



**M A S**

**Palestine Economic Policy Research Institute (MAS)**

**Background Paper  
Roundtable (8)**

**The socio-economic ramifications of the  
power supply crisis in Gaza Strip<sup>1</sup>**

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<sup>1</sup> *The views expressed here are solely those of the author and do not necessarily represent the views of MAS.*

## 1. Introduction

Generally speaking, Gaza's infrastructure has suffered significantly from a lack of investment affecting key areas such as water, energy and communications network. Basic services are simply unable to keep up with demand (Gaza 10). In addition to the Palestinian political division, other significant factors play primary role in deepening the electricity crisis. Currently, electricity blackouts in Gaza last between 12-18 hours each day, and have sometimes even reached 20 consecutive hours. In the pre-war context prior to the Israeli war on Gaza, Gaza was already suffering from an electricity deficit as a result of fuel scarcity, the net lending problem, inefficient management, inadequate infrastructure, power leakage, limited financial resources and impediments on the sector development caused by the Israeli siege and internal political division (DNA 2014)<sup>2</sup>. Gaza is already unable to meet 50 percent of its electricity demand today. Failure to invest in Gaza's power sector makes an already dire situation even worse.

If no further power options are developed, the extent of the energy deficit would further grow to 63 percent of demand by 2030. To avert this outcome, Gaza needs to develop short, medium and strategic interventions to address the chronic deficit in power supply (World Bank 2017)<sup>3</sup>. Due to electricity crisis, the life in Gaza has become risky, vulnerable, unhealthy, with a poor educational environment, and with high cost paid in most socio-economic aspects (UNDP 2017)<sup>4</sup>.

## 2. Sources of electricity supply in Gaza

Currently there are three sources of electricity supply in Gaza: 27-28 MW imported electricity from two Egyptians feeders lines; 60-65 MW generated by the Gaza Power Plant (GPP); and 120 MW imported electricity from Israel through 10 feeder lines. Thus, the total supply of electric power in the Gaza Strip from the aforementioned three sources is about 212 MW. Consequently, the electricity supply to Gaza since 2013 from all three sources has fluctuated constantly at between 20 to 50 per cent of the estimated demand of 450 (Gisha, 2017, World Bank, 2017)<sup>5</sup>.

### 2.1 GAZA Power Plant (GPP)

The only large scale generation capacity in the Palestine is the troubled Gaza Power Plant. The 140 MW diesel-fired plant was developed as an Independent Power Project and has been operating since 2004 on a 20-year Power Purchase Agreement involving significant take-or-pay capacity charges (World Bank, 2017). Due to the high cost of diesel, the plant is so expensive to operate – costing NIS 1.05-1.65 (US\$ 0.29-0.46) per kilowatt-hour – that it can typically be run only at half capacity. It has also suffered repeated damage during armed conflict affecting its fuel storage capacity (World Bank, 2017).

In June 2006, the Israeli military bombed Gaza's GPP, destroying its six transformers. It took five months for the plant to resume partial production, and today the power plant still can't function at full capacity. Under the blockade, the power plant can't import parts to replace damaged components. Temporary fixes have allowed the plant to function at a minimal level, but those solutions were never made to last, and now—10 years later—Gaza's power system is at risk of collapse.

In April, 2017, GPP was forced to shut down completely after exhausting its fuel reserves and being unable to replenish them due to a shortage of funds. The shutdown occurred in the context of an

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<sup>2</sup> Detailed Needs Assessment (DNA) and Recovery Framework for Gaza Reconstruction, Ministerial Committee for the Reconstruction of Gaza, August, 2015.

<sup>3</sup> World Bank, 2017, Securing Energy for Development in West Bank and Gaza, SUMMARY REPORT

<sup>4</sup> UNDP, 2017, Mohammed Samhouri, Three Years After the 2014 Gaza Hostilities Beyond Survival: Challenges to Economic Recovery and Long Term Development

<sup>5</sup> World Bank, 2017, Securing Energy for Development in West Bank and Gaza, SUMMARY REPORT. Gisha, Maayan Niezna, 2017, Hand on the Switch: Who's responsible for Gaza's infrastructure crisis?

ongoing dispute between Palestinian authorities in Gaza and Ramallah on tax exemption for fuel and revenue collection from electricity consumers<sup>6</sup>. Accordingly, recent months have seen a significant decline in energy supply. The GPP is currently produced 65 MW accounted for 50% of the full capacity and fueled by industrial diesel obtained from Egypt at lower prices than Israel (Gisha, 2017, World Bank, 2017).

## 2.2 Egyptian feeder Lines

Egyptian power is currently cheaper than Israeli power due to the historic low cost of natural gas, while the capacity of its power system is about 30 times Palestinian demand making it relatively easy for Egypt to supply the scale of power that Palestine might need. Nevertheless, historical imports from Egypt into Gaza (which have been managed through the local Egyptian distribution company rather than the national Egyptian transmission operator) have proved unreliable due to security issues in Sinai. In addition, Gaza has not yet established any payment record with Egypt since the cost of these imports has been covered by third party benefactors (World Bank, 2017).

There are two feeder lines from Egypt with full capacity of 28 MW. However, the two Feeders supply Rafah governorate with real capacity about 17 MW through two 22kV feeding lines: one line has a capacity of 5 MW the other line has a capacity of 12 MW. The Egyptian electricity is restricted to feed Rafah Governorate according to the agreement which constitutes of 6 to 9% of the total Power supply to Gaza Strip. However, the power supply from Egypt is regularly interrupted due to maintenance issues. According to the Gaza Electricity Distribution Company (GEDCO), the Egyptian lines were completely down for an average of six days per month during 2016. The Egyptian energy supply is paid through a deduction of Egypt's contribution to the PA fund to the League of Arab States (Gaza 10 Years). The electricity supply from Egypt came to a halt on 24 April due to technical malfunctioning. In July and August, 2017, the Egyptians lines were completely down due to the maintenance issues.

## 2.3 Israeli Feeder Lines

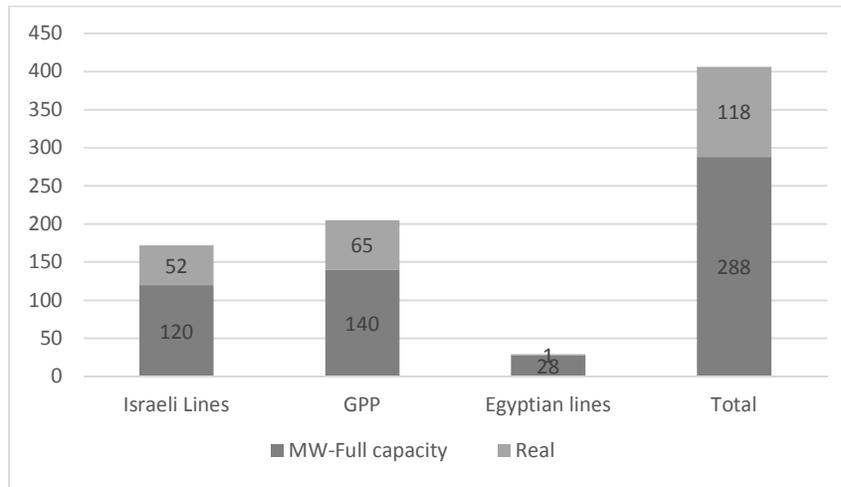
There are ten feeder lines from Israel with capacity of 120 MW with a maximum power of 12 MW for each feeder lines provided by the Israeli Electricity Company (IEC). Israeli lines were cut on at least one of the 10 lines for three to four days per month. In June 2017, Israel began reducing its electricity feed to the Gaza Strip, deepening an energy crisis, after the Palestinian Authority limited how much it pays for power supply due to the dispute over tax issues with authorities in Gaza. As a result, Gaza's energy supply was reduced and daily blackouts reached 20 hours per day. The PA decided to reduce its payments by 25% for electricity supplied from Israel to the Gaza Strip. At the time of writing, Israeli supply has also been reduced to around 80MW, following the PA's decision to reduce payments for Israeli supplied electricity. This reduction has partially been offset by the import of Egyptian fuel, enabling the GPP to produce some 55MW. Thus the total supply again is up at 127MW .

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<sup>6</sup> OCHA, 2017, Gaza plunges into darkness: Severe deterioration in the energy situation

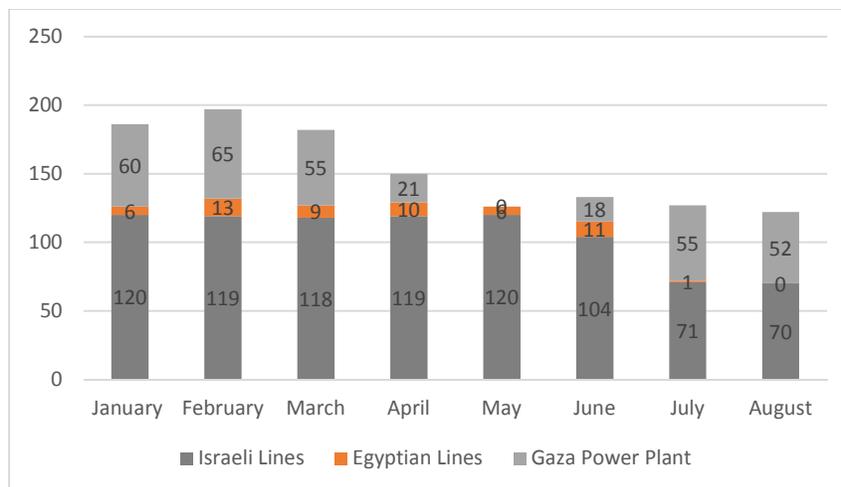


**Figure 1. Full Capacity Vs current situation-2017**



OCHA, 2017

**Figure 2. Electricity supply per month (average megawatts)**



OCHA, 2017

### 3. Supply Vs Demand

Based on population growth, a conservative projection will see the demand for energy increase to 550MW by 2020. However, in a more optimistic scenario, the next few years would see the completion of a number of critical water and wastewater facilities as a well further progress in Gaza’s economic recovery. In this scenario, the energy demand would increase to 850MW (UNRWA, 2017)<sup>7</sup>.

Projecting future supply is much more difficult. Several key projects, which have been in the pipeline for years, including the establishment of a 161Kv line from Israel and conversion of the GPP to natural gas, are moving forward, albeit slowly. Seeing these projects reach fruition also requires agreement on, inter alia, new arrangements for revenue collection, payment and management,

<sup>7</sup> UN, 2017, Gaza Ten Years later United Nations Country Team in the occupied Palestinian territory 2017

project financing and import permits given much of the equipment required is considered ‘dual use’ by the Israeli Defense Ministry.

Table 1 shows that electricity supply is expected not to change in the future as the political horizon is not clear. In contrast, electricity demand is increasing over time, hence the deficit as well as the percentage of supply to demand will be around 30% and 40%, respectively in 2017.

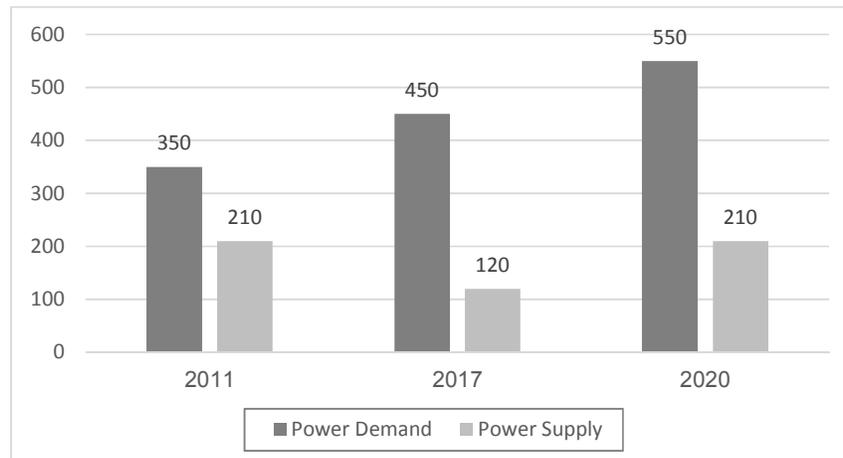
**Table 1. Electricity Supply to Gaza by Source**

Indicator	2012	2017	2020 (projection)
Electricity Supply	210 MW	120-142 MW	210-360MW
Electricity demand	350 MW	450 MW	550 -850
Deficit	140	330-308	340-490
Supply/Demand	60%	30%	40%

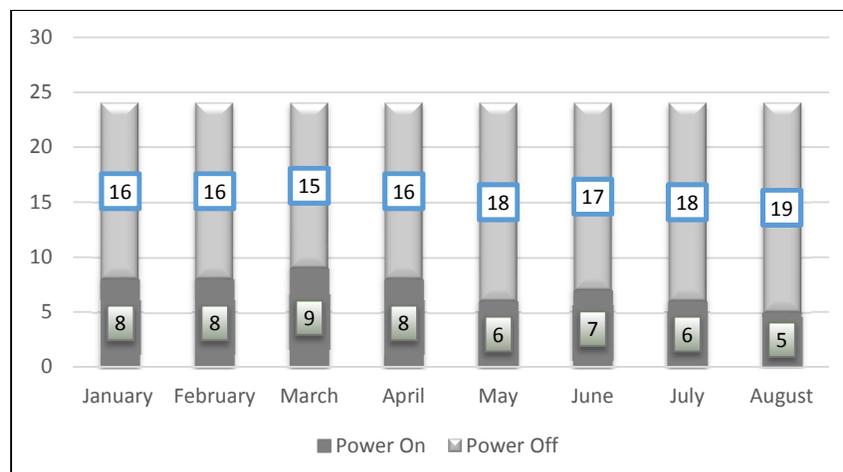
Source: Based on OCHA, UNRWA, 2017

Figure 3 shows the gap between the power supply and power demand. Figure 4 shows that daily blackouts peaked at 19 hours a day in August 2017, with a monthly average of 17 hours daily.

**Figure 3. Power Supply Vs Power Demand**



**Figure 4. Availability of electricity per month (average hours per day 2017)**



Source: OCHA, 2017

#### 4. Causes of electricity shortages:

The power supply from different sources has never reached to the full capacity to many reasons including bombing by air force of Israel, net lending inefficient networks, shortage in fuel and spare parts, management and coordination, and funding difficulties.

**Bombing By Israel:** In 2006, Israel bombed the power plant, destroying six of its transformers and its fuel reservoir. Even after repairs, the plant today is capable of producing 60 to 80 megawatts at most if the fuel is available. In the war of 2014, fuel tanks were damaged in an Israeli air strike and one reservoir has not been repaired due to difficulties bringing in the required equipment. Power lines have been destroyed at different times, and the difficulty involved in repairing them under fire has resulted in supply disruptions

**Restriction on the flow of fuel:** The operation of the GPP is hindered by restrictions on the flow of diesel from Israel to Gaza, which is needed for running it (about 350- 360,000 liters of diesel are required daily for the plant to run at this capacity), and restrictions on the entry of equipment and parts. The relay network itself is extremely difficult to repair and maintain, due to a shortage of equipment, which Israel either bars from entry, or subjects to special permits that take a long time to obtain. In 2007, Israel decided to reduce both the supply of electricity and the supply of fuel. Israel also apply significant restrictions on international organization such as UN<sup>8</sup> to halt the activities of repair and the flow of spare parts, equipment, pipe lines, cables, etc.

**Funding difficulties and low collection rate:** the most significant reasons for the shortage in fuel for the power plant are funding difficulties, a long and intricate history of disagreements between the Palestinian Energy Authority in the Gaza Strip and in Ramallah over the rate of excise taxes. The excise tax is 116 percent of the original price of the fuel (in other words, consumers pay more than double the base price), and it is collected by Israel and transferred to the Palestinian Authority. The decrease in the level of coordination between authorities in the West Bank and Gaza contributed greatly to reduce the chances and conditions for the continuation of the European grant. Since November 2013, humanitarian agencies and donors have spent over US\$ 11 million in emergency fuel support to critical service providers (OCHA, 2015).

**Other causes for freezing the grant from European Union were:** the poor performance of local authorities and of GEDC in collecting electricity fees from subscribers and insufficient collected fees to pay the costs of electricity production. Despite the improved performance of the Company in collecting the bills in the last years, the Company's willingness to contribute in covering the cost of fuel imported from Israel has not improved to the same degree (Mas, 2013).

According to GEDC, Gaza experiences low collection rates on electricity bills with around 40 percent as many households claim inability to pay electricity bills. Recent statistics shows that nearly 70% of households do not pay their electricity bills due to their inability to afford them or due to lack of enforcement (OCHA, 2015). In addition, the inability to automatically collect payment from tens of thousands of people who aren't receiving paychecks, widespread exemptions from payment for electricity, electrical power piracy, deficient enforcement and high taxation on fuel all pose drains on household resources (MAS, 2013)<sup>9</sup>.

**Net Lending, Management and coordination difficulties:** The poor track record of paying Israeli power import bills has led to the so-called 'net lending' crisis and a high accumulation of outstanding debt. Since power purchased from IEC is only partially paid for by the companies which purchase and receive the power, the unpaid portion is then partially covered through 'net lending' (a fiscal mechanism whereby money is deducted from clearance revenues that would otherwise be transferred

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<sup>8</sup> UN,2010, Gaza's electricity crisis: the impact of electricity cuts on the humanitarian situation

<sup>9</sup> Mas, 2013, Electricity Crisis in Gaza: Causes, Consequences and Treatments, Round Table 10.

from Israel to the PA) and partially accumulated as outstanding debt. In 2015, the Israeli Minister of Finance deducted over NIS 1 billion (US\$ 275 million) from the PA's clearance revenues <sup>10</sup>.

The net lending caused by the electricity sector drains around 13 percent of Government's revenues. A recent World Bank report examines the factors that deter the systematic payments, including the lack of institutionalized and transparent invoicing by the IEC, as well as the high interest rates for late payments set unilaterally by the Israeli regulator. The World Bank concluded that a lack of transparency, weak governance, poor sector performance and political factors are among its key drivers.

Table 2 below outlines the main actors involved in management the supply of energy.

**Table 2. Institutions involved in Gaza electricity supply**

<b>Company / Authority</b>	<b>Responsibility</b>	<b>Management</b>
The Gaza Electricity Distribution Company (GEDCo),	Distributing electricity supplied by different sources. Maintenance of and improvements to infrastructure.	Based on Gaza: Its board is composed of mayors
The Gaza Power Plant (GPP),	Producing Energy in Gaza Strip	It is private institution belong PEC and following the instructions of the PA Government in Ramallah.
The Palestine Energy and Natural Resources Authority (PENRA) in Gaza	Supervision and monitoring the production, import, storage, transport, distribution and sale of energy, including supplies purchased from Israel. Establishes technical criteria for energy and undertakes research and development on renewable energy.	Public institution working separately in Ramallah and Gaza Strip
The Palestinian Energy Regulation Council PERC	Regulation of all matters related to electricity production, transmission, distribution and consumption, un a manner that ensures its availability, and continuity in meeting all types of use at appropriate prices, while protecting the environment and the interests of electricity consumers, producers and distributors.	Based in Ramallah, with a Board comprising a Chair and six members with professional competence, representatives of the public and private sectors, appointed by the President on nomination by the Prime Minister.
The Palestinian Fuel Authority in Ramallah,	Responsible for supplying gasoline, petrol by-products and cooking gas. The authority also coordinates between Israeli fuel suppliers and companies that sell fuel to the Palestinian market.	It is public institution belonging the PA Government in Ramallah

Inefficient network and theft: the distribution network in Gaza is inefficient, with total losses estimated at 30 percent. This means that 25 percent of the power injected into the grid is lost due to an old and damaged distribution network, with an additional 5 percent loss due to electricity theft. Upgrading the existing distribution network would substantially improve and increase power delivery and potentially increase electricity bill collection rate (OCHA, 2017).

Other reasons, include:

<sup>10</sup> OCHA, 2015, The humanitarian impact of Gaza's electricity and fuel crisis, Fact sheet.

- Despite important efforts by the regulator, PERC, electricity is not priced at cost recovery levels throughout the occupied territory. The gap between tariffs and costs is particularly large in the case of Gaza (World Bank 2017).
- While the operational performance of the distribution utilities has been improving, they are still only able to recover revenue for 50% of electricity purchases in Gaza Strip
- Even when revenues are collected, they are sometimes diverted by municipal governments to cover other expenditures than the purchase of power.

## **5. The ramifications of the energy crisis for socio-economic fabric**

### **5.1 Social impact**

- Cost of living: The substantial shortfall in electricity power supply over the past eight years has dramatically undermined the livelihood and living conditions of the population in Gaza and impacted the delivery of water supply, the management of wastewater and operation of the health and education services (Gisha, 2017).
- To mitigate the daily hardship of living for prolonged hours without electricity, especially during evening blackouts, those who can afford to do so buy mobile back-up generators. People have been killed and injured due to reliance on mobile back-up generators (UN, 2010, OCHA, 2017, Gisha, 2017). These generators, which are imported largely through the tunnels under Gaza's border with Egypt, can be unsafe when used incorrectly. According to the human rights organization Al Mezan, between 2010 and mid-2016, 29 people died in accidents that occurred as a result of the electricity shortage.
- Families in Gaza are forced to spend a large part of their income on energy, whether the meager supply of electricity they receive through high voltage lines, or on the cost of fuel, generators and their repair.
- Noise pollution: one constant in Gaza is the persistent noise made by generators – both domestic and industrial, large and small – that are employed throughout the Strip to power homes, businesses, schools and hospitals in the absence of consistent electricity supply Gisha (2017). Generators are noisy, emit pollution and reek of gas. Service providers and private households have resorted to back-up generators, which are unreliable due to their dependence on unaffordable fuel and spare parts. Private mobile generators can be particularly unsafe, environmentally polluting, and are not affordable by the poorest (OCHA, 2015).
- Constant fluctuations in power supply have resulted in the malfunctioning of sensitive medical equipment including ultrasound, X-ray, laboratory machines, cardiac monitors, sterilizing machines and infants' incubators. According to the WHO, 200 critical medical machines and equipment are currently out of order and awaiting repair in Gaza. These items are necessary for critical departments such as hemodialysis units and ICU. The lack of a proper maintenance system (sterilization services) also reduces the life span of the existing medical equipment.
- The cost of health services : waiting time for some types of elective surgery at Gaza's largest hospital (Shifa) extending up to 18 months (WHO).
- Fuel storage and generator capacity varies greatly between health facilities. For example, Shifa Hospital, which is the main hospital in the Gaza Strip, consumes around 650 litres per hour but has the capacity to store 135,000 litres of fuel. Five of the 14 Ministry of Health (MoH) hospitals in Gaza were provided with double electricity lines by GEDCO, and some critical departments such as intensive care, kidney dialysis and neonatal care units are supplied with solar-based energy sources that may sustain services for few hours. Nevertheless, dependency on generators is critical to hospitals (OCHA, 2017)
- According to the World Health Organization (WHO), without fuel to run generators, 40 surgical operation theatres, 11 obstetric operation theatres, 5 haemodialysis centres and hospital emergency departments serving almost 4,000 patients daily will be forced to halt critical services. Refrigeration for blood and vaccine storage will also be at risk (OCHA, 2017).

- To cope with the crisis, hospitals are working at minimal capacity and postponing elective surgeries; discharging patients prematurely after surgery; cancelling and reducing sterilization and cleaning services; and increasing referrals of patients outside of Gaza, particularly for chronic illnesses.
- Untreated sewage gets discharged into the sea, and without the ability to use pumps, water supply is also affected. Up to 90 million litres of partially treated sewage are being discharged into the Mediterranean Sea every day, partially due to electricity and fuel shortages (WASH cluster).
- Wastewater plants also have shortened treatment cycles and 120 million litres of untreated sewage are discharged into the Mediterranean Sea every day. Additionally, there is a constant risk of the backflow of sewage onto streets if sewage pump stations fail. Wastewater treatment plants have also shortened treatment cycles, thus increasing the pollution level of partially treated sewage discharged into the sea.
- Fuel shortages to run vehicles have forced municipalities to significantly reduce refuse collection, which generates additional public health hazards.
- Availability of water: the insufficient supply of electricity and fuel to operate water pumps and wells has caused a further reduction in the availability of running water in most households. This has increased people’s reliance on private, uncontrolled water suppliers and lowered hygiene standards. More than 70% of households in Gaza are being supplied with piped water for 6-8 hours only once every two to four days, due to insufficient power supply (WASH cluster).
- Household appliances like refrigerators or washing machines cannot be used, not to mention air conditioning in summer or heating in winter (OCHA, 2015)
- Baking is not possible without ovens. Fresh food is hard to sell without refrigerators.
- Crops cannot be irrigated without water pumps, and fishing boats are difficult to sail without fuel.
- Power cuts negatively affect the educational environment, both at school and at home. Studying in darkened classrooms affects students’ ability to concentrate as does the noise, smoke and smell of generators. Such impacts influenced the educational system in Gaza through affecting the work of the equipment and computers that rely on electricity, which eventually affects the ability of students to access the school.

## 5.2 Economic impacts

Many national and international institutions (OCHA 2017, UN 2017, MAS 2013, Palthink<sup>11</sup> 2014, Gisha, 2017, document the impact of power supply crisis on the aspects of socio-economic life as follows:

- Many of the Gaza workshops, factories and economic establishments have completely or partially stopped their businesses as a result of the constant interruptions of electricity. The industrial and agricultural sectors, including food production, are also harmed due to energy deficiencies.
- Owners of factories and service providers claim that the insufficient power supply make them to reduce the number of employees, the number of working days, and the number of hours. They also show that their business life is interrupted due to the unexpected and unpredictable of blackout as they have to arrange their business accordingly.
- Businesspersons lost many business opportunities due to the shortage in power supply as it cost them more and they cannot afford the additional cost.
- Commercial and services providers in Gaza reported a 30% surge in production costs due to disruptions in the supply of electricity.
- Supermarkets and factories are suffering from the poor conditions of storage, as they need regular, predictable power supply.

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<sup>11</sup> Palthink, 2014, Policy Paper: “The Exacerbating Electricity Crisis in Gaza and Urgency of Finding Strategic Solutions”.

- Industrial companies report that their costs are 150% more due to the instability in the power supply, which causes damage to products during processing and to machines.
- The lack of refrigeration causes significant damage to crops, in addition to an increase in the cost of production.
- The interruption in the irrigation of crops delays flowers and fruit from ripening, resulting in a decreased ratio of yield compared to input.
- Similarly, fodder production is interrupted, and the yield of egg production and output of dairy farms reduced, as adequate lighting cannot be provided for laying hens and power cuts interrupt the functioning of milk machines. Power cuts are also a major threat to aquaculture farms, since the pumps needed to filter or oxygenate the water are affected (UN, 2010).

## 6. Recommendations

**Political issues:** It is essential above all to de-link the basic human right of access to electricity from the Palestinian political division, as well as the conflict with Israel, and to introduce a set of sustainable solutions that can ultimately pave the road from short-term reconstruction and recovery to long-term growth and development.

**Trade-off among options:** The key energy policy issue for Gaza is where to strike the balance between Israeli imports and domestic gas-fired power generation, while intensively developing solar rooftop PV. Israeli electricity imports continue to be a valid option for future power supply, but would call for a significant scale-up of interconnection capacity (World Bank, 2017).

**Full Tax exemption:** A document issued by the Palestinian Energy and Natural Resources Authority (PENRA) suggests giving full tax exemption to fuel transferred to the power plant.

**Funding power supply:** PENRA also suggests funneling some donor funding and reconstruction grants towards the electricity sector, including for the purpose of purchasing tax free fuel, repairing infrastructure and making necessary modifications in the distribution system required for coping with higher demand.

**Collection rate:** It is important to continue to improve collection and reduction in exemptions given to institutions and organizations, which would increase revenue. PENRA also recommends signing an agreement with Israel to ensure access and safe travel by technicians to locations where they are needed (Gisha 2017). Despite the urgency of reducing electricity theft and improving collection of electricity bills in the provinces of Gaza, introducing pre-payment technologies (Palthink, 2014)<sup>12</sup> need to be carefully considered in terms of their potential impact on the poorest households.

**Budget allocations:** PENRA suggests allocating more of the Gaza reconstruction budget to repairing and expanding the electricity grid and the distribution network, together with increasing supply from Egypt and Israel.

**Line 161:** It is recommended to complete the “Line 161” project, which is intended to supply 100 megawatts of power from Israel.

**Solar Energy:** Investment in solar energy, requires lifting restrictions on the entry of necessary equipment to Gaza, tax exemptions for such equipment, and encouraging residents and institutions to use available solar energy. The Gaza predicament poses an ideal terrain for pursuing an aggressive program to promote the uptake of rooftop solar PV.

**Connect Gaza with the eight-power grid:** Connect Gaza to an electric interconnection project, through Egypt, for a 600-megawatt supply (a proposed power grid that would include Jordan, Syria, Libya, Egypt, Iraq, Turkey, Lebanon and Palestine).

<sup>12</sup> Palthink, 2014, *Policy Paper: “The Exacerbating Electricity Crisis in Gaza and Urgency of Finding Strategic Solutions”*

Conversion of the GPP to natural gas: Connect Gaza's power plant to a natural gas source, either in Israel or in Egypt, would reduce the cost of electricity production in the Strip and ensure the constant operation of the power plant. Thanks to major gas discoveries in the Eastern Mediterranean, it would be feasible in the medium term to import gas for gas-fired power generation, though the infrastructure needed to support such import remains to be established.

Strategic expansion and intervention: Based on population growth, a conservative projection will see the demand for energy increase to 550MW by 2020. However, in a more optimistic scenario, the next few years would see the completion of a number of critical water and wastewater facilities as a well further progress in Gaza's economic recovery. In this scenario, the energy demand would increase to 850MW. Therefore, upgrading the network, facilitating/easing of fuel entry and diversifying fuel sources, increasing the capacity of existing lines and installing additional power lines were already critical measures needed in order to meet current power demands. It is also recommended to complete the domestic transmission backbone in Gaza, and improve the enabling environment for independent power projects.

Apply efficiency measures: Measures to improve energy efficiency can also make a valuable contribution to energy security going forward. Investments to improve energy efficiency are proven to be much more cost-effective than expanding power generation capacity. Specifically, many of the measures included in the Government's plans cost between US\$0.01- 0.05 per kilowatt-hour, while new generation would cost at least US\$0.10 per kilowatt-hour.

Transmission infrastructure: As domestic Palestinian generation capacity expands, transmission infrastructure will also need to develop. In Gaza, this will call for a strengthening of the transmission backbone within a compact urban area.

Restructure Tariff: From a financial standpoint, it is important to consider the tariff implications of the preferred investment plan and whether it is affordable to the population in particular for the poorest people.

Institutional Reforms and Investment Plan: Build a transparent governance relationship among the key players of power supply management. From a technical standpoint, the different energy supply options need to be sequenced and packaged into an investment plan that reliably meets electricity demand.

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