



# Palestinian National Plan 2011-13

Energy Sector Strategy

## **1. Sector Profile**

In Palestine, energy sources consist of (i) the energy generated by petroleum and natural gas derivatives; (ii) electricity; and (iii) renewable energy (including solar power, wind power, and energy generated from burning wood, peat, etc.). With the exception of renewable energy, the Palestinian energy sector is distinctive of scarce sources and inability to fully exploit currently available ones, causing it to largely depend on importation from Israel. The ongoing Israeli occupation and control over borders and crossing point as well as over a vast area of the Palestinian territory have impeded implementation of many plans and programmes developed by national sector bodies.

The energy sector plays a vital role in developing the national economy and providing employment opportunities. Customs and taxes levied from electricity and petroleum purchases provide a significant support to the treasury of the Palestinian National Authority (PNA). These revenues are in consistence with the purchased energy quantities, comprising USD 400-500 per annum over the past five years.

PNA provides financial support to the petroleum and gas sector. Because the Government support the consumer sale price, petroleum and gas pose a burden on the PNA budget. Additionally, Israel deducts a portion of clearance revenues in consideration of electricity purchases from certain local government units and distribution companies (net lending). Between 2004 and April 2009, tax revenues generated from petroleum derivatives and electricity amounted to approximately NIS 9 billion. Over the same reporting period, however, the financial burden incurred by the PNA Treasury was almost NIS 4.6 billion.

## **2. Situation Analysis**

### **Energy generated by gas and petroleum derivatives:**

This source of energy comprises 51% of total consumption in the local market. A major portion of this energy is used as fuel by vehicles, heating and cooling system, workshops, and factories. As the PNA is incapable of importing natural gas, this fuel is used by the Gaza Electricity Generation Plant for electricity production. These derivatives include benzene, diesel, liquefied petroleum gas (cooking and heating gas). This subsector is mainly distinctive of the following:

- Full dependence on Israel as a sole source of importation. According to the Paris Protocol, PNA is entitled to import gas and petroleum derivatives from Egypt and Jordan, provided that they match US and EU standards. Since this is not the case, Israel has been the only source for importing petroleum and gas derivatives to the Palestinian local market.
- This subsector is insecure in light of PNA's inability to diversify importation sources. The Paris Protocol stipulates that imported products should be in line with the US and EU standards approved in Israel – a condition which cannot be met in imports from Egypt and Jordan.

- PNA lacks a local storage capacity. Local market needs are being imported on a semi-daily basis, creating a crises in the distribution system as well as incapability of meeting local demand on gas and petroleum derivatives.

### **Natural gas:**

In 1999, the PNA granted a 25-year licence to British Gaza International Limited to explore natural gas in the Mediterranean Sea off the Gaza coast. In 2000, BG discovered two gas fields in commercial quantities: (i) Gaza Marine, which extends over 22 miles along the Gaza beach; and (ii) Noa South, which is shared with Israel.

Of the field reserve (1,500 billion cubic feet (BCF)), BG expects that approximately 950 BCF would be extracted from the Gaza Marine field. Also, approximately 90 BCF were extracted from the Noa South field out of a reserve of 150 BCF. Nine years after natural gas had been discovered, BG is still unable to market the extracted gas. According to feasibility studies, almost 200 BCF should be extracted on a daily basis so that marketing would be rewarding. In addition, development cost of both fields is estimated at USD 500 million. To develop the fields with the aim of local consumption will not be economically feasible in light of the small domestic market. As the largest consumer of natural gas, average consumption of the Gaza Electricity Generation Plant is 30 million cubic metres a day. Full capacity of the plant is 140 megawatts.

Available marketing options include exporting the natural gas to Egypt and then to international market, or liquefying it in Egypt then exporting it to foreign market. Otherwise, natural gas could be exported through the Arab Gas Pipeline, exported to Israel, and re-exporting a portion thereof to the Gaza Strip and West Bank. Over the past years, BG has conducted several rounds of negotiations with successive Israeli governments to sell gas to Israel. Though Israel is in dire need of gas, not an agreement has been reached. In early 2008, BG announced that all talks with Israel failed because an agreement on the gas price had not been made.

### **Electricity:**

The electricity sector is a significant component of civil and industrial development as well as economic growth. Comprising approximately 31% of the total locally consumed energy, electricity is available from the following sources:

1. Importation from Israel: In 2008, Palestinian dependence on Israel constituted 87.7% of total electricity consumption, including 97.7% in the West Bank and 68.1% in Gaza.
2. Local generation (Gaza Electricity Generation Plant): In 2008, domestic electricity generation comprised 9.7% of local consumption in Palestine (28.7% of Gaza consumption).
3. Importation from neighbouring countries (Egypt and Jordan): In late 2006, the Palestinian Energy Authority (PEA) installed a 22KV medium pressure supply line with a 17MW capacity between the Palestinian Rafah and the Egyptian Rafah cities in order to supply the Palestinian Rafah city with electricity from Egypt. In early 2008, PEA also installed a 33KV medium pressure supply line to supply the Jericho governorate with electricity from Jordan.

In 2008, electricity importation from neighbouring countries represented 2.6% of total Palestinian consumption, including 2.3% in the West Bank and 3.2% in the Gaza Strip.

Electricity sources are presently distinctive of the following features:

- Almost complete dependence on Israel as a source of electricity. Taking into account that it is the only source that supplies the sole Palestinian electricity generation station, Israel controls 97.4% of electricity supply in Palestine.
- The quantity of energy contracted with currently available energy sources, is not sufficient to meet local needs. The Gaza Strip suffers from a deficit of 15% (about 40 megawatts) of the local demand. Supplies are also insufficient to meet the growing demand on electricity. The contracted quantity with Israel is approximately 750 megawatts, with Jordan 20 megawatts, and with Egypt 17 megawatts. Not a further single megawatt can be procured from either Jordan or Egypt because respective distribution lines cannot accommodate any further capacity. Agricultural
- Energy imported from Israel is not regulated by a purchase agreement, but by bilateral contracts between Palestinian local government units and distribution companies on the one hand, and the Israeli Electricity Company on the other.
- Electricity generated by the Gaza Electricity Generation Plant is expensive due to reliance on diesel. Maximum capacity of the plant is not exploited due to insufficient fuel and lacking appropriate infrastructure of transmission networks.

### **Renewable energy:**

In addition to wood, coal and peat, renewable energy is generated by solar power (temperature), used for heating water in residential buildings. Exploitation of renewable energy sources comprises approximately 18% of the total energy consumption in Palestine. Annual growth of the solar power use is almost 1%.

The use of renewable energy, especially solar power, is very low in comparison to available capacities. Of the total energy consumption, only 8% of solar power is used. It should be noted that this percentage have declined over the past years. Furthermore, it has not kept pace with the general growth and expansion of other sectors, nor has it met the demand on energy.

Certain small-scale pilot solar power projects were implemented to generate and supply electricity to outpatient clinics, schools and Bedouin residential areas. These projects also provided electricity to small villages, which were remote from public electricity networks, including Imneizil village in the southern Hebron governorate and 'Atuf village in northern West Bank. Total capacity of solar power projects is close to 50 kilowatts. An initial agreement has been reached between the PNA and Japanese Government to implement a solar call-based electricity generation project with a 300-500 kilowatt capacity to supply the industrial-agricultural zone in the Jericho area.

Currently, PEA is seeking to secure necessary funds to construct a solar powered, 100-megawatt electricity generation station in Jericho. To be built over several stages, the first stage will provide 10-20 megawatts.

With respect to wind power, an electricity generation project is presently being in place at the Al Ahli Hospital in Hebron city. Using a wind turbine, the project produces 700 kilowatts.

Palestine features promising capacities in the potential use of solar, wind and biomass powers. According to relevant studies, solar power annual rate amounts to 5.4 KW/h/m<sup>2</sup>/day – a high rate compared to other countries.

Biomass power generated by burning wood and agricultural waste is restricted to cooking and heating purposes in rural areas and constituted 9% of the total consumed energy in Palestine.

### 3. Vision

“To build an integrated Palestinian national energy system, which will be capable of securing energy from various sources. In addition to securing it, energy will be sufficient to meet local consumption needs as well as comprehensive, sustainable development. All currently available, local energy sources, particularly clean ones, will be exploited. These will be effective, highly qualitative, credible, and consistent with internationally recognised standards and quality requirements for social development and economic growth. To also be in line with environmental requirements, highly technical methods will be employed to secure and supply energy.”

### 4. Policies and Interventions

Policy	Policy Interventions
<b>Strategic Objective (1): Meet and secure energy needs</b>	
1. Diversify energy sources and provide an energy strategic reserve	<ul style="list-style-type: none"> <li>• Build a solar powered electricity generation plant in the West Bank with a capacity of 10 megawatts.</li> <li>• Construct an electricity generation plan in the West Bank with a 200 megawatt capacity.</li> <li>• Construct strategic warehouses and storage facilities of petroleum and gas derivatives in the West Bank and Gaza Strip.</li> <li>• Expand the Gaza Electricity Generation Plant’s capacity by 70 megawatts.</li> <li>• Conclude fair commercial agreements to purchase electricity from neighbouring countries.</li> </ul>

Policy	Policy Interventions
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<b>Strategic Objective (2): Provide sufficient quantities of energy to consumers with technical and environmental standards that meet internationally recognised standards</b>	
1. Develop the transmission and distribution system	<ul style="list-style-type: none"> <li>• Install a connection line with Jordan, including a 161/400 KV and two 33/161 KV transformation stations.</li> <li>• Install a connection line with Egypt, including a 66/220 KV and two 22/66 KV transformation stations.</li> <li>• Build four 33/161 KV transformation stations in the West Bank.</li> <li>• Increase the Gaza Electricity Generation Plant's capacity by 70 megawatts.</li> <li>• Build distribution systems in northern and southern West Bank.</li> <li>• Reorganise and develop the electricity distribution system at the Jerusalem District Electricity Company.</li> <li>• Rehabilitate distribution networks in the West Bank.</li> <li>• Rehabilitate, develop and repair distribution networks in the Gaza Strip.</li> </ul>
2. Apply modern technologies and automate the monitoring and control of the energy transmission and distribution system	<ul style="list-style-type: none"> <li>• Construct the National Control and Monitoring Centre.</li> <li>• Establish a monitoring and control centre at strategic warehouses, distribution centres, and petroleum stations.</li> <li>• Construct laboratories to examine specifications of petroleum derivatives.</li> </ul>
3. Competent use and rationalised consumption of energy	

<b>Strategic Objective (3): Increase the energy sector's economic competence</b>	
1. Deliver natural gas to the Gaza Electricity Generation Plant	<ul style="list-style-type: none"> <li>• Deliver gas to the Gaza Electricity Generation Plant.</li> </ul>
2. Terminate the phenomena of net lending and fuel smuggling from Israel	<ul style="list-style-type: none"> <li>• Provide prepaid metres to distribution companies in the West Bank and Gaza Strip.</li> </ul>

<b>Strategic Objective (4): Establish effective and efficient energy sector bodies</b>	
1. Restructure the energy sector	<ul style="list-style-type: none"> <li>• Develop regulations on the promotion of renewable energy use.</li> <li>• Approve and introduce necessary amendments to the Law on the Public Petroleum Commission.</li> </ul>

## 5. Allocation of Resources and Responsibilities

The table below shows the allocation of resources needed to implement interventions stated in the Major Policy Implementation Force, annexed with the Energy Sector Strategy. Total cost needed to implement major interventions amounts to approximately NIS 3.1 billion.

Policy	Major Interventions	Intervention Cost	Period of Implementation
		NIS '000	
Diversify energy sources and provide an energy strategic reserve	Build a solar powered electricity generation plant in the West Bank with a capacity of 10 megawatts.	200000	2011-12
	Construct an electricity generation plant in the West Bank with a 200 megawatt capacity.	1200000	2011-13
	Construct strategic warehouses and storage facilities of petroleum and gas derivatives in the West Bank and Gaza Strip.	165000	2011-13
	Expand the Gaza Electricity Generation Plant's capacity by 70 megawatts.	400000	2012-13
Develop the transmission and distribution system	Install a connection line with Jordan, including a 161/400 KV and two 33/161 KV transformation stations.	320000	2010-12
	Install a connection line with Egypt, including a 66/220 KV and two 22/66 KV transformation stations.	140000	2010-13
	Build four 33/161 KV transformation stations in the West Bank.	250000	2010
	Increase the Gaza Electricity Generation Plant's capacity by 70 megawatts.	20000	2010-13
	Build distribution systems in northern and southern West Bank.	100000	2011-13
	Reorganise and develop the electricity distribution system at the Jerusalem District Electricity Company.	12000	2011-13
	Rehabilitate distribution networks in the West Bank.	80000	2011-13

	Rehabilitate, develop and repair distribution networks in the Gaza Strip.	48000	2011-13
Apply modern technologies and automate the monitoring and control of the energy transmission and distribution system	Construct the National Control and Monitoring Centre.	32000	2011-13
	Establish a monitoring and control centre at strategic warehouses, distribution centres, and petroleum stations.	20000	2011-13
	Construct laboratories to examine specifications of petroleum derivatives.	20000	2011-13
Deliver natural gas to the	Gaza Electricity Generation Plant.	100000	2011
Terminate the phenomena of net lending and fuel smuggling from Israel	Provide prepaid metres to distribution companies in the West Bank and Gaza Strip.	100000	2010-12

## 6. Expected Results

Although indicators of progress towards achievement of the energy sector objectives and priorities are universal, they have been adapted so as to conform to the real state of affairs of the Palestinian energy sector. These indicators are in line with the national monitoring and evaluation system, developed by the Ministry of Planning and Administrative Development (MoPAD).

The energy sector particularly aims at providing energy sources of all types to all Palestinians at affordable prices. To this avail, PEA is attentive of avoiding a varied supply of energy between residential areas and segments of the society. Energy may not adversely impact citizens' health, but should improve the quality of their lives. To materialise the following objective will be a best indicator on scored achievements:

- Construct an electricity generation plan with a 280 MW capacity in the Gaza Strip in 2013.
- Construct an electricity generation plan with a 200 MW capacity in the West Bank in 2013.
- Construct a solar powered electricity generation plan with a 10-20 MW capacity in the West Bank in 2012.
- Build four 33/161 KV transformation stations in the West Bank in 2013.
- Build four warehouses and storage facilities of petroleum and gas derivatives in the West Bank and Gaza Strip.
- In 2013, complete 100% of installing a 40-km-long 400 KV connection line with Jordan; a 400/161 KV transformation station; tow 33/161 KV transformation stations in order to transmit 800 MW from Jordan.



- In 2012, complete 100% of installing a 55-km-long 220 KV connection line with Egypt; a 220/66 KV transformation station; tow 66/22 KV transformation stations in order to transmit 300 MW from Egypt.
- Terminate the phenomena of net lending.
- Deliver natural gas to the Gaza Electricity Generation Plant in 2011.

## **7. Development Approach**

PEA established a national working team (the Energy Sector Strategy Team), appointed members thereon, and identified its organisational structure, responsibilities, and terms of reference. Leading the Energy Sector Strategy development process, the National Team comprised representatives of respective government bodies, civil society actors, the private sector, and international organisations.

The Energy Sector National Team established three technical teams, each of which addressed an energy subsector, as follows:

1. Electricity Technical Team;
2. Petroleum and Gas Technical Team; and
3. Renewable Energy Technical Team.

The National Team held lengthy meetings for discussion of the Strategy:

- Attended by the PEA Chairman, the first meetings was held on 2 November 2009 for elaboration of the development on the Energy Sector Strategy.
- On 9 November 2009, members on the National Team met to examine achievements made in relation to Situation Analysis. Necessary adjustments were introduced and approved.
- On 12 November 2009, the National Team Leader met with a representative of the General Petroleum Commission for analysis of data pertaining to the Commission. The Head of the Petroleum and Gas Technical Team attended the meeting.
- On 25 November 2009, members on the National Team met for the third time for discussion of the draft vision and strategy objective. Required amendments were introduced and the Technical Team was assigned to take relevant notes.
- In presence of the PEA Chairman, the National Team convened on 5 January 2010 and elaborated on the draft Energy Sector Strategy.