meetMED

Mitigation Enabling Energy Transition in the MEDiterranean region

Together We Switch to Clean Energy

TOWARDS THE HARMONIZATION OF ENERGY EFFICIENCY INDICATORS FOR MONITORING: NEEDS AND EXPECTATIONS OF EGYPT, JORDAN AND PALESTINE

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The meetMED project is a two-year project funded by the EU and jointly carried out by the Mediterranean Association of the National Agencies for Energy Management (MEDENER) and by the Regional Centre for Renewable Energy and Energy Efficiency (RCREEE). Its main goal is to reinforce regional cooperation aimed at fostering the energy transition in Algeria, Egypt, Jordan, Lebanon, Libya, Morocco, Palestine and Tunisia under the umbrella of the UfM REEE platform.

The meetMED team in Brussels coordinates the project partners and experts in implementing the project activities, in the following areas of work: assessing EE and RES strategies and policies; advancing vocational training and public awareness; attracting sustainable RE and EE investments; supporting the UfM Renewable Energy and Energy Efficiency Platform.

The meetMED activities target and benefit a wide range of stakeholders, including policy makers, public authorities, investors and financial institutions as well as local communities and final customers. meetMED supports regional cooperation by building the technical capacity and raising the public awareness necessary to implement RE and EE projects and solutions, while creating synergies with other initiatives targeting energy transition in the Mediterranean region.

MEDENER is an international non-profit organization gathering agencies from the northern and southern Mediterranean countries in charge of implementing public policies on energy efficiency and the promotion of renewable energy sources, by implementing regional projects facilitating the sharing of know-how and best practices among its members and international partners, as well as accelerating the transfer of skills, methods and technologies in the field of energy efficiency and renewable energy.

RCREEE is an intergovernmental organization aiming at enabling the adoption of renewable energy and energy efficiency practices in the Arab region. RCREEE brings together regional governments and global organizations to initiate and lead clean energy policy dialogues, strategies, technologies and capacity development in order to increase Arab states' share of tomorrow's energy. Its key work areas are capacity development and learning, policies and regulations, research and statistics, and technical assistance.

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Acknowledgements

In the framework of the Paris Agreement, all the countries need to implement stricter Energy Efficiency policies and to measure more accurately their impacts on climate. Energy efficiency indicators are key to monitor policies and measures taken by the countries on the long run. In a previous project implemented in Morocco, Algeria, Lebanon and Tunisia, Energy Efficiency indicators have been collected for a period going from 1990 to 2010, thus highlighting interesting historical trends. Currently, we are working to update the EE indicators for more recent years (2010 - 2017) in the same four countries. The applicable methodology is the one used in Europe in order to have regional and international benchmarks.

In parallel with this work, the feasibility for extending the methodology to other countries in the region was forecasted. Three countries have been therefore identified: Palestine, Jordan and Egypt. The present report is the key output of this activity. Based on the field missions conducted in the three countries between July and October 2019 and on the useful insights collected from key stakeholders in the three countries, this report aims at presenting which are the challenges and the stakeholders concerning energy efficiency and climate-related monitoring as well as at proposing ways for improving and harmonizing this monitoring at a regional level.

The preparation of the report was coordinated and drafted by the core team of experts from ADEME (France), Didier Bosseboeuf and Alicia Tsitsikalis; data collection is kindly acknowledged to the committed work by the experts from RSS/NERC in Jordan, namely Mr. Muhieddin Tawalbeh, senior expert and Mr. Rashed Manaa, junior expert; PEC in Palestine, namely Mr. Nidal Abu Rub and Mr. Basil Yaseen; and RCREEE in Egypt, namely Ms. Rim Boukhchina and Ms. Eman Adel, data base manager. We would like to thank also all the stakeholders met during the field trips, who gave their time and fruitful comments for elaborating this report.

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Acronyms

ADEME	Agence de l'Environnement et de la Maîtrise de l'Energie / French Agency for Environment and Energy Management
ALMEE	Association Libanaise pour la Maîtrise de l'Energie et l'Environnement — Lebanese Association for Energy Saving and for Environment
ANME	Tunisian National Agency for Energy Conservation
APRUE	Algerian National Agency for Energy Conservation
CFLs	Compact fluorescent lamp
EE	Energy Efficiency
EEBC	Energy Efficiency Building Codes
ENEA	Italian National Agency for New Technologies, Energy and Sustainable
ESCO	Energy Service Companies
EU	European Union
GDP	Gross Domestic Product
GiZ	Gesellschaft für Internationale Zusammenarbeit, German agency for cooperation
GHGs	Greenhouse Gases
IDAE	The Spanish Institute for Diversification and Energy Saving
IEA	International Energy Agency
JREEEF	Jordan Renewable Energy and Energy Efficiency Fund
MEDENER	Mediterranean Association of National Agencies for Energy Management
meetMED	Mitigation Enabling Energy Transition in the Mediterranean Region
meetMED REN	meetMED Regional Experts Network
MEPS	Minimum Energy Performance Standards
NEEAP	National Energy Efficiency Action Plan
NEEREA	National Energy Efficiency and Renewable Energy Action
NERC	National Energy Research Centre of Jordan
NREAP	National Renewable Energy Action Plan
ONEE	Office National de l'Electricité et de l'Eau Potable
RE	Renewable Energy
REEL	Renewable Energy and Energy Efficiency Law No. 13

RES	Renewable Energy Sources
RCREEE	Regional Center for Renewable Energy and Energy Efficiency
SEMCs	Southern Eastern Mediterranean Countries
SUNREF PALESTINE	Sustainable Use of Natural Resources and Energy Finance Palestine
SWH	Solar Water Heater
UfM REEE	Union for the Mediterranean Renewable Energy and Energy Efficiency Platform

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Executive Summary

The meetMED project is performing several activities focusing on the evaluation of «Energy Efficiency and Renewable Energy Strategies and Policies implemented in the meetMED target countries». The final goal is to set a Mediterranean "observatory" for monitoring energy policies and measures through the so-called top-down energy indicators. This set of indicators called "MED'OBSERVEER" is built on the European experience called ODYSEE-MURE initiative.(1) The added value of updated EE and RE indicators is to measure the current impact of EE and RE strategies and therefore to adapt the national planning accordingly (NEEAP; NREAP). A first important contribution to this MED'OBSERVEER initiative is the update of energy efficiency indicators (EEIs) in four SEMCs (Algeria, Lebanon, Morocco and Tunisia), which is done in parallel to this work.

A set of interviews and field research helped assess the feasibility to expand the coverage of the MED'OBSERVEER initiative to three other SEMCs, namely Jordan, Palestine and Egypt. The willingness and the capacity of these three countries to become partners of this initiative in the field of energy efficiency and renewable energy policies were assessed.

This report explores the feasibility of extending the meetMED MED'OBSERVEER initiative to these three countries and shall contribute to the decision process of the donors. The objective is to increase the number of participating countries, which will be very valuable for the exchange of good practices and results. It will certainly enrich the analysis for the implementation of energy efficiency policies within the region. The report concludes with a set of recommendations about the participation of these countries based on a set of «eligible criteria».

This report is the result of the collective work of the experts from ADEME appointed by meetMED, the three national focal points who have organised the on-field missions and around twenty stakeholders who have kindly accepted to be interviewed by the team.

The terms of reference fixed three objectives to be covered in the report:

- Understand national backgrounds of EE monitoring in the three coun-

(1) www.odyssee-mure.eu/

tries: existing databases, legal framework, stakeholders involved, current trends in terms of EE, gaps in data collection and monitoring, etc.;

- Identify key stakeholders and sources of information for establishing the database and compiling the indicators;
- Raise awareness on the methodology of EE indicators and mobilize the stakeholders for EE and RES monitoring / define an action plan for implementing data collection.

Methodology

The methodology used was mainly based on a set of on-field interviews to relevant stakeholders during a 2-day mission in each of the three countries. The Medener team (3 experts from ADEME) and the three national focal points (NERC, PEC and RCREEE-respectively for Jordan, Palestine and Egypt) selected the stakeholders to be interviewed. The idea was to gather opinions from energy and environment ministries, statisticians in particular those in charge of the energy balance, analysts of EE policies and measures, practitioners on EEIs, and experts of the Energy Efficiency agencies and research centres or academics.

1) Recommendation on the data collection and the eligibility as a country partner for the future

Box 1 summarizes our diagnostic according to the eligibility criteria.

Box 1: Set of criteria to assess feasibility for monitoring energy efficiency

Eligibility Criteria	Egypt	Jordan	Palestine
Level of EE P&Ms			
Willingness to monitor			
Data availability	(a)		(a)
Practise in data base management			
Practice on EEIs	(b)		
Governance of data collection	(c)		
Participation to a benchmark			
Dissemination of results			

Legend: Green – Suitable; **Yellow** – To be confirmed; **(a)** Lack of data in the transport sector; **(b)** Only private sector (RCREEE); **(c)** No energy efficiency agency, 2 ministries in charge of EE P&Ms.

Source: Authors

In some countries, the main issue is related to the level and the nature of the governance institution responsible for data collection. In particular, in Egypt this is a problem because there is no EE Agency and data dissemination is difficult due to a strict law on internal security that makes complex and slow the data collection process. The following are the recommendations to expand MED'OBSERVEER to these countries:

- Jordan and Palestine are good candidates for participating in the MED'OBSERVEER initiative. For Egypt, instead, further investigation needs to be conducted and the project should be better explained to the Egyptian authorities.
- In all countries, coordination among various stakeholders is key for success. It is suggested to set in each country institutional task forces, involving from the beginning all the stakeholders that can provide data. On the other hand, one clear coordinator responsible for supervision shall be designated. A national seminar could be organised to set this task force. This initiative shall be endorsed by the institutions in order to avoid staff turnover but also to ensure its credibility. Focal points in each structure could be nominated. Technical task forces could be set in parallel by composing a core team.
- Definition of a clear communication strategy from the beginning could be an asset. Special attention shall be put on end-users of EEIs, namely other administration, private sector or civil society. Communication of results, outcomes of the EEIs monitoring shall be largely emphasized. The outputs might be technical notes for each sector for example in order to demonstrate the relevance of the using data.
- Capacity building should focus not on statistics, which seems to be handled, but on interpreting the indicators, coordination among stakeholders and communication.
- Data reliability and quality control is also key factor for success. It is suggested to set independent data checking that could help revising coherence and relevance of data. A specific seminar to share experiences among countries on these issues could be also carried out.
- Several additional studies shall be carried out to complete the set of indicators and explore parameters that have not been identified yet, especially in transport sector. Sharing experiences on a regional scale could

be useful to compare situations.

- The set of indicators shall also be completed for energy specific issues in each country, e.g. water issues and solar water pumps in Jordan. Indeed, water represents 14% of electricity consumption and has a great potential for EE because Non-Revenue Water is estimated to be close to 50%.
- In terms of data integration and information system, attention shall be put on integrating as much as possible the indicators into existing energy management systems and existing data collection flows (using the census, annual mandatory reporting from companies, etc).
- The issue of benchmarking and transparency versus confidentiality of data shall be raised at the beginning. Defining clearly which consolidated indicators could be shared publicly and which data still have restricted access rights might solve this issue.

Introduction

The meetMED project is performing several activities focusing on the evaluation of «Energy Efficiency and Renewable Energy Strategies and Policies implemented in the meetMED target countries». Its final goal is to set a Mediterranean "Observatory" to monitor energy policies and measures through the so-called top-down energy indicators. This set of indicators called "MED'OBSERVEER" is built on a previous European experience, called ODYSEE-MURE initiative.(2) The added value of updating EE and RE indicators is to measure the current impact of EE and RE strategies and therefore to adapt the national planning accordingly (NEEAP; NREAP). The update of energy efficiency indicators (EEIS) in four SEMCs (Algeria, Lebanon, Morocco and Tunisia) strongly contributed to the MED'OBSERVEER initiative.

A set of interviews and field research helped assess the feasibility to expand the coverage of the MED'OBSERVEER initiative to three other SEMCs, namely Jordan, Palestine and Egypt. The willingness and the capacity of these three countries to become partners of this initiative in the field of energy efficiency and renewable energy policies were assessed.

This report explores the feasibility of extending the meetMED MED'OBSERVEER initiative to these three countries and shall contribute to the decision process of the donors. The objective is to increase the number of participating countries, as this will be very valuable fin terms of exchange of good practices and results. It will certainly benefit the analysis of energy efficiency policies implementation within the region. The report concludes with a set of recommendations about the participation of these countries based on a set of «eligible criteria».

After presenting general objectives and methodology (Part 1), each country is presented: Jordan (2), Palestine (3) and Egypt (4). Each chapter is divided into: main trends in EE monitoring, regulatory framework and assessment of feasibility and detailed recommendations. Finally, a set of general recommendations is proposed.

(2) www.odyssee-mure.eu/

1. Objectives and Approach

1.1 Background

A recent report published by the Secretariat of the Union for the Mediterranean deplores the absence of a regional database in order to compare energy efficiency measures and strategies among all the Mediterranean countries. There are indeed many attempts to set up such databases, but these are either partial, incomplete or inconsistent with one another: different geographic perimeter, different tools for data collection and calculation. At the international level, there have been many attempts: among others, the institutional databases of the World Energy Council (3), the World Bank (4), the IEA (5) or IRENA (6), those produced within the framework of projects or carried out by private actors, those of the ODYSSEE-MURE project, and of the RISE initiative (Regulatory Indicators for Sustainable Energy) of SEforALL (7). At the regional level, the OME (8) or finally the "Taqaway initiative" developed by RCREEE and the League of Arab States(LAS) (9) can be mentioned.

Indeed, the obstacles to the establishment of regional databases are relatively well-known and the pitfalls are numerous, for instance:

- The issue of reliability of the data, homogeneity and consistency
- Calculation methodologies, which may differ between institutions and in terms of operators' techniques
- The absence of transparency
- The diversity of stakeholders involved and the competition among them (visibility, legitimacy, etc.)
- Financial constraints and weak means of investigation and monitoring
- Technical skills and capacities
- Sustainability of the monitoring systems

(3) https://www.worldenergy.org/
(4) https://databox.worldbank.org/en
(5) http://www.iea.org/policiesandmeasures/
(6) http://resourceirena.irena.org/gateway/
(7) https://www.seforall.org/heatmaps/energyefficiency
(8) http://www.ome.org/database/
(9) https://taqaway.net

The Mediterranean countries, through their energy efficiency agencies, have carried out the first comprehensive analysis of energy efficiency policies (EEP&Ms) impacts over the period 2000-2014 in the region. Other initiatives, such as Plan bleu (2012) and the Arab League (2014) have also developed Energy Efficiency Indicators (EEIs) as well as cross-countries analyses dedicated to SEMCs. Currently, a similar initiative called MED'OBSERVEER has been launched under the meetmed project covering four SEMCs, namely Algeria, Lebanon, Morocco and Tunisia. Based on data collection in the four countries, on the reports and additional data coming from the ODYSSEE database for the 7 NMCs, a cross-country comparison analysis on energy efficiency trends will be published in 2020.

The MED'OBSERVEER initiative tries to avoid these pitfalls through a methodology that involves each country singularly, builds capacities among all the stakeholders involved in data collection and adapts the indicators to the country expectations. Only a common set of indicators contributes to the regional benchmark.

1.2 Objectives and Expected Results

This report explores the feasibility of extending the initiative on energy efficiency to three additional countries: Egypt, Jordan and Palestine. The objective is to increase the number of participating countries, in order to benefit more from the exchange of good practices and results. It will certainly enrich the analysis of energy efficiency policies implementation within the region.

The sub-objectives are the following:

- Understand national backgrounds of EE monitoring in the three countries: existing databases, legal framework, stakeholders involved, current trends in terms of EE, gaps in data collection and monitoring, etc.;
- Identify key stakeholders and sources of information for establishing the database and compiling the indicators;
- Raise awareness around the methodology of EE indicators and mobilize the stakeholders for EE and RES monitoring / define an action plan for implementing data collection.

The expected result is this report describing the context in the three countries and proposing next steps for implementing EE monitoring.

1.3 Methodology

The methodology used was mainly based on a set of on-field interviews of relevant stakeholders during a 2-day mission in each of the three countries. Stakeholders were jointly selected by the MEDENER team (3 experts from ADEME) and the three national focal points, including two belonging to the MEDENER network (NERC and PEC respectively for Jordan and Palestine) and a meetmed expert from Egypt (RCREEE The idea was to gather opinions from energy and environment ministries, statisticians in particular those in charge of the energy balance, analysts of EE policies and measures, practitioners on EEIs, and experts of the Energy Efficiency agencies and research centres or academics. The exact date of the 3 missions, the identification of the stakeholders are reported in Annex 1.

In total, 24 interviews have been conducted. In order to facilitate the discussion, we have prepared 8 eligibility criteria that are relevant to pose the diagnostic corresponding to the objectives mentioned in the Annexes (5.1.).

Box 2: Criteria of eligibility for performing EEIs monitoring

1) A sufficient level of EE policies implementation in order to justify the need of setting up a monitoring system and to ensure that their impacts can be observed or visible on the energy end-use balance;
2) Willingness to monitor and evaluate the energy efficiency situation in detail;
3) Availability of the basic end use data and sustainability of data collection;
4) Experience in monitoring and more generally in managing databases;
5) Experience in Energy Efficiency Indicators;
6) Ability to organize a data collection, which is scattered through a good governance and expertise (e.g. a focal point from an energy efficiency agency);
7) Ability to participate in a regional benchmark;
8) Ability to use and disseminate their results.

Obviously, the interviews were conducted following a different approach, based on the different nature of the stakeholders (officials/private; energy/environment; ministries and statistical bureau etc.).. For instance, in Egypt the stakeholders were not aware of the methodology and more time had to be spent on presenting the project (objectives/outcomes etc.) rather than other useful information.

These rounds of talks were completed by online desk review of the reports suggested by the stakeholders, such as statistical yearbooks, NEEAPs and NDCs etc.

The analysis of the three countries is presented by chapter and follows the same structure:

- A rapid analysis of the energy demand and EE to detect the most important sectors, for which detailed data collection and EE monitoring are required.
- The description and analysis of the existing data collection and practices on EEIs monitoring in order to detect each national experience and the use of their monitoring system, if any.
- The review of the legal framework for reporting EE strategies in order to check the level of data used in designing strategies and to evaluate if the implemented policies are enough to justify the establishment of a monitoring system.
- The main outcomes of the stakeholders' interviews have been understanding their respective role and expectations towards an observatory, their willingness to participate in the benchmark and which focal point will be the most suitable to perform the work.

Bias and Constraints

Due to time and financial constraints, the coverage of the issues related to the monitoring (data collection and indicators) of renewable energies (RES) implementation has been overflown. However, the monitoring of EE is by far more complex that the ones on RES, which is certainly more widespread because the market for RES and P&Ms in the SEMCs are more mature. Furthermore, generally the institutional issues related to the implementation of EE and RE are rather similar because the interviewed stakeholders are generally covering both aspects. Unfortunately, it has not been possible to suggest a comprehensive strategy for improving data collection in the three countries yet, as this requires more inputs from the stakeholders. A final workshop to discuss the main findings of the study was not even organised.

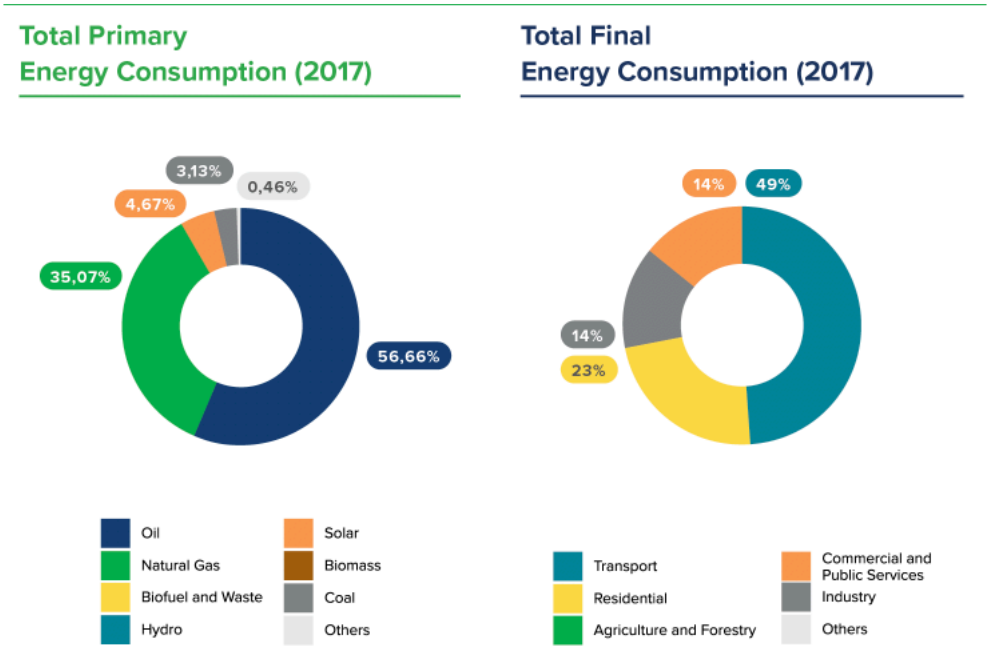
2. Jordan

2.1 General Background of EE in Jordan

2.1.1 Energy Consumption Trends

Jordan primary energy consumption (Figure 1) amounts for 9.3 Mtoe in 2017 (IEA[10]). It has practically tripled compared to 1990 and doubled from 2000. It largely relies on fossils with the dominant role of oil products (57%), gas (35%) and coal. The contribution of RES is still marginal (around 5%). The energy dependency rate is very high (97%). On the demand side, the final energy consumption amounted of 6.6 Mtoe in 2017 and has also rapidly increased from 1990. The transport sector is by far the largest consuming sector (50%) amounting for 3 Mtoe, the residential sector shares one quarter of the final energy consumption while industry and services sectors equally share the remaining consumption (around 14 % each).

Figure 1: Breakdown of primary consumption by fuels and final energy consumption by sectors in Jordan (2017)

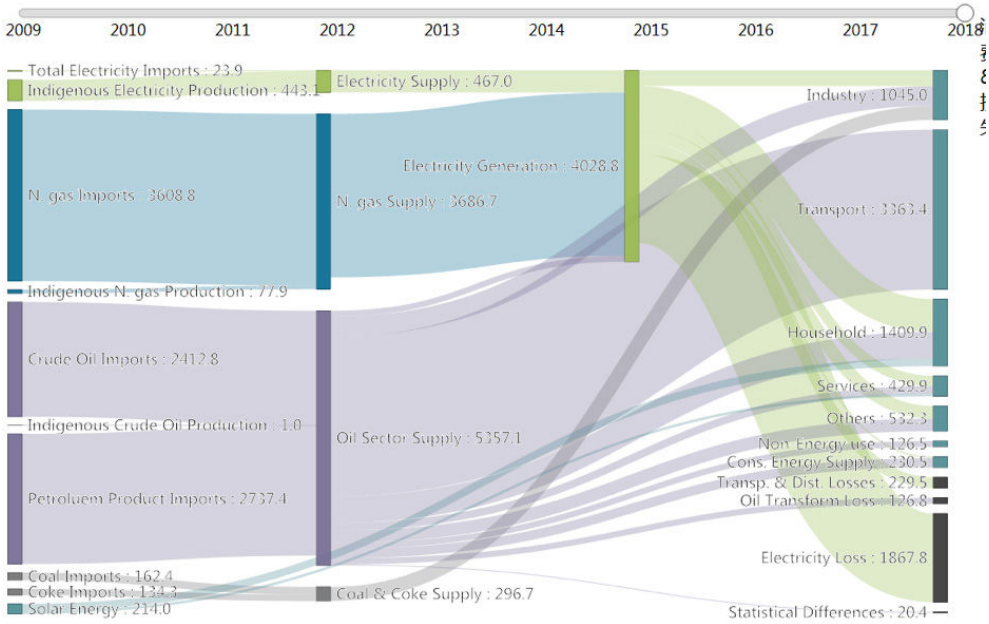


Source: meetMED2019

(10) https://www.iea.org/data-and-statistics?country=JORDAN&fuel=Energy%20supply&indicator=Total%20primary%20energy%20supply%20(TPES)%20by%20source

In terms of trends (Energy balance flow 2005-2018 for Jordan, Figure 2), the fastest increase can be observed in transport, particularly during the last decade, followed by the housing sector, which has followed a similar pattern since 2010. The trend in industry is rather erratic and the level of consumption in 2017 is similar to the one in 2010, and only slightly higher than in 2000. With respect to energy sources, the analysis is quite clear: oils products largely dominates (71%, 4.7 Mtoe) related to the importance of the transport sector in the final energy demand, followed by electricity (23%). With respect to the trends, oils products increased faster than electricity in the final consumption but both fuels are increasing very rapidly in the last decade.

Figure 2: Energy balance flow 2005-2018 for Jordan



Source: MERM: http://eis.memr.gov.jo/index.php/topic/balance-flow

2.1.2 Main Energy Efficiency Trends in Jordan

Currently, there is no comprehensive detailed and updated quantitative monitoring of the energy efficiency trends officially published by the Jordanian public administration by using detailed energy efficiency indicators (EEIs). Some partial and ad hoc information can be found in the second NEAAP and only very aggregated indicators can be found. Table 1 shows these aggregate indicators.

Table 1: Selected aggregate energy efficiency indicators for Jordan (1990-2017)

	1990	2000	2010	2017
Primary energy consumption per capita (Toe.capita)	0.9	1.0	1.0	1.0
Electricity consumption per capita (Mwh/cap)	0.9	1.3	1.9	1.9
Primary energy intensity (Toe/thousand 2010 USD)	0.39	0.34	0.27	0.30

Source: IEA

The most important and obvious achievement with respect to energy efficiency is the impressive improvement of the energy intensities (primary and final intensities) along the whole period 1990-2017. However, it should be noted that the final energy intensity has improved less rapidly than the primary energy intensity because the efficiency improvement has been faster in the transformation sector than in the end-uses sectors.

However, this good result for the Jordan economy should not hide that the energy productivity (the inverse of energy intensity) is rather low compared to the other neighbouring countries. Across the SEMCs, the level of the primary energy intensity in Jordan is the second highest one in the region. A more detailed analysis is needed to evaluate and monitor the energy efficiency performances in Jordan.

2.2 The Monitoring of Energy Efficiency Trends (EEIs)

2.2.1 The Energy Balance

In Jordan, the energy balance is produced by MEMR and published quite rapidly since the 2018 energy balance is already available (Table 2).

Table 2: The 2018 energy balance for Jordan (MEMR)

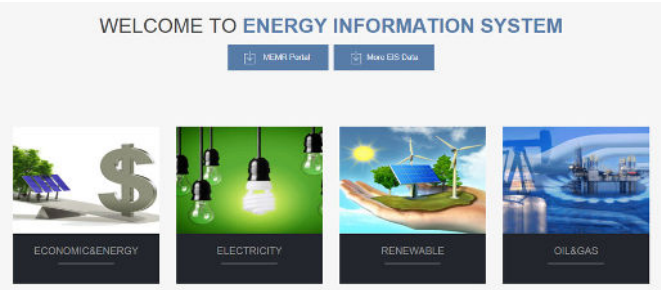
	Energy Balance (000 TOE)																
Sector	Crude Oil	Fuel Oil	Diesel	Gasoline	LPG	Kerosene	Jet Fuel	Pet Coke	Other	Total Oil	Coal	L Coke	N. gas	Electricity	Solar Energy	Bio Mass	Total Energy
Indigenous	1.0	-	-	-	-	-	-	-	-	1.0	-	-	77.9	443.1	214.0	54.0	790.0
Imports	2412.8	-	1184.7	1031.0	403.5	40.2	71.7	91.5	6.3	5241.8	162.4	42.8	3608.8	47.4	-	17.5	9120.7
Exports	-	-	-	-	-	-	-	-	-	-	-	-	-249.1	-23.5	-	-	-272.6
Bunkers	-	-	-4.2	-	-	-	-51.3	-	-	-55.5	-	-	-	-	-	-	-55.5
Stock Changes	-11.1	2.2	31.3	56.1	6.8	31.9	12.5	-	-0.6	129.1	-	-	-	-	-	-	129.1
Primary Energy	2402.7	2.2	1211.9	1087.2	410.3	72.1	32.9	91.5	5.7	5316.3	162.4	42.8	3437.6	467.0	214.0	71.6	9711.7
Oil Sector	-2402.7	439.5	764.1	517.2	73.6	-10.7	329.6	-	162.6	-126.8	-	-	-	-	-	-	-126.8
Electricity	-	-120.0	-4.2	-	-	-	-	-	-	-124.2	-	-	-3437.6	1694.0	-	-	-1867.8
Transp. & Dist.	-	-	-	-	-	-	-	-	-	-	-	-	-	-229.5	-	-	-229.5
Cons. Energy Supply	-	-155.3	-	-	-	-	-	-	-41.8	-197.1	-	-	-	-33.44	-	-	-230.54
Final Energy	-	166.4	1971.8	1604.3	483.9	61.4	362.4	91.5	126.5	4868.2	162.4	42.8	-	1507.7	214.0	71.6	6866.7
Industry	-	152.0	159.9	-	11.5	-	-	91.5	-	414.9	162.4	42.8	-	333.4	-	-	953.5
Transport	-	6.0	1382.0	1613.0	-	-	362.4	-	-	3363.4	-	-	-	-	-	-	3363.4
Household	-	-	117.9	-	378.6	61.4	-	-	-	557.9	-	-	-	691.2	160.8	53.6	1463.5
Services	-	-	88.5	-	72.6	-	-	-	-	161.1	-	-	-	215.6	53.2	18.0	447.9
Others	-	-	242.8	0.8	21.3	-	-	-	-	264.8	-	-	-	267.5	-	-	532.3
Non-Energy use	-	-	-	-	-	-	-	-	126.5	126.5	-	-	-	-	-	-	126.5
Statistical	-	8.4	-19.2	-9.5	-	-	-	-	-	-20.4	-	-	-	-	-	-	-20.4

Source: MEMR

Annually, the MEMR draft a report analysing the energy matters. Screening the data, which are useful for EEIs, we found data on primary and final energy consumptions evolutions presented in some commented graphs. It can be noted that a dedicated chapter exists for RES, but there is no dedicated information on energy efficiency.(11) This activity report is ideally complemented by a yearly brochure on facts and trends (currently 2019).(12) The full energy balance is shown only in tables, but no analyses are carried out.

In order to get a full picture of the data availability provided by MEMR, it is necessary to check the data availability from the "energy data system centre", which is freely accessible without a password in the interactive web portal. This portal is very well designed, very user friendly and has a relatively extensive open data system. It should be also noted that the data are very well updated (currently 2018) and are displayed with a reasonably long time frame (generally 2005-2018). Figure 3 shows the web page portal.

Figure 3: Portal to the Jordan energy information system



Source: http://eis.memr.gov.jo/index.php

(11) https://memr.gov.jo/echobusv3.0/SystemAssets/469adf39-0f2f-4d01-a72b-d394c3b56332.pdf
(12) https://memr.gov.jo/EchoBusV3.0/SystemAssets/PDFs/EN/BroshorEn2019.pdf

As the portal shows, there is no facility devoted to energy efficiency as such and, even worse, no EEIs can be found elsewhere except for the primary energy intensity ratio.

However, very crucial data are accessible through the portal and the following screenshots aim at presenting the level of disaggregation in Jordan, which is relevant to our analysis.

Table 3 shows the 2018 energy balance by 6 end-uses sectors. Residential is separated from services but agriculture is gathered in the category "other" and there is no breakdown of industry consumption by branches. This energy balance is available at least from 2005 to 2018 but may exist with longer time series.

Table 3: Energy balance by end-uses sector and years retrieved from the MEMR portal

Year	Final Energy Consumption										
	Industry	Transport	Household	Services	Others	Non-Energy use	Total Consumption	Growth	Per Capita Energy	Per Capita Electricity	Energy Intensity
	000 toe	000 toe	000 toe	000 toe	000 toe	000 toe	000 toe	%	kgoe	kwh	kgoe/1000USD
2005	1158.7	1778.9	1059.9	340.1	281.7	182.9	4802.2		1284		
2006	1182.2	1822	1064.2	364.4	297.7	159	4889.5	1.82	1283		
2007	1192.2	1912.1	1070.3	368	336.6	147.7	5026.9	2.81	1299	1841	213
2008	1095.4	1767.3	1009.5	355.1	320.3	159.4	4707	-6.36	1254	1967	213
2009	1100.9	1952.3	1082.7	373	326.9	185.3	5021.1	6.67	1294	1999	212
2010	1014.1	1991	1018.9	377.5	326.3	144.9	4872.7	-2.96	1204	2102	210
2011	960.5	2011.4	1136	362.4	356.2	59.3	4885.8	0.27	1193	2166	209
2012	695.1	2520.8	1197.8	342.5	357.6	43.5	5157.3	5.56	1247	2230	208
2013	924.1	2733.7	1109.3	328.4	288.7	52.8	5437	5.42	1249	2235	208
2014	1079.42	2558.26	1151.62	338.51	379.35	108.9	5616.05	3.29	1272	2318	207
2015	991.36	2810.45	1272.39	366.88	386.87	127.6	5955.54	6.05	1373	2483	207
2016	1063.66	3184.52	1342.5	405.09	420.82	179.1	6595.68	10.75	981	1701	296
2017	938.2	3431.3	1548.6	459.7	490.6	176.8	6987.1	5.93	996	1748	299
2018	953.5	3363.4	1463.5	447.9	532.3	126.5	6866.7	-1.72	942	1701	235

Source: MERM: http://eis.memr.gov.jo/index.php/topic/2016-04-03-05-42-13/2016-04-03-05-44-58

In fact, more detailed information can be also found in the portal when a retrieval by fuel types is operated: Oils products can be split into 7 categories and into 4 end-uses for electricity.

2.2.2 The Monitoring of Energy Efficiency Indicators

By investigating on the experience of managing an EEIs database by the Jordanian administration, it seems that there is currently no database or reporting organized on energy EEIs. However, there are clearly new trends towards developing MRV systems as it has been announced by the Ministry of Environment and operated by the Royal Scientific Society (RSS), if we consider the JREEEF monitoring. Outside the ministries, no real EEIs reporting seems to

be carried out even within NERC, universities or research centres. It is worth mentioning that in 2014 NERC has established an information system on renewable energy and energy efficiency with funding from the EU (http://www.jordanenergydata.org). Unfortunately, this information system is not functioning due to the lack of financial support, which is mainly needed for data collection and maintaining the system.

The only existing comprehensive experience on EEIs in Jordan has been performed in 2012 in the framework of a UNEP-MAP-funded project. This report untitled energy efficiency indicators in SEMCs covers 10 Arab countries and is available in English and French.[13]

Figure 4: Cover page of Jordan national report (2012)

Based on the ODYSSEE methodology developed in the framework of the EU funded programme H2020 and coordinated by ADEME, the report provides a cross-country comparative analysis of energy efficiency trends supported by a data collection operated by each participating country. In addition to the regional synthesis,[14] 10 national reports have been carried out including Jordan.[15] For Jordan, the focal point was the Ministry of Energy and Mineral Resources with the technical assistance of NERC.

To ease the cross-country comparison across the SEMCs, the same data collection was requested to the partners. The analysis of data availability in Jordan compared to other participating countries (Table 5) is quite interesting. As it can be seen, the availability of energy data was excellent (92.2%). The

(13) https://www.rcreee.org/sites/default/files/energy_efficiency_indicators_in_rcreee_member_countries_web_may_2015_.v11.pdf
(14) https://www.rcreee.org/content/energy-efficiency-indicators-2014
(15) https://planbleu.org/sites/default/files/upload/files/5-4-EN_Rapport_indicateurs_Jordan.pdf

Jordanian experts consider that it is mainly due to the fact that the energy sector in Jordan is well developed and organized. It is worth mentioning that the focal point working with the experts was the Head of Statistics and Information Division of the Ministry of Energy and Mineral Resources, thus facilitating data collection.

Table 4 : Major reference documentations for the Jordanian report

	Document	Organization
1	Statistical Yearbook 2009	Jordan Department of Statistics
2	Annual Reports 2003-2010	Ministry of Energy & Mineral Resources
3	Annual Reports 2006-2010	Electricity Regulatory Commission
4	Annual Reports 2003-2010	National Electric Power Company
5	Jordan's Second National Communication (SNC) 2009	Ministry of Environment
6	Annual Reports 2003-2010	Central Electricity Generating Company
7	Monthly Statistical Bulletin, Various issues.	Central Bank of Jordan

Source : Plan bleu National report of Jordan (2012)

Table 5 : Data availability in Jordan for the calculation of energy efficiency indicators

Sector	Energy data			Socio-economic data		
	Total number of data	Available data**		Total number of data	Available data %**	
		Number	%		Number	%
Macro	56	56	100	42	42	100
Transformation sector	98	98	100			
Transport sector	49	42	85,7	105	88	83,8
Tertiary sector	28	24	85,7	35	28	80
Residential sector	21	21	100	49	45	91,8
Industry sector	56	51	91	91	68	74,7
Agriculture & fishing	14	5	35,7	56	34	60,7
Total	**322**	**297**	**92,2%**	**378**	**305**	**80,70%**

Source : Plan bleu National report for Jordan (2012)

Table 6: Final consumption evolution by end-use sector (Jordan 2005-2017)

Year	Final Energy Consumption										
	Industry	Transport	Household	Services	Others	Non-Energy use	Total Consumption	Growth	Per Capita Energy	Per Capita Electricity	Energy Intensity
	000 toe	000 toe	000 toe	000 toe	000 toe	000 toe	000 toe	%	kgoe	kwh	kgoe/1000USD
2005	1158.7	1778.9	1059.9	340.1	281.7	182.9	4802.2		1284		
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2011	960.5	2011.4	1136	362.4	356.2	59.3	4885.8	0.27	1193	2166	209
2012	695.1	2520.8	1197.8	342.5	357.6	43.5	5157.3	5.56	1247	2230	208
2013	924.1	2733.7	1109.3	328.4	288.7	52.8	5437	5.42	1249	2235	208
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2017	938.2	3431.3	1548.6	459.7	490.6	176.8	6987.1	5.93	996	1748	299
2018	953.5	3363.4	1463.5	447.9	532.3	126.5	6866.7	-1.72	942	1701	235

Source: MERM: http://eis.memr.gov.jo/index.php/topic/2016-04-03-05-42-13/2016-04-03-05-44-58

2.3 The Legal Reporting on Energy Efficiency

Although some observers consider that there is a relatively low interest in energy efficiency implementation at least compared with RES, Jordan has a long-lasting experience in implementing and monitoring energy efficiency. In fact, Jordan should be recognized as one of the most advanced Arab countries in terms of EE policy implementation. According to the 2015 Arab Future Energy Index (AFEX) developed by RCREEE, the 2015 scoreboard on energy efficiency ranks Jordan as second for creating a favourable environment for energy efficiency investments.

According to RCREEE, "the main accomplishments in Jordan during the recent period include: the implementation of the subsidy removal plan, whereby all subsidies for oil products were eliminated; the adoption of its first NEEAP; and the formulation of MEPS for household appliances. However, Jordan still needs to strengthen its implementation capacity to properly capitalize on the new energy efficiency policies. Currently, the country lacks the institutional champion to lead the implementation of energy efficiency" (AFEX 2015).

Along with the interviews, the existence of three major legal frameworks, which are shaping the EE implementation were mentioned:

i. the energy efficiency law;

ii. the medium- and long-term future energy efficiency strategies described in the NEAAP 1 and NEAAP 2, including some ex-post and ex-ante impact evaluation indicators;

iii. the newly submitted UNFCCC National Determined Contribution (NDCs) of Jordan, which also incorporates the description of some EE policies that will contribute to GHGs reductions.

This section presents firstly the administrative reporting system on EE policies both from the MEMR and the Ministry of Environment and, secondly, the reporting of Energy Efficiency indicators.

2.3.1 Energy Efficiency and Renewable Energy Law

The updated Renewable Energy and Energy Efficiency Law No. 33, 2014 shapes the current regulatory framework for RE and EE. The underlying targets are to increase renewable energy from 2% of overall energy in 2013 to 10 % in 2020, and to improve energy efficiency by 20 % by 2020. This law contains some EE provisions, which regulates the procedures and means of conserving energy and improving its efficiency (for instance, Article 10 of the bylaw No. 73 (2012) obliges mandatory installation of solar water heaters in place since1 April 2013 for new apartments exceeding 150 m^2, as well as for offices in commercial buildings exceeding 100 m^2, and for residential buildings exceeding 250 m^2).

2.3.2 The first National Energy Efficiency Action Plan (NEEAP1) - 2013-2015

The two NEEAPs promote stakeholders' engagement and contribute to the development of a framework for the EE sector. They establish indicative energy saving targets as well as policies and measures that should be implemented to overcome barriers and help reach these goals. These documents have been always mentioned by all the stakeholders during the interviews, thus showing the strategic role of this document in framing the implementation of EE policies.

In response to the high level of energy intensity in Jordan and the high electricity consumption growth in the beginning of the 2000s, the Jordanian Council of Ministers approved the first National Energy Action Plan (NEEAP1) of Jordan in June 2013 for the period 2013-2015. It concerned only electricity matters and the aims were to curb the electricity growth and to save 500 GWh in the first two years (2013-2015). A target was set up to achieve the 20% decrease in electricity consumption. The implementation of NEAAP1 has been evaluated by the MEMR. Results on 11 main energy efficiency measures show an average rate of completion of around 40% with huge discrepancies in the program implementation from a full completion in labelling programs to only a 10% implementation for the replacements of incandescent lamps as seen in the table 7 below.

Table 7: Rate of completion of selected NEEAP 1 measures in Jordan

measures	Sectors	Title of the 11 measures	Average 5years 2006-2010	Target by 2014		Rate of completion	
				%	GWh	%	GWh
	Residential		4447	5.6%	509	34%	172
1	*Residential*	*Replacement of 1.5 million incandescent lamps with energy efficient lamps (CFL)*			*246*	*20%*	*49.2*
2	*Residential*	*Energy Label program for four home appliances*			*91*	*100%*	*91.0*
3	*Residential*	*Installation of 30,000 Solar water heaters*			*147*	*10%*	*14.7*
4	*Residential*	*Survey of energy consumption in Residential sector by the end of 2012*				*100%*	
5	*Residential*	*Installation of 5,162 Solar water heaters in cooperation with Jordan River Foundation*			*25*	*70%*	*17.4*
6	Industrial	Mobile Energy and Environment Clinic	3013	3.3%	100	80%	80.4
7	Commercial	Replacement of conventional Ballasts by Electronic Ballasts for fluorescent Lamps	1875	2.7%	50	30%	15.0
8	Water Pumping	Phase 1-Improvement of Energy Efficiency of the Water Authority of Jordan (IEE) & Phase 2- (EEP)	1668	5.1%	85	40%	34.1
9	Street Lighting	Replacement of Mercury lamps by efficient lamps & use Automatic street lighting controls & voltage regulators	288	6.6%	19	60%	11.4
10	Public sector	Reduce the consumption of public buildings by 10%			33	30%	9.9
11	Pubic sector	Replacement of 50,000 of incandescent lamps with compact fluorescent lamps (CFL)			9	10%	0.9
		Total of the 11 measures	11291	7.1%	806	40%	324

Source: MEMR/JREEEF 2019

2.3.3 The Second National Energy Efficiency Action Plan (NEEAP2) -2018-2020

Jordan decided to update its action plan, by developing a second NEEAP for the period 2018-2020, which has been endorsed by the Ministry on 30 March 2017.

As it is recognized by numerous stakeholders, the second NEAAP is more ambitious, consistent, relevant and documented than NEAAP 1. For instance, NEEAP2 contains 36 measures instead of 25 as in NEEAP1 and the electricity target is 17.5% compared to 4.4% for NEEAP1. Jordan has one of the most ambitious EE targets of the region. The Jordanian strategy aims to reduce energy consumption by 20% by 2020 and 18% in 2030. It is noticeable that the target for RES seems less ambitious (10%) at least compared with other SEMCs.

As it has been stated, the indicative target of the second NEEAP (2018-2020) is more ambitious and aims at saving 17.5% of electricity by 2020 (1975 GWh), compared to the annual average electricity consumption of the last 5 years (2010-2014). It is distributed by sectors, as indicated in Table 8.

Table 8: Sectoral electricity targets of NEAAP2 (2017-2020)

	Baseline 5 years average consumption 2006-2010 (GWh)	Saving according to NEEAP 2017 - 2020 (GWh)	% of 5 years average baseline consumption
Residential	4447	998	22,4%
Industrial	3013	383	12,7%
Commercial & services	1875	376	20,0%
Water pumping	1668	163	9,8%
Street lighting	288	55	19,1%
Total	**11291**	**1975**	**17,5%**

Source: MEMR

NEEAP2 comprises 36 energy efficiency measures. Table 9 shows the expected electricity savings by measures in the housing and services sectors respectively. The current evaluation of NEAAP2 is encouraging since, in 2019, 7% over the 20% 2020 objective has been reached.

Table 9: The four energy efficiency measures in the residential sector in Jordan (NEEAP2)

No	Measures	Description	Period	Electricity saving (GWh)	Program Cost (MJD)	Bill saving for users (MJD)
1	Replacement incandescent lamps with LED for low and medium households income classes (<600 kWh/month)	1 million LED targeting 250000 consumers	2016-2020	155	10	12
2	Enforcement of Energy Label and standards program for 4 home appliances	Air conditioning - Refrigerators - Freezers - W machines	2016-2020	400	NA	21
3	EE building codes enforcement in residential sector (just insulation)	About 66000 new households during the next 5 years.	2017-2020	401	259	75
4	Program for roof insulation of existing building in residential sector	15000 houses with around 2 million m² of roof	2017-2020	41	32	7
	Total			998	301	116

Source: MEMR

2.3.4 The Jordan Renewable Energy and Energy Efficiency Fund (JREEEF)

In order to get a better appraisal of the EE strategy implementation, it is useful to put into perspective the means dedicated to the related investments. In that respect, the analysis of the Jordan Renewable Energy and Energy Efficiency Fund (JREEEF) provides some highlights. JREEEF was launched in 2012 by the Jordanian government to facilitate RES and EE investments in various sectors, such as residential, educational (schools), health (hospitals) as well as private, public, industrial and service sectors through subsidies, interest subsidies and loan guarantees. Overall, the JREEEF will allocate a significant amount to demonstrate the reality of EE and ReS implementation. Table below shows the level of support for each kind of project proposed by JREEEF, which mainly relies on grants and guarantees.

Table 10: Financial support by programs through JREEEF

Program	Financial Support	Incentives
Solar water heaters	Grant Guarantees	50% Interest subsidies, Provide selective credit and risk guarantees to banks for loans for investments in RE and EE projects
Roof top PV	Grant Guarantees	30% Idem above
Insulation	nd	nd
SMEs Hotels (25 hotels)	Grant Guarantees	100% - Energy Audit 25%-50% for grant EE measures
Public Schools program	Grant	100%
Energy Audit for governmental BLD	Grant	50%

Source: MEMR

2.3.5 Reporting on Climate Change: the 3rd National Communication and the 1st NDC

2.3.5.1 The 3rd National Communication on Climate Change (TNC)

Being EE a crucial option to mitigate GHG emissions, it is also important to analyse how the reporting on climate change refers to energy efficiency policies and monitoring.

Jordan was among the first group of developing countries to ratify the UNFCCC and make an accession to the Kyoto Protocol in 1994 and 2003 respectively. In response to its obligations towards the UNFCCC, Jordan submitted its Initial National Communication on Climate Change in 1997 and the Second National Communication in 2009. Moreover, Jordan, supported by UNDP, launched its Third National Communication Report to UNFCCC (TNC Report) in December 2014. More recently, supported by GIZ, the First NDC Report for Jordan was submitted and published by UNFCCC in October 2016.

The TNC (2014) is a very comprehensive document (281 pages), in which all the mitigation and adaptation projects envisaged are well described and their impact on GHGs abatements is quantified from 2010 to 2040.Overall, 43 projects are anticipated in the mitigation strategy, of which one third are energy efficiency oriented. Table 11 lists these projects and the related quantitative impacts on GHGs abatements at the 2040 horizon. As it can be seen, transport projects are considered in the list.

Table 11: Energy efficiency projects in the Jordanian 3rd National communication

N°	Sector	Project
26	All	DSM/ introduce actions to reduce overall energy consumption
27	Electricity	Improving Combustion Efficiency in Rehab Power Plant
29	Electricity	Loss Reduction in Electricity Transmission and Distribution (T&D)
3	Transport	Amman – Zarqa Bus Rapid Transit (BRT)
4	Transport	hybrid cars for public passengers
21	Industry	Use of steel slag and/or fly ash to substitute the raw materials needed to produce clinker
22	Industry	Increase the percentage of Pozzolana in CEM II cement
23-24	Industry	Produce new cement product CEM IV with 45% of Pozzolana
33	Industry	Using Regenerative burners instead of conventional burners in Steel Reheating Industry
35	Industry	Returning Un-returned condensate to the feed water tanks in Food Industry
40	Industry	Replacing High Thermal Mass with Low Thermal Mass (LTM) in Ceramic factories
41	Industry	Insulating the Un-insulated pipes and tanks in food industries
42	Housing	Insulating walls and roofs in 35000 new houses
34-36	Housing	Solar water heater in 90 0000 households
38	Service	Street Lighting: Replacing 125 W Mercury lamps with 70 W high Pressure Sodium lamps
39	Service	Replacing Fluorescent lamps with LED in commercial buildings

Source: Author from Third National Contribution UNDP

Energy efficiency is considered as a pillar of the climate change strategy. As it is stipulated in the NDC, "the high cost of importing energy puts a heavy burden on the public budget already constrained by running costs. Since the prices of energy imports have increased with high risk in constant supplies, this situation spurred governmental action to improve energy efficiency and provide additional energy resources". (16)

The analysis of both the TNC and NDC reports usefully complements the NEEAP analysis because they include climate mitigation policies of the transport sector, which are excluded from NEAAP that is only dedicated to electricity. These two reports are effectively part of the EE measures in the mitigation strategy. Although the NDC is more recent and gathers more EE measures than the TNC, the description and the quantitative evaluation of EE measures is more explicit in the TNC.

2.3.5.2 The First National Determined Contribution on Climate Change (NDC (2016)

The role of energy efficiency in the climate change strategy is effectively mentioned in the NDC under the headline "Rationalizing energy consumption in all sectors and improving their efficiency and raising awareness about the long-term financial benefits of energy efficiency".

Jordan is determined to nationally reduce its GHG emissions by a bulk of 14 % by 2030. This contribution of GHGs reduction will be unconditionally fulfilled at, maximally, 1.5% by the Country's own means and by additional 12.5 % conditionally and subject to availability of international financial aid and support to means of implementation. The two targets will be achieved based on implementing at least 70 projects (43 sectoral projects resulted from the mitigation scenario assessment articulated in the 2014 Third National Communication Report (NTC) to UNFCCC completed by 27 new sectoral priority projects proposed). These projects will be supervised by the national Climate Change Policy of the Hashemite Kingdom of Jordan 2013-2020. The screening of the NDC shows that there is no explicit and detailed information of the targets' achievements by type of EE measures.

(16) https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Jordan%20First/Jordan%20INDCs%20Final.pdf

The most important input of the NDC for our analysis is the reference of sustainable transport actions mentioned in the "long-term national transport strategy 2014", launched by the Ministry of Transport (MoT), in which the sustainable transport is one of its pillars. With a percentage of 16% of emissions share to the bulk GHGs of Jordan, the transport sector is the second source (after energy sector emitting 28%) of GHGs emissions in the country. One of the major objectives of the long-term transport strategy is to increase the modal share of public transport from 13% in 2010 to 25% in 2025. Box 3 summarizes the most emblematic anticipated actions for transport.

Box 3: Transport actions with energy efficiency impacts in the Jordanian NDC

- Reduce all emissions from the transport sector (i.e. CO_2, CO, PMx, NOx expressed in tons per day)
- Reduce percentage of fuel consumption (in tons per day)
- Reduce road traffic at the national level and in densely populated areas for several types of vehicle
- Implement the national BRT system
- Implement the railway system in particular to ease the transport of goods within the country
- Implement policies related to fleet characteristics to enhance efficiency and reduce emissions
- Ensuring the inclusion of energy efficiency considerations when buying transport modals.

Source: NDC For Jordan

It is noticeable that there is a reference to the need for "improving the collection of data on energy use patterns and identifying the most useful data on the efficiency of energy use for policy makers".

2.4 Review of Stakeholders Relevant on Energy Efficiency Matters

2.4.1 Ministry of Energy and Mineral Resources (MEMR)

The Ministry of energy and mineral resources (MEMR) is the key actor for our work as it is in charge of designing, implementing and monitoring the RE and EE strategies of Jordan. In addition, the MEMR is producing and publishing the energy balance.

Within the MEMR, energy efficiency matters are dealt at two levels of the organigram: The management of the renewable energy and energy efficiency fund (JREEEF) directly linked to the Minister on one hand and the Planning and international Cooperation Directorate on the other hand. This Directorate is subdivided into 4 division: Crisis management; International Cooperation Division; Statistics and information Division; Technical Studies Division. Around 20 staff members are working in the Statistics and Information Division.

The energy balance is carried out within the Ministry and all energy data are publically available within the Energy Information System, thered in the interactive web portal on the website of the Ministry.

However, the Ministry recognized that MEMR is interested in end-uses consumers surveys (for instance in sharing questionnaires) and is looking for funds for supporting more dedicated surveys. MEMR is able to conduct its own surveys.

Concerning the monitoring of EE, the main effort of the Ministry is oriented towards the monitoring of the JREEEF Fund projects, which will also provide data relevant for the meetmed project.

MEMR has already participated as focal point in the RCREEE's project on "energy efficiency indicators in the Mediterranean countries" in 2011. However, MEMR is not currently deeply engaged in the production and monitoring of EEIs and would suggest that EEIs can be included in the Energy Information System if a pilot phase demonstrates the sustainability of the data collection for EEIs.

2.4.2 Ministry of Environment

The Ministry of Environment has four priority sectors for Climate Change, namely Energy, Transport, Water, and Agriculture and has set a monitoring system on climate change related mainly to reporting to UNFCCC every four years and preparing some biannual reports supported by UNDP. The most recent documents are: the 3rd National Communication in 2017 (See section 3 below); the 2nd Biannual National Reports (BNR), the NDC (or INDC) in 2017 (see section 3 below), the on- going PNR (2019) and the 4th National Communication that will be prepared for 2021. All these reports contain quantitative information on RE and EE both on past trends and future projections. The Ministry does not develop forecasting scenario.

Concerning the current development of the monitoring of RE and EE, the most significant information is the recent launching in 2019 of a MRV system with the support of the World Bank within the Ministry of Environment. This MRV system is a multi-level web-based system for climate issues and will start with the RE and EE sectors. For instance, it covers UNFCCCs and domestic emissions factors in the future, the inventory of CO_2 emissions, and the description and possibly the evaluation of the implemented projects implemented. EEIs can be easily converted in CO_2 indicators and could be possibly included in the MRV system.

2.4.3 Energy and Minerals Regulation Commission (EMRC)

Energy regulators are extremely relevant for this work as they can provide data from utilities and shape the regulatory framework, which is able to sustain the data collection. In Jordan, the Energy and Minerals Regulation Commission (EMRC), is the national regulator. EMRC is a governmental body, established in 2014 [17], which since 2017 has become the sole regulator for the energy sector. Its main activities are summarized in Box 4 below.

(17) legal successor of the Electricity Regulatory Commission (ERC), the Jordan Nuclear Regulatory Commission (JNRC) and the Natural Resources Authority (NRA) – Source: https://www.jordanewe.com/about-sector/energy-and-minerals-regulatory-commission-emrc

Box 4: Main activities of the energy regulator in Jordan

- Regulating the sector on the basis of balance between the interests of the consumers, licensees, investors and any other relevant parties.
- Attending to the interest of electricity consumers, provided the compliance thereof with the conditions on provision of service as issued by the licensees and approved by EMRC.
- Ensuring security of supply, sustainable, durable and of high quality services.
- Ensuring the compliance of enterprises operating in the sector with the standards of environmental protection instructions, laws and the general safety conditions applicable in the Kingdom environment and human health and properties.
- Ensuring the provision of necessary services by the licensees to consumers in an adequate manner.

Among the EMRC's duties, we have selected the following relevant to our works:

- Participating in developing the technical standard specifications related to the sector appliances' and facilities in consultation with other stakeholders
- Building an integrated information system in the sector.
- The Commission is responsible for regulating and monitoring the energy sector, natural resources, minerals, radio and nuclear work in the Kingdom; including petroleum, petroleum products, oil shale, coal, natural gas, liquefied natural gas, biofuels, generation, transmission, distribution and supply of electricity, renewable energy, radiation protection, safety and nuclear security.

Source: EMRC

As regulator, EMRC manages a complete database on fuel sales and consumption provided by utilities. However, the reporting is not mandatory even for the energy intensive industries. Therefore, despite quality checks performed by the EMRC, sometimes the data are not very reliable. The annual report does not show any data that can be directly used (http://www.emrc.gov.jo).

EMRC also conducts interesting studies, such as the project supported by UNIDO and funded by the EU on 12 energy audits in food industry and 40 energy audits on hotels, public buildings, and 200 schools.

EMRC is reflecting on a possible scheme on energy efficiency obligations towards utilities. In that respect, many data will be necessary to document the setting of the level of obligation and the specific technical characteristics of the energy efficiency actions. Therefore, an EEIs monitoring will be an important opportunity.

EMRC holds a lot of sectoral energy end-uses data, which can be useful for EEIs development.

2.4.4. Department of Statistics (DOS): The Environmental Statistics Division.

The Department of Statistics, within the Ministry of planning, is the main stakeholder related to EEIs monitoring and the main provider of information and methodologies applied (surveys).

The DOS published annually a statistical yearbook available on their website (http://dosweb.dos.gov.jo/databank/yearbook/YearBook_2018.pdf). The last version available is from 2018, it is partly translated into English and contains 330 pages. The DOS is conducting the classic statistical activities devoted to a national statistical office through administrative data and dedicated surveys. Energy statistics are presented in the statistical yearbook and grouped in two chapters: industry and electricity. However, the entire energy balance is not published as such and only some tables are presented, i.e. the transformation sector is not presented (see box 5). However, the energy balance is subject to be published elsewhere by the Ministry of Energy (MENR).

Box 5: Energy data and selected socio-economic data published in the statistical yearbook for EEIs

Table 7.2.1.	Petroleum Fuel Production and Sales, 1961 and 2017 (000 Metric Tons)
Table 7.2.5.	Consumed Primary Energy, 2007- 2017 (000 t.o.e)
Table 7.2.6.	Sectorial Distribution & Percentage Consumption of Final Energy, 2007 – 2017 (000 t.o.e)
Table 8.1.	General Data on Electric Energy, 2017 – 2018
Table 8.5.	Consumed Electricity by Usage, 2017 and 2018
Table 9.2.1.	Buildings of Private Sector that are Completely Constructed by Governorate, 2017
Table 11.1.3.	Number of Licensed Vehicles and Percentage Change, 2007 – 2018
Table 11.1.4.	Number of Licensed Vehicles by Type of Vehicle, Ownership and Governorate,
Table 15.2.1.	Hotels Statistics, 2004-2018
Table 22.2.1.	Monthly Industrial Production Indices by Economic Activity, 2017 (2010 = 100)
Table 23.4.	Annual Growth Rates of GDP by Economic Activity at Current Prices, 2010-2017

In addition to energy data, some useful socio-economic data are also available in the statistical yearbook. For the sake of simplicity, only some crucial data have been presented above. They come from administrative sources or energy or socio-economic surveys:

- The Census performed every 10 years, the last one was carried out in 2015;
- Household expenditures survey available every 2 years since 2005;
- Household survey covering cross cutting issues with EE and RE;
- Survey on awareness of environment and climate change issues (questions on accepted temperatures and cooling needs);
- Industry survey - some annually, others quarterly done;
- Employment surveys (n. of employees in the tertiary sector).

There seems to be enough classical statistics in the socio-economic field (i.e. industrial production, stock of energy equipment), and on energy even on the energy behaviours. They are regularly published in public access.

The environment division of DOS must be the main contact for data collection useful for monitoring energy efficiency.

2.4.4 National Energy Research Centre (NERC) - Member of MEDENER

National Energy Research Centre (NERC) is one of the specialized technical centers of RSS has been established in 1998 in Amman for the purposes of research, development, training in the fields of new and renewable energy and raising the standards of energy use in the different sectors. The main goal of NERC is to ensure energy efficiency conditions in the relevant sectors (industry, buildings) and support the relevant market key actors and energy consumers in reducing overall energy consumption. NERC is a research and technological centre and the national energy centre working on energy planning and policy for RE and EE. NERC is the technical arm for Jordanian government on RE and EE policy, strategy and planning. NERC is also a member of MEDENER (https://www.medener.org/en/membre/nerc-jordan/). Among the services that NERC can provide, results from audits and laboratory testing procedures for electrical appliances (Air conditioners, clothes washers, refrigerators, solar water heaters and lighting) could be shared. The experience the NERC gained during its previous work carried out for the Arab League, is also a crucial advantage.

NERC is clearly one of the crucial focal point for energy efficiency studies in Jordan that should be mobilized. They also confirmed their strong motivation to participate, to facilitate any useful contacts for the EEIs data collection and to be active in the promotion of benchmarking among the Mediterranean countries.

2.4.5 Jordan Standards and Metrology Organization (JSMO)

The Jordan Standards and Metrology Organization (JSMO) was established as a public organization in 1994 and its scope was extended in 2000. The main objectives pursued by JSMO are similar to classic national standardization bodies, such as the adoption of a national system for standardization and metrology based on accepted international practices as well as ensuring the quality of local products and services through the adoption of appropriate Jordanian Standards in order to enhance their competitiveness in the local and international markets.

Interviewing JSMO was useful to gather information about the policies applied in Jordan in the field of energy efficiency or CO_2 standards for energy consuming equipment (ie. electrical appliances) or practices (i.e. energy management) as well as their implementation or future development. At this stage, the aim was not to review the precise characteristics of each of the standards but rather to understand the monitoring of these standards and the associated data collection.

JSMO is dealing with both labels and standards development and their control and monitoring. Currently 9 energy efficient products have standards, and more will be developed under the eco-design initiative since Jordan tends to transpose the Eco-design and Energy Efficiency Directive (EED). Labels on electrical appliances have been implemented ten years ago (JS 1772-3:2007 for lamps; JS 1772-1:2008 for refrigerators and freezers; JS 1772-2:2009 for air conditioning etc.;) and, more recently, also standards for washing machines and air conditioning in 2018, and refrigerators in 2019). Most of energy consuming equipment are imported but few appliances are manufactured or assembled in Jordan (i.e. television, refrigerator). JSMO controls the compliance of imported equipment with the Jordanian requirements through their «Border control department».

Up to date, JSMO does not perform regulatory impact assessments.

JSMO will be key to provide the main features of energy efficiency standards for electrical appliances that are needed to calculate EEIs.

2.4.6 Water Energy and Environment Center (WEEC)

The Water, Energy and Environment Center (WEEC) was established in 1982 at the University of Jordan. Its research activities focused on water related issues. The centre had broadened its function to include the environmental and energy issues due their interdisciplinary nature and to cope with water-food-energy nexus as the core of sustainable development. The centre concentrates on the following areas: water and environment; renewable energy; efficiency of end uses, such as for buildings and water, and energy economics and policies. The centre is organized in four divisions: water and monitoring, air quality, climate change and environmental studies (including Solid Waste Management).

Among the works performed by the centre, the most relevant ones for our purposes are the GHGs inventory (project sponsored by GEF) and the 2nd biannual report on CO_2 emissions.

The respondent drawn the attention to the importance of the electricity consumption related to water management (14% of electricity consumption of Jordan, which costs 350 million JoDs for electricity each year) and the associated electricity efficiency potential estimated at 50% with, for instance, a potential of 36% on water pumping (2014). In terms of policies, the centre is currently working on the elaboration of standards and on the strategy for developing PV solar pumps for farmers (project EU/EBRD – 30 MW).

This interview clearly demonstrates that water issues should be part of this data collection and analysis.

2.4.7 Technical Assistance to the Renewable Energy and Energy efficiency programme in Jordan – REEE II-TA

REEE II is the second sector support programme to the energy sector in Jordan, with a €90 M budget from the European Commission, to contribute to the development and implementation of effective policies that would help Jordan reach its RES and EE targets for 2020. It also aims at building national capacities of public, private and NGO institutions.

Besides a rapid description of some key projects led by REEEE (i.e. KFw & GFA supported project on public buildings), the NEEAPs elaboration and their implementation in the Arab countries, particularly in Jordan, was shared. It seems clear that there was an improvement in the elaboration and documentation of NEEAP2 compared to NEEAP1 in terms of description and ex-ante evaluation of the EE policies.

2.4.8 Other Stakeholders

However, due to time constraints, it has not been possible to meet all the necessary stakeholders to perform a full data collection mapping for Jordan. Box 6 shows other possible actors that can be mobilized for providing data or as user of the future monitoring system.

Box 6: Other stakeholders and implementers for energy efficiency project implementation

Housing	Services
1. The three distribution companies (JEPCO, EDCO and IDECO) 2. Jordan National Building Council (JNBC) under the Ministry of Public Works and Housing 3. MIT. 4. Insulation material suppliers, Local manufacturers, construction enterprises, Jordan Engineers Association, Banks	1. Jordan Chamber of Commerce 2. Ministry of Public Works and Housing 3. Ministry of Health 4. Ministry of Education 5. Ministry of Tourism, Hotels Association, Banks, Jordan Architects and Engineers Associations 6. Jordan National Building Council (JNBC) under the Ministry of Public Works and Housing.

Source: Author from JREEEF

2.5 Feasibility for the Participation in MED OBSERVEER

Jordan has a long-lasting experience in energy efficiency implementation, which is recognized at the international level. According to the Arab 2015 AFEX index, Jordan ranks 2nd among the SEMCs. Jordan is currently reorienting its energy strategies towards energy efficiency, balancing the renewable energy strategy that was favoured in the past. The adoption of energy efficiency law (2013) and of the NEAAP2 shapes the regulatory framework and

implementation strategy in a positive way. The current energy efficiency targets are more ambitious compared with the previous ones. Therefore, energy policies are numerous and more consistent than ever particularly on electricity efficiency through labels and standards. The environment concerns have certainly raised the profile on mitigation policies for climate change. The 3rd National Contribution and the recent NDC mention many energy efficiency policies with a particular concern on transportation, which was excluded from the NEEAPs. Overall, more than 40 energy efficiency policies are currently implemented in Jordan with some significant resources with the setting of the RE and EE JREEEF fund. Jordan has also the willingness to transpose some elements of the EU directives related to energy efficiency (i.e. eco-design). In conclusion, it can be stated that, due to the revival of energy efficiency in Jordan, EEIs monitoring is in a good timing.

This ambitious strategy calls for and leads to the need to monitor the impact of EE policies. Both ministries - MEMR and the Ministry for Environment - have recently launched a MRV system or platforms to monitor projects related to their strategies. A good example is the JREEEF MRV system.

However, these MRVs system are project-based related. Through an international initiative of Plan Bleu, Jordan has participated in a project on EEIs to evaluate and monitor energy efficiency at sectoral and macro levels. Although this project is rather old (2012), the Jordanian experts from the administration who have participated in this evaluation are still in place meaning that know-how is maintained in Jordan. Unfortunately, no follow-up and updating has occurred on this EEIs practice certainly due to lack of funding.

Our series of interviews have clearly put in evidence that “it is time to re-start again” due to the revival of energy efficiency. All the consulted stakeholders have strongly expressed their willingness to participate in a project on EEIs. Their intentions concern all the implementation steps of the intended project. They are interested to participate in the data collection process, in the interpretation, the sharing and the dissemination of the results and to be part of the international benchmark. Obviously, the involvement of each of the stakeholders will differ according to their features (i.e. electricity data for the regulator). We noted a very encouraging involvement of new stakeholders, such as the energy regulator, the standardization body and the Ministry of environment.

Beyond this obvious “willingness to participate”, also an analysis on data issues related to the specificities of this evaluation was performed.

Despite the investigation was time-limited, it has been demonstrated in a previous section of this report that Jordan is able to fulfil the bulk of the data requirements. Obviously, particular efforts will have to be done on energy consumption breakdown for certain end-uses (i.e. electrical appliances, vehicle types or sectors for the tertiary sector). The involvement of new stakeholders will certainly contribute to increase the data coverage of the EEIs data base. We also consider that the rhythm of data updating is good enough since the energy balance in published with only one-year delay. The statistical yearbook shows data on energy demand drivers that are published within a reasonable time. Jordan has a willingness to share and publish its information as it can be seen in the energy information portal of the MEMR.

Usual weaknesses in the data collection related to EEIs were also mentioned. Firstly, there are no statistical regulations to organise the detailed data collection of the energy end-uses data as it is organised for the energy balance. Therefore, due the low willingness to share data on a regular basis, the sustainability of data collection is not ensured. Data are scattered in many places and sometimes the access to reliable data is difficult. There are difficulties in data checking from data mainly provided by the private sector (utilities etc.), since there is no mandatory monitoring from private stakeholders. Sometimes, there are differences in the nomenclature used by different institutions (i.e. compatibility of data of imports and sales). It happens that there are different levels of validity of data (surveys at local level versus national representativeness). The existence of different timeframes (long-term series do not fit with «new questions») is also a limit.

The last issue to be noted concerns the data management. Currently Jordan is launching several MRVs systems or platforms (generally through international funding) within the public administration. This is very encouraging for the future hosting of our database and, without anticipating, the EEIs data base can be easily hosted through the portal of the energy information of MEMR that we have presented above.

Without anticipating too quickly on the project implementation within the Jordan administration, it can be assumed that it will be easy to determine a focal point. MEMR or NERC are certainly good candidates because

they have the experience in this type of evaluation and they are very well placed to organise the sustainability of the data collection, the use and the dissemination of the results.

2.6 Recommendations

Due to time constraints, it was difficult at this stage to have a complete image of the data collection and EEIs implementation issues of the Jordanian context. This statement limits the relevance to propose at this stage recommendations to improve the implementation of EEIs in Jordan. However, the general recommendations suggested at the end of this report will apply also for Jordan.

The main important recommendation to the donors is that Jordan is a very good candidate to participate to an enlarged project on energy efficiency indicators. Seven main arguments support this statement:

- There is a strong willingness to participate to the forthcoming project on EEIs, which have been expressed by many stakeholders including Ministries for energy, Ministry of environment and the regulator. This engagement will facilitate data collection, interpretation and the sharing of the results in particular to the decision-makers.
- Due to the revival of energy efficiency and mitigation policies in Jordan supported by new ambitious targets and strategies adopted under official documents, such as NEAAP2 and the 3rd National Contribution on climate change recently published, EEIS monitoring will be very timely proposed for Jordan.
- The number of energy efficiency policies (around 40) currently implemented to make the MRV useful is large enough. This implies that the public authorities of Jordan need to monitor the impact of these policies.
- The energy end-uses data collection currently available in Jordan fulfils the expectations to perform a relevant EEIs analysis. The amount of data in Jordan is above the average of SEMCs.
- Jordan is launching MRVs and platforms on energy projects. The EEIs monitoring system will complement these tools. The hosting of the future EEIs database can easily be made through the existing energy information portal of MEMR.

- We have identified several focal points able to manage the Jordanian partnership. MEMR and NERC are suitable candidates.
- Difficulties to implement the project in a sustainable way are foreseen but they are similar to those encountered in other countries. A special attention shall be put on articulation of the EEIs monitoring with existing databases and MRV components (JREEF, Ministry of Environment) through an enlarged task force involving all the stakeholders. Staff and resources shall be allocated to the dialogue and the sharing of data, including thinking about potential regulatory options to make mandatory - or at least enriched - the existing data collection flow (questions added in the existing survey on technical consumptions for example, etc.).

3. Palestine

A three-day mission (16-18 September 2019) was carried out by Mr. Didier Bosseboeuf and Thierry Meraud (ADEME, France) in Palestine with the assistance from the Palestinian Energy Centre (PEC)[18], MEDENER member. The agenda of the meeting is attached in the Annex.

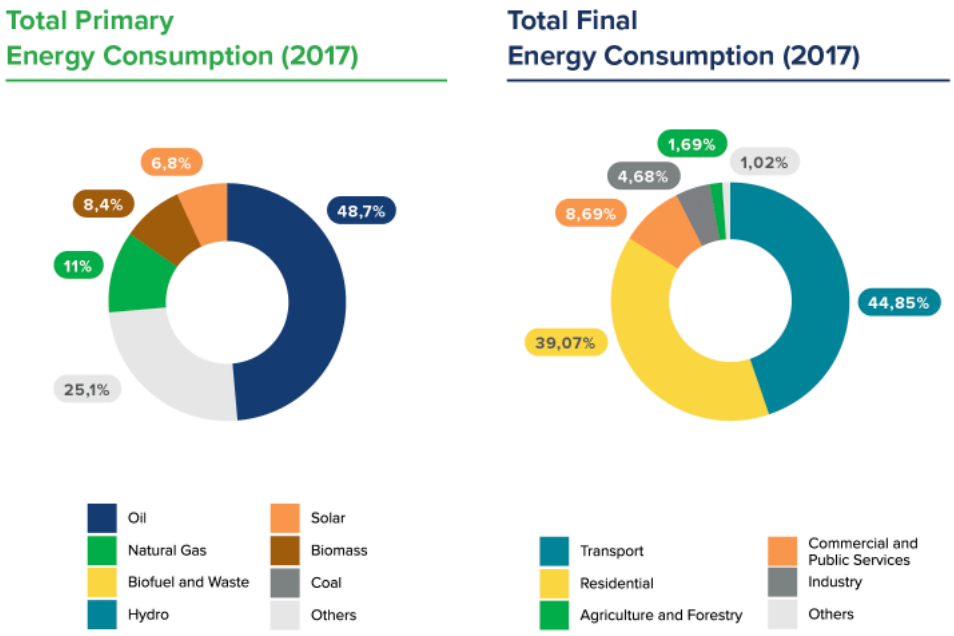
3.1 General Background of EE in Palestine

3.1.1 Main Energy Efficiency Trends in Palestine

Palestine is ranked 5th in AFEX 2017,[19] thus emphasizing the important efforts made by the country in adopting energy efficiency measures. Even if Palestine has fallen from the 2015 ranking, its score remains quite high (62) and has improved (in 2015 AFEX, Palestine was ranked 4th, with a score of 55). Apart from the legal regulation and strategies that will be developed in the second part, it is worth mentioning that diesel and gas prices are the highest in the Region and some electricity prices remain the benchmark for all the region (example of residential electricity prices and subsidies). Electricity represents 27% of energy consumption mainly imported from the Israel Electric Corporation (IEC) for electricity. Neither oil nor natural gas is produced in Palestine.

(18) PEC is reporting to PENRA, officially
(19) https://www.rcreee.org/sites/default/files/afex_ee_2017.pdf

Figure 5: Breakdown of primary consumption by fuels and final energy consumption by sectors in Palestine (2017)



Source: meetMED Report on RE and EE strategies and policies (2019)

Figure 6: Selected energy Performance Indicators in Palestine, 2014-2018

Data and Indicator	Year				
	2014	2015	2016	2017	2018
Total final consumption (1000TJ)	69.7	66.4	70,1	68.0	65.3
Of which Transport (%)	48.7	43.6	45.6	46.6	45.4
Of which household (%)	38.4	41.4	39.7	38.4	38.0
Of which services (%)	7.6	8.5	8.8	8.8	9.8
Of wich Industry (%)	4.2	5.2	4.8	5.4	6.1
Energy Intensity (MJ/USD)	3.8	3.9	4.0	3.8	3.6
Electricity Consumption Per Capita (KWh/Capita)	1,048	1,151	1,142	1,138	1,149

3.2 The Monitoring of Energy Efficiency Trends (EEIs)

3.2.1 The Energy Balance (PCBS)

During the scoping mission, it was possible to visit the main energy data provider: the Palestinian Central Bureau of Statistics (PCBS). The energy statistic division presented the main surveys and data collection relevant to energy efficiency monitoring. Palestine produces annually basic energy statistics and carries out sporadically sectoral energy surveys, which can allow to produce energy efficiency indicators. Although there is no a comprehensive energy efficiency database or a platform were all relevant data for monitoring energy efficiency are gathered, Palestine has a certain experience in energy efficiency indicators and in monitoring energy audits.

PCBS is the official statistical institution of Palestine. It publishes annually a certain number of publications on general statistics, such as the Statistical Yearbook of Palestine and the Jerusalem Statistical Yearbook, and more specifically on energy statistics. They can be easily retrieved from the website [20].

The following surveys are relevant:

- National energy balances 2001-2018 format UNDP. It is noticeable that the building sector is split between housing, services and agriculture (http://www.pcbs.gov.ps/Portals/_Rainbow/Documents/EnergyB-2017-1E.html)
- Detailed monthly energy statistics tables (1996-2017) (not relevant for this project)
- Energy Households Survey (1999-2015), which provides market shares of households consumption by fuel types and by end-uses (heating, sanitary hot water, cooking; etc.) [21]
- Energy consumption survey in transport (2014), which provides in particular: Total fuel consumed by fuel type, Vehicle type and region; Total mileage by fuel type, vehicle type and region, Registered Vehicles by the fuel

(20) http://www.pcbs.gov.ps/PCBS-Metadata-en-v4.3/index.php/catalog
(21) http://www.pcbs.gov.ps/PCBS-Metadata-en-v4.3/index.php/catalog/204/related_materials

- Energy consumption survey in agriculture
- Economic series by sectors (useful for setting energy efficiency indicators)

Table 12 : Selected performance energy indicators and disaggregation of transport in official statistics (PCBS)

Flows	Energy Products										
	Solar Energy (MWh)	Wood and Charcoal (Ton)	Olive Cake (Ton)	Bitumen (Ton)	Oils and Lubricants (Ton)	LPG (Tons)	Oil (1000 Liter)	Kerosene (1000 Liters)	Gasoline (1000 Liters)	Diesel (1000 Liters)	Electricity (MWh)
1.1 Primary production	1,564,532	214,965	35,120	-	-	-	-	-	-	-	45,000
1.2 Imports	-	3,407	-	23,583	1,554	189,537	5,440	1,391	314,765	730,645	5,576,864
1.3 Exports	-	-530	-	-	-85	-	-	-	-	-	-
1.4 Stock change	-		-	-	-	-	-	-	-	-	-
1.Total energy supply	**1,564,532**	**217,842**	**35,120**	**23,583**	**1,469**	**189,537**	**5,440**	**1,391**	**314,765**	**730,645**	**5,621,864**
2. Statistical differences	-	-	-	-	-	-	-	-	-	-	-
3.Transformation	-	-	-	-	-	-	-	-	**-8,565**	**-124,861**	**500,852**
3.1 Electricity plants	-	-	-	-	-	-	-	-	-8,565	-124,861	**500,852**
4. Losses	782,266	-	-	-	-	-	2	4	2,519	1,863	734,726
5. Final consumption	**782,266**	**217,842**	**35,120**	**23,583**	**1,469**	**189,537**	**5,438**	**1,387**	**303,681**	**603,921**	**5,387,990**
5.1. Final energy consumption	**782,266**	**217,842**	**35,120**	**-**	**-**	**189,537**	**5,438**	**1,387**	**303,681**	**603,921**	**5,387,990**
5.1.1 By industry	-	6,770	8,780	-	-	12,248	2,719	126	476	9,514	647,988
5.1.2 By transport	**-**	**-**	**-**	**-**	**-**	**5,200**	**-**	**-**	**295,196**	**581,388**	**-**
5.1.2.1 Road	-	-	-	-	-	5,200	-	-	295,196	581,388	-
5.1.3 By household and other sectors	**782,266**	**211,072**	**26,340**	**-**	**-**	**172,089**	**2,719**	**1,261**	**8,009**	**13,019**	**4,740,002**
5.1.3.1 Households	782,266	206,830	26,340		-	158,276	-	1,163	-	2,269	3,325,638
5.1.3.2 Agriculture	-	-	-	-	-	2,480	-	32	4,257	5,256	33,010
5.1.3.3 Commerce & public services	-	4,242	-	-	-	11,333	2,719	66	3,752	5,494	1,381,354
5.2 Non energy use	**-**	**-**	**-**	**23,583**	**1,469**	**-**	**-**	**-**	**-**	**-**	**-**

Indicator	Year				
	2014	2015	2016	2017	2018
Renewable energy share in the total final energy c	13.8	13.8	13.6	10.3	10.7
Energy Dependancy Rate (%)	80.3	84.8	84.7	87.3	86.9
The Energy Consumption of the Transport Sector to the total energy Consumption (%)	48.7	43.6	45.6	46.6	45.4
The Energy Consumption of the Household Sector to the total energy Consumption (%)	38.4	41.4	39.7	38.4	38.0
The Energy Consumption of the Service Sector to the total energy Consumption (%)	7.6	8.5	8.8	8.8	9.8
The Energy Consumption of the Industry Sector to the total energy Consumption (%)	4.2	5.2	4.8	5.4	6.1
Energy Intencity (MJ/USD)	3.8	3.9	4.0	3.8	3.6
Annual Electricity Consumption Per Capita (KWh/Capita)	1,048.0	1,151.4	1,141.9	1,138.3	1,148.7

Region	Fuel Type and Vehicle Type							
	Diesel				Gasoline			
	Passengers Vehicles	Goods Vehicles	Other Vehicles	Total	Passengers Vehicles	Goods Vehicles	Other Vehicles	Total
Palestine	**307,135**	**309,778**	**14,647**	**631,560**	**260,989**	**9,015**	**883**	**270,887**
West Bank	**237,140**	**207,101**	**8,374**	**452,615**	**160,718**	**1,592**	**433**	**162,743**
North of West Bank	93,743	53,997	4,461	**152,201**	56,116	854	202	**57,172**
Middle of West Bank	75,116	90,811	1,715	**167,642**	62,069	-	77	**62,146**
South of West Bank	68,281	* 62,293	2,198	**132,772**	42,533	738	154	**43,425**
Gaza Strip	**69,995**	**102,677**	**6,273**	**178,945**	**100,271**	**7,423**	**450**	**108,144**

Electricity distributors may have more detailed data by end-uses.

3.2.2 Experience in Monitoring Energy Efficiency

In Palestine, three types of initiatives on energy efficiency indicators can be mentioned:

1. The official and recurrent one relies on the basic statistics mentioned above. PCBS publishes annually some few basic energy indicators including energy efficiency indicators, such as the energy intensity and the electricity per capita. From the household survey, three EEIs are calculated (average consumption per households by fuel type; the consumption for two important end-uses, space heating and air conditioning) but they are only published from time to time (i.e. 2015 and some data are available also for 2017 and 2018).

2. The second type of experience has occurred along two ad hoc international studies (Plan bleu 2011 and RCREEE commissioned by the Arab League in 2014 [22]). Palestine was one of the 13 countries having participated to these benchmarks on EEIs. It is noticeable that, in both projects, PEC was the focal point selected for Palestine. It also demonstrates the willingness of the Palestinian government to participate in international benchmark on energy efficiency performances. However, in both projects, the number of EEIs was very limited: primary and final intensities, sectoral intensities (industry, services and transport and unit consumption for dwellings).

3. The third relevant initiative is the recent development and management of a database on energy audits at the EE Unit of the Palestinian Energy authority. The basis of this database is a €2 Million energy efficiency fund supported by the French development bank (AFD) on energy audits. Until now, 250 energy audits have been performed and monitored for several sectors, such as public buildings, schools, hotels, hospitals etc. All information provided during the audits including energy efficiency performances are stored in this database. In that respect, this is an obvious and important source of data for energy efficiency monitoring.

(22) https://planbleu.org/sites/default/files/upload/files/5-8-EN_Rapport_indicateurs_Palestine.pdf

3.3 The Legal Reporting for Energy Efficiency

In the absence of a regulatory framework, such as an energy efficiency law, our analysis on the legal framework for energy efficiency relies on three documents: NEAAP1 & NEEAP 2 and the First NDC.

3.3.1 The National Energy Efficiency Plans (NEEAPs 1&2)

The Palestinian Energy and Natural Resources Authority (PENRA) has carried out the first NEEAP for the period 2012-2020. Several energy efficiency objectives were set up at this occasion. The evaluation of NEEAP 1 shows that it has been implemented satisfactorily.

Based on the lessons learnt from the evaluation of NEEAP 1 and PENRA's vision of the sector, PENRA, with the support of the World Bank and in collaboration with the French Development Agency (AFD - Agence Française de Développement), prepared an Energy Efficiency Action Plan for 2020-2030 (also referred to as NEEAP II) as a prolongation of the current plan for 2012-2020. NEEAP II introduces more ambitious energy efficiency targets.

The NEEAP II plan focuses on electricity since this form of energy has the largest share in the Palestinian final energy mix. The plan is also concentrated on a reduction of the consumption and not on the development of the renewable energy, such as wind, biomass or solar PV. The potential for developing these renewable energies has already been addressed in another study led by PENRA.

Without going into details, it is interesting to look at which sector or end-uses the future effort on energy efficiency will be promoted. Table 13 summarizes the main actions and the related energy savings. It can be observed that no particular measures are reported in the transport sector.

Table 13: Main energy efficiency actions envisaged in the NEAAP II for Palestine (2020-2030)

Energy Efficiency actions	Benefits (GWh)	Total costs (US$ million)	C/B (US$/kWh)
Lighting: move to CFL standard	2,612	1.750	0.001
Lighting: move to LED standard	322	2.275	0.007
Introduction of more efficient fridges	127	4.375	0.035
Switch to gas for room heating	246	24.832	0.101
Electronic thermostats	222	10.177	0.046
Labelling and national campaign	1,270	3	0.002
Repairing of SWH	1,576	126	0.080
Smart metering for all households	1,587	48	0.038
Submetering	317	4.812	0.015
Building thermal insulation	720	345	0.479
Labelling program	881	50	0.057

Source: PENRA NEAAP 2

3.3.2 The first INCR and NDCs (MenA).

Palestine recently gained accession to the United Nations Framework Convention on Climate Change (UNFCCC). On 22 April 2016, Palestine signed and ratified the Paris Agreement. While its priority on climate change is adaptation, it is also committed to ensuring that its emissions pathway is in line with the objective of the UNFCCC to stabilise greenhouse gas emissions. It also submitted to the UNFCCC on 11 November 2016 its Initial National Communication Report (INCR), while developing its National Adaptation Plan (NAP).[23]

Box 7: Abstract form the National Adaptation plan on energy

Palestine's energy strategy entails the generation of 50% of electricity consumed by 2020 and two power stations respectively of 400 and 450 MW planned in the North and South of the West Bank. The strategy also specifically sets a target of 10% from renewables by 2020. Solar energy has the greatest potential with daily average insolation of 5.4kWh/m²/day for both heat and electricity generation. However, other renewable energy sources, such as wind, geothermal and biomass are expected to play a role. It is estimated that there is potential to generate 20-40 MW from energy-from-waste (e.g. municipality solid waste, agriculture and some industrial waste), with high potential for gasification. There has also been a recent possible discovery of natural gas in West Bank.(...). Legislation and regulations (e.g. building standards and codes) are being adopted and energy conservation measures (e.g. green-building concepts) are being introduced to enforce and encourage energy efficiency and use of renewable energy.

Source: NAP

(23) https://unfccc.int/files/national_reports/non-annex_i_parties/application/pdf/national_adaptation_plan__state_of_palestine.pdf

MenA is in charge of climate change issues and therefore has the responsibility to endorse the GHGs emissions inventory for Palestine towards UNFCCC requirements as well as to carry out the Nationally Determined Contribution (NDCs) of Palestine. It also mentioned that MenA has contributed to the second NEEAP.

The first NDCs for Palestine was published in 2017. As such, the NDC builds upon the INCR, the NAP, and is in line with the National Development Plan and the recently developed sectoral strategies to achieve sustainable economic development in line with emissions reduction. Table 14 summarises the mitigation actions, and their anticipated GHG emission reductions under both scenarios. It can be noted that energy efficiency accounts for a large and strategic share of the total of the GHGs Mitigations actions. The NDCs also includes designation of EE policies, mainly for transport and households' sector and for public lighting.

Table 14 : Mitigations actions envisaged in the NDCs of Palestine

Mitigation action	Brief description of the action
Solar photovoltaic	Generation of 20%-33% of electricity using solar PV. Energy Service Companies (ESCOS) could be used to overcome financial barriers.
Energy efficiency in buildings	Buildings standards on thermal efficiency, developing on existing regulations.
Use of waste for cement production	Municipal solid waste used as a substitution of 20% of coal in cement production. Acquired through contract tender to private organisations.
Use of waste for electricity generation	Deployment of a 1 MW (50 tonnes per day of waste) waste incineration unit.
Reduction of methane from landfill	The capture of 14,000 tonnes of landfill gases per annum for use in power generation.
Energy efficient lighting	Annual increase as part of buildings standards. Increase of 1% per annum using energy efficient lightbulbs.
Hybrid electric vehicles	Promotional campaigns and maintenance/increases to tax credits for qualifying vehicles
Compressed natural gas powered vehicles	Development of compressed natural gas refuelling infrastructure and amendment to the Traffic Act regarding licence fees. Assumes that 20% of trucks and buses could use compressed natural gas by 2040.
Modal shift programmes	Numerous measures including standard public service contracts, simplified fare systems, improved passenger information and better vehicles and maintenance. Envisions a 25% shift from private vehicle to public bus by 2030.
Afforestation	Annual increase of 200 hectares of forested land per annum, building on existing forested land.

Source: NDCs for Palestine

From Table 14, two conclusions can be drawn:

1. There will be more EE policies in the future. Their impact on GHGs emissions and energy consumption will be visible through CO_2 and EEIs.

2. The NDC monitoring will lead to develop EEIs of diffusion and unit consumption, which will be useful for a future work on detailed EEIs.

3.4 Review of stakeholders relevant on energy efficiency matters

3.4.1 Palestinian Energy and Natural Resources Authority (PENRA)

PENRA has been established in 1995. PENRA is in charge of the development of the institutional energy framework. This includes overall sector coordination, policy elaboration, system development, generation, transmission, distribution, tariffs and regulation. Within PENRA, an Energy Efficiency Unit (EEU)[24] has been launched, whose main missions are:

1 Identify, analyse and propose possible technical and cost effective policies and measures for EE improvements regarding the generation as well as the consumption aspects,

2 Encourage and promote activities targeting EE actions and reducing negative environmental influence caused by energy conversions within both generation and consumption processes.

3.4.2 Palestinian Electricity Regulatory Council (PERC)

PERC was established in 2012 and its revenues come from License fees, Governmental subsidies (under the general Electricity Law No. 13) and other donations. PERC ensures that customers of regulated utilities receive safe, adequate and reliable service matching interests between customers and companies working in the electricity sector. A relatively detailed database on electricity sales by sec-

(24) EEU is an internal program, not official institution

tors is also compiled. PERC has to perform the following main functions:

- review, determine and recommend tariffs;
- review and provide recommendations on licenses;
- monitor and enforce licensees' performance;
- resolve disputes among stakeholders of the sector;
- disseminate information and educate consumers.

3.4.3 Palestinian Energy and Environment Research Center (PEC)

PEC is the national R&D institution, established in 1993. According to the new reforms, PEC works under the auspices of the Palestinian Energy Authority. It is responsible for studies and promotion of energy conservation and renewable energy in Palestine. PEC develops and implements national programs for energy conservation, rational use of energy, and implement national programs for utilisation of renewable energy. More precisely the following aims are particularly relevant for our purposes: Policy design (norms, labels and incentives); Evaluation of technical and economic market potential and environmental impacts; Promotion of energy efficiency and clean technologies through pilot projects.

PEC was the technical focal point of Palestine for the two international projects on EEIs indicators mentioned above.

3.4.4 The Ministry of Environment Affairs (MEnA)

The Ministry of Environment affairs (MenA), formerly PENA, since 1996 is the central authoritative body for all environmental issues in the Palestinian territories. It is the umbrella under which all environmental regulations, projects and strategies are created and implemented. It seeks to maintain and safeguard the environment with plans to protect human health, curb and reduce the depletion of natural resources, combat desertification, prevent the aggravation of air and water pollution, promote environmental awareness and ensure achievement of sustainable urban development.

History of the Palestinian government's participation in international climate negotiations and the recent actions of the Palestinian government towards climate

change were presented. GHGs inventory is under the responsibility of MenA. MenA stressed the importance of the two new reports – namely, the INDC and the NDC - in shaping environmental policies implementation. It also pointed out the importance of energy efficiency in achieving the GHGs emissions reduction target. In that respect, the monitoring of climate change is crucial for MenA, including EE policies.

The importance of EE policies in the environmental strategy for GHGs abatements has been underlined. Therefore, it strongly supports EE monitoring, because:

- It will contribute to better understand the role and the impact of energy efficiency policies in the overall climate change strategy;
- it will help to track the achievements of the Climate change objectives and to track the contribution of energy efficiency of the NDCs implementation in Palestine.

3.4.5 Other Stakeholders

The following stakeholders can be data providers as well as users of the results.

- Palestinian Electricity Transmission Company Limited (PETL). This government owned company is involved from the source to distribution companies and final consumers, as well as importing/exporting electricity. PETL owns, operates and develops the transmission grid. PETL is the purchaser of power generated from projects with capacity higher than 1MW.
- Distribution Companies (DISCos): There are 6 distribution companies for electricity (NEDCo, TEDCo, JDECo, HEPCo, SELCo in the West Bank and GEDCo in Gaza), in addition to the municipal / local councils not affiliated with any distribution company. Three of these companies are joint stock private companies, while the other three (Southern Electricity Company, Hebron Electric Power Company and Tubas District Electricity Company) still work informally without proper registration to competent departments.

3.5 Feasibility for the Participation in MED OBSERVEER

Palestine is committed in EE implementation, which is recognized at the inter-

national level. From our understanding, this new orientation is due to some difficulties that the Palestinian stakeholders are currently facing in pursuing the development of renewables energies in the Palestine market. This effort has been recognized at international levels since Palestine has been awarded for a good practice on energy efficiency program (Energy Globe Award 2019 [25]). Despite the lack of an energy efficiency law, the regulatory framework is improving and Palestine, after the evaluation of a first NEEAP covering the 2012-2020 period, has launched a second NEAAP (2020-2030). However, it should be noticed that the EE policy implementation is mainly financed through international donors. At the same time, even if labels and standards for electrical appliances have not been implemented yet, the NEAAP, mainly dedicated to electricity issues, is covering this area. Concerning the transport sector, which has highest EE potential, the policies mentioned in the NDC are the main reference. From the conducted analysis on these two legal documents (NEEAPS and NDC), it can be concluded that the expected level of EE policies implementation is sufficiently robust to be visible through a top down monitoring (EEIs) and timely.

This ambitious strategy calls for monitoring the impact of these EE policies. The Palestinian government recognized that issue and is already experiencing a very good practice in m-anaging energy audits through a very powerful database (bottom-up evaluation).

Besides this project-based related MRV system, the Palestinian government is also experienced in national monitoring through the EEIs methodology. It has participated in two international projects gathering other Mediterranean and Arabic countries (Plan Bleu (2012) and Arab league (2014)). Although these projects are rather dated and there is no current practice on EEIs due to lack on international funding, the Palestinian experts who participated are still working in the same administration having gained more experience on MRV.

Certainly, due to the revival of energy efficiency in the national energy transition strategy, all the stakeholders interviewed have strongly expressed their willingness to participate in the setting-up of a MRV system that might be able to monitor the NEAAPs and NDCs targets and, generally, the impact of EE policies. They also mentioned their interest in sharing information and practices in an international project through a benchmarking approach.

(25) https://www.energyglobe.info/palestine2019?cl=en&id=331348

On data issues, the analysis is rather easy to do and very positive. Discussions and scanning their publications (surveys results, web site etc.) with the Palestinian bureau of statistics (PBCS) confirmed that the level of availability and quality of energy and activity data required for a future monitoring system is adequate and sufficiently robust. Basic data are available with time series (since 2000) and detailed sectoral data, particularly for the households and transport sectors (covering 80% of the total final consumption), are available through several surveys. These statistics can be successfully completed by technical data coming from the audits database on the energy performances of equipment or sub-sectors (hospital, schools, public offices etc.). This does not prevent that some energy end-uses consumptions are still not well covered (i.e. electrical appliances) and additional surveys for updating the existing ones or new areas (freight transport) are needed. PBCS is ready to share its data and is interested to collaborate actively in data provision and analysis.

Currently, there is not a comprehensive detailed set of EEIs except very few basic EEIs published by PBCS. Consequently, a monitoring tool able to manage and store these EEIs is missing. Therefore, there is a clear opportunity to develop such national database useful to monitor EEIs target and EE P&Ms as it is well understood by the Palestinian government.

Furthermore, the strategy of publishing statistics by PBCS is very well organised and opened. PBSC manages a very comprehensive and user-friendly website with a dedicated slot for energy statistics. This demonstrates that the Palestinian administration have a willingness to share and publish its information. In the future, EEIs can be published in this website.

It shall be considered that the reporting of energy efficiency facts and trends is partly taking into account the existing legal documents (NEAAP and NDC). However, there is no dedicated organised and systematic reporting of the EE situation for Palestine.

With respect to the selection of a focal point within the Palestinian administration, no decision has been taken but it will be easy to determine a focal point in Palestine, since PEC has already been the focal point for similar projects in the past, meaning that it could be a good candidate due to its positioning in the Palestinian administration, its expertise and experience on EE monitoring including at the international level.

3.6 Recommendations

Due to time constraints, a definitive analysis on the ability of the Palestinian government to fulfil the requirements for EE monitoring system is not available. However, the review made suggests that it is possible to recommend the participation of Palestine based on the following:

- Currently, there is not in place an MRV system in Palestine able to monitor the energy efficiency targets and assess the impact of EEP&Ms at sectoral or national levels. However, it has some past experiences, although quite dated.
- There is a strong willingness to participate, which has been expressed by many stakeholders including Ministry of energy, Ministry of environment, statistical bureau and research centres. This engagement will facilitate data collection, interpretation and sharing of the results in particular to the decision-makers. There is an adequate legal framework to boost the energy efficiency ambition in Palestine. More stringent EE targets have been adopted and above all a new comprehensive energy efficiency strategy has been reported and evaluated within two newly adopted official documents, namely the NEEAP 2 and the NDC. This strategy will require a detailed monitoring, so far EEIs monitoring will be very well timely for Palestine.
- Around 20 EE P&Ms policies are - or will be- in place in Palestine covering electricity and transports end-uses. Their impact will be sufficiently large to be visible on energy demand and to make the MRV workable.
- Through PBCS, the energy statistics currently available in Palestine allows to develop relevant and detailed EEIs required to perform an energy efficiency monitoring tool. Additional detailed information exists to complete these data, such as the energy audits data base. However, new energy consumption surveys will help to add useful indicators especially on the residential sector.
- The current energy statistics are well organised in a database with easy and user-friendly retrievals. Without prevailing the choice of the Palestinian administration, the hosting of a future EEIs database can be easily solved through the existing energy information portal of PBCS or PEC.

- Several focal points able to manage the Palestinian partnership have been identified. Among them, PEC, a former focal point for this kind of practice and member of MEDENER, could be a suitable candidate.
- Difficulties to implement the project in a sustainable way are foreseen, particularly when the international financing will be over. However, they are similar to those in other countries.

During the visit to PBCS, preliminary discussions pointed out some data gaps by end-uses (e.g. for lighting and vehicle types). Except for some surveys where both activity data (stock of energy equipment) and energy data are provided, we did not enquire the existence of activity data in physical units (e.g. tons of cement). However, the economic series provide sufficiently useful information, such as GDP, added value, index of production.

The main conclusion is that Palestine is able to fulfil the bulk of key energy and activity data requested for a proper monitoring of energy efficiency. They are public, published and easily accessible. Further discussion with PCBS may reveal the existence of additional and more detailed data.

4. Egypt

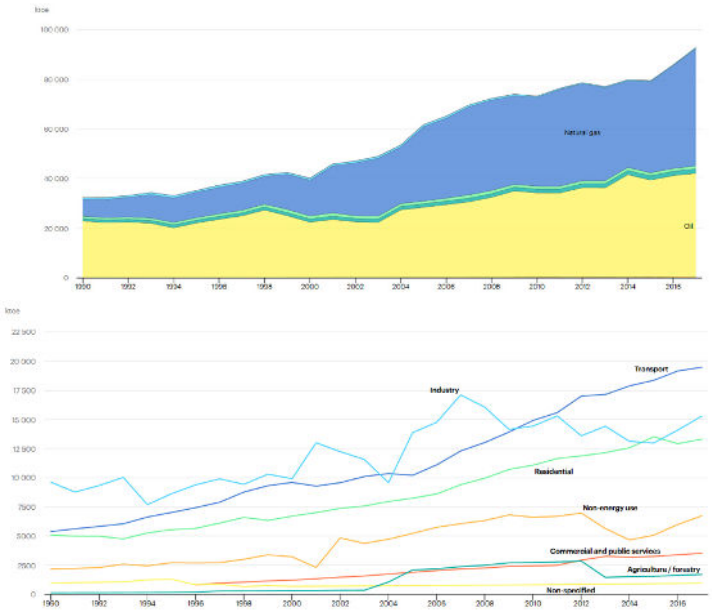
A two-day mission (28-28 October 2019) was carried out by Mr. Didier Bosseboeuf (ADEME, France) in Egypt, with logistical assistance from RCREEE. The agenda of the meetings is attached in the Annex.

4.1 General Background of EE in Egypt

4.1.1 Energy Consumption Trends

The electrical consumption data are integrated in the distribution chapter. The most significant table shows the evolution of electrical consumption according to 9 consumer sectors over 5 years (see Figure 7). A graphical representation of this distribution of consumption is shown below. It is noticeable that the ratio of household consumption to industry and other purposes is relatively high due to the continued urban expansion under the current conditions in the country and the ongoing increase in the use of electrical appliances, especially air conditioners due to high temperatures during summer.

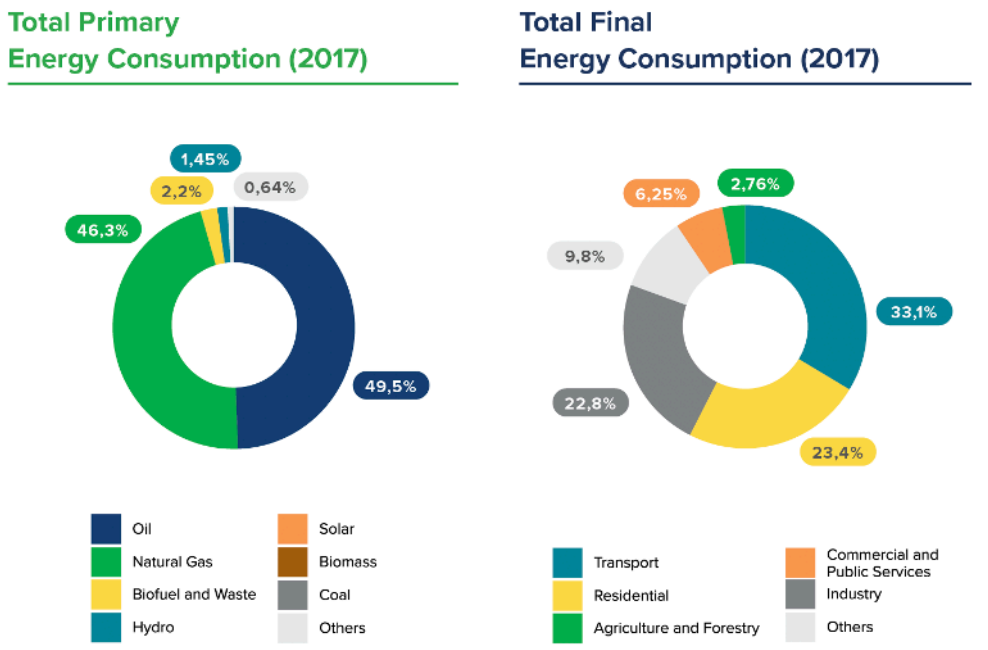
Figure 7: Total primary consumption by fuel type (Egypt 1990-2017) and by sector



Source: IEA

On the other hand, consumption by industrial branches as well as by usage in the building sector is not published (which does not mean that it does not exist).

Figure 8: Breakdown of primary consumption by fuels and final energy consumption by sectors in Egypt (2017)



Source: meetMED (2019)

4.2 The Monitoring of Energy Efficiency Trends (EEIs)

During the mission, there was no opportunity to meet experts from the administration taking care of energy statistic and energy efficiency monitoring. Therefore, it is rather impossible assessing in a duly way the possibility to collect official data.

The only relevant element is the yearly publication of the energy balance from IEA. These data are supposedly provided by the Egyptian authorities.

Furthermore, based on the discussions with RCREEE, it resulted that RCREEE is developing an energy balance for Egypt. RCREEE also develops and manages two databases on energy and energy efficiency filled within their project

with Plan Bleu. The recent funding strategy of RCREEE is based on the realization of national and international projects in the Arab countries. For reasons of geographic proximity, many RCREEE projects concern Egypt. While some of these projects were quickly mentioned during the discussion, there was no time enough to assess the exact content of these projects, in particular the relevant databases for monitoring energy efficiency. The general principle is that these databases are the result of ad hoc projects.. From the analysis of RCREEE portal, 6 projects demonstrates the undeniable know-how of RCREEE in monitoring energy efficiency in Egypt and in feeding the future work on a follow-up of the energy efficiency in Egypt. Some projects are only focused on Egypt (e.g. Energy efficiency fund), others have international coverage where Egypt is represented.

To sum up, the RCREEE developed for Egypt: the annual energy balance; energy efficiency indicators; the NEAAPs containing descriptions of energy efficiency and renewable energy policies and statistical framing data on the energy efficiency; and databases that allow to organize, store, manage and query statistical data on energy efficiency. From this point of view, it is therefore possible to conclude that the RCREEE has enough experience in monitoring energy efficiency and that, indirectly, the Egyptian public authorities, which have endorsed these reports, benefit from it. However, it is not possible to prejudge the appropriation of the results by these same public authorities. There was not enough time during this mission to analyse in detail the relevance of the results, but we know certain authors of these documents who have an international reputation in the field. However, we consider, in addition to updating this data, that there is significant room for improvement in this monitoring system, for example by developing new efficiency indicators. An additional objective would be to improve the appropriation of the results by the public authorities.

The RCREEE made it clear that it could not represent Egypt in a future project, but obviously it can play a technical consultative role if it is mandated by the Egyptian ministries.

4.3 Legal Framework for Energy Efficiency

4.3.1 Laws

The Electricity Law (No. 87/2015) includes a chapter on improving energy efficiency in different sectors and the Executive Regulations of the Electricity Law issued in May 2016 includes details on the measures for EE.

4.3.2 National Energy Efficiency Action Plan (NEEAPs)

The Egyptian National Energy Efficiency Action Plan (NEEAP) in the electricity sector was launched in 2012 and elaborated by the Ministry of Energy and Electricity, the League of Arab States, and RCREEE. The NEEAP is considered to be an electrical energy efficiency roadmap in the residential, public and tourist sectors in Egypt. It includes energy conservation measures in the public and tourist sectors. As for the residential sector, it includes measures of using efficient lighting systems, establishing and activating financing mechanisms for solar water heaters.

Box 8: Main measures in the Egyptian NEEAPs

- EE lighting (distribution of 12 million CFL and LED lamps by the electricity distribution companies).
- EE standards and labelling program for electric appliances.
- Financing mechanism in industrial, commercial and tourism sectors.
- EE in street lighting.
- 2nd Phase of the program for EE in public buildings.
- EE in utilities including water treatment and sewage plants
- EE measures taken by electricity distribution companies, which include:
  - provision of EE services,
  - awareness campaigns,
  - minimize network loss
  - prepaid/smart meters deployment

4.3.3 Nationally Determined Contribution (NDCs)

Egypt submitted its first INDC in June 2017. On energy, main measures are related to the deployment of renewable energy but some elements on energy efficiency are also mentioned.

Box 9: Abstract from INDC report submitted by Egypt[26] in June 2017

«Policies targeting development that is more sustainable rely upon five main pillars:

1. More efficient use of energy, especially by end users;
2. Increased use of renewable energy as an alternative to non-renewable energy sources;
3. Use of advanced locally appropriate and more-efficient fossil fuel technologies, which is less-emitting, in addition to new generations of nuclear power;
4. Energy efficiency is the cornerstone to be targeted by policy makers to decouple demand on energy and economic growth;
5. Reform energy subsidies. This policy is implemented using four pillars, namely: set different prices for petroleum products based on energy generation efficiency; increase the efficiency of energy use; provide support to certain sectors to promote switching from conventional energy sources to clean energy sources; and apply the fuel subsidy smartcard system to ensure that subsidies are received by target beneficiaries.

The degree to which efficiency improvements can limit energy demand growth is one of the main distinguishing characteristics of greenhouse gas reduction pathways. Energy efficiency could be improved radically through a combination of behavioural changes and rapid introduction of stringent efficiency regulations, technology standards, and environmental externality pricing, which mitigates rebound effects.»

Greenhouse Gas Mitigation Measures in Different Energy Sub-Sectors

Sector	Mitigation measure
Industry	Energy efficiency improvements
	Utilization of solar energy for water heating
Transportation	Energy efficiency improvements
Passengers	Increase Share of Railways Pass. Transport
	Increase Share of Buses Pass. Transport
	Increase Share of Microbuses Pass. Transport
	Increase Share of River Pass. Transport
	Cairo metro (Line 3 phase 3& 4 + Line 4)
Freight	Improve road transport efficiency
	Switch from road to river transport
	Switch from road to rail transport
Agriculture	Energy efficiency improvements
Res.& Comm.	Energy efficiency improvements
	Utilization of solar energy for water heating
Electricity	Energy efficiency improvements
	Nuclear energy use for power generation
	Renewable energy use for power generation
Petroleum	Energy efficiency improvements

Source: NDC (2017)

(26) https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Egypt%20First/Egyptian%20INDC.pdf

4.4 Review of Stakeholders Relevant for EE monitoring

Five meetings with different stakeholders were organized during this mission. Due to time constraints, there was not the opportunity to meet three other public actors directly concerned by the issues of energy efficiency that would be likely either to provide statistics, or to be potential users of the databases (petroleum ministry, environment ministry and housing ministry (though planned). No contact was established with the National Institute for the Statistics.

4.4.1 Ministry of Electricity and Renewables Energies

In Egypt, the institutional governance of EE P&Ms is dual: The Ministry of Electricity and Renewable Energy on one hand and the Ministry of Petroleum on the other hand. In each of these ministries, a specific (restricted) department deals with energy efficiency.

The goal of the Ministry of Electricity end Renewable Energy is to provide the electricity to all consumers all over the country. As it can be seen below, in order to fulfil that obligation, the Ministry must provide data and can be engaged in international projects. Its main missions are to:

- Settle the general plan and energy generation, transmission and distribution.
- Suggest the electric energy prices for different voltage and usages.
- Supervise the study and execution of essential electrical projects.
- Publish the statistics and data relating to electric energy production and consumption.
- Provide the technical consultancies and services in the electric fields to Arab countries and all others.

http://www.moee.gov.eg/english_new/EEHC_Rep/2017-2018en.pdf

In the absence of an energy efficiency agency, this Ministry could be the focal point on EEIs monitoring or at least a user. In view of its high positioning, the meeting was more “strategic” than “technical”. In the Egyptian context, although Egypt is a fossil-producing country and the renewable energy market is relatively mature, the Ministry confirms that energy efficiency is becoming a very important option in the energy transition.

Two important documents were mentioned: the second NEAAP is being validated at the level of ministries and parliament and the annual statistical yearbook of the ministry of Electricity and renewable Energy.

The series of annual directories on electricity statistics has been available since 2010 on the ministry’s website.[27] Most of the data available concerns production and transmission.

If Egypt commits to this project, given the institutional set-up in which two ministries are responsible for energy efficiency, the question quickly arises about the choice of a “focal point”, considering that there is no energy efficiency agency. One solution would be to create a committee that brings together the two departments and other stakeholders.

Moreover, the Ministry seems very cautious about Egypt’s participation in a benchmark on energy performance in the Mediterranean region and therefore about the data sharing associated with it. He stressed that the availability of statistical data is sometimes confidential and falls under the seal of internal security. So, there would be a long process for obtaining the data. But the Ministry would be interested in exchanging information and data collection practices and generally on methodologies and capacity building in a regional framework. However, participation in the collection and restitution of common regional data should be the subject of more in-depth discussions.

4.4.2 New and Renewable Energy Authority (NREA)

Due to the existence of two ministries (electricity and fossils), there are two regulators. We only met the electricity regulator.

(27) http://www.moee.gov.eg/english_new/EEHC_Rep/2017-2018en.pdf

In 1986, the New and Renewable Energy Authority (NREA) was established to act as the national focal point for expanding efforts to develop and introduce renewable energy technologies to Egypt on a commercial scale together with implementation of related energy conservation programs. NREA is entrusted to plan and implement renewable energy programs in coordination with other concerned national and international institutions within the framework of its mandate.

Several energy efficiency policies concern the electricity sector, in particular energy efficiency labels and standards for electrical appliances. During the meeting, it was mentioned the possibility in the near future of introducing a system of obligations on energy efficiency with the electric companies. This policy will require significant data collection to set the government's targets for the obligated, based on the energy saving potential and subsequently a monitoring system.

As a result, the electricity regulator strongly supports the process of developing energy efficiency indicators. The regulator says it is ready to facilitate the collection of detailed data on electricity consumption and to ask the electric companies for the necessary data subject to availability (i.e. breakdown of electricity sales by sectors and branches). Information on electricity consumption by use will be difficult to obtain at first. In summary, due to its institutional position, the regulator would be a very useful data provider.

4.4.3 EgyptErA

In 2015, the Egyptian Electric Utility and Consumer Protection Regulatory Agency (EgyptERA) became an autonomous institutional entity in charge of handling and developing electricity activities involving producers, transmission operators, distribution companies and end users. In order to enhance its capacities to take on the additional responsibilities stipulated in the new law, EgyptERA approached the Association of Mediterranean Energy Regulators (MEDREG) to facilitate and develop regulatory practices that are coherent with the energy market in the country.

4.4.4 International Academy for Renewable Energy and Energy Efficiency (IAREEE)

The International Academy for Renewable Energy and Energy Efficiency started

to work as renewable consultant and training organization in 2014. Among its activities, this association compiles and disseminates information on low-emissions technologies and their utilization. In addition, it promotes the adoption of practices, technologies and systems for the use of solar energy and energy efficiency technologies. It reflects the point of view of industrialists close to energy efficiency that brought a complementary point of view to the research.

In Egypt, the energy efficiency market could take over from the noticeable start of saturation of the renewable energy market. Indeed, if the renewable market has experienced strong growth - undoubtedly too rapid- in the recent past, the lack of evolution of the regulatory framework fixed by the public authorities associated with renewable energies shall be mentioned. As a result, energy efficiency would be a more promising market in the short and medium term for manufacturers.

This association supports the initiative to set up an energy efficiency monitoring system. In fact, setting a target for improving energy efficiency as indicated in the second NEEAP requires monitoring by the public authorities.

4.4.5 The Regional Center for Renewable Energy and Energy Efficiency (RCREEE)

RCREEE is well known to the meetmed project, being one of the key partners of the project. RCREEE is an intergovernmental organization with diplomatic status that aims to enable and increase the adoption of renewable energy and energy efficiency practices in the Arab region. The RCREEE team works with regional governments and global organizations to initiate and lead clean energy policy dialogues, strategies, technologies and capacity development in order to increase Arab states' share of tomorrow's energy.

Created in 2008 and obtaining its legal status in 2010, RCREEE got long-lasting experience through its solid alliance with the League of Arab States. RCREEE is committed to tackle each country's specific needs and objectives through collaborating with Arab policy makers, businesses, international organizations and academic communities in key work areas: capacity development and learning, policies and regulations, research and statistics, and technical assistance. The centre is also involved in various local and regional projects and initiatives that are tailored to specific objectives. We may con-

sider that RCREEE strives to lead renewable energy and energy efficiency initiatives and expertise in all Arab states based on five core strategic impact areas: facts and figures, policies, people, institutions, and finance.

Clearly the knowledge developed by RCREEE on the two first areas exactly fit with the technical needs of elaborating a monitoring system on energy efficiency. A concrete example of this statement is that RCREEE has managed the setting of the first NEEAP of the Arab league countries.

Tangible facts and scientific approaches are the right starting point to determine the region's past, present, and future status in renewable energy and energy efficiency fields. RCREEE provides the most accurate and transparent renewable energy and energy efficiency information for the Arab region through consistent methodologies and strong partnerships with local governments and regional and international institutions. Our methodology identifies the first pan-Arab green energy baseline for RCREEE member states and forecasts potential energy saving opportunities and technologies to be deployed. The information is published for free through comprehensive printed and digital index reports, specific country profiles, performance indicators on national and regional levels, and case studies.

The research and analysis activities in local and regional renewable energy and energy efficiency fields include:

- Data collection and analysis
- Reports, indexes, and performance indicators
- Maintaining a regional database
- Monitoring and assessment
- Specific studies
- Publishing and dissemination
- Research and development grants

Their capacity development activities in local and regional RE and EE fields include:

- Pricing and tariffs
- Projects planning and management
- Products and services certification and standardization
- New technology orientation
- Energy service providers regulations and certification
- Statistics, research, and data analysis

Box 10 : the TaqaWay project

The TaqaWay sustainable energy knowledge portal is a joint collaborative initiative between the League of Arab States (LAS) and the Regional Center for Renewable Energy and Energy Efficiency (RCREEE). TaqaWay is an information portal for the Arab region. In a new way, it presents a streamlined renewable energy and energy efficiency data. TaqaWay also includes visual statistics, and information on Arab countries' market capabilities, institutions, projects, stakeholders, and policies on a single online portal. In addition, it provides tools for data analysis and benchmarking Arab countries' readiness and market capabilities in renewable energy and energy efficiency. Some features and contents of TaqaWay have been developed with additional kind support of UN-ESCWA and UNEP.

TaqaWay is intended to help policy makers, non-governmental institutions, investors, academia, experts, and researchers to find reliable, accurate and updated information on sustainable energy in the Arab region. All data is free and accessible to the public within an interactive and high-quality end-user experience.

- An online repository of the Arab region sustainable energy data via TaqaWay Sustainable Energy Knowledge Portal (www.taqaway.net)
- An online expert platform which allows users to discuss the latest energy topics in an interactive manner via forums, messages and workspaces through TaqaWay Sustainable Energy Network (www.taqaway.net/network)
- An E-learning platform including online courses in collaboration with our partners such as the League of Arab States, UN-ESCWA and UNEP.

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- An E-learning platform including online courses in collaboration with our partners such as the League of Arab States, UN-ESCWA and UNEP.

4.4.6 GIZ department on EE and RES

Given the historical importance of GIZ in the establishment of governance institutions for EE and RES in Egypt, GIZ's point of view was interesting, especially with respect to the establishment of "cell" in charge of efficiency at the level of ministries and, generally, to the history of the establishment of institutions in charge of EE and to the funding and support for the realization of NEEAPs.

4.5 Feasibility for a Participation in MED OBSERVEER

Egypt is a major country in the Mediterranean region and its participation is highly desirable. At the moment, Egypt does not participate in the network of MEDENER because there is no clearly identified interlocutor playing the role of an energy efficiency agency. This institutional obstacle is reinforced by the splitting of responsibilities for the governance of energy efficiency at government level into two ministries. However, it has become clear that energy efficiency has recently become a priority in the energy transition, although the country is a producer of fossil energy and the market for renewables is developing satisfactorily. Energy efficiency even appears to be a new energy policy, which would complement a market for renewables that might appear to be almost saturated, if the regulatory aspects do not evolve.

The main proof of this new prioritization of energy efficiency is undoubtedly the forthcoming publication of the second NEEAP. Independently from who the interlocutor was, this document has always been mentioned and appears

to be a very structuring element in the implementation of energy efficiency.

Therefore, the realization of this NEEAP indicates two important facts. On the one hand, there is now a sufficient level of current and future implementation of energy efficiency policies, which in fact justifies the establishment of an energy efficiency monitoring system. On the other hand, the development of the NEAAP required a satisfactory collection of data that demonstrates a thorough know-how on the collection of energy data and energy efficiency issues. However, this does not demonstrate the current capacity of the Egyptian authorities to develop and maintain an efficient system for monitoring energy efficiency by means of statistical indicators. The absence of an official annual energy balance established by the public authorities or the national statistical office reflects this.

In Egypt, the experience in the field of energy efficiency indicators and more generally in the management of energy efficiency and renewable energy databases exist anyhow. In particular, at least 6 relevant projects carried out at RCREEE have been identified as having a direct relationship with the monitoring of energy efficiency, thus being able to feed future works.

Time constraints impeded to meet all the relevant interlocutors (e.g. the Ministry of the Environment or Housing). In addition, the nature of the exchanges was more strategic than purely technical. As a result, it was not possible in the time available to establish a precise assessment of the ability of the Egyptian authorities to produce detailed statistics on energy consumption that might be useful for EEIs monitoring.

The effective participation of Egypt will therefore require an additional effort in order to overcome some reluctance. Thus, it appears that the development of a national tool for monitoring energy efficiency as may be proposed is of great interest to the Egyptian authorities. However, the Egyptian participation in a benchmarking exercise among countries in the Mediterranean area will require an effort. Finally, the difficulty to provide and validate the use of their statistics even for their internal use in relation to statistical legislation on internal security, which can cause extremely long delays, has been mentioned several times. It will be necessary to pay attention, in liaison with the Egyptian authorities, to the designation of the focal point. The Ministry of Electricity could be this focal point.

4.6 Recommendations

Considering the important stakes for the project in involving Egypt and some institutional and technical uncertainties, it is recommended to have a second mission to Egypt. This mission would require providing in advance documents and arguments to the Egyptian authorities who could facilitate their decision.

However, due to time limitations, it was difficult to get a complete image of their current practices and plans on the EEIs implementation according to the context. Obviously, the national context being quite different across the three countries, shall have a fine tuning for a good implementation of the EEIs. However, there are some common features:

- This is the right moment for these countries to implement a monitoring system because energy efficiency becomes a priority in their energy transition. Based on the NEAAPs reviews, it is certain that these countries will implement energy efficiency policy on a large scale. However, the priority is given to policies towards electricity end-uses and they have difficulties to propose or to implement policies in transport, which is the most important energy consuming sector.
- Data availability is correct enough to perform a relevant analysis in the 3 countries.
- They have a certain experience in EEIs and database managements (in particulars for EE projects).

Conclusions

The main issue, which is not shared among countries, is the level and nature of the governance for the data collection, in particular in Egypt, where there is not an energy efficiency agency and the data dissemination is difficult due to internal statistical law on interior security, thus making complex and very slow the data collection process.

Box 11 summarizes our diagnostic according to the eligibility criteria.

Box 11: Assessment of eligibility for monitoring energy efficiency

Eligibility Criteria	Egypt	Jordan	Palestine
Level of EE P&Ms			
Willingness to monitor			
Data availability	(a)		(a)
Practise in data base management			
Practice on EEIs	(b)		
Governance of data collection	(c)		
Participation to a benchmark			
Dissemination of results			

Legend: Green – Suitable; **Yellow** – To be confirmed; **(a)** Lack of data in the transport sector; **(b)** Only private sector (RCREEE); **(c)** No energy efficiency agency, 2 ministries in charge of EE P&Ms.

Source: Authors

From the box above, it is clear that Jordan and Palestine are good candidates for participating to a top down evaluation of EE. Egypt, instead, needs further investigation and in depth explanation of the project to Egyptian authorities.

The following general recommendations can be drawn for expanding MED'OBSERVEER to these countries:

- Jordan and Palestine are good candidates for participating in the MED'OBSERVEER initiative. Egypt, instead, needs further investigation and in depth explanation of the project to Egyptian authorities.
- In all countries, coordination among various stakeholders is crucial for success. It is suggested to set in each country institutional task forces involving all the stakeholders' data providers from the beginning. On

the other hand, one clear coordinator shall be designated, being responsible for supervision. A national seminar could be organised to set this task force. This initiative shall be endorsed by the institutions in order to avoid staff turnover but also to ensure its credibility. Focal points in each structure might be designated. Technical task forces could be set in parallel by composing a core team.

- Definition of a clear communication strategy from the beginning could be an asset. A special attention shall be put on end-users of EEIs that could be other administrations, private sector or civil society. Communication of the results and the outcomes of the EEIs monitoring shall be largely emphasized. Outputs could be technical notes for each sector, i.e. to demonstrate the relevance of using the.
- Capacity building should focus not on statistics, which seems to be handled, but on indicators interpretation, coordination among stakeholders and communication.
- Data reliability and quality control is also a key condition for success. It is suggested to set independent data checking that could help revising coherence and relevance of data. Specific seminars could be carried out to share experiences among countries on these issues as well.
- Several additional studies shall be carried out to complete the set of indicators and explore parameters that have not been identified yet, especially in the transport sector. Sharing experiences at the regional level could be useful to compare situations.
- The set of indicators shall also be completed on energy specific issues for each country, for example water issues and solar water pumps in Jordan. Water represents 14% of electricity consumption and has a great potential for EE because Non Revenue Water is estimated to be close to 50%.
- In terms of data integration and information system, an attention shall be put on integrating as much as possible the indicators into existing energy management systems and data collection flows (using the census, annual mandatory reporting from companies, etc).
- The issue of benchmarking and transparency versus confidentiality of data shall be raised at the beginning. Clearly defining which consolidated indicators could be shared publicly and which data still have restricted access rights could solve this issue.

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Annexes

Mission to Jordan (Amman)

16-18 April 2019

16 April 2019	
1	Jordanian RE and EE Fund (JREEEF) Mrs Eng. Lina Al-Mobaideen, Head of project Development division
2	Ministry of Environment M. Belal Shqarin, Director of Climate Change
3	Jordan Standards & Metrology Organization (JSMO) Ms. Fadia Abdalghani
4	REEE II Technical Assistance Emil Alasis-Muqatash, Team Leader Ms. Amel Mrad Bida, Expert
17 April 2019	
5	National Energy Research Center (NERC/RSS) M. Whalid Shahin, President Eng. Muhieddin Tawalbeh, Manager of Energy Efficiency and Solar Thermal Energy
6	Water and Environment Center / RSS Ms. Ruba Ajjour, Manager of Climate Change Studies
7	Ministry of Planning, Department of Statistics Dr Isma Haddad, Head of Environment Statistics
8	Ministry of Energy and Mineral Resources (MEMR) Ms Eng Shorouq Abdel Ghani, Director of the Organizational development Unit
9	Energy and Minerals Regulation Commission (EMRC) Ms. Muna Al Musa

Mission to Palestine (Ramallah)

16 – 19 September 2019

17 September 2019	
1	Palestinian Energy Authority (PENRA) / Palestinian Energy Centre (PEC) (M. Basil YASEEN & Nidal Abu RUB)
2	Palestinian Energy Authority (PENRA) M. Mohammed MOBAYYED ; Director Energy Efficiency Unit
3	Palestinian Electricity Regulatory Council (PERC) Mr. Hamdi R. TAHBOUB (President) & Qais SAMARA (Monitoring Department)
4	PEC / PENRA M. Ayman ISMAIL - DG
18 September 2019	
5	Ministry of Environment Affairs M. Ahmed I. Abu Thaher (DG international relationships)

6	Palestinian Central Bureau of Statistics (PCBS) M. Mahmoud ABDALRAHMAN (DG Area Statistics Directorate)
7	Chamber of Commerce : M. Abd Alghani ATARI (Chairman)
19 September 2019	
8	Palestinian Energy Authority (PENRA) / Palestinian Energy Centre (PEC) Mr. Basil YASEEN & Nidal Abu RUB

Mission to Egypt (Cairo)

28-29 October 2019

28 October 2019	
1	EgyptEra
2	Ministry of Electricity and Renewable Energy
3	New and Renewable Energy Authority
4	International Academy for renewable Energy & Energy Efficiency (IAREEE) Mr. Wael Madkour, Director
5	RCREEE M. Khalid Salmi, Director of Planning, Mrs Eman Adel, database manager, M. Maged Mahmoud, technical director
29 October 2019	
6	Egyptian Environmental Affairs Agency (EEAA) and The Ministry of Environment (ME)
7	GIZ Energy efficiency and renewable section

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