation of metrics for the large industries was done, with external support, but essentially was done in consultation with the main operators, in 2014. This is very good. The working groups managed to obtain a consensus by which the Saudi industries should have to be on the second quartile of energy efficiency.

The department has led the formation of a joint agreement with 10 public entities to use their mandates and with this ensure the compliance of the industries with the national energy management system. This is the way the KSA has been organizing the energy management at the national level – by using the existing rules and mandates, avoiding therefore the lengthy legislative processes.

From 2014 till 2019 the scope of work of the department in regard to its role of MV&E is to simply monitor the market actors, although the latter ones already know the requirements they must satisfy.

In 2020, the department will initiate the enforcement phase, where penalties may be applied. On the limit, an operator may see its license revoked.

The interviewee acknowledges that there is a sound culture of EE especially within the heavy industries which inclusively have knowledge of organizational energy management systems, such as those promoted by the ISO 50001. Notwithstanding, during the interactions with the industries the interviewee reported that there has been, in a small number of cases, evidences of a less good technical knowledge. In contrary, the SME's which exist in large quantity are thought to have low EE and energy management culture.

In 2018, the department initiated a process to collect and compile information about energy consumption in more than 3000 industry-related sites, as a way to identify the most energy intensive consumptions. As a result of this work and using the support of Saudi Electricity Company (SEC), it was found that the heavy industries constitute 65% of the electricity consumption in the industry sector and the SMEs represent 25%.

The 3000 customers were disaggregated in 12-13 sub-sectors. It was not clear if the categorization follows any existing national or international economic activity codification scheme. SEEC should aim to align this disaggregation of energy consumption by economic activity with a recognized economic activity codification scheme, such as, the International Standard Industrial Classification (ISIC) (Rev4). The ISIC (rev 4) provides a set of activity categories that can be utilized for the collection and reporting of statistics according to such activities. Furthermore, SEEC should aim to combine efforts with the Saudi Statistics Authority for the proper archiving, statistical analysis and publication of this information.

The next step of screening was to analyze the energy consumption of each sector and the level of concentration (i.e., the number of sites in the sector). This resulted in a reduced number of subsectors (6) of which only 16 sites were part of.

The energy in general has been subsidized and sold at very low prices. This is a market barrier that deters market actors of recognizing the benefits of energy efficiency, simply because the cost effectiveness of efficiency projects is not there. The interviewee referred, however, that there is a tendency for this subsidization to be reduced.

While it was acknowledged that there is subsidy on energy, the interviewee referred that there is no policy for incentives, i.e., financial support for the adoption of energy efficient technologies or practices.

The initial work on the large energy consumers is ongoing. SEEC will implement another phase of development in this segment during the period 2020-2024. During this period, SEEC will be making visits that will aim at making performance measurement and verification of the measures indicted on the reports received from large industries' operators. Simultaneously, SEEC is getting support to organize energy auditing work on smaller companies (SMEs). This support is provided by an energy auditing company.

The work to create the environment for the adoption of ISO 50001 requirements by local organizations is also ongoing. This international standard is related with energy management, not EE specifically. But of course, it has the potential to contribute immensely to the outcomes of the NEEP. There are 2-3 certification bodies that are registered at SASO. SEEC is developing an online system to support organizations in becoming certified or at least compliant with this referential. The website will contain awareness raising materials and contents and will include a step-by-step explanation to help organizations to have a certifiable Energy Management System.

In 2018 the mandate of the department was enlarged so that the department would also focus on the feedstock materials for industries. For this purpose two additional full-time equivalent have been contracted.

The interviewee referred that the capacity development has happened more on areas such as softs skills and project management. The technical aspects result from the professional background of the persons that make part of the department. This, somehow puts the NEEP in a less relevant position and deserves being confirmed with the Human Resources department.

Meeting n° 8 – Buildings Technical Team

Mr. Talal Al Roge

Mr. Mohammed Shaya Alfuraydi (Project Manager)

Mr. Tiago Queiroz Santos

Mr. Al Roge an Energy Efficiency specialist. He works with SEEC for 2 years and has assisted the department in many initiatives.

The most important initiative of this department, vis-à-vis, the national energy efficiency is the regulation on the Corporate Average Fuel Economy (CAFE). The CAFE program is derived from the equivalent program being implemented in the united states of America. The program consists in a documental revision of certificates provided by vehicle manufacturers/importers. The certificates must be issued by accredited laboratories. It was not clear the extent to which SASO ensures the authenticity of the certificates.

The regulation addresses the new and imported used cars, although this is done slightly different for each of those groups of cars. The regulation focuses on light trucks and cars. The national program for implementation of the CAFE regulations comprises two phases. On the first phase (2016-2020), importers must be prepared to comply with (and to report on) the program's requirements and has a given stringency (i.e., minimum energy performance requirements, determined in km/liter). The second phase is supposed to happen from 2021 and until 2023. The main difference from phase 1 is on the level of stringency. During this phase the threshold is set to be 10.3 km/litre in cars and 9.0 km/litre in light trucks. The enforcement of this regulation happens on the end of each phase. The program includes the labelling of the vehicles' energy efficiency. The labelling follows the same procedures set out by SASO for the electrical appliances. First label has surged in 2014, it had 6 categories. The second label surged in 2017. It is a reformulation of the first one, to include one more category (excellent +). This new label has 7 categories. In 2018, SEEC has elaborated the label for electric cars.

The technical team of Transports is composed of SEEC, SASO, Customs, Ministry responsible for commerce. SASO is currently implementing a lab for future testing of vehicles.

Meeting n° 9 – Assistant SEEC DG in administrative subjects

Mr. Abdullah Albawardi

Mr. Mohammed Shaya Alfuraydi (Project Manager)

Mr. Tiago Queiroz Santos

Mr. Albawardi is the NEEP coordinator and previous NEEP Project Manager. He is currently the assistant of SEEC Director General on administrative aspects.

The EE Information System (IS) is currently composed of 6 sub-IS. The sub-IS are:

- GBEE – a platform for government entities to store and analyze energy consumption data of their buildings. It also generates reports as it is supported on a SQL database management system. It is supposed to store data of around 200000 government buildings. Currently, there is no data collected but in the future there will be data about the entity, the energy consumption, buildings' useful area and the buildings' general information (type, location, ...). In the future, NEEP should consider the nexus energy-water and this platform should also be used to store data on water consumption so that a line of action addressing water efficiency or conservation can constitute one action of EE.
- Purchased samples system – a platform to store test reports of samples purchased on the local market to verify their compliance with EE Standards. Tests are performed by SASO. Users of this portal are MoCI (responsible for market surveillance) and SASO. The database contains data from more than 700 samples. The portal generates data on compliance rates, since 2016.
- S&LS – Platform to issue EE labels/certificates for all products covered under the Saudi EE Standards. Data of a given product is entered by the applicant only once during product registration. The database contains mainly information that helps characterizing the EE of the products. In the future, it is expected to include the quantity of the registered products, by model.
- Saudi CAFE – Regulation that defines the corporate (linked to the importer) average fuel economy of light duty vehicles. The source of data is mainly Customs who provides the imports data for each vehicle importer. While currently the program deals with cars and light trucks, in the future it will also consider heavy-duty vehicles.
- Energy Reporting – Platform to store energy performance related data for heavy industries. Companies in the scope must submit data to this platform on an annual basis. The data requested is in general related with: raw material input, energy (electricity, fuel, steam) consumption, level of production.
- ESCO – platform for ESCOs to apply for licenses. The database is populated directly by the applicants with their details, vis-à-vis, the requirements of the licensing program and there are more than 50 licensed ESCOs.

The interviewee didn't seem to consider very relevant to have the cooperation of the Statistics General Authority within SEEP. On the evaluation report or on the project document the evaluator will explain some of the ideas that make this cooperation seem relevant.

The Energy Conservation law has been drafted (during NEEP1) but it has not been enacted because, on one hand, it was conflicting with other existing laws. On the other hand, it was considered preferable to use existing laws to derive from them, the necessary regulatory frameworks. It was therefore, considered unnecessary.

The SEEP is based on a multi-year (3-years) action plan in which adaptive management is present. To make SEEP operative, there are 13 technical teams, all of them having persons from SEEC. The SEEP action plans ends-up by being part of SEEC's action plans.

The SEEC's multi-year action plan is developed and approved at the level of the Executive Committee of SEEC and, afterwards, taken for approval at the SEEC Board. In theory it should be this way – in practice this approval has been inexistent due to the lack of a formal DG of SEEC. The monitoring of action plans seems to be done in a very effective manner. There are weekly meetings between the technical teams and the SEEP coordinator. Progress of activities is communicated, and problems reported. There are monthly meetings of the executive committee, in which progress of activities and solutions for the problems found are discussed. The last stage of monitoring is where currently there are some problems. There should be quarterly meetings of SEEC's Board, but this does not happen since December 2017 or January 2018. As mentioned before, there is no formal DG of SEEC and this is seen as a clear risk to the SEEP.

The interviewee explained the role of a consultancy (BAIN) on the development of SEEP. BAIN has been assisting SEEC on the development of SEEP strategy (designing the processes and procedures) and on the execution of SEEP. This contract with BAIN is about to end on the end of 2019 and there is good level of confidence about the autonomy that was built during the past years.

Questioned about the future possible role of UNDP, the interviewee referred that specific technical assistances may be necessary, namely, on the production of desalinated water. In addition, UNDP could also derive objectives for the SEEP that are aligned with the Sustainable Development Goals (SDGs) and Saudi Vision 2030. Furthermore, the interviewee mentioned that UNDP could commission a comparative study with other countries where similar work of developing and implementing EE strategies have been carried out.

A new salary scale and a new strategy (that includes the new mandate) and a new DG for SEEC, needs to be approved by the SEEC Board. The salary scale must afterwards be approved by Minister responsible for Finance. It is expected that by the end of 2019 the SEEC Board will meet and take care of this subject due to its high level of importance.

In terms of capacity building, the information about the courses that SEEC promotes is disseminated through the national Engineering body and the chamber of commerce. The announcements do not restrict women to participate. If few have been participating it may be because there are few women that are Engineers. The preparation of courses must foresee the appropriate conditions for women to participate.

SEEC is currently implementing a training program for public sector professionals that are working on the operations or procurement areas. The target groups can be technicians or engineers. The number of participants so far is around 154 but the target is that this 24 hours course on fundamentals of EE and energy management in buildings, reaches to 4000 participants by the end of 2020. The initiative is part of the GBEE project and is being done in cooperation with TVT Colleges. SEEC has developed the materials and carried out training of trainers. TVT Colleges are replicating the courses to reach to the targeted number of participants.

Regarding the EE Information System, no new lines of action besides the current six, are foreseen. When questioned about the intention to have an energy observatory, the interviewee mentioned there are plans to establish a platform that integrates all energy-related information (including EE) so that a sort of energy observatory can be created. This is however, in the remit of the Ministry of Energy, not SEEC. There was a first workshop for this in June 2019.

Meeting n° 10 – Debriefing mission 1 at UNDP

Mr. Asim Salah

Ms. Mayssam Tamim (Assistant Resident Representative)

Tiago Queiroz Santos

UNDP told they would send financial reports of the past years.

A discussion was held about the perception of effectiveness by which work is handled at SEEC. Ms. Tamim explained that several government entities, to obtain conditions to achieve the goals of the Vision 2030, the government supported the creation of Vision Realization Offices (VROs) in which qualified, proactive and competent professionals are employed and paid above the average so that a good work is done. This is somehow what is happening at SEEC although still with some restrictions, namely, on the contracting of new staff and on setting the salaries that allow retaining the good talents.

The Project Document should be very well aligned with the needs of the SEEC.

Due to the comments received from NEEP coordinator, about the future role of UNDP, it would make sense that UNDP would have a seat on the executive committee of SEEC. In this way UNDP would be in much better conditions to, proactively, propose measures that are in their hands to obtain.

It was said by UNDP that the evaluator could benefit from looking at the National Transformation Plan. This plan is thought to be the Action Plan for the Vision 2030.

Meeting n° 11 – ECRA

Mr. Hakam Zummo

Mr. Mohammed Shaya Alfuraydi (Project Manager)

Tiago Queiroz Santos

Mr. Zummo is the team leader of the Buildings Technical Team and is a staff member of ECRA.

The team has 15 elements of other entities, some working on full-time others in part-time basis, for the team.

Mr. Zummo was asked about the project that had involved monitoring of electricity consumption in 1500 households. The project is apparently called the End-use Project and unfortunately, again, not much information about it was made available. The only information that the interviewee could make available was that the project aimed at determining the proportion of energy consumption associated with each supposed major energy use (air conditioning, water heating, lighting, refrigeration, etc ...). There was some insistency from the evaluator to obtain a copy or to access to more clarifying information of what exactly has been done.

Questioned about the reasons for so substantial changes done recently to the electricity tariffs, the interviewee responded that they were due to political reasons. After some insistency, it was possible to understand that the time-of-use tariff that was applied on the industry companies was abolished because it was found that their consumption pattern was constant through out the day and therefore, the time-of-use tariff structure was perceived as useless. However, this was done without knowing the work, being carried out by SEEC, of knowing the industries, their energy uses and their energy needs (throughout the day) to infer about the usefulness of the time-of-use tariff.

While the blocks tariff structure is effective for the purpose making evident for consumers that if they spend more they will get into the upper blocks where unitary price of electricity is higher, the time-of-use tariff is effective in the control of the daily peak of power demand.

It was referred that most probably, the changes on the tariff will result in increase of revenues to the utility, which means that the consumers will be paying more for the electricity they demand for. Even if this is done though a cross-subsidization (i.e., within the blocks tariff structure).

ECRA is studying how a change to smart meters can be beneficial and most likely, this will happen in the coming years. This is seen as a measure favoring the surging of conditions for users to become more able of managing the energy they demand.

Smart-metering is generally linked to smart-grids and to some of the approaches that can be thought out to manage the demand of electricity. In some economies, the concept of demand-response and valuing the flexibility of demand are being studied and implemented. Under such scheme, consumers with significant loads can get into an agreement with Distribution and Supply Operators (DSO) so that, upon request of the DSO, a certain load is reduced for a given period of time. In this scheme, the

consumer that voluntarily reduces the load, is remunerated by his action. This is an area where it could make sense, for the KSA, to initiate a series of studies to assess the benefits and implications of making an effective exploitation of flexibility of demand.

Questioned about the understanding of the electricity bills by the final costumers, the interviewee referred that there is no issue with that. Final customers tend to complain with the high value of the bills in summer, he added. A transparent billing information is seen as a key aspect for householders to adopt EE measures.

The discussion followed by moving to the topic Cogeneration. We started talking about the requirements to be licensed and apparently, with exception of cogenerations under Power Purchase Agreements, the existing requirements do not prevent a cogeneration (which is a process for simultaneous production of heat and power in a more efficient way than if produced in separate) to use the heat produced in a less good way. There is here an obvious improvement opportunity at the regulatory level. In mature markets, where cogeneration is regulated for a long time ago, for a cogeneration do be licensed (or to maintain its license), it must effectively use the heat produced. The equivalent electric efficiency (REE on the image below) is a dimensionless coefficient used to compare different installations and to verify legal compliance with cogeneration regulations. It must be higher or equal to 0,55.

$$REE = \frac{E}{C - \frac{T}{0,9 - 0,2 \times \frac{CR}{C}}} \geq 0,55$$

, where: E – electricity generated; C – primary energy used; T – thermal energy (effectively) used; CR – Energy from renewable fuels used

Figure 5 - Mathematical expression to calculate the equivalent electric efficiency of a cogeneration system

The enforcement of this regulation implies that a regular (e.g., annual) energy audit is done to the cogeneration, to verify if the unit's heat rate use.

Meeting n° 12 – Finance Department of SEEC

Mr. Ismael Alqubayshi

Mr. Mohammed Shaya Alfuraydi (Project Manager)

Tiago Queiroz Santos

Mr. Alqubayshi is the team leader of the Funding Team of SEEP and the line Manager of the Finance department of SEEC.

He works for SEEC since 2013, always on Finance related aspects. The department has currently 3 full time staff. Mr. Alqubayshi told around 8 would be necessary in case SEEC would go totally independent and if the department would need to solve all the financial aspects of the current structure (which is not the case since UNDP plays an important role, he added). As an example, it was told that currently, SEEC staff's pay roll is done in great majority through UNDP (103 out of 111) and only 8 have their salary completely processed through SEEC.

When questioned about what is missing on the department for it to be able to process the payments to the staff and avoid that this is done through UNDP, the interviewee indicated a number of challenges:

- The department does not have an information (Enterprise Resource Planning) system to allocate funds and expenses to the several areas of SEEC. Apparently, a request for proposals is under development so that SEEC can procure such a system (in principle based on SAP).
- There is not enough qualified personnel. Besides the line manager, there would be the need for 7 full time equivalent and currently there are only 2. This is an area where UNDP could assist – obtaining qualified personnel after Finance and HR departments elaborate the job descriptions and submit the request to UNDP.
- There is no internal auditor function, within SEEC. And this is a mandatory aspect. Currently UNDP makes audit for each payment and makes financial audit of all books throughout the year. This is seen as a great support. The interviewee referred that the internal audit function could either be internalized or they could rely on a business partner (the latter seen as a more efficient solution).

It was referred that the resolution of these challenges is done at the level of the Director General.

It was surprising to observe that a support area within SEEC is lacking resources to properly fulfill its functions in a SEEC with its current (and potentially growing) structure.

In the quality of the Funding Team within SEEP, the interviewee referred that the team provides support to other government units and technical teams within SEEP. Currently the team is composed of 4 elements (the team leader and more three experts in finance – retired people from ministry of finance). As in other SEEP teams, there are weekly meetings and this team reports on a monthly basis to the SEEP coordinator.

When asked about the capacity of the banking sector to properly analyze and consider EE projects as a different subject than conventional banking, the interviewee agreed that since EE in KSA is giving its first steps, the banking sector are not prepared to see EE financing as a distinct market segment, hence, they are not able to develop and monitor dedicated financial products. An example was given by the evaluator to better obtain understanding by the interviewee. The evaluator asked what would be more bankable:

- A new car and a new commercial for a company that is producing and selling certain goods;
- An investment in EE on the manufacturing site of the same company

The interviewee responded that it would be the second option the best one, but he was not sure if banks would see it the same way. Of course, the example is overly simplistic and that, economically, both options could be winning options (i.e., be supported by convincing cashflow generation). However, in nature, the second has a perceived lower risk and therefore could deserve a higher credit from the financing institution and therefore have a lower interest rate associated. In the end, it was agreed that the programme should be supportive of a measure to develop the capacity of local financing institutions to: i) develop and maintain EE-specific financial products; as well as to, ii) recognize the ESCO business model as a valid way to make EE investment projects a reality. It should be noted that within the ESCO business model it is not necessarily the ESCO that takes the financial risk (customer may want to do it, using its equity or assuming a credit with a bank) but an ESCO may need to obtain financing from a local financing institution to finance their pipeline of projects.

Meeting n° 13 – HR Department of SEEC

Mr. Anas Abdulwahab

Mr. Mohammed Shaya Alfuraydi (Project Manager)

Tiago Queiroz Santos

Mr. Abdulwahab is in SEEC's HR department since 2014. The department counts with 5 permanent staff, including the line manager.

The department is responsible for:

- Recruitment of staff
- Human capital development
- Retain talent

The interviewee referred that the current situation, of a certain dependency on UNDP for a HR function (contracting of new staff and processing of salaries), poses some risks for the individuals. The employees coming to work at SEEC through UNDP are not protected (by GOSI), in case of unemployment. However, it was mentioned that it was due to the support of UNDP that the SEC employees started to have health insurance (for themselves, their children, their wives and their parents).

From the human capital development perspective, the department follows closely the HR management approach used in the US's corporations. They assist the several organization's units or departments on assessing the training needs of their employees, by establishing an individual development plan. The training needs is obtained though a gap analysis between the desired objectives and competencies, of the function and of the individual. The department also carries out (and manages the results of) the evaluation of the trainings held by the employees. In addition, it evaluates the training services providers.

HR department facilitates the access to health insurance. It also assists in solving problems with the insurance company.

As an improvement opportunity, it was referred by the evaluator that HR department could provide orientations to newcomers, about the different certifications that SEEC has achieved and that intends to maintain. In the end, on an organization, it is the persons who make the difference. On the reception of new employees it is suggested that HR has informative things about the existing Energy Management System, about the Quality Management System and about the Management system related with Security of Information.

Meeting nº 14 – Urban Planning and District Cooling Technical Team

Mr. Mohammed Fahad Alarwan | Mr. Abdullah Al Shatwi

Mr. Mohammed Shaya Alfuraydi (Project Manager)

Tiago Queiroz Santos

The UP&DC Technical Team is composed of 14 members (engineers, architects, urban planners). The team is considered an enabler and not a core team and this is why it is meant to only develop guidelines.

In terms of urban planning the team develops work that has impact on both, transportation and buildings. The technical team developed General Guidelines whose current ownership is MOMRA. Said guidelines have been developed with support of foreign consulting company.

It is not obvious that there is mention of district cooling on the guidelines of urban planning. The work done so far was discussed. The progress seems less good than on other TT (only development of UP general, and now, comprehensive guidelines) – although it implies interaction with several stakeholders. Comprehensive guidelines will be the update of existing regulations, done through a gap analysis between general guidelines and current UP regulations.

There is a criteria to assume from what level, of cooling needs, a district cooling system starts to make sense (15000 Tons). The public sector was selected as the exemplary to initiate the process – ECRA is the DC regulator. Cooperation with RDA for assessing zones in Riyadh where only DC will be allowed. DC based on electricity driven chillers only.

It is not evident if the choice of placing DC in this TT is the wisest one. The supply of cooling for a relatively large number of users is considered supply-side and therefore, there would be good reasons for the DC to be embedded on the Utilities technical team. If properly regulated (the obligation to use DC on new developments), a technical team from the Utilities team would be called to take care of studying preliminary feasibility and to hand over the design and works to a contractor. Under the UP&DC team which is an enabler team, the initiatives tend to difficulty move out of the paper.

Still regarding DC, it was found that the intention is to use only electrically driven chillers. Although a contextualized comparative study should be done, the vision of what could be seems limited. In general, large stations aiming to supply thermal energy (heat or cooling), are cogeneration plants. Looking at DC in this perspective (and from the perspective of utilities) makes even more sense. Imagining that a new development of public buildings is under planning. The complex of buildings will require cooling but will also require power. For the latter, this new complex of buildings will be a new burden for the grid and the power that will draw will have to be transported in the lines, which have inherent losses. After knowing the cooling needs of this new buildings complex, a tri-generation¹⁸ system could be sized to satisfy its needs. Said tri-generation system could be composed of a natural-gas driven engine/gas turbine¹⁹, an alternator to generate power, a heat recovery system to collect the heat that would otherwise go to the atmosphere and an absorption chiller²⁰. Said integration of energy systems is known to have a higher efficiency than if the total final energy (electricity and cooling effect) would be produced separately. The following schematic illustrates the possibilities of energy conversion in a tri-generation system.

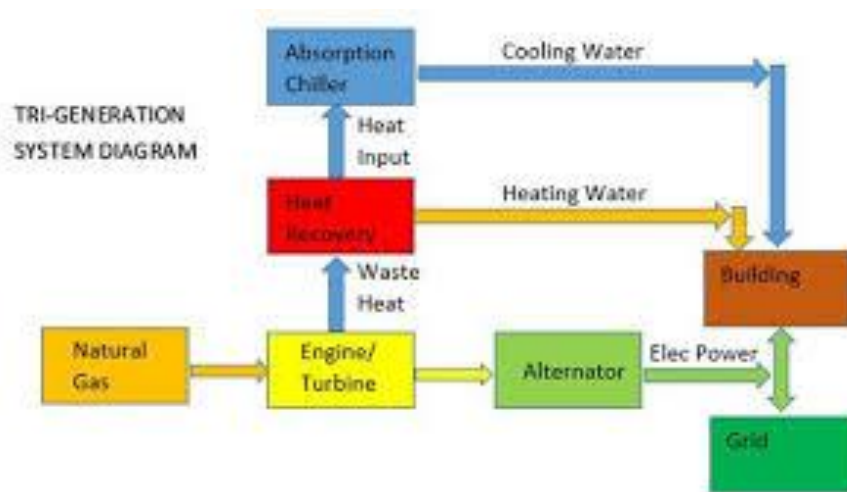


Figure 6 - Trigeneration system diagram

The image below illustrates the energy flows on the trigeneration process.

¹⁸ Simultaneous production of heat, cooling and power.

¹⁹ Below 5 MW electric – internal combustion engine | Above 5 MW electric – gas turbine engine

²⁰ An equipment that produces refrigerated water through an absorption effect and using as the driver, thermal power.

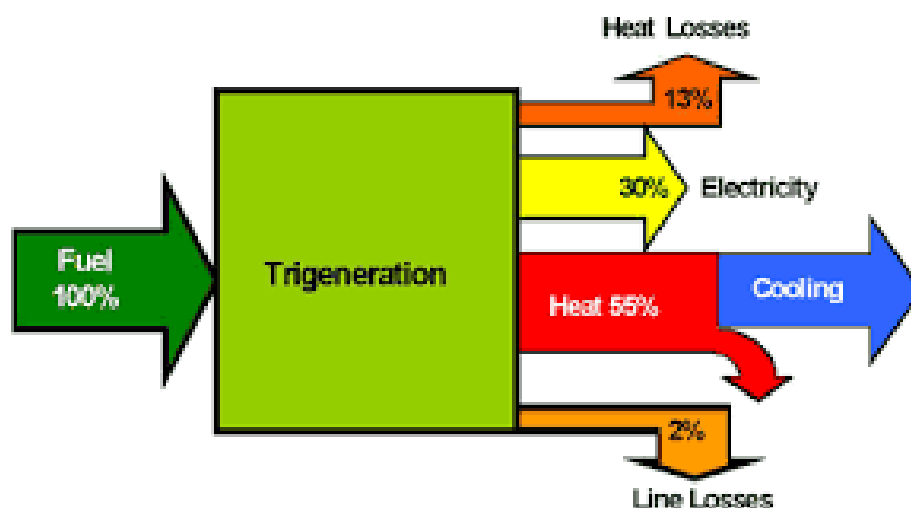


Figure 7 - Energy flows in a trigeneration system

Meeting n° 15 – Awareness Technical Team

Mr. Mohammed KuliB

Mr. Mohammed Shaya Alfuraydi (Project Manager)

Tiago Queiroz Santos

15-16 campaigns developed so far. All linked to the existing standards.

Main focus is on public. Key messages are developed in a way to support the two stages:

- Choice of a product
- Utilization of the product

Gender aspects – example of a specific campaign for women on cars since they are starting to represent an important share of the buyers

One of the largest TT – 17 (2 internal ; 15 external)

Campaigns do not address construction actors and facility managers

There is no intention to develop demonstration projects and use results to disseminate

Refine their annual plan based on: requests from social networks; new standards; surveys.

No perceived problems on the approval of annual budgets.

No specific campaigns targeting construction sector or facilities management professionals.

Meeting n° 16 – Acting Director General of SEEC

Mr. Nasser Alghamdi

Mr. Mohammed Shaya Alfuraydi (Project Manager)

Tiago Queiroz Santos

One of the first things that was said by the DG is that there is an acknowledgement that SEEC wouldn't be as it is today without the UNDP project NEEP.

Future contributions from UNDP could be to support the development needs of SEEC on the following aspects:

- Train, build the capacity and equip the Finance and HR departments with the necessary means as part of the exit strategy of the UNDP NEEP Project.
- Man power and expertise to be able to accomplish the new expanded mandate (Industry TT and Utility).
- Capacity building of financing institutions (EE lending and third-party financing of ESCO projects).
- Train, professional development and certification of technicians working on the construction and installation of energy related products (e.g., installers of AC, windows, thermal insulation).
- Experienced ESCO business professional to assist revision of M&V plans and further develop policy aspects (the ESCO TT)
- Road transportation EE expert (Road heavy-duty vehicles)
- Carryout a comparative study of the work done in KSA around the national EE programs and the work done in other countries.
- Capacity building of Ministry of Finance on the development of financing mechanisms that can have a catalytic effect on the adoption of efficient technologies and practices with a controlled erosion on the state budget.
- Development of the Saudi Energy Observatory.

Annex 2. Documents Reviewed

For the evaluation of NEEP 2 the following documents were reviewed:

- NEEP 2 Project Document
- Annual work plans and respective substantive changes
- Annual project reports
- Financial project reports
- Vision 2030 and respective National Transformation Program
- THERMAL TRANSMITTANCE VALUES FOR RESIDENTIAL BUILDINGS (Based on SASO 2856/2014)
- Mid-term and final evaluation of NEEP 1
- International Energy Agency website (on aspects related with KSA)

Annex 3: Changes from Baseline

Table 8 - Changes from the baseline

Desired Impact Area	Baseline Situation (Jan.2012)	Desired Situation at End of Project	Actual Situation at End of Project (Dec.2019)	Attribution of Positive Changes to the Project? (Evidence)
Legislative and regulatory aspects				
1. <u>Regulatory enabling environment</u> : Partners involved on/assisted to the development of energy conservation law and implementing regulations	Disrupted efforts by different entities.	National program for EE to unify and consolidate efforts of government and non-government stakeholders to rationalize energy use and increase EE.	Developed an ecosystem adopted by Saudi Energy Efficiency Program consists of +150 experts from +30 government and non-government entities to unify the efforts and ensure alignment amongst different parties.	SEEP ecosystem has become a success story for other entities locally and regionally.
2. <u>Planning of actions to a more EE economy</u> : Buildings and Transport sectors addressed through multi-year action plan	Labels for 3 Appliances exists.	Enhance policies and strategy for sustainable use of natural resources and environment and ensure enforcement of standards in the key sectors.	26 EE standards and regulations for the building sector have been issued led to an increase in the ACs EER for 57%. Standards for LDVs have been enforced resulting in 11.2% fuel economy improvement compared to 2015.	

Capacity Building				
<p>1. <u>Capacity of SEEC staff and energy managers of partner institutions:</u> Number of professionals by partner institution professionally developed to develop work on the management of EE at the national level</p>	No national EE capacity	Building national capacity in the EE by workshops and training courses and professional certifications. Qualifying national trainers to ensure sustainability.	More than 66 training programs and seminars, 28 of which are certified training, conducted for the benefit of 1511 trainees resulted in 335 certified professionals and 13 qualified trainers in the EE field. 12 universities offering EE courses with more 970 students enrolled. Conventional training colleges now offer EE courses with more than 12,000 students enrolled. Participated in the establishment of Energy Efficiency Excellence Center at KFUPM with 20 participating students. 7 Energy Conservation in Buildings training courses for 154 government employees.	Qualifying universities and colleges graduates to work in energy management/audit project. Improve the government employees skills in EE for better planning and application of maintenance plans. EE researches conducted through EE Excellence Center that also facilitates the transfer of EE technologies.
<p>2. <u>Capacity to teach EE matters:</u> Number of ToT sessions on several relevant topics provided to man and women of all partner institutions; Number of individuals qualified as expert-trainers on several relevant topics to the most significant energy consuming sectors</p>				
<p>3. <u>Capacity of private sector to manage EE:</u> Number of professionals from the private sector trained by expert-trainers</p>				

Information useful for EE management at the national level				
<p>1. <u>State of the art identification on the design of EE Information Systems:</u> Ability to define and adapt tailor made ICT tool that congregates supply and demand information necessary to proper energy planning</p>	Initial data of EE exist at different stakeholders.	Databases for EE in key sectors.	<p>GBEE database for government buildings. SL&S for energy labels. ESCO e-portal for the ESCO licensing. ERS for energy performance in the industrial sector. Saudi Cafe database for LDVs. Purchased Samples system for market surveillance.</p>	
<p>2. <u>Ready to use EE Information System:</u> Participatory EEIS perfectly adapted to the needs of national energy planning and perfectly integrated on the institutional arrangement of the NEEP</p>				
Improved knowledge and awareness				
<p>1. <u>Baseline creation:</u> Level of awareness among different target groups assessed nationally</p>	No national capacity in EE despite very limited awareness campaigns.	Enhance EE awareness to reduce energy consumption and encourage energy efficient behaviour.	<p>14 nation-wide EE awareness campaigns conducted using different means of media in addition to participation in national events and exhibitions resulted in improving people's awareness and behaviours regarding EE.</p>	
<p>2. <u>Mindset transformation:</u> Comprehensive communication and awareness plan for all economy sectors</p>				