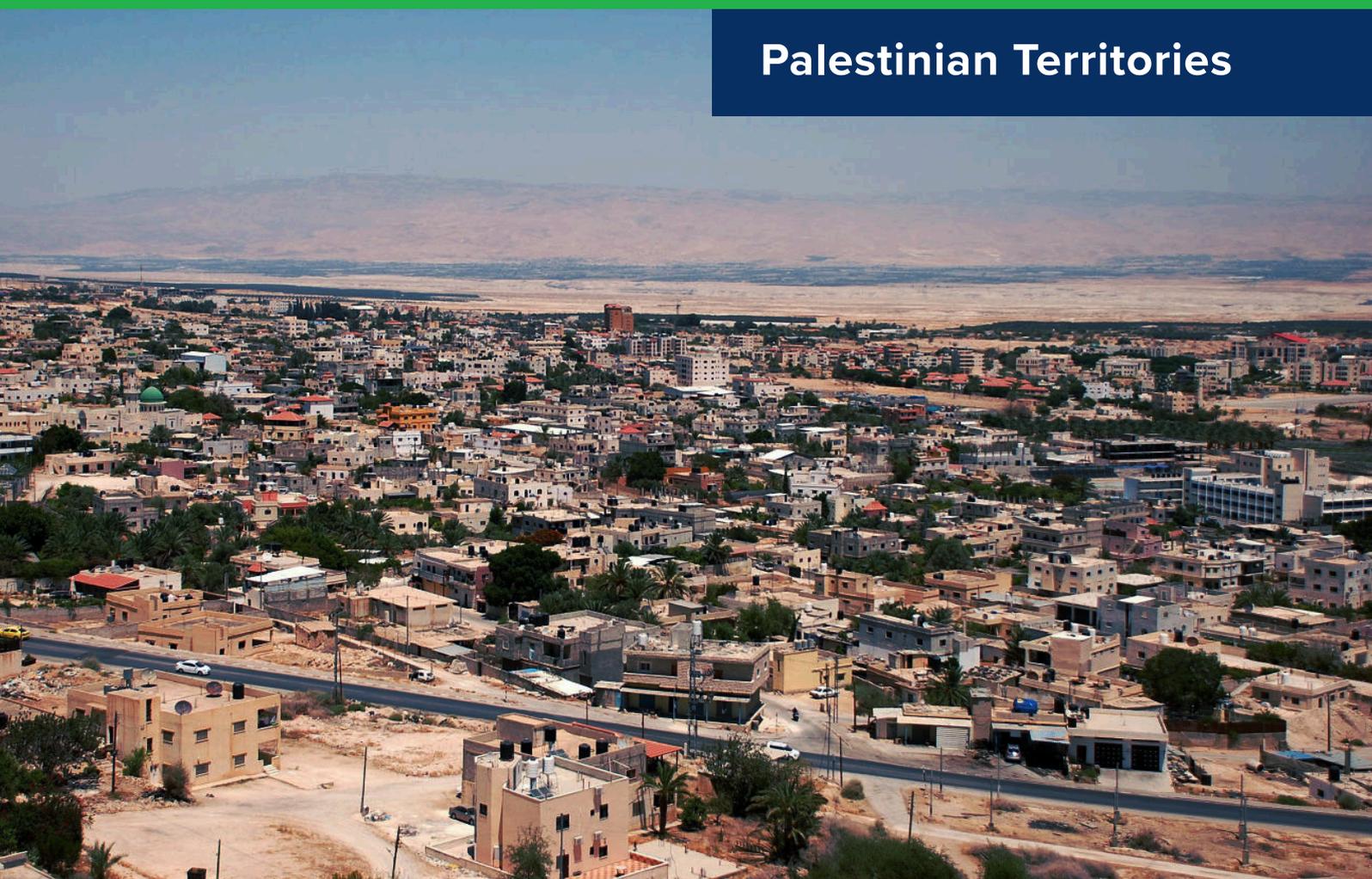




Mitigation Enabling Energy Transition in the MEDiterranean region  
Together We Switch to Clean Energy

# COUNTRY REPORT ON ENERGY EFFICIENCY AND RENEWABLE ENERGY INVESTMENT CLIMATE

## Palestinian Territories



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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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# Acronyms

<b>AFD</b>	French Development Agency (Agence française de développement)
<b>CSP</b>	Concentrating Solar Power
<b>DisCos</b>	Distribution Companies
<b>ENEA</b>	Italian National Agency for New Technologies, Energy and Sustainable Economic Development
<b>EE</b>	Energy Efficiency
<b>EQA</b>	Environment Quality Authority
<b>ESCOs</b>	Energy Service Companies
<b>FDI</b>	Foreign Direct Investment
<b>FFEM</b>	Fonds Français pour l'Environnement (or FGEF - French Global Environment Facility)
<b>FIT</b>	Feed-in-tariff
<b>GDP</b>	Gross Domestic Product
<b>GHG</b>	Green House Gasses
<b>IEC</b>	Israel Electric Corporation
<b>IFC</b>	International Finance Corporation
<b>INCR</b>	Initial National Communication Report
<b>MEDENER</b>	Mediterranean Association of National Agencies for Energy Management
<b>NAP</b>	National Adaptation Plan
<b>NDC</b>	Nationally Determined Contribution
<b>NEAP</b>	Palestinian National Environmental Action Plan
<b>NEEAP</b>	National Energy Efficiency Action Plan
<b>PEAP</b>	Palestinian Environment Assessment Policy
<b>PEC</b>	Palestinian Energy and Environment Research Center
<b>PENRA</b>	Palestinian Energy and Natural Resources Authority
<b>PERC</b>	Palestinian Electricity Regulatory Council
<b>PES</b>	Palestinian National Environmental Strategy
<b>PETL</b>	Palestinian Electricity Transmission Company (ex: National Transmission Company)
<b>PIF</b>	Palestine Investment Fund
<b>PIPA</b>	Palestinian Investment Promotion Agency
<b>PLO</b>	Palestinian Liberation Organization
<b>PMA</b>	Palestinian Monetary Authority

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**Country Report on Energy Efficiency and Renewable Energy Investment Climate**

<b>PNA</b>	Palestinian National Authority
<b>PPA</b>	Power Purchase Agreement
<b>PSI</b>	Palestinian Solar Initiative
<b>PT</b>	Palestinian Territories
<b>PV</b>	Photovoltaic
<b>RCREEE</b>	Regional Center for Renewable Energy and Energy Efficiency
<b>SUNREF</b>	Sustainable Use of Natural Resources and Energy Finance
<b>SWH</b>	Solar Water Heaters

## Foreword



It has been a great privilege and responsibility for me to coordinate the activities planned within the meetMED project dedicated to “Mapping selected countries’ investment climate and market structure in order to mitigate investment risks for pre-defined Energy Efficiency and Renewable Energy Sources technologies”.

These activities addressed policy and regulatory risks and barriers for the financing of energy efficiency and renewable energy sources in two Mediterranean countries (Palestinian Territories and Algeria), by gathering updated information on the national economy, in particular the investment climate in the energy sector, the energy market structure and the legislative framework for energy efficiency and renewable energy sources investments.

This meetMED Investment Country Report is the main outcome of the activity and is aimed at giving a brief and up-to-date picture of the energy efficiency and renewable energy markets of Palestinian Territories providing for transparent and comprehensive analysis of the existing legal and regulatory framework applicable to an investment in the energy sector. A survey has been conducted through questionnaires and interviews addressed to public decision-makers and local and foreign sectoral companies in order to study the market confidence in the field of renewable energy sources and energy efficiency.

Policy recommendations are a crucial part of the report through the combination of general and specific recommendations which guarantees both long-term policy advice and short-term policy guidance for the improvement of investment climate and market structure.

This report shows that there is a pressing need to achieve an extraordinary deployment of initiatives and actions in order to promote and to support strategies and policies in the Mediterranean region that trigger a tumultuous investment growth in renewable energy and energy efficiency. On the other hand, it is clear that overcoming existing barriers and risks to invest-

ment requires deep changes to the regulatory framework and to market rules, that have to be necessarily accompanied by adequate technical assistance, guidelines and good practices so that they can effectively contribute to green investment and sustainable growth.

The report has been carried out with the agreement and remarkable support of Palestinian Energy and Environment Research Center (PEC) experts in order to identify the strategic goals and objectives of the reviewing process.

I hope that these meetMED case studies might represent a starting point for next project cooperation opportunities, to be applied to all MEDENER and RCREEE countries, properly revised and expanded, so as to contribute significantly to the definition of a framework of detail at regional level, to be taken as an additional tool to support the sharing and dialogue between countries.

My warm and sincere thanks go to our Partners and to all the colleagues who have contributed, through their effort and expertise, to the successful realization of this work.

**Roberto Del Cielo**

ENEA – Activity Leader

## Acknowledgements



This meetMED report provides an accurate insight into the market structure and normative frameworks for RE and EE investments in the Palestinian Territories – identifying opportunities, risks, and barriers through a detailed survey of national authorities as well as of domestic and foreign companies. It is directed to policy makers, public authorities, investors and financial institutions, local communities and final customers as to provide guidance and raise awareness on opportunities and choices that increase the penetration of the RES and EE systems.

The report is the fruit of very effective teamwork between the experts from the Italian National Agency for Energy (ENEA) and from the Palestinian Energy Council (PEC) under the framework of the EU-funded meetMED project.

In particular, special thanks should go to Dr Aysar Yasin from the An-Najah National University who drafted the report and carried out extensive consultations in the Palestinian Territories and to Dr. Basel Yaseen, renewable energy director at the Palestine Energy Centre (PEC), who secured the support necessary to initiate and complete this report.

From the ENEA team, Dr Cecilia Camporeale and Dr Roberto Del Ciello secured the consistency of the report and the comprehensive supervision on its methodology and on its schedule, with the support of Dr Maged Mahmoud from the RCREEE, in his quality as leader of the relevant meetMED working area.

This report would not be complete without acknowledging the special contribution of individuals and organizations from the Palestinian Territories that have granted solid commentaries and in-depth peer review of the text, among others: Eng. Ayman Ismail, Technical Vice President of Palestinian Energy and Natural Resources Authority (PENRA), and Dr. Mohammad Alsayed, from the An Najah National University.

The report also benefited from discussions with general directors from the Palestinian Electricity Transmission Company Ltd. (PETL), the Palestinian Electricity Regulatory Council (PERC), the Tubas Electricity Distribution Company (TEDCO) and other DisCos, the Palestinian Investment Fund (PIF), the Palestinian Investment Promotion Agency (PIPA), the Palestinian Solar and Sustainable Energy Society, the Environment Quality Authority, and the Palestinian Central Bureau of Statistics (PCBS).

The technical quality and the diversity of the team that contributed to this report, together with its undivided commitment, proved the vitality of the meetMED human capital: a network of experts of the energy agencies and ministries from the Southern and Northern shores of the Mediterranean Sea, working together to facilitate the implementation of RE and EE policies in their countries.

**Matteo Barra**

meetMED Project Manager

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# Executive Summary

## Background

This meetMED report was elaborated as part of the project ‘Mitigation Enabling Energy Transition in the Mediterranean Region’ (meetMED) and focuses on mapping the investment climate in order to mitigate the investment risks for Energy Efficiency and Renewable Energy Sources technologies in the Palestinian Territories.

The main objective of the report is to identify the policy and regulatory risks and barriers by gathering updated information from market players on the investment climate, after an overview of the energy market structure and of the legislative framework for investments in the field of energy efficiency and renewable energy sources. In conclusion, the report presents its general and specific policy recommendations, which provide both long-term policy advice and short-term policy guidance for the improvement of the investment climate.

## Introduction

This meetMED country report on renewable energy sources (RES) and energy efficiency (EE) investment climate provides a transparent and comprehensive analysis of the legal and regulatory framework applicable to domestic and foreign investment in the RES and EE sector of the Palestinian Territories. The report highlights investment risks and barriers based on the analysis of the energy market structure and of the market confidence, taking into account the experience of domestic and foreign market players. The main objective of the report is to promote energy investment through the identification of potential investment opportunities and the formulation of policy recommendations.

Besides general information about the Palestine Territories – like country information, political system, economic situation, national financial institutions, and international investment flows – the report describes the significance of the energy sector in the economy of the country - energy supply and con-

sumption, national energy plan and strategy. The report focuses on hydrocarbons, electricity, energy efficiency, and foreign investment legislation. The market structure and institutional governance are analysed, including shedding light on environmental and social protection in the energy sector, on the RES and EE market, and on the institutional structure of the energy sector.

The EE and RES market confidence in the Palestinian Territories has been analysed by means of two questionnaires. The first questionnaire is directed for public authorities on foreign direct investment (FDI) attractiveness in RES and EE. The second questionnaire is directed to entrepreneurs/companies potentially interested in investments in Palestinian Territories on RES and EE.

## Methodology

The methodology used to prepare this report was designed by a joint team of experts from ENEA and from the Palestinian Energy and Environment Research Center (PEC), which is one of the energy research institutions within the Palestinian Energy and Natural Resources Authority (PENRA).

Together, the team defined the strategic goals and objectives of the report, designed its table of content, and identified the relevant stockholders that include: the Palestinian Electricity Regulatory Council (PERC), the Ministry of Finance and Planning, the Ministry of National Economy/Standards and Metrology Association, the Environment Quality Authority, Distribution Companies (utilities), the Palestinian solar and sustainable energy society, the Palestinian Investment Promotion Agency (PIPA), the Palestinian Electricity Transmission Company (PETL).

The report takes into account the results of investment climate country reports carried out by international organizations, such as UNCTAD, IEA, IRENA, OECD, and the outcomes of EU-funded projects, such as CLIMA-SOUTH (2014-2017) and the “Facility for regional dialogue and integrated maritime policy/Climate Change”.

The team prepared two questionnaires that were sent out to stakeholders interested in the report, such as international organizations, financial institutions, and investors.

The first draft of the report was prepared by Dr Aysar Yasin from An-Najah National University, as a local consultant for the PEC in close collaboration with country experts. The initial findings of the report were discussed in a workshop held in Rome on 4 December 2019 at the ENEA headquarters, and further drafts were commented by country experts and peer reviewers in order to secure the quality and in-depth review of the report.

## The Current Energy Situation in the Palestinian Territories

The Palestinian Territories are a very complex area divided into two administrative regions, involving 4,7 million population, that cause different limits to the potential development of infrastructures and to the development policies of energy sector.

The fragile and unclear political situation reflects in the slowdown of the economic performance of recent years. The GDP is different in the two administrative territories: West Bank and Gaza Strip. In 2017, the GDP in Palestinian Territories grew by 3.1%; the GDP per capita in the West Bank increased by 2.4%, whereas it declined by 2.9% in Gaza Strip. The weakness of the Palestinian economy is underline by the growth of the unemployment rate increased in Palestinian Territories to 28.1% compared to 27.2% in 2016. The credit market is guarantee by 12 traditional banks and 3 Islamic banks capable to bear risks as well as political and economic fluctuations, but also by money changers and specialized lending institutions, mainly based on non-bank deposit.

The energy situation is severe in the Gaza strip and it is improving in the West Bank. This complexity energy situation is due to the high dependence on Israel, the physical separation of Gaza and West Bank, high political instability and insufficient infrastructure.

In 2018, the primary energy consumption <sup>(1)</sup> in Palestinian Territories is about 75,178 TJ. The fuel and gas represent about 58%, imported and generated electricity is about 28% and renewable energy (solar energy, wood, etc.) is about 12%.

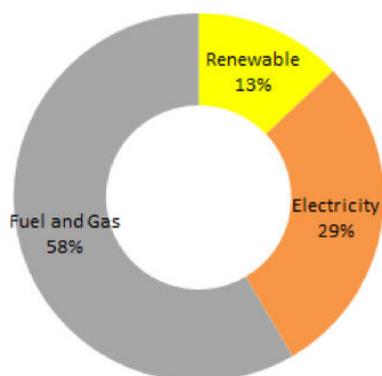
(1) PCBS, Energy Balance 2018

## Country Report on Energy Efficiency and Renewable Energy Investment Climate

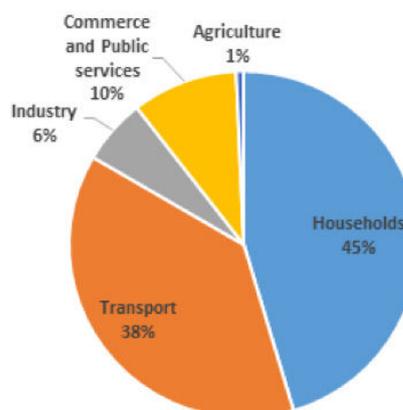
The electricity supply meets only half of the demand in Gaza, which frequently leads to a blackout. Although the West Bank generally has around-the-clock electric power, a deficiency appeared during winter and summer. Palestinian Territories rely primarily its electricity needs on the import flow from Israel, Egypt and Jordan, with costs of energy higher than in neighbouring countries.

The only large scale generation capacity in the Palestinian Territories is the 140 MW Gaza Power Plant. The plant is based on diesel-fired technology, and it is currently facing a continuous interruption because of the siege imposed on Gaza Strip. The plant is so expensive to operate that it can typically be run only at half capacity. It has also suffered repeated damage during armed conflict affecting its fuel storage capacity.

**Figure E.1** – Primary Energy Consumption in PT in 2018



**Figure E.2** – Final Energy Consumption in PT by sector in 2018



In 2018, the Palestinian final energy consumption in the household's sector was about 45%, in the transport sector was 38%, whilst the remaining was going to commercial, industry, and agriculture. This means that the residential and transport sectors spent the largest final energy consumption. About 99.9% of households in Palestinian Territories were connected to the public electricity network. About 56.5% of households had solar water heaters. The average electricity consumption per household was 306 kWh in January 2015.

The electricity sector suffers from operational and financial problems due to high losses and low collection rates. In 2018, about 14% of electricity produc-

tion was lost and never billed due to the poor state of the infrastructure and illegal connections <sup>(2)</sup>.

## Relevant Energy Laws and Regulations

Since 2010, PENRA has embarked on a comprehensive program for restructuring and developing the energy sector, including the legal, legislative, regulatory and institutional aspects within a clear strategic vision. In 2012, the Palestinian cabinet adopted the overall renewable energy strategy<sup>(3)</sup> that set a target of 130 MW from different renewable energy sources for electricity generation by 2020.

In the same year, the Palestine Solar initiative (PSI), an initiative launched by PENRA in order to promote the solar energy and to educate people about the solar energy and its applications, aimed also to install on-grid residential rooftop solar systems of 1 to 5 kWp PV for 1000 houses distributed geographically in West Bank governorates and installed capacity target of 5 MW by 2015. Under the PSI plan, households purchase themselves the solar systems from developers or installers, possibly through “green loans” and then sell energy produced back to the grid in return for a feed-in-tariff. Although initially attractive, over time the PNA reduced the feed-in-tariff rates due to budgetary restrictions, making the program progressively less attractive to consumers. As of December 2016, PENRA reported that approximately 300 systems of 5 kWp each were installed on the residential sector under the PSI.

PENRA set out a sectoral energy strategic framework for developing the energy sector for the period 2017-2022. It takes into account the new agreements with Israel regarding the transfer of energy distribution sector to the Palestinian government, the government plans to exploit and develop oil and natural gas in Palestinian Territories, the supply of Gaza Strip with natural gas, and the legislation for the development and the exploitation of RES.

The overall national strategy of the sector is to build an integrated Palestinian energy sector that achieves the concept of sustainability and continuity of development. It also provides energy demand by raising the percentage of

(2) PCBS, Energy Balance 2018

(3) Energy sector strategy (2012)

clean energy in the total energy supplied to the market and by reducing the negative environmental impacts of energy supply and consumption in addition to the production and the consumption of energy as efficiently as possible, while ensuring the realization of the concept of security of energy supply, which is essential to achieve the principle of sustainability of the sector.<sup>(4)</sup>

PENRA has adopted three basic programs for sponsoring RE and EE for the period 2017-2019.<sup>(5)</sup> The same programs, adopted in the policy statement for the period 2017-2019, will be used during the period 2020-2022, as these programs cover policy objectives associated with the achievement of the strategic objectives of the sector.

Another sectorial energy strategy for the years 2014-2016 has been developed by PENRA, called “Comprehensive Energy Strategy for Palestine”. This strategy was adopted by the Council of Ministers in 2012. In 2020, local energy sources should cover approximately 50% of the total electricity consumption and RES should be at least 10% of the electricity produced locally in 2020, which is 240 GWh. Unfortunately, the strategy has not been fully achieved.

Electricity is generated by PV benefits from the incentives or is subject to different prices according to their applicable framework. Incentives for power plants greater than or equal to 1 MW peak from RES are available in order to sell their production. The Chinese government is seeking to build a 30 MW solar plant in the Southern West Bank and PENRA will issue a competitive tender for the construction of 3 solar power plants with a capacity of 10 MW each. Noor Palestine Solar Program is intending to install 200 MW distributed in different phases, wherein the first phase includes the installation of 35 MW grid-connected utility-scale PV power parks and 500 schools.

Currently, no law addressing the hydrocarbon sector is in force but there is a draft under preparation to integrate the different energy subsectors planning and policy-making activities to a single policy and planning body in order to enable better and affordable energy services to consumers. Furthermore, other objectives are: i) assuring the optimal exploitation of both conventional and RES available; ii) regulating and developing the electricity sector; iii) encouraging local manufacturing, utilization of high-efficiency energy-consum-

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(4) Energy sector strategy (2012)

(5) Comprehensive national strategy of energy sector in Palestine, (2016)

ing equipment; iv) contributing to the protection and conservation of the environment also including the reduction of the GHGs.

According to the Electricity Law, issued on 23 April 2009, PENRA as energy policy-maker have to work on encouraging research about alternative energy sources, as well as regulating their exploitation using by law.

Renewable Energy and EE Law has been produced as a result of the collaboration between PERC, PEC and PENRA. The law outlines the mandate of PENRA, PERC, and PEC as related to RES and EE. It defines the position of PENRA as the policy-making institution responsible for the preparation of the energy strategy and its implementation. PENRA, with the technical support of PEC, is assigned to identify the areas of high RES and EE potential, which in turn will be prioritized for the development of RES installations and EE measures. Potentially, this could enhance the deployment of RES and EE in the PT.

The most recent law related to renewable energy in PT is the Decree-Law related to renewable energy and EE issued in 2015, where the art. 2 states that the objective of the law is to encourage the utilization of RES and their applications in increasing its contribution to total energy balance and achieve secure energy provision in line with renewable energy strategy. Articles 14 and 18 of the same Decree-Law encourages investment in renewable energy production by granting all the privileges that investment law provides.

In 2012, PENRA had prepared and launched the National Energy Efficiency Action Plan (NEEAP). The plan aims to achieve an indicative target of 5% for the electricity consumption in 2020, compared to that foreseen in the Energy Sectorial Strategy (2017-2022). The achievement of the mentioned target means energy savings of approximately 384 GWh annually by 2020, leading to at least 55 million USD annual savings of the total electricity cost in Palestinian Territories and annual CO<sub>2</sub> emissions reduction by 285,000 tons.

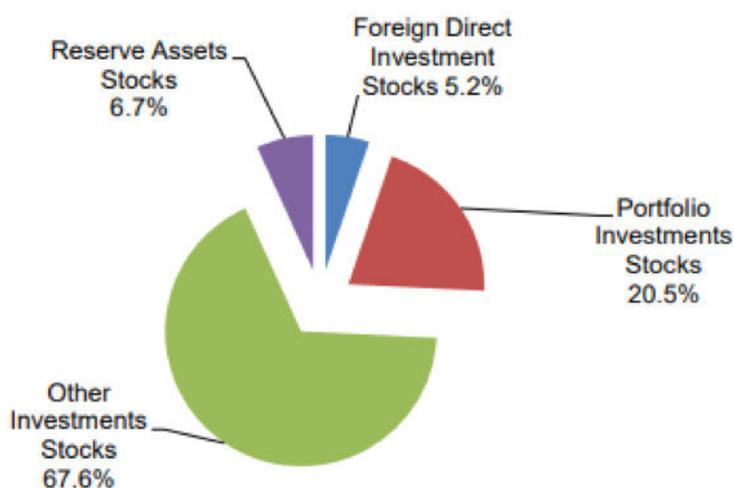
PENRA already started a pilot phase in 2010–2015, which included various activities in the field of EE and rationalizing consumption. Cabinet decree was adopted in March 2012 provides a general legal framework for EE measures adoption. Voluntary EE building code (2004) is adopted.

## The International Investment Flow in Palestinian Territories

The total stock of investment abroad by the domestic enterprises amounts to USD 6,619 million at the end of 2017, of which 20.5% is portfolio investment stocks, 6.7% reserve assets, 5.2% foreign direct investment and 67.6% is other investments (Figure E.3).

The total foreign investment stock in domestic enterprises in the Palestinian Territories amounted to USD 3,017 million at the end of 2017, of which 55.3% is foreign direct investment, mainly focused in the financial intermediation sector.

**Figure E.3** The percentage distribution of external assets stocks of residents' enterprises in PT by type of investment at the end of 2017



According to data from the Palestinian Central Bureau of Statistics, FDI stock was at USD 2.72 billion at the end of 2018, suggesting a net inflow of around USD 200 million at that time. Foreign investments incoming to Palestinian Territories focus on telecommunications, real estate, and financial services. Historically, Qatar has been the main investor in the area followed by Jordan.

To attract foreign investment, the Government has established a regulatory framework favourable to investors. Following the principle of non-discrimination, all benefits guaranteed by law are offered to both local and foreign investors, including protection against expropriation, guarantees for repatria-

tion, tax incentives and exemptions, etc. More information can be found in the “Doing Business in the Palestine” Guide issued by the Palestine Trade Centre.

Noteworthy investments in Palestinian Territories include the approval of the 450 MW Jenin power plant in the West Bank valued at more than 600 million USD and a 300 million USD cement factory in Beit al-Lahm. PNA was also seeking international financing for the development of its marine gas field, which remains untapped to this day. Its cost was last estimated at USD 1.2 billion by the World Bank, but this figure may be lower if Israel agrees to let Palestinians use its gas infrastructure.

## Survey on Market Confidence

A questionnaire for public authorities on FDI to assess the effectiveness and adequacy of national and local policies to increase FDI in RES and/or EE was distributed to the main energy institutions and organisations. The questionnaire focuses on:

1. RES and EE in the national energy policy;
2. Grid connection for producers;
3. Licensing procedures for small scale producers – the level of administrative complexity and financial costs, duration;
4. Capital costs for investment in production facilities;
5. Availability of financial support for investments – grants, subsidies, access to credit;
6. Priority feed-in for renewable energy;
7. Feed-in tariffs and other forms of support;
8. Policy consistency as a factor for investment security;
9. All the questions refer to the production of renewable energy by wind, photovoltaic/thermal solar and biomass and EE implementation.

Another questionnaire was conducted for entrepreneurs potentially interested in investing in RES and EE. The questionnaire focuses on:

1. The companies working in the field of renewable energy and EE;
2. Overview of the activities, revenues, and assets of the companies working in the field of renewable energy and EE;

3. The investments made and planned in the production of renewable energy from biomass, wind, PV, and solar thermal;
4. The investments made and planned in EE in buildings, industrial processes, lighting, heating, and air conditioning;
5. Investigate the main barriers: financial and economic barriers, technological and infrastructural barriers, institutional and regulatory barriers, and public awareness and information barriers;
6. Reasons for the international expansion of the company in renewable energy and/or EE sector.

## Recommendations

Based on the analysis of the relevant legislation, market structure and market confidence in the EE and RE sector, the report suggests the following policy recommendations on legislation and incentives.

### Legislation:

1. Review and update the existing laws and the instructions mainly net metering, PSI, direct offer, competitive biddings, incentives, etc. This is to make all parties benefit from investing in RE and EE. Currently, some DisCos consider investors in RE as a competitor which makes them (DisCos) not supportive and cooperative. The review and modification should generalize the benefits to consumers, Investors, and DisCos.
2. Enhance the infrastructure like the national grid to absorb all the energy generated from RES without affecting the quality of power signal
3. Clear guidance for investment and connection of RES projects;
4. Prepare national and transmission distribution code in accordance with the required codes, like Jordan, Egypt, and Israel;
5. Open the market for Energy Services Companies (ESCOs) through the ratification of the laws and the bylaws of EE. The current situation does not encourage investment in ESCOs as energy efficiency unit in PENRA perform free of charge energy auditing.
6. Adapt and ratify the building and green building codes in all sectors. Right now, there are no building codes in Palestine.
7. Organise the energy sector. The energy sector still requires further reforms, some municipalities and village councils still not annexed to DisCos and deal directly with IEC.

8. Create information centres and data banks for all RES and EE projects.
9. Classifications of RES and EE companies based on performance and capacity. The market of RE becomes not safe and risky as some unqualified companies start to work in this field with little experience.
10. Unify the standardization of the RES and EE equipment.

#### Incentives:

1. Review the investments motivations presented from PIPA to include the EE projects, together with RES;
2. Extra incentives towards tax exemptions in EE goods and projects;
3. Open the energy markets for small and large investments, provided that small investors cannot implement their projects because large investors cover all the demand;
4. Further awareness campaigns should get started, such as organizing workshops at all levels, utilizing formal and informal mass media, social media, etc., and updating the schools' curriculums to include subjects on EE and RES.

# 1. General Information on Palestinian Territories

## 1.1. Country Information

The Palestinian Territories, as shown in Figure 1<sup>(1)</sup>, lie on the Western edge of the Asian continent and on the Eastern extremity of the Mediterranean Sea, between 34°20'– 35°30' E and 31°10'– 32°30' N. It includes two areas: the West Bank 5949 km<sup>2</sup> (including East Jerusalem), and the Gaza Strip 365 km<sup>2</sup><sup>(2)</sup>.

Figure 1 – Palestinian Territories map today



(1) Climate Resilient Transformation with Green Climate Fund, program funded by UNDP 30/06/2019.  
 (2) Federal Research Division (2004).

The Palestinian Territories can be divided into five topography regions<sup>(3)</sup>:

- Jordan Valley Region: Its altitude varies between 200-300 m below sea level to about 100–200 m above sea level. The region is flat with terrain slopes up to 3 degrees.
- Eastern hills: extending along the eastern part of the West Bank, its altitude varies between 200 and 800 m above sea level and terrain inclination reaches up to 15 and more degrees.
- Central Highlands: extending over 120 km and comprising Hebron in the South to Tubas in the North, this region is mountainous, with some parts reaching over 1000 m above sea level. It is considered the largest part of the West Bank.
- Western West Bank: including the districts of Jenin and Tulkarem, its altitude is 100-300 m above sea level and mostly low to medium inclined terrain.
- Gaza Strip: mainly flat, with dunes near the coast, its highest point reaches 105 m above sea level.

Figure 2<sup>(4)</sup> shows the main regions of the PT. There are 557 localities, distributed as follows: 524 in West Bank and 33 in Gaza Strip. These are administered by 379 local authorities, which in turn into 124 municipalities, 10 local councils and 245 village Councils. The population according to census 2017<sup>(5)</sup> is 4.78 million inhabitants for an area of 6020 km<sup>2</sup> with population density in West Bank and Gaza Strip of 484 and 5203 people/km<sup>2</sup>, respectively<sup>(6)</sup>. It is worth noting that population density in the Gaza strip is among the highest population densities in the world<sup>(7)</sup>.

(3) Atlas of solar resources of the Palestinian Territories (2014)

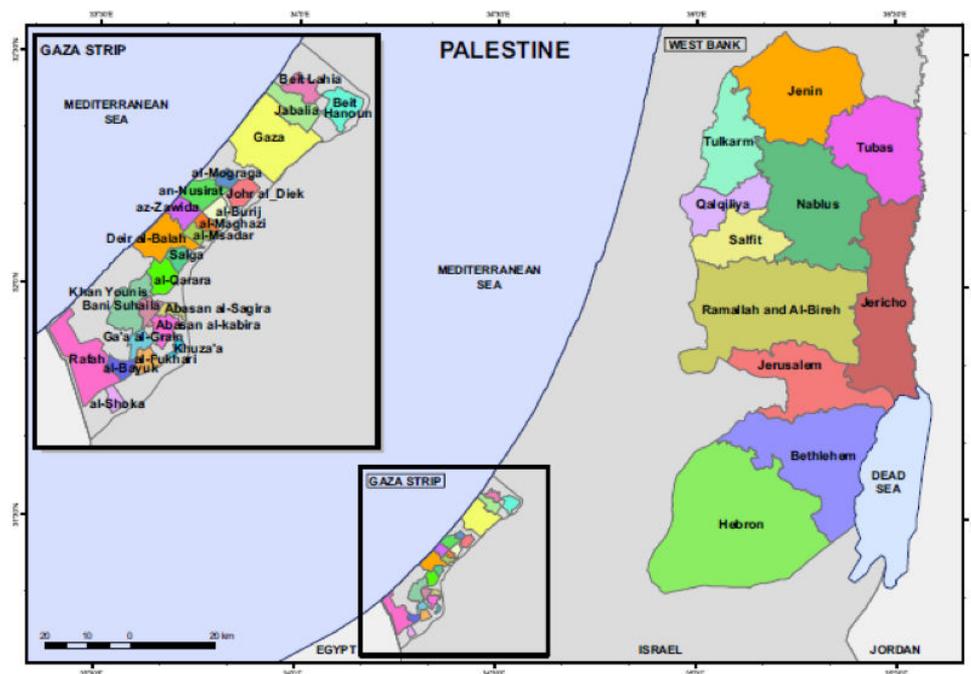
(4) Juaidi A et al., (2016)

(5) Census 2017, Palestinian Bureau of Statistics

(6) Census 2017, Palestinian Bureau of Statistics

(7) Palestinian Central Bureau of Statistics PCBS (2007)

Figure 2 – Regions of Palestine Territories



## 1.2. Political System

The Palestinian National Authority (PNA) has been created after signing the Oslo Accords between the Palestinian Liberation Organization (PLO) and the State of Israel in 1993 and 1995<sup>(8)</sup>. According to Oslo Accords, PNA has limited self-governance of parts of the West Bank and Gaza Strip. The most important matters are related to the borders of Israel and PT, Israeli settlements, the status of Jerusalem, Israel's military presence in - and control over - the remaining territories after Israel's recognition of Palestinian autonomy, and the Palestinian right of return. Nonetheless, the Oslo Accords did not create a Palestinian State.

According to Oslo accords II<sup>(9)</sup>, PT is divided into three administrative regions: the Areas A, B, and C. The Areas are not connected. In Area A, the full civil and security control belongs to PT. In Area B, PT has civil control, but security control is joint between Israel and PT. In Area C, the full civilian and

(8) Sean F. McMahon (2009)

(9) Israeli-Palestinian Interim Agreement on the West Bank and the Gaza Strip, 28 September 1995. From the Knesset website

security control is provided by Israel. Approximately 60% of the land regions in the West Bank are classified as Area C. The more or less direct control of Israel constitutes an important limit to the potential development of traditional energy infrastructures and, in general, to all development policies of the energy sector<sup>(10)</sup>.

The State of Palestine consists of the following institutions that are associated with the PLO: President of the State of Palestine, the Palestinian National Council, the Executive Committee of the Palestine Liberation Organization. These should be distinguished from the President of the Palestinian National Authority, Palestinian Legislative Council (PLC) and PNA Cabinet, all of which are associated with the Palestinian National Authority instead.

### 1.3. Economic Situation and Performance

The slowdown in the performance of the Palestinian economy continued throughout recent years due to political and economic developments and changes, which had a negative impact on key economic drivers and weakened activity<sup>(11)</sup>. The fragile and unclear political situation makes the private sector lag behind its role in enhancing the growth of the economy. This dominated macro-economic indicators and economic growth.

The main obstacles to growth in recent years can be summarised as follows:

1. Instability of the political situation in light of the tensions associated with the growing conflict in international relations in the Middle East;
2. Drop-in foreign grants to Palestinian governments;
3. Land confiscation and settlement expansion, which prohibits Palestinians in West bank from utilizing the available resources in Area C;
4. Closure of Gaza Strip.

Figure 3<sup>(12)</sup> shows the GDP by region for PT. The GDP in PT grew by 3.1% during 2017, showing an increase compared to its 4.7% level in 2016. The Palestinian economy witnessed a 6.3% increase in 2012 and decline by 0.2% in

(10) Juaidi A et al. (2016)

(11) Palestine Monetary Authority (PMA) (2018)

(12) PCBS (2017)

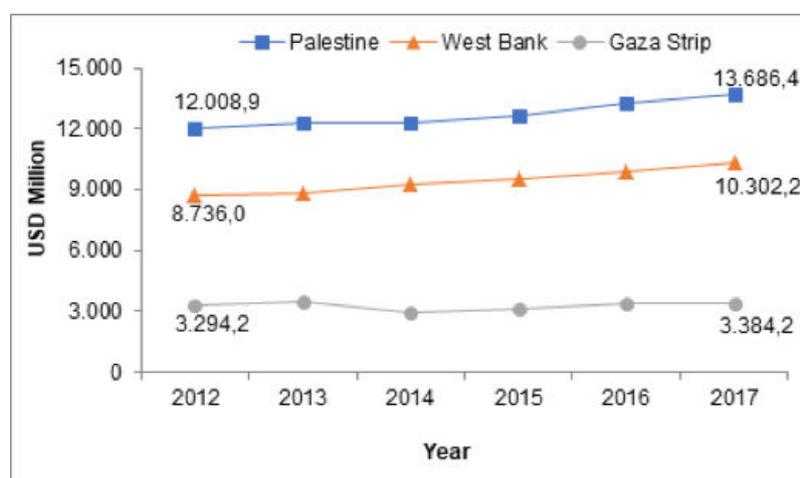
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2014 before it increased again to 3.1% in 2017. The growth rates in GDP varied between the Gaza Strip and the West Bank in 2017, where the growth rate in the West Bank reached 4.3%, whereas it declined by 0.3% in Gaza Strip.

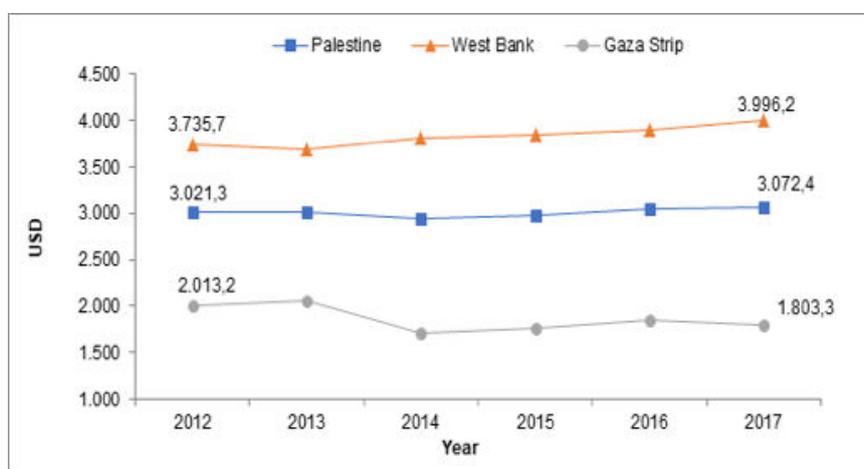
As a result of this variation in growth rates, the Gaza Strip contribution to GDP decreased to reach 24.7% in 2017 compared to 25.6% in 2016. Figure 4<sup>(13)</sup> shows the GDP per capita in PT increased in 2017 compared to 2016, reaching USD 3,072.4. The standards of living in PT during 2017 became more than it was during 2012 when it stood at USD 3,021.3. As a result of the variation in GDP growth, the GDP per capita in the West Bank increased by 2.4%, whereas it declined by 2.9% in Gaza Strip during 2017.

The GDP per capita in the Gaza Strip recorded a decrease as it reached 45.1% of the GDP per capita in the West Bank in 2017 compared to 47.6% in 2016. The GDP per capita in the West Bank totaled USD 3,996.2 in 2017 compared to USD 1,803.3 in Gaza Strip. This means that GDP per capita in Gaza Strip represented 45.1% of the GDP per capita in the West Bank in 2017, remained lower than its level in 2016, which was 47.6%.

Figure 3 – GDP by region, 2012- 2017 at constant prices (base year: 2015)



(13) PCBS (2017)

**Figure 4** – GDP per capita by region, 2012- 2017 at constant prices (base year: 2015)

The value-added of economic activities increased in PT during the year 2017, except agriculture and information and communications fell by 5.7% each.<sup>(14)</sup> Wholesale and retail trade activities recorded the highest increase by 8.7%, followed by construction activities with 6.3%, service and other branches by 1.2%, industry and transportation and storage by 2.2% for each.

The labour force participation rate decreased in PT to 45.9% in 2017. The unemployment rate increased in PT to 28.1% in 2017 compared to 27.2% in 2016.<sup>(15)</sup> During 2017, the nominal average daily wage in PT increased by 3.9% to USD 32, while the real average daily wage increased by 3.7% during the same period. The consumer price index in PT recorded a slight increase of 0.21% during 2017 (the base year 2010).

## 1.4. National Financial and Credit Market Institutions

The banks are the main institutions that contribute to credit markets in PT: there are 15 banks, of which 12 are conventional and 3 are Islamic banks. Figure 5<sup>(16)</sup> shows the names and classification of banks in PT and other banking systems and institutions.

(14) PCBS (2017)

(15) PCBS (2017)

(16) Jamaldeen F.(2012)

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The banking sector has experienced persistent improvement and development throughout the years stimulating its strength and capacity to bear risks and political and economic fluctuations (Figure 6).<sup>(17)</sup> The key difference between conventional banks and Islamic banks is that conventional banks earn their money by charging interest and fees for services, whereas Islamic banks earn their money by profit and loss sharing, trading, leasing, charging fees for services rendered, and using other sharia contracts of exchange.<sup>(18)</sup>

Figure 5 – Banking System and Institutions

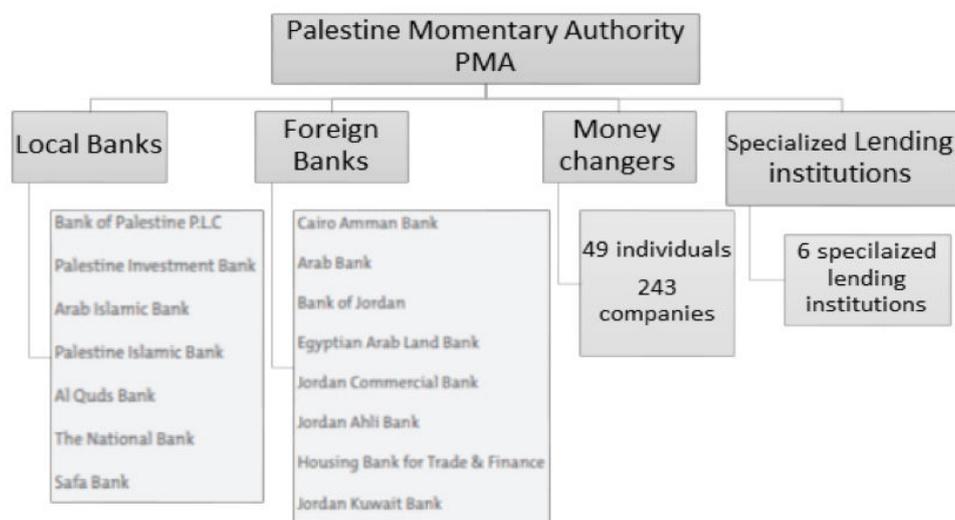
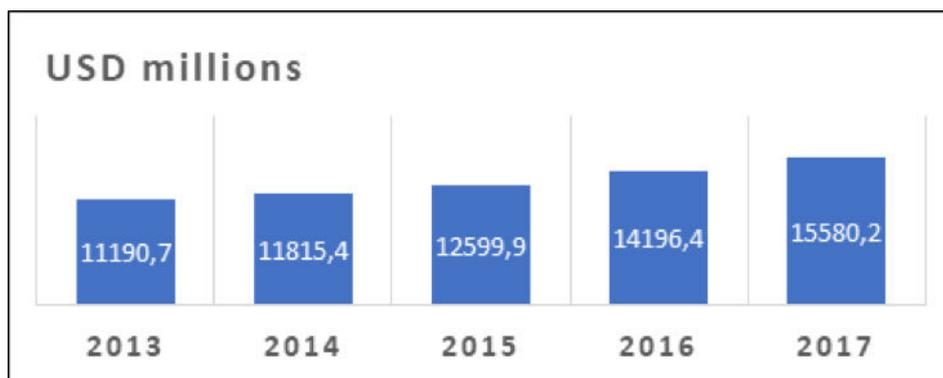


Figure 6 – Assets of banks operating in Palestinian Territories, 2013-2017



Islamic and conventional banks in PT play an important role in economic development by transferring the financial resources from savings surplus units

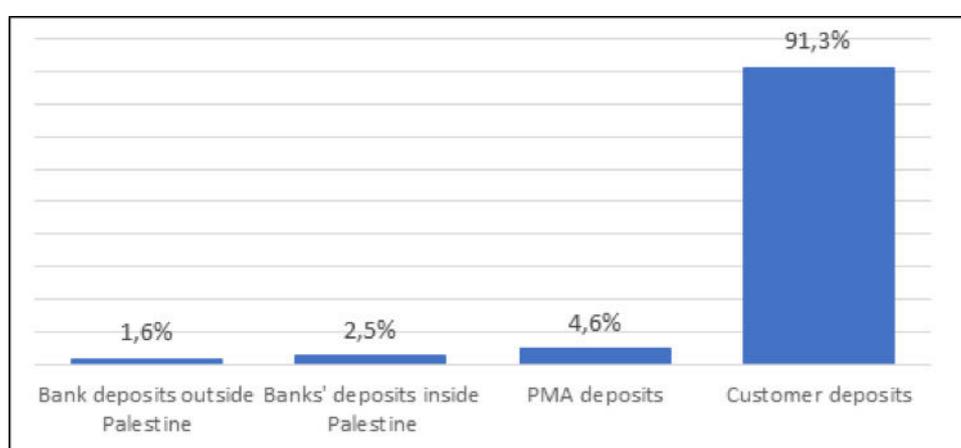
(17) Ra’fat T. Jallad , Laui Antari (2019)

(18) Jamaldeen F.(2012)

to savings deficit units. The banking system is supervised by the PMA<sup>(19)</sup>. Islamic banks constitute about 18% of the banking system, while conventional banks share the remaining 82%.<sup>(20)</sup>

The structure of banking deposits is shown in Figure 7. The customer's deposits present about 91.3% (USD 11982 million). The analysis of the deposits at the Palestinian banking system shows an 11.7% rise of the total deposits at the end of 2017 compared to 11.8% at the end of 2016 thus reaching USD 13,117.8 million.<sup>(21)</sup>

**Figure 7 – Structure of deposits, 2017**



The largest and most important component of total deposits is the non-bank deposits as it is an indication of the continuous flow of funds to banks. This is due to the increasing number of bank branches which expands to include remote and rural areas, increasing clients' confidence in banks and the continuation of banking awareness-raising campaigns. Most of the customer deposits came from the private sector. The share of this sector continued to rise to 93.9%, compared to 93.6% in 2016. Most deposits are from the resident private sector while non-resident deposits registered 3.3% of the total private sector deposits.<sup>(22)</sup>

The money changers are one of the cornerstones of financial stability. Efforts of PMA to enhance the safety and stability of the money changer continued in 2017. The total assets of this sector experienced an accelerated increase of

(19) Ra'fat T. Jallad , Laui Antari (2019)

(20) Palestine Monetary Authority (PMA), 2018.

(21) Jamaldeen F. (2012)

(22) PCBS & PMA (2017)

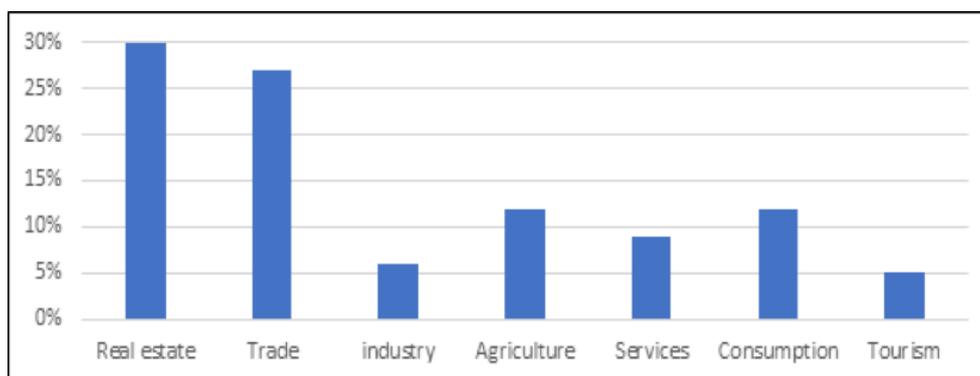
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5.9% in 2017 compared with 5.1% in the previous year to USD 74.3 million.<sup>(23)</sup>

The specialized lending institutions are one of the significant financial institutions in PT. PMA published several supervisory instructions for the purpose of developing and safeguarding lending institutions and their clients; it controls and regulates the specialized lending institutions in order to raise the size of financing offered by these institutions and stimulate their role as financing channels that complete banks in their work. Four profit-making institutions are working in PT: Vitas Palestine, ACAD Finance, AL Ebdaa Microfinance, Asala for Credit and Development Company. The two non-profit companies are Palestine for Credit and Development Company (FATEN) and Reef Finance.

The number of their clients (borrowers) in 2017 rose to 72,209, including 48,936 in the West Bank and 23,273 in Gaza Strip. The sectoral distribution of specialized lending is shown in Figure 8.

**Figure 8 – Sectoral distribution of specialized lending**



The volume of the loan portfolio reached approximately USD 215 million in PT. The portfolio includes conventional bank loans at 84.5% or USD 181.7 million and Islamic loans at 15.5% or USD 33.3 million.<sup>(24)</sup>

Domestic liquidity levels experienced accelerated growth in 2017 reaching 12.6% compared to 10.1% in 2016 reaching USD 10,993.2 million due to being influenced by economic performance and changes in liquidity components (net foreign assets, net domestic assets, and net other items).<sup>(25)</sup>

(23) Palestine Monetary Authority (PMA), 2018.

(24) Palestine Monetary Authority (PMA) (2018)

(25) Palestine Monetary Authority (PMA) website.

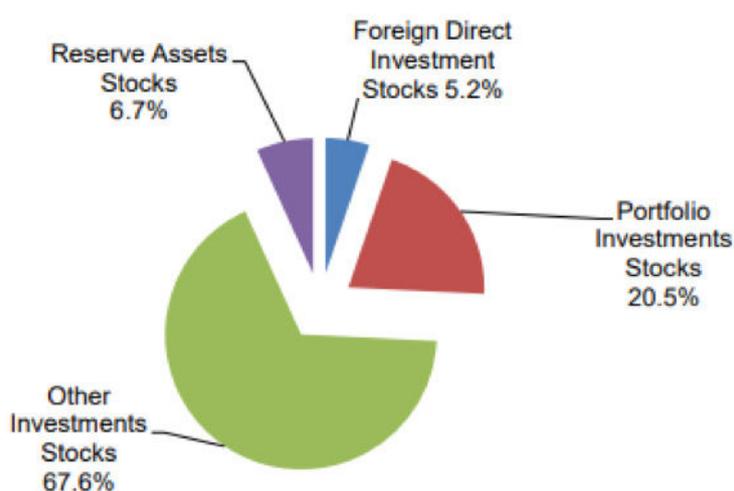
## 1.5. International Investment Flows

The total stock of investments abroad (assets) by resident enterprises in Palestine amounted to USD 6,619 million at the end of 2017, of which 67.6% is a foreign exchange in these enterprises and their deposits in banks abroad. The distribution of assets is illustrated in Figure 9<sup>(26)</sup>; other investments abroad (includes trade credits, loans, currency and deposits, and others) amounted to USD 4,468 million, 67.6% of total assets; portfolio investments abroad amounted to USD 1,360 million, 20.5% of total assets; stock of reserve assets for the PMA amounted to USD 446 million, 6.7% of total assets; and the FDI abroad amounted to USD 345 million, 5.2% of total assets at the end of 2017.

The total foreign investment stock in resident enterprises in PT (liabilities) amounted to USD 3,017 million at the end of 2017, of which 55.3% is FDI.

With regard to the distribution of liabilities, FDI amounted to USD 1,669 million, 55.3% of total liabilities; portfolio investments were USD 703 million, 23.3% of total liabilities; while other investments totalled USD 645 million, 21.4% of total liabilities at the end of 2017. This is illustrated in Figure 10<sup>(27)</sup>.

**Figure 9** – Percentage Distribution of External Assets Stocks of Resident Enterprises in Palestinian Territories by Type of Investment, at the end of 2017

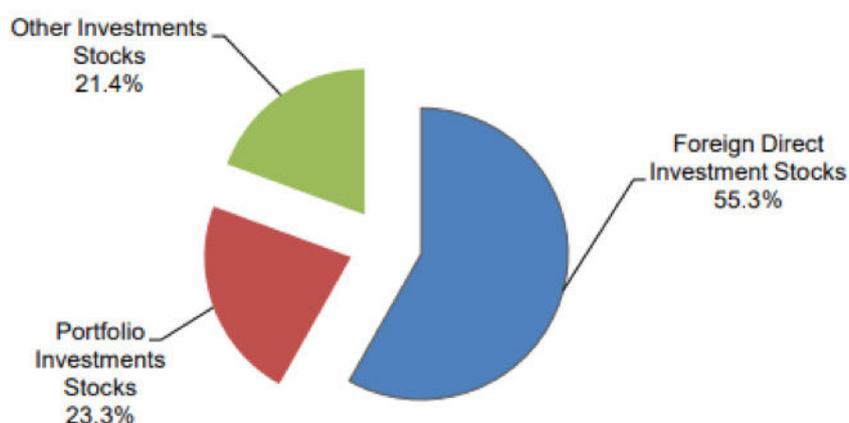


(26) PCBS & PMA (2017)

(27) PCBS & PMA (2017)

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**Figure 10** – Percentage Distribution of Foreign Liabilities Stocks in Resident Enterprises in Palestinian Territories by Type of Investment, at the end of 2017



The results in Table 1 showed that 63% of FDI in resident enterprises in PT are concentrated in the financial intermediation sector.<sup>(28)</sup> Table 2 shows investments from Jordan contributed for 81.3% of the total stock of FDI in resident enterprises in PT. As shown in Table 3, 55.5% of total portfolio investments in resident enterprises in PT are concentrated in the financial intermediation sector.

Table 4 shows investments from Jordan contributed for 51.7% of the total stock of portfolio investments in resident enterprises in PT. The external investments by resident enterprises in Palestine were greater than investments by non-residents in resident enterprises in PT at the end of 2017.<sup>(29)</sup>

**Table 1** – Percentage Distribution of FDI in Resident Enterprises in PT by Economic Activity at the end of 2017

Economic Activity	Value (in Million USD)	Percentage (%)
Financial Intermediation	1,051	63.0
Services, Transport, Storage, Communications & Internal Trade	516	30.9
Industry	64	3.8
Constructions	38	2.3
<b>Total</b>	<b>1,669</b>	<b>100</b>

(28) PCBS & PMA (2017)

(29) PCBS & PMA (2017)

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**Table 2** – Percentage Distribution of FDI in Resident Enterprises in PT by Country at the end of 2017

Country	Value (in Million USD)	Percentage (%)
Jordan	1,356	81.3
Qatar	130	7.8
Egypt	48	2.9
United States of America	34	2.0
Cyprus	19	1.1
Saudi Arabia	18	1.1
Other Countries	64	3.8
<b>Total</b>	<b>1,669</b>	<b>100</b>

**Table 3** – Percentage Distribution of Foreign Portfolio Investment in Resident Enterprises in PT by Economic Activity at end of 2017

Economic Activity	Value (in Million USD)	Percentage (%)
Financial Intermediation	390	55.5
Services, Transport, Storage, communications & internal trade	263	37.4
Industry	36	5.1
Constructions	14	2.0
<b>Total</b>	<b>703</b>	<b>100</b>

**Table 4** – Percentage Distribution of Foreign Portfolio Investment in Resident Enterprises in PT by Country at end of 2017

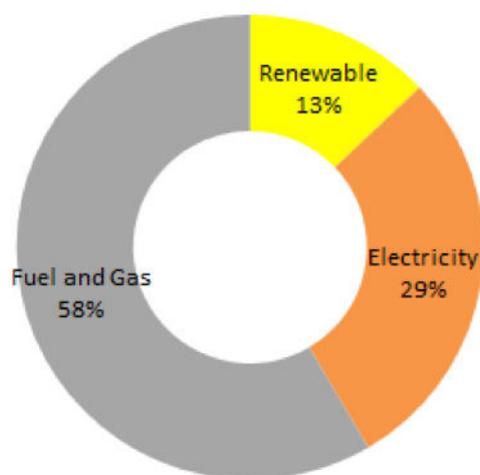
Country	Value (in Million USD)	Percentage (%)
Jordan	363	51.7
Kuwait	63	9.0
United Arab Emirates	62	8.8
Saudi Arabia	57	8.1
Qatar	36	5.1
United States of America	29	4.1
Other Countries	93	13.2
<b>Total</b>	<b>703</b>	<b>100</b>

## 2. The Role of the Energy Sector in the Economy of the Country

### 2.1. Energy Supply and Consumption

The energy situation is severe in the Gaza strip and is improving in the West Bank. A number of research papers and projects studied the Palestinian energy sector in detail: they describe the complex energy situation due to, among others: the high dependence on Israel, the scattered territory, various political risks, the relatively low-income level, the insufficient grid, the “loss” of energy through un-authorized abstraction of electricity.<sup>(1)</sup>

Figure 11 – Primary energy consumption, 2018



The primary energy consumption in PT is 75,178 TJ in 2018 and it is distributed as shown in Figure 11, with fuel and gas represent the mainly energy, which goes to residential and transportation sectors.

(1) Juaidi A et al., (2016), Yaseen BT (2009) and Hamed TA, Flamm H, Azraq M. (2012)

Energy sources in PT consist of the energy generated by petroleum and natural gas derivatives, imported and generated electricity and renewable energy. The energy balance in PT is highlighted in Figure 12 by a Sankey diagram.

PT import most of its energy needs from Israel. The total imported energy in PT by type of energy for the year 2017 is presented in Table 5<sup>(2)</sup>. It is worth noting that about 369 GWh of electricity is locally generated with is about 6.2% from the total electricity demand for the year 2017. Small amounts of biomass energy (olive cake and wood) is utilized for heating applications.

**Table 5** – Imported Energy in PT by Type of Energy and Region, 2017

Region	Type of energy							
	Electricity (MWh)	Gasoline (k liter)	Diesel (k liter)	Fuel Oil (k liter)	Kerosene (k liter)	LPG (ton)	Bitumen (ton)	Wood & charcoal (tons)
West Bank	4,801,564	274,716	496,146	4,769	1,279	124,208	23,352	3,300
Gaza Strip	775,300	40,049	234,497	671	114	65,329	232	107
<b>Palestine</b>	<b>5,576,864</b>	<b>314,765</b>	<b>730,643</b>	<b>5,440</b>	<b>1,393</b>	<b>189,537</b>	<b>23,584</b>	<b>3,407</b>

Source: Palestinian Energy and Natural Resources Authority (PENRA). Energy statistics reports 2017.

The power supply meets only half of the demand in Gaza, leading to rolling blackouts of eight hours on and eight hours off. Although the West Bank generally enjoys 24-hour power supply, shortages have emerged during peak winter and summer months. With demand projected to grow at an average annual rate of about 3.5% in the foreseeable future. PT imports almost all of its electricity from the Israel Electric Corporation (IEC), as shown in Figure 13<sup>(3)</sup>. A small portion of electricity is purchased from Jordan to supply the city of Jericho and another portion from Egypt to supply Rafah in Gaza. The only large-scale generation capacity in the territories is the troubled Gaza Power Plant with 140 MW capacity.<sup>(4)</sup>

(2) PCBS (2017), Energy Balance of Palestine

(3) Energy statistics reports 2017

(4) PCBS (2015) and PENRA (2012)

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Figure 12 – Sankey Diagram of Energy Balance in Palestinian Territories in 2018

Units: TeraJoul

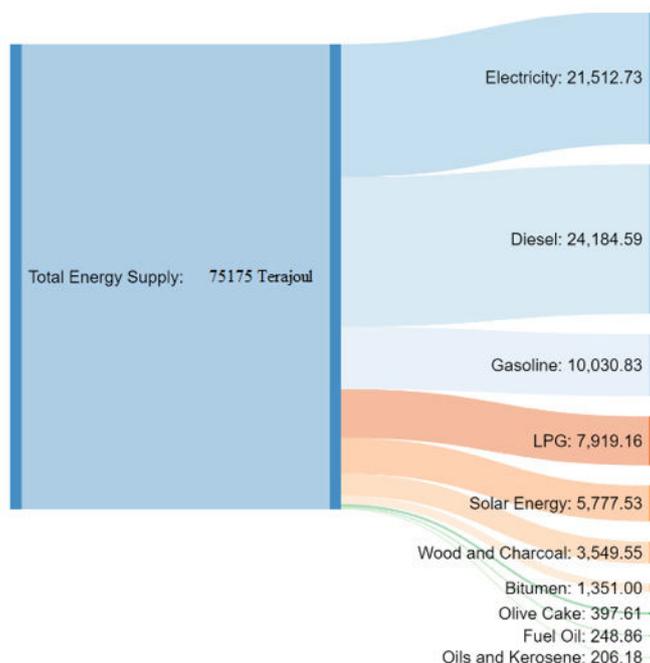


Figure 13 – Quantity of electricity imported and purchased in Palestinian Territories by region and source in 2017

Units: MWh

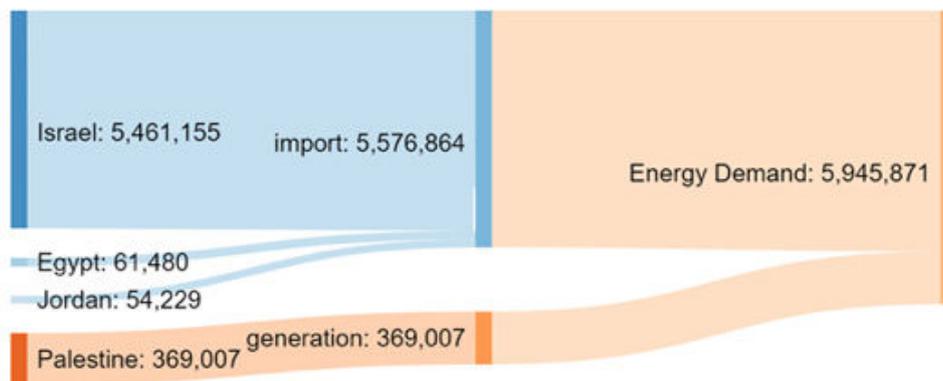


Table 6 shows the average annual prices of different energy types in 2017 for West Bank and Gaza Strip. The costs of energy sources are higher than neighbouring countries.

The results of the household survey conducted in 2015<sup>(5)</sup> indicated that about

(5) PCBS household energy survey 2015

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99.9% of households were connected to the public electricity network. Of these, 58.3% of households used a normal electricity meter and 41.7% of households used a prepaid electricity meter. The results of the survey indicated that 56.5% of households had solar water heaters; this percentage was 59.6% in January 2009. Figure 14 shows percentages of households have solar heater by region in January 2015.<sup>(6)</sup>

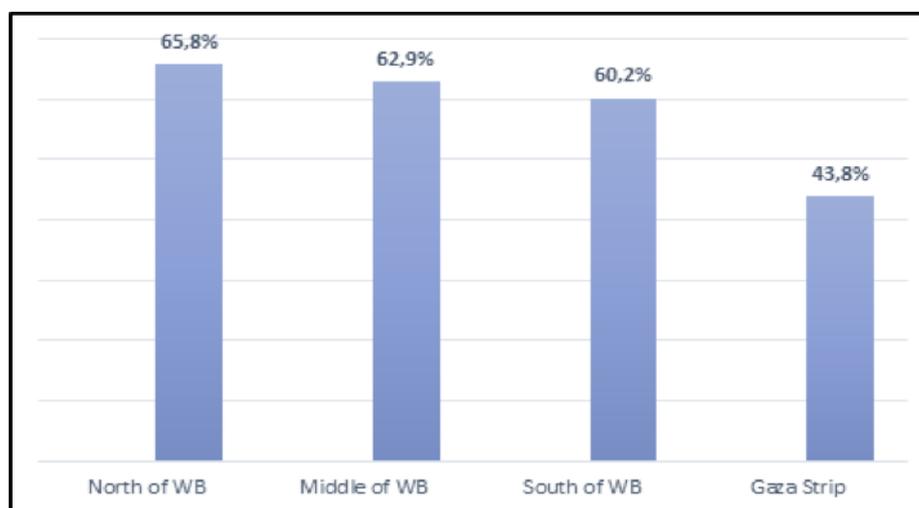
The findings of the survey indicated that average electricity consumption per household was 306 kWh in January 2015 compared to 275 kWh in January 2009; it was 442 kWh in the Middle of the West Bank and was a maximum of 265 kWh in Gaza Strip, as shown in Figure 15.<sup>(7)</sup>

**Table 6** – Annual Average Consumer Prices in Gaza Strip for Selected Energy Types by Month, 2018

Region	Diesel (\$/liter)	Gasoline (\$/liter)	Coal (\$/kg)	Kerosene (\$/liter)	LPG (\$/12kg*)
West Bank	1.68	1.79	2.04	1.69	19.0
Gaza Strip	1.45	1.67	1.69	1.45	17.83

\*12 kg is the weight of LPG bottle

**Figure 14** – Percentages of Households have Solar Heater by Region, January 2015



(6) PCBS household energy survey

(7) PCBS household energy survey 2015

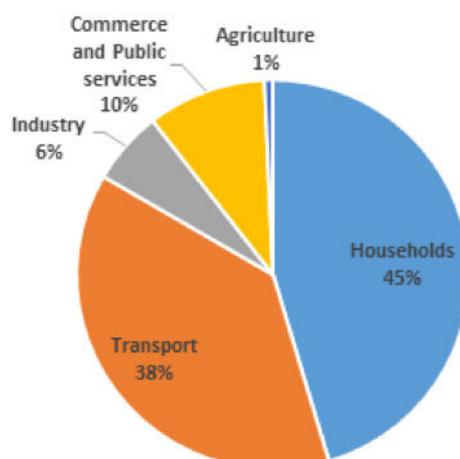
**Figure 15** – Average Household Electricity Consumption in Households Using Electricity by Region, January 2015



The 65,913 TJ of final energy consumption is illustrated in Figure 16 by sectors, where the residential and transportation sectors spent the largest energy consumption.

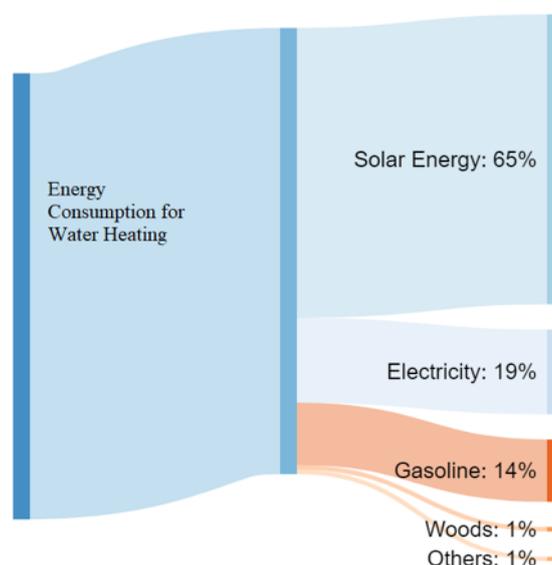
The great amount of energy consumed in the residential sector goes to water heating. According to the last available household survey, in 2015, about 65% of the energy consumption for water heating comes from flat plate SWHs (Figure 17) and the dependence on woods and olive oil cake is residual, while about 33% of the energy used for water heating comes from electricity and gasoline.<sup>(8)</sup>

**Figure 16** – Energy consumption by sectors, 2018



(8) PCBS household energy survey 2015

**Figure 17** – Distribution of energy consumption for water heating, 2015



The electricity sector suffers from operational and financial problems due to high losses and low collection rates. In 2015, DISCOs in the West Bank and Gaza billed consumers for 76% of the power they purchased from suppliers, with the other 24% loss and never billed due to the poor state of the infrastructure and illegal connections.

In the West Bank and Gaza, renewable energy generation is still in its infancy. As depicted from Figure 12, the total energy supply from RES is 9,892 TJ.

The contributed of each renewable energy sources is : solar energy 5777 TJ, wood and charcoal 3549 TJ, and olive cake 397 TJ.

The amount of electrical energy produced from different types and configurations of PV systems is approximately about 490 TJ.

The Palestinian Cabinet adopted a renewable energy strategy in 2012 that set a target of 130 MW for domestic renewable generation by 2020, of which only 18 MW has been installed as of 2017. In terms of rooftop solar, the PSI, launched in 2012, aimed to install on-grid residential rooftop solar systems in the West Bank, each with a range of 1-5 kW, for a total installed capacity target of 5 MW by 2015. Under the plan, households purchase the solar systems

themselves through “green loans” and sell energy back to the grid in return for a feed-in-tariff. Although initially attractive, over time the PNA reduced the feed-in-tariff rates due to budgetary restrictions, making the program progressively less attractive to consumers. As of December 2016, PENRA reported that approximately 300 systems were installed under the PSI.<sup>(9)</sup>

## 2.2. Current Energy Plan of the Country

PENRA sets a comprehensive national strategy of the energy sector in PT (2017-2022). The current energy plan of the country mentioned in this section is depicted from this strategy.<sup>(10)</sup> Since 2010, PENRA has embarked on a comprehensive program for restructuring and developing the energy sector, including the legal, legislative, regulative and institutional aspects within a clear strategic vision. The energy plan has the following objectives:

1. improving the energy sector to the level that responds to the requirements of economic and industrial development;
2. providing the needs of the current and future local market through the institutional structure of the sector;
3. ensuring the continuity of its development through democratic, legislative and regulatory frameworks that define the authorities and responsibilities of institutions operating in that domain.

Accordingly, PENRA developed the Strategic sectorial plan of 2011-2013, which in turn included the sectorial vision of the energy sector at 2020. It defined the strategic objectives of that vision and adopted a set of programs and activities through which these objectives can be achieved. PENRA also reviewed the sectorial strategy to cover the period 2014-2016. The programs and activities were modified to conform to the political and financial situation and take into account the achievements reached during the period 2011-2013.

The energy plan sets out a strategic framework for developing the energy sector for the time period 2017-2022. It takes into account the new agreements with the Israeli side regarding the transfer of energy distribution sector

(9) World Bank Group (2017)

(10) Comprehensive national strategy of energy sector in Palestine, (2016)

to the Palestinian government, and the government plans to exploit and develop the sources of oil and natural gas in PT, and the supply of Gaza Strip with a natural gas source for production, and the electricity laws and legislations related to the development and the exploitation of RES in PT.

The national strategy for the energy sector in PT includes a set of steering and guiding policies aimed at achieving a comprehensive vision for the sector and presenting the national methodology to meet the challenges of energy demand in PT in the coming years.

The overall national strategy of the sector is to build an integrated Palestinian energy sector that achieves the concept of sustainability and continuity of development. It also provides energy demand by raising the percentage of clean energy in the total energy supplied to the market and reducing the negative environmental impacts of energy supply and consumption, in addition to the production and the consumption of energy as efficiently as possible, while ensuring the realization of the concept of security of energy supply, which is essential to achieve the principle of sustainability of the sector.

### The energy policy statement for the period 2017-2019

PENRA has adopted three basic programs in budgeting policy programs for the following three years in order to achieve the strategic objectives of the energy sector in PT. Such programs are summarized as follows:

First Program - Managing and developing the traditional energy sources: This program creates a national system for producing traditional energy in order to meet the current and future needs, providing various energy resources, building and developing the transmission and distribution system, which is able to cover the increase in the energy demand to be reached with economic efficiency reflecting the real cost of the production, transmission, and distribution of traditional energy sources.

Second Program - Developing RES and EE: This program is based on conducting studies and researches, developing pilot and pioneer projects, developing techniques, guidelines and incentives, capacity building, raising awareness for improving the utilization of RES, as well as enhancing energy consumption rationing and environmental protection. This program is imple-

mented by the PEC in coordination with PENRA and in cooperation with other relevant stakeholders from the public and private sectors. The program targets the parties working in the energy field, including policymakers, investors and researchers in addition to the beneficiaries of energy services.

Third Program - Administrative and financial program: This program aims to serve the first and second program and also to achieve the third strategic objective, which is associated with building effective organizations working in the energy sector.

### Statement of the program's policy for the period 2020-2022

The three programs, adopted in the policy statement for the period 2017-2019 will be used during the period 2020-2022, as these programs cover policy objectives associated with achieving the strategic objectives of the sector.

PENRA has developed a Comprehensive RES Strategy for PT, which was adopted by the Council of Ministers in 2012.<sup>(11)</sup> In 2020, local energy sources should cover approximately 50% of the total electricity consumption and RES should be at least 10% of the electricity produced locally in 2020, which is 240 GWh. Based on the RES assessment studies conducted by PENRA, the technology required in terms of implementation and investment has been identified until 2020. Table 7 shows the future strategy for RES and EE in PT.

**Table 7 – Future Strategy for RE and EE in PT**

Technology	2020 (MW)
PV system – Grid connected	25
Roof tops PV system (PSI)	20
CSP	20
Biogas from landfills	18
Biogas from manures	3
Small scale wind turbines	4
Large scale wind turbines	40
<b>Total</b>	<b>130</b>

The second phase of the RES strategy began after evaluating the first phase and the Palestinian market in terms of the application and use of renewable

(11) RE strategy in Palestine report, 2012

energy technology. This has been accompanied by a series of preferred tariffs and incentives approved by the Palestinian ministers' council, which in turn will help to some extent to reach the 2020 target.

The purchase prices of electricity generated by PV is shown in Table 8.

**Table 8** – Prices of electricity generated by PV

The capacity of the plant and its type	Purchase price (NIS)
Household (PSI) up to 5 KW for the first 1000 household	0.54
Net metering	No purchase tariff but treated according to special instructions of NM
Direct bids with a capacity of 1 to 5 MW	90% at most of the average purchase price of different sources of traditional energy sources
Energy generating plants that won competitive bids	The least price among competitive projects and up to a ceiling of not more than 90% of the average purchase price of traditional energy sources

## 3. Legislative Framework of the Energy Sector

### 3.1. Hydrocarbons Law

Currently, no law addressing the hydrocarbon sector exists but there is a draft under preparation. The scope of the draft law is to achieve the following goals<sup>(1)</sup>:

- Integrate the different energy subsectors planning and policy-making activities to a single policy and planning body in order to enable better and affordable energy services to consumers;
- Assure the optimal exploitation of both conventional and renewable energy resources available in PT;
- Enable the development of an integrated energy strategy for the short, medium and long term;
- Facilitate the development of the Palestinian electricity sector in the generation, transmission and distribution fields;
- Regulate and develop the electricity sector in PT;
- Encourage local and foreign investment in the sector so as to achieve an adequate and reliable supply of electric power to the consumers at a reasonable cost;
- Create a comprehensive governance structure for the hydrocarbons sector to achieve also the exploitation of indigenous sources of hydrocarbons;
- Promote the utilization of RES to increase their contribution to the energy mix of the country, contribute to the security of supply, achieve sustainable development and decrease energy import dependency;
- Encourage the utilization and development of RES and taking advantage of its applications to increase the proportion of its contribution to the ag-

(1) The Comprehensive National Strategy of Energy Sector in Palestine, 2016

gregate energy in the total energy balance and to achieve a safe supply of it in line with the general strategy of renewable energy;

- Encourage local manufacturing and utilization of renewable energy systems;
- Promote and institutionalize actions related to EE improvement in the demand and supply side;
- Contribute to the protection and conservation of the environment facing also the Green House Gas issue;
- Promote regional cooperation with neighbouring countries in the field of sustainable energy;
- Save energy through its optimal use in the different sectors and contribute to meeting the requirements of sustainable development and environmental protection and conservation.

## 3.2. Electricity Law

The Electricity Law<sup>(2)</sup>, issued on 23 April 2009, is the leading law that defines the electricity sector organizations, their structures and responsibilities. In addition to basic terms specific for the electricity sector, it addresses the operations of the following organizations and companies: PENRA, PERC, PETL, and DisCos.

In the electricity sector, the Electricity Law has set PENRA as the policymaker of the sector. It has also established PERC and PETL. PENRA is responsible for the supervision of the energy sector, energy planning and the elaboration and implementation of the energy strategy and policy. PENRA also develops legislation related to the energy sector and has already set the Energy Strategy 2011-2013, 2014-2016 and 2017-2022.

PERC is the only regulatory body established in the energy sector besides the Water Regulatory Commission. PERC was established in 2010 and started its operation in 2011 with substantial financial support from the World Bank and technical assistance from Nexant and Price water house Coopers (PwC). More specifically, PERC is the regulator of the electricity and RES subsectors and it is responsible for recommending on licensing of the energy companies and the tariffs, the monitoring of the market, the assurance of fair competition, the com-

(2) The Comprehensive National Strategy of Energy Sector in Palestine, 2016

plaint management and the dispute resolution. In 2011, PERC managed to issue the first tariff applied unanimously to distribution companies and local councils that distribute electricity. PERC has already developed procedures and rules and regulations for licensing electricity distribution companies, and five distribution companies have been licensed. Furthermore, PERC is not mandated to make the final decisions as regards licensing and tariff setting. It acts as an advisor to PENRA, the final decision-maker. Moreover, PERC is not equipped with the legal framework to impose penalties on violators. This creates the situation of a regulator unable to enforce its decisions and sanction abusive conduct, which further destabilizes the electricity sector management.

PEC is a governmental institution working under the umbrella of PENRA. PEC is concerned with all matters related to the development and exploitation of the sources of alternative energy. Among its main functions, it encourages the use of alternative energy, increases awareness of the local consumer in terms of rationalization of energy consumption, raises the efficiency of its use to ensure the reduction of energy losses, achieves the goal of optimal use of energy, contributes to the preservation of the environment and reduces the emission of toxic gases.

In 2013, PETL was established by the electricity law, which is a newly established company that is wholly owned by the government according to the general electricity law, and the decision of the Council of Ministers No. (10/01/16) for 2013. Its operations were launched in February 2014. Its mandate includes two main roles: to own, operate, maintain and develop the transmission grid and to purchase electric power from various sources and then to sell it to distributors and other customers. However, at the moment, PETL does not own any infrastructure in the transmission grid. Currently, PETL manages 4 substations of 161/33 kV each in order to transfer the supply from the IEC-owned substations to the Palestinian ones and replaces the existing connection points. There is also a plan for the creation of two National Dispatch Centres. PETL is in an urgent need for capacity development as regards the technical subjects of the operation and management of the grid, and the connection of power plants.

DisCos that are active in PT are listed in Table 9. Several municipalities and rural councils are still providing the service of power distribution. DisCos purchase electricity from IEC and sell it to consumers in the MV or the LV. About 35% of the municipalities are not clients of DisCos yet. These municipalities have

## Country Report on Energy Efficiency and Renewable Energy Investment Climate

signed contracts for power supply with IEC. Some municipalities receive electricity from IEC but do not pay off the debt in full despite retaining profits from the sales to the municipalities' consumers. The reason for debt accumulation is bad management, such as utilizing the profits for other infrastructure projects. In some cases, not all consumers pay off their debts to the municipalities.

**Table 9** – List of DisCos in PT

Name of the company	Location
The Northern Electricity Distribution Company (NEDCo)	Northern West Bank
Jerusalem District Electric Company (JDECo)	Ramallah and around area
Hebron Electric Power (HEPCo)	Hebron municipality
Southern Electric Power (SELCo)	Southern municipalities Yatta and Al Thaherya
Gaza Electricity Distribution Company (GEDCo)	Gaza
Tubas District Electricity (TDECo)	Tubas city and region

Despite the above-mentioned hurdles, efforts to restructure the electricity sector have moved forward. After issuing the Electricity Decree, in 2010 PENRA issued instructions 1 and 2, which require companies and local councils to rectify their status. These instructions directly order companies and councils to comply with the Electricity Decree-Law. According to the instructions, each company that works in the field should register as a public share company to be eligible for and obtain a practicing license. Otherwise, non-compliant companies will be subject to penalties.

With regard to RES, the Electricity Law explicitly mentions that PENRA must work on encouraging research on alternative energy sources, as well as regulating its exploitation using by laws.

In addition to the Electricity Law, there is a Renewable Energy and EE Law that has been produced as a result of the collaboration between PERC, PEC, and PENRA. The law outlines the mandate of PENRA, PERC and PEC as related to RES and EE. It defines the position of PENRA as the policy-making institution responsible for the preparation of the energy strategy and its implementation. PENRA, with the technical support of PEC, is assigned to identify the areas of high RES and EE potential, which in turn will be prioritized for the develop-

ment of RES installations and EE measures. Potentially, this could enhance the deployment of RES and EE in the PT.

The most recent law related to renewable energy in PT is the Decree-Law related to renewable energy and EE issued in 2015. Article 2 of the Decree-Law states that the objective of the law is to encourage utilization of RES and their applications in increasing its contribution to total energy balance and achieve secure energy provision in line with renewable energy strategy.

It also aims at environmental protection and also at fulfilling sustainable development requirements. The Decree-Law has specified the roles and responsibilities of the various institutions and bodies involved in the energy regulation, monitoring, production, distribution, and transfer of energy. It also describes the role and responsibility of the Energy Research Centre in terms of its role in conducting research to define the best alternatives and locations for renewable energy production and raising awareness and capacity building in this sector. Although article 18 of the Decree-Law encourages investment in renewable energy production through granting all the privileges that investment law provides, article 12 of the Decree restricts the production for commercial purposes for a limited period to be regulated by the license. It also did not define the FiT that electricity companies shall apply for generated electricity from RES and left it to be adopted by the council of Ministers upon PENRA recommendation.

The decision of the Council of Ministers No. (6) of 2017 is on the regulation of incentive package contract for the purpose of encouraging investments in renewable energy technologies. Article (4) on Power stations with a capacity no less than 1 MW, that are implemented within the Approved Areas shall benefit from the following incentives:

- **Phase 1:** income tax shall be imposed with (0%) for seven years, as of the date of operation of the power station.
- **Phase 2:** income tax shall be imposed with (5%) for five years, starting from the end of Phase 1.
- **Phase 3:** income tax shall be imposed with (10%) for three years, starting from the end of Phase 2.

After the end of phase 3, income-tax shall be calculated based on the applicable and effective rates. Article (5) for Net Energy Metering Projects Incentives are related to:

1. Projects registered at PIPA and benefiting from incentives stipulated in the Law are according to the following rules:
  - a. Extension of the granted incentive for projects that generate 20 kW at least, for one year, according to the applicable category.
  - b. Extension of the granted incentive for projects that generate 40 kW at least, for two years, according to the applicable category.
  - c. Extension of the granted incentive for projects that generate 60 kW at least, for three years, according to the applicable category.
2. Projects that have benefited from the Law incentives or existing projects that have not previously benefited from the incentives, and have developed their power resources to generate 40 kW at least, to use it in its project activities, shall be subject to income tax of 5% for two years.

### 3.3. Energy Efficiency and Renewable Energy Sources

Based on the regional and international efforts known as End-use electricity efficiency improvement and conservation guidelines, PENRA had prepared and launched NEEAP. The aim of the plan is to achieve an indicative target of 5% of the electricity consumption in 2020 compared to that foreseen in the Energy National Strategy. This goes along with regional and international efforts known as Arab End-Use EE Improvement and Conversation Guidelines which was approved by the Arab Ministerial Council of Electricity in 2010. The achievement of the mentioned target means energy savings of approximately 384 GWh annually by 2020, leading to at least USD 55 million annual savings of the total electricity cost in PT and annual CO<sub>2</sub> emissions reduction by 285,000 tons.

In order to achieve this target, a number of measures and procedures from PENRA and PEC should be implemented and scheduled according to specific phases, each one lasting for 3 years. Evaluation indicators to measure the

implementation progress should be identified in order to perform a comprehensive review at the end of each phase before proceeding to the next one.

It is worth mentioning that PENRA started a pilot phase in 2010–2015, which included various activities in the field of EE and consumption rationalizing. More specifically, the pilot phase included energy auditing in industrial, governmental and service entities, in addition to other related activities, such as those mentioned below:

- Providing prepaid meters to distribution companies in the West Bank and Gaza Strip;
- Issuing regulations to normalize energy audits for different consumers in terms of type and consumption;
- Increasing public awareness and capacity building of the energy sector employees about the rational use of energy, which contributes to the sustainable development and supports the Palestinian economy;
- Implementation of national energy savings programs and projects in distribution, commercial, residential and industrial sectors;
- Energy audit enforcement in the industrial, commercial sectors, governmental entities according to specific standards related to energy consumption;
- Establishing home appliances testing facilities that serve local market needs.

Current activities related to promoting EE and implementing NEEAP fall under the auspices of the PENRA. Cabinet decree was adopted in March 2012 and provides a general legal framework for EE measures adoption. Voluntary EE building code (2004) is adopted. No minimum energy performance standards with appropriate labeling schemes for household appliances are adopted.

By 2012, 1,600,000 m<sup>2</sup> of SWHs have been installed. No energy-efficient buildings are built. One demonstration project for an energy-efficient building is built in the industrial zone in Bethlehem funded by the AFD. By 2012, about 5,000 Compact Fluorescent Lamps (CFLs) have been distributed and now most municipalities are using LED lights in street lighting.

No internal tax benefits for EE projects exist. Revolving Fund for financing

EE projects was established in 2012. It is based on the ESCo model where financial savings achieved as a result of EE measures are transferred back to the fund for the financing of future EE projects. There is a full exemption from customs duty on imported SWHs.

Electricity prices are unsubsidized. A special tariff exists for residential customers to encourage rational use of electricity based on the pre-paid metering system and consumption level. There is no time-differentiated price structure for industrial customers to encourage consumption shifting from peak hours. More than 50 energy audits were conducted in residential and tertiary sectors and then 200 energy audits were conducted in the industrial sector. No Energy Service Companies (ESCOs) exist.

### 3.5. Foreign Investment Legislation

PNA did not adopt a foreign investment law until April 1995. Article 1 in the Investment Law defines investor as any natural or legal person seeking or offering to invest in PT.

The application of the investment law to all potential investors in the PT makes the investment law comprehensive in that respect. This comprehensive approach to potential investors represents the first indication that the PNA seeks to treat all investors in a non-discriminatory manner. This is clearly stated in Article 18.2 of the investment law.

The Investment Law in Article 1 defines Investment as the creation or addition of economic activities (industry, tourism, agriculture, health, education, construction services) in PT, including establishing new projects and adding new schemes of production and new machinery, which results in increasing employment and production.

The official PNA summary of the Investment Law states that the Investment Law prescribes that “investments involving a local presence must be done through a Palestinian registered company, which can be a wholly-owned subsidiary”. The official translation of the Investment Law does not, however, contain any provision that prescribes what form foreign investment must take in the PT. The existence of a requirement that foreign investors must use the

corporate form as the investment structure raises three concerns. First, this requirement is not found in the Investment Law, which creates the concern that the Investment Law does not contain the entire legal regime covering foreign investment. Second, if local Palestinians can invest through partnerships as well as registered companies, then the requirement to use the corporate form would discriminate against foreign investors, in violation of the Investment Law's principle of non-discrimination. Third, the registered company requirement limits the flexibility of a foreign investor. A foreign investor could not, for example, invest through a branch or a partnership even if those investment tools better suited the investor's business strategy and operations.

The Investment Law exempts approved investment projects from paying income tax and duties for several years based on the combination of either the amount of capital invested or the number of Palestinian workers employed, and the anticipated length of the investment.

The Foreign Investment Survey of resident enterprises in PT for 2016 has revealed important results for researchers, academics, and decision-makers. The results indicated that investments abroad by resident enterprises in PT were greater than foreign investments in resident enterprises in PT at the end of 2016. The main findings of the survey are as follows:

- The total stock of resident enterprises in PT investments abroad (assets) amounted to USD 5,879 million at the end of 2016. The total foreign investment stock in resident enterprises in PT (liabilities) amounted to USD 2,925 million at the end of 2016;
- Concerning the distribution of assets, FDI abroad amounted to USD 357 million, 6.1% of total assets; portfolio investments abroad amounted to USD 1,112 million, 18.9% of total assets; other investments abroad amounted to USD 4,097 million, 69.7% of total assets; and the stock of reserve assets for the PMA amounted to USD 313 million, 5.3% of total assets at the end of 2016;
- Concerning the distribution of liabilities, FDI amounted to USD 1,701 million, 58.1% of total liabilities; portfolio investments were USD 658 million, 22.5% of total liabilities; while other investments totalled USD 566 million, 19.4% of total liabilities, at the end of 2016.

The results show that 60.9% of FDI in resident enterprises in PT is concentrated in the financial intermediation sector, while investment from Jordan contributed to 79.9% of the total stock of FDI in resident enterprises in PT. The results also show that 49% of total portfolio investments in resident enterprises in PT are concentrated in the financial intermediation sector, while investments from Jordan contributed to 48.6% of the total stock of portfolio investments in resident enterprises in PT.

Due to the tense political and security situation of the territory, PT attracts scarce FDI beyond aid from the EU, the U.S.A., and Arab countries. However, PT has a market economy, in which the private sector plays an important role. Its strategic location and need for the development of large-scale infrastructure make PT a largely unexploited market with a great potential investment.

## 4. Market Structure and Institutional Governance

### 4.1. The Institutional Structure of the Energy Sector

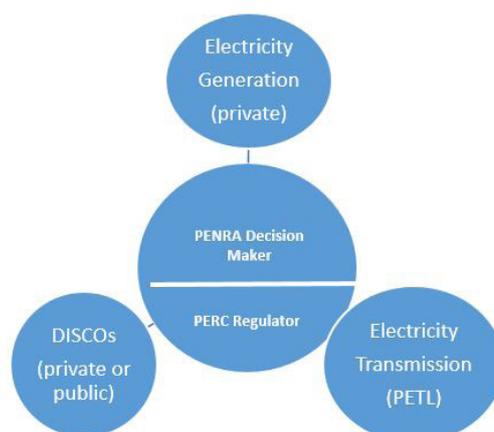
To understand the institutional structure of the energy sector in the PT, the related laws and regulations that manage and organize this sector are illustrated below:

- Decision No. (12/1995) established the PENRA and determined its authorities and responsibilities.
- The General Electricity Law is stated under the Legislative Decree No. (13/2009). This law regulates the electricity sector and defines the institutions operating in the sector, its organizational structure, and its role and responsibilities. The law also amended the functions and tasks of the PENRA in line with other established institutions working in the sector, providing to them some tasks and duties that were previously under the PENRA.
- Decision No. 4/2002 regarding the natural resources in PT, which regulates the projecting, exploration and exploitation of natural resources.
- The Decision of the Council of Ministers of 1994 regarding the establishment of the General Petroleum Authority to take up the functions of the management of oil and gas derivatives in PT and determine prices in the domestic market. This decision is amended after the decision of the Council of Ministers for 2003, which transfers the General Petroleum Corporation under the umbrella of the Ministry of Finance.
- The Decree-Law No. (14) on Renewable Energy and EE in PT for the year 2015, which aims to encourage the exploitation of RES and identifies the tasks of relevant institutions, such as the PENRA, PERC as well as the mechanisms related to the establishment of power plants that depend on the RES, their sizes and their contracting mechanisms.

PENRA has implemented a comprehensive plan aimed at restructuring the electricity sector and building the necessary institutions for the management and development of that sector, the main institutions include DisCos, PERC, PEC, and PETL. Figure 18 shows the electricity sector stakeholders in PT.

The General Petroleum Corporation is another energy player in PT. The main objective of this corporation is to purchase oil and cooking gas from available sources of sale and sell it to the distribution stations, monitoring the quality of hydrocarbons in the local market, licensing oil and gas distribution stations, and setting up the tariff for oil and cooking gas derivatives and reviewing them monthly.

**Figure 18** – Electricity Sector Stakeholders



## 4.2. Environmental and Social Protection in the Energy Sector

The Environment Quality Authority (EQA) seeks to promote sustainable environmental development of the Palestinian society. EQA is the umbrella for all the activities and studies related to environmental planning, protection, monitoring, and control. However, this is not solely the responsibility of EQA but it should rather be shared by all other Palestinian ministries and institutions concerned with the Palestinian environment based on the principle of partnership and complementary work.<sup>(1)</sup>

(1) Environment Quality Authority (EQA), [http://www.lacs.ps/documentsShow.aspx?ATT\\_ID=6056](http://www.lacs.ps/documentsShow.aspx?ATT_ID=6056), last access 17/09/2019.

In 1999, PNA issued a law concerning the environment.<sup>(2)</sup> The law mainly aims to protect the environment from all forms and different shapes of pollution. It also protects the public health and social welfare.<sup>(3)</sup> The law includes different articles protecting the environment from industrial, agricultural and constructional activities. Special articles are included in the law to protect the environment from solid waste, hazardous material, and waste. EQA, in coordination with the competent authorities, determines the activities and projects which should obtain an advance environmental approval for obtaining a license as well as the projects which are permitted to be erected in the restricted areas.

The Palestinian Environment Assessment Policy (PEAP)<sup>(4)</sup> was approved by the Palestinian Cabinet on the 23 April 2000 under decree no. 27-23/4/2000. The policy mainly aims to support the sustainable economic and social development of the Palestinian people. PEAP classifies the environmental assessment studies as an Initial Environmental Evaluation (IEE) and Environmental Impact Assessment (EIA). IEE for projects where significant environmental impacts are uncertain and EIA for projects, which are likely to have significant environmental impacts, in particular for power plants.

Palestinian National Environmental Strategy (PES)<sup>(5)</sup> was a ten-year environmental strategy developed in 1999 and planned to be updated every five years, for 2000–2010. The strategy identified and analyzed reasons behind the prevailing environmental problems, formulated objectives and defined tools and measures for achieving them. The urgent issues considered in this strategy are depletion of water resources, deterioration of water quality, land degradation, depletion of natural resources, air and noise pollution, deterioration of nature and biodiversity, landscape degradation, and threats to cultural heritage<sup>(6)</sup>.

The Palestinian National Environmental Action Plan (NEAP) was developed to elaborate the general themes and strategy elements set in the environmental national strategy into a set of prioritized projects and actions for the years 2000, 2001 and 2002 (where subsequent updates for the following years were also planned) to deal with the environmental problems in PT. It was de-

(2) Environment Quality Authority (EQA), Law No. (7) For The Year 1999 Concerning The Environment, [http://environment.pna.ps/ar/files/Law\\_No\\_7\\_For\\_The\\_Year\\_1999\\_Concerning\\_The\\_Environment.pdf](http://environment.pna.ps/ar/files/Law_No_7_For_The_Year_1999_Concerning_The_Environment.pdf), last access 18/09/2019.

(3) Palestinian Ministry of Environmental Affairs (2000)

(4) Palestinian Ministry of Environmental Affairs (2000)

(5) Environment Quality Authority (EQA), Law No. (7) For The Year 1999 Concerning The Environment, [http://environment.pna.ps/ar/files/Law\\_No\\_7\\_For\\_The\\_Year\\_1999\\_Concerning\\_The\\_Environment.pdf](http://environment.pna.ps/ar/files/Law_No_7_For_The_Year_1999_Concerning_The_Environment.pdf), last access 18/09/2019.

(6) Environment Quality Authority (EQA), Law No. (7) For The Year 1999 Concerning The Environment, [http://environment.pna.ps/ar/files/Law\\_No\\_7\\_For\\_The\\_Year\\_1999\\_Concerning\\_The\\_Environment.pdf](http://environment.pna.ps/ar/files/Law_No_7_For_The_Year_1999_Concerning_The_Environment.pdf), last access 18/09/2019.

veloped through a consultative process involving many Palestinian ministries and institutions with implied mandates concerning the environment.

EQA is the official Palestinian body with the mandate to monitor and implement all that is necessary for the protection of the Palestinian environment and the provision of a clean and healthy environment to ensure the right of all Palestinians to the highest attainable level of health and welfare as guaranteed in the Palestinian basic law and environmental law.<sup>(7)</sup> The unstable political situation in PT leads to a delay in carrying out strategic planning in the environmental sector, which was started in 1999.

The Palestinian environment has suffered from wrong management leading to a deterioration in the different environmental elements, including water, soil, air, and biodiversity.

There is a close link between the environmental sector and sustainable development of other sectors, including the economic, social and political sectors. The environmental sector engages the energy sector and others to create a tool for sustainable development and preserving natural resources.

The level of energy consumption in the PT is closely connected to population growth rates and levels of economic development. PT depends on electricity and all forms of fossil fuel for household, industrial and transport use, in addition to solar energy.<sup>(8)</sup> Energy production, particularly when it is based on fossil fuel, is considered one of the main sources of environmental pollution. PT depends on purchasing electricity from IEC and produces a small amount of its overall electricity consumption.<sup>(9)</sup> On the other hand, the production of renewable energy is still in its first steps and has not achieved significant figures yet. Nevertheless, renewable energy accounts for 18% of overall energy consumption in PT. Being environment-friendly, such type of energy should be further supported and developed.

The industry sector in PT consumes about 5.5% of the country's total energy.<sup>(10)</sup> This is relatively small in PT when compared with neighbouring countries. There

(7) Palestinian Ministry of Environmental Affairs (2000)

(8) Environment Quality Authority (EQA), Law No. (7) For The Year 1999 Concerning The Environment, [http://environment.pna.ps/ar/files/Law\\_No\\_7\\_For\\_The\\_Year\\_1999\\_Concerning\\_The\\_Environment.pdf](http://environment.pna.ps/ar/files/Law_No_7_For_The_Year_1999_Concerning_The_Environment.pdf), last access 18/09/2019.

(9) Yaseen BT (2009) and PCBS (2015)

(10) PCBS (2015)

are several types of industries in PT, most of which are traditional and light industries, including chemical and pharmaceutical industries, leather tanning, textile and clothes, stone and coal industry, electroplating of metals, and food industry.

The transport sector in PT consumes about 36.4%, thus it is quite important with all other sectors for achieving economic development and social welfare. It also plays a major role in achieving territorial contiguity within the Palestinian society. The current use of traditional modes of transport is a source of environmental pollution, due to gas emissions from fuel combustion in vehicles, such as sulphur oxides, nitrogen oxides, carbon monoxide, suspension materials, and others. Transport is also a primary source of increased levels of noise and migration of living organisms, which negatively reflects on health, environment, and society.

### 4.3. Renewable Energy and Energy Efficiency Market

The PTs are located in a region that is rich with the energy deriving from the sun. The yearly sunshine hours are 3,000 and average global horizontal irradiance is 5.4 kWh/m<sup>2</sup>/day. This qualifies the PT to be among the world's top locations for the installation of solar systems.

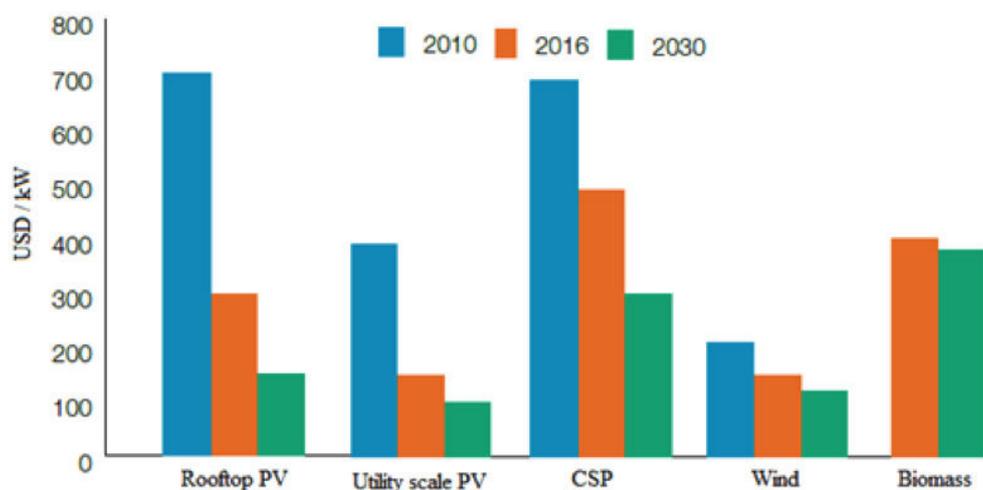
Renewable energy represents the only truly independent form of power supply that does not rely on imports of electricity or fuel. As the cost of solar energy continues to decline, as shown in Figure 19, the option looks increasingly attractive for the West Bank and Gaza.

Important efforts have been made to increase the utilization of RES. In particular, in 2012 PENRA set a target to increase the share of renewable energy targets. The target aims to generate 130 MW of power supply from domestic renewable resources by 2020. As of March 2017, less than 15% of that target had been achieved.

If obstacles in investing in RES in PT were removed, the potential for renewable energy development goes far beyond current policy targets. Upon the

study conducted by the World Bank<sup>(11)</sup>, the existing renewable energy target could be increased to reach 4,246 MW. The study assumes only 165 MW of potential has been identified for Gaza in the form of rooftop solar due to extreme land constraints and vertical patterns of urbanization.

Figure 19 – Cost decline of solar energy



The West Bank includes both rooftops and utility-scale systems. The assumed potential for rooftops PV systems is 534 MW. The utility-scale PV or CSP systems are limited to West Bank and reach 103 MW in Area A and B and reach 3,374 in Area C. The assumed potential for wind and biomass in PT is 72 MW.

Many opportunities are currently open for RES investments in the PT:

- The progress in RES across local and regional markets has stimulated the growth of the know-how of experts, and specialized companies in the field of renewable energy in PT.
- Through an effort to promote green energy investments in the Palestinian private sector, the AFD declared an involvement of USD 25 million to launch a green-finance fund through expanding its Sustainable Use of Natural Resources and Energy Finance (SUNREF) program in PT.<sup>(12)</sup>
- The Palestine Investment Fund (PIF) is mobilizing a USD 2 billion invest-

(11) World Bank Group

(12) Sunref Palestine, 2020

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ment program to improve industrial infrastructure, digital infrastructure, and energy security through conventional and renewable energy.<sup>(13)</sup>

- Noor Palestine Solar Program (NPSP) is PIF's leading project in renewable energy with an investment portfolio of USD 200 million and a total capacity of 200 MW. Phase 1 of this program is under implementation with a capacity of 60 MW including implementing utility-scale PV power parks and utilizing rooftops of 500 schools for grid-connected PV systems.

In parallel to the completion of phase I, PIF plans to develop additional medium solar parks and a large-scale solar park of 50 MW and above, as well as construct several strategic rooftop projects.

The Chinese government is seeking to build a 30 MW solar plant in the southern West Bank. PENRA will issue a competitive tender for the construction of 3 solar power plants with a capacity of 10 MW each.

Interesting opportunities are open in the field of EE.

The Palestinian National Energy Efficiency Action Plan (NEEAP) aims to save 384 GWh of the total energy demand by 2020, representing around 1% reduction per year (compared to 2010 levels). The action plan is mainly focused on electricity because this energy type has the largest share in the Palestinian final energy mix. The details are shown in Table 10.

**Table 10** – EE targets under NEEAP 2012–2020

Sector	Targets (GWh)			
	Phase I (2012-2014)	Phase II (2015-2017)	Phase III (2018-2020)	2020
Industry	5	6	8	19
Buildings	38	130	195	363
Water Pumping		1	1	2
<b>Total (GWh)</b>	<b>43</b>	<b>137</b>	<b>204</b>	<b>384</b>

Source: Information provided by NEEAP and PENRA

PENRA, with the support of AFD and the World Bank, has been actively spurring the implementation of the three-phased NEEAP for 2012-2020. Phase I has been successfully achieved and Phase II is being implemented satisfacto-

(13) Palestine Investment Fund (PIF)

rily. PENRA's EE Unit has so far undertaken 300 energy audits across different sectors of the Palestinian economy, which have triggered the investments required to unlock the untapped EE potential. Phase III has already started.

To further encourage energy-efficiency investments, PENRA has drafted the ambitious NEEAP for 2020-2030 with the support of the World Bank. The proposed target is to reduce by 5% the forecast consumption during the 10 years, a total savings of 5,000 GWh. This represents a large increase from the 384 GWh savings of the current NEEAP 2012-2020. The future action plan is also divided into three phases.

AFD first through FFEM-FGEF, then in co-financing with the same, has developed a collaboration with PENRA in the field of EE since 2008.

The main outcome of the collaboration is the setting up of a Revolving Fund, component 1 of the program, introduced to solve the incentive problem by creating a mandate for energy efficiency projects in the public sector (25 were implemented). With an initial seed funding of 1.5 million euro, it is administered by the Energy Efficiency Unit (EEU) settled within PENRA, disposing of the required technical knowledge, and supported with funding for the required capital investments. The EEU team provides the expertise and motivation to identify and manage projects. The ministry of finance benefits from the savings in energy bills. The ministries receive training, equipment, and capital investments to improve the management of their energy systems. The seed money from AFD has been used to start the fund, given the budgetary constraints. The initial investment would be repaid to the Fund, allowing continued, self-funded investments in the future.

AFD decided to request a post-evaluation of these EE programs. The present report is the first step for a concept note that: (i) identifies the main questions to be used as a focus for the evaluation work; (ii) specifies indicators to be used to answer the questions and the corresponding information sources; and (iii) establishes the stages of reasoning that will allow the consultant to answer the questions.

## 5. The Market Confidence in Palestinian Territories

### 5.1. Questionnaire: Who and How?

To study the market confidence in the field of renewable energies and EE, two questionnaires were conducted with two different target groups.

#### 5.1.1. Questionnaire for Public Authorities on FDI Attractiveness in Renewable and EE

A questionnaire for public authorities on FDI to assess the effectiveness and adequacy of national and local policies to increase FDI in RES and/or EE was conducted. The target group of this questionnaire was the following institutions and corporations:

- PENRA, PERC, and PETL;
- Palestinian Investment Promotion Agency (PIPA);
- private and non-private research centers in the field of energy;
- Palestinian solar and sustainable energy society;
- Palestinian Investment Fund (PIF);
- Sustainable Use of Natural Resources and Energy Finance (SUNREF);
- Environment Quality Authority;
- Academic institutions represented by professors specialized in the field of RES and EE and working as consultants: Najah University, Birzeit University, and Palestinian Polytechnic University.

The main questions of this questionnaire identify the key success factors and barriers to the progress of local renewable energy and EE development in PT. The questionnaire pays special attention to factors, such as:

- RES and EE in the national energy policy;
- grid connection for producers;
- licensing procedures for small scale producers – the level of administrative complexity and financial costs, duration;
- capital costs for investment in production facilities;
- availability of financial support for investments – grants, subsidies, access to credit;
- priority feed-in for renewable energy;
- feed-in tariffs and other forms of support;
- policy consistency as a factor for investment security;
- all the questions refer to the production of renewable energy by wind, photovoltaic/thermal solar and biomass and EE implementation.

### 5.1.2. Survey for entrepreneur/company potentially interested in investment in Palestinian Territories on RES and EE

The target group of this questionnaire is private companies working in the field of renewable energy. The questionnaire pays special attention to factors, such as:

- The companies working in the field of renewable energy and energy efficiency;
- Overview of the activities, revenues, and assets of the companies working in the field of renewable energy and energy efficiency;
- The investments made and planned in the production of renewable energy from biomass, wind, PV, solar thermal;
- The investments made and planned in EE in buildings, industrial processes, lighting, heating and air conditioning;
- Investigate the main barriers: financial and economic, technological and infrastructural, institutional and regulatory, and public awareness and information;

- Risk transfer mechanisms;
- Reasons for the international expansion of the company in the Renewable Energy and / or EE sector.

## 5.2. The Public Authorities Point of View

To have a deep understanding of the government institutions' point of view about investments in RES and EE, the most important items invoked in the questionnaire are illustrated below.

### 5.2.1. Climate Governance

Respondents agree that the climate-related issues received growing attention in the Palestinian political agenda and that those issues and mechanisms are important efforts to be integrated by successive Palestinian governments.

In 2010, PENRA conducted a RES assessment in PT, whose main output was that there is a great potential in investing in RES, mainly solar, wind and biogas for electricity production. To promote renewable energy, PENRA has started an awareness campaign through initiating the PSI, launched in 2012, aimed to install on-grid residential rooftop solar systems in the West Bank, each with a range of 1-5 kW, for a total installed capacity target of 5 MW by 2015. Under the plan, households purchase the solar systems through "green loans" and sell energy back to the grid in return for a feed-in-tariff. As of December 2016, PENRA reported that approximately 300 systems were installed under PSI.

The overall renewable strategy has been adopted with the main target to reach 130 MW or at least 240 GWh by 2020. Then, in 2015, the RES and EE laws have been ratified by the president of PT in addition to bylaws, such as net metering mechanisms, direct offers, and competitive biddings. An appropriate incentive was adopted by PIPA, such as tax exemptions and income tax. The Palestinian Cabinet adopted an exceptional mechanism with PIF toward installing PV systems.<sup>(1)</sup>

In the same context, NEEAP, as already introduced in section 4.2, aims to reduce 384 GWh of total energy demand by 2020. The action plan is mainly

(1) For further information, please refer to section 4.2 of this report.

focused on electricity because this energy type has the largest share in the PT final energy mix.

PT recently completed its Initial National Communication Report (INCR), which was submitted to the United Nations Framework Convention on Climate Change (UNFCCC) in November 2016, thus highlighting its commitment to being an active player in tackling and responding to climate change.

PT also recently developed its National Adaptation Plan (NAP), in accordance with the UNFCCC's Consultative Group of Experts guidelines for the least developed countries, and on 11 November 2016 became the sixth country to have submitted its NAP to the UNFCCC.

The NAP identifies a wide range of issues like water, agriculture, food, and energy. Nationally Determined Contribution (NDC) builds upon the INCR and the NAP. It is also in line with the National Development Plan and the recently developed sectoral strategies to achieve sustainable economic development in line with emissions reduction.

EU, Sweden, Belgium, and France sponsored a lot of projects with PENRA and some Palestinian energy agencies. Those projects are mostly in the field of renewable energy and EE, which finally comes within the actions supporting climate change mitigation.

The energy efficiency program is one of the strategic programs that PENRA has developed with PEC and AFD to participate in the reduction of PNA's expenses. The main target of this program is to improve the efficiency of energy consumption, which leads to saving an essential amount of money at the national level.

Another initiative developed by AFD is SUNREF, which stands for Sustainable Use of Natural Resources and Energy Finance. This project is implemented in a context of economic fragility and energy constraint as the demand for energy keeps growing.

PT energy dependency towards Israel and its exposure to climate change make it urgent to mainstream new ways of producing and consuming energy and to build renewable energy capacities. To meet the demand and support a steady economic growth, PT needs reliable, low-cost and sustainable energy sources.

The project is built on 3 axes co-financed by AFD and the EU. AFD sponsored the initiative with € 25 million and the EU sponsored € 8 million. Finance is broken down as follows:

- **A credit facility for 2 partner banks (€ 25 million)**

This credit line will enable the banks to grant loans to project developers (companies or and/or individuals) willing to invest in the sector of renewable energies and energy efficiency.

- **Investment premiums (€ 5 million)**

Five million euros will be allocated to the payment of investment premiums for project developers. Their amount will vary from 15% to 30% of the total loan. The objective of such a mechanism is to incentivize these investments to boost the sector.

- **Technical Assistance (€ 3 million)**

The technical assistance is set up for 4 years by PENRA (acting as project owner) and an external consultant and aims at facilitating the identification and assessment of projects as well as strengthening the capacities of the different stakeholders.

## 5.2.2. Financial Incentives for RES and EE

Bank of PT manages green funds with soft loans. Those loans with low interest encourage investment in renewable energy and EE. Speed and SUNREF are projects sponsored by AFD and EU.<sup>(2)</sup> As mentioned above, they offer financial incentives to promote RES and EE in PT. EU is sponsoring a lot of projects to promote RES and EE utilization in addition to capacity building. There is a tax exemption offered to RES and EE goods by the Ministry of Finance. These exemptions are applied to FDI, if it is registered as a local company.

The FIT mechanism, normally designed to encourage RES and EE, does not exist in PT. The only FIT is applied under PSI for the residential sector up to 5

(2) Refere to section 4.3 of this report

kW (FIT 0.54 NIS/kWh). This FIT is guaranteed for the lifetime of the system, which is normally 20 years. The available mechanisms are according to net metering or direct offers through PPA.

For a large power station with a capacity above 1 MW, the PPA is signed between the developer and PETL as a purchaser and guarantee side. Some investors are conservative from PETL guarantee and they are demanding the sovereignty guarantee. The sovereignty guarantee is a pledge and commitment from the Ministry of Finance to investors or developers in the case DisCos do not commit to paying the cost of energy to an investor. For power stations with a capacity of less than 1 MW, PPA was left to the DisCos and municipalities, and village councils.

### 5.2.3. Standardization, Licensing and Planning

The transmission access of the renewable energy power station is regulated and facilitated for small and large-scale producers. Some power stations are connected directly to LV power lines or to MV power lines through a step-up transformer.

From the above representation, it is clear that the licensing procedure is simple and speedy and this is confirmed by the questioned stakeholders.

Building code in PT is being designed but it is still in a draft phase. Green building code included in the draft but it is not compulsory.

The RES equipment characteristics are sufficiently standardized especially for PV systems and its accessories. PENRA and Palestinian Standards Institution prepared technical specifications for PV modules, inverters, controllers, batteries, cables, etc. The SWH equipment is standardized but most of the equipment that reaches the Palestinian market through Israeli market second-hand does not necessarily comply with Palestinian standards. Some SWHs are locally manufactured but no testing facilities exist yet to check the compliance with the Palestinian standards.

All questioned stakeholders confirm that the administrative framework facilitates small renewable energy producers but some of them need further documents and clarifications.

## 5.2.4. The Market for Electricity Production

The PPA is in force and depends on the capacity. If the power station capacity is greater than 1 MW, the PPA is signed between the developer and PETL. The PPA is signed between developer and DisCos or the village council if the capacity is less than 1 MW. If the PPA is signed, the developers have the priority to sell all the energy they produce and they have a guarantee from PETL and DisCos.

The competitive bidding is not practiced in PT yet. The IFC with PENRA is preparing all the documents related to the competitive procedure. The first half of 2020 will face the first phase of competitive bidding up to 30MW.

To increase the share of renewables, the questioned and interviewed stakeholders see that both small and large producers should be supported. Most of them see that concentrating on low scale power stations is better and more feasible towards achieving a higher share of renewable energy. Large power stations require large land areas, available in Area B and C, but those areas are under full control of Israelis, thus a complicated procedure is necessary to implement large power stations. Small power stations require a small area, which is available on the rooftops and in Areas A, B, and C. The high price of land in PT in general - and particularly in Area A - is another element in favour of small scale power stations.

## 5.2.5. Electricity Consumption

According to the response of the questioned companies, even if the competitive bidding is still not available in PT, this may represent an effective tool to boost the consumption of electricity from RES. Once the competitive bidding is applied, the renewable energy producer sells electricity to DisCos upon the competitive price. The power sold from RES producers is injected into the electric network. In most cases, the consumers cannot freely choose among competitive electricity providers and cannot opt to buy electricity from RES, at least at this stage.

The full life-cycle costs (including environmental externalities and health impacts) do not reflect energy prices for all types of energy.

The electricity prices are not fully transparent and the consumers do not un-

derstand exactly the sub-costs included in the energy price. DisCos sell electric energy to consumers mostly twice the price it buys from IEC. The distribution companies justify this increase in operational cost and taxes.

### 5.2.6. Promotion and Information

Marketing campaigns are promoting the production of renewable energy in PT. These campaigns are taking different shapes like:

- Local media through local newspapers and TVs by publishing success stories of how implementing PV power stations can reduce the dependency on IEC and reduce the interruption in power supply as well as reducing the CO<sub>2</sub> emissions;
- PIPA conducts marketing campaigns;
- All conferences and workshops organized in the field of energy encourage further utilization of RES;
- The marketing campaigns organized by specific sponsored projects as Speed, SUNREF, bank of Palestine, etc.

The political level represented by the presidency establishment and Minister's Cabinet support all efforts towards further utilization of RES and EE. The governmental media through visual, print and audio partially participate in marketing campaigns for utilizing PV energy. PIPA always promotes RES incentives through private and governmental media. Most stakeholders consider that a positive public image about RES and EE is conveyed in the press but still not sufficient.

The technical expertise and advice are easy to access for small producers/consumers that want to start generating renewable energy especially in the field of PV power systems and solar water heaters. Palestinian engineers still need external support for grid impact assessment.

In a survey-based study<sup>(3)</sup> conducted on one of the Palestinian universities about practices related to energy conservation, the conclusion was the following:

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(3) Aysar Yasin and etal. (2015)

- The students were aware of the importance of energy conservation and were acquainted with the energy situation in PT.
- The students had no idea about energy conservation establishments and facilities that are interested in dissemination of energy conservation in PT.
- About 25% of the surveyed students did not follow the energy conservation behaviour. The ethical factor was the main motivation for turning off the appliances in the university.
- The economic and environmental factor had less effect in the students' behaviour.
- The students had no idea about energy labels. This is an indication of the lack of awareness of the students in a very important measure of energy conservation.
- The students were aware of the importance of energy conservation in reducing gas emissions and protecting the environment in general.
- Half of surveyed students knew which appliances consume the highest amount of energy in their homes. Most of the students earned their knowledge on energy conservation from documentary programs and internet.

The main recommendation of the study<sup>(4)</sup> can be summarized as follows:

- The energy conservation facilities and establishments should improve and further their efforts to let more people involved in their activities, especially university and school students.
- The school and university curricula should include scientific materials that improve students' knowledge on energy conservation issues and practices. The importance of energy conservation should be addressed as well as it is the relation with the environment and national economy.
- The governmental and non-governmental establishments and facilities that care about energy conservation should cooperate and coordinate with each other. The Ministry of High Education should be strongly involved with the activities of energy conservation.

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(4) Aysar Yasin and eral. (2015)

## 5.3. The Domestic Enterprises' Point of View

In order to have a deep understanding of the domestic enterprises in the West Bank, the following questions and inquiries have been submitted to the stakeholders either through a questionnaire or direct interview. The followings are a summarization and analysis of the collected answers to the questionnaire.

Most of the domestic enterprises working in the field of energy are not part of a group and service companies (installation and operation). The scope of technology is renewable energy, mainly PV technology with its main components and solar water heaters with its main components. No domestic enterprises working in the field of EE as PENRA performs auditing services in the industrial and commercial sectors in addition to the motivations and supports offered from funded projects. The biomass energy is utilized in PT but just individually and no specialized companies are working in this field.

The revenues of the companies working in the field of solar energy range from USD 80,000 to USD 2 million. The number of employees ranges from 3 to 10 employees. Most of the employees are electrical, mechanical and energy engineers as well as technicians. It was difficult to find companies working in the field of PV energy before 2005 as all PV systems installed before this date were financed by the EU. The respondents mentioned PEC as an example of the institutions that installed PV systems in rural areas with the support of the EU in the nineties.

The energy companies normally import all the PV systems equipment from international suppliers. The structure of the PV systems is locally fabricated. Most of the flat SWH collectors are imported from international suppliers with a small percentage fabricated locally or come from Israeli second-hand market. The other components, like structures, storage tanks, pipes, fittings, are available in the local market. The evacuated tubes SWHs with its fittings are imported from international suppliers.

Solar technologies have the advantage that they can be used in a wide range and types of applications, small or large projects, grid-connected, autonomous, back-up, etc. The investment in PV technology is increasing dramatical-

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ly in PT. There are a lot of companies working in the field of PV systems design and installation as well as companies investing in PV electrification. Msader for Natural Resources and Infrastructure Development (Msader) invests and leads large-scale strategic projects in the field of PV electrification and others, as in the Noor Palestine Solar Program (NPSP), the PIF's leading project in renewable energy with an investment portfolio of USD 200 million and a total capacity of 200 MW. Phase 1 of this program is under implementation with a capacity of 60 MW including implementing utility-scale PV power parks and utilizing rooftops of 500 schools for grid-connected PV systems. Table 11 illustrates the number of investments in PV energy from 2016 until 2020. It is worth mentioning that SUNREF<sup>(5)</sup> project installed 8 PV systems.

**Table 11 – Amount of investments in PV Energy from 2016 until 2020**

Year	USD Million
2016	3
2017	16
2018	24
2019 (partially predicted)	10
2020 (predicted)	72

There are some companies working in the field of the installation of solar energy systems mainly PV systems and SWHs, such as Msader companies for energy systems, 3K energy solutions Company, Ayava Solar Company, Pal Solar, Satco Company, Excellent Solars, and Sunergy Integrated Solutions.

PENRA performs different feasibility studies for implementing parabolic through CSP systems. However, no indicators show that CSP systems are going to be implemented in the near future in PT. Different researchers,<sup>(6)(7)</sup> study the feasibility of implementing parabolic through CSP for power generation in PT mainly in Jericho. The studies confirm the feasibility under some conditions and special FIT.

Solar thermal energy is mainly utilized in PT for water heating with a small fraction for food drying and this is approved in a study performed by a researcher in this field.<sup>(8)</sup> About USD 8 million/year is the average investment in solar

(5) Sunref Project Palestine, 2020

(6) Aysar yasin and Osama Draidi (2016).

(7) Aysar Yasin (2019)

(8) Aysar Yasin (2017)

water heaters in the residential sector. The industrial and commercial sectors like hotels and hospitals start to utilize solar energy for water heating and other purposes. The evacuated tubes SWHs technology are intensively used.

The EE investment in industrial processes started thanks to the SUNREF project sponsored by AFD. SUNREF project presents facilitations for implementing solar water heating systems and the beneficiaries pay through the revolving funds. From 2016 until 2019, it financed 25 projects at a cost of USD 60,000.

The EE investment in lighting is initiated in SPEED project<sup>(9)</sup>. About 11 streets were lighted by high efficient LED lighting. About USD 900 000 were spent in 2 years from 2016 to 2017. From 2018 until 2020, about USD 2.2 million will be spent on installing 55,000 high efficient LED lighting on each 11 governorates.

PT has been researching its wind resources for years, only theoretical estimations of wind potential had been made so far. Measured data already reveal a moderate potential, with some sites in the hilly region in the middle of the West Bank recording wind speeds above 5 m/s. There is no investment in wind energy in PT. This is mainly due to the unavailability of long term wind data for the sites with expected potential. The data collected in some sites are not encouraging to invest in power production indeed. Some ambitious studies published by some researchers estimated that wind energy has the potential to account for 6.6% of energy usage in PT.<sup>(10)</sup> In a study managed by PENRA (Mercados)<sup>(11)</sup>, the investment cost of a small wind turbine in PT is ranged from 3,500-5,500 USD/kW and 2,000-3,400 USD/kW for large scale wind turbines.

The potential of biomass energy in PT is limited to the following types: wood, olive oil cake, biogas, municipal waste. The wood and olive oil cake are used in rural areas for heating purposes. The animal solid waste resources are mentioned by the respondents as a useful and viable input for electricity generation. Moreover, recently the informal deposit of solid waste has been forbidden. As a consequence, three large landfills in the West Bank have been built. The assessment study managed by PENRA (Mercados)<sup>(12)</sup> analyses the potential of these two sources of energy to produce biogas used for electrici-

(9) Promotion of EE & RE in strategic sectors In Palestine project, AFD

(10) Tarq abu Hamed, 2012

(11) Renewable Energy Resources Assessment Report, 2011

(12) Renewable Energy Resources Assessment Report, 2011

ty generation through animal waste distributed digester with a capacity of 50 kW, with a planned cost of about USD 80,000 and a landfill waste centralized digester of a capacity 6 MW, with a planned cost of USD 8.5 million.

### 5.3.1. Barriers to Investments

The barriers to the investment in RES and EE in PT can be divided into the following:

#### 1. Economic and financial barriers

PPA is already in force but still premature in PT. This brings to the fact that most of the investors are often required further clarification. The lack of sovereignty guarantees, connection mechanism, and no unified tariff within municipalities are all considered as an obstacle. The market design issues do not hinder the integration of renewable energies. The market for RES and EE is not highly concentrated, but its concentration improves continuously. In PT, the externalities are not modelled, it is considered a drawback that reduces the feasibility of such projects or at least increases the payback period.

The lack of subsidized loans for large or small scale facilities is one of the obstacles facing further investment in the RES and EE. The payback period of PV power stations is not considered an obstacle as it does not exceed 5-6 years.

#### 2. Technological and Infrastructural Barriers

The existing electricity grid in most governorates needs to be extended and modified to be able to receive additional power from PV power stations. The lack of grid capacity is considered one of the main obstacles to attract further investment in PV energy. This problem is very prominent in the Tubas Governorate.

The grid connection constraints are also an obstacle provided that each investor must present a grid impact study to the PETL. The grid impact study normally costs from USD 5000 to USD 20,000 based on capacity. Furthermore, according to the respondents, no qualified research institutions in PT could perform this study.

The processing time for giving permits to invest in RES and EE is considered acceptable, but may not be satisfactory for some investors. However, it is not considered as a big obstacle that hinders investment in RES and EE.

Area A is very limited and mostly considered as not suitable for large power plants. Power plants in Area B and C must be authorized by the Israeli side and this can be an important obstacle to be overcome.

The coordination among relevant institutions like PENRA, PEC, PETL, PERC, municipalities and village councils are acceptable but still under development. The regulations and rules designed by PERC and proved by PENRA are not totally respected by municipalities and DisCos.

It is worth noting that some DisCos face some obstacles towards the further implementation of PV grid-connected systems. This behaviour is implicitly practiced.

### 3. Public awareness and Information Barriers

The frequent interruption of electricity becomes common in most Palestinian governorates. Increasing the capacity of the current electric network is not an easy task and requires a long time with greater costs. These, together with the desire to become more independent from IEC, are the main reasons behind the acceptance of investing in RES and EE. Despite its high capital cost, the Palestinians became aware of the importance of RES. To this aim, PENRA has started huge awareness campaigns through the Speed and SUNREF projects. Through Speed projects, about 300 energy audit was performed within hospitals, hotels, some ministries headquarters, security offices, and schools. Through SUNREF project, about 25 private and governmental institutions benefitted from the revolving funds to install SWH systems based on evacuated tubes.

The skills shortage and the lack of training in the field of RES and EE are not particularly important problems in PT.

An-Najah University graduates master students have specialized in the field of RES and EE since 2005. Two local universities offer undergraduate programs in RES engineering and the environment. A lot of training workshops were arranged for technicians and engineers to train them in PV installation and design, energy conservation in industrial sectors, SWH design, and installation, etc.

## 5.4. The International Companies Point of View

The investment in PT by international companies in the field of RES and EE is still premature. Few international companies try to open coordination offices in Ramallah to start investment activities, mainly in PV electrification, in PT. Respondents mentioned many reasons for investing in PT in the field of RES<sup>(13)</sup>, such as:

- 300 sunshine days yearly, with annual Global Horizontal Irradiation (GHI) of above than 2,000 kWh/m<sup>2</sup>.
- Even if no projects had been identified yet, waste to energy is also part of the national strategy.
- Dynamic Economy, representing a variety of investment opportunities for a growing country and market.
- Access to Finance through a well-established financial system, suitable work environment, and a qualified labour force.
- Specific Incentives for projects creating or expanding economic activities in certain sectors.
- Supportive Ecosystem and commitment.
- Qualified Industrial Zones strengthening the success of investment through offering services, advanced infrastructure and rewarding incentives for investments.
- Priority to developing sustainable renewable energy sector.
- PT has the highest price incentive in the region, as the country fully relies on imports of its energy needs.
- The 2015 Renewable Energy and Natural Resources Law came into effect to promote the exploitation and development of renewable sources, and to increase the proportion of its contribution to the total energy mix and also regulates the power purchase.
- Renewable Energy and Natural Resources Law defined pricing strategy for the generated electricity from solar energy resources.

(13) Palestinian Investment Promotion Agency, 2020

- There are many success stories.

Most of the international investors are aware of PT commitment like <sup>(14)</sup>:

- Profitable return on investment.
- Modern framework of economic laws to encourage and support foreign and local investments.
- Free investments in all sectors and any ownership percentage.
- Free transfers of generated profits and freedom of repatriation of income generated from the investment.
- Protection of investors, no expropriation, nationalization.
- Equal treatment for investors of all nationalities.
- Protection of all confidential information.

Respondents recall how PIPA presents the following characteristics and services to international investors:

- Represents PT vision and policies to promote the private sector and to define an appropriate investment climate.
- Contributes to maintain and to develop environmentally friendly investment.
- Constantly improves customer services to foreign and domestic investors acting as an effective One-Stop-Shop.
- Facilitates cooperation between the private sector and the government, thereby creating and maintaining a more competitive investment environment.
- Offers investors the necessary information to support their decisions start-up and to invest including assistance in obtaining all necessary licenses.
- Offers updated information and data related to investment opportunities, expenditure and funding in PT.
- Continuous relationship with investors through PIPA's After Care program.

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(14) Palestinian Investment Promotion Agency, 2020

# 6. Policy Recommendations and Conclusions

## 6.1 Policy Recommendations

### 6.1.1 Upgrade the existing legal and regulatory framework for investment in EE & RES

#### Long term

- Reviewing and updating the existing laws and the instructions related to net metering, PSI, direct offer, competitive beddings, incentives, etc. to consider the benefits for all parties, like DisCos and consumers.
- Unifying the standardization of the RES and EE equipment. This should be ratified with cooperation with PSI, PERC, and DisCos.
- Preparing national and transmission distribution code in accordance with the required codes, like Jordan, Egypt, and Israel. This code is very important as it will be considered as a reference to all investors in the field of RE.
- Opening the market for ESCOs (Energy Service Companies) by ratifying the laws and bylaws of EE.

#### Short term

- Organizing the energy sector for all stakeholders to undergo energy laws. In the current situation, some municipalities and villages councils and communities manage their own electrical energy system without coordination with PENRA or DisCos.
- Developing clear guidance for investment in - and connection among - RES projects.
- RES and EE companies should hire only qualified and certified engineers and technicians. DisCos and PENRA should offer such certifications in coordination with related committees like the engineering committee.

## 6.1.2 Investment and market promotion of RES & EE through appropriate investment climate

### Long term

- Extra incentives for tax exemptions in EE goods and projects.
- Enhancing the infrastructure like the national grid in order to absorb all the energy generated from RES without affecting the quality of power signal.

### Short term

- Reviewing the reasons for investments presented by PIPA to include EE projects, besides RE ones.
- Opening the energy markets to small and large investments, provided that small investors cannot implement their projects because large investors cover all the demand.
- Identifying the roles of all the stakeholders in this sector to facilitate the procedure of investing in RES and EE.

## 6.1.3 Have long-term policy advice and short-term policy guidance for the improvement of investment climate and market structure in PT

### Short term

1. Creation of an information center and data bank for all RE projects.
2. Classifications of RES and EE companies based on performance and credibility. This classification is based on the feedback received from the customers of such companies.
3. Adapting and ratifying the building and green building codes in all sectors. The following institutions are involved: Engineering Committee, Ministry of Economy, local government ministries and municipalities.
4. Further awareness campaigns should start with:
  - The organisation of workshops at all levels.
  - The use of formal and private mass media, social media, etc.
  - Updating the schools' curricula to include subjects related to EE and RE.

## 6.2 Conclusions

- The banking sector has experienced persistent improvement and development throughout the previous years thanks to its strength and capacity to endure risks as well as political and economic fluctuations.
- About 63% of FDI in resident enterprises in PT are concentrated in the financial intermediation sector.
- The statistics on energy consumption showed that PT is not an industrialized country as the main share of energy is used by the residential and transportation sectors. This suggests efforts should be focused on solutions to the shortage of energy supply in the household sector.
- PT depends mainly on energy imported from the Israeli side and the policy implemented by the Palestinian governments goes towards reducing this dependency by utilizing RES, local conventional power generation, energy efficiency, and increasing imports from Arab neighbouring countries.
- The electricity sector suffers from operational and financial problems due to high losses and low collection rates.
- The PENRA has adopted basic programs to budget the energy sector, including managing and developing the traditional energy resources, developing renewable energy resources and energy efficiency measures as well as administrative and financial programs.
- In 2012, the PENRA developed a comprehensive renewable energy strategy for PT to encourage investment in RES, but the strategy was very ambitious and lacked the procedures needed for implementation.
- The private sector in PT realized that investing in the installation of PV systems is feasible. This resulted from the statistics on the installed PV capacities.
- PSI was a successful starting up an initiative to encouraging the use of PV energy but it faced some obstacles coming from some DisCos. DisCos have serious concerns on the PSI and the imposed prices of the solar-generated electricity.
- The existing and potential solar power generation stations are relatively new but they would need some technical capacities for O&M in the future.
- DisCos and some stakeholders complain about the possible damage to

the electrical equipment due to the bad quality of the power supply injected from some PV power systems. More accurate grid impact assessments should be performed by professional and experienced people.

- Some interviewed engineers from some DisCos and stakeholders are complaining about the inaccurate and bad quality of some grid impact assessments presented by contractors.
- Even some private RES companies complain from the procedure for licensing the PV power systems and connecting them to the grid. Nonetheless, they have a strong tendency to invest in PV electrification.
- The accurate review of the laws and regulations issued by PNA and PEN-RA indicates significant interest from PNA towards further improvement of RES and EE sectors. This is also noted thanks to the activities carried out by PIPA as well as to projects carried out by PIF through investments in school buildings, rooftops, PSI, and others. The Government has also established a special regulatory framework favourable to investors.
- The selling, installing and maintaining of PV systems is growing and the commercial feasibility in this sector is increasing due to the increased awareness, promotion, investments, and available projects as well as to reducing the cost of the system over the past few years. Unfortunately, this is not true for SWH, even if it is more feasible than PV systems. The percentage of Palestinian homes that use SWH dropped to 57% in 2015 after it was more than 62% in the last decade (before 2010).
- The interviewed private sector RES enterprises showed that most of the PV equipment is purchased from Europe and China. The power electronic components are mostly purchased from Europe, while PV modules are mostly purchased from China. The flat plate SWH systems collectors are sold from Israeli second-hand market or locally manufactured, and some are imported from China. The evacuate tube SWH collectors are mainly imported from China.
- The interviewed stakeholders and private enterprises assured that the lack of subsidized loans for large or small scale facilities is one of the obstacles that further investments in the RES and EE are facing. The pay-back period of PV power stations is not considered an obstacle as it does not exceed 5-6 years.

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