



National Energy Efficiency Action Plan

Palestine

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In coordination with PEC/PEA

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Preface

The Arab EE Directive has been developed jointly between the League of Arab States (LAS), MED-EMIP and RCREEE based on the Directive 2006/32/EC of the European commission (EC) on energy end-use efficiency and energy services.

Through the framework of the Arab EE Directive, the Arab countries who are interested in adopting the directive are requested to set EE target and assign an existing or a new public entity to draw or apply a 3 year National Energy Efficiency Action Plan (NEEAP). The public sector should lead by example (exemplary role) and power utilities should provide services or contributing to a fund to implement EE measures. An annual progress report will be submitted to the League of Arab states RCREEE showing the achieved savings..

This document developed jointly by RCREEE and MEDEMIP proposes a template and structure to report the salient features of the first NEEAP. The latter will be prepared for the first three year reporting period 2011-2013 by national entities. The template is not mandatory but a tool to assist the stakeholders to communicate essential measures and impact of their NEEAPs and will also assist RCREEE to summarize and analyze the results to be published on an annual basis by the Arab League.

The objective of this template is to report already ongoing or planned measures to generate, transmit, distribute and use electricity more efficiently in order to meet any indicative national energy efficiency target that may be, or has been already stated for the 1st NEEAP period of three years 2011-2013.

RCREEE, as a regional platform promoting the development and harmonization of energy efficiency policies in the MENA region, with the support of the Arab League, will play an important role in providing technical assistance on the subject area to the Arab member states.

RCEEE will assist the Arab states in drafting their NEAAPs, discussing and assisting them in assessing the impact of national EE targets and supporting them in jointly identifying cost effective EE measures. Moreover, RCEEE will contribute in developing methodologies to measure and quantify the energy saving impact of the NEEAP's according to the recommendations framed in the Arab EE directive. RCEEE will furthermore explore various strategies to monitor progress of implementation of NEEAP's, formulating recommendations for effective delivery mechanisms, participating in, and providing input to various technical committees.

RCEEE will jointly explore with LAS and entities participating in implementation of the Arab EE Directive to apply and register for nationally appropriate mitigation actions (NAMA) as a basis for international recognition of many meaningful measures under NEEAP, that can be build under the existing Clean Development Mechanism (CDM) and may even fit into a regional program of activity type CDM measure.

List of Abbreviations

DM	Department of Meteorology
EA	Engineers Association
EDU	Electricity Distribution Utilities (including GEDCO, HEPCO, JDECO, SELCO, etc.)
EQA	Environmental Quality Authority
GEDCO	Gaza Electricity Distribution Company
GPP	Gaza Power Plant
HEPCO	Hebron Electricity Company
IEC	Israel Electricity Corporation
JDECO	Jerusalem District Electricity Company
MHPW	Ministry of Housing and Public Work
MNE	Ministry of National Economy
MOF	Ministry of Finance
NEDCO	Northern Electricity Distribution Company
PA	Palestinian Authority
PCBS	Palestinian Central Bureau of Statistics
PEA	Palestinian Energy Authority
PEC	Palestinian Energy and Environment Research Center
PERC	Palestinian Electricity Regulatory Council
PIF	Palestinian Investment Fund
PFI	Palestinian Federation of Industry
PPC	Palestinian Petroleum Commission
PSI	Palestinian Standards Institute
PWA	Palestinian Water Authority
R&D	Research and Development Institutions
REERU	Renewable Energy and Environment Research Unit

SELCO

Southern Electricity Company

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1. Overview: Overall national indicative target

1.1 Key indicators

No	Indicator	Unit	Year 2010	Year 2020
1	Electricity intensity	kWh/US\$	0.90	0.95 ¹
2	National end-use electricity consumption	GWh	4,749	8,640 GWh
3	Projected electricity consumption growth rate on annual basis			6%
4	Share of electricity in final energy consumption		31%	35% ²
5	Share of electricity consumption by sector			
	Sector 1 Industries	9%	427 GWh	11% (950 GWh) ³
	Sector 2 Buildings (household, public & Commercial)	70% ⁴	3,324 GWh	70% (6,048 GWh)
	Sector 3 Others (water pumping, agriculture, etc.)	1%	47 GWh	3% (259 GWh)
	Sector 4 Losses ⁵	20%	950 GWh	16% (1,383 GWh)
6	Marginal cost of kWh supplied (2011-2013)			

¹ Based on medium growth scenario for electricity consumption and GDP forecast

² Phasing out the use of some primary energy sources such as; olive cake, oil, and lubricants as they constitute potential harm to the environment, in addition improvement of socio-economic conditions.

³ A medium development scenario that suggest growth in electricity sales to growing industrial sector.

⁴ 54% is consumed by residential buildings and the rest 20% is consumed by public and commercial buildings including: shopping malls, hotels, schools and nursing homes, hospitals, welfare institutions, higher academic institutions, commercial branches, government ministries and authorities, local authorities and street lightings.

⁵ Losses (technical and non-technical which is mainly non-collection of dues and stolen electricity) considered as a sector as it "consumes" on average around 20% of the total power.

1.2 Indicative target

The national indicative target is calculated according to paragraph 1.4 and the sectoral indicative targets and estimated based on the sectors baseline and sector EE measures reported in chapter 2 in order to meet the national target. Background data and forecasts provided by the PEA and population growth forecast provided by PCBS were used to predict on a medium growth scenario the growth in electricity consumption until 2020, including sectors' consumptions.

Total	Baseline Consumption GWh/5 years Average ¹	National indicative Energy Efficiency target			
		2020		2013 (first NEEAP) 3 years	
		%	GWh	%	GWh
Sector 1 Industries	370	2%	19	1%	5
Sector 2 Buildings	2,880	6%	363	1%	38
Sector 3 Others	41	1%	2	0%	-

Sector 4 Losses	823	3%	42	1%	11
Total	4,114	5% ²	426 ³	1%	54 ⁴

¹ 2006-2010

² PEA Target identified in the National EE and RE Plan

³ Based on medium forecast scenario for electricity consumption growth and it is equivalent to saving MUS\$ 64 based on current kWh prices of US\$ 0.15, and equivalent to 300 thousands tones of CO₂

⁴ Based on medium forecast for electricity consumption averaged over the period 2011-2013 and it is equivalent to saving MUS\$ 8 based on current kWh prices, and reduction of 38 thousands tones of CO₂ possibly emitted.

1.3 Name and mandated national entity and contact person

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1.4 Calculation methodology of the baseline electricity consumption and the national indicative electricity savings target for 2020

Member States shall use the end use electricity consumption for the most recent five year period previous to the implementation of this Directive for which official data are available, to calculate an average amount of annual electricity consumption as per footnote 3.

- This electricity shall constitute the average amount consumed during the five-year period, not adjusted for degree days, structural changes or production changes.
- On the basis of this average amount of electricity consumption, called the baseline consumption, the national indicative electricity savings target shall be calculated for the total duration of this Directive

Example-1: If the five year averaged national end use electricity consumption has been 10,000,000 MWh and the indicative target for 2020 has been set at 20% than 10,000,000 x 0.20 = 2,000,000 MWh of electricity need to be saved through projects listed in the NEEAP until the end of 2020.

The indicative electricity savings target in MWh for 2020 should be supported by measures listed and described in the national NEEAP. The calculation to reach this target is based on **accumulated** accounting of annual electricity savings. This methodology does not require by definition to select only measures producing sustainable electricity savings for all years up 2020; nor does it require “infinite” sustainability. However a realistic sustainability of each measure should be given to calculate the accumulated electricity savings up to and including 2020

2. Sectoral presentation: Planned and ongoing EE measures for 2011-2013

Energy efficiency improvement program, energy services, other measures to improve energy efficiency

2.1 Sector 1 Industries

2.1.1 Overview table of all EE measures

No	Title and description of the EE measure	Implementation period	Electricity savings for the first 3 years 2011-2013
1	<p>Energy Efficiency Management Initiative and pilot projects: An ongoing program for promoting and applying Energy Audit tools in selected industrial premises and public buildings. The program enables raising the awareness of industries' managers and engineers by conducting full energy audits and presents them in awareness workshops and meetings. In addition, the program enables building the capacity of the PEC team in conducting Energy Audit through training on real cases.</p>	2011 – 2013	<p>A target of 1 GWh equivalent to saving a MUS\$ 0.15 on <u>current average kWh price of US\$ 0.15</u> and reducing 0.7 kTon¹ of possible emitted CO₂ until end of 2013.</p>
2	<p>Promoting the use of EE process technology and Energy Management in industries: While initiative (1) enables raising the awareness on the benefit of energy audit, this initiative aims at encouraging the use of energy management tools in industries as part of the EE technical solution. This may include: (1) using combined heat and power (CHP) system in the application of technology in which electrical energy and heat are produced in a single integrated system, (2) Improving motors efficiency, (3) using efficient O&M practices and (4) frequently regulating and monitoring energy consumption. The initiative involves providing specific incentives.</p>	2012 - 2015	<p>A target of 3 GWh equivalent to saving MUS\$ 0.45 and 2.1 kTon CO₂ by 2013</p>

¹ 1 kWh estimated equivalent to around 0.7 kg CO₂ emission as an average value of different fuels based on US Energy information Administration (<http://www.eia.gov/oiaf/1605/coefficients.html#tbl1>)

2.1.2 Detailed information of individual measures

Initiative (1)	Energy Efficiency Management Initiative and pilot projects
Objective	Reducing the consumption of energy through the promotion of the energy audit in key sectors; in particular the industries
Description of the measure	An ongoing project funded by the French AFD and the French Global Environment Facility and implemented by the PEC team supported by French experts. The project components entail building the capacity of PEC team through training them on conducting energy audit. Pilot energy auditing is implemented for different industrial premises, in addition to implementing the tool on hotels and hospitals. One of the main components of the project enables raising the awareness of managers and engineers in industries and other public and commercial buildings. This is achieved through presenting energy audit cases implemented in workshops and meetings focusing on the methodology, process, pre and post technical and operational measures, and the benefit reached by applying EE recommendations on both energy consumption and the economical feasibility. It is intended to reach out as many industries as possible to spread the knowledge and strengthen the capacities.
Stakeholders involved	PEA, PEC, PFI, JDECO, REERU, Ramallah and Al-Biereh Chamber of Commerce (the project steering committee)
Target group	Industries, hotels, hospitals, etc.
Program cost	MUS\$ 0.15
Total resources cost	MUS\$ 0.15
Cost / kWh saved	0.15 US\$/kWh
Reduction of subsidies	NA
Source of funding	AFD
Financial instruments	Funds provided by AFD and managed by PEC/PEA
Awareness	
Monitoring and quantification of impact	A steering committee chaired by PEC ¹ monitors the progress and expected to evaluate the outcomes of the project when finalized

Initiative (2)	Promoting the use of EE process technology and Energy Management in industries
Objective	Sustainably developing the industrial sector and strengthening its competitiveness
Description of the measure	Energy management process technology tackles both the use of the electrical power and thermal energy in industries. Tools such as combined heat and power (CHP) system, improving motors' efficiency, energy consumption monitoring techniques, and efficient O&M are among other efficient energy management tools for industries. The initiative allows to building on the achievement of the ongoing initiative (1) through introducing technical solutions and providing incentives for industries applying EE process technology and management. Incentives scheme will

¹ The role of the committee is to follow up on the implementation of the project. The committee meets regularly and checks the implementation of the project tasks. It is anticipated that by finalizing the project, an evaluation report will be prepared and discussed in a meeting

	be offered to encourage and assist industries. Schemes of tax deduction on EE equipments and measures could be proposed by PEA.
Stakeholders involved	PEA, PEC, PFI, EDU, MNE
Target group	PFI, Industrial associations, Industries
Program cost	MUS\$ 0.3
Total resources cost	MUS\$ 2.5
Cost / kWh saved	0.83 US\$/kWh
Reduction of Subsidies	NA
Source of funding	National fund as incentives and industrial self financing
Financial instruments	Self and a financial incentive scheme through PEA's Incentives as tax deduction. Self financing will be sought as part of an awareness scheme on the expected payoff when using Energy Management measures.
Awareness	Part of the initiative
Monitoring and quantification of impact	PEC chairing a technical and expert committee and to ensure best implementations, members from different Palestinian Industrial Associations will be presented.

2.2 Sector 2 Buildings (residential, public and commercial)

2.2.1 Overview table of all EE measures

No	Title and description of the EE measure	Implementation period	Electricity savings for the first 3 years 2011-2013
1	Preparation of the national green building guidelines (GBG) and associated codes: Identifying and evaluating the sustainability requirements in building sector in Palestine aiming at (a) reducing energy use in buildings on the planning phase and when possible existing buildings., (b) reducing material consumed in buildings' construction and hence the cost of construction, (c) mitigating any environmental impacts and (d) initiating the preparation of the national green building codes.	2012 -2015	Assumed ² 0.5 GWh until end 2013. This is equal to saving MUS\$ 0.075 , based on current kWh price, and reducing CO ₂ emission by 0.35 kTon
2	Design and implement a plan for replacing IBL with CFL in buildings sector: Vast majority of buildings are still fitted with incandescent bulbs lights (IBL). Although their initial cost is low but it is obvious that IBL are not any more efficient as they emit 90% of the power they consume as heat and the rest is the visible light. This initiative aims at promoting the use of energy savings Compact	2011 – 2014	Replacing 160,000 IBL with average savings of 51 watt/CFL each average 5 working hours would save 27 GWh , equivalent to MUS\$ 4.0 , and a

² By insuring that GB codes and the former Building Insulation Code are all enacted by relevant institutions.

	Florescent Lights (CFL), which has 8-15 times average rated life and 3 times efficiency compared to IBL. The plan for promoting CFL will consist of financial incentives scheme by which tax on CFL will be deducted. An awareness activities targeting public will be planned as part of the implementation of the measure. Until 2013, 160,000 CFL will be used to replace IBL.		reduction of 19 kTon of CO ₂ emission.
3	Design and Implementation of the Energy Input Labeling for energy appliances used in buildings sector: EE appliances, such as refrigerators, freezers, ovens, stoves, etc. use significantly less energy compared to other non EE appliances. The initiative aims at using energy input labeling (EE Labels) to rank the EE appliances for the consumers. This initiative is integrated with the national awareness program and an incentive scheme by which high consuming appliances used by the public (e.g. old non-EE refrigerators) could be replaced by EE appliances.	2011 – 2015	A target of 2 GWh equivalent to MU\$ 0.3 and a reduction of 1.4 kTon of CO ₂ emission.
4	National Awareness program on EE and RE in buildings: This initiative aims at promoting awareness among Palestinian society on the importance of energy savings by designing and implementing several activities that focus on the 'technical' and 'lifestyle' approaches in the process of rational use of energy and reducing energy bills. Tailored activities will target the public groups in schools, universities, public buildings, etc. This initiative is integrated with other proposed initiative.	2011 – 2015	Assuming ³ saving 3 GWh equivalent to MU\$ 0.45 and a reduction of 2.1 kTon of CO ₂ emission.

2.2.2 Detailed information of individual measures

Initiative (1)	Preparation of the national green building guidelines (GBG) and associated codes
Objective	Assessing the technical requirements needed to achieve sustainability in

³ Assumption is made on a forecast scenario which favors the public tendency to use a lifestyle approach when consuming energy, and on investing on EE appliances. Awareness campaign entails contests activities by which EE appliances could be rewarded to winners. A 1.5 GWh/year savings are assumed.

	the buildings sector and evaluating these requirements to help reducing energy consumption and material use while preserving the environment.
Description of the measure	Identifying and evaluating the sustainability requirements of the buildings sector in Palestine to help and encourage construction of energy efficient buildings by (a) reducing energy use in buildings, (b) reducing material consumed in buildings' construction and hence (c) reducing the cost of construction, and (d) mitigating any environmental impacts. GBG contains compulsory and optional design and construction requirements for the building sector (including architectural, mechanical, and electrical appliances). Requirements are those identified in the relevant codes. The guidelines are intended to be applied on all buildings. Buildings evaluated based on the green buildings guidelines are ranked according the degree of compliance to guidelines requirements. Incentives for green buildings will be integrated in the incentive plan and financial instrument initiative. Relevant Green Building Codes are: EE in Buildings Envelopes, EE in Buildings HVAC, EE in Lighting and Appliances, and Energy Audit Procedure in Buildings, etc.
Stakeholders involved	PSI, EA, PEA, PEC, MHPW, EQA, PSI, R&D
Target group	Buildings, Architectural and Engineering firms, Municipalities and local governorates
Program cost	MUS\$ 0.25
Total resources cost	MUS\$ 0.25
Cost / kWh saved	0.5 US\$/kWh
Reduction of subsidies	NA
Source of funding	National ⁴
Financial instruments	National
Awareness	Part of the initiative (4)
Monitoring and quantification of impact	PEC, EA chair a committee with members from relevant institutions and experts

Initiative (2)	Design and implement a national campaign for replacing IBL with CFL in residential, public, and commercial buildings
Objective	Promoting and encouraging the use of energy savings compact florescent lights (CFL) instead of the widely used incandescent fluorescent bulb lights (IBL) which consumes more energy.
Description of the measure	Majority of the households, commercial and public buildings have light bulb replacement potentials (CFL instead of the IBL). It could be assumed that in households, an average of 5 bulbs per house is used for an average operation of 5 hours a day. Each bulb has an average of 67.5 Watt (60 and 75 watt) that when replaced by CFL with average 16.5 watt (13 and 20 watt), would mean saving 51 watt on average for each bulb. The result is the decrease in buildings' purchase of electricity. This initiative seeks to use around 160,000 CFL replacing the IBL. The implementation of the

⁴ National and/or international financing of measures means that a governmental institution could have such measure as an item in their proposed budget to ministry of finance, in addition a measure could be an item proposed as part of the sleeked international assistance that usually submitted annually to the Ministry of Planning for fund raising.

	replacement plan will be integrated with financial incentives scheme whereby taxes on CFL will be deducted. In addition incentives on electricity bills could be sought from EDU, and awareness campaigns forming part of the national awareness initiative (4). Profile of each governorate related to electricity consumption and socio-economic conditions will be considered during the implementation of the incentives scheme.
Stakeholders involved	PEA, MLG, EDU, Municipalities and local governorates
Target group	Households, public and commercial
Program cost	MUS\$ 0.5
Total resources cost	MUS\$ 0.7
Cost / kWh saved	0.03 US\$/kWh
Reduction of subsidies	NA
Source of funding	Governmental, EDU, private sector
Financial instruments	Tax deduction of CFL and incentives on electricity bills sought from EDU
Awareness	Linked to national awareness program
Monitoring and quantification of impact	PEEC, EDU and Municipalities to jointly promote and evaluate the success

Initiative (3)	Implementation of the Energy Input Labeling (EE Labels) for energy appliances used in buildings sector
Objective	Decreasing the demand on energy consuming appliances by replacing them with EE appliances
Description of the measure	In addition to lighting, there are seven major household appliances ¹ that consume the bulk electricity either on 'operation' or 'stand-by' mode. Regulating and ranking the manufacturing and importing of such appliances to comply with EE requirements are highly essential. The initiative focuses on introducing the EE labels while conducting relevant awareness programs for the public as part of the national awareness initiative. The initiative is integrated with an incentive and financial instrument plan by which disadvantaged population could be offered specific assistance for replacing their non EE appliances.
Stakeholders involved	PEA, EDU, PEC, MNE, PSI
Target group	Commercial and industrial sector, public
Program cost	MUS\$ 0.5
Total resources cost	MUS\$ 0.5
Cost / kWh saved	0.25 US\$/kWh
Reduction of subsidies	NA
Source of funding	National and International
Financial instruments	Financial incentive scheme
Awareness	Part of the national awareness
Monitoring and quantification of impact	PEC and PSI to lead with participation from relevant institutions

¹ including: Refrigerator, Air Conditioner, Washing Machine, Oven, TV set, Clothes Dryer, and Dishwasher

Initiative (4)	National Awareness program on EE and RE in buildings
Objective	Raising and strengthening the awareness of the public on the benefit of EE measures by designing and implementing several diverse activities tailored for each public group.
Description of the	Raising the awareness of the public on the importance and benefits of

measure	applying EE measures in their own premises and entities is considered the main driving force for achieving an EE goals and targets. Awareness will focus on both 'technical' and 'lifestyle' approaches in the conservation of energy and the benefit of such approaches. To properly reach out public groups, specific programs will be designed for each group. E.g. Schoolchildren, as a group that comprises with their teachers and around 40% of the total population, will be outreached in their schools with simple hands on activities in addition to conducting EE competitions, championships, and awards handed to those achieved the best energy savings. Similar activities will be tailored for university students and for the public. Printed leaflets, guidelines, and background knowledge will be prepared and disseminated. Special lectures and advertisement broadcasted on national media will be designed.
Stakeholders involved	PEA, MEHE, UNRWA, Media Centers
Target group	Schools, Higher academic institutions, public buildings, etc.
Program cost	MUS\$ 1.5
Total resources cost	MUS\$ 1.5
Cost / kWh saved	NA
Reduction of subsidies	NA
Source of funding	EDU, Private Sector, National Funds, International Funds
Financial instruments	
Awareness	
Monitoring and quantification of impact	PEA, PEC, MEHE

2.3 Sector 3 Others (water pumping, agriculture, etc.)

2.3.1 Overview table of all EE measures

No	Title and description of the EE measure	Implementation period	Electricity savings for the first 3 years 2011-2013
1	Implementing a water economy program: The measure aims at regulating water pumping where operators are encouraged to perform pumping efficiency inspection regularly based on the pump system capacities.	2012 – 2015	<u>After 2013</u> an expected saving of 0.3 GWh until 2015

2.3.2 Detailed information of individual measures

Initiative (1)	Implementing a water economy program
Objective	Regulating water pumping at operators side by encouraging performing efficiency inspection.
Description of the measure	Regulation for frequent efficiency inspection on pump system performance will be prepared in order to achieving best performance at

	best efficiency. Incentives for upgrading and retrofitting of pumping system will also be offered for those operators that may demonstrate clear water pumping efficiency improvement. Such incentives could be provided from the PWA in return of promoting efficient management of the water pumping sector.
Stakeholders involved	PEA, PWA, Local Authorities, Municipalities, MLG
Target group	Pumping stations
Program cost	MUS\$ 1.5
Total resources cost	MUS\$ 1.5
Cost / kWh saved	No cost saved until 2013. Until 2020 an estimate 2 GWh saving is proposed.
Reduction of subsidies	NA
Source of funding	PWA, MLG, International funds
Financial instruments	Financial incentive scheme
Awareness	Part of the initiative
Monitoring and quantification of impact	PEA, PWA, Municipalities

2.4 Sector 4 Losses

2.4.1 Overview table of all EE measures

No	Title and description of the EE measure	Implementation period	Electricity savings for the first 3 years 2011-2013
1	Rehabilitating old electricity transmission and distribution networks: The rehabilitation of the power transmission and distribution network is needed in order to lower the 20% network power losses. At this stage a 1% power saving is.	2012 – 2015	Reduction 1% of the losses until 2013 will save 11GWh equivalent to MUS\$ 1.65 and 7.7 kTon CO₂

2.4.2 Detailed information of individual measures

Initiative (1)	Rehabilitating and restructuring transmission and distribution networks
Objective	The rehabilitation of the power transmission and distribution network is essentially needed in order to lower the 20% network power losses. At this stage a 1% power saving is sought targeting the technical losses only.
Description of the measure	Electricity distribution networks rehabilitation and restructuring is considered a pillar national EE projects as will reduces the high percentage of losses, improves service quality, cuts the cost, preserves the environment, ensures the safety of workers and third parties, and meets the growing demand on electricity. Palestinian urban areas, industrial and commercial areas will be targeted in the first NEEAP period.
Stakeholders involved	PEA, PETEL, EDU, Municipalities
Target group	Districts, Municipalities and village councils

Program cost	MUS\$ 1.0
Total resources cost	MUS\$ 1.5
Cost / kWh saved	0.136 US\$/kWh
Reduction of subsidies	NA
Source of funding	National and International
Financial instruments	National and a financial incentive scheme
Awareness	
Monitoring and quantification of impact	PEA, EDU, Municipalities

3. Additional measures

3.1 Measures for exemplary role of public sector

3.1.1 Overview table of all EE measures

No	Title and description of the EE measure	Implementation period	Electricity savings for the first 3 years 2011-2013
1	EE and RE through Energy performance certificate: Accreditation of Energy Efficiency and RE standard testing centers bounded by the national energy conservation law.	2012 – 2014	Assumed 3 GWh¹ savings that is equivalent to MUS\$ 0.45 and 2.1 kTon CO₂

¹ through implementing EE and RE performance testing of relevant products

3.1.2 Detailed information of individual measures

Initiative (1)	EE and RE through Energy performance certificate
Objective	The initiative aims at institutionalizing the testing and certification EE and RE performance and products bounded by the Energy Conservation Law and the associated standards and codes.
Description of the measure	Ensuring the implementation of the EE and RE codes and standards and the quality of implementation through independent testing centres. EE and RE codes prepared together with management and laboratory ISO relevant standards will be used as reference for accreditation. Both PSI and PEC will be the accredited responsible authority of testing centers.
Stakeholders involved	PEA, PEC, REERU, R&D, PSI
Target group	Buildings, industrial and services sectors
Program cost	MUS\$ 2.0
Total resources cost	MUS\$ 2.0
Cost / kWh saved	0.67 US\$/kWh
Reduction of subsidies	NA
Source of funding	National and international

Financial instruments	Revenues and financial assistance
Awareness	Training programs
Monitoring and quantification of impact	PSI, PEC, REERU, R&D

3.2 Measures under utility responsibility (according to article 5 of Arab EE directive)

3.2.1 Overview table of all EE measures

No	Title and description of the EE measure	Qualitative progress
1	Providing data and information on generation, transmission and distributions of power electricity	PEC and EDU to conduct Energy sector knowledge assessment and identify gaps in information and data
2	Improving services provided to customers	PEA to regulate and EDU to monitor quality of services provided
3	Contribution in funding relevant activities of EE measures	PEA to set incentives for EDU's financial contributions to activities and EE measures
4	Contributing in awareness campaigns and programs and in Energy Audit training	JDECO educational center in Jericho as part of the campaign and training. Universities and R&D institution jointly with EDUs and PEC to assist.

3.3 Measures for power sector (according to Article 4 of Arab EE directive)

3.3.1 Performance overview

No	Title and description of the EE measure	Implementation period	Unit (savings M\$/year)
1	Promoting clean energy conversion using solar	2010 – 2013	0.422 GWh/year ⁵

⁵ This has been indicated by PEA proposed actions.

	PV: Generating electrical power from RE by construction of a PV Power Station of 300 kWp capacity. This project is funded by the Japan International Cooperation Agency (JICA)		
2	Promoting clean energy conversion using CSP technology: Construction of thermal energy conversion power station using CSP technology with the project pre-feasibility. The World Bank Approved a fund for prefeasibility studies	2010 – 2015	20 GWh/year
3	Utilizing RE in electrification remotely isolated localities: Improving socio-economic conditions for disadvantaged communities by providing them with required electricity. This initiative is part of the PEA strategic plan to promote the use of solar thermal systems of high concentration in the industries and to improve the locally used domestic systems by better systems with proven thermal performance. Measures 1,2 and 3 in this section are expected to work on parallel with the adoption of the energy conservation law and the enacting of the feed in tariff.	2012 – 2015	0.2 GWh/year

4. Horizontal and Cross-Sectoral measures

4.1 Overview table of all EE measures

No	Title and description of the EE measure	Implementation period	Electricity savings for the first 3 years 2011-2013
1	Preparation and adoption of the Energy Conservation Law: A regulatory framework that provides needed legal bylaws and institutional arrangements for embarking on EE and RE drive. Features of the Law include; relevant EE and RE codes and labeling, Certification and accreditation of energy managers and auditing firms, and incentives for implementation of EE and RE in addition to regulating the Feed-in-Tariff schemes. The overall aim of the initiative is to regulate effectively all measures related to EE and RE in all sectors. Savings are expected as complementary to actions proposed in above proposed measures (e.g. 2.1.1).	2011 – 2013	An assumed 1 GWh savings until end 2013, which is equivalent to savings MUS\$ 0.15 of current kWh price. This is also equivalent to reducing 0.7 kTon CO ₂ emissions
2	Restructuring and Enhancing the role of the Palestinian Energy and Environment Research	2011 – 2012	NA

	<p>Center (PEC): This initiative aims at enhancing the role of PEC by restructuring it as part of the national energy system. PEC will be serving as the Palestinian Renewable Energy and Energy Efficiency Agency. The center should demonstrate its roles effectively in the awareness, monitoring, and evaluation of the ongoing EE and RE measures. Implementation of the PEC role is going to be cooperatively with relevant stakeholders, including R&D.</p>		
3	<p>Design and implementation of a plan for increasing the penetration of the diverse solar energy thermal systems in the different sectors: PCBS statistics showed that around 70% of the households in the PA use the solar domestic hot water systems. The SDHW systems are also used, but with minimal penetration, in commercial in industrial sectors. It is anticipated that more effective utilization of Solar energy thermal systems in domestic, commercial and industrial entities could save huge amount of energy. This initiative aims at exploring the potential of implementing solar thermal systems other than SDWH in buildings and industrial sectors and drawing a plan for implementation with specific pilot projects.</p>	2011 – 2015	Assumed a 3 GWh contribution equivalent to saving MUS\$ 0.45 and a reduction of 2.1 kTon of CO ₂
4	<p>Renewable energy resources atlas for Palestine: the initiative aims at preparing the wind and solar energy atlas for Palestine that could be used for assessing RE potential utilizations and their feasibilities. E.g. wind energy in Palestine is highly dependent on the measoscale phenomena. By identifying potential spots, wind energy systems (small, medium, or even large) could be proposed.</p>	2011 – 2013	NA
5	<p>Human resources capacity building in EE: The aim is to develop the capacity of energy managers and technicians in Palestine by training them on energy audits and EE feasibility studies for industrial and buildings sectors. The initiative is going to be implemented cooperatively with EDU, higher academic institutions, and Engineers Association. The initiative complements the AFD funded</p>	2011 – 2014	NA

	program elaborated in 2.1.1.		
6	Feasibility assessment and cost effective analysis of the utilization of waste-to-energy systems: The aim is to study the potential of waste-to-energy option in Palestine. Wastes are the generated combustible solid waste streams that could be incinerated in heat recovery energy conversion systems.	2011 – 2013	NA
7	Design and implementation of a national plan for retrofitting and upgrading streets lightings: inefficient poor lighting wastes significant financial resources each year and creates unsafe conditions. This initiative aims at using EE technologies and design to cut street lighting costs and replacing old (HPS) with new efficient lightings. In addition, the initiative aims at assessing the use of high quality solar street lightings. 8,000 lights will be replaced until 2013 and dimming system will be used as needed.	2011 – 2014	Average 150 watt HPS with ballast replaced by 70 efficient LED lights saving an average of 5.6 GWh equivalent to MUS\$ 0.84 equivalent to saving 4 kTon CO₂ emission

4.2 Detailed information of individual measures

Initiative (1)	Preparation and adoption of the Energy Conservation Law
Objective	Sustainably develop the Palestinian economy while mitigating greenhouse emission and reducing considerably the dependence on imported energy.
Description of the measure	<p>The law sets forth measures for energy efficiency and renewable energy utilization in all energy consuming sectors and at power generation, transmission, and distribution systems. The law is considered a regulatory framework that provides needed legal framework and institutional arrangement for the efficient utilization of EE and RE measures and techniques. Features of the Law include among others:</p> <ul style="list-style-type: none"> • Relevant EE and RE codes and labeling, • Certification and accreditation of energy managers and auditing firms, • Incentives schemes for embarking on EE and RE, including the Feed-in-Tariff schemes that support RE power generation. • Agreements with bulk energy consumers involving EE targets, • Strengthening the EE and RE awareness. <p>Incentives, including:</p> <ul style="list-style-type: none"> • Fiscal incentives: whereby exemptions or reduction on direct taxes or central sales taxes can be introduced, and customs duty

	<p>concessions on the import of material, components, and equipment used in EE and RE projects, and</p> <ul style="list-style-type: none"> • Financial incentives: for various EE and RE programs including providing soft loans through relevant national financial bodies and national banks for identified EE and RE technology systems. • Feed-in-Tariff for RE generators with specific approved capacities and on both generation bounded by the generation meters and on export back to power grid bounded by export meters.
Stakeholders involved	PERC, MNE, MLG, EDU
Target group	All sectors
Program cost	MUS\$ 0.5
Total resources cost	MUS\$ 0.5
Cost / kWh saved	NA
Reduction of subsidies	NA
Source of funding	National and International
Financial instruments	Financial assistance
Awareness	
Monitoring and quantification of impact	A steering committee chaired by PEA

Initiative (2)	Restructuring and Enhancing the role of the Palestinian Energy and Environment Research Center (PEC)
Objective	Restructuring PEC to be the national Renewable Energy and Energy Efficiency Agency mandated to tackling the issues related to EE and RE in cooperation with relevant stakeholders.
Description of the measure	<p>As PEA is a regulatory body, it is essential, however, to identify the role of PEC in the context of the Energy Conservation Law (in initiative 1) and the national energy system, which consist of the regulatory bodies (PEA and PERC in particular), EDU, research and development institutions, academic institutions and private consultancy institutions. In that sense PEC should have an independent status with a board of director chaired by the head of PEA and members representing relevant stakeholders and experts. The role of PEC will be bounded by the EE and RE law. Among the essential roles of PEC are:</p> <ul style="list-style-type: none"> • Monitors the fine implementation of NEEAP and other related actions within the framework of the Energy Conservation Law, • Collects and provides energy information and act as an national observatory in that sense, • Works closely with R&D institutions on promoting EE and RE technologies and measures, • Works closely with relevant institutions in the awareness programs and campaigns, • Works closely with relevant associations and higher education institutions to enhance the training and education program in EE and RE, • Works closely with standards institutions and R&D to ensure the implementation of relevant EE and RE codes, • Helps promoting the use of EE appliances and devices in the

	energy consuming sectors,
Stakeholders involved	PEC, PEA, PERC, EDU, R&D, PSI, EQA, MLG
Target group	PEC
Program cost	NA
Total resources cost	NA
Cost / kWh saved	NA
Reduction of subsidies	NA
Source of funding	National
Financial instruments	National
Awareness	
Monitoring and quantification of impact	A board of directors (institutions and experts) chaired by PEA

Initiative (3)	Design and implementing a plan for increasing the penetration of the diverse solar energy thermal systems in the different sectors
Objective	Enhancing the demands on solar energy thermal systems in all energy consuming sectors
Description of the measure	<p>Solar domestic hot water (SDHW) systems are widely used in Palestinian households with more than 70% of the houses relying on them. They contribute in EE and RE technologies by saving 15% of the household energy consumption. The use of solar thermal energy conversion applications is however diverse and could suit all sectors as solar energy is available with high utilization potential. The initiative enables assessing and further promoting the use of the thermal conversion of solar energy in different sectors, such as:</p> <ul style="list-style-type: none"> • High concentrating solar collectors in specific industrial, public and services sectors, • Thermal to electrical Energy conversion devices in power generation sector, • Solar thermal energy conversion in HVAC in buildings, • Water disinfection and treatment in services sector, • Water desalination/distillation, • Water pumping, • Solar bonds, • Solar drying systems, • Solar cooking, • Etc. <p>To ensure the penetration, tailored awareness programs will be designed in addition to announcing relevant incentive plans. Pilot projects from each application will be designed, built, and demonstrated as part of an outreach awareness plan.</p> <p>Improvement of the locally manufactured SDHW system and other solar energy conversion systems will be sought based on testing and certifying the systems and their components. PEC and other accredited testing facilities will perform the tests after demonstrating that testing facilities possess the required capacities and comply with the laboratory quality</p>

	testing standards, e.g. ISO 17025.
Stakeholders involved	PEA, PEC, REERU, PERC, R&D, EQA, MEHE, MLG
Target group	All sectors
Program cost	MUS\$ 1.0 (assessments and pilots)
Total resources cost	MUS\$ 1.2
Cost / kWh saved	0.4 US\$/kWh ⁶
Reduction of subsidies	NA
Source of funding	National and international
Financial instruments	Loans, tax exemptions and financial Incentive schemes
Awareness	Directive awareness champagnes
Monitoring and quantification of impact	PEC chairing a technical and expert committee

Initiative (4)	Renewable energy resources atlas for Palestine
Objective	Assessment the potential RE conversion systems in Palestine and best RE applications for potential geographic locations
Description of the measure	<p>The atlas will contain maps that illustrate the potential of both wind and solar energy applications and therefore presents valuable background information and data for decision-makers, investors, experts, engineers, and relevant stakeholders. Maps will be based on 250-1000 m modeled interpolation integrated with verified atmospheric dispersion models with downscaling capabilities (e.g. German MEMO, US MM5, etc.). Available synoptic data and ground measurements will also be used. RE resources maps include:</p> <ul style="list-style-type: none"> • Wind resource mapping, • Solar resource mapping, • Integration of resources and related data into GIS, • Solar energy applications opportunities, • Wind energy applications opportunities. <p>In particular, wind speed and direction in Palestine are highly dependent on the dominant mesoscale phenomena (breezes, mountain and valley wind, natural channeling, etc.), thus the maps of wind energy potential will show locations suitable for small and medium wind turbines, whether single units or farms. The resources maps will be integrated with several other proposed initiatives.</p>
Stakeholders involved	PEC, R&D, MLG, Municipalities
Target group	R&D, Private sectors, public institutions
Program cost	MUS\$ 0.07
Total resources cost	MUS\$ 0.07
Cost / kWh saved	NA
Reduction of subsidies	NA
Source of funding	National and International
Financial instruments	Directive applied Research and development

⁶ This is calculated as: Program cost/energy saved in kwh

Awareness	
Monitoring and quantification of impact	PEC, R&D, DM

Initiative (5)	Human Resources Capacity Building in EE
Objective	To develop the capacity of energy engineers and managers in energy audits and EE feasibility studies in industrial and buildings sectors.
Description of the measure	The initiative targets engineers, architects, environmental scientists, and qualified technicians who work in the energy engineering or energy management fields. Training is going to be performed in cooperation with higher academic institutions and engineers association with possibility for certifications (i.e. certified energy auditor) granted by Engineers Association and PEA. Training concentrates on real cases implementation, pilot projects, field visits and inspections, etc.
Stakeholders involved	Colleges of Engineering, Engineers Association, PEA, PEC, Municipalities, Engineering Consulting Firms, Industrial unions and associations
Target group	Engineers, professional technicians, managers
Program cost	A training course for 20 trainee costs ca. US\$40,000. Part of the money should be secured from training fees.
Total resources cost	US\$ 40,000./training course x 10 training courses = MUS\$ 0.4
Cost / kWh saved	NA
Reduction of subsidies	NA
Source of funding	Government grant, Engineers Association, College of Engineering, International funding
Financial instruments	
Awareness	PEC reaching out industries, universities, engineers associations and building on the ongoing AFD funded program
Monitoring and quantification of impact	PEC, R&D

Initiative (6)	Feasibility assessment and cost effective analysis of the utilization of waste-to-energy technology
Objective	The aim is to study the potential of waste-to-energy option in Palestine and its technical and economical feasibilities
Description of the measure	The limited lands and problem of accessibilities are considered major challenges facing the management of the solid waste service sector, in particular the municipality solid waste (MSW). In order to preserve the land and the environment, it is highly essential to reduce the waste considerably. As combustible waste (organic, paper and cardboard, plastics) comprises over 85% of the generated MSW there exists an opportunity for reducing waste and at the same time recover the energy content in the waste (heat recovery). Current figures show that Palestinians produce around 4000 t/year of combustible waste in the West Bank area alone. Research on the energy content of the generated combustible waste showed that the gross calorific value ranges from 18-20 MJ/kg for mixed combustible wastes. This means a potential of 0.5 MtoeMboe of energy equivalent. The potential and feasibility of

	incineration system will be investigated and cost analysis will also be conducted. These types of studies provide also the environmental impact assessment.
Stakeholders involved	PEC, REERU, MLG, Municipalities, EQA
Target group	Municipalities, local authorities
Program cost	MUS\$ 0.08
Total resources cost	MUS\$ 0.08
Cost / kWh saved	NA
Reduction of subsidies	NA
Source of funding	Research and development fund, International
Financial instruments	
Awareness	
Monitoring and quantification of impact	PEA, Municipalities, MLG

Initiative (7)	Design and implementation of a national plan for retrofitting and upgrading streets lightings
Objective	Using EE technologies and design to cut street lighting costs and replacing old (HPS) with new efficient lightings. In addition the initiative aims at assessing the use of high quality solar street lightings and when possible hybrid wind/solar street lightings.
Description of the measure	Inefficient poor lighting wastes significant financial resources each year and creates unsafe conditions. In Palestine roads and streets lightings efficiency need to be investigated and replaced with EE street lightings systems with dimming systems when required. The initiative will assess solar energy technology in providing the needed power for streets lightings. In this proposed initiative 8,000 lights will be replaced until 2013.
Stakeholders involved	PEA, PETEL, HPW, MLG, MT, Municipalities,
Target group	Municipalities, MLG, Local Authorities
Program cost	MUS\$ 0.48
Total resources cost	MUS\$ 0.6
Cost / kWh saved	0.093 US\$/kWh
Reduction of subsidies	NA
Source of funding	National Funding
Financial instruments	Municipality
Awareness	
Monitoring and quantification of impact	PEA, PETEL, Municipalities

4.3 Supportive measures with difficult to quantify electricity savings impact

No	Title and description of the EE measure	Qualitative progress
1	Applied scientific research on RE	R&D be encouraged to conduct researches on EE

		and the utilization of RE
2	EE and RE in higher education academic programs	PEA, Universities and vocational institutions toe Work jointly in providing courses in EE and RE
3	EE and RE in school curriculum (e.g. technology)	PEA with universities and MEHE to propose curriculums containing EE and RE especially in Technology and Science courses
4	Specific awareness campaigns on the non-technical power losses and its adverse consequences	PEA and EDU reaching out schools, universities, social networks
5	National RE fund	Financial supportive mechanism for R&D
6	Conferences and workshops in EE and RE	Universities with PEA and PEC to organize the events
7	Integrating Energy Sector information in a relevant geographic information system (GIS) on regular bases	PEC, R&D and EDU consorted works to structure the information system on energy sector in a dynamic effective way.

5. Criteria to assess energy efficiency policy implementation progress

Progress for overall measures such as energy policies, directives, and politics

No	Action/Activity	Qualitative progress
1	National Energy Efficiency Policy announcement	PEA to lead the effort
2	Expert preparing the first draft of the NEEAP	REERU in cooperation with PEA and PEC
3	Preparation of the national EE and RE strategy (2011- 2020) with active participation of stakeholders	PEA to lead the effort
4	General Electricity Law (2009) –Electricity Tariff	Finalized and implemented 2011

5	Restructuring SELCO	Effectively providing services
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